DOGGER BANK D
WIND FARM

Artificial Nesting Structure Compensation Measure

Preliminary Environmental Information Report

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C	Commitments Register
D	Scoping Rationale

Glossary

Term	Definition
Areas of Search	Broad geographical areas considered during the site selection process for the project infrastructure.
Artificial Nesting Structure	A structure designed to provide safe and secure large scale nesting compartments for targeted by design bird species, in this case kittiwake.
Associated Development	Associated Development is infrastructure that supports the development or operation of the principal development (the Project) or improve its sustainability given wider development or environmental needs. This supportive function extends to the mitigation (and compensation) of impacts of the development or operation of the principal development.
Automatic Identification System	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status, e.g. under power. Most commercial vessels and United Kingdom / European Union fishing vessels over 15m length are required to carry Automatic Identification System.
Baseline	The existing conditions as represented by the latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of the Project.
Commitment	Refers to any embedded and additional mitigation, enhancement or monitoring measures identified through the Environmental Impact Assessment process and any commitments outside the Environmental Impact Assessment process. All commitments adopted by the Project are provided in **Appendix C Commitments Register.**
Design	All of the decisions that shape a development throughout its design and pre-construction, construction / commissioning, operation and, where relevant, decommissioning phases.
Design Commitments	Design commitments include: • Measures that form an inherent part of the development design evolution such as modifications to the location or design of the development made during the pre-application phase; and • Measures that will occur regardless of the Environmental Impact Assessment process as they are imposed by other existing legislative requirements or are considered as standard or best practice to manage commonly occurring environmental impacts. All design commitments adopted for the development are provided in **Appendix C Commitments Register**.
Development Consent Order	A consent required under Section 37 of the Planning Act 2008 to authorise the development of a Nationally Significant Infrastructure Project, which is granted by the relevant Secretary of State following an application to the Planning Inspectorate.
Dogger Bank D Wind Farm	The Dogger Bank D Wind Farm Project including the generation infrastructure and three potential Electrical Connection Opportunities to utilise the energy produced.
Effect	An effect is the consequence of an impact when considered in combination with the receptor's sensitivity / value / importance, defined in terms of significance.
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, which sets out the Environment Impact Assessment process for assessing the likely significant effects of a project on the environment.
Environmental Impact Assessment	A process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information and includes the publication of an Environmental Statement.
Environmental Statement	A document reporting the findings of the Environmental Impact Assessment which describes the measures proposed to mitigate any likely significant effects.
Evidence Plan Process	A voluntary consultation process with technical stakeholders which includes a Steering Group and Expert Topic Group meetings to encourage upfront agreement on the nature, volume, and range of supporting evidence required to inform the Environmental Impact Assessment and Habitats Regulations Assessment process.
Expert Topic Group	A forum for targeted technical engagement with relevant stakeholders through the Evidence Plan Process.
Geoarchaeology	The application of earth science principles and techniques to the understanding of the archaeological record. Includes the study of soils and sediments and of natural physical processes that affect archaeological sites such as geomorphology, the formation of sites through geological processes and the effects on buried sites and artefacts.
Greenhouse Gases	Gases such as carbon dioxide and methane that absorb infrared radiation and trap heat in the atmosphere, an increase of which due to human activity has led to climate change.
Historic Seascape Character	The attributes that contribute to the formation of the historic character of the seascape.
Impact	A change resulting from an activity associated with the Project, defined in terms of magnitude.
Marine Guidance Note	A system of guidance notes issued by the Maritime and Coastguard Agency, which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Marine Archaeology	The remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities.
Mean High Water Springs	The highest level reached by the sea at high tide during mean high water spiring tide, which is determined by averaging throughout the year, the heights of two successive high waters during a 24-hour period in each month when the range of the tide is at its greatest.

Term	Definition
Mitigation	Any action or process designed to avoid, prevent, reduce or, if possible, offset potentially significant adverse effects of a development. All mitigation measures adopted for the development are provided in the Commitments Register.
Mitigation Hierarchy	A systematic approach to guide decision-making and prioritise mitigation design. The hierarchy comprises four stages in order of preference and effectiveness: avoid, prevent, reduce and offset.
Monitoring	Measures to ensure the systematic and ongoing collection, analysis and evaluation of data related to the implementation and performance of a development. Monitoring can be undertaken to monitor conditions in the future to verify any environmental effects identified by the Environmental Impact Assessment, the effectiveness of mitigation or enhancement measures or ensure remedial action are taken should adverse effects above a set threshold occur.
Project Design Envelope	A range of design parameters defined where appropriate to enable the identification and assessment of likely significant effects arising from a project's worst-case scenario. The Project Design Envelope incorporates flexibility and addresses uncertainty in the Development Consent Order application and will be further refined during the Environmental Impact Assessment process.
Safety Zones	A statutory, temporary marine zone demarcated for safety purposes around a possibly hazardous offshore installation or works / construction area.
Scour Protection	Protective materials used to avoid sediment erosion from the base of the foundation due to water flow.
Study Area	A geographical area and / or temporal limit defined for each Environmental Impact Assessment topic to identify sensitive receptors and assess the relevant likely significant effects.
The Applicant	SSE Renewables and Equinor acting through 'Doggerbank Offshore Wind Farm Project 4 Projco Limited'.
The Project	Dogger Bank D (DBD) Offshore Wind Farm Project, also referred to as DBD in this document.
Topside	The section of the offshore Artificial Nesting Structure on which the nesting ledges will be situated.
Wind Turbines	Power generating devices located within the DBD Array Area that convert kinetic energy from wind into electricity.
Worst Case Scenario	The worst Case scenario will be based on considerations of the maximum parameters of infrastructure requirements.
Zone Of Influence	A precautionary buffer used to screen in potential effects which could occur to European designated site habitats and any functionally linked land which indirectly supports qualifying features of sites. This may vary depending on the qualifying feature of focus.

1. Introduction

1.1. Project Background

1. The proposed Dogger Bank D Offshore Wind Farm (hereafter 'the Project' or 'DBD') is the fourth phase of the Dogger Bank Wind Farm. The Project will be capable of exporting up to 1.5GW of renewable electricity, thereby supporting the decarbonisation of the UK energy system as well as contributing to UK energy security.

2. The Project's offshore Array Area is located within the Dogger Bank region of the southern North Sea, approximately 210km from the Yorkshire coast at its closest point. The Array Area comprises wind turbines connected to an offshore platform by subsea inter-array cables. Electricity generated offshore will be transmitted to shore via offshore export cables, which will make landfall to the south-east of Skipsea in East Riding of Yorkshire.

3. SSE Renewables and Equinor (acting through 'Doggerbank Offshore Wind Farm Project 4 Projco Limited') submitted the Preliminary Environmental Impact Report (PEIR) for the main development in June 2025[1](*main development is defined as all offshore and onshore infrastructure required to develop the electricity generating station and transmission of electricity to the National Grid*). Further detail on the main development is provided in **Chapter 4 Project Description** (Dogger Bank D, 2025a) of the PEIR.

1.2. Purpose of this Document

4. This PEIR is now submitted pursuant to Section 42 of the Planning Act 2008 in relation to an offshore Artificial Nesting Structure (ANS) for the Project. An ANS is a purpose-built structure installed at sea and fixed to the seabed, designed to provide optimal nesting spaces for seabirds (specifically kittiwake (*Rissa tridactlya)*) that may be impacted by offshore wind farm development.

5. As part of the Habitats Regulations Assessment (HRA), a **Report to Inform Appropriate Assessment (RIAA)** (Dogger Bank D, 2025b) was prepared to assess the Project's potential effects on relevant European sites. The **RIAA (Part 1 of 3)**, submitted alongside the PEIR, concluded that a potential Adverse Effect on Integrity (AEoI) on the Flamborough and Filey Coast (FFC) Special Protection Area (SPA) cannot be ruled out as a result of predicted collision mortality of kittiwake when considered in-combination with other offshore wind farms. To support a potential derogation case, a **Kittiwake Compensation Roadmap and Evidence** document (Dogger Bank D, 2025c) was also submitted with the PEIR, setting out a plan to secure the necessary compensation measures (ANS for kittiwake).

6. It is anticipated that the Project will fully assess the impact of ANS within the application for the Development Consent Order (DCO), with the ANS falling under the definition of Associated Development. This will likely be within a separate ANS-specific Environmental Statement (ES) within the application. As the PEIR for the main development did not include the environmental impacts of the ANS, this PEIR sets out a preliminary assessment for the ANS. The Project is seeking consultation responses on this document to confirm that the approach taken is both appropriate and proportionate to the scale of the proposed ANS development.

[1] All documents submitted with the PEIR can be found within the following: https://community.engage.stantec.com/doggerbank-staging/peir.html#/

2. Legislative Background

7. This section describes the background legislation that underpins the approach that DBD is proposing in order to consent the ANS as part of the main development.

2.1. National Legislation

8. The Planning Act 2008 established the legal framework for the application, examination and determination of Nationally Significant Infrastructure Projects (NSIP). DBD is defined as a NSIP as it contains an offshore generating station with an expected capacity greater than 100MW. The proposed ANS is intended to be consented as Associated Development. Associated Development is considered to be any physical development that is directly linked to the main NSIP, helping to either construct or operate or address its impacts, and is approved within the same DCO application. Specific guidance on Associated Development is provided in relation to the Planning Act 2008 and is summarised in **Section 2.2**. Section 42 of the Planning Act 2008 specifically outlines the duty of applicants to consult during the pre-application stage of a proposed NSIP.

9. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires potentially significant environmental impacts of a NSIP to be considered in the decision-making process. The regulations outline the process for environmental information provision to enable the Environmental Impact Assessment (EIA) process, namely an EIA to be carried out in support of an application for consent. The main DBD development is classified as Schedule 1 under the regulations, and as such the entire project including Associated Development must undergo EIA.

2.1.1. Habitats Regulations

10. In England and Wales, the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and elements of Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) are implemented under (i) the Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations') onshore and up to 12 nautical miles (nm) offshore and (ii) the Conservation of Offshore Marine Habitats and Species Regulations 2017 between 12nm and 200nm offshore.

11. Under Regulation 63 of 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 Network site and is not directly connected with or necessary for the management of the site. The National Site Network includes existing and newly designated Special Areas of Conservation (SAC) and SPA.

12. The proposed ANS has not been considered as part of the main development's HRA, because its potential impacts are site-specific and spatially discrete from the main development. A separate Draft Report to Inform Appropriate Assessment (RIAA) has been prepared (see **Appendix A**), which includes a screening process of designated sites relevant to each AoS.

2.1.2. Marine and Coastal Access Act

13. The Marine and Coastal Access Act 2009 (MCAA) established the introduction of Marine Conservation Zones (MCZ) and governs their protection. Sections 125 and 126 of the MCAA places specific duties on the MMO and the Secretary of State relating to DCO decision-making. Section 126 applies where:

(a) A public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and

(b) The act is capable of affecting (other than insignificantly):

(i) The protected features of an MCZ.

(ii) Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

14. Natural England has responsibility under the MCAA to give advice on how to further the conservation objectives for the MCZ, identify the activities that are capable of affecting the designated features and the processes which they are dependent upon.

15. In line with the HRA process, a separate Marine Conservation Zone Assessment (MCZA) Screening Report has been prepared (see **Appendix B MCZA Screening Report**). Based on the outcomes of the MCZA Screening it is not anticipated that a MCZ Stage 1 or 2 Assessment will be required.

2.2. Policy and Guidance

2.2.1. Guidance on Associated Development

16. The Department for Communities and Local Government issued a guidance note on Associated Development applications for major infrastructure projects (DCLG, 2013). The guidance states that it is for applicants to decide whether to include something that could be considered as Associated Development in an application or whether to seek consent via other routes. Applicants are encouraged, as far as is possible, to make a single application where developments are clearly linked. It is also noted that the impacts of all relevant development must be assessed, including any Associated Development, and the applicant should ensure there is sufficient information to satisfy relevant European environmental requirements, principally under the Habitats Directive.

2.2.2. NSIP Advice Notes

17. Several advice notes published by the Planning Inspectorate (PINS) are relevant to the ANS environmental assessment and have been used to inform its preparation. These advice notes provide information in relation to the Planning Act 2008 and the EIA process. Advice notes of relevance to this document are:

- Nationally Significant Infrastructure Projects: Advice on the Preparation and Submission of Application Documents (July 2025);
- Nationally Significant Infrastructure Projects: Advice on working with public bodies in the infrastructure planning process (March 2025);
- Nationally Significant Infrastructure Projects: Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements (March 2025); and
- Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessments (March 2025).

3. Site Selection Process

3.1. Site Selection Process Overview

18. A site selection process for the ANS has been undertaken, and is being continuously refined, in order identify suitable locations for the ANS to compensate for potential impacts on the kittiwake feature of the FFC SPA. A structured and iterative approach has been used to identify and refine Areas of Search (AoS) suitable for the ANS. The site selection process is informed by a combination of ecological, technical, logistical, and regulatory considerations, to ensure that all shortlisted sites support project objectives while minimising environmental, construction and operational risks. Each site selection stage is described in the following sections.

19. As part of the site selection process, a review was carried out on the AoS shortlisted in the Round 4 Kittiwake Strategic Compensation Plan (KSCP: The Crown Estate, 2024). This review identified that some constraints used in the previous work to exclude areas were not genuinely exclusive, while others represented realistic constraints. Consequently, the site selection process required a re-evaluation of these findings to identify suitable areas of search.

3.1.1. Defining the Area of Search (AoS) (Step 1)

20. A study area was initially determined to ensure that any areas identified for the ANS would contribute towards the overall objective of delivering a suitable compensation scheme for the kittiwake feature of the FFC SPA and that the measure would be technically deliverable by the Project.

21. The study area was based on the known ecological requirements of kittiwake, including their foraging range to maintain population connectivity while avoiding close proximity to the FFC SPA colony. Statutory Nature Conservation Bodies (SNCBs) advised that the ANS location should occur beyond the 55km mean foraging range of the FFC SPA whilst maintaining connectivity to allow for the potential for colony interchange (considered 300km in the site selection exercise). Consequently, to include for this consideration the AoS were identified using a buffer zone exceeding 55km and not exceeding 300km from the FFC SPA. This resulted in a broad study area, of 111,600 km^2 within English Waters of the southern North Sea, extending from Berwick-upon-Tweed in the north to the Thames Estuary in the south, and offshore to the UK Exclusive Economic Zone (EEZ) boundary. Hard constraints identified included existing offshore infrastructure such as wind farms, wave and tidal installations, operational cables and pipelines, aggregate extraction areas, and oil and gas structures. Designated protected areas (SPA, MCZ, SAC) were also assigned as hard constraints.

22. In addition to the hard constraints, further ‘soft’ constraints were considered, including bathymetric and geological limitations and ecological suitability (partly assessed by applying the ‘ecological suitability score’ developed by NIRAS as part of Appendix D to the Round 4 Kittiwake Compensation Plan (The Crown Estate, 2024)). Ecological suitability was measured by factors such as connectivity to the FFC SPA, prey availability, and potential interspecies competition. Consideration was also given to human activity such as commercial fishing, shipping routes, disposal sites, and dredging operations. The study area was subsequently refined to remove areas deemed unsuitable for ANS development, resulting in ten initial project-identified AoS. These AoS were assessed for suitability alongside additional AoS identified by other developers, resulting in a total of 16 sites that were subject to the initial constraints analysis through a detailed Black-Red-Amber-Green (BRAG) assessment.

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

23. The BRAG assessment was undertaken through a series of internal workshops to quantify risks associated with both ‘hard’ and ‘soft’ constraints within each site, and to determine the potential suitability of each candidate location. Although some AoS had previously undergone constraints assessment for other projects and as part of the Round 4 Kittiwake Compensation Plan, it was considered necessary to reassess all AoS to ensure the analysis reflected the updated constraints categories relevant to DBD.

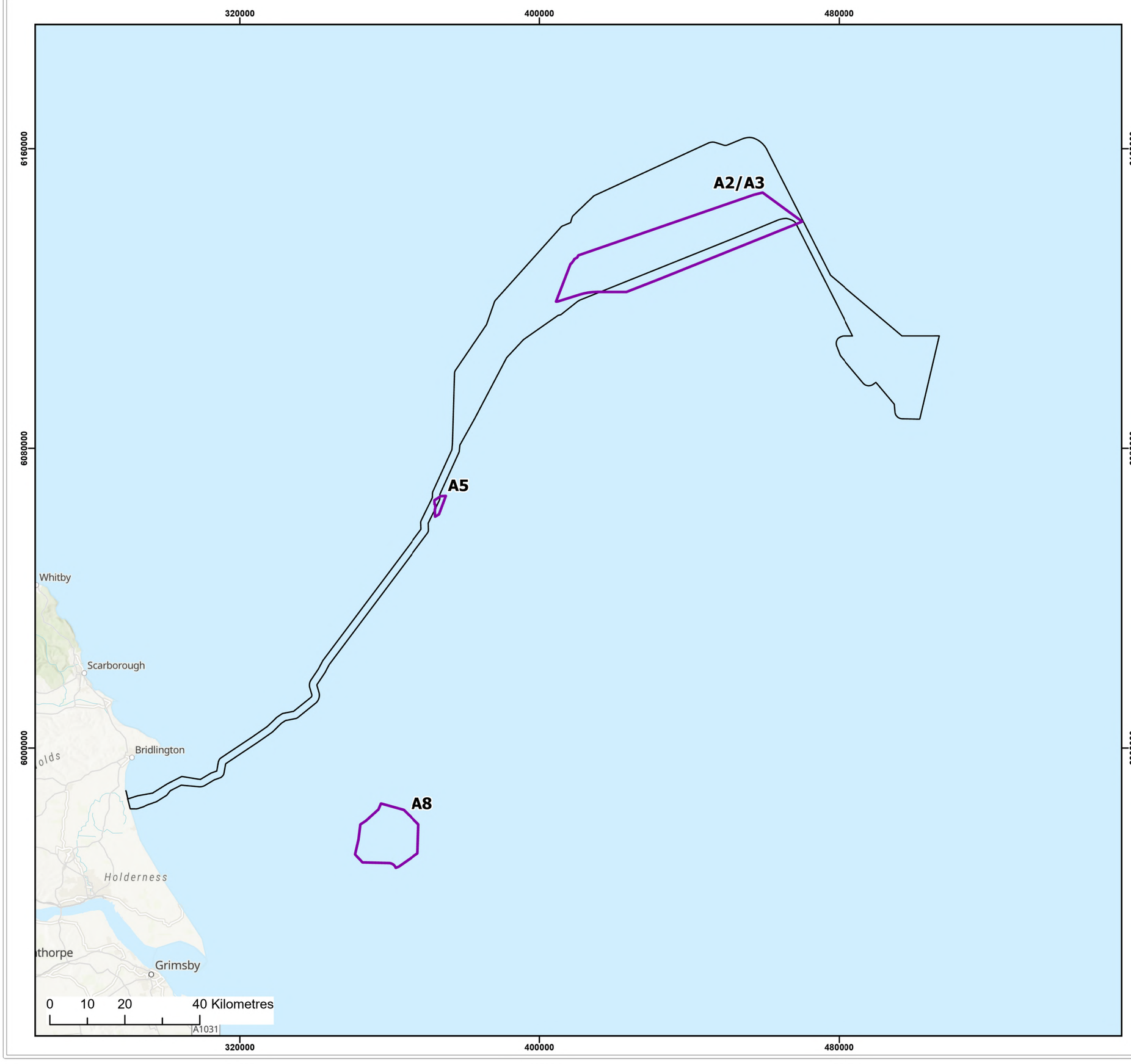
24. For each AoS, constraints were first analysed as part of the BRAG assessment and given an initial ‘pre-mitigation’ BRAG score. Any mitigation which could be applied to lower risks identified for each constraint were then considered, following which a second ‘post-mitigation’ score was given to each AoS. This allowed for the identification of possible mitigation strategies that could lower the risks associated with the environmental and physical constraints. To further differentiate between higher scoring sites, further written justifications were included in relation to distance from the FFC SPA, sediment type, and bedform type.

25. Following this review and assessment, a ‘shortlist’ of 14 sites was taken forward for further review and refinement, with particular focus on physical and logistical constraints.

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

26. As part of the long listing and short listing process, internal and external workshops were held, including sessions on engineering and navigational risks with the Maritime and Coastguard Agency (MCA) and Trinity House. At an engineering workshop in December 2024, it was advised that for crew safety and operational reasons AoS should be within 70km (for Crew Transfer Vessels) or 200km (for Service Operations Vessels) of access ports. For the purposes of this site selection exercise the Dogger Bank Wind Farm Operations and Maintenance (O&M) base in the Port of Tyne was assumed to be the base case access port. The majority of AoS A2/3 however is >200km from Port of Tyne, but close proximity to the DBD lease area and resulting O&M efficiencies were considered desirable in this instance. Wave height and working depth limitations were also reviewed, resulting in the removal of ten sites from the short list. In addition, a workshop with Natural England was held in February 2025 focused on the ecological potential of sites. Natural England raised concerns regarding a site closest to the coast, stating that priority should be given to creating nesting spaces in offshore areas that are within underutilised foraging grounds. Natural England also highlighted concerns that some sites could pose increased collision risk due to proximity to the Outer Dowsing and Dogger Bank South wind farms.

27. The subsequent conclusions of these workshops resulted in four sites (AoS) being taken forward for further refinement and are the subject of this Section 42 consultation. These sites are A2, A3, A5, and A8. A2 and A3 have since been combined into a single AoS (A2/3) due to their proximity. Their previous separation was based on the assumption that the disused cable and associated buffer represented a constraint, however this feature is no longer considered to be so. As a result, three AoS are now taken forward for assessment in this document: A2/3, A5, and A8 (see **Figure 3.1**) and are the focus of this Section 42 consultation.



Legend:

- ANS AoS
- Offshore Development Area

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: ANS Areas of Search

Figure: 3.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0085

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/12/2025	AB	GC	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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4. Description of the Associated Development

4.1. Introduction

28. The Applicant is currently appraising three AoS for the ANS. Following this Section 42 consultation, AoS may be refined, retained or removed from consideration and this will be set out within the DCO application. The worst-case parameters across the three current AoS have been used in the development of this report.

4.2. Design Commitments

29. The Project has made a number of design commitments to avoid, prevent and minimise potential adverse environmental effects. Key design commitments are provided through the Commitments Register (**Appendix C Commitments Register**) submitted with this report. The commitment identification in this report has been developed in line with the Commitments Register submitted with the PEIR for the main development.

30. Proposed commitments may evolve during the pre-application phase as the EIA progresses and in response to refinements to the ANS Project Design Envelope and stakeholder feedback. The final commitments will be confirmed in the Commitments Register which will be submitted with the DCO application.

4.3. ANS Design Envelope Approach

31. At this stage, the ANS description is indicative and based on a concept design. The ANS design will continue to evolve as the EIA and site selection work progress. A final description will be provided in the Environmental Statement (ES), which will form part of the DCO application. **Table 4-1** describes the AoS identified through the site selection process in **Section 3.1.3** and sets out the associated infrastructure requirements for the ANS. The worst-case scenario covers the maximum design parameters within the three identified AoS (see **Figure 3.1**).

Table 4-1 Key AoS parameters

Feature	Indicative Parameter
Distance to shore (at its closest point)	A2/3 - 155km A5 – 95km A8 - 46km
Areas	A2/3 – 699km^2 A5 - 9km^2 A8 - 298km^2
Water depths	A2/3 - 33m to 49m at Lowest Astronomical Tide (LAT) A5 - 35m to 50m at LAT A8 - 26m to 49m at LAT

32. The ANS EIA (in line with that of the Project) will be based on a design envelope approach in accordance with the National Policy Statement (NPS) EN-1 (paragraph 4.3.11 and paragraph 4.3.12 (Department for Energy Security & Net Zero, 2025) which recognises that: *"In some instances, it may not be possible at the time of the application for development consent for all aspects of the proposal to have been settled in precise detail"* and *"Where some details are still to be finalised, the ES should, to the best of the applicant's knowledge, assess the likely worst-case environmental, social and economic effects of the proposed development to ensure that the impacts of the project as it may be constructed have been properly assessed"*. It also refers to the Rochdale Envelope in its footnote 86 to paragraph 4.3.12.

33. The following sections provide an overview of the current understanding of the potential infrastructure and activities required for the ANS, including the project design envelope .

4.3.1. Overview

34. The ANS will be specifically designed to provide nesting spaces for breeding kittiwake, but the Project is retaining flexibility for the structure to support guillemot and razorbill if required. It will comprise a foundation that anchors the structure to the seabed, and the ANS topside which hosts the nesting spaces. The ANS topside will have individual nesting ledges on the exterior of the topside and each successive nesting ledge is offset, resulting in a wall that is inclined away from the main deck. Internal staircases and walkways will provide access to nesting spaces and allow researchers to make observations and ring chicks if required.

35. The ANS topside will measure a maximum of 30m in both width and length, reach up to 40m in height, and extend up to 65m above LAT after accounting for required sea surface level clearance (or 80m above LAT inclusive of lightning protection). Dimensions are primarily driven by the number of nesting spaces required as well as embedded design features to maximise ANS success such as inclined walls.

36. Foundation designs will be informed by several factors including environmental characteristics such as ground conditions, water depths, metocean conditions, economic parameters, and supply chain constraints. The findings of the assessment will also be used to refine the foundation design. The following foundation design options for the ANS are currently being considered:

- Monopile; and
- Gravity base.

4.3.1.1. Monopile Foundation

37. A monopile foundation typically consists of a single tubular piece, formed out of a number of rolled steel plates welded together, that is driven into the seabed by impact piling or vibro-piling. The assessment of effects from piling for the ANS foundation will be undertaken both with and without the use of noise reduction technology at the ES stage, assuming that monopiles remain within the project design and a significant adverse effect is predicted on receptor species. The Applicant has committed to applying best endeavours to the use of primary and/or secondary noise reduction measures for the main Project, and that commitment also applies for the installation of the ANS, in line with the latest policy from Defra. In areas of firmer ground conditions drilling of the seabed may be required prior to piling. This is only considered for the installation of monopile foundation in the assessment as it provides the worst-case assessment in terms of drill arisings. The drill arisings (spoil) would be disposed of adjacent to the foundation location, from a vessel pipe that would be above or slightly below the sea surface. At the point of disposal, the spoil will be expected to settle onto the seabed in the immediate vicinity of the foundation.

4.3.1.2. Gravity Base Foundation

38. A gravity base foundation is a concrete or steel structure that is floated or transported by barge to the ANS site and then ballasted when in the correct location and deposited onto the seabed, or lifted and set down onto the installation location by use of a heavy lift crane vessel. This foundation type is stable by way of its sheer weight. They vary in shape but typically consist of a wide base footprint to provide stability, with a number of columns rising through the water column and splash zone to provide support to the topside at the defined interface level.

39. The design envelope for these foundation types for the ANS are presented in **Table 4-2**.

Table 4-2 Project design envelope - ANS foundation type

Parameter	Value
Monopile Foundation	
Number of monopiles	1
Maximum pile diameter at seabed (m)	8
Maximum pile diameter above sea surface (m)	9
Scour protection area (m^2)	1,520
Seabed preparation area (m^2)	1,520
Seabed preparation volume (m^3)	3,040
Maximum hammer energy required for piling (kJ)	6,000
Pile penetration depth below seabed (m)	40
Drill diameter (m) (if required)	9
Volume of drill arisings (m^3) (if required)	2,545
Gravity Base Foundation	
Shaft diameter (m)	12
Diameter of base on seabed (m)	50
Scour protection area (m^2)	8,495
Seabed preparation area (m^2)	11,400
Seabed preparation volume (m^3)	39,820

4.3.2. Pre-installation Foundation Works

40. Prior to the commencement of installation, surveys will be undertaken to confirm that the seabed is clear of any obstructions (including archaeological, benthic, geotechnical and unexploded ordnance (UXO)) in order to inform micro-siting of the ANS foundation, clearance operations, and seabed preparation to avoid potentially sensitive (or dangerous) receptors.

41. Depending on the type of foundation selected for the ANS, some degree of seabed preparation (e.g. UXO, boulder and sandwave clearance) may be required to provide a level surface upon which the ANS foundation will be installed, or to deposit scour protection to protect the structural integrity of the ANS foundation. The following sections describe these ancillary works to the ANS foundation in more detail.

4.3.2.1. Unexploded Ordnance

42. It is not possible at this stage to determine if any UXO would be present in the AoS. The results of the geophysical surveys will be analysed by an appropriate UXO contractor or consultant to determine a list of potential UXO targets for investigation. A UXO identification survey (often combined with an archaeological Remotely Operated Vehicle (ROV) survey) will then be undertaken prior to construction to ascertain whether any of the potential UXOs can be confirmed as such. Micrositing around any UXOs that are confirmed will be the preferred option for the development, but if clearance is deemed necessary a separate marine licence application will be made at the time.

4.3.2.2. Dredging

43. Both foundation types may require levelling and dredging of the soft mobile sediments to ensure the stability of the foundation. Vessels such as a Trailing Suction Hopper Dredger will be used to remove the required amount of sediment to level the seabed. The spoil will likely be side-cast adjacent to the ANS foundation location. In some cases, it may be necessary to place a layer of gravel on the seabed prior to the installation of the foundation.

4.3.2.3. Scour Protection

44. Scour is a hydrodynamic process which results in seabed erosion and subsequent 'scour hole' formation around offshore infrastructure and may compromise the structural integrity of structures over time. Scour protection is the primary mitigative measure to prevent this from occurring and involves the deposit of a material around the ANS foundation to protect the seabed around the structure (**Table 4-2**).

45. Several types of scour protection exist, including (but not exclusively) mattress protection, sand bags, rock bags, and flow modifiers. However, the most common method is the placement of rock around the foundation base.

46. The final method of scour protection installation will be decided post-consent. However, a typical approach is to deposit a layer of small rocks (the filter layer) at the foundation location, followed by installation of the foundation on or through the filter layer. Afterwards, a layer of larger, higher graded rocks (the armour layer) is deposited on top to protect the seabed at the foundation base. The filter layer can also be laid after the foundation has been installed and it is possible to avoid multiple layers by using a heavier rock material with a wider gradation.

47. The quantity of scour protection required for the ANS will vary depending on the foundation type and hydrodynamic conditions at the selected location, with estimates presented in **Table 4-2.** Note the Gravity Base foundation represents the worst-case scenario in terms of scour protection requirements.

4.3.3. ANS Installation

48. A detailed ANS installation procedure will be provided prior to construction. The installation is expected to follow the standard practice for offshore platform installation:

- The ANS foundation and topside will be fabricated onshore and loaded onto a suitable installation vessel or barge at an appropriate marshalling port (likely to be within the UK).
- The installation vessel or barge will transit to the relevant ANS location where the foundation will be installed (typically pile driven for a monopile foundation or sinking a gravity base foundation using ballast).
- The topside will then be lifted by crane onto the pre-installed foundation. The installation vessel will typically use either jack-up legs or dynamic positioning to maintain stability during the installation sequence.

4.3.4. Aids to Navigation, Lighting and Colour Scheme

49. The ANS will comply with the requirements of the Civil Aviation Authority (CAA), the Maritime and Coastguard Agency (MCA) and Trinity House (the General Lighthouse Authority) in respect to all aids to navigation. This includes the appropriate lighting and marking of any offshore structures that extend above the sea surface. The location of the ANS infrastructure will also be submitted to the UK Hydrographic Office (UKHO) so that Admiralty Charts can be updated accordingly (see Design Commitment CO8 listed in **Appendix C Commitments Register**).

4.3.5. Construction Vessels

50. During the construction of the ANS, a variety of vessels will be required to support installation activities and the transport of equipment and infrastructure. The exact number and specifications of these vessels will be confirmed when nearer the construction period but is likely to comprise the following vessels:

- Site preparation – survey vessel, dredger, boulder clearance vessel, and guard vessel(s);
- Foundation and topside installation – support vessel, crew transfer vessel (CTV), rock placement vessel, installation vessel (jack-up vessel (JUV) or heavy lift vessel (HLV)), and guard vessel(s);
- ANS commissioning – CTV, installation vessel (JUV / HLV), and guard vessel.

51. Due to construction sequencing, these vessels will not all be on site at the same time, but it is anticipated that a maximum of approximately five will be present at any one time. The maximum anticipated number of trips throughout the entire construction period is 38.

52. Each installation vessel or barge may be assisted by a range of support vessels. These are typically smaller vessels such as tugs, anchor handling vessels, or similar. It is assumed that these vessels will make the same general movements to and from ANS location as the installation vessels they are supporting.

53. The methodology for the construction phase may involve the use of JUV. JUVs are installation vessels that lower three or more legs onto the seabed and lift themselves out of the water to provide a stable platform to conduct works. This is particularly useful for the construction of heavy infrastructure, such as craning of the ANS foundation and topside The legs of the JUV directly impact the seabed through the 'jacking-up' process. The Project Design Envelope for the use of JUVs is provided in **Table 4-3**.

Table 4-3 Project design envelope - jack-up vessels

Parameter	Value
JUV footprint (m^2)	8,400
Anchoring footprint (m^2)	2,496
Total area impacted by JUVs / HLVs and anchoring over construction period (m^2)	10,896

54. In some instances, anchoring may be necessary during construction. There are still direct impacts on the seabed as a result of the multiple anchors dropped to secure the vessel, but it is less commonly used because Dynamic Positioning (DP) is a more efficient means to position the vessel. However, the deployment of DP and thus anchoring disturbance is less than would occur for the use of JUV.

4.3.6. Helicopter Movements

55. It is not currently expected that any helicopter movements would be required for the construction of the ANS, other than under circumstances deemed force majeure.

4.3.7. Safety Zones

56. Safety zones help to ensure a safe distance is maintained between the ANS and vessels. As the ANS is not an Offshore Renewable Energy Installation (OREI) it will not qualify for a Safety Zone under the Energy Act 2004. However, the Applicant intends to propose an advisory 500m safe passing distance during the construction of the ANS to ensure the safety of construction vessels, personnel and infrastructure, as well as for other vessels navigating in the area. In addition, advance warning and location details of operations during construction and operation including the advisory Safety Zones and passing distances will be communicated through Notices to Mariners and Kingfisher Bulletins.

57. After construction an advisory safety zone of 50m is expected, returning to 500m when major maintenance activities are underway.

4.3.8. Construction Programme

58. Construction of the ANS is expected to take six months and will be completed a minimum of two breeding seasons prior to operation of the first turbine.

4.3.9. Operation and Maintenance

59. The Operation and Maintenance (O&M) phase of the ANS is anticipated to be in excess of 37 years. During the O&M phase a number of routine, and potentially ad-hoc, activities will be undertaken. There may also be a number of visits for ecological purposes to assess the effectiveness of the structure in achieving its aims. The O&M strategy will be finalised once the technical specification and final location of the ANS is known and will be developed post-consent with an outline schedule provided within the kittiwake compensation implementation and monitoring plan submitted with the DCO application. The strategy will ensure that all infrastructure is maintained in safe working order and to maximise operational efficiency throughout the lifetime of the ANS.

60. O&M activities are grouped into two categories:

- Preventative maintenance – planned activities such as scheduled maintenance of the ANS and its foundation, geophysical, benthic and other surveys (similar to those carried out in pre-construction phase); modifications and retrofit campaigns; and
- Corrective maintenance – activities such as repairs, antifouling, replacements and remedial works to the ANS and its foundation, and scour protection.

61. An estimated seven JUV / HLV visits are predicted over the lifetime of the ANS. Some jack-up vessel footprint disturbance (up to 1,200m^2) would occur on each of these occasions.

4.3.9.1. Operation and Maintenance Port

62. It is likely that the existing Dogger Bank O&M facility at the Port of Tyne will be used (and expanded if necessary) as the base of operations for the ANS. However, if this is not the case, an alternative port will be selected in the north-east of England.

4.3.9.2. Vessel Operations

63. In order to perform the O&M activities, a variety of vessels will be required to transport personnel and equipment to enable the execution of the works. These can be grouped into two categories:

- Routine – CTVs, SOVs and PSVs / OSVs that are permanently assigned to the ANS or visiting in a planned, routine manner; and

- Ad-hoc – JUVs / HLVs / Offshore Construction Vessels (OCVs), normally specialised in their nature, to perform specific tasks usually linked to corrective maintenance. An estimated 7 JUV / HLV / OCV visits are predicted over the lifetime of the ANS.

64. It is likely that the Service Operation Vessels (SOV) will operate from the existing Dogger Bank O&M facility at the Port of Tyne. However, this is subject to a detailed review and an alternative port may be selected in the north-east of England. Other vessels are unlikely to operate from the Port of Tyne. Instead, they may be deployed from any suitable port within the North Sea basin.

4.3.10. Decommissioning

65. Decommissioning will typically follow a reverse sequence of the construction methodology and will involve similar numbers of vessels and equipment. In many cases the scale of the activities during the decommissioning phase will be equivalent to, or less than, the activities during construction.

66. The submission of a decommissioning programme will be required pre-construction (Design Commitment CO21). This initial programme must be approved by the relevant authority and will be updated throughout the lifetime of the Project. Before decommissioning begins, a final version must be submitted and approved by the MMO.

5. Consultation

67. To date, consultation on the ANS has been received through the ongoing Evidence Plan Process (EPP), including Expert Topic Group (ETG) meetings and wider technical consultation meetings with relevant stakeholders, in addition to statutory consultation on the PEIR for the main development. Details of the technical consultation undertaken to date are provided in **Table 5-1**.

68. Consultation responses will be documented and considered in the ongoing EIA process. Responses which are considered relevant to this document, and the Applicant's responses (where applicable), will be included in an appropriate location with the ANS ES.

Table 5-1 Stakeholder consultation undertaken to date on the ANS

Meeting	Stakeholder(s)	Date(s) of Meeting	Purpose of Meeting/Consultation
ETG Meetings			
ETG4 (Offshore Ornithology Compensation) Meeting 1	Natural England MMO RSPB Supported by specific meetings held with other stakeholders as appropriate	28th May 2024	• To agree the target sites and species for compensation measures. • Review of ranking and scoring of a measure as a case study and agree methodology. • To present the refined long list of measures and discuss measures excluded from the long list. • To agree that there are no feasible compensation measures which are 'missing'. • Exploring Natural England's position on different requirements (scale) for compensation. • Discuss additional evidence necessary to confirm feasibility of each measure. • High level consideration for kittiwake (e.g. collaboration).
ETG4 (Offshore Ornithology Compensation) Meeting 2		6th November 2024	• To provide an update on quantum of impact calculations. • To provide an update on the approach to compensation. • ANS site selection.
ETG4 (Offshore Ornithology Compensation Meeting 3)		11th November 2025	• Review key S.42 PEIR responses and actions. • Present outline ANS design and shortlisted AoS. • Provide ETG members with updates relating to the project since last engagement on 06/11/2024.
			• Discuss next steps for progressing ornithological compensation options.
Other Technical Consultation			
Site Selection Workshop	Natural England	24th February 2025	• Provide Natural England with updates on the ANS AoS since last engagement on 06/11/2024 and seek comment on the approach to site selection. • Demonstrate how additional data will inform site selection refinement.
FCC Tracking Data – Role of Utilisation Distribution	Natural England RSPB	6th March 2025	• Provide an update on how the FCC seabird tracking data has been used to inform the site selection process. • Discuss next steps and timelines for integrating updated tracking data.
Dogger Bank D ANS Feasibility Workshop	MCA Trinity House	21st March 2025	• Present the basis of the assessment for shipping and navigation for the proposed ANS areas in terms of navigational features and vessel traffic movements. • To provide a geographical ranked feasibility for each ANS area and recommendations for next steps.
Dogger Bank D Section 42 Consultation on the Preliminary Environmental Information Report (PEIR)	Natural England MMO	5th August 2025	Consultation on the Kittiwake Compensation Roadmap and Evidence document. The purpose of the compensation roadmap was to present progress on proposed compensation measures, gather stakeholder feedback on the measure proposed, and identify any additional factors requiring consideration ahead of a formal DCO application submission to PINS. This document also presents a roadmap for delivering kittiwake compensation as the Project progresses including a timeframe for delivery and consideration of adaptive management measures.

6. Methodology

6.1. Introduction

69. This chapter provides an overview of the methodology used in this preliminary environmental report. The methodology set out here draws upon that of the PEIR submission for the DBD Project to assist with consistency of approach and outcomes.

6.2. Characterisation of the Baseline Environment

70. The characterisation of the baseline environment is required to understand the likely significant effects of the development. As outlined in **Section 3 Site Selection Process**, three AoS (A2/3, A5 and A8) are being considered at this stage, and therefore the baseline environment has included consideration of all three AoS. These AoS are expected to be refined for the DCO application as further evolution of the site selection and AoS occurs. The approach to establishing the characteristics of the baseline environment is set out for each topic in the subsequent chapters.

71. Within each technical chapter a Study Area will be defined and the characterisation of the baseline environment will follow the steps set out below:

- Review available information and document data sources;
- Review potential impacts that might be expected to arise from the development;
- Determine if the available data are sufficient and of adequate quality to make EIA judgments with reasonable confidence;
- If further data are required, gather additional data in a targeted manner, directed at answering key questions and filling important information gaps;
- Review all information gathered to ensure the baseline environment can be sufficiently characterised with adequate detail; and
- Identify the presence of relevant receptors within the Study Area.

6.3. Scoping of Impacts

72. Following the characterisation of the existing environment, potential impacts are considered for each receptor in **Section 7** to **Section 21** and scoping of these impacts has been undertaken. Impacts are scoped out from this preliminary assessment where it is considered that there is no potential for an impact to occur and the rationale for the scoping of impacts is provided in **Appendix D Scoping Rationale**. Following scoping, the impacts scoped in have then been assessed using the methodology described below.

6.4. Assessment of Effects

73. The ANS could potentially result in a number of impacts and effects on the environment. The definitions are as follows:

- **Impact:** An impact is a change resulting from an activity associated with the Project, defined in terms of magnitude; and
- **Effect:** An effect is the consequence of an impact when considered in combination with the receptor's sensitivity / value / importance, defined in terms of significance.

74. Assessments of effects has been undertaken in this report using industry standards and guidance within each technical chapter and applying professional judgement from experienced technical specialists. Where topic assessment methodology differs from that presented in this chapter, it is presented within the relevant topic chapter.

75. A matrix approach will be adopted when determining the significance of the effects that have been 'scoped in', to provide consistency across EIA topics and provide a system of common tools and terms, as described in **Section 6.4.5**.

6.4.1. Impact Identification

76. Impacts are considered throughout all phases of the ANS and can be classed as:

- Direct impacts related to the construction, and operation and maintenance of the ANS;
- Indirect impacts experienced by a receptor that is removed from the direct impact;
- Cumulative impacts occurring as a result of the development in conjunction with other existing or planned developments;
- Transboundary impacts which may occur when impacts from the development affect the environment of another European Economic Area (EEA) member state;
- Inter-relationships of impacts between EIA topics; and
- Interactions between impacts within the same EIA topic where receptors are affected by multiple impacts acting together.

6.4.2. Impact Pathway

77. The assessment uses the conceptual 'source-pathway-receptor' model. By applying this model, the assessment identifies how potential impacts resulting from the ANS's activities affect receptors within the receiving environment. The 'source-pathway-receptor' model is defined as follows:

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

6.4.3. Receptor Sensitivity and Value

78. The ability of a receptor to adapt to change, tolerate and / or recover from potential impacts is important in assessing its sensitivity to the impact being considered. The overall receptor sensitivity is determined by considering the tolerance, adaptability and recoverability of the receptor. This is achieved through applying known research and collected information, coupled with previous experience and expert judgment.

79. The value of a receptor is considered when determining receptor sensitivity. However, it should be noted that a receptor with high value does not necessarily equate to high sensitivity. For example, an Annex II species (under the Habitats Directive) would have a high value, but if it was highly tolerant of changes in its environment or had high recoverability, then its sensitivity should reflect these characteristics.

6.4.4. Assessment of Impact Magnitude

80. The magnitude and probability of an impact occurring is determined through the consideration of the following factors:

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

6.4.5. Evaluation of Effect Significance

81. Once the receptor sensitivity and impact magnitude have been determined, the effect significance is predicted by using quantitative or qualitative criteria, as appropriate, which will integrate information from both dimensions. Wherever possible, matrices such as that presented in **Table 6-1** are used to support the evaluation of effect significance to maintain consistency throughout the EIA process and transparently illustrate how expert judgment has been applied.

Table 6-1 Example effect significance matrix

		Adverse Effect				**Beneficial Effect**			
		Impact Magnitude							
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Receptor Sensitivity	**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

82. The effect significance can be considered to be major, moderate, minor or negligible and either of adverse or beneficial effect. In general, major and moderate adverse effects are deemed to be significant. In these cases, additional mitigation may be required to avoid, prevent, reduce or, if possible, offset likely significant adverse effects to acceptable levels. Residual effects following the adoption of additional mitigation will then be assessed to conclude the residual effect significance.

6.4.6. Decommissioning Phase

83. As described in **Section 4.3.10**, removal of the ANS may occur following decommissioning of the DBD Project. However, at this stage the details of the removal activities, if they occur, are unknown and will be developed as understanding of the future consenting requirements evolves as well as what feasible from an engineering perspective. Consequently, at this stage it is expected that all decommissioning phase impacts would be similar to (or lesser) in scale to those of the construction phase impacts, when and if it occurs. As such, at the ES stage further consideration and assessment will be made of the impacts that have been assessed as potentially significant in the construction phase. Subsequently, these will also be assessed with relevance to the decommissioning phase.

6.5. Data and Information Sources

84. An initial desk-based study has been undertaken using publicly available data sources at the time of writing to establish the baseline conditions for each technical topic. The desk study helps identify sensitive features and sites which have the potential to be affected by the ANS. Specific desk-based sources used for each topic are listed within the relevant technical sections.

85. A number of surveys have been completed to date across A2/3, A5 and A8. At this stage of the assessment, individual topic chapters indicate whether the data has been used to inform this assessment at this stage or will be used to inform the later ES.

6.6. Cumulative Impacts

86. Cumulative effects are the result of the impacts of the ANS acting in combination with the impacts of other proposed and reasonably foreseeable developments on receptors. This includes plans and projects that are not inherently considered as part of the current baseline.

87. Within each technical chapter, a topic-by-topic specific Zone of Influence (ZoI) is identified and justified. A high level cumulative assessment is provided where relevant as part of this ANS PEIR, and where potentially significant cumulative effects are identified will be carried through into the subsequent ES. The ZoIs will inform the screening of projects with the potential for cumulative effects, using the cumulative effects assessment (CEA) short list established during the DBD PEIR (submitted June 2025). The CEA short list will be updated to reflect the 6-month cut-off period as agreed with stakeholders at the ES stage, and therefore any projects identified with the potential for cumulative effects may be subject to change. Subsequently, those impacts identified within this document will be assessed at the ES stage against the updated CEA short list.

6.7. Transboundary Impacts

88. In terms of potential transboundary impacts from the ANS, the closest AoS to the EEZ is A2/3, situated approximately 45km from the Netherlands' EEZ at the nearest point.

89. Given the small scale of the ANS and the locations of the AoS, the potential for transboundary impacts is expected to be very limited. However, the individual topics within the main assessment will consider whether there exists any potential for transboundary impacts from the ANS and assessed separately if required.

6.8. Inter-Relationships

90. The assessment of effects will consider the potential for inter-relationships between topic effects on individual receptors. The objective is to identify where the accumulation of residual effects on a single receptor, and the relationship between those effects, gives rise to synergistic effects and the need for additional mitigation.

91. Each technical section summarises potential inter-relationships and determines whether there is a likelihood that the scale of the effect on the relevant receptors would notably increase.

6.9. Interactions Assessment

92. The assessment of effects will consider the potential for effect interactions whereby different technical effects may occur on individual receptors. The objective is to identify where the accumulation of residual effects on a single receptor as a result of different technical effects (both direct or indirect) give rise to synergistic effects and the need for additional mitigation.

93. Each technical chapter summarises potential effect interactions between them and receptors, or where those interactions overlap with other technical chapters.

94. The potential for Project-level effect interactions (the combined effects of the DBD Project and the ANS) is considered and assessed within the relevant technical chapters where impacts have been scoped into the assessment. It is noted that the potential for construction phase effect interactions is limited (but possible) due to the spatial and expected temporal difference in construction timescales between the ANS and the DBD Project. However, there may be potential operation phase effect interactions. All potential construction, and O&M phase effect interactions are identified in each technical chapter, and where the impact has been scoped in, assessed herein.

7. Marine Physical Processes

95. This chapter of the ANS PEIR presents the existing environment and the potential changes due to construction, O&M, and decommissioning of the ANS associated with Marine Physical Processes. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

7.1. Study Area

96. The Marine Physical Processes Study Area has been defined based on the direct footprint of the ANS (near-field) and wider areas of seabed and coast that could potentially be affected (far-field) (**Figure 7.1**).

7.2. Data Sources

97. The desk-based sources used in this report for the consideration of impacts and changes to the Marine Physical Processes are presented in **Table 7-1**.

Table 7-1 Desk-based sources used to inform the baseline for Marine Physical Processes

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
EMODnet bathymetry	100% Study Area	2020	Baseline regional mapping of bathymetry, seabed substrate and sub-surface geology to provide an overview of seabed conditions, complementing site specific surveys.
BERR Atlas tidal currents	100% Study Area	2008	Mean spring tidal range. Peak flows on mean spring tides. Tidal ellipse excursions.
BERR Atlas waves	100% Study Area	2001 to 2008	Significant wave height.
BGS seabed sediments	100% Study Area	Pre-1987	Seabed sediment composition.
Cefas suspended sediment concentrations	100% Study Area	1998 to 2015	Annual suspended sediment concentrations between 1998 and 2015.
Numerical modelling and benthic survey data collected for DBD	Adjacent to AoS (DBD Offshore Export Cable Corridor (ECC) and Array Area)	2024	Grab samples. Particle size analysis data. Numerical modelling of changes to suspended sediment and resulting seabed level, and changes to wave and tidal regimes.
FRONTWARD	100% Study Area	2025	Shelf-sea front satellite dataset

98. In addition to the desk-based sources in **Table 7-1**, the following site-specific data in **Table 7-2** has been considered. Hydrodynamic, wave and sediment dispersion modelling undertaken for DBD PEIR has also been considered where relevant and referenced accordingly.

Table 7-2 Completed Baseline Surveys for Marine Physical Processes

Dataset	Spatial Coverage	Survey Year
Marine geophysical survey	DBD Array Area	2023
Benthic survey	DBD offshore ECC, Array Area and Characterisation Area (spatial overlap with A2/3)	2024
Marine geophysical survey	DBD offshore ECC (spatial overlap with A5), Characterisation Area, A2/3 and A8	2024 - 25
Marine geotechnical survey	DBD Array Area and offshore ECC (spatial overlap with A5, and included cone penetration tests (CPTs) at A2/3 and A8)	2025
Benthic survey	A5 and A8	2025
Metocean	Dogger Bank	2024

7.3. Assumptions and Limitations

99. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**. This assessment will be refined where relevant and presented in the EIA to be submitted at a later date.

100. Given the large amount of data that was collected for the site-specific surveys for DBD and Dogger Bank South (DBS) offshore wind farms, there is a good baseline understanding of Marine Physical Processes in the AoS and adjacent areas.

7.4. Existing Environment

7.4.1. Bathymetry

101. The bathymetry across the AoS is as follows (EMODnet, 2020) and as shown on **Figure 7.1**:

- A2/3: 33m – 49m below LAT;
- A5: 35m – 50m below LAT; and
- A8: 26m – 49m below LAT.

7.4.2. Tidal Currents

102. An understanding of tidal currents in the Study Area provides insight into how they drive sediment transport. The tidal regime in the southern North Sea is strongly influenced by predominantly semi-diurnal tides that enter from the Atlantic Ocean (Department for Business, Enterprise and Regulator Reform (BERR), 2008a). Modelled peak flows for mean spring tides are as follows and as shown on **Figure 7.2**:

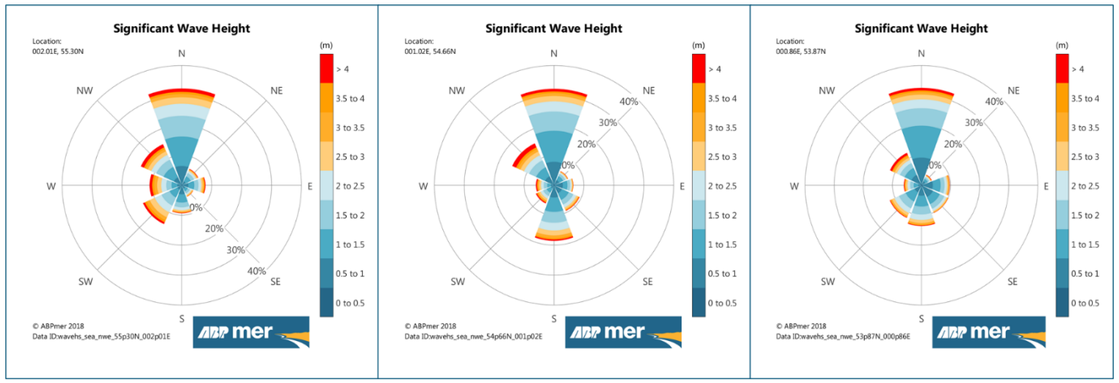
- A2/3: 0.2 to 0.4m/s;
- A5: 0.6 to 1.0m/s; and
- A8: 0.8 to 1.2m/s.

7.4.3. Waves

103. Given its open sea location, the AoS are exposed to relatively high levels of wave energy. Wave data available from APBmer 'Seastates' show that the most frequent waves for all three AoS approach from the north (see **Plate 7-2**). BERR (2008) described annual mean significant wave heights (see **Figure 7.3**):

- A2/3: 1.76m to 2.00m;
- A5: 1.51m to 2.00m; and
- A8: 1.26m to 1.50m.

Plate 7-2 Significant Wave Height roses across the AoS (taken at centrepoint of AoS) (ABPmer, 2018)

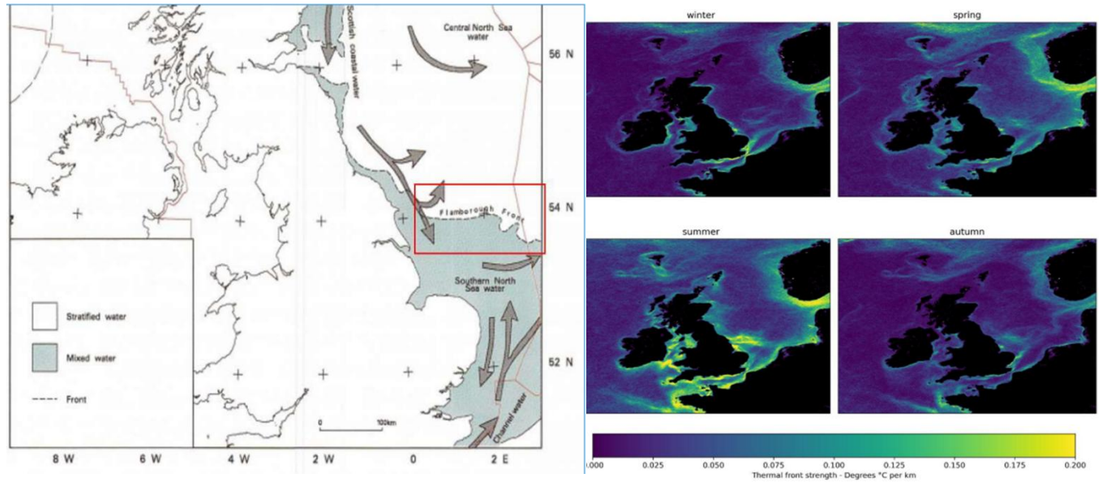


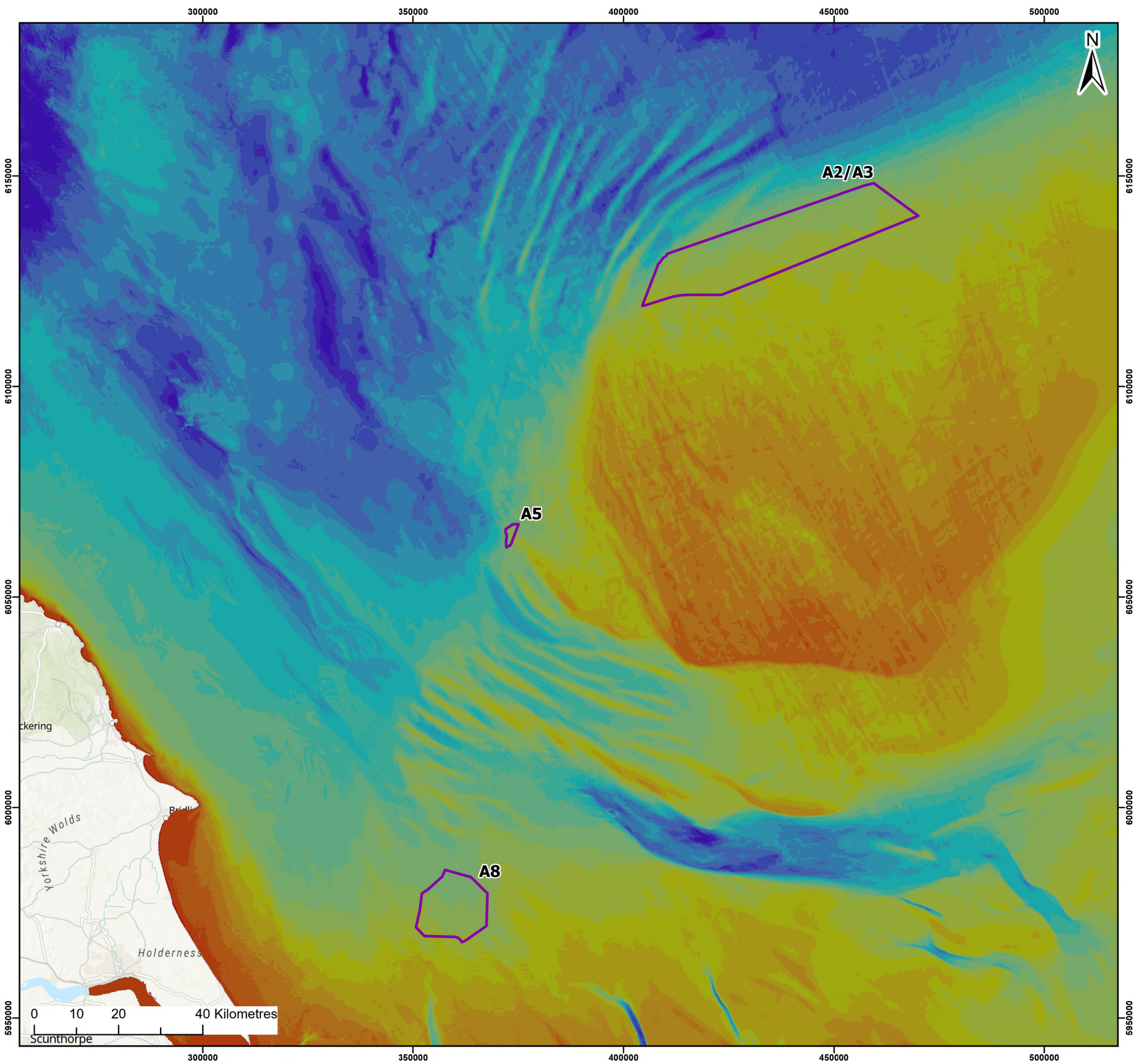
A2/A3 A5 A8

7.4.4. Stratification

104. The Flamborough Front is a tidal mixing front that is present in the southern North Sea off the east coast of England between spring and early autumn (FRONTWARD, 2025), and shown on **Plate 7-1.** This tidal mixing front forms in the water column at the boundary between stratified water and vertically mixed water. The position of the front is controlled by surface buoyancy and mechanical mixing from tides and wind.

Plate 7-1 Location of Flamborough Front according to North Sea Task Force (1993 (left) and seasonal strength of the front determined by the FRONTWARD project (right) (Sullivan et al., 2025)





Legend:

- ANS AoS

Bathymetry (m) (LAT)

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

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK
WIND FARM

Title:

Marine Physical Processes Study Area
and Offshore Bathymetry

Figure: 7.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0051

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

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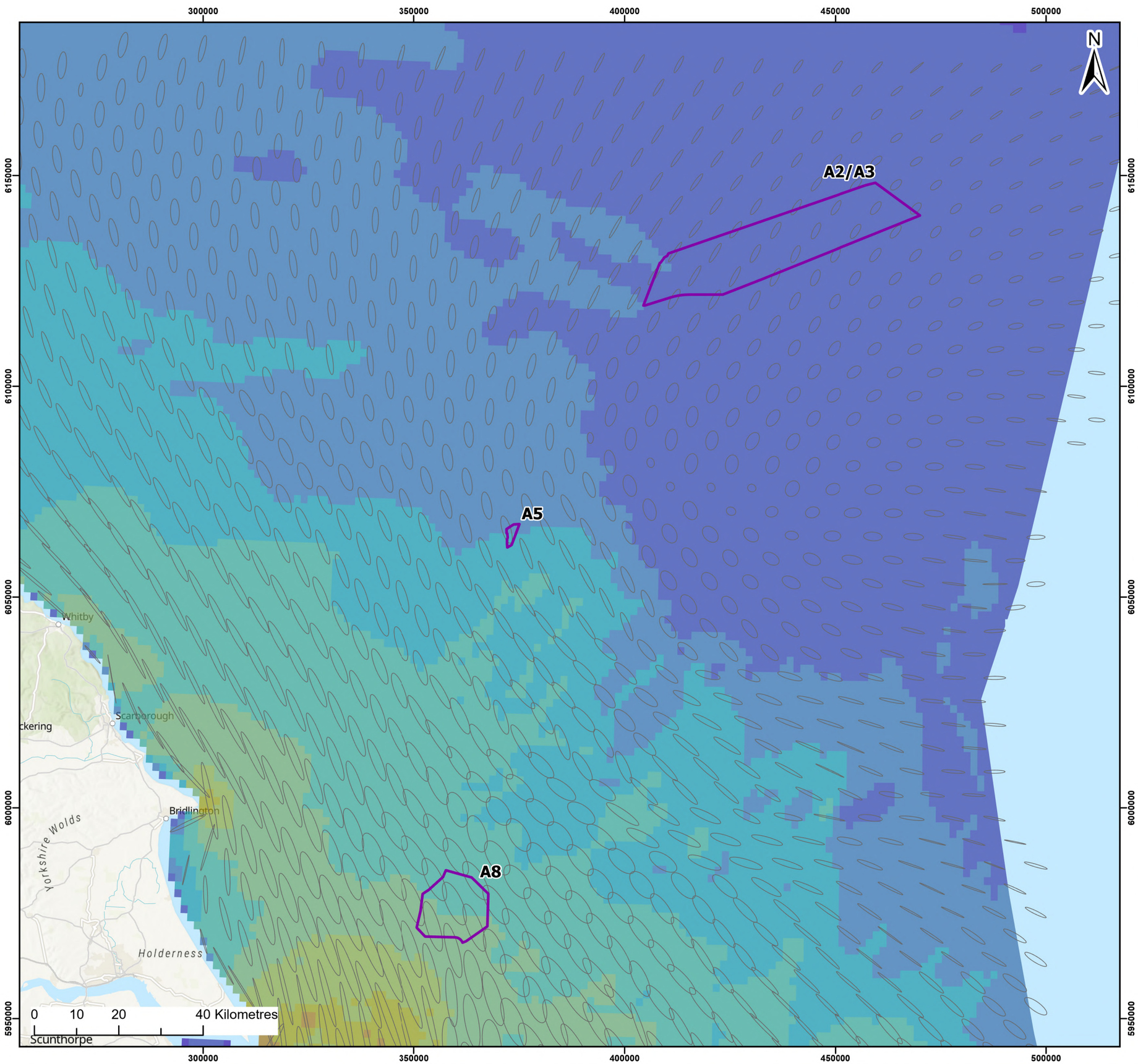

Legend:

- ANS AoS
- Spring Tidal Ellipse

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

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Peak Flow for a Mean Spring Tide (BERR, 2008)

Figure: 7.2

Drawing No: PC6250-HAS-XX-OF-DR-GS-0052

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Co-ordinate system: WGS 1984 UTM Zone 31N

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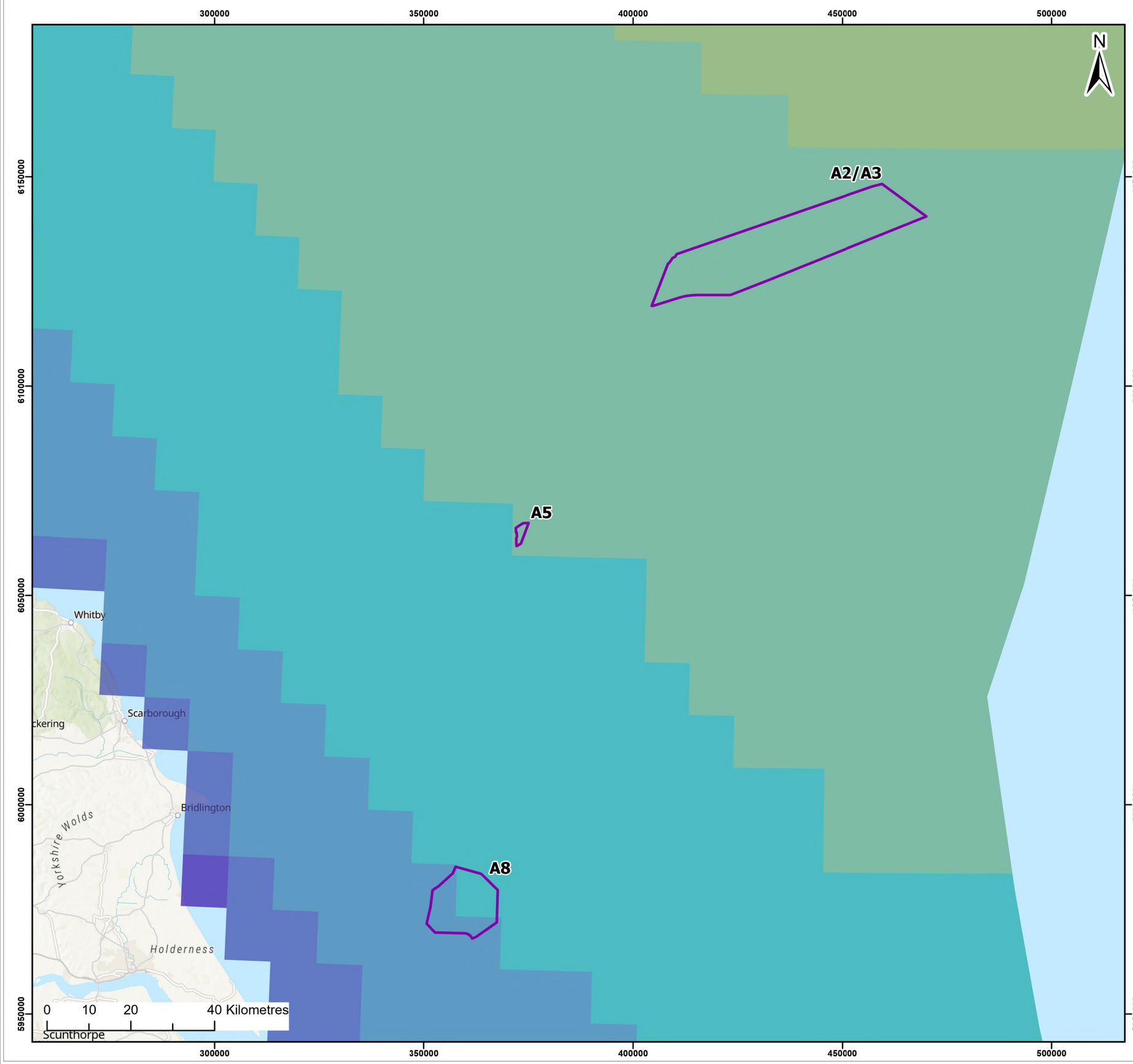

Legend:

ANS AoS

Annual Mean Significant Wave Height (m)

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

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Annual Mean Significant Wave Height (BERR, 2008)

Figure:	Drawing No:
7.3	PC6250-HAS-XX-OF-DR-GS-0079

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Co-ordinate system: WGS 1984 UTM Zone 31N

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7.4.5. Bedload Sediment and Transport

105. British Geological Survey (BGS) showed that the seabed within the AoS is as follows (**Figure 7.4)**:

- A2/3: predominantly composed of sand in the south of the Zone and slightly gravelly sand in the middle to north of the Zone. There are small patches of gravelly sand across the Zone and an isolated patch of gravel in the centre of the Zone;
- A5: composed entirely of sand; and
- A8: predominantly comprised of sand in the northern half, slightly gravelly sand across the middle of the Zone and gravelly sand, with sandy gravel occurring in the south of the Zone. There is a small patch of gravelly muddy sand in the south-east corner of the Zone.

7.4.6. Suspended Sediment Concentrations

106. The Centre for Environment, Fisheries and Aquaculture Sciences (Cefas) (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015. Average concentrations within the AoS are as follows (**Figure 7.5**):

- A2/3 is approximately 0mg/l;
- A5 is approximately 0-2mg/l; and
- A8 is approximately 2mg/l – 3mg/l.

7.5. Marine Physical Processes Scoping

107. **Table 7-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 7-3 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Marine Physical Processes

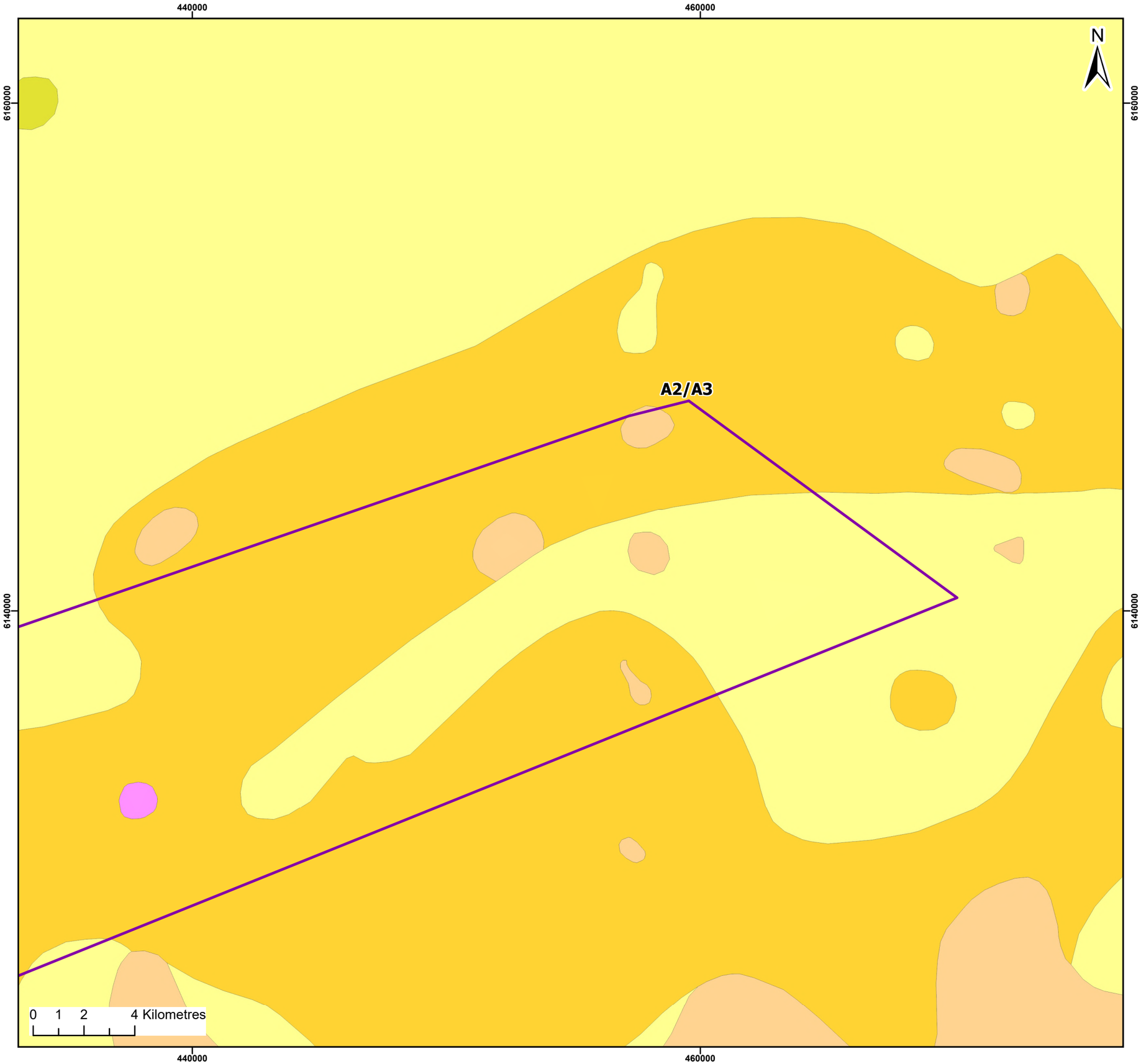
Potential Impact	Construction	Operation	Decommissioning
Changes in suspended sediment concentration, transport, and seabed level due to drilling for ANS foundation installation/decommissioning	✓	X	✓
Changes in suspended sediment concentration, transport, and seabed level due to seabed preparation for ANS foundation installation	✓	X	✓
Changes in the tidal current regime due to the presence of infrastructure (ANS foundation)	X	✓	X
Changes in the wave regime due to the presence of infrastructure (ANS foundation)	X	✓	X
Changes in water circulation due to the presence of infrastructure (ANS foundation)	X	✓	X
Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundation)	X	✓	X
Indentations on the seabed due to installation/decommissioning vessels	✓	✓	✓
Cumulative impacts	✓	✓	✓

7.6. Potential Effects

108. The following sections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to Marine Physical Processes. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worse-case scenario.

7.6.1. Assessment Methodology

109. The assessment of effects on Marine Physical Processes is based on a ‘source-pathway-receptor’ conceptual model, whereby the source is the initiator event, the pathway is the link between the source and the receptor impacted by the effect, and the receptor is the receiving entity. An example of this type of conceptual model is shown by foundation 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).



Legend:

- ANS AoS

Seabed Sediment

- Gravel
- Gravelly Sand
- Muddy Sand
- Sand
- Slightly Gravelly Sand

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK
WIND FARM

Title:

Distribution of seabed sediment (BGS) in the ANS AoS
- Page 1 of 4

Figure: 7.4

Drawing No: PC6250-HAS-XX-OF-DR-GS-0054

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Co-ordinate system: WGS 1984 UTM Zone 31N

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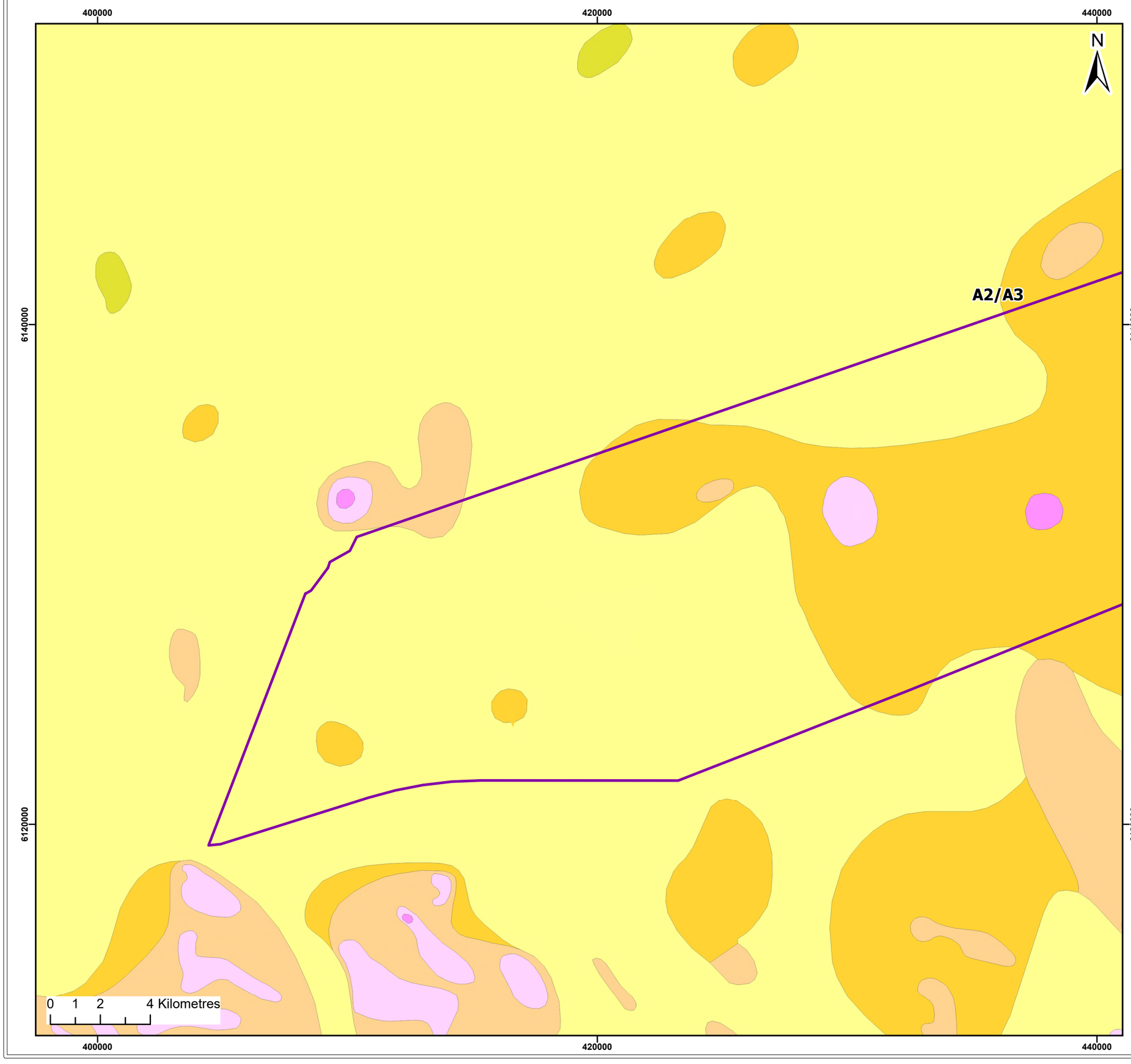

Legend:

- ANS AoS

Seabed Sediment

- Gravel
- Gravelly Sand
- Muddy Sand
- Sand
- Sandy Gravel
- Slightly Gravelly Sand

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Distribution of seabed sediment (BGS) in the ANS AoS
- Page 2 of 4

Figure: 7.4

Drawing No: PC6250-HAS-XX-OF-DR-GS-0054

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Co-ordinate system: WGS 1984 UTM Zone 31N

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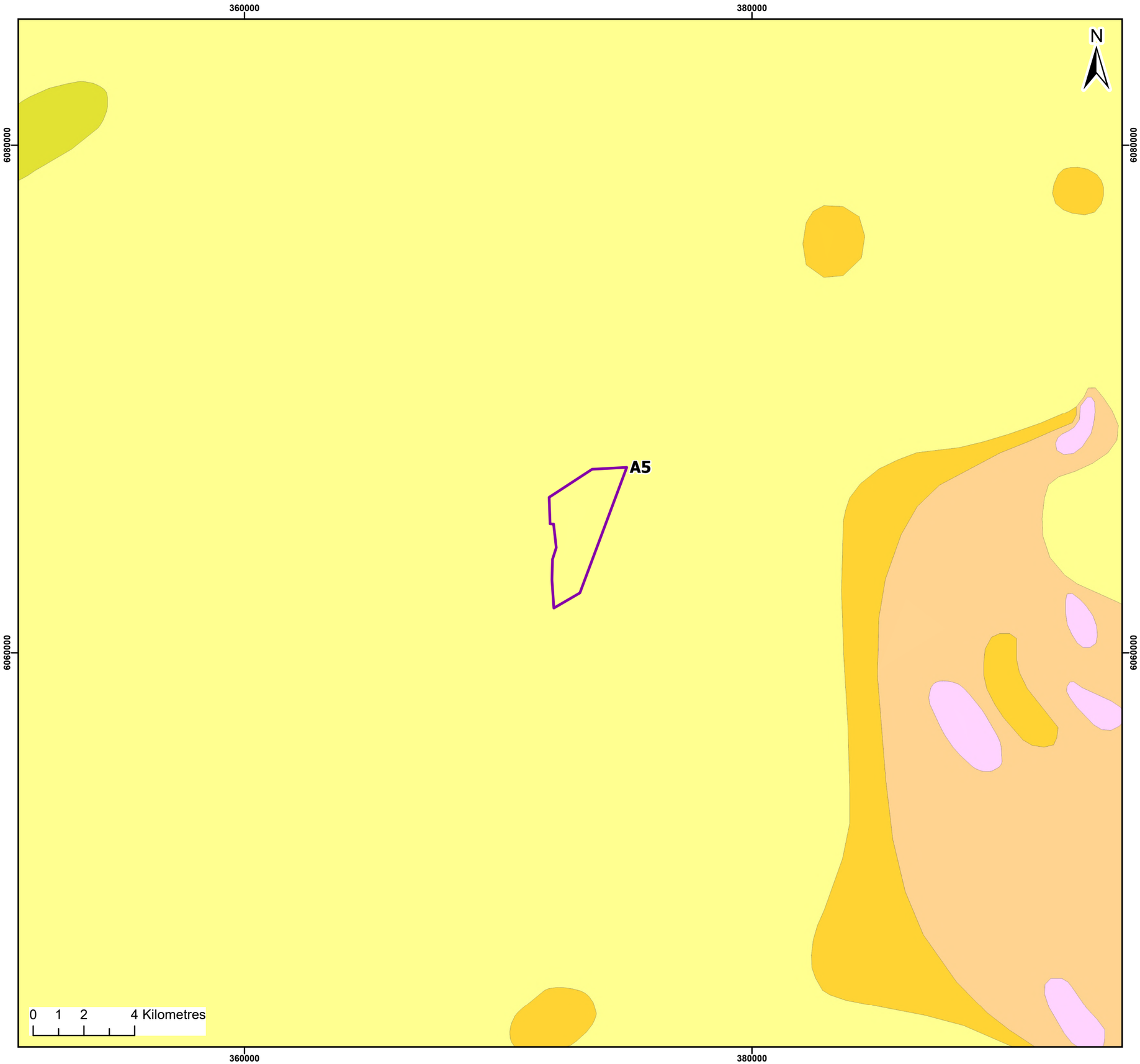

Legend:

- ANS AoS

Seabed Sediment

- Gravelly Sand
- Muddy Sand
- Sand
- Sandy Gravel
- Slightly Gravelly Sand

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Distribution of seabed sediment (BGS) in the ANS AoS
- Page 3 of 4

Figure: 7.4

Drawing No: PC6250-HAS-XX-OF-DR-GS-0054

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Co-ordinate system: WGS 1984 UTM Zone 31N

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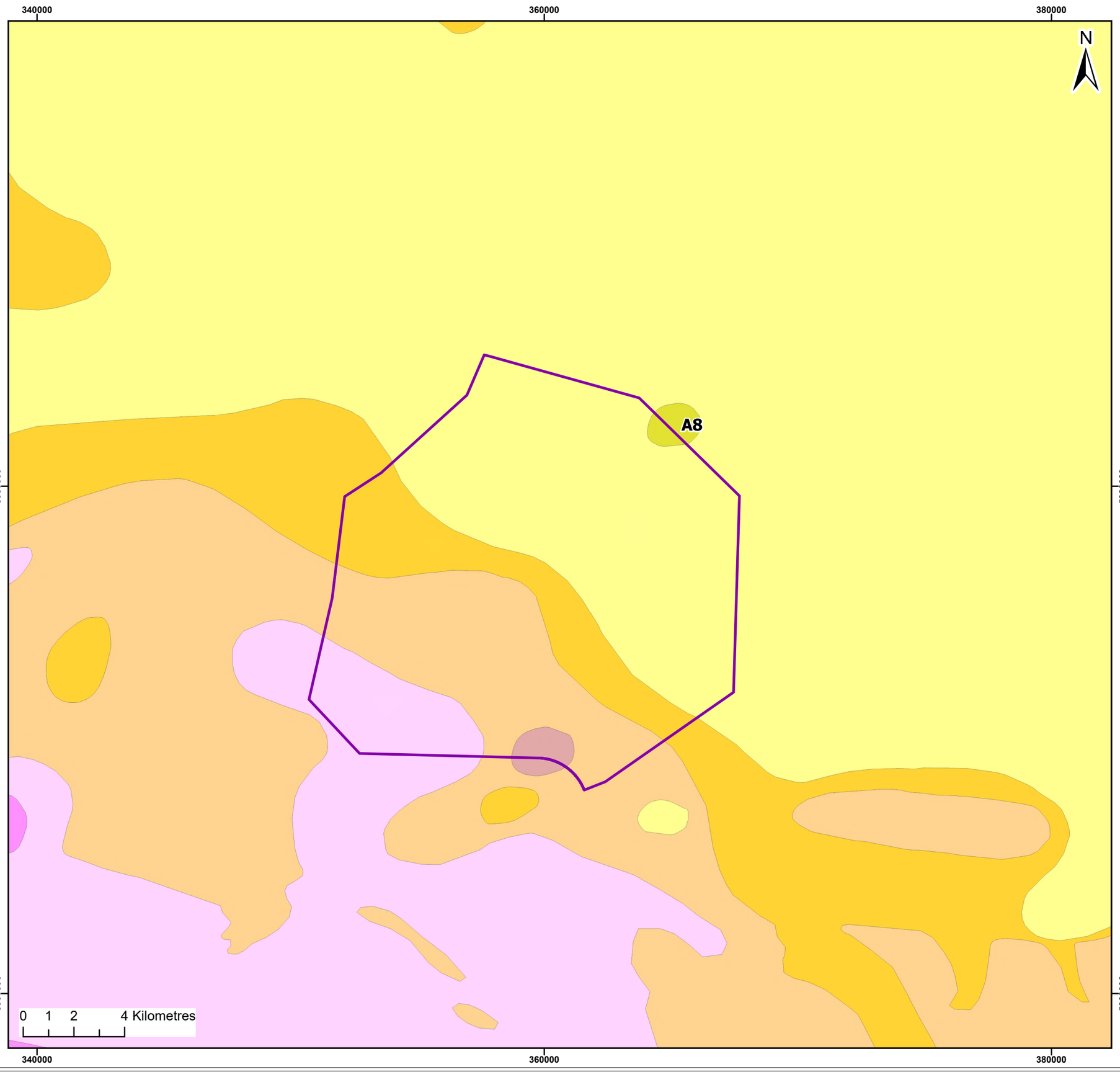

Legend:

- ANS AoS

Seabed Sediment

- Gravel
- Gravelly Muddy Sand
- Gravelly Sand
- Muddy Sand
- Sand
- Sandy Gravel
- Slightly Gravelly Sand

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK
WIND FARM

Title:

Distribution of seabed sediment (BGS) in the ANS AoS
- Page 4 of 4

Figure: 7.4

Drawing No: PC6250-HAS-XX-OF-DR-GS-0054

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Co-ordinate system: WGS 1984 UTM Zone 31N

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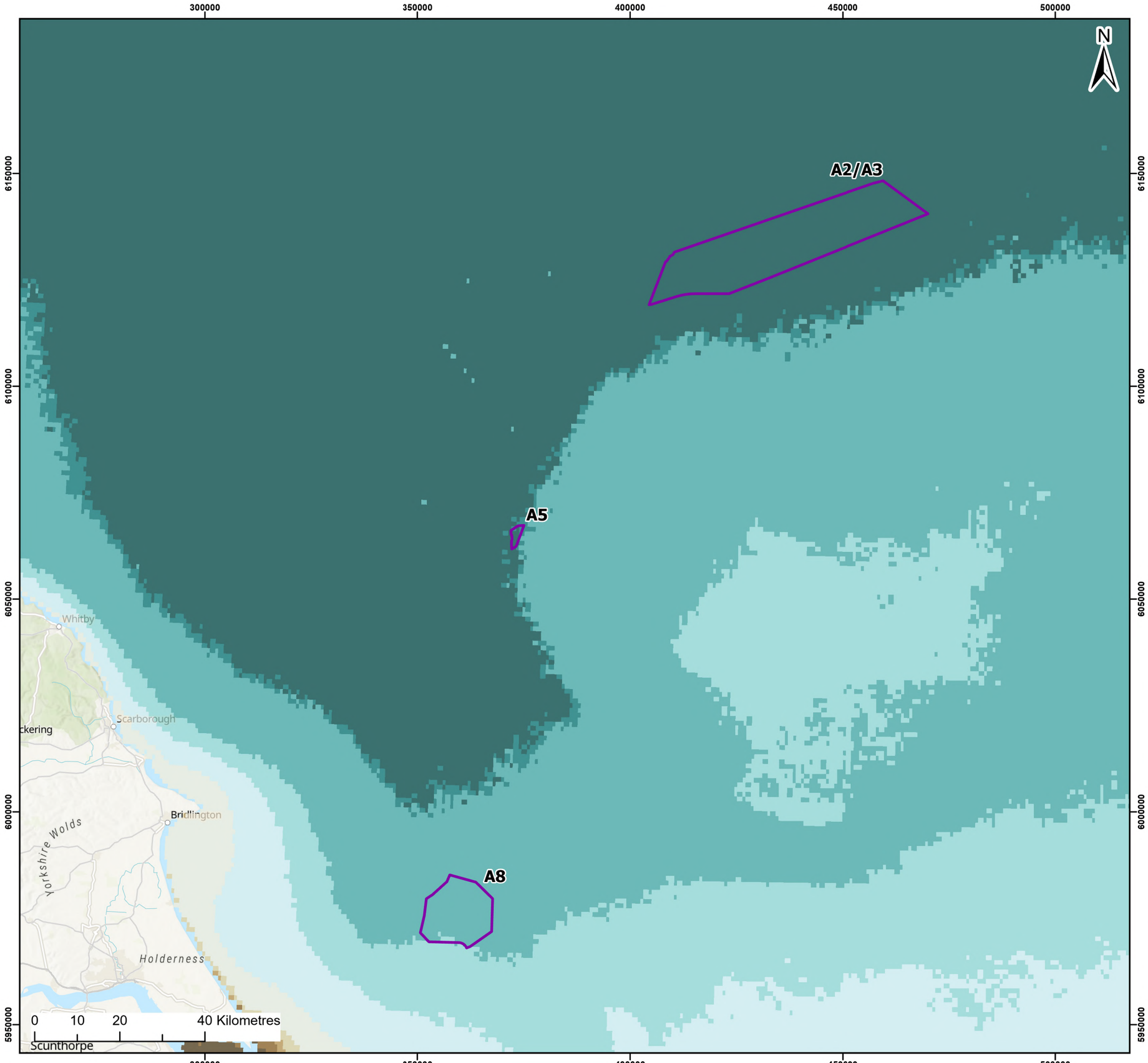

Legend:

ANS AoS

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

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

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Average suspended particulate matter (SPM) 1998-2015 (Cefas, 2016)

Figure: 7.5

Drawing No: PC6250-HAS-XX-OF-DR-GS-0055

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

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110. The conceptual model will be supported by previous numerical modelling work undertaken specifically for the Dogger Bank South and Dogger Bank D (RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited, 2025; Dogger Bank D, 2025d) projects. Given the proximity of these projects to the AoS and the highly precautionary worst-case scenarios compared to the ANS, it can therefore be assumed that the modelling would encompass any effects caused by the ANS in isolation. Additional hydrodynamic and sediment transport modelling for the ANS would be disproportionate to the potential impact and a conceptual evidence-based assessment is considered sufficient.

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

112. 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 habitats. In this case, the magnitude of impact is determined in a similar manner to the first assessment method but the significance of effect on other receptors is made within the relevant EIA topic chapters pertaining to those receptors.

113. 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 (Newell *et al.*, 2004);
- Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2 (Cefas, 2004);
- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (Collaborative Offshore Windfarm Research into the Environment (COWRIE) (Lambkin *et al.*, 2009));
- Marine Physical Processes Guidance to inform Environmental Impact (Natural Resource Wales, 2025); and
- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase I: Expectations for pre-application baseline data for designated nature conservation and landscape receptors to support offshore wind applications (Parker *et al.*, 2025).

7.6.2. Potential Effects during Construction

114. Potential construction-related impacts would be limited to a ZoI based on an understanding of the tidal ellipses in the Study Area (Figure 7.6). The ZoI is based on the knowledge that effects arising from the ANS construction on the hydrodynamic and sedimentary regime are relatively small in magnitude and are local in spatial extent. It is expected that changes to physical processes would have returned to background levels within the excursion of one spring tidal ellipse. It is important to note that this ZoI is highly precautionary, as the ANS is a single structure, and it could be located anywhere within the three AoS.

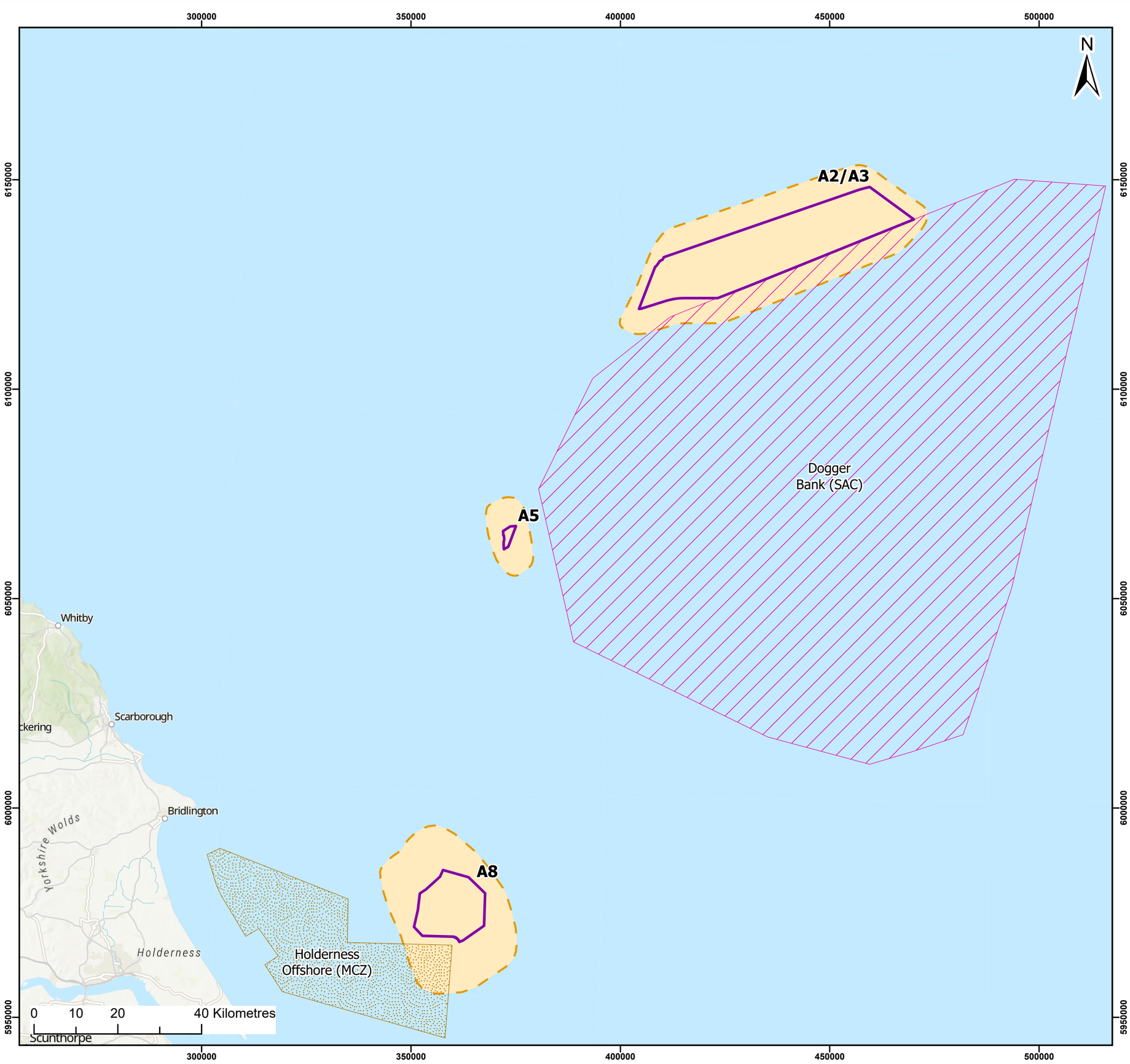
115. The maximum ZoI on the tidal regime varies across the AoS, as follows:

- A2/3: approximately 6km extending from the AoS in a north-west – south-east orientation;
- A5: approximately 7km extending from the AoS in a north-northwest – south-southeast orientation; and
- A8: approximately 11km extending from the AoS in a north-east – south-west orientation.

116. Given the proximity of the AoS to designated sites with an inherent geomorphological value such as the Dogger Bank SAC (A2/3: 20m; A5: 7km), and the Holderness Offshore MCZ (A8: 2km), the following impacts are scoped into the EIA for further consideration during construction.

7.6.2.1. Changes in suspended sediment concentration, transport, and seabed level due to drilling for ANS foundation installation (MPP-C-03)

117. Sediments below the seabed within the AoS would become disturbed during any drilling activities that may be needed at the location of the ANS foundation releasing suspended sediment into the water column. The increase in suspended sediment concentrations has the potential to deposit sediment and change the elevation/level of the seabed. Coarse sediment would fall rapidly to the seabed (minutes or tens of minutes) immediately after it is discharged. Fine sediment would be transported and dispersed by tidal currents in suspension in the water column before depositing on the seabed.



Legend:

- ANS AoS
- Zone of Influence
- Special Area of Conservation (SAC)
- Marine Conservation Zone (MCZ)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Zones of Influence in the AoS

Figure: 7.6

Drawing No: PC6250-HAS-XX-OF-DR-GS-0078

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Co-ordinate system: WGS 1984 UTM Zone 31N

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118. Suspended sediment dispersion modelling was undertaken for DBD to provide the evidence base to assess the effect of the drilling process on suspended sediment concentrations and seabed level. The modelling assumed a worst-case scenario of 57 turbines and one offshore platform would be drilled, with a total volume of released sediment up to 976,410m^3. The results show that the drilling process would cause local increases in suspended sediment concentrations at the point of discharge of the sediment at each of the 57 wind turbine locations and offshore platform foundation. The predicted suspended sediment concentrations are highest closest to the points of release with maximums of 1mg/l in the surface layer increasing to 2mg/l in the bottom layer (Dogger Bank D, 2025d). The worst-case thickness of sediment deposited from the plume would not exceed 1mm (Dogger Bank D, 2025d). Given that the sediment volume for the ANS is several orders of magnitude smaller than that of DBD (the maximum volume of drill arisings is anticipated to be 2,545m^3), the predicted effect at the ANS will be significantly lower by comparison.

119. As set out in **Figure 7.6**, the ZoI for A2/3 overlaps with the Dogger Bank SAC and the ZoI for A8 overlaps with Holderness Offshore MCZ. Therefore, sediment from drilling would likely be dispersed into the water column and could deposit onto these designated sites. Any suspended sediment deposited on the seabed will become reworked by tidal currents and transported as bedload becoming integrated in the prevailing sediment transport regime with no net change to seabed morphology. Therefore, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** sensitivity. Given a maximum deposition thickness of 1mm for the modelling undertaken at DBD, sediment thicknesses would be anticipated to be less for the ANS foundation installation. After this initial deposition, this sediment would be continually re-suspended to reduce the thickness even further to a point where it will be effectively zero. This would be the longer-term outcome once the sediment supply from foundation installation has ceased. Therefore, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** magnitude in the near-field and far-field.

120. Overall, with a sensitivity of **negligible** and a magnitude of **negligible** for both the near-field and far-field, the potential impact of suspended sediment and seabed level on both receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment**.

7.6.2.2. Changes in suspended sediment concentration, transport, and seabed level due to seabed preparation for ANS foundation installation (MPP-C-04)

121. Seabed sediments and shallow near-bed sediments within the footprint of the ANS would be disturbed during dredging activities to create a suitable base prior to foundation installation. Suspended sediment dispersion modelling was undertaken for DBS to provide the evidence base to assess the effect of the seabed preparation on suspended sediment concentrations and seabed level. The modelling assumed a worst-case scenario of 200 turbines and three offshore platforms (all monopile foundations), with a total volume of released sediment up to 367,817m^3. The results show that seabed preparation would cause local increases in suspended sediment concentrations at the point of discharge of the sediment at each of the 200 wind turbine locations and three offshore platform foundations. The predicted suspended sediment concentrations are highest closest to the points of release with maximums of 2mg/l in the surface layer, and 0.5mg/l in the bottom layer (RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited, 2025). Suspended sediments returned to baseline conditions within 5km from the area of disturbance in the bottom layer, and within 100s of metres in the surface layer, with effects at each foundation lasting no more than a few hours. The worst-case thickness of sediment deposited from the plume would not exceed 5mm. Given that the sediment volume for the ANS is several orders of magnitude smaller than that of DBS (the maximum volume of sediment disturbed is anticipated to be 39,820m^3), any effects would be encompassed by the modelling.

122. As set out in **Figure 7.5**, the ZoI for A2/3 overlaps with the Dogger Bank SAC and the ZoI for A8 overlaps with Holderness Offshore MCZ. Therefore, sediment from seabed preparation would likely be dispersed into the water column and could deposit onto these designated sites. Any suspended sediment deposited on the seabed will become reworked by tidal currents and transported as bedload becoming integrated in the prevailing sediment transport regime with no net change to seabed morphology. Therefore, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** sensitivity. Given a maximum deposition thickness of 5mm for the modelling undertaken at DBS, sediment thicknesses would be anticipated to be less for seabed preparation for the ANS foundation installation. After this initial deposition, this sediment would be continually re-suspended to reduce the thickness even further to a point where it will be effectively zero. This would be the longer-term outcome once the sediment supply from foundation installation has ceased. Therefore, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** magnitude in the near-field and far-field.

123. Overall, with a sensitivity of **negligible** and a magnitude of **negligible** for both the near-field and far-field, the potential impact of suspended sediment and seabed level on both receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment**.

7.6.2.3. Indentations on the seabed due to the presence of installation vessels (MPP-C-07)

124. There is potential for certain vessels used during the installation of the ANS foundation to directly impact the seabed. This applies to those vessels that utilise jack-up legs or several anchors to hold station and to provide stability for a working platform. Where legs or anchors (and associated chains) have been inserted into the seabed and then removed, there is potential for an indentation to remain, proportional to the dimensions of the object. However, the disturbance footprint would be limited in scale and any impacts would be temporary in nature with indentations infilling through natural processes over the course of a few days to months. Given that the AoS are remote from the Marine Physical Processes receptors, there would be no change on the identified receptor groups associated with indentations on the seabed due to presence of installation vessels. **This impact will therefore not be considered in more detail at the next stage of assessment.**

7.6.3. Potential Effects During Operation

7.6.3.1. Changes in the tidal current regime due to the presence of infrastructure (ANS foundation) (MPP-O-01)

125. Potential operation-related impacts would be limited to a ZoI based on an understanding of the tidal ellipses in the Study Area (**Figure 7.5**). Potential impacts during operation could occur due to the physical presence of infrastructure (i.e. ANS foundation and associated scour protection), which may result in localised changes to tidal currents due to physical blockage effects. As outlined in **Section 7.4.2**, a conceptual approach supported by bespoke numerical modelling undertaken at DBD is used to inform this assessment.

126. The modelling undertaken for DBD assumed the maximum number of monopile foundations (113) and two offshore platform foundation structures on the seabed. The presence of the monopile foundations for DBD was predicted to result in a maximum reduction in speed of up to 0.04m/s within the confines of the DBD array. Within a short distance outside the array boundary, the effect reduces until there is no impact on current speed. Given that the ANS would be composed of one foundation (albeit a single GBS foundation with a larger diameter), any effects would be encompassed by the modelling undertaken for DBD.

127. Tidal currents are the primary driver of sediment transport across the Study Area. As set out in **Section 7.4.2**, the ZoI for tidal currents encroaches into the Dogger Bank receptor (A2/3) and the Holderness Inshore MCZ (A8). However, the change in tidal current speed would only be a few percent within this area of encroachment. Therefore, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** sensitivity and a **low** magnitude in the near-field and a **negligible** magnitude in the far-field.

128. Overall, with a sensitivity of **negligible** and a **low** magnitude in the near field and **negligible** magnitude in the far-field, the potential changes in the tidal current regime due to the presence of infrastructure on both receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

7.6.3.2. Changes in the wave regime due to the presence of infrastructure (ANS foundation) (MPP-O-02)

129. Potential impacts on waves during operation could occur due to the physical presence of infrastructure (ANS foundation), which may result in localised changes in waves due to physical blockage effects. The infrastructure would present an isolated obstacle to the passage of waves locally, causing a modification to the wave heights and / or directions as they pass. Generally, this would cause a wave shadow effect to be created by each piece of infrastructure. Any changes in the wave regime may contribute to changes in seabed morphology due to alteration of sediment transport patterns.

130. Wave modelling undertaken for DBD showed that the presence of the DBD windfarm resulted in a reduction of significant wave height up to 0.04m to 0.06m within the confines of the array area (Dogger Bank D, 2025d). With distance, the effect gradually reduces until there is no impact on wave conditions. Given that the ANS would be composed of one foundation (albeit a single GBS foundation with a larger diameter), any effects would be encompassed by the modelling undertaken for DBD.

131. Considering the water depths at the AoS (**Section 7.4**), waves are not the primary driver of sediment transport and therefore, neither receptor is sensitive to changes in wave regime. Therefore, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** sensitivity and a **negligible** magnitude in the near-field and far-field.

132. Overall, with a sensitivity of **negligible** and a **negligible** magnitude in the near field and far-field, the potential changes in the wave regime due to the presence of infrastructure on both receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

7.6.3.3. Changes in water circulation due to the presence of infrastructure (ANS foundation) (MPP-O-03)

133. The main potential impact on the Flamborough Front is changes in near field mixing due to local foundation wake effects and the potential for local destabilisation of water column stratification (i.e. those restricted to the area inside and immediately outside the Array Area) driven by interaction of the tidal current processes with the foundations.

134. The Flamborough Front is a strongly stratified regional feature in spring and summer and the high buoyancy forces associated with the stratification would not be destabilised by the local and relatively small turbulent wake generated in the near field of a single ANS foundation.

135. Given the small wake effect associated with a single ANS foundation, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** sensitivity and a **negligible** magnitude in the near-field and far-field.

136. Overall, with a sensitivity of **negligible** and a **negligible** magnitude in the near field and far-field, the potential changes in water circulation due to the presence of infrastructure on both receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

7.6.3.4. Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundation) (MPP-O-04)

137. Modifications to the tidal current regime and / or the wave regime due to the presence of the ANS foundation structure during the O&M phase may manifest as changes in sediment transport regime.

138. The predicted reductions in tidal currents (Operational Impact MPP-O-01) and waves (Operational Impact MPP-O-02) associated with the presence of the worst-case GBS foundation structure would result in a minimal reduction in the sediment transport potential across the areas where such changes are observed. Conversely, the smaller areas of increased tidal flow would result in minimal increase in sediment transport potential. Modelling for DBD showed a comparison of predicted bed shear stress values before and after the installation of the DBD Project, demonstrating that the change in the DBD Array Area would be maximum reduction of about 0.04N/m^2, which is considered very small (Dogger Bank D, 2025d). Given that the ANS would be composed of one foundation in isolation (albeit a GBS foundation with a larger diameter) and would have scour protection at the base of the foundation, the reduction in bed shear stress would be less than DBD. The minimal reduction in bed shear stress associated with the ANS would allow sand, the dominant sediment type across all AoS, to be transported into, across and out of the AoS.

139. Given the minimal change in bedload sediment transport and seabed morphology associated with a single ANS foundation, the Dogger Bank SAC and Holderness Offshore MCZ are considered to have a **negligible** sensitivity and a **low** magnitude in the near field, and **negligible** magnitude in the far-field.

140. Overall, with a sensitivity of **negligible** and a **low** magnitude in the near field and **negligible** magnitude in the far-field, the potential changes in water circulation due to the presence of infrastructure on both receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment**.

7.6.3.5. Indentations on the seabed due to repair and maintenance vessels (MPP-O-08)

141. As described in **Section 7.6.2.3**, given that the AoS are remote from the Marine Physical Processes receptors, there would be no change on the identified receptor groups associated with indentations on the seabed due to presence of repair and maintenance vessels. **This impact will therefore not be considered in more detail at the next stage of assessment.**

7.7. Inter-Relationships

142. Potential inter-relationships between Marine Physical Processes and other environmental topics have been considered, where relevant, in **Table 7-4.** The inter-relationships identified will be addressed in the relevant chapters in the ES with the DCO application.

Table 7-4 Marine Physical Processes – Inter-Relationships with Other Topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
MPP-C-03, MPP-C-04	Changes in suspended sediment concentration, transport, and seabed level - due to drilling for foundation installation. Changes in suspended sediment concentration, transport, and seabed level - due to seabed preparation for foundation installation.	**Marine Water and Sediment Quality** **Benthic and Intertidal Ecology** **Fish and Shellfish Ecology** **Offshore Archaeology**	The level of changes in SSC due to drilling and seabed preparation for foundation installation are assessed in **Chapter 8 Marine Water and Sediment Quality.** The level of changes in seabed level due to drilling and seabed preparation for foundation installation are assessed in **Chapter 9 Benthic and Intertidal Ecology, Chapter 10 Fish and Shellfish Ecology** and **Chapter 16 Offshore Archaeology.**	This chapter informs **Chapter 8 Marine Water and Sediment Quality, Chapter 9 Benthic and Intertidal Ecology, Chapter 10 Fish and Shellfish Ecology,** and **Chapter 16 Chapter Offshore Archaeology.**

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Operation and Maintenance				
MPP-O-04	Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundation).	**Benthic and Intertidal Ecology** **Fish and Shellfish Ecology** **Commercial Fisheries** **Offshore Archaeology**	Disruption to sediment transport processes could affect receptors of these topics by altering the existing sedimentary environment.	This chapter informs **Chapter 8 Marine Water and Sediment Quality, Chapter 9 Benthic and Intertidal Ecology, Chapter 10 Fish and Shellfish Ecology,** and **Chapter 16 Chapter Offshore Archaeology.**

7.8. Interaction Assessment

143. The impacts identified and assessed in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 7-5**.

Table 7-5 Marine Physical Processes – potential interactions between impacts

Construction, O&M	MPP-C-03	MPP-C-04	MPP-C-07	MPP-O-01	MPP-O-02	MPP-O-03	MPP-O-04	MPP-O-08
Changes in suspended sediment concentration, transport, and seabed level due to drilling for ANS foundation installation (MPP-C-03)		No	No	No	No	No	No	No
Changes in suspended sediment concentration, transport, and seabed level due to seabed preparation for ANS foundation installation (MPP-C-04)	No		No	No	No	No	No	No
Indentations on the seabed due to the presence of installation vessels (MPP-C-07)	**No**	**No**		**No**	**No**	**No**	**No**	**No**
Changes in the tidal current regime due to the presence of infrastructure (ANS foundations) (MPP-O-01)	No	No	No		Yes	Yes	Yes	No
Changes in the wave regime due to the presence of infrastructure (ANS foundations) (MPP-O-02)	No	No	No	Yes		Yes	No	No
Changes in water circulation due to the presence of infrastructure (ANS foundations) (MPP-O-03)	No	No	No	Yes	Yes		No	No
Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundations) (MPP-O-04)	No	No	No	Yes	No	No		Yes
Indentations on the seabed due to repair and maintenance vessels (MPP-O-08)	No	No	No	No	No	No	Yes	

7.8.1. DBD Project Effect Interactions

144. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

7.8.1.1. Construction Impacts (MPP-C-03, MPP-C-04, MPP-C-07)

145. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of seabed preparation activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

7.8.1.2. Operational Impacts (MPP-O-01, MPP-O-02, MPP-O-03, MPP-O-03, MPP-O-04, MPP-O-08)

146. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Marine Physical Processes, there is no potential for within-Project effects during operation.

7.9. Cumulative Effects

147. The ZoI used to identify relevant plans and projects for the Study Area as defined in **Section 7.1**. Where there is potential for cumulative effects with other plans and projects within the ZoI, this is addressed in **Table 7-6.**

7.10. Summary and Next Steps

148. The findings of this assessment for all scoped in impacts in relation to Marine Physical Processes are summarised in **Table 7-7**. Based on the preliminary assessment all potential effects are of **negligible adverse** significance or **no change** for Marine Physical Processes. These impacts received an assessment of not significant in EIA terms and therefore will not be considered further at ES.

Table 7-6 Marine Physical Processes – potential cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
MPP-C-03	Changes in suspended sediment concentration, transport, and seabed level due to drilling for ANS foundation installation	No	Offshore wind farm projects and other development could have the potential for impacts on Marine Physical Process receptors. However, as no effects were predicted to have an effect greater than negligible adverse (alone), in consideration of the small ANS footprint, no effects greater than negligible adverse are predicted cumulatively, either with the DBD Project or from other Projects.	N/A
MPP-C-04	Changes in suspended sediment concentration, transport, and seabed level due to seabed preparation for ANS foundation installation	No		N/A
MPP-C-07	Indentations on the seabed due to the presence of installation vessels	No		N/A
Operation				
MPP-O-01	Changes in the tidal current regime due to the presence of infrastructure (ANS foundation))	No	Offshore wind farm projects and other development could have the potential for impacts on Marine Physical Process receptors. However, as no effects were predicted to have an effect greater than negligible adverse (alone), in consideration of the small ANS footprint, no effects greater than negligible adverse are predicted cumulatively, either with the DBD Project or from other Projects.	N/A
MPP-O-02	Changes in the wave regime due to the presence of infrastructure (ANS foundation)	No		N/A
MPP-O-03	Changes in water circulation due to the presence of infrastructure (ANS foundation)	No		N/A
MPP-O-04	Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundation)	No		N/A
MPP-O-08	Indentations on the seabed due to repair and maintenance vessels	No		N/A

Table 7-7 Marine Physical Processes – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
Construction							
Changes in suspended sediment concentration, transport, and seabed level due to drilling for ANS foundation installation (MPP-C-03)	A2/3	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A5	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A8	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
Changes in suspended sediment concentration, transport, and seabed level due to seabed preparation for ANS foundation installation (MPP-C-04)	A2/3	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A5	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A8	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
Indentations on the seabed due to the presence of installation vessels (MPP-C-07)	A2/3	*Receptors*: All receptors *Value*: N/A – no pathway for effect *Sensitivity*: N/A – no pathway for effect	N/A – no pathway for effect	No change (Not significant)	N/A	Not significant (no change)	No
	A5	*Receptors*: All receptors *Value*: N/A – no pathway for effect *Sensitivity*: N/A – no pathway for effect	N/A – no pathway for effect	No change (Not significant)	N/A	Not significant (no change)	No
	A8	*Receptors*: All receptors *Value*: N/A – no pathway for effect *Sensitivity*: N/A – no pathway for effect	N/A – no pathway for effect	No change (Not significant)	N/A	Not significant (no change)	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
Operation and Maintenance							
Changes in the tidal current regime due to the presence of infrastructure (ANS foundation) (MPP-O-01)	A2/3	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Low** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A5	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Low** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A8	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Low** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
Changes in the wave regime due to the presence of infrastructure (ANS foundation) (MPP-O-02)	A2/3	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A5	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A8	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
Changes in water circulation due to the presence of infrastructure (ANS foundation) (MPP-O-03)	A2/3	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A5	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A8	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Negligible** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundation) (MPP-O-04)	A2/3	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Low** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A5	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Low** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
	A8	*Receptors*: All receptors *Value*: Negligible *Sensitivity*: Negligible	Near-field: **Low** Far-field: **Negligible**	Negligible (not significant)	N/A	Negligible Adverse	No
Indentations on the seabed due to repair and maintenance vessels (MPP-O-08)	A2/3	*Receptors*: All receptors *Value*: N/A – no pathway for effect *Sensitivity*: N/A – no pathway for effect	N/A – no pathway for effect	Not significant (no change)	N/A	Not significant (no change)	No
	A5	*Receptors*: All receptors *Value*: N/A – no pathway for effect *Sensitivity*: N/A – no pathway for effect	N/A – no pathway for effect	Not significant (no change)	N/A	Not significant (no change)	No
	A8	*Receptors*: All receptors *Value*: N/A – no pathway for effect *Sensitivity*: N/A – no pathway for effect	N/A – no pathway for effect	Not significant (no change)	N/A	Not significant (no change)	No

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase.

8. Marine Water and Sediment Quality

149. This chapter of the ANS PEIR presents the baseline and the potential effects of construction, O&M, and decommissioning of the ANS associated with Marine Water and Sediment Quality. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

8.1. Study Area

150. The Marine Water and Sediment Quality Study Area is aligned with that of Marine Physical Processes (**Chapter 7**) based on the tidal ellipses and wave data relative to the direct footprint of the ANS. The ZoI is based on the knowledge that effects arising from the ANS on the hydrodynamic and sedimentary regime are relatively small in magnitude and are local in spatial extent. It is expected that changes to physical processes would have returned to background levels within the excursion of one spring tidal ellipse. It is important to note that this ZoI is highly precautionary, as the ANS is a single structure, and it could be located anywhere within the three AoS.

8.2. Data Sources

151. The following data in **Table 8-1** has been collected and used to inform the assessment.

Table 8-1 Desk-based and site-specific sources used to inform the baseline for Marine Water and Sediment Quality

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Desk-Based Sources			
Marine Management Organisation (MMO) Public Register	Across the UK	2025	Other plans or projects within the Zone of Influence.
Physical and sedimentary processes data collected for the Dogger Bank A/B/C (DBA, DBB, DBC) and Sofia Offshore Wind Farms	100% Study Area / AoS	2011 to 2014	Grab samples. Particle size analysis data. Numerical modelling of changes to suspended sediment and resulting seabed level, and changes to wave and tidal regimes. Sub-surface geology. Bathymetry.
Cefas suspended sediment concentrations	100% Study Area / AoS	1998 to 2015	Annual suspended sediment concentrations between 1998 and 2015.
OSPAR Quality Status Report 2010 and 2023 and Interim Assessment 2017	North East Atlantic	2010, 2017, 2023	Chemical contamination overview and sediment quality in the 'Greater North Seas' Region, within which the AoS sit.
Site Specific Sources			
Sediment quality survey	DBD Array Area and areas south-east of the offshore ECC	2023	Sediment contaminant concentrations and particle size analysis.
Sediment quality survey	DBD Offshore ECC and AoS A2/3 and A5 specifically	2024	Sediment contaminant concentrations and Particle Size Distribution (PSD) analysis.
Grab sampling, eDNA and drop-down video and contaminant samples	A5 and A8	2025	Grab sampling, eDNA and drop-down video and contaminant samples

8.3. Assumptions and Limitations

152. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**.

153. Given the large amount of data that was collected for the site-specific surveys for the DBA, DBB, DBC, DBS and Sofia offshore wind farms, there is a good baseline understanding of marine physical processes at the AoS and adjacent areas.

154. Where any key assumptions, data limitations or technical difficulties were encountered during baseline characterisation with the above data sources, these have been identified in **Table 8-2.**

Table 8-2 Assumptions or limitations identified from the data sources for Marine Water and Sediment Quality

Data Source	Assumption/Limitation	Potential Implications on Assessment?
Site Specific Water Quality Data	All sites	Due to a lack of water quality data specific to the Study Area, desk-based sources including OSPAR's monitoring programmes have been used to inform this assessment. However, this limitation is not considered significant and is unlikely to affect the reliability and certainty of the assessment of effects.

8.4. Existing Environment

8.4.1. Sediment Quality

8.4.1.1. Sediment Characterisation

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

156. A2/3 is characterised by mixture of predominantly sand and gravelly sand, with a few areas of sandy gravel and gravel. A5 is characterised entirely by sand. A8 is characterised by sand, gravelly sand, and sandy gravel with a smaller area of gravelly muddy sand towards the southern side of the AoS (British Geological Society (BGS), 2024). This is presented in **Figure 7.4**.

157. Surveys for the Project were undertaken in 2023, 2024 and 2025 respectively which included site-specific sediment sampling within the Array Area and offshore ECC (Dogger Bank D 2025g).

158. For A2/3 within the 'Characterisation Area' for the Project, PSD analysis of these samples found that sediments were predominantly sandy; with high variation of gravel and smaller areas of mud. Based on the Folk (BGS modified) classification system, 75% of the samples were typified as 'sand', and 25% as mixed sediments (with varying content of sand, gravel, and mud). These results support the predictive BGS sediment data shown on *Figure 9.3* of Dogger Bank D PEIR **Volume 1, Chapter 9 Marine Water and Sediment Quality** (Dogger Bank D 2025d). For A5 within the Export Cable Corridor, the Particle Size Distribution (PSD) analysis of a single sample (ST029) indicated sandy sediments.

159. A further benthic survey of A5 and A8 (Fugro, 2025) confirmed sediments within A8 mainly comprised gravelly sand sediment whereas A5 comprised fine sand.

160. Additional surveys carried out to inform the EIA of DBC (the scope of which overlaps with DBD) (Dogger Bank Teeside A & B, 2014) and Sofia Offshore Wind Farm (which is within close proximity to DBD) (Forewind, 2014) also support this data.

8.4.1.1.1. Sediment Chemistry

161. Understanding of sediment chemical composition within the offshore ECC (for A2/3 and A5) is informed by the site-specific survey undertaken in 2024, (Dogger Bank D, 2025g). The results of this survey confirmed that there are no exceedances of Cefas Action Level (AL) 1 by any of the samples from within the offshore ECC. The Cefas ALs are 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 Environment Regulations (WER) Compliance Assessment Process.

162. Since the submission of PEIR for the main development, additional sediment samples were undertaken in A5 and A8 in 2025, the results of which are provided in **Table 8-3**. In the absence of Cefas ALs for Polycyclic Aromatic Hydrocarbons (PAHs), the Canadian Sediment Quality Guidelines (SQGs) are applied. The parameters for assessing contamination against the Canadian SQGs are Interim Sediment Quality Guidelines (ISQGs) and Probable Effect Level (PEL). These parameters represent two concentration thresholds; ISQG a lower threshold that is unlikely to cause a toxic response in marine organisms, and PEL being a higher threshold that is likely to cause a toxic response.

Table 8-3 Minimum, mean and maximum concentration of contaminants within the 2025 A5 and A8 benthic survey

Contaminant	Minimum (mg/kg dry weight)	Mean (mg/kg dry weight)	Maximum (mg/kg dry weight)	Lower quality guideline	Upper quality guideline
Trace metals				**AL1 (mg/kg dry weight)**	**AL2 (mg/kg dry weight)**
Arsenic (As)	4.9	5.95	6.5	20.00	100.00
Cadmium (Cd)	<0.04	0.04	0.04	0.40	5.00
Chromium (Cr)	7.7	8.075	8.4	40.00	400.00
Copper (Cu)	2.4	2.7	3.0	40.00	400.00
Mercury (Hg)	<0.01	0.04	0.13	0.30	3.00
Nickel (Ni)	3.3	4.35	5.0	20.00	200.00
Lead (Pb)	6.6	6.78	7.0	50.00	500.00
Zinc (Zn)	9.2	13.475	16.3	130.00	800.00
Organotins					
Dibutyltin (DBT)	<Limit Of Detection (LOD)	<LOD	<LOD	0.10	1.00
Tributyltin (TBT)	<LOD	<LOD	<LOD	0.10	1.00
Polyaromatic hydrocarbons (PAHs)				**ISQG (ug/kg dry weight)**	**PEL (ug/kg dry weight)**
Acenaphthene	<LOD	<LOD	<LOD	6.71	88.90
Acenaphthylene	<LOD	<LOD	<LOD	5.87	128.00
Anthracene	<LOD	<LOD	<LOD	46.90	245.00
Benz[a]anthracene	<LOD	1.99	2.63	74.80	693.00
Benzo[a]pyrene	<LOD	2.16	2.32	88.80	763.00
Benzo[b]fluoranthene	<LOD	4.4	5.52	N/A	N/A
Benzo[g,h,i]perylene	<LOD	2.9	3.51	N/A	N/A
Benzo[e]pyrene	<LOD	3.81	4.67	N/A	N/A
Benzo[k]fluoranthene	<LOD	3.32	4.12	N/A	N/A
C1-Napthalenes	<LOD	5.98	10.9	N/A	N/A
C1-Phenanthrenes	<LOD	8.42	14.0	N/A	N/A
C2-Napthalenes	<LOD	6.56	11.8	N/A	N/A
C3-Napthalenes	<LOD	7.73	12.0	N/A	N/A
Chrysene	<LOD	3.58	4.92	108.00	846.00
Dibenz[a,h]anthracene	<LOD	<LOD	<LOD	6.22	135.00
Fluoranthene	<LOD	4.92	6.75	113.00	1,494.00
Fluorene	<LOD	<LOD	<LOD	21.20	144.00
Indeno[123-c,d]pyrene	<LOD	2.36	2.94	N/A	N/A
Naphthalene	1.47	1.97	2.39	34.60	391.00
Perylene	<LOD	<LOD	<LOD	N/A	N/A
Phenanthrene	<LOD	6.0	10.7	86.70	544.00
Pyrene	<LOD	4.33	5.82	153.00	1,398.00
Total Hydrocarbon Content (THC) (mg/kg)	<LOD	2.32	2.62	N/A	N/A
Polychlorinated biphenyls (PCBs)				**AL1 (mg/kg dry weight)**	**AL2 (mg/kg dry weight)**
2,2',4,5,5'-Pentachlorobiphenyl CB101	<LOD	<LOD	<LOD	N/A	N/A
2,3,3',4,4'-Pentachlorobiphenyl CB105	<LOD	<LOD	<LOD	N/A	N/A

Contaminant	Minimum (mg/kg dry weight)	Mean (mg/kg dry weight)	Maximum (mg/kg dry weight)	Lower quality guideline	Upper quality guideline
2,3,3',4',6-Pentachlorobiphenyl CB110	<LOD	<LOD	<LOD	N/A	N/A
2,3',4,4',5-Pentachlorobiphenyl CB118	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,3',4,4'-Hexachlorobiphenyl CB128	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,4,4',5'-Hexachlorobiphenyl CB138	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,4,5,5'-Hexachlorobiphenyl CB141	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,4',5',6-Hexachlorobiphenyl CB149	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,5,5',6-Hexachlorobiphenyl CB151	<LOD	<LOD	<LOD	N/A	N/A
2,2',4,4',5,5'-Hexachlorobiphenyl CB153	<LOD	<LOD	<LOD	N/A	N/A
2,3,3',4,4',5-Hexachlorobiphenyl CB156	<LOD	<LOD	<LOD	N/A	N/A
2,3,3',4,4',6-Hexachlorobiphenyl CB158	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,3',4,4',5-Heptachlorobiphenyl CB170	<LOD	<LOD	<LOD	N/A	N/A
2,2',5-Trichlorobiphenyl CB18	<LOD	<LOD	<LOD	N/A	N/A
2,2,3,4,4',5,5'-Heptachlorobiphenyl CB180	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,4,4',5',6-Heptachlorobiphenyl CB183	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,4',5,5',6-Heptachlorobiphenyl CB187	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,3',4,4',5,5'-Octachlorobiphenyl CB194	<LOD	<LOD	<LOD	N/A	N/A
2,4,4'-Trichlorobiphenyl CB28	<LOD	<LOD	<LOD	N/A	N/A
2,4,5-Trichlorobiphenyl CB31	<LOD	<LOD	<LOD	N/A	N/A
2,2',3,5'-Tetrachlorobiphenyl CB44	<LOD	<LOD	<LOD	N/A	N/A
2,2',4,4'-Tetrachlorobiphenyl CB47	<LOD	<LOD	<LOD	N/A	N/A
2,2',4,5'-Tetrachlorobiphenyl CB49	<LOD	<LOD	<LOD	N/A	N/A
2,2',5,5'-Tetrachlorobiphenyl CB52	<LOD	<LOD	<LOD	N/A	N/A
2,3',4,4'-Tetrachlorobiphenyl CB66	<LOD	<LOD	<LOD	N/A	N/A

163. These results, combined with the results of the 2024 survey presented in PEIR (Dogger Bank D, 2025g) show that there are no exceedances of Cefas AL1/Threshold Effects Level (TEL) in any of the samples from within the AoS. Concentrations of trace metals are considerably lower than their respective Cefas AL1s. Concentrations of PAHs are lower than their respective ISQG, or where an ISQG value for a particular congener is not available, the result is still lower than the Cefas AL1 (0.1ug/kg dry weight) for all samples. Concentrations of Polychlorinated Biphenyls (PCBs) are below the limit of detection for all samples. Overall, sediment contamination across the AoS is therefore considered to be negligible.

164. Two contaminants were not sampled for; these were polybrominated diphenyl ethers (BDEs) and organochlorines. BDEs are flame retardants which were once widespread in consumer and industrial goods and processes, and their use is now severely restricted. The AoS are not located within or in close proximity to an industrial area (being a significant distance offshore) and therefore there is no pathway for effect. Similarly, organochlorines are typically found in pesticides and originate from agricultural land or estuaries; neither of which are sufficiently close to the AoS for there to be a pathway for an effect to arise.

8.4.2. Water Quality

8.4.2.1. Suspended Sediment Concentrations

165. Cefas (2016) mapped the spatial distribution of average annual suspended sediment concentrations around the UK continental shelf between 1998 and 2015 and found that Dogger Bank is characterised by values lower than 2mg/l (within A2/3 and A5). This value is in line with other estimates recorded for the area (Eleveld *et al.*, 2006) and high bed shear stresses in the area have been seen to coincide with low concentrations of suspended matter (Stanev *et al.*, 2008). These values increase closer to the Holderness coast to approximately 30mg/l in shallower water near the coast. At A8, concentrations are estimated between 2mg/l to 3mg/l.

8.4.2.2. Chemical and Physio-Chemical Parameters

166. OSPAR's Quality Status Reports (QSR) evaluate the water quality status of the North-East Atlantic and reflects over ten years of joint monitoring and assessment by OSPAR Contracting Parties. Dogger Bank and the Project fall within Region II, the 'Greater North Sea' (OSPAR, 2010).

167. For this region, the 2010 QSR concluded that concentrations of metals, PAH and PCB were unacceptable at many monitoring sites, notably along the coast. The QSR recommended measures to reduce pollution from nutrients and hazardous substances, and the oil and gas sector focussing on problem areas and regional hotspots.

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

169. The most recent 2023 QSR (OSPAR, 2023a) reported that within the whole OSPAR maritime area, there have been substantial decreases in the concentrations of many of the most serious hazardous substances (for example, PCBs and PAHs) when compared to levels in the 1980s and 1990s. However, within the majority of the sub-regions (including the Greater North Sea region), concentrations of mercury and PCB 118 remain an issue. Hazardous substances resulting from intensive human activity continue to be a problem in the Greater North Seas region. Within the Northern North Seas, 'not good' hazardous substance status persists. The 2023 QSR indicated that only one sub-region may improve its pollution status within the next 10-20 years.

8.5. Marine Water and Sediment Quality Scoping

170. **Table 8-4** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 8-4 Summary of impacts proposed to be scoped in (✓) and out (X) for Marine Water and Sediment Quality

Potential Impact	Construction	Operation	Decommissioning
Effects on Water Quality Arising from Suspended Sediment Concentrations (MWS-C-01)	X	X	X
Remobilisation of Existing Contaminated Sediments (MWS-C-03) (MWS-O-03)	X	X	X

8.6. Potential Effects

171. All impacts are scoped out of this preliminary assessment for all phases of the development due to the absence of any contaminated sediments in the study area and a limited pathway to significant suspended sediment concentrations (**Appendix D Scoping Rationale**). Therefore, no potential effects are considered further for this topic.

8.7. Inter-Relationships

172. Potential inter-relationships between Marine Water and Sediment Quality and other environmental topics have been considered, where relevant in **Table 8-5**.

Table 8-5 Marine Water and Sediment Quality – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
BEN-C-O3 FSE-C-04	SSC and deposition in relation to all construction activities	**Chapter 9 Benthic Ecology** **Chapter 10 Fish and Shellfish Ecology**	N/A – any potential increase in SSC or deposition would only be for a short duration during construction, with an expectation that conditions would return to background levels within a short period.	Section 8.4.2.
BEN-C-05 FSE-C-06	Remobilisation of contaminated sediments in relation to all construction activities	**Chapter 9 Benthic Ecology** **Chapter 10 Fish and Shellfish Ecology**	N/A – No samples exceeded the Cefas Action Levels and therefore contaminants are not of concern.	Section 8.4.1.
Operation and Maintenance				
BEN-O-03 FSE-O-04	SSC and deposition in relation to all operational activities	**Chapter 9 Benthic Ecology** **Chapter 10 Fish and Shellfish Ecology**	N/A – Any operational phase effects from suspended sediments would arise from jack-up activities only and therefore would not exceed concentrations to have a cross-topic effect.	Section 8.4.2.
FSE-O-06	Remobilisation of contaminated sediments if present	**Chapter 10 Fish and Shellfish Ecology**	N/A – No samples exceeded the Cefas Action Levels and therefore contaminants are not of concern.	Section 8.4.1

8.8. Interactions Assessment

173. No impacts were identified for further assessment and therefore no potential for impacts to interact with each other in this topic or with the main DBD Project exists.

8.9. Cumulative Effects

174. As detailed in **Table 8-6**, no effects were identified for assessment in this report and therefore no potential for cumulative effects within this topic exists.

Table 8-6 Marine Water and Sediment Quality — cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
MWS-C-01	Effects on Water Quality Arising Suspended Sediment Concentrations – Study Area	No	Not assessed alone therefore no potential for impacts cumulatively	N/A
MWS-C-03	Remobilisation of Existing Contaminated Sediments	No	Not assessed alone therefore no potential for impacts cumulatively	N/A
Operation				
MWS-O-03	Remobilisation of Existing Contaminated Sediments	No	Not assessed alone therefore no potential for impacts cumulatively	N/A

8.10. Summary and Next Steps

175. Given that there are no exceedances of contaminant levels in any AoS and the very limited potential for any significant increase in SSC, all impacts in relation to Marine Water and Sediment Quality have been scoped out and will not be considered further.

9. Benthic Ecology

176. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS associated with Benthic Ecology. As outlined in **Chapter 4 Description of the Associated Development**, three potential AoS for the ANS are being considered at this stage: A2/3, A5 and A8.

9.1. Study Area

177. The Benthic Ecology Study Area is defined as the AoS plus a ZoI (see **Figure 9.1**). The assessment of the effects on benthic ecology considers the direct footprint of the ANS (near-field) and the wider areas of the seabed and coast that could potentially be affected (far-field).

178. Based on evidence from modelling carried out for the DBD PEIR, sediment disturbance (the most far reaching of marine physical process modelled outputs) from the array area installation activities (comparable in a conservative sense to an ANS) will be localised. Though tidal ellipses are typically used to determine the dispersal of sediment and the potential distance of travel, the range of excursion does not equate with the distance over which this impact may occur on benthic receptors. This is determined by a combination of factors including sediment particle size, mass and local hydrology.

179. For the Inner Dowsing Offshore Wind Farm in the southern North Sea, it was predicted that 90% of sediments re-suspended during installation re-settled within 1km of the construction corridor (OSPAR, 2023). The amount of re-suspended material was regarded insignificant compared to baseline conditions. The findings of a separate study on the environmental impact of subsea trenching operation (Gooding *et al.*, 2012) suggested that the impacts on sediment disturbance vary depending on sediment particle size. Coarser sediments are likely to settle back in the very near-field (~100m) with finer particles deposited further afield (1km to 2km).

180. This conceptual evidence-based assessment is supported by the findings of a review of the evidence base into the physical impacts of marine aggregate dredging on sediment plumes and seabed deposits (Whiteside *et al.* 1995; John *et al.* 2000; Hiscock and Bell, 2004; Newell *et al.*, 2004; Tillin *et al.*, 2011; Cooper and Brew, 2013). Although aggregate dredging is slightly different, the findings are deemed to be similar with the impacts arising from the ANS.

181. Therefore, a distance of 2km is deemed a precautionary ZoI and will be used for the Benthic Ecology Study Area. The extent of the Benthic Ecology Study Area will provide a regional context on benthic ecology and also cover potential effects outside of the AoS (see **Figure 9.1**).

9.2. Data Sources

182. The sources listed in **Table 9-1** are considered relevant to the Benthic Ecology Study Area, and have been drawn upon where relevant to inform this report. These sources will be considered further within the EIA as needed.

Table 9-1 Desk-based sources used to inform the baseline for Benthic Ecology

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) (EMODnet, 2023)	100% Study Area	2023	EUSeaMap 2016 is a predictive habitat map which covers the seabed of a large area of European waters including the North Sea. Habitats are described in the EUNIS and Marine Strategy Framework Directive predominant habitat classifications and predicted based on a number of physical parameters. Associated confidence maps are also available which give a breakdown of confidence in predicted habitats into high, medium, and low categories.
Marine Information Network (MarLIN)	100% Study Area	2024	Details of marine species, biotopes and sensitivity assessments. Broadscale and not specific to the Study Area.
National Biodiversity Network (NBN) Atlas	100% Study Area	2024	An open access online portal for biological data in the UK. There is UK wide coverage for species distributions, collated from a variety of organisations.
Ocean Biodiversity Information System (OBIS)	100% Study Area	2024	A global open-access data source for biological data.
Technical reports for Strategic Environmental Assessment (SEA) Areas 2 and 3 (Department for Environment, Food and Rural Affairs (Defra), 2009)	100% Study Area	2009	Description of survey data published in the SEA for Areas 2 (northern North Sea) and 3 (southern North Sea).

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
JNCC resources	100% Study Area	2025	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.
JNCC resources and Natural England Open Data	100% Study Area / AoS	2025	Details of SSSI, SAC, SPA and MCZ.
OneBenthic	100% Study Area / AoS	2025	Database of benthic datasets (e.g. seabed macrofauna, sediment particle size).
Dogger Bank A, B, C, South, Sofia and Hornsea Four Offshore Wind Farms	The Study Areas of the relevant projects in the Dogger Bank region.	Various	These projects provide a baseline characterisation for fish and shellfish, supported by project site-specific surveys. Some baseline characterisations overlap with the Study Area.
The Crown Estate, De Rijke Noordzee, Centre for Environment, Fisheries and Aquaculture Science (Cefas), Flanders Marine Institute, Offshore Wind Evidence and Change Programme, North Sea Net Gain Project (Marine Environmental Data and Information Network (MEDIN), 2022)	100% Study Area / AoS	2022	Detailed maps which model community types and distributions of key benthic species in the North Sea.

183. In addition to the data in **Table 9-1**, the following site-specific data outlined in **Table 9-2** has been collected.

Table 9-2 Completed baseline surveys for Benthic Ecology

Dataset	Spatial Coverage	Survey Year
Marine geophysical survey	DBD Array Area	2023
Benthic survey	DBD Array Area	2023
Benthic survey	DBD offshore ECC and Characterisation Area (spatial overlap with A2/3)	2024
Marine geophysical survey	DBD offshore ECC, Characterisation Area, A2/3 and A8 (spatial overlap with A5)	2024 - 25
Marine geotechnical survey	DBD Array Area and offshore ECC (spatial overlap with A5, and included cone penetration tests (CPTs) at A2/3 and A8)	2025
Benthic survey	A5 and A8	2025

9.3. Assumptions and Limitations

184. This preliminary assessment uses information available at the time of writing as described in **Section 6.5.** Information available from neighbouring wind farms in the wider Dogger Bank area, site designation data for the Dogger Bank SAC and data available on the Cefas OneBenthic data portal has been considered. Datasets for the neighbouring projects include those from the characterisation (EIA) stages of development. As a result, the benthic ecology of the project areas has been thoroughly characterised and there is a high degree of confidence in the data for the purpose of informing the impact assessment.

185. During the analysis of publicly available benthic habitat maps, The European Nature Information System (EUNIS) habitat classification (EEA, 2022) was used. Classifying benthic communities, biotopes or EUNIS levels may be subject to recorder bias due to the potential for confusion between biotopes which occupy similar habitats e.g. Infralittoral sands (MB523) mapped as Sublittoral sands (MB52) or where the characteristic species could allow classification of multiple biotopes. However, this is a known characteristic of the habitat mapping process and is not considered to materially affect the overall confidence in it for the purpose of informing the assessment.

186. **Table 9-3** provides further detail on the assumptions and limitations and their implications on the assessment.

Table 9-3 Assumptions or limitations identified from the data sources for Benthic Ecology

Data Source	Assumption/Limitation	Potential Implications on Assessment?
EMODnet bathymetry	Derived from aggregated datasets of varying resolution, age, and survey methods across EU member states. May not reflect fine-scale bathymetric features or recent seabed changes due to sediment transport or anthropogenic activity.	These limitations are not considered to materially affect the overall confidence in the assessment outcomes and are used to inform broad-scale seabed morphology and hydrodynamic modelling. Supplemented with site-specific multibeam bathymetry and ground-truthing to resolve fine-scale habitat features and improve confidence in habitat suitability modelling.
OneBenthic	Integrates multiple benthic datasets (e.g. PSA, infaunal data, habitat maps) but spatial coverage is uneven and may not reflect recent ecological shifts or disturbance events. Taxonomic resolution and sampling effort also varies between contributing surveys.	As above, this limitation is not considered to materially affect the overall confidence in the assessment outcomes and provides a valuable regional context for benthic community composition and sediment characteristics. Limitations addressed through integration with site-specific benthic survey data, and eDNA to ensure contemporary relevance and ecological accuracy.
Environmental Statements from Offshore Wind Farms near Dogger Bank (e.g. Dogger Bank A, B, C; Dogger Bank South East and West; Sofia)	ES chapters may rely on predictive habitat models, legacy datasets, or limited ground-truthing. Survey effort and methods vary between projects. Some assessments may not fully capture cumulative effects or ecological connectivity across the Southern North Sea region.	As above, these limitations are not considered to materially affect the overall confidence in the assessment outcomes and are used to contextualise regional pressures and inform CEAs. Limitations will be mitigated through cross-referencing with updated datasets, MMO monitoring data, and site-specific surveys to ensure consistency and ecological robustness.

9.4. Existing Environment

187. Site-specific benthic surveys for A2/3 were conducted between 9th September and 26th September 2024 due to the AoS falling inside the Offshore ECC and Characterisation Area. Further site-specific benthic surveys have been undertaken between 31st July - 9th August 2025 within A5 and A8, with three grab samples located in A5 and 16 in A8.

188. To inform this report, predictive seabed habitats derived from EUSeaMap (European Marine Observation and Data Network (EMODnet), 2023), and survey data from DBD, Dogger Bank South, and Dogger Bank Teesside A & B (now Dogger Bank C and Sofia Offshore Wind Farms respectively) have been used. These predictive habitats and data from other OWF projects have been ground-truthed by the site-specific benthic surveys.

189. The findings of the 2024 and 2025 geophysical and benthic surveys in A2/3, and A5 and A8 respectively are described in **Table 9-4**. Other monitoring surveys of the Dogger Bank SAC for both research (carried out by the Senckenberg Research Institute) and pre-construction baseline characterisations, have shown similar results and that these sediment types and infaunal communities are representative of this region. Therefore, the 2024 survey provides a representative characterisation of A2/3 and the findings from the 2025 benthic surveys provide the characterisation for A5 and A8 (see **Table 9-2**).

Table 9-4 Biotope classifications for A2/3 from the site-specific surveys data

EUNIS (EEA, 2022) Habitat Classification		Equivalent JNCC Classification (JNCC, 2023)	Number of Stations in A2/3	Number of Stations in A5	Number of Stations in A8
Biotope Complex Level 4	Biotope Complex Level 5				
MC321 - Faunal communities of Atlantic circalittoral coarse sediment	MC3213 - *Protodorvillea kefersteini* and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand	SS.SCS.CCS.Pkef - Protodorvillea kefersteini and other polychaetes in impoverished circalittoral mixed gravelly sand	3	-	-
	MC3212 – Mediomastus fragilis, Lumbrineris spp. And venerid bivalves in circalittoral coarse sand or gravel	SS.SCS.CCS.MedLumVen - Mediomastus fragilis, Lumbrineris spp. and venerid bivalves in circalittoral coarse sand or gravel	-	-	5
	-	-	-	-	5
MC521 - Faunal communities of Atlantic circalittoral sand	-	SS.SSa.CFiSa - Circalittoral fine sand	2	-	-
	MC5211 - *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand	SS.SSa.CFiSa.EpusOborApri - *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand	10	-	-
	MC5212 - *Abra prismatica*, *Bathyporeia elegans* and polychaetes in circalittoral fine sand	SS.SSa.CFiSa.ApriBatPo - *Abra prismatica*, *Bathyporeia elegans* and polychaetes in circalittoral fine sand	1	3	6

EUNIS (EEA, 2022) Habitat Classification		Equivalent JNCC Classification (JNCC, 2023)	Number of Stations in A2/3	Number of Stations in A5	Number of Stations in A8
Biotope Complex Level 4	Biotope Complex Level 5				
MC621 - Faunal communities of Atlantic circalittoral mud	MC6216 - Seapens and burrowing megafauna in Atlantic circalittoral fine mud	SS.SMu.CFiMu.SpnMeg - Sea pens and burrowing megafauna in circalittoral fine mud	14*	-	-

*Spatial distribution within all samples showed seapens themselves to be Absent using the SACFOR classification. Mounds were also classed as Absent, apart from one station (ST118) where mounds were assessed as Rare.

190. The EUSeaMap project conducts broad-scale predictive modelling to predict habitats within the North Sea based on known environmental characteristics which are cross-checked with extant survey data. The EUSeaMap predictions, shown on **Figure 9.1** have been used to determine the anticipated habitat types within the Benthic Ecology Study Area alongside the site-specific information for A5 and A8 (EMODnet, 2023).

191. The EUNIS (EMODnet, 2023) habitat types show the majority of the Benthic Ecology Study Area is predicted to comprise of sublittoral sand (A5.2). However, as shown on **Figure 9-1,** the benthic habitats within A2/3 and A5 are predicted to be predominately deep circalittoral sand (A5.27) with small sections of deep circalittoral coarse sediment (A5.15) and deep circalittoral mud (A5.37). There is also a small section of circalittoral fine sand (A5.25) on the west and southern border of A2/3.

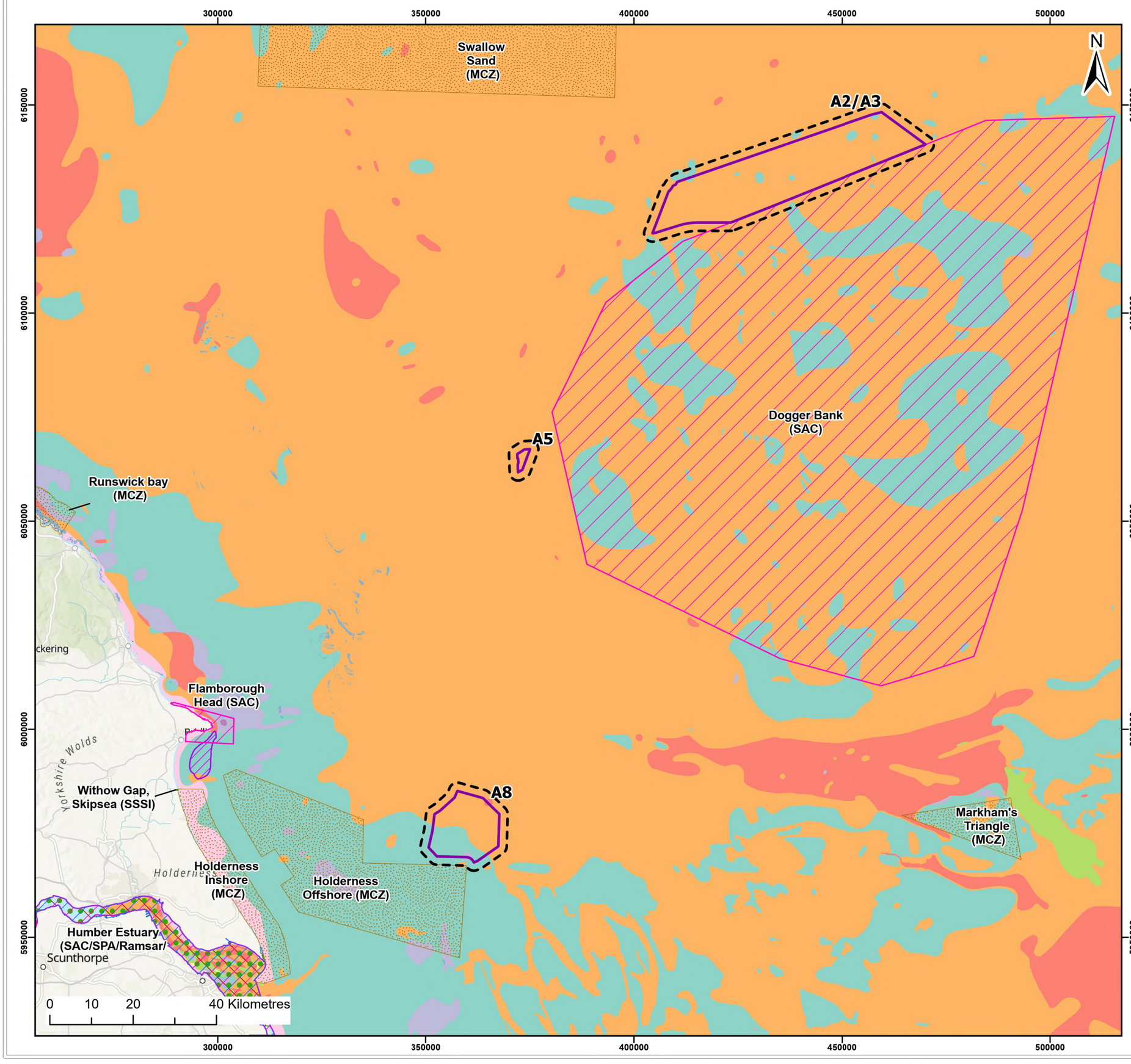
192. The benthic habitats in the section of the Benthic Ecology Study Area closer to shore (A8) are more heterogeneous, with more coarse and mixed sediment habitats predicted; such as infralittoral coarse sediments (A5.13), circalittoral coarse sediments (A5.14), circalittoral mixed sediments (A5.44) and circalittoral fine sand (A5.25) (**Figure 9-1**).

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

- All AoS:
  - Deep circalittoral sand (A5.27) – Offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. Very little data is available on these habitats however they are likely to be more stable than their shallower counterparts and characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms;
- A2/3 and A8:
  - Deep circalittoral coarse sediment (A5.15) – This habitat may cover large areas of the offshore continental shelf although there is relatively little quantitative data available. Such habitats are quite diverse compared to shallower versions of this habitat and generally characterised by robust infaunal polychaete and bivalve species; and
  - Deep circalittoral mud (A5.37) – In mud and cohesive sandy mud in the offshore circalittoral zone, typically below 50m to 70m, a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as *Thyasira* spp., echinoderms and foraminifera.
- A8:
  - Circalittoral fine sand (A5.25) – This habitat is generally more stable than shallower, infralittoral sands and consequently supports a more diverse community. This habitat extends offshore, while very little information is available on these, they are likely to be more stable than their shallower counterparts. This habitat is characterised by a range of taxa including polychaetes, bivalve molluscs and amphipod crustacea;
  - Circalittoral mixed sediments (A5.44) – A wide range of infaunal polychaetes, bivalves, echinoderms and burrowing anemones such as *Cerianthus lloydii* are often present in such habitat and the presence of hard substrata (shells and stones) on the surface enables epifaunal species to become established, particularly hydroids such as *Nemertesia* spp and *Hydrallmania* falcata. The combination of epifauna and infauna can lead to species rich communities.

9.4.1. Designations

194. The Benthic Ecology Study Area contains one protected area, Dogger Bank SAC, designated for sandbanks which are slightly covered by sea water all the time (1110) (see **Table 9-5**). This site, and its designated features in relation to benthic habitats, is detailed in **Figure 9.1.** Dogger Bank SAC is considered further through **Appendix A**. The MCZA Screening (**Appendix B**) also considers nearby MCZs, although all are located more than 2km from the AoS meaning there is no direct overlap with the designated sites and the infrastructure footprints.



Legend:

- ANS AoS
- Benthic Ecology Study Area
- Smithic Bank (as delimited by JNCC)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Ramsar
- Marine Conservation Zone (MCZ)
- Site of Special Scientific Interest (SSSI)

EU Seamap - Substrate

- Biogenic substrate
- Coarse substrate
- Fine mud
- Mixed sediment
- Muddy sand
- Rock or other hard substrata
- Sand
- Sandy mud
- Seabed
- [Sabellaria spinulosa] reefs

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Benthic Ecology Study Area, Designated Sites and Seabed Habitats

Figure:	Drawing No:				
9.1	PC6250-HAS-XX-OF-DR-GS-0057				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
01	24/10/2025	AB	GC	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

Table 9-5 Designated sites for benthic features within the Benthic Ecology Study Area

Site	Designating Features	Distance to Benthic Study Area (Closest AoS)
Dogger Bank SAC	Sandbanks which are slightly covered by sea water all the time.	Adjacent (A2/3); 7km (A5)

9.4.2. Protected Habitats and Species

195. Annex I sandbanks which are slightly covered by seawater all the time occur where areas of sand form distinct elevated bathymetric features that are predominantly surrounded by deeper water and where the top of the sandbank is in less than 20m water depth.

196. Although none have been recorded or noted within the ANS ZoIs, Reefs are protected under Annex I of the Habitats Directive. Reef habitat can be either biogenic (made up of hard matter created by living organisms) or of geogenic (formed by non-biogenic substrata) origin. A8 is 2km from the Holderness Offshore MCZ, which is outside of the ANS ZoI and has reefs as a designated feature.

197. There are currently no known areas of biogenic reef within the Benthic Ecology Study Area. The benthic surveys in 2024-2025 did not identify any potential for stony reef within any of the areas associated with A2/3 (Fugro, 2024), A5 or A8 (Fugro, 2025).

198. Two juvenile specimens of the Ocean Quahog Arctica islandica were identified in the grab samples at stations STN_01 and STN_03 of A5. The Ocean Quahog is on the OSPAR list of threatened and/or declining species and is a Feature of Conservation Importance (FOCI) in MCZs; it is a long-lived bivalve, taking over a decade to reach sexual maturity and capable of living for more than 500 years (Tyler-Walters & Sabatini, 2017).

199. The Benthic Ecology Study Area (all AoS) also contains several UK Biodiversity Action Plan (BAP) habitats. While these habitats are not afforded a Protected status, they are considered valuable ecological receptors. These habitats are predicted to be primarily composed of the following:

- Subtidal sands and gravel;
- Coarse and mixed sediments with moderate to high infaunal diversity and scour-tolerant epibenthic communities; and
- Sandy sediments with low infaunal diversity.

9.5. Benthic Ecology Scoping

200. **Table 9-6** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**. Impacts scoped in have been assessed further below.

Table 9-6 Summary of impacts proposed to be scoped in (✓) and out (X) for Benthic Ecology

Potential Impact	Construction	Operation	Decommissioning
Temporary habitat loss / physical disturbance	✓	✓	✓
Habitat loss / alteration	X	✓	X
Increased suspended sediments and sediment re-deposition	✓	✓	✓
Remobilisation of contaminated sediments	X	X	X
Pollution events resulting from the accidental release of pollutants	X	X	X
Disturbance from noise and vibration	✓ (piling only)	X	X
Introduction of marine INNS from vessels	X	X	X
Colonisation of introduced substrate	X	✓	X

9.6. Potential Effects

201. A range of potential impacts on benthic ecology have been identified which may occur during the construction, O&M, and decommissioning phases of the ANS. These impacts include those issues identified as requiring consideration in the Overarching NPS for Energy (EN-1) (DESNZ, 2025d), the NPS for Renewable Energy Infrastructure (EN-3), Department for Energy Security and Net Zero (DESNZ, 2023a).

202. **Chapter 7 Marine Physical Processes** considers any changes to hydrodynamics resulting from the ANS, such as impacts on waves and tidal currents, bedload sediment transport and seabed morphological changes, and suspended sediment concentrations. All of these processes can impact benthic ecology and the results of that chapter's assessment will be taken into account for the following impacts discussed for construction (**Section 9.6.1)** and operation (**Section 9.6.2**).

203. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to marine water and sediment quality. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction and O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worst-case scenario. Design commitments adopted for this assessment are described in **Appendix C Commitments Register** (Design Commitment CO115).

9.6.1. Potential Effects during Construction

204. Potential impacts during the construction phase of the ANS on benthic ecology will arise from disturbance of the seabed during the installation of the foundation and any required scour protection (such as rock or concrete mattresses). Impacts which span the life of the ANS (e.g. habitat loss / alteration) will be considered as part of the operational phase assessment and are therefore not considered in the construction phase assessment to avoid duplication.

9.6.1.1. Temporary Habitat Loss/ Physical Disturbance (BEN-C-01)

205. There is potential for direct physical disturbance of the seabed from construction activities such as the installation of the foundation, seabed preparation (dredging) and indentations on the seabed from jack-up vessels. Areas affected by installation activities would be relatively small scale in relation to the wider environment. They will be localised in nature, limited to the immediate footprint of the activity. Seabed recovery is expected to be rapid once installation activities cease, given the likely tolerance and recoverability of the habitats present.

206. However, because the impact directly affects the benthos and given the potential sensitivity of certain species present, the sensitivity of **medium** to **high** and magnitude of **negligible adverse** has been assessed. Therefore, the potential impact of temporary habitat loss / physical disturbance on benthic receptors is of **negligible** to **minor adverse significance** (which is not significant in EIA terms). Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will not be considered in more detail at the next stage of the assessment.**

9.6.1.2. Increased Suspended Sediments and Sediment Re-Deposition (BEN-C-03)

207. Seabed preparation (for gravity base), installation of the foundation, and any scour protection (such as rock or concrete mattresses) may cause an increase of suspended sediment concentrations and lead to sediment re-deposition in the water column. Such concentrations have the potential to affect the benthos by blocking filter feeders and/or smothering sessile species once sediment settles out of the water column and is deposited on the seabed. It is important to note that the duration of these suspended concentrations will be short-term and temporary (see **Chapter 7 Marine Physical Processes** for additional context on the scale and duration of these effects).

208. Light attenuation is highly correlated with levels of suspended matter, and the availability of light can affect phytoplankton biomass. There is currently limited research on the effects of light attenuation due to increased suspended sediments and sediment re-deposition from OWFs. Wang *et al* (2023) noted both phytoplankton and zooplankton may experience either positive or negative effects from the 'shading effect', leading to a ±10% fluctuation of primary production. Therefore, given the well-mixed nature of the southern North Sea, it is proposed to not assess primary productivity in relation to light attenuation further.

209. A sensitivity of **low** to **high,** and magnitude of **negligible adverse** has been assigned. Therefore, the potential impact of increased SSCs on benthic receptors is short-term of **negligible** to **minor adverse significance** (which is not significant in EIA terms). Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will not be considered in more detail at the next stage of assessment**.

9.6.1.3. Disturbance from Noise and Vibration (BEN-C-07)

210. It is likely that there is habituation for benthic ecology receptors to noise created by the existing shipping which occurs in the southern North Sea. There may be reactions from some benthic species to episodic noise such as that from pile driving (Lovell *et al.*, 2005; Heinisch and Wiese, 1987), however any impact is likely to be localised and temporary.

211. Other underwater noise sources during construction (e.g. vessel traffic) are unlikely to cause significant effects on benthic receptors. There is no evidence to suggest this low level of noise and vibration has a significant effect on benthic ecology. Unexploded Ordnance (UXO) clearance required ahead of construction would also have small spatial and temporal impacts due to the nature of the activity and would therefore not have the potential of likely significant effect on benthos receptors.

212. Dannheim *et al* (2020) also acknowledge that, although there is evidence suggesting a change in behaviour for some benthic species, the effects of noise and vibration remain a priority area for future research, as it is not yet known if changes to population structure and distribution may be affected in the long term.

213. However, piling may act as a source and pathway to benthic receptors. A sensitivity of **negligible** and magnitude of **negligible adverse** has been assigned. Therefore, the potential impact of disturbance of noise and vibration on benthic receptors is short-term of **negligible adverse significance** (which is not significant in EIA terms). For areas where there is the potential of ocean quahog (*Artica islandica*), the sensitivity changes to **high** for this biotope, which causes the significance to be **minor adverse**. Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will not be considered in more detail at the next stage of the assessment**.

9.6.2. Potential Effects during Operation

214. Potential impacts during operation will mostly result from the physical presence of infrastructure on the seabed (i.e. foundation and any scour protection above the seabed) which will result in habitat loss / alteration. Maintenance activities (see **Section 4.3.9**) also have the potential to result in short-term temporary impacts, similar to those occurring during construction, but smaller in extent and therefore of a lower magnitude.

215. Any changes in marine physical processes and marine water and sediment quality will be considered in **Chapter 7 Marine Physical Processes** and **Chapter 8 Marine Water and Sediment Quality**.

9.6.2.1. Temporary Habitat Loss / Physical Disturbance (BEN-O-01)

216. During the operation phase, there is potential for ongoing physical disturbance of the seabed from maintenance activities such as indentations on the seabed from jack-up vessels undertaking foundation repairs (seven JUV / HLV visits are predicted over the lifetime of the ANS). In general, the impacts from planned maintenance should be temporary, localised and smaller in scale than those during construction.

217. A sensitivity of **low** and magnitude of **negligible** adverse has been assigned. Therefore, the potential impact of temporary habitat loss / physical disturbance on benthic receptors is short-term of **negligible adverse** significance (which is not significant in EIA terms). For areas where there is the potential of ocean quahog (*Artica islandica*), the sensitivity changes to **high** for this biotope, which causes the significance to be **minor adverse.** Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will therefore not be considered in more detail at the next stage of assessment**

9.6.2.2. Habitat Loss / Alteration (BEN-O-02)

218. The presence of the ANS foundation and scour protection on the seabed is expected to result in a very small footprint of habitat loss relative in the context of the extent of broadscale habitat in the Benthic Ecology Study Area. The level of effect will be dependent upon the habitat type, its scarcity in the wider area and the presence of species that rely on that habitat.

219. Recent research suggests there is also a slight potential for ecological halo effects surrounding the planned infrastructure (Dagraer *et al.*, 2020) if it is placed on sandy habitats, which is the most common habitats expected for the AoS (see **Section 9.4**). However, it is considered that there is only potential for the impact to be significant in EIA terms if the ANS is located in sensitive and scarce habitat types, for example *S. spinulosa* reefs, stony reefs, seapens, or areas supporting burrowing megafauna, etc.

220. A sensitivity of **high** and magnitude of **negligible adverse** has been assigned. Therefore, the potential impact of habitat loss / alteration on benthic receptors is of **minor adverse** significance (which is not significant in EIA terms). Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will therefore not be considered in more detail at the next stage of assessment**.

9.6.2.3. Increased Suspended Sediments and Sediment Re-Deposition (BEN-O-03)

221. As any potential for temporary physical disturbance during operation and maintenance activities has been considered, a sensitivity of **low** to **not sensitive** and magnitude of **negligible adverse** has been assigned. Therefore, the potential impact of increased SSCs on benthic receptors is determined as short-term, with resultant **negligible adverse** significance (which is not significant in EIA terms). As no additional data are expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will therefore not be considered in more detail at the next stage of assessment**.

9.6.2.4. Colonisation of Introduced Substrate (BEN-O-11)

222. The sub-sea structures are expected to be colonised by a range of species leading to a localised increase in biodiversity. The presence of the structures would also provide habitat for mobile species and serve as a refuge for fish. This represents a change from the baseline ecology. Overall, the area available for colonisation would be low and to date, there is no evidence of significant changes of the seabed beyond the vicinity of the foundation structures due to the installation of wind farms (Lindeboom *et al.*, 2011). However, as noted in **Section 9.6.2.2,** recent research also highlights the potential for ecological halo effects resulting from colonisation of introduced substrate (Lefaible *et al.*, 2019; Breackman *et al.*, 2020).

223. The sensitivity of **low** to **high** and magnitude of **negligible adverse** has been assessed. Therefore, the potential impact of colonisation of introduced substrate on benthic receptors is of **negligible** to **minor adverse** significance (which is not significant in EIA terms). Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, **this effect will therefore not be considered in more detail at the next stage of assessment**.

9.7. Inter-Relationships

224. Potential inter-relationships between benthic ecology and other environmental topics have been considered, where relevant, in **Table 9-7**.

Table 9-7 Benthic Ecology – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where Addressed
Construction				
BEN-C-01 BEN-C-03 BEN-C-07	All impacts in relation to all construction activities	**Chapter 10 Fish and Shellfish Ecology**	Benthic species act as prey species for a wide range of fish receptors. Impacts on Benthic Ecology may therefore lead to impacts on fish and shellfish ecology.	This chapter informs **Chapter 10 Fish and Shellfish Ecology**
BEN-C-03	SSC and deposition in relation to all construction activities.	**Chapter 8 Marine Water and Sediment Quality**	The level of changes in SSC and sediment redeposition are assessed in **Chapter 8 Marine Water and Sediment Quality**. This informs the BEN-C-03 impact.	**Section 9.6.1.2** and **Section 8.7**
Operation and Maintenance				
BEN-O-01 BEN-O-02 BEN-O-03 BEN-O-11	All impacts in relation to all operational activities	**Chapter 10 Fish and Shellfish Ecology**	Benthic species act as prey species for a wide range of fish and shellfish receptors. Impacts on Benthic Ecology may therefore lead to impacts on fish and shellfish receptors.	This chapter informs **Chapter 10 Fish and Shellfish Ecology**
BEN-O-03	SSC and deposition in relation to all operational activities	**Chapter 8 Marine Water and Sediment Quality**	The level of changes in SSC and sediment redeposition are assessed in **Chapter 8 Marine Water and Sediment Quality**. This informs the BEN-O-03 impact.	**Section 9.6.2.3** and **Section 8.7**

9.8. Interactions Assessment

225. Some of the impacts identified and assessed in this topic may have the potential to interact with each other. Potential interactions between impacts are identified in **Table 9-8**.

Table 9-8 Benthic Ecology – potential interactions between impacts

Impact ID	BEN-C-01	BEN-C-03	BEN-C-07	BEN-O-01	BEN-O-02	BEN-O-03	BEN-O-11
Temporary habitat loss / physical disturbance (BEN-C-01)		Yes	No	No	No	No	No
Increased SSCs and re-deposition (BEN-C-03)	Yes		No	No	No	No	No
Disturbance from noise and vibration (BEN-C-07)	No	No		No	No	No	No
Temporary habitat loss / physical disturbance (BEN-O-01)	No	No	No		Yes	Yes	No
Habitat loss / alteration (BEN-O-02)	No	No	No	Yes		No	Yes
Increased suspended sediments and sediment re-deposition (BEN-O-03)	No	No	No	Yes	No		No
Colonisation of introduced substrate (BEN-O-11)	No	No	No	No	Yes	No	

9.8.1. DBD Project Effect Interactions

226. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

9.8.1.1. Construction Phase Interactions (BEN-C-01, BEN-C-03, BEN-C-07))

227. The DBD Project and the ANS may have overlapping construction phases, therefore it is possible, although unlikely, that construction activities may occur at the same time. All AoS are too distant from the DBD Array Area for construction impacts such as disturbance or habitat loss, increased SSC, or underwater noise to interact with the DBD Array Area, at distances of 170km, 120km and 34km.

228. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to an interaction is highly limited. Should the ANS be constructed at the same time as DBD project, the overall magnitude of temporary habitat loss / physical disturbance would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.

9.8.1.2. Operational Phase Interactions (BEN-O-01, BEN-O-02, BEN-O-03, BEN-O-11)

229. The DBD Project and the ANS may have overlapping operational phases, therefore it is possible, although unlikely, that operational activities may occur at the same time. All AoS are too distant from the DBD Array Area for operational impacts such as disturbance or habitat loss, increased SSC, or introduction of colonised substrate to interact with the DBD Array Area, at a distance of 170km, 120km and 34km.

230. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a within-Project impact is highly limited. Should the ANS operational activities occurring at the same time as the nearby projects, the overall magnitude of temporary habitat loss / physical disturbance would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.

9.9. Benthic Ecology Cumulative Effects

231. The cumulative effects that will be considered are presented in **Table 9-9.**

9.10. Summary and Next Steps

232. The preliminary assessment presented above is tabulated and summarised in **Table 9-10**. Based on the preliminary assessment all potential effects are of **negligible** or **minor adverse** significance (not significant in EIA terms). Given no additional data is expected to be available that will identify significant differences to the baseline characterised in this report, and that ground-truthing has already taken place through the benthic surveys, no further detail will be provided on the impacts presented here at ES.

Table 9-9 Benthic Ecology – potential cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
BEN-C-01	Temporary habitat loss / physical disturbance from installation of the ANS foundation, seabed preparation including sandwave levelling, and indentations on the seabed from jack-up vessels.	Yes	Temporary physical disturbance from construction activities for nearby projects could result in a cumulative effect on benthic receptors.	Dogger Bank South East, Dogger Bank South West, Eastern Green Link (EGL) 3, 4 and 5 may have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that construction activities may occur at the same time. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as the nearby projects, the overall magnitude of temporary habitat loss / physical disturbance would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.
BEN-C-03	Increased SSC and sediment re-deposition from installation of the ANS foundation and any erosion or other protection.	Yes	Increased SSC from nearby projects could result in a cumulative effect on benthic receptors.	Dogger Bank South East, Dogger Bank South West , EGL3, EGL4 and EGL5 have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that construction activities may occur at the same time. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as the nearby projects, the overall magnitude of increased SSCs and sediment re-deposition would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.
BEN-C-07	Disturbance from noise and vibration from pile driving during construction activities and UXO clearance.	Yes	Disturbance from noise and vibration generated construction activities for nearby projects could result in a cumulative effect on benthic receptors.	Dogger Bank South East, Dogger Bank South West, EGL3, EGL4 and EGL5 have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that piling activities may occur at the same time. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative noise impact is highly limited. Should the ANS be piled at the same time as the nearby projects, the overall magnitude of underwater noise would be no greater than the projects piling alone. Overall, this is a magnitude of **low,** with **minor adverse** significance.
Operation and Maintenance				
BEN-O-01	Temporary habitat loss / physical disturbance from maintenance activities.	Yes	Temporary habitat loss / physical disturbance from construction activities for nearby projects could result in a cumulative effect on benthic receptors.	Nearby projects all have operational phases that overlap with O&M of the ANS, therefore it is possible, although unlikely, that operational activities may occur at the same time. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS have operational activities occurring at the same time as the nearby projects, the overall magnitude of temporary habitat loss / physical disturbance would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.
BEN-O-02	Habitat loss / alteration from presence of the ANS foundation, scour protection, any erosion or other protection.	Yes	Habitat loss / alteration in the Dogger Bank SAC and wider area from nearby plans/projects may result in a cumulative effect on benthic receptors.	Nearby projects all have operational phases that overlap with O&M of the ANS, therefore during the operational phase, habitat loss will occur at the same time due to the presence of infrastructure. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Given the distance to the nearby projects, the overall magnitude of habitat loss / alteration would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
BEN-O-03	Increased SSC and sediment re-deposition from O&M activities.	Yes	Increased SSC from nearby projects could result in a cumulative effect on benthic receptors.	Nearby projects all have operational phases that overlap with O&M of the ANS, therefore it is possible, although unlikely, that operational activities may occur at the same time. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS have operational activities occurring at the same time as the nearby projects, the overall magnitude of increased SSCs and sediment re-deposition would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.
BEN-O-11	Colonisation of introduced substrate from presence of sub-sea structures, including foundation structures.	Yes	Presence of hard substrate from nearby projects could provide a surface for INNS to colonise, resulting in a cumulative effect on benthic receptors.	Nearby projects all have operational phases that overlap with O&M of the ANS, therefore during the operational phase, colonisation of introduced substrate will occur at the same time due to the presence of infrastructure. Given that only a single foundation could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Given the distance to the nearby projects, the overall magnitude of colonisation of introduced substrate would be no greater than the projects alone impacts. Overall, this is a magnitude of **negligible**, with **negligible adverse** significance.

Table 9-10 Benthic Ecology – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
Construction							
Temporary habitat loss / physical disturbance (BEN-C-01)	A2/3	*Receptors*: MC321 / MC521 / MC621 *Value*: Low to High *Sensitivity*: Medium to High	Negligible	Negligible to Minor Adverse	Where biotopes / communities of greater than low value or sensitivity are recorded as present, that habitat and location will be avoided.	Negligible Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Medium	Negligible	Negligible to Minor Adverse		Negligible Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Medium	Negligible	Negligible to Minor Adverse		Negligible Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High *Sensitivity*: High	Negligible	Minor Adverse		Negligible Adverse	No
Increased SSCs and re-deposition (BEN-C-03)	A2/3	*Receptor*: MC321 / MC521 / MC621 *Value:* Low to High *Sensitivity*: Low to Not Sensitive	Negligible	Short-term and Temporary Negligible to Minor Adverse	N/A	Short-term and Temporary Negligible to Minor Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Low to Not Sensitive	Negligible	Short-term and Temporary Negligible Adverse		Short-term and Temporary Negligible Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Low to Not Sensitive	Negligible	Short-term and Temporary Negligible Adverse		Short-term and Temporary Negligible to Minor Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High	Negligible	Short-term and Temporary Minor Adverse		Short-term and Temporary Minor Adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
		Sensitivity: High					
Disturbance from noise and vibration (BEN-C-07)	A2/3	*Receptor*: MC321 / MC521 / MC621 *Value:* Low to High *Sensitivity*: Negligible	Low	Short-term and Temporary Negligible adverse	Not required.	Short-term and Temporary Negligible Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Negligible	Low	Short-term and Temporary Negligible adverse		Short-term and Temporary Negligible Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Negligible	Low	Short-term and Temporary Negligible adverse		Short-term and Temporary Negligible Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High *Sensitivity*: High	Low	Short-term and Temporary Negligible adverse		Short-term and Temporary Negligible Adverse	No
Operation and Maintenance							
Temporary habitat loss / physical disturbance (BEN-O-01)	A2/3	*Receptor*: MC321 / MC521 / MC621 *Value:* Low to High *Sensitivity*: Low	Negligible	Negligible to Minor Adverse	Where biotopes / communities of greater than low value or sensitivity are recorded as present, that habitat and location will be avoided during the construction phase.	Short-term and Temporary Negligible Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Low	Negligible	Negligible to Minor Adverse		Short-term and Temporary Negligible Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Low	Negligible	Negligible to Minor Adverse		Short-term and Temporary Negligible Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High	Negligible	Minor Adverse		Short-term and Temporary Minor Adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
		Sensitivity: High					
Habitat loss / alteration (BEN-O-02)	A2/3	*Receptor*: MC321 / MC521 / MC621 *Value:* Low to High *Sensitivity*: High	Negligible	Minor Adverse	No alternative options available, micro-siting to avoid any sensitive or uncommon biotopes / communities will be undertaken where possible.	Minor Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: High	Negligible	Minor Adverse		Minor Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: High	Negligible	Minor Adverse		Minor Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High *Sensitivity*: High	Negligible	Minor Adverse		Minor Adverse	No
Increased suspended sediments and sediment re-deposition (BEN-O-03)	A2/3	*Receptor*: MC321 / MC521 / MC621 *Value:* Low to High *Sensitivity*: Low to Not Sensitive	Negligible	Short-term and Temporary Negligible to Minor Adverse	Not required.	Short-term and Temporary Negligible to Minor Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Low to Not Sensitive	Negligible	Short-term and Temporary Negligible to Minor Adverse		Short-term and Temporary Negligible to Minor Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Low to Not Sensitive	Negligible	Short-term and Temporary Negligible to Minor Adverse		Short-term and Temporary Negligible to Minor Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High *Sensitivity*: High	Negligible	Short-term and Temporary Negligible Adverse		Short-term and Temporary Negligible to Minor Adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Addressed Further in the ES
Colonisation of introduced substrate (BEN-O-11)	A2/3	*Receptor*: MC321 / MC521 / MC621 *Value:* Low to High *Sensitivity*: Not Sensitive to High	Negligible	Negligible to Minor Adverse	Not required	Negligible to Minor Adverse	No
	A5	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Not sensitive to High	Negligible	Negligible to Minor Adverse		Negligible to Minor Adverse	No
	A8	*Receptors*: MB323 / MB523 / MC321 / MC521 / MD521 *Value:* Low *Sensitivity*: Not Sensitive to High	Negligible	Negligible to Minor Adverse		Negligible to Minor Adverse	No
		Receptor: Ocean quahog (*Artica islandica*) *Value:* High *Sensitivity*: High	Negligible	Negligible Adverse		Negligible Adverse	No

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase, with the exception that underwater noise impact magnitude would be lower due to no piling at decommissioning.

* Not including designations.

10. Fish and Shellfish Ecology

233. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS associated with Fish and Shellfish Ecology. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

10.1. Study Area

234. The study area for Fish and Shellfish Ecology (hereafter referred to as the 'Study Area') is defined as International Council for the Exploration of the Sea (ICES) Rectangles 40F1, 40F2, 39F1, 39F2, 38F0, 38F1, 37F0, 37F1, 36F0 and 36F1. This Study Area has been defined to include all AoS whilst also encompassing maximum tidal excursions from AoS. The Study Area provides a regional perspective on fish and shellfish populations relative to the AoS.

235. The extent of the Study Area provides a regional context for fish and shellfish ecology, including potential effects outside of the AoS as shown on **Figure 10.1**.

10.2. Data Sources

236. A desk study has been undertaken to compile baseline information in the previously defined Study Area(s) (see **Section 10.1**) using the sources of information set out in **Table 10-1**.

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

Table 10-1 Desk-Based Sources used to inform the baseline for Fish and Shellfish Ecology

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Fish spawning and nursery grounds (Coull *et al., 1*998; Ellis *et al*., 2012)	UK territorial waters	1998 and 2012	Both studies map the distribution of predicted spawning and nursery habitats of a number of key fish and shellfish species in waters around the UK.
Marine Information Network (MarLIN)	UK territorial waters	2024	Details of marine species, biotopes and sensitivity assessments. Broadscale and not specific to the Study Area.
National Biodiversity Network (NBN) Atlas	UK territorial waters (mixed coverage depending on species).	2024	An open access online portal for biological data in the UK. There is UK wide coverage for species distributions, collated from a variety of organisations.
Ocean Biodiversity Information System (OBIS)	Global	2024	A global open-access data source for biological data.
MMO Landings Data (weight and value) by species	UK territorial waters	2013 to 2023	MMO landings data (weight and value) by species. Data is available for the ICES rectangles relevant to the Study Area.
International Bottom Trawl Survey (IBTS)	European waters	2023	The IBTS Working Group (IBTSWG) coordinates fishery-independent multispecies bottom trawl surveys within the ICES area. Data collected in spring and autumn provides estimates of stock abundance (CPUE) of commercially important demersal species. Data is available for the ICES rectangles relevant to the Study Area.
ICES International Herring Larvae Surveys (IHLS)	European waters	2013-2023	ICES programme of IHLS in the North Sea and adjacent areas, in operation since 1967. Provides quantitative estimates of herring larval abundance.
Dogger Bank South Wind Farm	The Study Areas DBS are located in the vicinity of the ANS AoS	Various	These projects provide a baseline characterisation for fish and shellfish, supported by project site-specific surveys. Some baseline characterisations overlap with the Study Area.
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) (Vasquez *et al.*, 2021).	European waters	2021	EUSeaMap 2021 is a predictive habitat map which covers the seabed of a large area of European waters including the North Sea. Habitats are described in the EUNIS and Marine Strategy Framework Directive predominant habitat classifications and predicted based on a number of physical parameters.
Site specific eDNA survey (see PEIR Volume 2, Appendix 10.3 Benthic Ecology Baseline Characterisation Report)	DBD Array Area, DBD offshore ECC and Characterisation Area (spatial overlap with A2/3)	2024	Environmental DNA (eDNA) samples have been collected from approximately 1m below sea surface and approximately 5m from the seafloor, identifying 22 distinct fish taxa in the samples.

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Site specific eDNA survey	A5 and A8	2025	Environmental DNA (eDNA) samples have been collected from approximately 1m below sea surface and approximately 5m from the seafloor

10.3. Assumptions and Limitations

238. This preliminary assessment uses information available at the time of writing as described in **Section 6.5.** Where any key assumptions, data limitations or technical difficulties were encountered during baseline characterisation with the above data sources, these are outlined in **Table 10-2.**

Table 10-2 Assumptions or limitations identified from the data sources for Fish and Shellfish Ecology

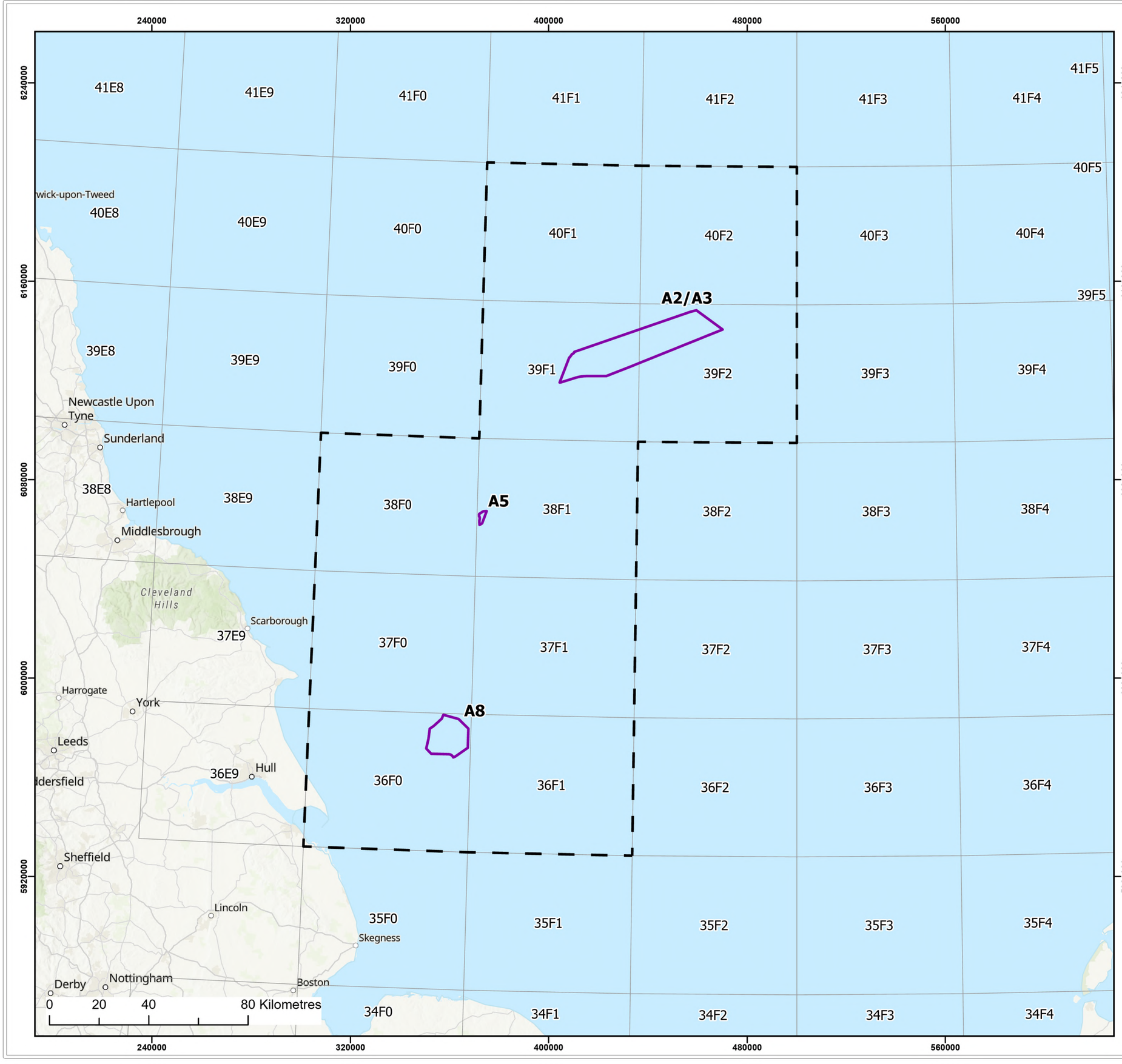
Data Source	Assumption/Limitation	Potential Implications on Assessment?
Fish spawning and nursery grounds (Coull *et al., 1*998; Ellis *et al*., 2012)	Over 10 years old and so may not reflect current species composition and abundance.	The limitation will be mitigated for herring and sandeel with the inclusion of site-specific benthic PSA data, and heatmapping of herring and sandeel habitat suitability using the most recent 10 years of ICES IHLS data, Cefas OneBenthic Data, fishing vessel monitoring system (VMS) data and other contemporary data sources as set out in the methods described by Reach *et al (*2024).
MMO Landings Data (weight and value) by species	Data does not provide a fully accurate representation of community or species composition, relative abundance, or biomass. This is because the species and associated quantities available for landing are determined through the system of Total Allowable Catches (TACs) and quotas. Quota allocation varies between regions, fleets, and individual vessels. Therefore, the landings from specific areas are not necessarily proportional to either abundance or biomass, nor is landing data corrected for fishing effort. Furthermore, vessels hold quotas for specific species and, therefore, focus fishing effort on targeting these species. Stock conservation measures (e.g. seasonal closures) may also influence the pattern of landings. A key consideration is, therefore, that the absence of a species from landing statistics does not indicate that it is absent within a given sea area. Commercial landings data therefore provide a useful indication of species composition in a given area but does not represent an exhaustive account of all species.	These limitations are not considered to materially affect the overall confidence in the assessment outcomes, which are based on a worst-case scenario (see **Section 4.3**) and, as set out in **Section 10.2** more recent and regional data sources, such as site-specific benthic survey data, site specific eDNA data, the last 10 years of IHLS data, shellfish stock assessments, have been used to supplement the baseline.

10.4. Existing Environment

10.4.1. Overview

239. The Study Area supports a wide range of fish and shellfish species, many of which have high commercial importance, with the region supporting significant commercial fisheries for over 300 years. The distribution of fish communities in the North Sea is broadly related to changes in water depth and temperature (Daan *et al.*, 1990). In shallow waters (50m - 100m depth) in the central and northern North Sea (ICES Divisions IVa and IVb) the commercial fish assemblages are dominated by haddock *Melanogrammus aeglefinus*, whiting *Merlangius merlangus*, herring *Clupea harengus*, dab *Limanda limanda* and plaice *Pleuronectes plattessa*. The Study Area is located within ICES Division IVb. Scientific trawling (independent of commercial data) of the Study Area reveals that the key species contributing to the similarity of fish assemblages in the region are solenette *Buglossidium luteum*, dab, common dragonet *Callionymus lyra*, and sand goby *Pomatoschistus minutus* (Callaway *et al.*, 2002).

240. EDNA analysis of samples collected in site-specific offshore survey campaigns for the DBD Project carried out in summer 2023 and autumn 2024, detected the presence of 22 and 26 distinct fish taxa respectively within the Study Area (see **Section 10.1**). Not all samples taken in these surveys have relevance to the ANS AoS - samples taken in the DBD Array Area are a significant distance (>34km) from the nearest AoS so are not used to inform this baseline. However, the DBD ECC overlaps with A2/3 and A5, so eDNA samples taken in these areas do have relevance to this baseline. Water samples were collected in the near surface (~1m below surface) and bottom (~5m above seafloor) layers of the water column, with samples covering A2/3 and A5. Results from both campaigns were largely comparable with Atlantic mackerel *Scomber scombrus* being the most relatively abundant taxon detected in both survey campaigns.



Legend:

- ANS AoS
- Fish and Shellfish Study Area
- ICES Rectangles

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Study Area for Fish and Shellfish Ecology Receptors

Figure: 10.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0075

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	12/11/2025	AB	GC	A3	1:1,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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241. Other commonly detected taxa associated with ANS AoS from the eDNA surveys included *Clupeidae*, sprat *Sprattus sprattus*, herring, *Pleuronectiformes* as well as plaice, dab and lemon sole *Microstomus kitt*, and the *Ammodytidae* family, indicating the presence of sandeel *Ammodytes marinus*. Detected species of conservation concern included Atlantic horse mackerel *Trachurus trachurus*, haddock, cod *Gadus morhua* and Atlantic salmon *Salmo salar* (see Dogger Bank D PEIR **Volume 2, Appendix 10.3 Benthic Ecology Characterisation Report**, Dogger Bank D, 2025g**),** which are listed as 'vulnerable' on the International Union for Conservation of Nature (IUCN) Red List. Cod is also listed as a Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) 'Threatened and / or declining species'. A belica *Leucaspius delineates*, a freshwater and invasive species, was tentatively detected in the 2024 campaign. For the full list of fish taxa detected by eDNA analysis, see Dogger Bank D PEIR **Volume 2, Appendix 10.3 Benthic Ecology Baseline Characterisation Report** (Dogger Bank D, 2025g).

242. More recently (2025), a further eDNA survey has been conducted in ANS AoS A5 and A8, with samples collected from approximately 1m below sea surface and approximately 5m from the seafloor. Results were largely in agreement with those reported for 2023/2024. Once again Atlantic mackerel was the most relatively abundant taxon detected in the surface samples across the survey area and the most frequently detected in general. Whiting was the most relatively abundant taxa in the samples taken from near the seafloor. European Sprat and sandeel (family Amodytidae) were frequently detected.

243. Overall, eDNA survey findings from 2023-2025 in the Study Area reveal a fish assemblages typical of the central North Sea and align with similar surveys undertaken for other projects in the vicinity of the AoS (DBS, 2024).

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

245. Both herring and sandeel have been identified as having spawning and nursery grounds within the Study Area. However, it should be noted that no ANS AoS overlaps with high confidence potential supporting habitat for herring spawning or sandeel (see **Figure 10.2** and **Figure 10.3**). Both of these species are highly sensitive to changes in substrate composition. Herring populations within the Study Area increase during the summer and autumn, with spawning peaking between August and October, preferring to lay their eggs on the seabed on clean gravel substrates (Coull *et al*., 1998). This specific seabed spawning habitat preference makes herring sensitive to activities that disturb the seabed, with herring also being sensitive to underwater noise.

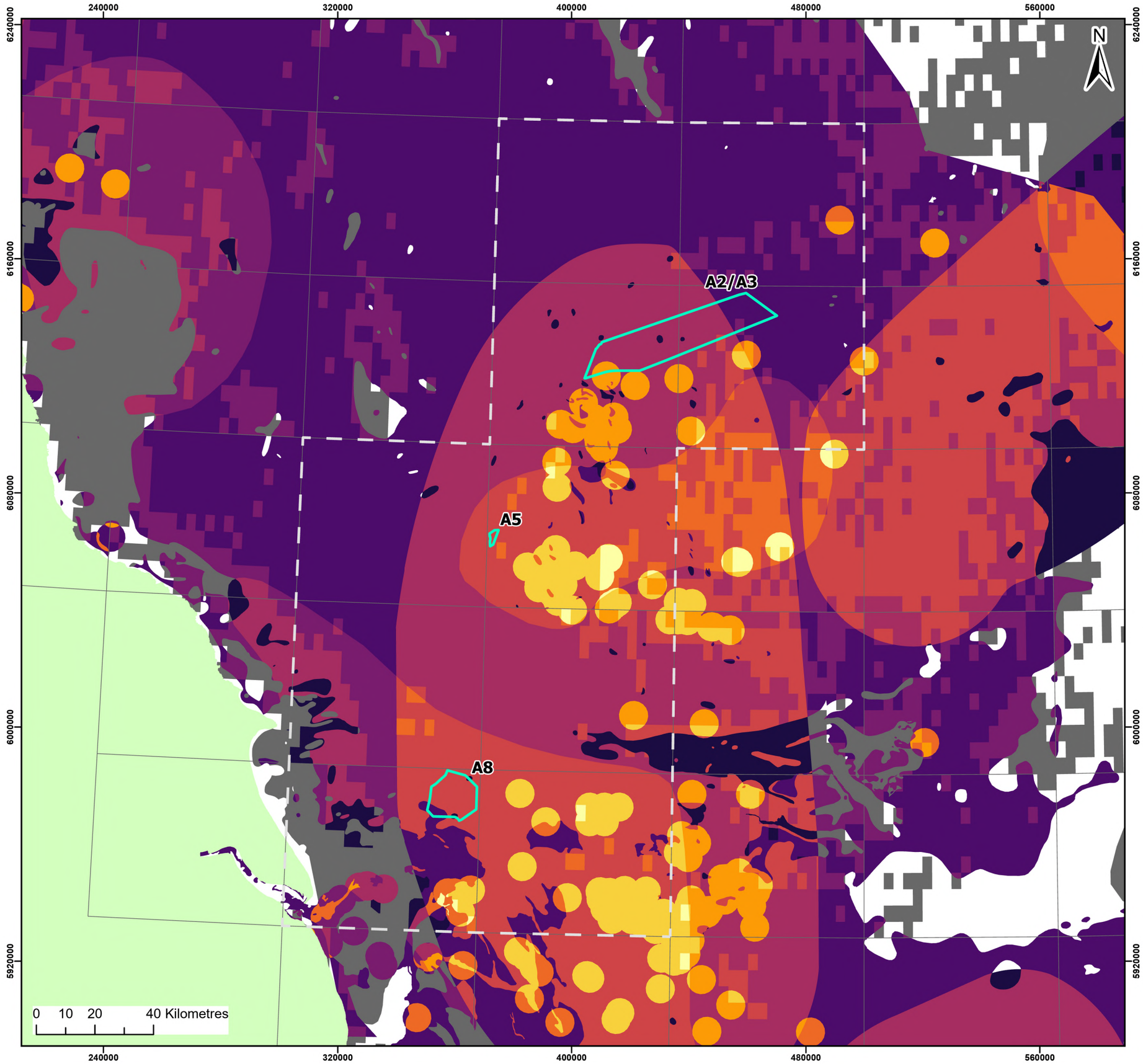
246. Dogger Bank was until recently an extensive sandeel fishing ground within UK waters, with the species also acting as a key component of food webs across the area, serving as a prey species for a wide range of predators including fish, birds and marine mammals (Cefas, 2007). However, a new byelaw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

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

248. A number of elasmobranch species are found within UK waters, with species including small-spotted catshark *Scyliorhinus canicula*, spurdog *Squalus acanthias* and thornback ray *Raja clavata* (Daan *et al*., 1990). A single basking shark *Cetorhinus maximus* has been observed in the Study Area during digital aerial surveys in November 2021. Other elasmobranch species present within UK waters may also have a presence within the Study Area including tope *Galeorhinus galeus*, cuckoo ray *Leucoraja naevus*, blue skate *Dipturus batis*, and flapper skate *Dipturus intermedius*. Blue skate and flapper skate are classed as critically endangered on the IUCN Red List.

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

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



Legend:

- ANS AoS
- Fish and Shellfish Study Area
- ICES Rectangles

Confidence potential supporting habitat

- 0.01 - 0.02 - HIGHER
- 0.02- 0.03
- 0.03 - 0.05
- 0.05 - 0.08
- 0.08- 0.1
- 0.1 - 0.15
- 0.15 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5
- 0.5 - 0.75 - LOWER

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Potential habitat and spawning ground suitability heatmap for sandeels, based on *Reach et al. (2024)* methods

Figure:	Drawing No:
10.2	PC6250-HAS-XX-OF-DR-GS-0082

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/12/2025	AB	GC	A3	1:1,300,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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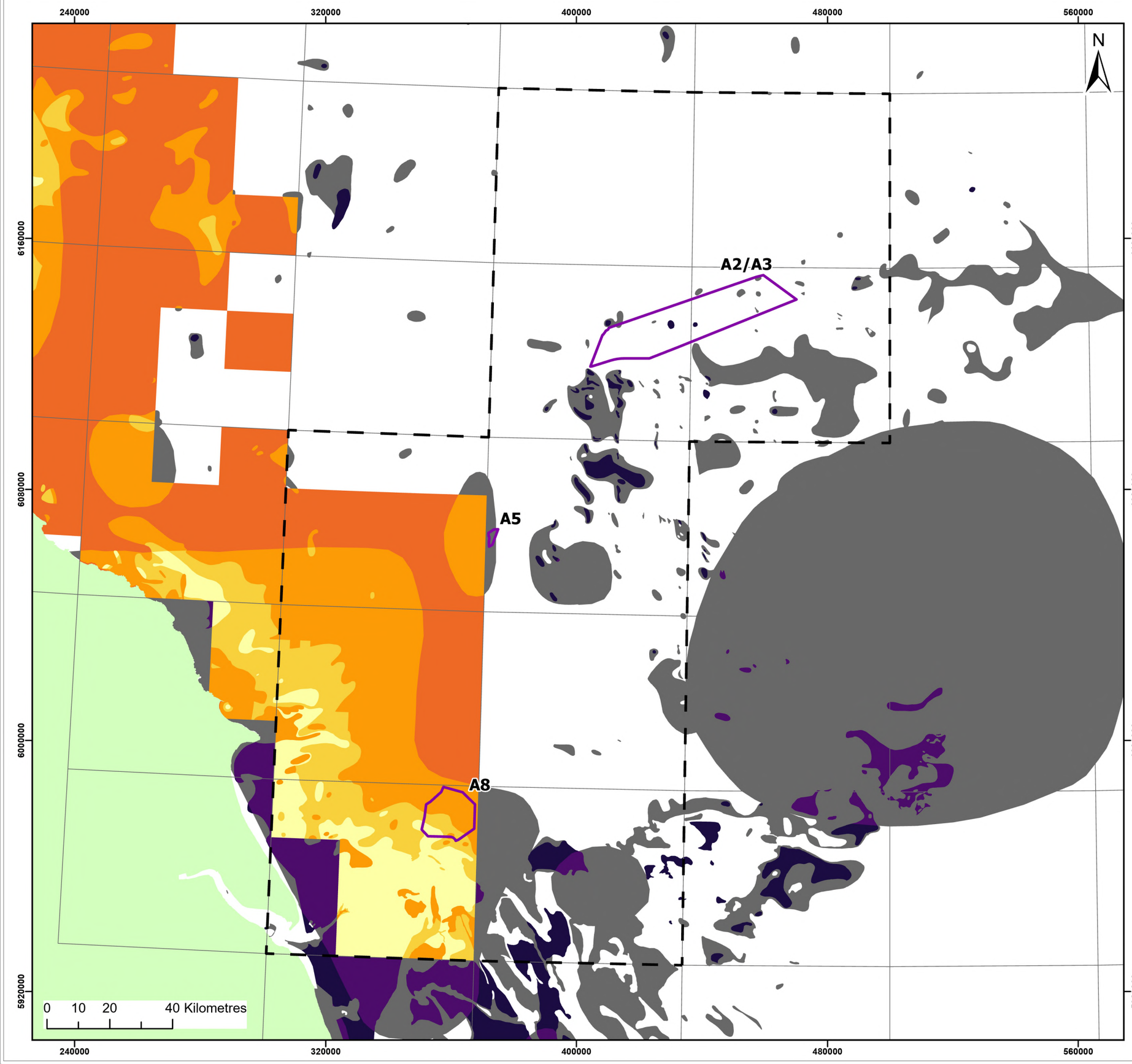

Legend:

- ANS AoS
- Fish and Shellfish Study Area
- ICES Rectangles

Herring Spawning Potential

- 0.02 - 0.04 - HIGHER
- 0.04 - 0.06
- 0.06 - 0.08
- 0.08 - 0.1
- 0.1 - 0.15
- 0.15 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.75 - LOWER

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Potential spawning habitat suitability heatmap for herring, based on *Kyle-Henney et al. (2024)* methods

Figure:	Drawing No:
10.3	PC6250-HAS-XX-OF-DR-GS-0083

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/12/2025	AB	GC	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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10.4.2. Spawning and Nursery Grounds

251. Spawning and nursery grounds, defined by Coull *et al* (1998) and Ellis *et al* (2012), have been used to indicate which species may have spawning and nursery grounds within the Study Area. Due to the broad scale of these spawning and nursery maps, the use of these data sources can be considered to represent conservative estimates of the geographical extent of spawning and nursery grounds. It is acknowledged that data sources such as Ellis *et al* (2012) are over 10 years old and so may not reflect current species composition and abundance.

252. In addition, site specific data and recent herring larvae data have been used to further inform the baseline for sandeel and herring spawning (see **Section 10.4.3**).

253. The Study Area overlaps a number of fish spawning and nursery grounds, and these are listed in **Table 10-3** with their corresponding conservation importance and hearing sensitivities.

Table 10-3 Spatial overlap between the Fish and Shellfish Ecology Study Area and spawning and nursery areas of key fish and shellfish species (Coull et al., 1998; Ellis et al., 2012)

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

Species	Hearing Group	Areas Overlapping the Study Area		Conservation Designation
		Spawning	Nursery	
Mackerel	Group 1: Fish with no swim bladder or other gas chamber	Yes (high intensity)	Yes (low intensity)	UK BAP, IUCN (Least Concern).
Sprat	Group 3: Fish in which hearing involves a swim bladder or other gas volume	Yes (undetermined intensity)	Yes (undetermined intensity)	-

254. **Table 10-4** lists the fish and shellfish species with spawning and nursery grounds that overlap with the Study Area, and the intensity and annual timings of these activities.

Table 10-4 Species with spawning and / or nursery grounds in the Offshore Development Area (Coull et al., 1998; Ellis et al., 2012) [Orange months denote spawning periods, black dots denote peak spawning]

Species	Spawning season in the Study Area												Nursery ground present?
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Plaice	●	●											Yes
Common sole				●									Yes
Cod		●	●										Yes
Anglerfish													Yes
Whiting													Yes
Mackerel					●	●	●						Yes
Ling													Yes
Sandeel sp.													Yes
European hake													Yes
Lemon sole													Yes
Sprat					●	●							Yes

Species	Spawning season in the Study Area												Nursery ground present?
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Herring													Yes
Spurdog													Yes
Tope													Yes
Blue whiting													Yes

255.

10.4.3. Sandeel and Herring Spawning Habitat

256. Both sandeel and herring are thought to be particularly sensitive to disturbance, due to highly specific substrate requirements.

257. Various spatial datasets with coverage of the Study Area have been utilised to create combined heatmaps of potential herring spawning habitat and sandeel habitat following the new 2024 MarineSpace methods set out in Kyle-Henney *et al* (2024) and Reach *et al* (2024), respectively. For details of the method see **DBD PEIR Volume 2, Appendix 11.2 Fish and Shellfish Ecology Technical Report**. Updated versions of these heatmaps (taking into account comments received from stakeholder on this document) will be presented in the ES and DCO submission. As set out in **Figure 10.2** and **Figure 10.3**, A2/3 and A5 do not overlap with the highest potential sandeel and herring spawning grounds and A8 does not overlap with the highest potential sandeel spawning grounds but has a slight overlap with a higher potential herring spawning ground.

10.5. Fish and Shellfish Ecology Scoping

258. **Table 10-5** identifies the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 10-5 Summary of impacts scoped in (✓) and out (X) for Fish and Shellfish Ecology

Potential Impact	Construction	Operation	Decommissioning
Temporary habitat loss / physical disturbance	✓	✓	✓
Habitat loss / alteration	X	✓*	X

Increased suspended sediment and sediment-redeposition	✓	X	X
Remobilisation of contaminated sediments if present	X	X	X
Underwater noise and vibration	✓	X	X
Changes in fishing pressure	X	X	X
Introduction of hard substrate	X	X	X
Cumulative impacts	✓	X	X
Transboundary impacts	X	X	X

*It is acknowledged that the impacts 'Habitat loss / alteration' and 'Introduction of hard substrate' begin during construction and could potentially continue following decommissioning if the foundation is left in-situ (although all infrastructure above the seabed is anticipated to be completely removed) but the impact is assessed once only during operation to avoid duplication of identical assessments across project phases.

10.6. Potential Effects

259. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to fish and shellfish ecology receptors. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description as the basis for the worst-case scenario. Design commitments adopted for this assessment are listed in **Appendix C Commitments Register** (Design Commitment CO115).

10.6.1. Potential Effects during Construction

260. Potential impacts during construction will arise from physical disturbance of seabed habitats and suspension of sediment during foundation installation work for the ANS (including seabed preparation).

261. Impacts which span the life of the ANS (e.g. long term habitat loss, introduction of hard substrate) is considered as part of the operation phase assessment (see **Section 10.6.2**) and are therefore not considered in the construction phase assessment to avoid duplication. It is acknowledged that these impacts begin to take effect during the construction phase.

10.6.1.1. Temporary Habitat Loss / Physical Disturbance (FSE-C-02)

262. Foundation installation work for the ANS (including seabed preparation) will physically disturb the seabed. The relevant works could potentially include seabed sweeping, dredging, interaction of jack up vessel feet with the seabed, lowering the foundation onto the seabed, and physical disturbance associated with piling.

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

264. 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.

265. Overall, herring spawning grounds are considered to have a **high** sensitivity, sandeel habitat has a **medium** sensitivity, and all other fish and shellfish receptors have a **low** sensitivity.

266. As set out in **Figure 10.2** and **Figure 10.3**, the AoS to not overlap with the highest potential sandeel and herring spawning grounds.

267. The extent of the impact will be highly limited given that a single ANS is being installed, with a single gravity base or monopile foundation (see **Section 30** for further detail of the limited design envelope). This will be a highly localised and limited magnitude in the context of the extent of supporting habitat across the region. The works do not overlap with the highest potential herring and sandeel spawning habitat. Taken together, the magnitude of impact is **negligible.**

268. Overall, with a sensitivity of **low** to **high**, and a magnitude of **negligible adverse**, the potential impact of temporary habitat loss / physical disturbance on fish and shellfish receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

10.6.1.2. Increased Suspended Sediment and Sediment-Redeposition (FSE-C-04)

269. Foundation installation work for the ANS (including seabed preparation) will physically disturb the seabed. This in turn will cause the suspension of sediment into the water column. The relevant works include seabed sweeping, dredging, interaction of jack up vessel feet with the seabed, lowering the foundation onto the seabed, and physical disturbance associated with piling.

270. 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, or for filter-feeding species such as bivalves. Further, sediment plumes may result in the smothering of sessile demersal species and 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.

271. Overall, herring spawning grounds have a **high** sensitivity, sandeel habitat has a **medium** sensitivity, and all other fish and shellfish receptors have a **low** sensitivity.

272. As set out in **Figure 10.2** and **Figure 10.3**, the AoS do not overlap with the highest potential sandeel and herring spawning grounds.

273. The extent of the impact will be highly limited given that a single ANS is being installed. This will be a highly localised, limited, and temporary impact magnitude in the context of the extent of supporting habitat across the region. The works do not overlap with the highest potential herring and sandeel spawning habitat. Taken together, the magnitude of impact is **negligible**.

274. Overall, with a sensitivity of **low** to **high**, and a magnitude of **negligible adverse** the potential impact of increased suspended sediments and sediment re-deposition on fish and shellfish receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment**.

10.6.1.3. Underwater Noise and Vibration (FSE-C-07)

275. Underwater noise generated by pile driving and other construction activities may result in disturbance and displacement of fish species and have the potential to affect spawning behaviour, nursery areas and migration patterns. The extent of the impact will be highly limited given that a single ANS will be installed.

276. This preliminary assessment is based on underwater noise modelling for monopiling at DBD and will be validated at the next stage of assessment with site specific modelling for each relevant AoS). Some AoS such as A8 are closer to the known herring spawning ground at Flamborough Head than piling already modelled in the DBD Array Area, so should this AoS be retained at DCO application stage it will be important to understand, at the next stage of assessment whether there is potential for pile driving for the ANS to disturb spawning herring at Flamborough Head. It is important to note that piling is considered as a worst case, with gravity base foundation options that do not require piling also under consideration (see **Section 4.3.3**). Should piling be undertaken, this would comprise a single monopile only (see **Section 4.3.3**).

277. Overall, herring spawning grounds have a **high** sensitivity, adult fish hearing Group 3 and Group 4 (Popper *at al*., 2014) have a **medium** sensitivity, adult fish hearing Group 1 and Group 2, and all shellfish receptors have a **low** sensitivity.

278. As set out in **Figure 10.2** and **Figure 10.3**, the AoS do not overlap with the highest potential sandeel and herring spawning grounds.

279. The extent of the impact will be highly limited given that a single ANS is being installed, with only one monopile being piled as a worst case. Based on underwater noise modelling undertaken for DBD, it is not expected that worst case 135 dB SEL_{SS} behavioural disturbance ranges will overlap with high potential herring spawning grounds which are known to be located in coastal waters of Flamborough Head. This will be a highly localised, limited, and temporary impact magnitude in the context of the extent of supporting habitat across the region. The works do not overlap with the highest potential herring and sandeel spawning habitat. Taken together, the magnitude of impact is **negligible.**

280. Overall, with a sensitivity of **low** to **high**, and a magnitude of **negligible adverse** the potential impact of underwater noise and vibration on fish and shellfish receptors is of **negligible adverse** significance. **This will be validated by site specific underwater noise modelling at the next stage of assessment.**

281. In the case of UXO, a detailed UXO survey will be completed prior to construction. The exact type, size and number of possible detonations and duration of UXO clearance operations is therefore not known at this stage. Given that a single ANS is being installed, it is considered unlikely that UXO clearance will be required. Detailed pre-construction surveys will identify the presence of any potential UXO, and the Project intends to microsite around these where possible to avoid the need for any clearance activity. **This impact will therefore not be considered in more detail at the next stage of assessment.**

10.6.2. Potential Effects during Operation

282. Potential impacts during operation will mostly result from loss of habitat and changes to seabed substrata from the physical presence of infrastructure (i.e. foundation and associated scour protection) and maintenance activities (**Section 4.3.9**).

10.6.2.1. Temporary Habitat Loss / Physical Disturbance (FSE-O-02)

283. Maintenance activities (**Section 4.3.9**) may result in localised disturbance to seabed habitats; however these will be of such limited spatial extent and frequency that they are not considered likely to cause any significant effects in EIA terms. Impact magnitude is no greater than that set out in **Section 10.6.1.1**, leading to an effect significance of **negligible adverse**. **This impact will therefore not be considered in more detail at the next stage of assessment**.

10.6.2.2. Habitat Loss / Alteration (FSE-O-03)

284. The presence of the ANS foundation and scour protection on the seabed will result in a very small footprint of habitat loss (0.0085km^2) (see **Section 4.3**) in the context of the extent of broadscale habitat in the Study Area (35,836km^2). The extent of the impact will be highly limited given that only a single ANS is being installed.

285. It is considered that there is only potential for the impact to cause significant effects in EIA terms if the ANS is located within a highly sensitive and scarce habitat type, for example high-intensity herring spawning habitat. As set out in **Figure 10-2** and **Figure 10-3**, the ANS AoS do not overlap with the highest potential sandeel and herring spawning grounds.

286. Overall, with a sensitivity of **low** to **high**, and a magnitude of **negligible adverse** the potential impact of habitat loss/alteration on fish and shellfish receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

10.7. Inter-Relationships

287. Potential inter-relationships between Fish and Shellfish Ecology and other environmental topics have been considered, where relevant, in **Table 10-6**.

Table 10-6 Fish and Shellfish Ecology – inter-relationships with other topics

Receptor	Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction					
All fish and shellfish receptors	All impacts	All impacts relating to fish and shellfish ecology	Marine Mammals Offshore Ornithology	Fish and shellfish act as prey species for a wide range of marine mammal and seabird receptors. Impacts on Fish and Shellfish Ecology may therefore lead to impacts on Marine Mammals or seabirds.	This chapter informs **Chapter 11 Marine Mammals** and **Chapter 12 Offshore Ornithology**.
	All impacts	All impacts relating to fish and shellfish ecology	Commercial Fisheries	Fish and shellfish act as a target species for Commercial Fisheries. Impacts on Fish and Shellfish Ecology may therefore lead to impacts on Commercial Fisheries.	This chapter informs **Chapter 13 Commercial Fisheries**.
	FSE-C-04	Increased suspended sediment and sediment-redeposition	Marine Water and Sediment Quality	The level of changes in SSC and sediment redeposition are assessed in **Chapter 8 Marine Water and Sediment Quality**.	**Section 10.6.1.2** and **Section 8.7**
	FSE-C-06	Remobilisation of contaminated sediments if present	Marine Water and Sediment Quality	The level of changes in SSC and sediment redeposition are assessed in **Chapter 8 Marine Water and Sediment Quality**.	**Section 10.6.1.2** and **Section 8.7**
Operation and Maintenance					
All fish and shellfish receptors	FSE-O-02 / FSE-O-03	All impacts relating to fish and shellfish ecology	Marine Mammals Offshore Ornithology	Fish and shellfish act as prey species for a wide range of marine mammal and seabird receptors. Impacts on Fish and Shellfish Ecology may therefore lead to impacts on Marine Mammals or seabirds.	This chapter informs **Chapter 11 Marine Mammals** and **Chapter 12 Offshore Ornithology**.
	FSE-O-02 / FSE-O-03	All impacts relating to fish and shellfish ecology	Commercial Fisheries	Fish and shellfish act as a target species for Commercial Fisheries. Impacts on Fish and Shellfish Ecology may therefore lead to impacts on Commercial Fisheries.	This chapter informs **Chapter 13 Commercial Fisheries**.

10.8. Interactions Assessment

288. The impacts identified and assessment in this topic have the theoretical potential to interact with each other. Potential interactions between impacts are identified in **Table 10-7.** The potentially interacting impacts identified do not have an effect significance greater than **negligible adverse** when considered alone. When considered together, due to the already negligible nature of the impacts, the interaction of impacts is not assessed to lead to an effect significance greater than **negligible adverse**. **Impact interactions will therefore not be considered in more detail at the next stage of assessment.**

Table 10-7 Fish and Shellfish Ecology – potential interactions between impacts

Construction and Operation and Maintenance

	FSE-C-02	FSE-C-04	FSE-C-07	FSE-O-02	FSE-O-03
Temporary habitat loss / physical disturbance (FSE-C-02)		Yes	No	No	No
Increased suspended sediment and sediment-redeposition (FSE-C-04)	Yes		No	No	No
Underwater noise and vibration (FSE-C-07)	No	No		No	No
Temporary habitat loss / physical disturbance (FSE-O-02)	No	No	No		Yes
Habitat loss / alteration (FSE-O-03)	No	No	No	Yes	

10.8.1. DBD Project Effect Interactions

289. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

10.8.1.1. Construction Impacts (FSE-C-02, FSE-C-04, FSE-C-07)

290. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of construction activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

10.8.1.2. Operational Impacts (FSE-O-02 FSE-O-03)

291. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Fish and Shellfish Ecology, there is no potential for within-Project effects during operation.

10.9. Cumulative Effects

292. The ZoI used to identify relevant plans and projects for the fish and shellfish ecology CEA is the Study Area as defined in **Section 10.1**. Where there is potential for cumulative effects with other plans and projects within the ZoI, this is addressed in **Table 10-8**.

10.10. Summary and Next Steps

293. The preliminary assessment above is tabulated and summarised in **Table 10-9**. Based on the preliminary assessment all potential effects are of **negligible adverse** significance. However, the following impact will be considered further at ES stage, based on site-specific underwater noise modelling, which will allow validation of the findings of this preliminary assessment:

- Underwater noise and vibration (FSE-C-07)

294. The assessment will also update the cumulative assessment with other projects, based on new information.

Table 10-8 Fish and Shellfish Ecology – potential cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
FSE-C-02	Temporary habitat loss / physical disturbance	No	The extent of these impacts is limited both spatially and temporally in relation to identified fish and shellfish receptor groups within the Study Area.	N/A
FSE-C-04	Increased suspended sediment and sediment-redeposition	No	The extent of these impacts is limited both spatially and temporally in relation to identified fish and shellfish receptor groups within the Study Area.	N/A
FSE-C-07	Underwater noise and vibration	Yes	Underwater noise from the activities of other developments within the Study Area have potential to overlap with impacts generated during the construction of the Project, in particular piling noise.	Dogger Bank South East and Dogger Bank South West may have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that piling activities may occur at the same time. Given that only a single monopile could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative noise impact is highly limited. Should the ANS be piled at the same time as these projects, the overall magnitude of underwater noise would be no greater than the projects piling alone. Overall, this is a magnitude of **low,** with **minor adverse** significance.
Operation and Maintenance				
FSE-O-02	Temporary habitat loss / physical disturbance	No	The extent of these impacts is limited both spatially and temporally in relation to identified fish and shellfish receptor groups within the Study Area.	N/A
FSE-O-03	Habitat loss / alteration	No	The extent of these impacts is limited both spatially and temporally in relation to identified fish and shellfish receptor groups within the Study Area.	N/A

Table 10-9 Fish and Shellfish Ecology – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Construction							
Temporary Habitat Loss / Physical Disturbance (FSE-C-02)	A2/3	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A5	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A8	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
Increased Suspended Sediment and Sediment-Redeposition (FSE-C-04)	A2/3	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A5	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A8	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
Underwater Noise and Vibration (FSE-C-07)	A2/3	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	Yes – the findings of this assessment will be validated with site-specific underwater noise modelling
	A5	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	Yes – the findings of this assessment will be validated with site-specific underwater noise modelling
	A8	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	Yes – the findings of this assessment will be validated with site-specific underwater noise modelling

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Operation and Maintenance							
Temporary Habitat Loss / Physical Disturbance (FSE-O-02)	A2/3	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A5	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A8	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
Habitat Loss / Alteration (FSE-O-03)	A2/3	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A5	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No
	A8	Receptors: All *Sensitivity*: Low to High	Negligible	Negligible Adverse	None required	Negligible Adverse	No

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase, with the exception that underwater noise impact magnitude would be lower due to no piling at decommissioning.

* Not including designations.

11. Marine Mammals

295. This chapter presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS associated with Marine Mammals. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

11.1. Study Area

296. The study area for marine mammals is considered in the context of their Management Unit (MU) population as shown in **Figure 11.1** and **Figure 11.2**.

11.2. Data Sources

297. A desk study has been undertaken to compile baseline information relevant to the ANS works and study area using the sources of information set out in **Table 11-1**.

Table 11-1 Desk-based sources used to inform the baseline for Marine Mammals

Data Source	Spatial Coverage		Year(s)	Summary of Data Contents
Dogger Bank D Site Specific Surveys	Dogger Bank D Array Area with a 4km buffer		2021 - 2023	Statistical analyses of high definition aerial survey marine mammal observation survey data for the Dogger Bank D Array Area.
Creyke Beck Zone 3 Dogger Bank (2013)	Dogger Bank development zone		Surveys undertaken from 2009 to 2011.	Statistical analyses of high definition aerial survey marine mammal observation survey data for the Dogger Bank development zone.
Teesside A & B Dogger Bank (2014)	Teesside A & B Dogger Bank zones		Surveys undertaken from 2010 to 2012	Site-specific boat-based survey. High-definition aerial surveys since 2009.
Humber Gateway Offshore Wind Farm	Humber Gateway Offshore Wind Farm zone		Surveys undertaken from May 2004 to April 2005	Aerial and boat-based surveys.
Small Cetaceans in the European Atlantic and North Sea (SCANS-IV): Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys (Gilles *et al.*, 2023); Winter SCANS: Estimates of Cetacean Abundance in the Southern North Sea in Winter 2024 (Ramirez-Martinez *et al.*, 2025)	European Atlantic and North Sea		Survey undertaken in Summer 2022 and winter 2024	Density and abundance estimate for cetacean species in the European Atlantic and North Sea.
Small Cetaceans in the European Atlantic and North Sea (SCANS-III): Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Hammond *et al.*, 2021)	European Atlantic and North Sea		Survey undertaken in Summer 2016	
Small Cetaceans in the European Atlantic and North Sea (SCANS-II): Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management (Hammond *et al.*, 2013)	European Atlantic and North Sea		Survey undertaken in Summer 2005	
Revised Phase III data analysis of Joint Cetacean Protocol (JCP) data resources (Paxton *et al.*, 2016)	United Kingdom (UK) waters		Data from a range of sources, analysed and reported on in 2015 and 2016	Density mapping for the most common cetacean species in UK waters.
Joint Cetacean Data Protocol (online data resource)	UK waters		Various	Sightings and survey data from a large number of surveys within UK waters.
Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.*, 2019)	North-East Atlantic		Data from a range of sources, analysed and reported in 2019	Density mapping for the most common cetacean species in European and North-East Atlantic waters for each month.

Data Source	Spatial Coverage		Year(s)	Summary of Data Contents
Scientific Advice on Matters Related to the Management of Seal Populations (SCOS, 2021, 2022, and 2024)	UK waters		August surveys undertaken in years 2021, 2022 and 2024	Updated data and information on grey seal and harbour in the UK. Includes the most recent haul-out counts and population estimates for each seal Management Unit (MU) in the UK.
Seal telemetry data (e.g. Sharples *et al.*, 2008 & 2012; Carter *et al.*, 2017 & 2022; Jones *et al.*, 2017; Russel & McConnel, 2014; Vincent *et al.*, 2017; Russel *et al.*, 2016; Matthiopoulos *et al.*, 2004)	UK waters		Various	Provides the results of seal tagging studies in the UK and Europe, to provide an indication of seal movements.
Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals (Carter *et al.*, 2022)	UK waters		Data from a range of sources, analysed and reported on in 2022	Provides grey seal and harbour seal density estimates for UK waters, and for each seal designated SAC.
Sea Watch Foundation volunteer sightings off eastern England (SWF, 2024)	Eastern England		Public sightings database (currently available data from September 2022 to April 2024)	Public sightings database, records of marine mammals at locations around the UK.
MARINE life surveys from North Sea ferry crossings	North Sea		Various	Visual survey data from ferry crossings in the North Sea.
Management Units for cetaceans in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG), 2023)	UK waters		Data from a range of sources, analysed and reported on in 2022	MU areas and abundance estimates for the most comment cetacean species in the UK.
UK Cetacean Stranding Investigation Programme	UK waters		Various	Strandings reporting and analysis for stranded cetaceans around England.

11.3. Assumptions and Limitations

298. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**. This assessment will be refined where relevant and presented in the EIA to be submitted at a later date.

299. For certain species there can be limited information on density estimates and abundances due to lack of data or sightings during surveys, therefore, a range of sources will be used to gain information for the assessments.

300. **Table 11-2** provides further detail on the assumptions and limitations and their implications on the assessment.

Table 11-2 Assumptions or limitations identified from the data sources for Marine Mammals

Data Source	Assumption/Limitation	Potential Implications on Assessment?
Small Cetaceans in the European Atlantic and North Sea (SCANS) Reports; Waggitt et al., 2019 ddistribution maps; SCOS reports; seal telemetry data	Density and abundance estimates are limited to sightings and survey efforts so may not cover every species in each report.	No implications, estimates of densities and abundances will have to be obtained across a range of reports to ensure estimates are obtained for each species.

11.4. Existing Environment

301. Within the North Sea region, the occurrence of eight different marine mammal species has been identified (Gilles *et al.*, 2023; Hammond *et al.*, 2013; Paxton *et al.*, 2016; Hammond *et al.*, 2021; Waggitt *et al.*, 2019; Special Committee on Seals (SCOS), 2024):

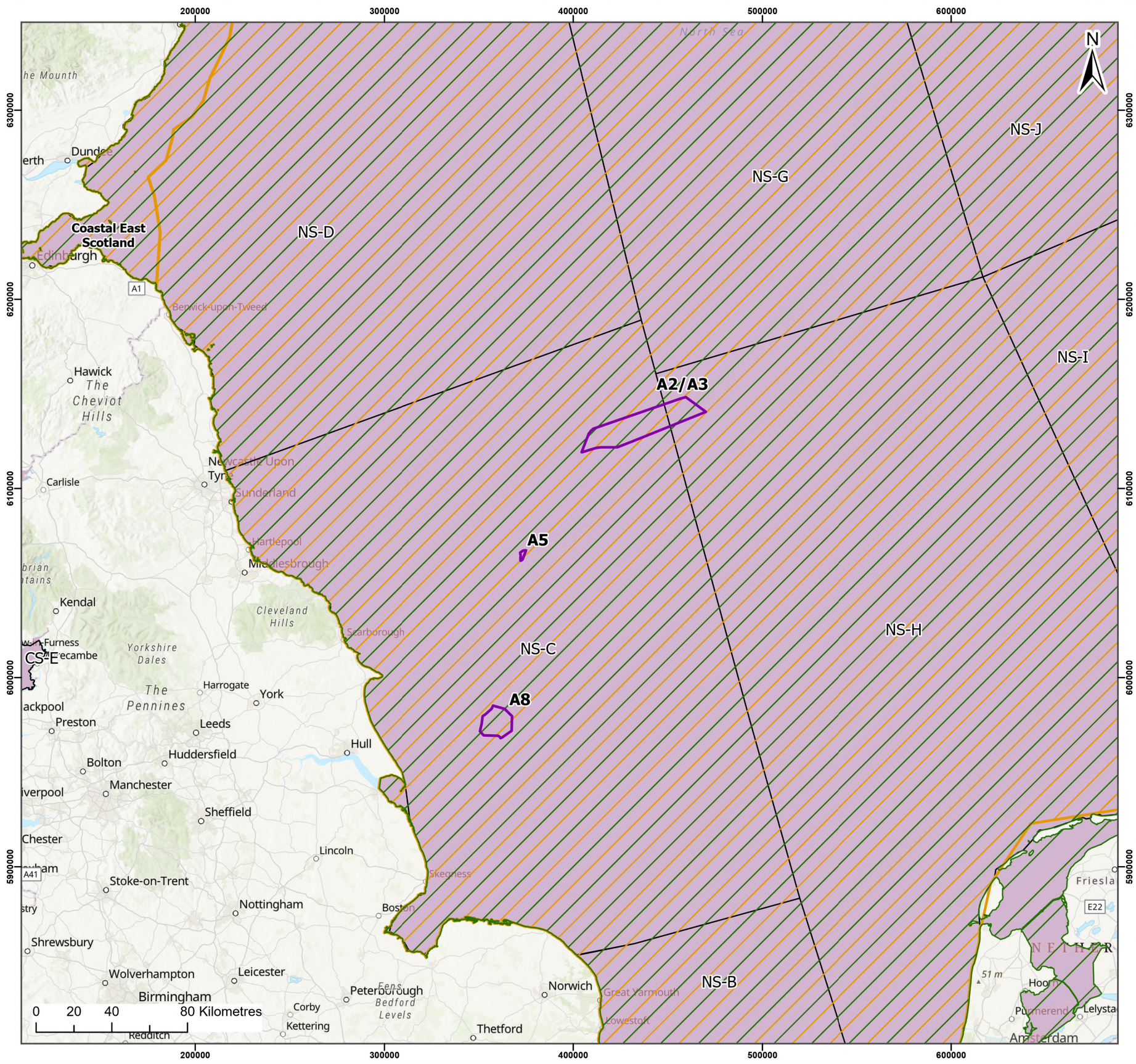
- Baleen whales:
  - Minke Whale Balaenoptera acutorostrata;
- Toothed whales:
  - Harbour porpoise *Phocoena phocoena*;
  - Bottlenose dolphin *Tursiops truncatus*;

  - White-beaked dolphin Lagenorhynchus albirostris;
  - Short-beaked common dolphin Delphinus delphis;
  - Atlantic white-sided dolphin Lagenorhynchus acutus;
- Pinnipeds:
  - Grey seal Halichoerus grypus; and
  - Harbour seal Phoca vitulina.

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

303. In the summer of 2022, a large-scale survey of marine mammals studied their distribution and abundance in the North-East Atlantic (Small Cetacean Abundance in the North Sea (SCANS) IV) (Gilles *et al.*, 2023). The ANS will be potentially situated within survey block NS-H or NS-C, where harbour porpoise was the most sighted species. Within these survey blocks, the highest species abundance for harbour porpoise was estimated to be at 55,691 (Confidence Limit (CL): 33,863 – 87,685), bottlenose dolphin was 2,520 (CL: 57 – 6,616), white-beaked dolphin was 894 (CL: 12 – 2,387), minke whale was 1,061 (CL: 231 – 2,771) and for short- beaked common dolphins it was estimated to be 192 (CL: 6 – 724).

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



Legend:

- ANS AoS
- SCANS IV Survey Block
- Bottlenose dolphin MU -Coastal East Scotland and Greater North Sea
- Harbour porpoise MU -North Sea
- Common dolphin, White-beaked dolphin, and Minke Whale Management Unit - Celtic and Greater North Seas (CGNS)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Management Units for Cetaceans

Figure: 11.1 | Drawing No: PC6250-HAS-XX-OF-DR-GS-0058

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	05/12/2025	AB	GC	A3	1:2,000,000
01	28/10/2025	JH	AB	A3	1:2,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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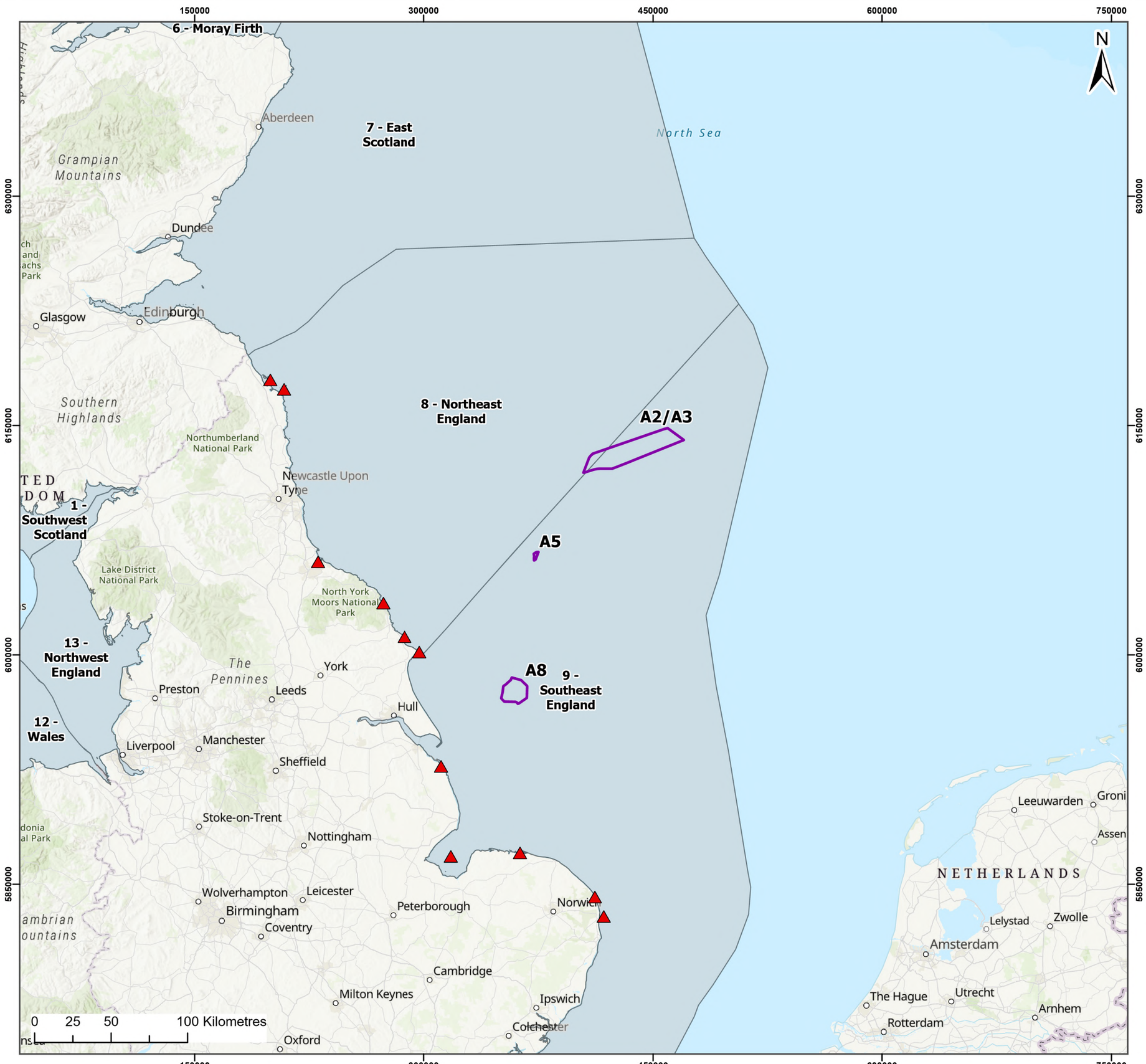

Legend:

- ANS AoS
- Seal Management Unit
- Seal Haul Out Sites

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Management Units for Seals

Figure: 11.2 | Drawing No: PC6250-HAS-XX-OF-DR-GS-0059

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	28/10/2025	JH	AB	A3	1:2,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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305. Further cetacean distribution maps of the North-East Atlantic (Waggitt *et al.*, 2019), show similar results indicating that harbour porpoise would be the species most likely to be present year-round in the AoS. The maps also indicate higher summer densities on the north-east coast of England for minke whale and white-beaked dolphins, albeit in much smaller numbers than those of harbour porpoise (Waggitt *et al.*, 2019). The Joint Cetacean Protocol Phase III report (Paxton et al., 2016) shows similar results, indicating varying areas of higher densities for harbour porpoise, minke whale and white-beaked dolphins. In addition, similar findings were found on the winter SCANS-IV survey. Between January and March 2024, as an extension to the SCANS-IV survey further aerial surveys were conducted. Harbour porpoise, white-beaked dolphin and minke whale were sighted within the survey effort. Within the survey blocks NS-C or NS-H the highest abundance estimate of harbour porpoise was 48,065 (CL: 25,640 – 77,989). For white-beaked dolphin, an abundance estimate of 3,546 (CL:841 – 7,897). However, the sighting rate of minke whales were too low to gain an estimate (Ramirez-Martinez *et al.*, 2025).

306. Both grey and harbour seals are utilising the North Sea along the north-east coast of England, with a few haul-out sites situated along the North Sea coast. Harbour seals remain more localised to their specific haul-out sites and are concentrated in coastal and inshore waters. Particularly high abundances are in The Wash area, from which they spread out up to 273km, which represents their maximum recorded foraging range (Carter *et al.*, 2022). Grey seals, on the other hand, range much further offshore, with maximum recorded traveling distances of up to 448km to forage. Haul-out clusters of abundances are found nearshore off the east coast of England, but modelled hotspots are extending all the way to the fringes of Dogger Bank (Russel *et al.*, 2017; Carter *et al.*, 2022). A8 is likely to have higher density estimates for both grey and harbour seal (although there can be variability) due to it being the closest AoS to the coast and designated seal SACs.

307. The Holderness coast lies just north of the Humber Estuary, in which a survey was carried out for the Humber Gateway Offshore Wind Farm, between 2004 and 2005. Aerial and vessel-based surveys for the Humber Gateway Offshore Wind Farm recorded 78 grey seals and eight harbour seals in the Study Area (RPS Planning Transport & Environment, 2005). Furthermore, the Humber provides an important area for grey seal pup production (Carter *et al.*, 2022).

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

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

310. Digital aerial surveys covering the DBD OWF Array Area and a 4km buffer were conducted monthly between October 2021 and September 2023. Although the DBD Array Area lies outside the AoS, it provides useful information on marine mammals in the wider area. Surveys were undertaken using high-resolution camera systems to capture digital still imagery to assess the abundance and distribution marine megafauna within the survey area. The digital aerial baseline surveys indicate the key species observed in the Array Area were harbour porpoise, common dolphin, minke whale, grey seal, and several unidentified species groups (seals, marine mammals and porpoise / dolphin).

311. Based on available data at this stage, it is expected that only seven marine mammal species occur regularly enough in the area to warrant assessment. All other species are anticipated to be only occasional or rare visitors. The species expected to be taken forward for assessment are:

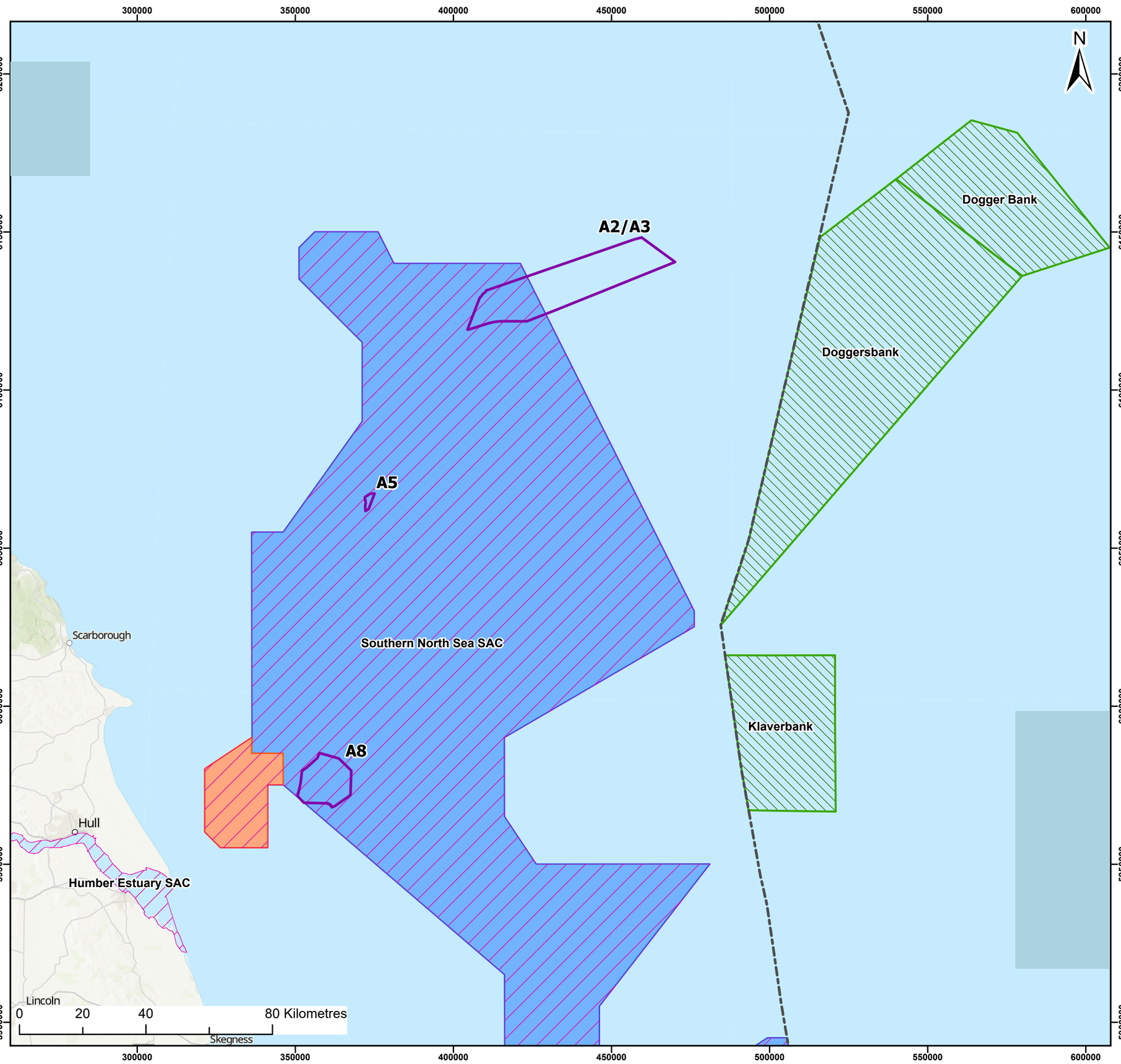
- Harbour porpoise;
- White-beaked dolphin;
- Bottlenose dolphin;
- Common dolphin;
- Minke whale; and
- Harbour and grey seal.

11.4.1. Management Units

312. The MUs for harbour porpoise, bottlenose dolphin, minke whale, white-beaked dolphin, common dolphin are shown on **Figure 11.1**. The MUs for harbour and grey seal, including key haul-out sites are shown on **Figure 11.2**.

11.4.2. Designations

313. Within the Southern North Sea (SNS) SAC, A8 and A5 lie fully within and A2/3 is partially overlapping with the SAC. These are within the summer area of the SNS SAC, which is the seasonal designated area of the SAC that has persistently higher densities of harbour porpoise during summer months (April to September inclusive) (**Figure 11.3**).



Legend:

- ANS AoS
- Special Area of Conservation (SAC)
- Southern North Sea SAC Winter Area
- Southern North Sea SAC Summer Area
- Natura 2000 Site
- UK Waters International / Exclusive Economic Zone Boundary

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

UK and Overseas Designated Areas for Marine Mammal Species

Figure: 11.3

Drawing No: PC6250-HAS-XX-OF-DR-GS-0060

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	28/10/2025	JH	AB	A3	1:1,200,000
02	23/01/2026	JH	AB	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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314. There are several SACs within the areas surrounding area the AoS. The closest is the Humber Estuary SAC, approximately 50km from A8, with a major haul-out site nearby at Donna Nook. The Wash and North Norfolk Coast SAC lies approximately 85km from the nearest point of A8 and is designated for harbour seal, with major haul-out sites at The Wash (105km) and Blakeney Point (96km). The Berwickshire and North Northumberland Coast SAC for grey seal lies approximately 207km away from the closest AoS (A2/3).

315. Flamborough Head SAC is located approximately 52km from the closest AoS (A8) and although not designated for any marine mammals, the number of grey seals using Flamborough Head as a haul-out site have increased over the past few years. The Yorkshire Wildlife Trust (2023) recorded over 500 grey seals during their August surveys.

316. In terms of designated sites overseas, A2/3 is approximately 33km from the Dutch Doggersbank Natura 2000 site and 64km from the German Dogger Bank Natura 2000 site to the east. The Dutch Doggersbank has been assessed for harbour porpoise, grey and harbour seal, whereas the German Dogger Bank only features harbour porpoise and harbour seal. South of these sites lies the Natura 2000 site Klaverbank, designated for harbour porpoise, grey and harbour seal, which is approximately 128km from the nearest A2/3.

317. A HRA screening and draft RIAA has been undertaken (**Appendix A**) to consider the potential for likely significant effects on designated sites.

11.5. Marine Mammals Scoping

318. **Table 11-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 11-3 Summary of impacts proposed to be scoped in (✓) and out (X) for Marine Mammals

Potential Impact	Construction	Operation	Decommissioning
Underwater noise: physical and auditory injury resulting from impact piling during construction	✓	×	×
Underwater noise: behavioural impacts resulting from impact piling during construction	✓	×	×
Underwater noise: physical and auditory injury resulting from noise associated with other construction and maintenance activities (such as dredging and rock placement) and vessel noise	✓	×	×
Underwater noise: behavioural impacts resulting from other construction and maintenance activities (such as dredging and rock placement), and vessel noise (including disturbance to foraging areas)	✓	✓	×
Disturbance at seal haul-out sites	✓	×	×
Vessel interaction (increase in risk of collision)	✓	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×

11.6. Potential Effects

319. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to marine mammal receptors. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, operation and maintenance activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worst-case scenario. Design commitments adopted for this assessment are described in the sections above and listed in **Appendix C Commitments Register** (Design Commitments CO114 and CO115). Assumptions and definitions are provided below and in line with the methodology described in **Chapter 6 Methodology**.

11.6.1. Potential Effects during Construction

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

11.6.1.1. Underwater Noise: Physical and Auditory Injury from Impact Piling During Construction (MM-C-01)

321. Different foundation types are being considered for the ANS infrastructure, as discussed in **Section 4.3**. If monopiles are required, this is driven into the seabed by impact piling or vibro-piling. Therefore, key potential impacts during construction for marine mammals are expected to be those from underwater noise, principally from piling activity. Potential impacts of underwater noise due to piling are auditory injury: both Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS).

322. All species of cetaceans rely on sonar for navigation, finding prey and communication, and are therefore highly sensitive to permanent hearing damage (Southall *et al.*, 2007). PTS is a permanent impact, and marine mammals within the potential impact area are considered to have very limited capacity for avoidance and are considered unable to recover.

323. Any TTS would be temporary, and individuals would recover from any temporary changes in hearing sensitivity after the noise source has ceased. However, as a precautionary approach, medium sensitivity to TTS assumes an individual has limited capacity to avoid, adapt to, tolerate or recover from the anticipated effect.

324. The sensitivity for all marine mammal receptors to PTS is considered to be **high** as a precautionary approach. The sensitivity for all marine mammal receptors to TTS is considered to be **medium**.

325. The extent of the impact will be highly limited given that a single ANS is being installed, with only one monopile being piled as a worst case. Based on underwater noise modelling undertaken for the main development PEIR, the impact ranges for PTS due to piling resulted in negligible magnitudes for all species other than harbour porpoise and minke whale which had magnitudes of medium. For TTS all species were assessed as having negligible magnitudes of impact.

326. Therefore, for the ANS installation it is expected the magnitudes would be less than what was assessed for the DBD Project at PEIR due to the presence of only one monopile. Therefore, for PTS all species are predicted to have a magnitude of impact of **negligible**, other than harbour porpoise and minke whale which is predicted to have a magnitude of **low**. For TTS, all species are assumed to have a magnitude of **negligible.**

327. Overall, with a sensitivity of **high**, and a magnitude of **low** the potential impact of PTS injury due to impact piling underwater noise on harbour porpoise and minke whale is of **moderate adverse** significance. For all other species, with a sensitivity of **high**, and a magnitude of **negligible** the potential impact of PTS auditory injury due to impact piling underwater noise on marine mammal receptors is of **minor adverse** significance. For TTS, a sensitivity of **medium** and magnitude of **negligible** results in a **negligible adverse** significance for all species. These predictions will be validated by site specific underwater noise modelling at the next stage of assessment.

328. To reduce the risk of marine mammal exposure to PTS a Marine Mammal Mitigation Protocol (MMMP) will be implemented to provide appropriate mitigation and monitoring during piling (Design Commitment CO114 in **Appendix C**).

11.6.1.2. Underwater Noise: Behavioural Impacts from Impact Piling During Construction (MM-C-02)

329. Underwater noise during piling has the potential to result in disturbance effects. For disturbance effects of underwater noise, a dose response curve approach will be used wherever there is data available. At present, it is expected that a dose response curve approach would only be possible for harbour porpoise, grey seal, and harbour seal, for impact piling. It is currently expected that this assessment would utilise the information provided within Graham *et al* (2017; 2019) for harbour porpoise, and Whyte *et al* (2020) for grey seal and harbour seal, as well as the results of the underwater noise modelling to inform this assessment. The best available dose response curves (at the time of writing) will be used to inform these assessments.

330. For disturbance effects, where a dose response curve approach is not possible due to a lack of information, the potential for disturbance will use reported and observed disturbance ranges wherever there is the information to do so (including the Effective Deterrence Ranges (EDR) for harbour porpoise (Joint Nature Conservation Committee (JNCC) *et al.*, 2025 and the disturbance range for seal species due to piling as reported by Russel *et al* (2016). A review of the reported disturbance ranges for each marine mammal species, and for each potential noise source, will be undertaken to determine whether an assessment can be undertaken.

331. Marine mammals within the potential disturbance area are considered to have the capacity to avoid such effects, although any disturbance to marine mammals would be temporary and they would be expected to return to the area once the disturbance had ceased. The sensitivity of marine mammals is therefore considered to be **medium** for all marine mammal species.

332. Based on the assessments undertaken for the PEIR for the DBD OWF, using different disturbance assessment methods mentioned above, magnitudes of negligible to low for all species were assessed. Therefore, as a worst case it is assumed the magnitude for this preliminary assessment is **negligible** to **low** for all species. However, this will be validated by site specific underwater noise modelling at the next stage of assessment.

333. Overall, with a sensitivity of **medium**, and a magnitude of **negligible** to **low** the potential impact of disturbance due to impact piling underwater noise on marine mammal receptors is of **negligible** to **minor adverse** significance.

11.6.1.3. Underwater Noise: Physical and Auditory Injury Resulting from Noise Associated with Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic (MM-C-05)

334. The potential for PTS and TTS due to other construction activities (such as dredging and rock placement), as well as construction vessels is not expected to be significant. Underwater noise modelling undertaken for other offshore wind projects in the North Sea show PTS cumulative ranges (i.e. the noise over a period of 24 hours (SEL_{cum})) to have the potential to cause PTS or TTS within 100m of the construction activity or vessel (with the exception of up to 500m or 1,000m for rock placement activities (for PTS and TTS respectively), or up to 150m or 250m for dredging (for PTS and TTS respectively). This is considered unlikely to be of significant risk to any marine mammal species. Therefore, the sensitivity is considered to be **medium** for all marine mammal receptors.

335. For the DBD PEIR, site-specific underwater noise modelling was undertaken to determine the potential risk for PTS and TTS from underwater noise from noise sources other than piling. The modelling predicted potential impact ranges, it can be considered for the ANS installation these impact ranges will be less than what was assessed for the PEIR for the DBD Project. Therefore, the magnitude of impact for all marine mammal receptors are considered to be **negligible**.

336. Overall, with a sensitivity of **medium**, and a magnitude of **negligible** the potential impact of auditory injury due to underwater noise from other construction activities on marine mammal receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment**.

11.6.1.4. Underwater Noise: Behavioural Impacts from Resulting from Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic (MM-C-06)

337. Underwater noise from other construction activities (such as dredging and rock placement), along with the presence of vessels offshore, has the potential for disturbance effects.

338. Marine mammals within the potential disturbance area were considered to have the capacity to avoid such effects. Any disturbance would be temporary, with the expectation to return to the area once the disturbance had ceased, or they have become habituated to the sound or presence of vessels (doing activities). The sensitivity for marine mammal receptors to disturbance is considered to be **medium** for all species.

339. All related construction activities are considered to be moving sources, and therefore, once the activity / vessel moved past a certain area, the marine mammals would return to the area. The potential for disturbance that could result from underwater noise during other construction activities would be temporary in nature, not consistent throughout the offshore construction period, and short term. The magnitude of impact is therefore considered to be **negligible** for all species.

340. Overall, with a sensitivity of **medium**, and a magnitude of **negligible** the potential impact of disturbance due to other construction activity underwater noise on marine mammal receptors is of **negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

11.6.1.5. Disturbance at Seal Haul-out Sites – From Piling Works and Vessel Transits (MM-C-08)

341. Seals vary in their reaction to construction disturbance depending on the type of disturbance (e.g. vessel noise / presence, piling) and proximity to haul-out sites. This is assessment takes a precautionary approach, acknowledging that both grey and harbour seal have some capacity to avoid, adapt to, tolerate, or recover from the anticipated impacts. The sensitivity of grey and harbour seal is therefore considered to be **medium**.

342. The loudest activity potentially required for the ANS installation is impact piling for one monopile. However, the ANS locations being considered, all are located at significant distances away from haul-out sites, as discussed in **Section 11.4.2**. The underwater noise for piling and other construction activities will also be short term, therefore the magnitude of impact from piling and other construction activity is considered to be **negligible**.

343. Disturbance from the ANS and the port of origin for construction vessels (location to be confirmed) has the potential to disturb seals at haul-out sites (as shown on **Figure 11.2**), for example seals hauled out near Flamborough Head. Depending on the route and proximity to the haul-out sites (note that for DBA and DBB vessel mobilisation has been largely from international ports, with UK ports being used for crew transfers). However, due to the scale of the ANS works the amount of vessel required will be limited, the presence of vessels will be temporary and short term. Therefore, the magnitude of impact is considered to be **low** for vessel presence.

344. Overall, with a sensitivity of **medium**, and a magnitude of **negligible** to **low** the potential impact of disturbance to seal haul-out sites on grey and harbour seal is of **negligible** to **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

11.6.1.6. Vessel Interaction (Increase in Risk of Collision) (MM-C-09)

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

346. Larger whale species, such as minke whales, are at a greater risk of vessel collisions compared to smaller cetaceans, therefore it is considered minke whale have a sensitivity of **medium** and all other species have a **low** sensitivity.

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

348. Measures include:

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

349. With the inclusion of the above embedded mitigation measures, it is considered highly unlikely that there would be any potential risk of vessel collision to marine mammals.

350. Due to the limited number of vessels required for the ANS works and the short term nature of the works. As well as the embedded mitigation measures, it is considered the magnitude of impact is **low** for all marine mammal species.

351. Overall, with a sensitivity of **low** for all species, other than minke whale which has a **medium** sensitivity, and a magnitude of **negligible** for all species the potential impact of increased risk of collision is of **negligible** to **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

11.6.2. Potential Effects during Operation

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

11.6.2.1. Underwater Noise: Behavioural Impacts Resulting from Maintenance Activities - Maintenance of Infrastructure, Presence of Vessels and Vessel Traffic (MM-O-06)

353. Potential behavioural impacts from O&M activities have been considered, however, they are expected to be lower in magnitude than those during construction, due to the absence of pile driving, and fewer vessels required for O&M activities. As for construction activities and vessel presence, the potential for disturbance will be assessed following a similar approach. Therefore, all species have been considered to have a sensitivity of **medium**.

354. The level of underwater noise produced from O&M activities is expected to be much lower than those expected during the construction phase. During O&M, there is the potential for vessels transiting and conducting maintenance activities, however, the number of vessels would be much less than those assessed during construction. Vessel movements to and from the O&M port (to be decided post-consent) would be incorporated within existing vessel routes where possible. The vessels conducting the maintenance work would be slow moving or stationary at times. Therefore, the magnitude of impact is anticipated to be **negligible** for all species.

355. Overall, with a sensitivity of **medium** for all species, and a magnitude of **negligible** for all species the potential impact of disturbance due to O&M activities is of **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

11.6.2.2. Impacts on Vessel Interaction (Increase in Risk of Collision) – from all Vessel Movements Relating to Operation and Maintenance Activities (MM-O-09)

356. As outlined for construction, the increased risk of collision with marine mammals during operation is considered unlikely, however, will be assessed. As for construction, larger whale species, such as minke whales, are at a greater risk of vessel collisions compared to smaller cetaceans, therefore it is considered minke whale have a sensitivity of **medium** and all other species have a **low** sensitivity.

357. The commitment to best practice measures and a Vessel Code of Conduct to be secured through a PEMP (see Design Commitment CO115 listed in **Appendix C Commitments Register**) will significantly reduce any potential for marine mammals to collide with vessels during O&M activities. As for construction, based on the limited number of vessels required for the ANS O&M activities and embedded mitigation measures, it is considered the magnitude of impact is **low** for all marine mammal species.

358. Overall, with a sensitivity of **low** for all species, other than minke whale which has a **medium** sensitivity, and a magnitude of **negligible** for all species the potential impact of increased risk of collision is of **negligible** to **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

11.7. Inter-Relationships

359. Potential inter-relationships between Marine Mammals and other environmental topics have been considered, where relevant, in **Table 11-4**.

Table 11-4 Marine Mammals – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
MM-C-05	Underwater Noise: Physical and Auditory Injury Resulting from Noise Associated with Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic	Shipping and Navigation	Number of vessels required and the existing amount of vessel numbers and transits within the area will be considered.	Within MM-C-05 assessment.
MM-C-09	Impact on Vessel Interaction (Increase in Risk of Collision)	Shipping and Navigation	Number of vessels required and the existing amount of vessel numbers and transits within the area will be considered.	Within MM-C-09 assessment.
MM-O-09	Impacts on Vessel Interaction (Increase in Risk of Collision) – from all Vessel Movements Relating to Operation and Maintenance Activities	Shipping and Navigation	Number of vessels required and the existing amount of vessel numbers and transits within the area will be considered.	Within MM-O-09 assessment.

11.8. Interactions Assessment

360. The impacts identified and assessed in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 11-5**.

Table 11-5 Marine Mammals – potential interactions between impacts

Construction and Operation and Maintenance								
	MM-C-01	MM-C-02	MM-C-05	MM-C-06	MM-C-08	MM-C-09	MM-O-06	MM-O-09
Underwater Noise: Physical and Auditory Injury from Impact Piling During Construction (MM-C-01)	-	No	No	No	No	No	No	No
Underwater Noise: Behavioural Impacts from Impact Piling During Construction (MM-C-02)	No	-	No	No	No	No	No	No
Underwater Noise: Physical and Auditory Injury Resulting from Noise Associated with Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic (MM-C-05)	Yes	No	-	No	No	No	No	No

Construction and Operation and Maintenance	MM-C-01	MM-C-02	MM-C-05	MM-C-06	MM-C-08	MM-C-09	MM-O-06	MM-O-09
Underwater Noise: Behavioural Impacts from Resulting from Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic (MM-C-06)	Yes	No	No	-	No	No	No	No
Disturbance at Seal Haul-out Sites – From Piling Works and Vessel Transits (MM-C-08)	Yes	No	No	No	-	No	No	No
Vessel Interaction (Increase in Risk of Collision) (MM-C-09)	No	No	No	No	No	-	No	No
Underwater Noise: Behavioural Impacts Resulting from Maintenance Activities - Maintenance of Infrastructure, Presence of Vessels and Vessel Traffic (MM-O-06)	No	Yes	No	No	No	No	-	No
Vessel Interaction (Increase in Risk of Collision) – from all Vessel Movements Relating to Operation and Maintenance Activities (MM-O-09)	No	No	No	No	No	No	No	-

11.8.1. DBD Project Effect Interactions

361. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

11.8.1.1. Construction Impacts (MM-C-01, MM-C-02, MM-C-05, MM-C-06, MM-C-08, MM-C-09)

362. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of seabed preparation activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

11.8.1.2. Operational Impacts (MM-O-06, MM-O-09)

363. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Marine Mammals, there is no potential for within-Project effects during operation.

11.9. Cumulative Effects

364. Potential cumulative effects could arise from:

- Piling at other offshore wind farms in combination with that being undertaken at the ANS location;
- Other construction activities at other offshore wind farms in combination with that being undertaken at the ANS location (vessels presence, cable installation works, dredging, seabed preparation and rock placement);
- Carbon capture storage projects, offshore mines, and gas storage projects;
- Geophysical surveys;
- Aggregate extraction and dredging, and disposal sites;
- Oil and gas developments, decommissioning, and seismic surveys;
- Sub-sea cable and pipelines;
- Coastal works (such as ports and harbours); and
- UXO clearance (other than for the Project).

11.10. Summary and Next Steps

365. The preliminary assessment above is tabulated and summarised in **Table 11-7**. Based on the preliminary assessment all potential effects are of **minor** to **negligible adverse** significance. However, the following impacts will be considered further at ES stage, based on the site-specific underwater noise modelling, which will allow validation of the findings of this preliminary assessment:

- Underwater Noise: Physical and Auditory Injury from Impact Piling During Construction (MM-C-01);
- Underwater Noise: Behavioural Impacts from Impact Piling During Construction (MM-C-02); and

366. The assessment will also update the cumulative assessment with other projects, based on new information and site-specific underwater noise modelling for piling will be required for the next stage of assessment. The modelling will be used to inform the assessments for piling, based on the option of installing a monopile, this will also consider soft-start and ramp-up procedures for the installation.

Table 11-6 Marine Mammals – Potential Cumulative Effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
MM-C-01	Underwater Noise: Physical and Auditory Injury from Impact Piling During Construction	No	No potential for cumulative impact has been identified and has therefore been screened out from the CEA. If there is the potential for any PTS, from any project, suitable mitigation would be put in place to reduce any risk to marine mammals.	N/A
MM-C-02	Underwater Noise: Behavioural Impacts from Impact Piling During Construction	Yes	Depending on the construction timetable for other OWFs, there is potential for temporal overlap in construction periods which could have a cumulative effect in relation to disturbance to marine mammals caused by underwater noise.	Dogger Bank South East and Dogger Bank South West have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that piling activities may occur at the same time. Given that only a single monopile could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative noise impact is highly limited. Should the ANS be piled at the same time as these projects, the overall magnitude of underwater noise would be no greater than the projects piling alone. Overall, this is a magnitude of **low**, with **minor adverse** significance.
MM-C-05	Underwater Noise: Physical and Auditory Injury Resulting from Noise Associated with Other Construction Activities – Installation of Offshore Infrastructure and Presence of Vessels	No	No potential for cumulative impact has been identified and has therefore been screened out from the CEA. If there is the potential for any PTS, from any project, suitable mitigation would be put in place to reduce any risk to marine mammals.	N/A
MM-C-06	Underwater Noise: Behavioural Impacts from Resulting from Other Construction Activities – Installation of Offshore Infrastructure and Presence of Vessels (MM-C-06)	Yes	Depending on the construction timetable for other OWFs, there is potential for temporal overlap in construction periods which could have a cumulative effect in relation to disturbance to marine mammals caused by underwater noise.	Dogger Bank South East and Dogger Bank South West have construction phases that overlap with construction of the ANS, therefore it is possible that construction activities may occur at the same time. Due to the small scale of the ANS works, the potential for the ANS works to meaningfully contribute to a cumulative noise impact is highly limited. Should the ANS construction works occur at the same time as these projects, the overall magnitude of underwater noise would be no greater than the projects piling alone. Overall, this is a magnitude of **low**, with **minor adverse** significance.
MM-C-08	Impact on Disturbance at Seal Haul-out Sites – from Piling Works and Vessel Transits	No	There is unlikely to be a significant effect from the project alone effects of the ANS on disturbance to seal haul out sites therefore this has been screened out of the CEA.	N/A
MM-C-09	Impact on Vessel Interaction (Increase in Risk of Collision)	Yes	Depending on the construction timetable for other OWFs, there is potential for temporal overlap in construction periods which could have a cumulative effect in relation to an increase in vessel collision risk due to an overall increase in vessels.	Dogger Bank South East and Dogger Bank South West have construction phases that overlap with construction of the ANS, therefore it is possible that construction activities may occur at the same time.

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
				Due to the small scale of the ANS works, the potential for the ANS works to meaningfully contribute to an increased risk of vessel collision cumulative noise impact is highly limited. Overall, due to the scale of the ANS works this is a magnitude of low, with minor adverse significance.
Operation and Maintenance				
MM-O-06	Underwater Noise: Behavioural Impacts Resulting from Maintenance Activities - Maintenance of Infrastructure, Presence of Vessels and Vessel Traffic	Yes	Depending on timelines for other OWFs, there is potential for temporal overlap with the operation of DBD which could have a cumulative effect in relation to disturbance to marine mammals caused by underwater noise.	There is the potential for multiple offshore wind farms to overlap with operation of the ANS, therefore it is possible that O&M activities may occur at the same time. Due to the small scale of the ANS works, the potential for the ANS works to have a cumulative impact for the maintenance of infrastructure is highly unlikely, therefore this is not considered further. However, there is the potential for the ANS to increase vessel presence. The potential of the operational vessels to meaningfully contribute to an increased risk of vessel collision is highly limited. Overall, due to the scale of the ANS works this is a magnitude of **low**, with **minor adverse** significance.
MM-O-09	Vessel Interaction (Increase in Risk of Collision) – from all Vessel Movements Relating to Operation and Maintenance Activities	Yes	Depending on timelines for other OWFs, there is potential for temporal overlap with the operation of DBD which could have a cumulative effect in relation to an increase in vessel collision risk due to an overall increase in vessels.	There is the potential for multiple offshore wind farms to overlap with operation of the ANS, therefore it is possible that O&M activities may occur at the same time. Due to the small scale of the ANS works, the potential for the ANS works to meaningfully contribute to an increased risk of vessel collision is highly limited. Overall, due to the scale of the ANS works this is a magnitude of **low**, with **minor adverse** significance.

Table 11-7 Marine Mammals – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Construction							
Underwater Noise: Physical and Auditory Injury from Impact Piling During Construction (MM-C-01)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: High	Low (harbour porpoise and minke whale) Negligible (for all other species)	Moderate adverse (harbour porpoise and minke whale) Minor adverse (for all other species)	Outline MMMP	Minor adverse	Yes
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: High	Low (harbour porpoise and minke whale) Negligible (for all other species)	Moderate adverse (harbour porpoise and minke whale) Minor adverse (for all other species)	Outline MMMP	Minor adverse	Yes
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: High	Low (harbour porpoise and minke whale) Negligible (for all other species)	Moderate adverse (harbour porpoise and minke whale) Minor adverse (for all other species)	Outline MMMP	Minor adverse	Yes
Underwater Noise: Behavioural Impacts from Impact Piling During Construction (MM-C-02)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible to low	Negligible to minor adverse	N/A	Negligible to minor adverse	Yes
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible to low	Negligible to minor adverse	N/A	Negligible to minor adverse	Yes
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible to low	Negligible to minor adverse	N/A	Negligible to minor adverse	Yes

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Underwater Noise: Physical and Auditory Injury Resulting from Noise Associated with Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic (MM-C-05)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Negligible adverse	N/A	Negligible adverse	No
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Negligible adverse	N/A	Negligible adverse	No
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Negligible adverse	N/A	Negligible adverse	No
Underwater Noise: Behavioural Impacts from Resulting from Other Construction Activities – Installation of Offshore Infrastructure, Presence of Vessels and Vessel Traffic (MM-C-06)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Negligible adverse	N/A	Negligible adverse	No
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Negligible adverse	N/A	Negligible adverse	No
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Negligible adverse	N/A	Negligible adverse	No
Impact on Disturbance at Seal Haul-out Sites – From Piling Works and Vessel Transits (MM-C-08)	A2/3	*Receptors*: Grey and harbour seal *Value*: High *Sensitivity*: Medium	Negligible to Low	Negligible to minor adverse	Best practice measures	Negligible to minor adverse	No
	A5	*Receptors*: Grey and harbour seal *Value*: High *Sensitivity*: Medium	Negligible to Low	Negligible to minor adverse	Best practice measures	Negligible to minor adverse	No
	A8	*Receptors*: Grey and harbour seal *Value*: High *Sensitivity*: Medium	Negligible to Low	Negligible to minor adverse	Best practice measures	Negligible to minor adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Impact on Vessel Interaction (Increase in Risk of Collision) (MM-C-09)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Low (except minke whale which is medium)	Negligible	Negligible to minor adverse	Best practice measures	Minor adverse	No
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Low (except minke whale which is medium)	Negligible	Negligible to minor adverse	Best practice measures	Minor adverse	No
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Low (except minke whale which is medium)	Negligible	Negligible to minor adverse	Best practice measures	Minor adverse	No
Operation and Maintenance							
Impacts on Underwater Noise: Behavioural Impacts Resulting from Maintenance Activities - Maintenance of Infrastructure, Presence of Vessels and Vessel Traffic (MM-O-06)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Minor adverse	N/A	Minor adverse	No
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Minor adverse	N/A	Minor adverse	No
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Medium	Negligible	Minor adverse	N/A	Minor adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Impacts on Vessel Interaction (Increase in Risk of Collision) – from all Vessel Movements Relating to Operation and Maintenance Activities (MM-O-09)	A2/3	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Low (except minke whale which is medium)	Negligible	Negligible to minor adverse	Best practice measures	Minor adverse	No
	A5	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Low (except minke whale which is medium)	Negligible	Negligible to minor adverse	Best practice measures	Minor adverse	No
	A8	*Receptors*: All marine mammal species *Value*: High *Sensitivity*: Low (except minke whale which is medium)	Negligible	Negligible to minor adverse	Best practice measures	Minor adverse	No

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase, with the exception that underwater noise impact magnitude would be lower due to no piling at decommissioning.

* Not including designations.

12. Offshore Ornithology

367. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS associated with Offshore Ornithology. As outlined in **Chapter 4 Description of the Associated Development**, three AoS for the ANS are being considered at this stage: A2/3, A5 and A8.

12.1. Study Area

368. The Study Area for Offshore Ornithology is defined as the sea area spanned by the three AoS for the ANS.

12.2. Data Sources

369. A desk study was undertaken to compile baseline information in the sea area spanned by the three locations for the ANS, using various sources of information from a range of projects in the geographic area overlapping or adjacent to the ANS AoS. There are no specific digital aerial survey data or other data for the ANS AoS to provide an indication of site-specific seabird abundances and densities. **Table 12-1** presents the sources used to inform the baseline for Offshore Ornithology.

Table 12-1 Desk-based sources used to inform the baseline for Offshore Ornithology

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Dogger Bank D Wind Farm Digital Aerial Survey Data	DBD Survey Area covering Array Area plus 4km buffer zone	2021-2023	Monthly digital aerial surveys providing abundance, density and spatial data for seabird species.
DBS Offshore Windfarms ES and associated appendices (RWE, 2023a, b and c)	DBS Array Survey Area at the south-west of the Dogger Bank Zone	2021-2023	Monthly digital aerial surveys providing abundance, density and spatial data for key species.
Seabird Tracking Database (Birdlife International, 2023)	North Sea	[Results span] 2007-2019	Movement traces from tracking studies of individual seabirds, browsable and viewable by species, deployment location (from country to level of colony site), season, tag type etc., and by overlap with a bespoke polygon in a geospatial search.
Desk-based Revision of Seabird Foraging Ranges Used for HRA Screening (Woodward *et al.*, 2019)	Tagging study sites globally for 27 species	Various tagging studies 1973-2018	Average foraging ranges ('mean max' – mean of maxima from each tracking study) per species of seabird breeding at SPA colonies in Britain and Ireland.
Identifying Important At-sea Areas for Seabirds Using Species Distribution Models and Hotspot Mapping (Cleasby *et al.*, 2018, 2020)	UK waters	2010-2014	Seabird hotspot maps generated at the UK-level, and at the level of individual SPAs.
Non-breeding season populations of seabirds in UK waters (Furness, 2015)	UK waters	Various datasets to 2013	Non-breeding seasonality and regions used by seabird populations in UK waters.
Dogger Bank C and Sofia Ornithology Technical Report (Burton *et al.*, 2014)	Dogger Bank Zone	2010-2011	Boat-based surveys and aerial surveys of the Dogger Bank Zone providing species accounts.
Dogger Bank A and B Ornithology Technical Report (Burton *et al.*, 2013)	Dogger Bank Zone	2010-2011	Boat-based surveys and aerial surveys of the Dogger Bank Zone providing species accounts.

12.3. Assumptions and Limitations

370. Where any key assumptions, data limitations or technical difficulties were encountered during baseline characterisation with the above data sources, these have been identified in **Table 12-2**. Primarily, it should be noted that none of the offshore windfarm survey data sources collected data from a geographic area overlapping the AoS. Therefore, all desk data sources provide generic baseline information for offshore ornithology in the broad sea region surrounding the AoS, rather than the AoS specifically. However, the scale of the ANS within each AoS means the numbers of seabirds predicted to use offshore habitat within the ZoI of ANS activities are extremely small in the context of regional populations and SPA populations, and there is very low likelihood that the ANS has singular significance as a habitat to any seabirds within the local or regional marine environment. Rather, they comprise a very small area within an important region in the eastern Atlantic for seabirds. Furthermore, installation of nesting provision for kittiwakes *within* the AoS would bring foraging resources (waters used by kittiwake according to tracking data) into greater proximity to a potential colony location. Therefore, the broad baseline achievable from the desk study is expected to be sufficient, and does not present a limitation to the assessment.

Table 12-2 Assumptions or limitations identified from the data sources for Offshore Ornithology in Table 12-1

Data Source	Assumption/Limitation	Potential Implications on Assessment?
Dogger Bank D Wind Farm Digital Aerial Survey Data	DAS dataset is focused on the DBD offshore aerial survey area which does not overlap with the AoS.	Provides generic baseline information for offshore ornithology in the broad sea region surrounding the AoS, rather than the AoS specifically. However, this ultimately does not present a limitation on assessment.
DBS Offshore Windfarms ES and associated appendices (RWE, 2023a, b and c)	DAS dataset is focused on the DBS offshore aerial survey area which does not overlap with the AoS.	Provides generic baseline information for offshore ornithology in the broad sea region surrounding the AoS, rather than the AoS specifically. However, this ultimately does not present a limitation on assessment.
Seabird Tracking Database (Birdlife International, 2023)	Datasets are submitted voluntarily by science and research groups. No dataset is more recent than 2019. Data is collected from a sample of one or few individuals of the breeding colony population. Not all designated/major sites, or main/feature species of designated sites are targeted for or suited to tracking studies. Tracking data is limited in geographic accuracy (though is high for purpose of identifying connectivity) and can additionally contain 'noise' and errors in point location. AoS to which connectivity is being assessed is a relatively small sea area in which to detect intersecting movement traces.	Individual movement traces may have a lower utility in indicating connectivity of seabirds to the small study area than modelling-based distribution maps. However, this ultimately does not present a limitation on assessment.
Desk-based Revision of Seabird Foraging Ranges Used for HRA Screening (Woodward *et al.*, 2019)	Foraging ranges are averages typically also carrying a high level of variance due to inter-individual, inter-colony and interannual variation in conditions and foraging behaviour. The foraging ranges only relate to breeding season ranging behaviour.	Provides relatively coarse indication of connectivity of species and designated sites to the AoS. However, this ultimately does not present a limitation on assessment.
Identifying Important At-sea Areas for Seabirds Using Species Distribution Models and Hotspot Mapping (Cleasby *et al.*, 2018, 2020)	Distributions and hotspots are modelled based on best fit against environmental variables, as opposed to reporting primary or direct observations of seabird habitat use.	Provides simulated coarse indication of connectivity of species and designated sites to the AoS. However, this ultimately does not present a limitation on assessment.
Non-breeding season populations of seabirds in UK waters (Furness, 2015)	Desk based synthesis from range of data sources, working at a very broad spatial scale.	Provides generic baseline information for offshore ornithology in the broad sea region surrounding the AoS, rather than the AoS specifically. However, this ultimately does not present a limitation on assessment.
Dogger Bank C and Sofia Ornithology Technical Report (Burton *et al.*, 2014)	Dataset is focused on the DBC and Sofia offshore aerial survey area which does not overlap with the AoS. Boat-based surveys have higher potential than aerial surveys to themselves influence seabird distribution through attraction or displacement.	Provides generic baseline information for offshore ornithology in the broad sea region surrounding the AoS, rather than the AoS specifically. However, this ultimately does not present a limitation on assessment.
Dogger Bank A and B Ornithology Technical Report (Burton *et al.*, 2013)	Dataset is focused on the Dogger Bank A and B offshore aerial survey area which does not overlap with the AoS. Boat-based surveys have higher potential than aerial surveys to themselves influence seabird distribution through attraction or displacement.	Provides generic baseline information for offshore ornithology in the broad sea region surrounding the AoS, rather than the AoS specifically. However, this ultimately does not present a limitation on assessment.

12.4. Existing Environment

371. The AoS are located in waters designated as part of the Southern North Sea SAC. This designation is in part due to abundance of prey for its marine mammal qualifying features, which also have importance as prey to seabirds. AoS A2/3 and A5 are also adjacent to the boundary of the Dogger Bank SAC.

372. As detailed in **Chapter 10 Fish and Shellfish Ecology**, Dogger Bank supports a wide range of fish and shellfish species and has recently seen an effective ban on the commercial fishery of sandeels within its boundary. Sandeels serve as a prey species for a wide range of predators including many seabirds.

373. There is no overlap between any AoS and SPAs or other designated sites with seabirds as qualifying species.

374. In the breeding season, the AoS may be used by kittiwake and other species for foraging and resting on the water. Some above-water structures of fixed location (e.g. the Dogger Bank C platforms installed in 2025) may be used for resting by seabirds and migrant birds, and potentially for nesting by a small number of species including kittiwake. The predicted numbers of seabirds currently using the AoS are extremely small in the context of regional populations and SPA populations. The AoS lie within published generalised foraging range of breeding seabirds (Woodward *et al*. 2019) at some island and mainland colonies on the North Sea coasts of Britain. Examples, based on their location and qualifying species' average ('mean-max') foraging range calculated by Woodward *et al* (2019) are:

- Flamborough and Filey Coast SPA;
- Forth Islands SPA;
- Farne Islands SPA;
- Coquet Island SPA; and
- St Abb's Head to Fast Castle SPA.

375. Seabird tracking data viewed for the desk study indicates potential connectivity between the AoS and the Forth Islands SPA and Flamborough and Filey Coast SPA during the breeding season, for gannet and kittiwake (Birdlife International, 2023). Tracking data from 15 individual breeding kittiwake from St Abb's Head to Fast Castle SPA (St Abb's Head colony) indicated no connectivity to the AoS but this data may only be representative of the individuals tracked, the incubation sub-period when birds were tracked, and/or the single year of data collection (2012). There was no tracking data available in the database for razorbill and puffin from the above SPAs, and these populations may have breeding season connectivity with the AoS as the species are considered to typically have foraging ranges potentially exceeding 100km (Woodward *et al*., 2019).

376. In the non-breeding season, the AoS may be used by birds for foraging and resting on the water, and some existing above-water structures in the region may be used for resting. In 2025, APEM were commissioned to undertake a digital aerial survey of 31 Oil and Gas platforms in the North Sea to assess the extent to which offshore platforms are used for nesting by seabirds. Of the 31, breeding kittiwake were confirmed at three platforms (ranging between 49 and 99 Apparently Occupied Nests (AON)per platform). No auk species were recorded at any platform. However, none of these platforms overlap with the ANS AoS.

377. The predicted numbers of seabirds using the ANS ZoI are extremely small in the context of regional populations. The AoS lie within the 'UK North Sea', 'south-west North Sea' and 'North Sea & Channel' population regions (variously, dependent on seabird species) as defined by Furness (2015). Populations in these regions in the non-breeding season typically comprise adults and immatures from breeding populations both in the UK and elsewhere in the eastern Atlantic (Iceland, Fennoscandia, Russia, France, Ireland, etc.).

378. A summary of desk study data of regional relevance to the AoS is shown in **Table 12-3.** Gannet, kittiwake, great black-backed gull, guillemot, razorbill, and puffin are the species which occurred most consistently in significant numbers across datasets from surveys in the region. Connectivity with kittiwake was one of the drivers of the site selection process to date for the AoS. The predicted numbers of all seabirds within the AoS are small in the context of regional populations, and extremely small within the development footprint as the ANS is a single structure and small in size compared to that of the surrounding sea area of similar marine habitat.

Table 12-3 Summary of desk-based data on Offshore Ornithology baseline

Source	Summary
Dogger Bank D Wind Farm Digital Aerial Survey Data	Species in greatest abundance / density within the DAS survey area: great northern diver, white-billed diver, gannet, kittiwake, great black-backed gull, herring gull, lesser black-backed gull, guillemot, razorbill and puffin.
DBS Offshore Windfarms ES and associated appendices (RWE, 2023a, b and c)	Eight species occurred regularly in the survey area: fulmar, gannet, great skua, kittiwake, great black-backed gull, guillemot, razorbill, and puffin.
Seabird Tracking Database (Birdlife International, 2023)	Geographically matching search results for tracking studies of individual seabirds indicated connectivity of the ANS with the Flamborough and Filey Coast SPA and the Forth Islands SPA.
Desk-based Revision of Seabird Foraging Ranges Used for HRA Screening (Woodward *et al.*, 2019)	There is indicated overlap with the Flamborough and Filey Coast SPA, the Forth Islands SPA, the Farne Islands SPA, the Coquet Island SPA, and the St Abb's Head to Fast Castle SPA, through the average foraging ranges of gannet, kittiwake and puffin breeding populations.
Identifying Important At-sea Areas for Seabirds Using Species Distribution Models and Hotspot Mapping (Cleasby *et al.*, 2018, 2020)	There is indicated overlap with the utilization distributions and at-sea hotspots of breeding kittiwake.
Non-breeding season populations of seabirds in UK waters (Furness, 2015)	The ANS AoS are located within a sea region used in all or part of the non-breeding season by a range of seabird taxa.
Dogger Bank C and Sofia Ornithology Technical Report (Burton *et al.*, 2014)	The following species were numerous in context of their North Sea population estimates at the time (Skov *et al.*, 1995): fulmar, gannet, kittiwake, lesser black-backed gull, great black-backed gull, guillemot, razorbill, little auk and puffin.
Dogger Bank A and B Ornithology Technical Report (Burton *et al.*, 2013)	

12.5. Offshore Ornithology Scoping

379. **Table 12-4** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 12-4 Summary of impacts proposed to be scoped in (✓) and out (X) for Offshore Ornithology

Potential Impact	Construction	Operation	Decommissioning
Direct Disturbance and Displacement	✓	✓	✓
Indirect Impacts Through Habitat and Prey Availability	✓	✓	✓
Barrier Effects	X	X	X
Collision Risk	X	X	X
Pollution Events Resulting from the Accidental Release of Pollutants	X	X	X

12.6. Potential Effects

380. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to offshore ornithology receptors. This assessment draws on baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and O&M description (**Chapter 4 Description of the Associated Development**) as the basis for the worst-case scenario. Design commitments adopted for this assessment are described in **Appendix C Commitments Register** (Design Commitment CO115). Assumptions and definitions are provided below and in line with the methodology described in **Chapter 6 Methodology**.

12.6.1. Potential Effects during Construction

381. Potential effects during the construction of the ANS will arise from physical disturbance of the seabed during installation, increased presence and movement of vessels, artificial lighting of construction sites, partially built structures, and other activity in offshore habitats.

12.6.1.1. Direct Disturbance and Displacement (ORN-C-01)

382. There is potential for movement and presence of construction-phase vessels, plus underwater and above-water noise and visual imposition from construction activities (e.g. piling), to cause direct disturbance and displacement to birds in the offshore habitats at the ANS location, or en route from Project ports. Design Commitment CO115 in **Appendix C Commitments Register** includes commitment to production of a PEMP Plan to manage movement of vessels to avoid designated sites en route from Project ports, or, if avoiding a designated area is not practicable, to actively avoid individuals or flocks of species with relative sensitivity to vessels such as red-throated diver or common scoter. The ZoI for construction-phase disturbance and displacement effects on offshore ornithology receptors is 2km, based on the maximum (i.e., worst-case) scale at which marine birds may displace in response to ship-based disturbance or cable laying (MMO, 2018; Outer Dowsing Offshore Wind, 2023; DESNZ, 2024).

383. Disturbance of birds may result in a movement in response, which expends additional energy, and if disturbed birds are displaced to different areas or habitats, they are additionally subject to potentially higher competition for resources, and potentially lower quality or quantity of resources. At the time of writing specific construction vessel routes are not confirmed, but traversing of designated sites such as Greater Wash SPA is expected to be extremely low in terms of volume of vessel traffic, duration and frequency. Therefore, the sensitivity and value of offshore ornithology receptors are **medium**. This acknowledges potential offshore ornithology receptors include species of conservation concern, and that offshore ornithology receptors have capacity to tolerate visual and noise disturbance from offshore construction and vessels, and to recover from and/or habituate to visual and noise sources in this environment. The magnitude of the impact is **low** as any disturbance during construction will be temporary, localised, and with reversible effects (disturbed birds which are displaced will be able to return to the location within a short time after any disturbance). The resulting effect is **minor adverse** which is **not** significant in EIA terms. A design commitment of production of a PEMP (CO115 in **Appendix C**) results in a residual effect of **negligible to minor adverse** which is **not** significant in EIA terms. **This potential impact will therefore not be considered in more detail at the next stage of assessment**.

12.6.1.2. Indirect Impacts via Habitat and Prey Availability (ORN-C-05)

384. Seabed preparation and construction of the ANS, use of jack up vessels (JUVs), and underwater noise from construction activities, has the potential to indirectly impact birds in the offshore habitats at the ANS location through direct temporary disturbance to the habitats of their prey species (fish and invertebrates), disturbing and displacing their prey species, or lowering availability of prey by making foraging more difficult (e.g. reduced water clarity). Permanent loss of prey habitat is considered within ORN-O-05 in **Section 12.6.2.2**

385. The sensitivity and value of offshore ornithology receptors are **medium**, noting that offshore ornithology receptors have capacity to forage in vicinity of offshore construction and vessels, and are mobile across spatial scales which easily permit movement to unaffected foraging waters. Given the very small proposed scale of the construction, the impact on birds' habitat and prey is considered to be **negligible** in the context of the available habitat to support prey species in the wider area, and most impacts will be reversible (in that they will mostly entail temporary effects on foraging conditions, rather than permanent effects on prey species such as displacement or mortality. Given the **negligible** magnitude of the impact and limited area across the foraging range of the various species in the Study Area a **negligible** effect is predicted, which is **not** significant in EIA terms. **This impact will therefore not be considered in more detail at the next stage of assessment**.

12.6.2. Potential Effects during Operation

12.6.2.1. Direct Disturbance and Displacement (ORN-O-01)

386. There is potential for movement and presence of maintenance vessels, lights and foghorns as part of Aids to Navigation (AtN) plus underwater and above-water noise and visual imposition from maintenance activities, to cause direct disturbance and displacement to birds in the offshore habitats at the ANS location. Disturbance to birds using the ANS for resting, foraging or breeding will be minimised to negligible frequency and intensity through restriction of routine maintenance regarding the ANS to outside the kittiwake breeding season (March to August, per Furness (2015)), with the exception of emergency works where required. Monitoring and research of breeding kittiwake at the ANS during the breeding season will primarily be carried out remotely via mounted cameras, however visits to ring or tag chicks during the breeding season will likely be required. Where possible these visits make use of design features for minimising disturbance to the colony (e.g. covert access from hatch in base of the topside and concealed access to nesting ledges from inside the ANS), and kittiwake colonies are tolerant of demographic studies undertaken in this manner (Coulson, 2011),Monitoring and research of breeding kittiwake at the ANS during the breeding season will be carried out remotely via mounted cameras, therefore this activity has no potential to cause disturbance and displacement of birds. Unscheduled visits for O&M are expected to be rare, as these would likely only be carried out if the structure became a hazard or there was risk to safety or life. The occasional vessel traffic will not add to the background vessel movements and so is expected to be negligible.

387. Disturbed birds may undertake movement in response, which expends additional energy, and if disturbed birds are displaced to different areas or habitats, these birds are additionally subject to potentially higher competition for resources, and potentially lower quality or quantity of resources. The sensitivity and value of offshore ornithology receptors are **medium**. This acknowledges that offshore ornithology receptors have capacity to tolerate visual and noise disturbance from offshore works and vessels, and capacity to recover from and/or habituate to visual and noise sources in this environment. The potential impact of disturbance during the O&M of the ANS is considered to be **negligible**, and consequently a **negligible adverse** effect is predicted , which is **not** significant in EIA terms. **This impact will not be considered in more detail at the next stage of assessment**.

12.6.2.2. Indirect Impacts via Habitat and Prey Availability (ORN-O-05)

388. There is potential for presence and operation of offshore structures to indirectly impact birds in the offshore habitats at the ANS location, through direct permanent conversion or loss of habitat of their prey species to the ANS footprint/structure. This could entail loss of habitat of some species and creation of habitat (the ANS within the water column) for other species. However, given the small scale of the ANS infrastructure (a single foundation and associated scour protection) this impact is considered to be negligible in the context of the extent of available habitat to support prey species in the wider area. There is potential for movement and presence of maintenance vessels, plus underwater noise from maintenance activities, to indirectly impact birds at the ANS location through direct temporary impact on the habitats of their prey species, disturbing and displacing their prey species, or lowering availability of prey by making foraging more difficult (e.g. reduced water clarity). Note that only seven JUV/HLV visits (usually linked to corrective maintenance (repairs, replacements and remedial works)) are predicted to be required over the lifetime of the ANS (average of once every five years). The scale of potential JUV footprint for disturbance of the seabed is up to 1,200m^2. Crew transfer vessels, which do not have potential for JUV footprint disturbance, are anticipated to be used for most planned maintenance activities, reducing potential for seabed disturbance or damage during these works.

389. Reduced availability of prey, via change in fish and invertebrate assemblage, reduced prey abundance or less optimal foraging conditions, has implications for birds' food supply, food intake, daily energy budgets and subsequently survival rates. The sensitivity and value of offshore ornithology receptors are **medium**, noting that offshore ornithology receptors have capacity to forage in vicinity of offshore structures and vessels, and are mobile across spatial scales which easily permit movement to unaffected foraging waters. However, the potential impact of intermittent habitat disturbance during the ANS O&M phase on birds' habitat and prey is considered to be negligible in the context of the available habitat to support prey species in the wider area. Furthermore, given the presence of the structure, alternative habitat could result in other prey species being present or promote increased diversity of prey species for some bird species. Given the **negligible** magnitude of the impact and limited area across the foraging range of the various species in the Study Area, a **negligible** effect is predicted, which is **not** significant in EIA terms. **This impact will therefore not be considered in more detail at the next stage of assessment**..

12.7. Inter-Relationships

390. Potential inter-relationships between Offshore Ornithology and other environmental topics have been considered, where relevant, in **Table 12-5**. The inter-relationships and how they are addressed will be detailed in the relevant chapters in the ES to be submitted with the DCO application.

Table 12-5 Offshore Ornithology – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
ORN-C-01	Direct disturbance and displacement, from construction and vessel movement	**Shipping and Navigation**	The potential impact of direct disturbance and displacement of birds during construction relates to Project port and vessel route factors which determine volume and proximity of vessels to sensitive birds in designated marine areas such as Greater Wash SPA.	**Section 12.6.1.1**
ORN-C-05	Indirect impacts via habitat or prey availability, from construction and vessel movement	**Benthic Ecology** **Fish and Shellfish Ecology**	N/A – The potential impact of the temporary habitat disturbance during the construction of the ANS, the impact on birds' habitat and prey is considered to be negligible in the context of the available habitat to support prey species in the wider area.	**Section 12.6.1.2**
Operation and Maintenance				
ORN-O-05	Indirect impacts via habitat or prey availability, from permanent construction, maintenance and vessel movements	**Benthic Ecology** **Fish and Shellfish Ecology**	N/A – The potential impact of intermittent habitat disturbance during the ANS O&M phase, the impact on birds' habitat and prey is considered to be negligible in the context of the available habitat to support prey species in the wider area.	**Section 12.6.2.2**
Decommissioning				
ORN-D-05	Indirect impacts via habitat or prey availability, from decommissioning and vessel movement	Benthic Ecology Fish and Shellfish Ecology	N/A – The potential impact of the temporary habitat disturbance during decommissioning of the ANS, the impact on birds' habitat and prey is considered to be negligible in the context of the available habitat to support prey species in the wider area.	**Section 12.6**

12.8. Interactions Assessment

391. Consideration has been given to potential interactions between the impacts identified for assessment in this topic. This is summarised in **Table 12-6**, although no potential for interactions between impacts has been identified.

Table 12-6 Offshore Ornithology – potential interactions between impacts

Construction and Operation and Maintenance				
	ORN-C-01	**ORN-C-05**	**ORN-O-01**	**ORN-O-05**
Direct Disturbance and Displacement (ORN-C-01)				
Indirect Impacts via Habitat and Prey Availability (ORN-C-05)	No			
Direct Disturbance and Displacement (ORN-O-01)	No	No		
Indirect Impacts via Habitat and Prey Availability (ORN-O-05)	No	No	No	

12.8.1. DBD Project Effect Interactions

392. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) has been considered and assessed below.

12.8.1.1. Construction Impacts (ORN-C-01, ORN-C-05)

393. The DBD Project and the ANS have overlapping construction phases, therefore it is possible, although unlikely, that construction activities may occur at the same time. All AoS are too distant from the DBD Array Area for ANS construction disturbance and displacement to interact with that of the DBD Array Area, at distances of 170km, 120km and 34km, respectively.

394. Given that only a single monopile location and movement of few vessels (undetectable among baseline vessel traffic) would be required for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as the Project, the overall magnitude of disturbance and displacement or indirect impacts via habitat and prey availability would be no greater than the project-alone impacts. Overall, this is a magnitude of negligible, with negligible adverse significance.

12.8.1.2. Operational Impacts (ORN-O-01, ORN-O-05)

395. The DBD Project and the ANS have overlapping operational phases, therefore it is possible, although unlikely, that maintenance activities may occur at the same time. All AoS are too distant from the DBD Array Area for disturbance and displacement to interact with the DBD Array Area, at a distance of 170km, 120km, and 34km, respectively.

396. Given that only a single structure would be required for the ANS, of insignificant scale relative to the ranging behaviour of seabirds, and maintenance would be scheduled to avoid the kittiwake breeding season, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS operational activities occurring at the same time as the project, the overall magnitude of disturbance and displacement or indirect impacts via habitat and prey availability would be no greater than the projects alone impacts. Overall, this is a magnitude of negligible, with negligible adverse significance.

12.9. Cumulative Effects

397. The ZoI(s) for the cumulative effects within which projects and plans are screened is:

- **2km** for ORN-C-01, ORN-C-05, ORN-O-01, ORN-O-05, ORN-D-01, ORN-D-05, based on the maximum (i.e., worst-case) scale at which marine birds may displace in response to ship-based disturbance or cable laying (MMO, 2018; Outer Dowsing Offshore Wind, 2023; DESNZ, 2024).

398. The cumulative effects have been assessed and are presented in **Table 12-7**.

12.10. Summary and Next Steps

399. The preliminary assessment above is tabulated in **Table 12-8.** Based on the preliminary assessment all potential effects are of **negligible to minor adverse** significance, and no effects are to be further assessed within the ES stage.

Table 12-7 Offshore Ornithology – potential cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
ORN-C-01	Direct disturbance and displacement, due to construction and vessel movement	Yes	Other projects and plans (within the ZoI of direct disturbance and displacement from the ANS) could potentially have a cumulative direct disturbance and displacement effect on birds.	Dogger Bank South East and Dogger Bank South West have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that construction activities may occur at the same time. Given that only a single monopile location and movement of few vessels (undetectable among baseline vessel traffic) would be required for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as these projects, the overall magnitude of disturbance and displacement would be no greater than the projects alone impacts. Overall, this is a magnitude of negligible, with negligible adverse significance.
ORN-C-05	Indirect impacts via habitat or prey availability, from construction and vessel movement	Yes	Other projects and plans (within the ZoI of indirect effects on habitats and prey from the ANS) could potentially have a cumulative indirect impact on birds.	Dogger Bank South East and Dogger Bank South West have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that construction activities may occur at the same time. Given that only a single monopile could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as these projects, the overall magnitude of temporary habitat loss / disturbance to prey, habitat or foraging conditions would be no greater than the projects alone impacts. Overall, this is a magnitude of negligible, with negligible adverse significance.
Operation and Maintenance				
ORN-O-01	Direct disturbance and displacement, due to maintenance and vessel movements	Yes	Other projects and plans (within the ZoI of direct disturbance and displacement from the Project) could potentially have a cumulative direct disturbance and displacement effect on birds.	Nearby projects all have operational phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that operational activities may occur at the same time. Given that only a single structure would be required for the ANS, of insignificant scale relative to the ranging behaviour of seabirds, and maintenance would be scheduled to avoid the kittiwake breeding season, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS have operational activities occurring at the same time as these projects, the overall magnitude of disturbance and displacement would be no greater than the projects alone impacts. Overall, this is a magnitude of negligible, with negligible adverse significance.
ORN-O-05	Indirect impacts via habitat or prey availability, from permanent construction, maintenance and vessel movements	Yes	Other projects and plans (within the ZoI of indirect effects on habitats and prey from the ANS) could potentially have a cumulative indirect impact on birds.	Nearby projects all have operational phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that operational activities may occur at the same time. Given that only a single monopile could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS have operational activities occurring at the same time as these projects, the overall magnitude of temporary habitat loss / disturbance to prey, habitat or foraging conditions would be no greater than the projects alone impacts. Overall, this is a magnitude of negligible, with negligible adverse significance.

Table 12-8 Offshore Ornithology – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Construction							
Direct Disturbance and Displacement (ORN-C-01)	A2/3	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Low	Minor adverse	PEMP	Negligible-Minor adverse	No
	A5	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Low	Minor adverse	PEMP	Negligible-Minor adverse	No
	A8	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Low	Minor adverse	PEMP	Negligible-Minor adverse	No
Indirect Impacts via Habitat and Prey Availability (ORN-C-05)	A2/3	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
	A5	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
	A8	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Operation and Maintenance							
Direct Disturbance and Displacement (ORN-O-01)	A2/3	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
	A5	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
	A8	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
Indirect Impacts via Habitat and Prey Availability (ORN-O-05)	A2/3	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
	A5	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
	A8	*Receptors*: Offshore ornithology receptors (seabirds) *Value*: Medium *Sensitivity*: Medium	Negligible	Negligible	None required	Negligible	No
Decommissioning							
Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase. * Not including designations.							

13. Commercial Fisheries

400. This chapter of the preliminary environment report presents the existing environment for commercial fisheries activity, which is understood as fishing activity legally undertaken where the catch is sold for taxable profit, and presents the potential effects of construction, O&M, and decommissioning of the ANS on Commercial Fisheries.

401. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8. Potential impacts of the ANS on charter angling, defined as fishing for marine species where the purpose is recreation and not sale or trade, are assessed in **Chapter 17 Other Marine Users**.

13.1. Study Area

402. The AoS are located within the western portion of the ICES Division 4b (Central North Sea) statistical area, within UK EEZ waters, and beyond the 12 nautical mile (nm) limit. For the purposes of recording fisheries landings, ICES Division 4b is divided into statistical rectangles used consistently across the UK and European Member States operating in the North Sea. Each ICES statistical rectangle is '30 min latitude and 1 degree longitude' in size, which equates to approximately 30nm^2.

403. The Study Area has been defined as all ICES rectangles which could be either directly, or indirectly affected by the ANS. For **Chapter 10 Fish and Shellfish Ecology**, this was defined based on a maximum tidal excursion from the AoS. For this chapter, given this tidal excursion may displace or disrupt commercially important fish and shellfish resources, an identical approach has been used:

- A2/3 is located in ICES rectangles 39F1 and 39F2 (A2/3 occupies 10.7% of 39F1 and 10.15% of 39F2) and lies within the maximum tidal excursion for 40F2.
- A5 is located on the Eastern border of ICES rectangle 38F1 (A5 occupies 0.26% of 38F1) and lies within the maximum tidal excursion for 38F0.
- A8 is located in ICES rectangle 36F0 (A8 occupies 5.73% of 36F0) and lies within the maximum tidal excursion for 36F1, 37F0 and 37F1.

404. Based on this spatial overlap of the AoS with ICES rectangles and proximity to nearby rectangles, the Commercial Fisheries Study Area (hereafter referred to as 'the Study Area') has been defined as the following nine ICES rectangles: 39F1/39F2/40F2 (A2/3), 38F0/38F1 (A5) and 36F0/36F1/37F0/37F1 (A8).

405. The Study Area is shown on **Figure 13.1**. Collectively, the AoS spatially overlap with approximately 3% of the total Study Area comprising the nine rectangles. The actual footprint of the ANS infrastructure (plus any associated construction activities) comprises a significantly smaller area (see further details in **Section 4.3.1**) which will be considered within the assessment below. As it is not known at this stage where the ANS will be located within the AoS, a precautionary approach has been taken to consider the full extent of the AoS when defining the Study Area.

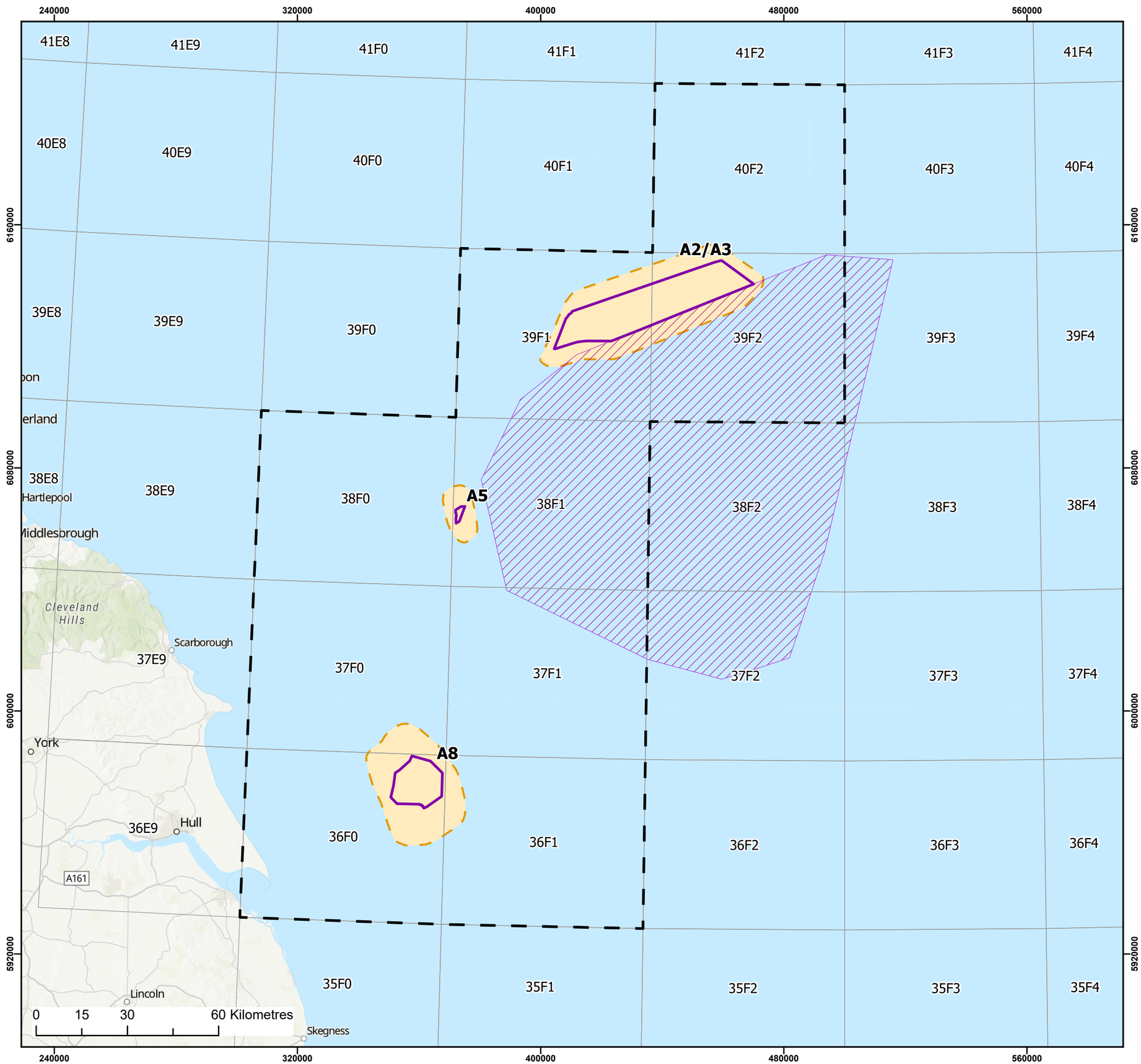
13.2. Data Sources

406. **Table 13-1** presents the desk-based sources used to inform the baseline for this chapter.

Table 13-1 Desk-based sources used to inform the baseline for Commercial Fisheries

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Marine Management Organisation (MMO), 2025)	Full coverage of the Study Area	2019 to 2023	Landings statistics data for UK and EU-registered vessels, with data query attributes for: landing year; landing month; vessel length category; ICES rectangle; vessel / gear type; port of landing; species; live weight (tonnes); and value (£).
The Applicant	Partial coverage of the Study Area	2023 and 2024	Marine traffic (AIS and radar) survey data for Dogger Bank D Wind Farm.
The Applicant	Partial coverage of the Study Area	Various dates in 2021, 2022 and 2023	Static fishing gear observations in Dogger Bank A, B and D Wind Farms.
The Applicant	Dogger Bank D Preliminary Environmental Information Report: Chapter 14 Appendix 14.2: Commercial Fisheries Baseline Technical Report	Various	Various figures relating to fishing data in the North Sea for the DBD Wind Farm Project.

407. It is intended that during the ES, full acquisition and analysis of the baseline data sources listed in **Table 13-2** (in addition to those identified in **Table 13-1**) is completed in order to develop a robust understanding of the baseline environment. Any limitations in the datasets underpinning the project assessments will also be detailed fully within the ES.



Legend:

- ANS AoS
- Commercial Fisheries Study Area
- Commerical Fisheries Area of Search based on maximum tidal ellipse for each ANS AoS
- ICES Rectangles
- Dogger Bank Fishing Byelaw Area

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Commercial Fisheries Study Area

Figure: 13.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0069

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	07/11/2025	AB	GC	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

Table 13-2 Desk-based data sources for Commercial Fisheries

Data Source	Date	Data Contents
MMO	2016 to 2020	VMS data for UK registered vessels ≥15m length.
ICES	2016 to 2020	VMS data for EU registered vessels ≥12m length.
Sources include the MMO and the local IFCA.	Various – most recent data will be sought.	IFCA and MMO fisheries surveillance data, showing records of fishing vessel observations from patrol vessels / aircraft.
The Applicant.	Various.	Marine traffic survey (AIS and radar) data identifying fishing vessel activity. Fisheries scouting surveys (fishing gear and vessel observations) and / or data and records held by the Company Fisheries Liaison Officer (FLO).
EU Market Observatory for Fisheries and Aquaculture (EUMOFA) database.	Landings sales values for the baseline study period.	First sale value of fisheries landings.
Sources include ICES and the local IFCA.	Various – most recent data will be sought.	Key species stock assessments.
Various sources.	Various.	Regional offshore wind farm PEIR and ES commercial fisheries assessments.
Various sources (e.g. Wageningen Marine Research for Dutch fisheries data).	Various.	Where relevant, landings and VMS data sourced directly from EEA Member States

409. Data analysis will then be corroborated and expanded upon by consultation with the fishing industry and other relevant stakeholders, including the following:

- MMO;
- Holderness Fishing Industry Group (HFIG);
- National Federation of Fishermen's Organisations (NFFO);
- Scottish Fishermen's Federation (SFF);
- NEIFCA;
- Scallop Industry Consultation Group (SICG);
- Local Fishermen's Associations and Producer Organisations, including inshore fishery groups;
- Any EU Member State representative organisations as identified during baseline data analysis; and
- Individual fishermen as identified by the Company FLO / other means.

410. Consultation will continue throughout the application process, and will not only seek to validate the baseline, but to identify key stakeholder concerns to inform the impact assessment.

13.3. Assumptions and Limitations

411. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**. Any key assumptions, data limitations or technical issues encountered during baseline characterisation with the above data sources are identified below.

412. Limitations of landings data include the spatial size of ICES rectangles, which can misrepresent actual fishing activity across the AoS. This should be taken into account when interpreting the data.

413. All commercial landings by UK-registered vessels are subject to the Register of Buyers and Sellers (RBS) legislation and therefore landings by UK vessels of all lengths are recorded within the MMO iFish database. While it is recognised that there is no statutory requirement for owners of vessels of 10m and under to declare their catches, registered buyers are legally required to provide sales notes of all commercially sold fish and shellfish under the 2005 Registration of Buyers and Sellers of First-Sale Fish Scheme (RBS legislation) (MMO, 2022a; 2023a). The RBS legislation applies to all licensed fishing vessels, regardless of length, and requires name, port letters and numbers (PLN) of the vessel which landed the fish to be recorded in relation to each purchase. For the 10m and under sector, landing statistics are recorded on sales notes provided by the registered buyers (MMO, 2022a; 2023a). Information that may not be formally recorded on the sales note, such as gear and fishing area, is added by coastal staff based on local knowledge of the vessels they administer - for example, from observations of the vessel during inspections at ports or from aerial and at-sea surveillance activities as well as discussions with the vessel owners and / or operators (MMO, 2022a; 2023a).

414. A lack of recent landings statistics for EU (non-UK) fleets is also recognised as a data limitation. Based on the most recent European Commission data call (from 2017 onwards) landings data is no longer available by ICES rectangle. Data at a scale of ICES division (the whole of the central North Sea) is less useful to understand fishing activity specific to the area overlapping the AoS. However, recently published MMO landings statistics incorporate data on landings by non-UK vessels into UK ports which partially informs this knowledge gap.

13.4. Existing Environment

415. A summary of the commercial fisheries baseline environment is provided in the following sections.

416. The fishing activity described below can be expected to have been modified to some degree by the introduction of fishing restrictions subsequent to the baseline study period. The introduction in 2022 of a byelaw prohibiting the use of bottom towed gear across the Dogger Bank SAC will have resulted in removal of any dredge, trawl or seine net fishing activity across areas in proximity to, or adjacent to the A2/3 AoS (from parts of ICES rectangles 39F1 and 39F2), within proximity to the A5 AoS (38F1) and the Byelaw has the potential to indirectly affect A8 AoS from the restriction in rectangle 37F1.

417. While this change in fishing activity post-2022 will be reflected in landings statistics and in some of the spatial fisheries data analyses extending to 2024, it is acknowledged that not all datasets capture the period following introduction of these fisheries management measures. Such measures may have increased fishing pressures outside of the Dogger Bank SAC, which may lead to an increase in fishing activity within the Study Area.

418. Historically, a Danish sandeel fishery was active in the North Sea but has declined substantially since the 2000s. As of March 2024, the UK government has prohibited sandeel fishing within English waters of ICES Area 4 (North Sea) by vessels of any nationality. Again, this can be expected to have reduced the fishing activity described in this section.

13.4.1. Overview of Landings

419. Landings from the Study Area by UK-registered vessels had an average value of £2.7 million across the period 2019 to 2023 (MMO, 2024). **Plate 13-1** shows landings values across this time period for each ICES rectangle within the Study Area, highlighting relatively high landings values in rectangles 36F0 and 37F0, where A8 is located or adjacent. **Plate 13-2** shows the landed weight by tonnage per ICES rectangle.

420. Landings from ICES rectangle 36F0 accounts for 51% of the total value of UK landings from the Study Area, and landings from rectangles 37F0 and 36F1 account for 22% and 11% of the total value, respectively. Across the 2019 to 2023 period, UK landings showed relative consistency, with a slight decline in 2020 likely due to the COVID-19 pandemic, increasing in 2021 before returning to approximately 2019 levels in 2022, and a further slight decline in 2023 with total landings valued at £22 million.

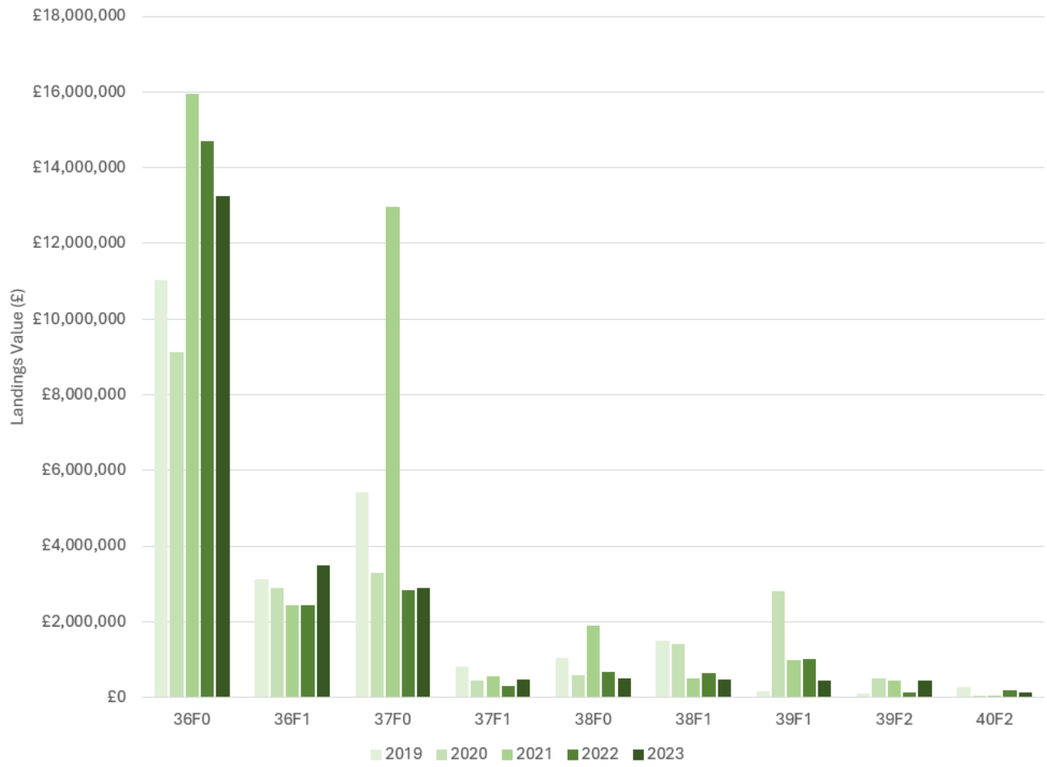


Plate 13-1 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries from the AoS, by ICES Rectangle, Between 2019 and 2023 (MMO, 2025)

421. **Plate 13-3** shows the key species landed from the Study Area. Shellfish species, most notably brown crab *Cancer pagurus* and lobster *Homarus gammarus* and but also scallops *Pecten maxims*, whelks *Buccinum undatum* and Nephrops *Nephrops norvegicus*, account for approximately 86% of total landings from the Study Area by value. Between 2019 and 2023, annual shellfish landings were generally consistent, with a dip in landings observed in 2020 likely due to the COVID-19 pandemic.

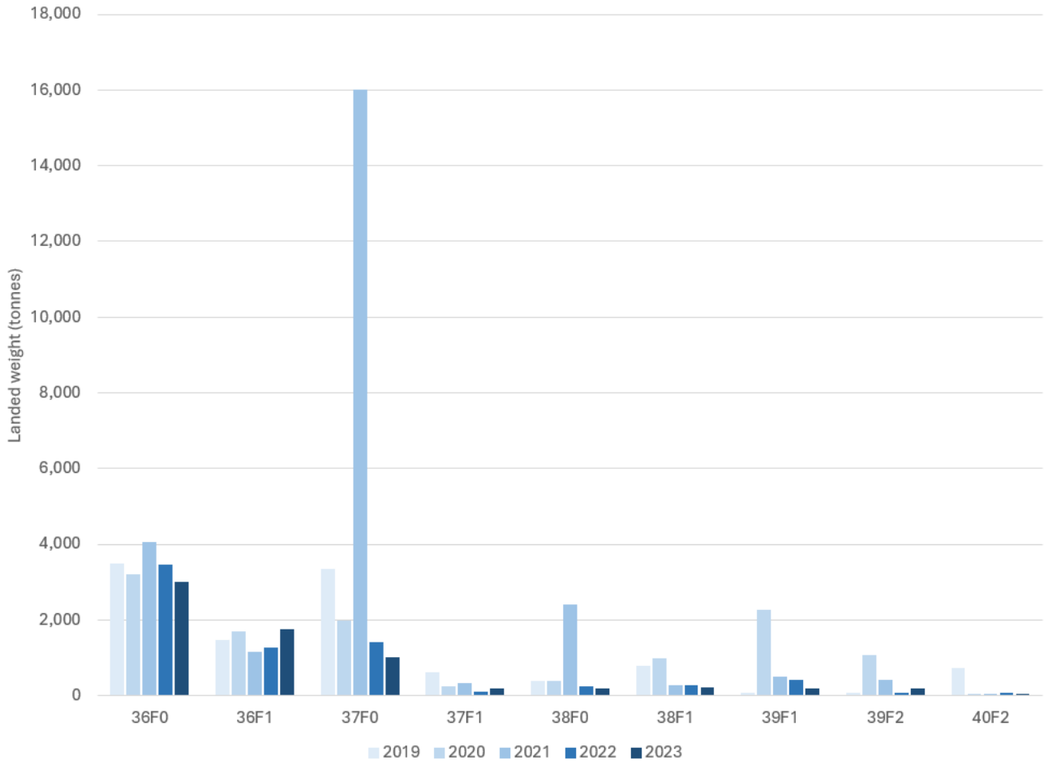


Plate 13-2 Annual Landings Weight (tonnes) by UK-Registered Vessels from the Commercial Fisheries from the AoS, by ICES Rectangle, Between 2019 and 2023 (MMO, 2025)

422. Landings of demersal fish species, including plaice *Pleuronectes platessa* and turbot *Scophthalmus maximus* account for approximately 3% of total landings from the Study Area by value and have shown a continuous decline over the five-year study period. Landings of pelagic species from the Study Area by UK-registered vessels have historically been very low but showed a substantial spike in 2021 which landings data indicate is associated with herring *Clupea harengus* catches in the month of September in 2021.

423. **Plate 13-4** shows the key fishing gear types utilised across the Study Area. The largest proportion of landings by value are attributed to potting gear. The value of landings by beam trawls operated by UK-registered vessels in the Study Area has remained relatively consistent, correlating with the observed landings of demersal species over the same period. The value of landings from dredge gear targeting scallops has remained relatively consistent other than a peak in 2020. Use of pelagic gear peaked in 2021, otherwise having a low landing value in other years. This is likely a reflection of the transient and highly mobile nature of pelagic shoaling fish, whereby landings are not associated with highly specific or consistent grounds.

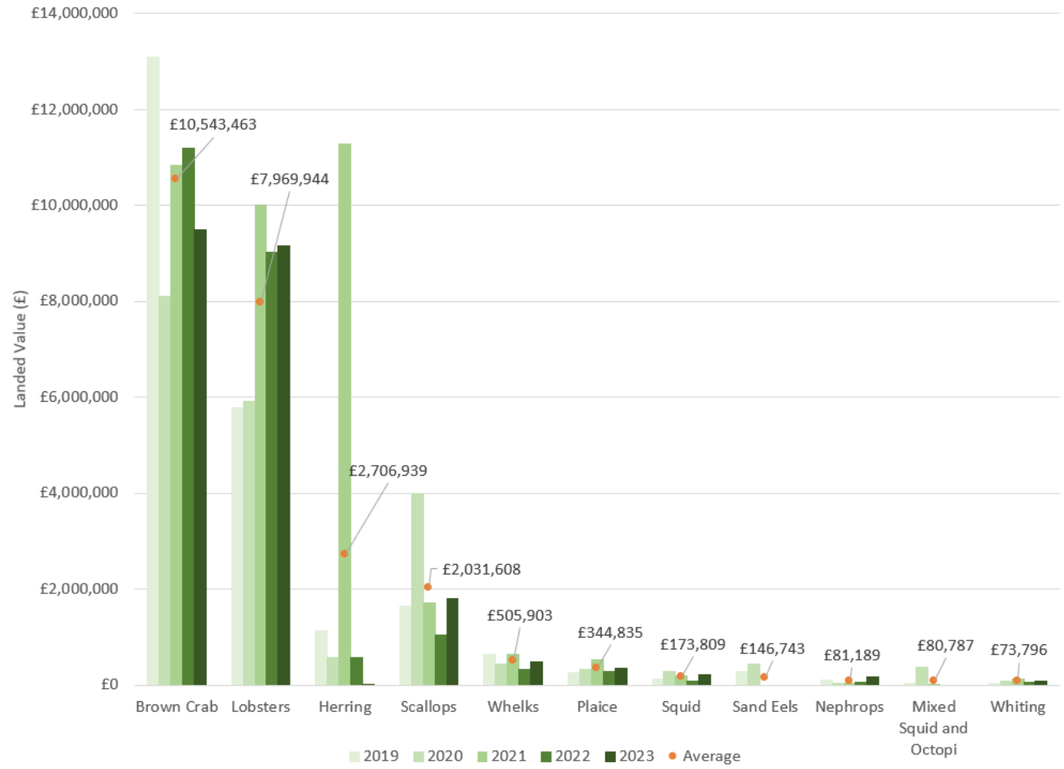


Plate 13-3 Annual Landings Value (£) by UK-Registered Vessels from the AoS, by Key Species, Between 2019 and 2023 (MMO, 2025)

424. For A2/3, within ICES rectangles that are either overlapping or in proximity to the AoS (39F1/39F2/40F2), landings statistics for 2019 to 2023 indicate that the majority of landings by value (76.3%) are associated with pots and traps, with 10.7% value from pelagic trawls and 8.1% from dredging.

425. For A5, within ICES rectangles that are either overlapping or in proximity to the AoS (38F0/38F1), landings statistics for 2019 to 2023 indicate that the majority of landings (79.0%) by value are associated with pots and traps, with 11.4% value from pelagic trawls and 6.4% from dredging.

426. For A8, within ICES rectangles that are either overlapping or in proximity to the AoS (36F0/36F1/37F0/37F1), landings statistics for 2019 to 2023 indicate that the majority of landings (80.1%) by value are associated with pots and traps, with 11.1% value from pelagic trawls and 6.1% from dredging.

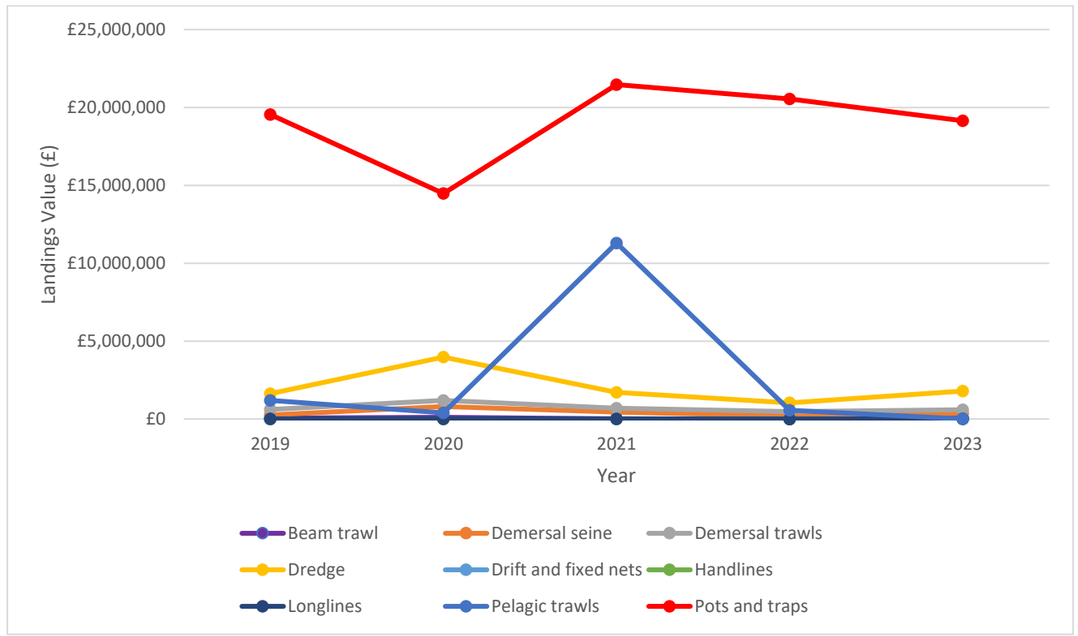


Plate 13-4 Annual Landings Value (£) by UK-Registered Vessels from the Study Area, by Key Fishing Gear, Between 2019 and 2023 (MMO, 2025)

427. UK landings data indicates that across the 2019 to 2023 period, and across the Study Area, English-registered fishing vessels accounted for approximately 77.4% of total landings, with Scottish-registered vessels accounting for 20.6%. Most landings were made by vessels in the following vessel length categories: 12m to 15m (16.8%), 18m to 24m (18.9%), 24m to 40m (23.1%) and 8m to 10m (13.6%). Key UK ports receiving landings from the Study Area include Bridlington, Grimsby, Hornsea, North Shields, Scarborough, Whitby and Withernsea. Non-UK ports including Ijmuiden (Netherlands) and Harlingen (Netherlands) also receive landings from the Study Area.

428. **Plate 13-5** presents landings by both UK and non-UK fishing vessels from the Study Area between 2019 and 2023. The data indicates limited EU vessel activity throughout the Study Area.

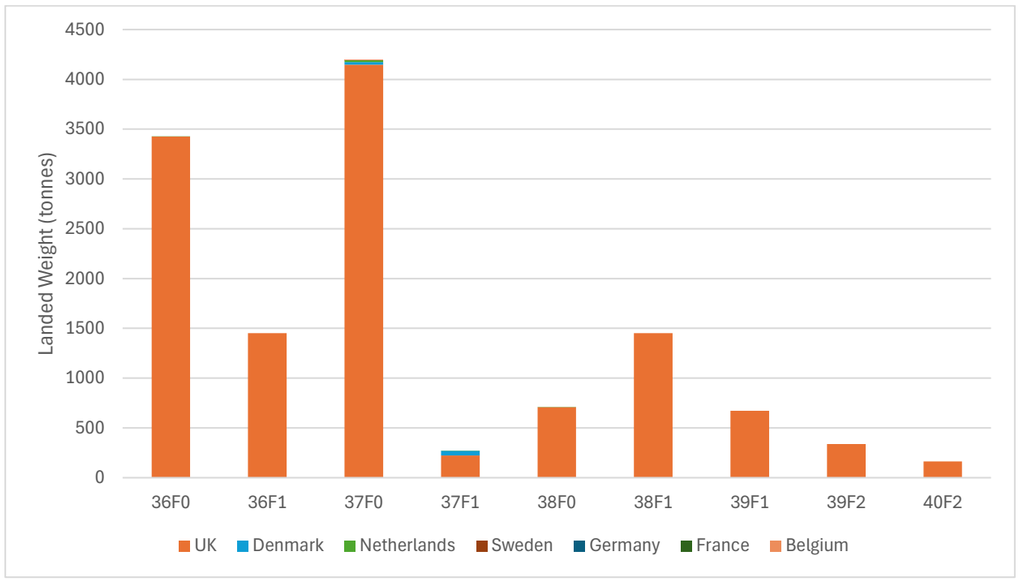


Plate 13-5 Average Annual Landed Weight (Tonnes) by UK and EU Vessels from the Study Area, by ICES Rectangle, Between 2019 and 2023 (MMO, 2025)

13.4.2. Landings by Fishing Gear Types

429. The following sub-sections summarise fishing activity in the Study Area by gear type.

13.4.2.1. Potting Fishery

430. The potting fishery primarily targets brown crabs and lobsters and accounts for £95.2 million first sales value landed across 2019-2023 from the Study Area. Approximately 65% of this value is associated with ICES rectangle 36F0, which directly overlaps with A8.

13.4.2.2. Scallop Dredge Fishery

431. Scallop dredge fishing primarily operates in ICES rectangles 36F0, 37F0 and 39F1. This area overlaps with A8 and the western portion of A2/3.

432. Scallop dredge fishing accounts for £10.14 million first sales value landed from 2019-2023 from the Study Area. Landings by UK scallop dredge vessels are made into Hartlepool and Scarborough. Scallops are targeted year-round, with landings peaking in spring.

13.4.2.3. Pelagic Trawl Fishery

433. The UK pelagic trawl fishery sporadically targets herring in the Study Area. It accounts for £13.5 million first sales value landed 2019-2023 from the Study Area. Landings of pelagic species from the Study Area have historically been low but showed a substantial spike in 2021 which landings data indicate is associated with herring catches in the month of September in 2021.

434. Non-UK pelagic trawlers may be sporadically active within the Study Area, with vessels registered in Denmark primarily targeting herring.

13.4.2.4. Demersal Trawl Fishery

435. The demersal trawl fishery primarily targets plaice and accounts for £3.6 million first sales value landed 2019-2023 from the Study Area. Relatively higher levels of demersal trawl activity occur in 39F1, 40F2, 38F1 and 37F1. These areas are located either within or around the SAC (noting demersal trawling no longer takes place in the Array Area as a result of byelaw implementation in 2022).

436. Non-UK trawlers active in the Study Area include Danish and Dutch vessels targeting primarily demersal and some shellfish species.

437. Landings by demersal trawlers are primarily made into North Shields and Dutch ports. Demersal trawl landings peak during autumn and winter months.

13.4.2.5. Beam Trawl Fishery

438. The beam trawl fishery accounts for £230,741 first sales value landed 2019-2023 from the Study Area.

439. Relatively higher levels of activity are located in 36F0, 37F0 and 40F2 (noting beam trawling no longer takes place in the Array Area as a result of byelaw implementation in 2022). These correlate to inshore areas around A8 and the offshore area to the north of A2/3.

440. No non-UK trawlers were active in the Study Area. Landings by beam trawlers are primarily made into Hartlepool, Great Yarmouth and Dutch ports.

13.4.2.6. Demersal Seine Fishery

441. The demersal seine fishery accounts for £2.1 million first sales value landed between 2019-2023 from the Study Area.

442. UK, Belgian and Dutch demersal seine vessels are active throughout the Study Area (noting demersal seining no longer takes place in the Array Area as a result of byelaw implementation in 2022).

443. Landings by demersal seine vessels are made into Hartlepool, Grimsby and Dutch ports.

13.4.2.7. Other Gear Types

444. Some intertidal fixed netting activity may also be expected to take place on the coastline between Flamborough and Withernsea, targeting shellfish. Landings in 2023 are recorded by drift and fixed nets in the nearshore.

13.5. Commercial Fisheries Scoping

445. **Table 13-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 13-3 Summary of impacts proposed to be scoped in (✓) and out (X) for Commercial Fisheries

Potential Impact	Construction	Operation	Decommissioning
Reduction in access to, or exclusion from established fishing grounds CF-C-02, CF-O-02, CF-D-02	A8 only – potting fleet	A8 only – potting fleet	X
Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds CF-C-03, CF-O-03, CF-D-03	A8 only – potting fleet	A8 only – potting fleet	X
Displacement or disruption of commercially important fish and shellfish resources CF-C-04, CF-O-04, CF-D-04	X	X	X
Increased vessel traffic associated with the Project within fishing grounds leading to interference with fishing activity CF-C-05, CF-O-05, CF-D-05	X	X	X
Additional steaming to alternative fishing grounds - all other fleets CF-C-07, CF-O-07, CF-D-07	X	X	X
Physical presence of infrastructure leading to gear snagging CF-O-09	X	X	X

13.6. Potential Effects

446. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to commercial fisheries. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**.

447. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associate Development**) as the basis for the worst-case scenario. Design commitments adopted for this assessment are described in the sections above and listed in **Appendix C Commitments Register** (Design Commitments CO7, CO9, CO11, CO12, CO113, CO16, CO115 and CO31).

13.6.1. Potential Effects during Construction

13.6.1.1. Reduction in access to, or exclusion from established fishing grounds (CF-C-02)

448. Installation activities and the physical presence of constructed infrastructure may lead to a temporary reduction in access to, or exclusion from established fishing grounds. There is potential for some loss of fishing opportunities during the construction period, though any effects are expected to be localised, and the operational range of relevant fleets will not be limited to the ANS footprint.

13.6.1.1.1. Receptor Sensitivity

449. UK potting fishery: The UK potting fleet operates across relatively distinct areas of ground in areas that are already heavily exploited and are therefore more sensitive to disruption. The UK potting fleet is deemed to be of medium vulnerability and medium recoverability across the Study Area. The sensitivity of the receptor is therefore, considered to be **medium**.

450. UK scallop dredge fishery: The UK scallop dredge fishery is targeted for the most part by nomadic vessels that are able to target distinct scallop grounds located around the UK coastline. Given adequate notification, it is expected that these vessels will be in a position to avoid construction areas. These fleets are considered to have a medium to large operational range; medium to high levels of alternative fishing grounds; and are deemed to be of low vulnerability and high recoverability. The sensitivity of these receptors is therefore considered to be **low**.

451. UK pelagic, demersal and beam trawl fisheries: The UK trawl fleets are highly mobile and operate across large areas of the North Sea and beyond. Given adequate notification, it is expected that these vessels will be in a position to avoid construction areas. These fleets are considered to have a medium to large operational range; medium to high levels of alternative fishing grounds; and are deemed to be of low vulnerability and high recoverability. The sensitivity of these receptors is therefore considered to be **low**.

452. UK demersal seine fishery: The UK seine fleet are highly mobile and operate across large areas of the North Sea and beyond. Given adequate notification, it is expected that these vessels will be in a position to avoid construction areas. These fleets are considered to have a medium to large operational range; medium to high levels of alternative fishing grounds; and are deemed to be of low vulnerability and high recoverability. The sensitivity of this receptor is therefore considered to be **low**.

453. Non-UK pelagic, demersal and beam trawl fisheries: The non-UK trawl fleets are highly mobile and operate across large areas of the North Sea and beyond. They have an extensive operational range and are considered to be highly adaptive and resilient to change. Given adequate notification, it is expected that these vessels will be in a position to avoid construction areas. The sensitivity of these receptors is therefore considered to be **negligible**.

13.6.1.1.2. Magnitude

454. Construction may lead to a temporary loss of access to fishing grounds and the fish and shellfish resources within these grounds for a range of fishing opportunities during the construction activities, which will directly affect various fishing fleets over a short-term duration. The impact is predicted to be short-term and intermittent with localised exclusion surrounding construction activities.

455. UK potting fishery: During construction, potting vessels may be required to remove pots from areas under construction. Potting fishers may therefore experience loss of earnings for the time taken to relocate gear, and (potentially) a loss of earnings associated with not being able to fish the specific grounds under construction (e.g. if alternative grounds are either not available, or not as productive). Potting typically involves a number of fleets of pots being deployed across a range of areas, and while it is highly unlikely that 100% of pots deployed by a single vessel will be impacted at any one time, it is understood that specific potting grounds may be targeted by specific operators. In this case, individual fishing businesses that routinely target the site will be impacted to a higher extent and this is accounted for within the assessment.

456. The ICES rectangle 36F0 overlaps significant shellfish grounds routinely targeted by UK vessels. Key species targeted include brown crab and lobster. The impact on the UK potting fleet is predicted to be of regional spatial extent, short-term duration and intermittent. It is predicted that the impact will affect the receptor directly. In consideration of the ANS footprint and temporary nature of the works, the magnitude is considered to be **medium (adverse)** for the UK potting fleet for A8 (i.e. a minor loss of target fish or shellfish resource, or minor loss of ability to carry on fishing activities). For A2/3 and A5, the magnitude is considered to be **low (adverse)** (i.e. undetectable change) for the UK potting fleet due to the value of landings from potting.

457. UK scallop dredge fishery: Scallop dredge fishing accounts for £10.14 million first sales value landed from 2019-2023 from the Study Area. The impact on the UK scallop dredge fleet is predicted to be of regional spatial extent, short-term duration and intermittent. It is predicted that the impact will affect the receptor directly. In consideration of the ANS footprint and temporary nature of the works, the magnitude of impact is considered to be **low (adverse)** for the UK dredge fleet.

458. UK pelagic trawl fishery: The UK pelagic trawl fleet is understood to be active across wide areas of the North Sea. Landings of herring from the Study Area have been sporadic across the study period, accounting for £13.5 million first sales value landed 2019-2023 from the Study Area. In consideration of the ANS footprint and temporary nature of the works, the magnitude of impact is considered to be **low (adverse)** for the UK dredge fleet.

459. UK demersal trawl fishery: The UK demersal trawl fishery is understood to be active across wide areas of the North Sea. The demersal trawl fishery primarily targets plaice and accounts for £3.6 million first sales value landed 2019-2023 from the Study Area. Where the impact may affect the receptor, it will be direct, of regional spatial extent, short-term duration and intermittent. The magnitude of impact is considered to be **low (adverse)** for the UK demersal trawl fishery.

460. UK beam trawl fishery: The UK demersal trawl fishery is understood to be active across wide areas of the North Sea. The beam trawl fishery accounts for £230,741 first sales value landed 2019-2023 from the Study Area. Where the impact may affect the receptor, it will be direct, of regional spatial extent, short-term duration and intermittent. The magnitude of impact is considered to be **low (adverse)** for the UK beam trawl fishery.

461. UK demersal seine fishery: The UK demersal trawl fishery is understood to be active across wide areas of the North Sea. The demersal seine fishery accounts for £2.1 million first sales value landed between 2019-2023 from the Study Area. Where the impact may affect the receptor, it will be direct, of regional spatial extent, short-term duration and intermittent. The magnitude of impact is considered to be **low (adverse)** for the UK demersal seine fishery.

462. Non-UK fisheries: As per **Plate 13-5,** any landings from non-UK fisheries across the entire Study Area are considered to be extremely low in comparison to those from UK vessels. Therefore, the magnitude of impact is considered to be **negligible (adverse)**.

13.6.1.1.3. Effect Significance

463. For ICES rectangle 36F0 and therefore A8 for UK potting, with a sensitivity of **medium**, and a magnitude of **medium (adverse)**, the potential impact of reduction in access to, or exclusion from established fishing grounds for potting is predicted of **medium adverse** significance. **This impact will therefore be considered in more detail at the next stage of assessment.**

464. For all other fisheries and non-UK vessels, overall, with a sensitivity of **low to negligible (adverse)**, and a magnitude of **low to negligible (adverse)**, the potential impact of reduction in access to, or exclusion from established fishing grounds is of **minor to negligible (adverse)** significance. **This impact will therefore not be considered in more detail at the next stage of assessment for these receptors.**

465. Design commitments include advance notification of planned construction activities to fishers and ongoing liaison throughout construction discussed in **Appendix C** (Design Commitment IDs CO11, CO113 and CO115). Taking account of these measures, the residual effect will be direct and temporary.

13.6.1.2. Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds (CF-C-03)

466. Fishing activity may be displaced from the ANS footprint, leading to gear conflict and increased fishing pressure on adjacent grounds. There is potential for displacement of fishing activity, however these effects are expected to be localised, and the operational range of relevant fleets will not typically be limited to within the ANS boundaries.

13.6.1.2.1. Receptor Sensitivity

467. The sensitivity of the fleets is as described under **Section 13.6.1.1.1** and is **medium** for the UK potting fleet and **low** for all other fleets except for the EU trawl fleets, which have **negligible** sensitivity.

13.6.1.2.2. Impact Magnitude

468. Conflict over diminished grounds may occur if displaced vessels explore grounds traditionally fished by other gear types; and / or displaced vessels relocate to actively fish grounds already targeted by the same gear. For example, this could include displaced demersal otter trawlers exploring areas fished by potters and thereby causing gear conflict or gear entanglement between potting lines and trawl gear and / or displaced demersal otter trawlers focusing effort in areas already fished by demersal otter trawlers and therefore increasing competition in that area. The impact is predicted to be of regional spatial extent, short-medium term duration and intermittent.

469. UK potting fishery: Conflict over diminished grounds may occur if displaced vessels operating mobile gear (e.g. dredge or demersal trawl) explore grounds traditionally fished by potters; and / or displaced potting gear is relocated into other actively fished potting grounds. Displacement of mobile gear may therefore increase the risk of interaction with potting gear.

470. When considering the impact of potters being displaced into grounds already targeted by potters two scenarios are feasible:

- Alternative fishing grounds are available to relocate gear, in which case gear conflict and displacement effects will be low.
- Alternative fishing grounds are not available as adjacent areas are already being fished by potters, in which case the gear already on the ground limits the level of displacement. While there remains potential for gear conflicts and increased fishing pressure to arise, appropriately mitigated exclusion impacts will limit this.

471. Taking these aspects into consideration the magnitude of impact is considered to be **medium (adverse)** for the UK potting fishery.

472. UK scallop dredge fishery: Displacement is not expected to significantly affect the dredge fishery operating across the Study Area, which has a wide operational range. The magnitude of the displacement impact is assessed to be **low (adverse)** for UK scallopers.

473. UK pelagic trawl fishery: Displacement is not expected to affect the UK trawl fleets, which have a wide operational range. In consideration of the landings value in **Plate 13.4**, The magnitude of the displacement impact is assessed to be **low (adverse)** for the UK pelagic trawl fishery.

474. UK beam and demersal trawl fisheries: Displacement is not expected to affect the UK trawl fleets, which have a wide operational range. In consideration of the landings value in **Plate 13.4**, the magnitude of the displacement impact is assessed to be **negligible (adverse)** for the UK demersal trawl and beam trawl fisheries.

475. UK demersal seine fishery: Displacement is not expected to affect the UK trawl fleets, which have a wide operational range. In consideration of the landings value in **Plate 13.4**, the magnitude of the displacement impact is assessed to be **negligible (adverse)** for the UK demersal seine fishery.

476. Non-UK fisheries: As per **Plate 13-5**, any landings from non-UK fisheries across the entire Study Area are considered to be extremely low in comparison to those from UK vessels. Therefore, the sensitivity of impact is considered to be **negligible (adverse)**.

13.6.1.2.3. Effect Significance

477. For ICES rectangle 36F0 and therefore A8 for UK potting, with a sensitivity of **medium**, and a magnitude of **medium (adverse)**, the potential effect of displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds is predicted to be of **medium adverse** significance. **This impact will therefore be considered in more detail at the next stage of assessment.**

478. For all other fisheries and non-UK vessels, overall, with a sensitivity of **low to negligible (adverse)**, and a magnitude of **low to negligible (adverse)**, the potential effect of displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds is predicted to be of **minor to negligible adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment for non-potting fisheries.**

479. Embedded mitigation measures include advance notification of planned construction activities to fishers and ongoing liaison throughout construction discussed in **Appendix C** (Design Commitment IDs CO11, CO113 and CO115). Taking account of these measures, the residual effect in all cases will be direct and temporary.

13.6.2. Potential Effects during Operation

13.6.2.1. Reduction in access to, or exclusion from established fishing grounds (CF-O-02)

480. O&M activities and the physical presence of constructed infrastructure may lead to a reduction in access to, or exclusion from established fishing grounds. It is assumed that fishing will resume where possible within proximity to the ANS footprint once it is operational. While the effect may be long term, it is expected to be localised, and the operational range of relevant fleets are not limited to the Project footprint. Fishing is expected to resume where possible within proximity to the ANS footprint when the construction is completed. The sensitivities are as per the construction phase.

481. However, these activities will be of such limited spatial extent and frequency that they are not considered likely to cause any significant effects in EIA terms. Impact magnitude will be smaller than that set out for construction in **Section 13.6.1.1** due to the operational nature of the ANS (**low adverse for potting, negligible adverse for all other fisheries**), leading to an effect significance of **minor to negligible adverse**. **This impact will therefore not be considered in more detail at the next stage of assessment.**

13.6.2.2. Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds (CF-O-03)

482. Fishing activity may be displaced from the ANS footprint, leading to gear conflict and increased fishing pressure on adjacent grounds, during the operation phase. Fishing is expected to resume where possible within proximity to the ANS footprint when the construction is completed. While the effect may be long term, it is expected to be localised, and the operational range of relevant fleets are not limited to the ANS footprint. The sensitivities for all fisheries are as per the construction phase.

483. However, these activities will be of such limited spatial extent and frequency that they are not considered likely to cause any significant effects in EIA terms. Impact magnitude will smaller than that set out for construction in **Section 13.6.1.2** (**low adverse for potting, negligible adverse for all other fisheries**) leading to an effect significance of **minor to negligible adverse. This impact will therefore not be considered in more detail at the next stage of assessment.**

13.7. Inter-Relationships

484. Potential inter-relationships between Commercial Fisheries and other environmental topics have been considered, where relevant, in **Table 13-4**.

485. The Commercial Fisheries assessment is not likely to have any key inter-relationships with other topics for the impacts scoped into this assessment.

Table 13-4 Commercial Fisheries – inter-relationships with other topics

Receptor	Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction					
All Commercial Fisheries receptors	All impacts	All impacts relating to Commercial Fisheries	Fish and Shellfish Ecology	Fish and shellfish act as a target species for Commercial Fisheries. Impacts on Fish and Shellfish Ecology may therefore lead to impacts on Commercial Fisheries	**Chapter 10 Fish and Shellfish Ecology** informs **Chapter 13 Commercial Fisheries**
Operation					
All Commercial Fisheries receptors	All impacts	All impacts relating to Commercial Fisheries	Fish and Shellfish Ecology	Fish and shellfish act as a target species for Commercial Fisheries. Impacts on Fish and Shellfish Ecology may therefore lead to impacts on Commercial Fisheries	**Chapter 10 Fish and Shellfish Ecology** informs **Chapter 13 Commercial Fisheries**

13.8. Interactions Assessment

486. The impacts identified and assessment in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 13-5.** Where there is potential for interactions between impacts, these are assessed below.

487. The details and scope of ANS decommissioning works will be determined by the relevant regulations and guidance at the time of decommissioning and provided in the Offshore Decommissioning Plan (see **Appendix C**, Design Commitment CO21).

488. For this assessment, it is assumed that inter-relationships during the decommissioning phase would be of similar nature to those identified during the construction phase.

Table 13-5 Commercial Fisheries – potential interactions between impacts

Construction and Operation and Maintenance		
	CF-C-02	**CF-C-03**
Reduction in access to, or exclusion from established fishing grounds **(CF-C-02)**		Yes
Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds **(CF-C-03)**	Yes	

13.8.1. DBD Project Effect Interactions

489. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

13.8.1.1. Construction Impacts (CF-C-02, CF-C-03)

490. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of seabed preparation activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

13.9. Cumulative Impacts

491. The ZoI used to identify relevant plans and projects for the commercial fisheries CEA covers the central and southern North Sea (ICES Divisions 4b). This area is considered representative of the fishing grounds used by the fleets operating within the commercial fisheries Study Area.

492. Where there is potential for cumulative effects with other plans and projects within the ZoI, this is addressed in **Table 13-6.**

13.10. Summary and Next Steps

493. The preliminary assessment above is tabulated and summarised in **Table 13-7**. Based on the preliminary assessment all potential effects are of **minor to negligible adverse** significance. Should AoS A8 be retained following site refinement, the following potentially significant effects could occur which would be further assessed in the ES stage:

- Reduction in access to, or exclusion from established fishing grounds (A8 only for potting fisheries) (CF-C-02) (A8 only).
- Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds (A8 only for potting fisheries) (CF-C-03) (A8 only).

494. The assessment will also update the cumulative assessment with other projects, where relevant, based on new information.

Table 13-6 Commercial Fisheries – Potential Cumulative Effects

Impact ID	Impact	Potential for Cumulative Effects	Rationale	Assessment
Construction				
CF-C-02	Reduction in access to, or exclusion from established fishing grounds	No	Other offshore wind farm projects and fisheries management measures could have the potential to reduce access to fishing grounds. This could lead to the potential cumulative effect of temporary (during construction) loss or restricted access to fishing grounds.	Dogger Bank South East and Dogger Bank South West may have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that construction activities may occur at the same time. Given that only a single monopile could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as these projects, the overall magnitude of reduction in access to, or exclusion from established fishing grounds would be no greater than the projects alone impacts. Overall, this is a magnitude of **medium** for potting, and **low/negligible** otherwise. This gives a significance of **medium adverse** for potting, and **low/negligible** otherwise.
CF-C-03	Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds	No	The loss of access to fishing grounds may lead to displacement at a cumulative level, where vessels are exploratory fishing and focusing effort in areas outside of cumulative developments. This could lead to the cumulative effect of incremental displacement.	Dogger Bank South East and Dogger Bank South West may have construction phases that overlap with construction of the ANS, therefore it is possible, although unlikely, that construction activities may occur at the same time. Given that only a single monopile could be installed for the ANS, the potential for the ANS works to meaningfully contribute to a cumulative impact is highly limited. Should the ANS be constructed at the same time as these projects, the overall magnitude of displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds would be no greater than the projects alone impacts. Overall, this is a magnitude of **medium** for potting, and **low/negligible** otherwise. This gives a significance of **medium (adverse**) for potting, and **low/negligible** otherwise.

Table 13-7 Commercial Fisheries – Summary of Effects

Impact	AoS	Receptor Type and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Construction							
Reduction in access to, or exclusion from established fishing grounds (CF-C-02)	A2/3	***Receptors***: UK potting, scallop dredge, pelagic trawl, demersal trawl, beam trawl, demersal seins, Non-UK pelagic trawl, demersal trawl and beam trawl fisheries. ***Sensitivity***: UK potting – medium. All others: low to negligible.	UK potting – medium adverse. All others: low to negligible adverse.	All fisheries: minor to negligible adverse.	Advance notification of planned construction activities to fishers and ongoing liaison throughout construction	All fisheries: minor to negligible adverse.	No
	A5						
	A8			UK potting – medium adverse. All others: minor to negligible adverse.		UK potting – medium adverse. All others: minor to negligible adverse.	Yes for A8 - Potting
Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds (CF-C-03)	A2/3	***Receptors***: UK potting, scallop dredge, pelagic trawl, demersal trawl, beam trawl, demersal seins, Non-UK pelagic trawl, demersal trawl and beam trawl fisheries. ***Sensitivity***: UK potting – medium. All others: low to negligible.	UK potting – medium adverse. All others: low to negligible adverse.	All fisheries: minor to negligible adverse.	Advance notification of planned construction activities to fishers and ongoing liaison throughout construction	All fisheries: minor to negligible adverse.	No
	A5						
	A8			UK potting – medium adverse. All others: minor to negligible adverse.		UK potting – medium adverse. All others: minor to negligible adverse.	Yes for A8 - Potting
Operation and Maintenance							
Reduction in access to, or exclusion from established fishing grounds (CF-O-02)	A2/3	***Receptors***: UK potting, scallop dredge, pelagic trawl, demersal trawl, beam trawl, demersal seins, Non-UK pelagic trawl, demersal trawl and beam trawl fisheries. ***Sensitivity***: UK potting – medium. All others: low to negligible.	UK potting – low adverse. All others: negligible adverse.	All fisheries: minor to negligible adverse.	N/A	All fisheries: minor to negligible adverse.	No
	A5						No
	A8						No
Displacement leading to gear conflict and increased fishing pressure on adjacent / alternative grounds (CF-O-03)	A2/3	***Receptors***: UK potting, scallop dredge, pelagic trawl, demersal trawl, beam trawl, demersal seins, Non-UK pelagic trawl, demersal trawl and beam trawl fisheries. ***Sensitivity***: UK potting – medium. All others: low to negligible.	UK potting – low adverse. All others: negligible adverse.	All fisheries: minor to negligible adverse.	N/A	All fisheries: minor to negligible adverse.	No
	A5						No
	A8						No

Impact	AoS	Receptor Type and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Further Assessment at ES Stage?
Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase * Not including designations.							

14. Shipping and Navigation

495. This chapter of the preliminary environmental report presents the existing environment and the potential effects of the construction, O&M, and decommissioning of the ANS associated with Shipping and Navigation. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

14.1. Study Area

496. It is recognised that the ANS may be located anywhere within the AoS. Therefore, the Study Area for shipping and navigation is conservatively defined as a 10 nautical miles (nm) buffer of each AoS, see **Figure 14.1**. A 10nm Study Area is standard for shipping and navigation vessel traffic assessments of surface structures as it captures relevant routeing in the region whilst still remaining site specific and providing local context to the analysis of risks. Desk Study

497. A desk study will be undertaken to compile baseline information using the sources of information set out in **Table 14-1**.

498. Relevant Meteorological Ocean data will also be included as a data source within the main assessment submitted with the DCO application but will be identified in proximity to the relevant AoS once refined.

Table 14-1 Desk-based sources used to inform the baseline for Shipping and Navigation

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Dogger Bank D Wind Farm Artificial Nesting Structure Preliminary Feasibility Assessment (Anatec, 2025)	Within 5nm of each AoS	2025	Study of shipping and navigation constraints including key navigational features and vessel traffic. Vessel traffic based on Automatic Identification System (AIS) data collected from terrestrial, offshore and satellite receivers during two 28-day periods from Summer and Winter 2024.
Automatic Identification System (AIS)	Full coverage of Study Areas	2025-26	Two 14-day seasonal periods of vessel traffic data collected via terrestrial, offshore and/or satellite receivers. Periods will cover 14-days from Summer 2025 and 14-days from Winter 2025-2026.
UKHO Admiralty Charts	Full coverage of Study Areas	2025	Admiralty charts 266, 267, 268, 1187, 1190, 1191, 1192, 1632, and 2182 which depict navigational features and constraints in proximity to the AoS.
UKHO Admiralty Sailing Directions North Sea (West) Pilot NP54 (UKHO, 2021)	In proximity to the AoS	2021	UKHO sailing directions are used for characterising other navigational features in proximity to the AoS.
Marine Accident Investigation Branch (MAIB) marine accident database	Full coverage of Study Areas	2015 to 2024	Latest maritime incident dataset available from the MAIB database. Detailed review limited to latest ten years of data (2015 to 2024).
Royal National Lifeboat Institution (RNLI) incident data	Full coverage of Study Areas	2015 to 2024	Latest maritime incident dataset available from RNLI. Detailed review limited to latest ten years of data (2015 to 2024).
The Crown Estate marine aggregate dredging areas	In proximity to AoS	2025	Dataset detailing the marine aggregate dredging areas within and in proximity to the AoS.

14.2. Assumptions and Limitations

499. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**. Any key assumptions, data limitations or technical difficulties encountered during baseline characterisation with the above data sources are identified in **Table 14-2**.

*Table 14-2 Assumptions or limitations identified from the data sources for Shipping and Navigation in **Table 14-1***

Data Source	Assumption/Limitation	Potential Implications on Assessment?
AIS	The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnage (GT) engaged on international voyages, cargo vessels of more than 500GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1st July 2002, and fishing vessels over 15m length overall (LOA).	Small craft may be underrepresented in the vessel traffic data but given the distance offshore, it is unlikely small craft (recreational vessels and fishing vessels under 15m) would be transiting without AIS installed. A proportion of smaller vessels also carry AIS voluntarily, typically utilising a Class B AIS device.

Data Source	Assumption/Limitation	Potential Implications on Assessment?
Historical Incident Data; MAIB	Although all UK commercial vessels are required to report accidents to the MAIB, non-UK vessels do not have to report unless they are in a UK port or within 12nm territorial waters (noting that the shipping and navigation Study Areas are not located entirely within 12nm territorial waters) or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report accidents to the MAIB.	The MAIB incident data cannot be considered comprehensive of all incidents in the shipping and navigation Study Areas as not all incidents are reported.
Historical Incident Data; RNLI	Although hoaxes and false alarms are excluded, any incident to which a RNLI resource was not mobilised has not been accounted for in this dataset. Given that the RNLI have an operational limit of 100nm, it is anticipated that an incident occurring further offshore would be unlikely to result in a response from a RNLI asset.	The RNLI incident data cannot be considered comprehensive of all incidents in the shipping and navigation Study Area as not all incidents require assistance from a RNLI resource. Given the 100nm operational limit, AoS further offshore (particularly A2/3) are less likely to feature a RNLI response if an incident occurred.
UKHO Admiralty Charts	The UKHO Admiralty Charts are updated periodically and therefore the information shown may not reflect the real time features within the region with total accuracy. For aids to navigation, only those charted and considered key to establishing the shipping and navigation baseline are shown. Navigational features are based upon the most recently available UKHO Admiralty Charts and Sailing Directions at the time of writing.	UKHO Admiralty Charts may not illustrate the most up to date or current conditions. During consultation input will be sought from relevant stakeholders regarding the navigational features baseline.

14.3. Existing Environment

14.3.1. Navigational Features

500. Key navigational features within and in proximity to each ANS AoS will be identified in the main assessment submitted with the DCO application. These include the numerous offshore wind farms at varying stages of development, offshore platforms, wells, and subsea infrastructure associated with the oil and gas industry, wrecks and obstructions, subsea interconnector cables, and various IMO routeing measures, ports, harbours, and associated anchorages.

14.3.2. Vessel Traffic Movements

501. As outlined in **Table 14-1,** a desk-based study of AIS data will be undertaken within a 10nm Study Area of each ANS AoS in the main assessment submitted with the DCO application.

502. To inform this preliminary assessment consideration has been given to the findings of the preliminary feasibility assessment. This found that routeing commercial vessels are most prominent, especially in proximity to A8. These include cargo vessels, particularly DFDS Seaways Roll-On/Roll-Off Cargo (RoRo) routeing between Immingham and Nordic ports. DFDS Seaways Roll-On/Roll-Off Passenger (RoPax) routeing between the UK and the Netherlands are also in proximity to A8. Other commercial vessels such as tankers are also known to utilise these routes. Sea-Cargo and Smyril Line operated RoRo also route in proximity to A5 between the UK and Norway and to ports in the Faroe Islands, respectively. Oil and gas vessels will likely be routeing to/from and operating at the neighbouring oil and gas platforms, especially in proximity to A8. Commercial routeing further offshore, around A2/3, is less well defined but does include the same Sea-Cargo route as A5.

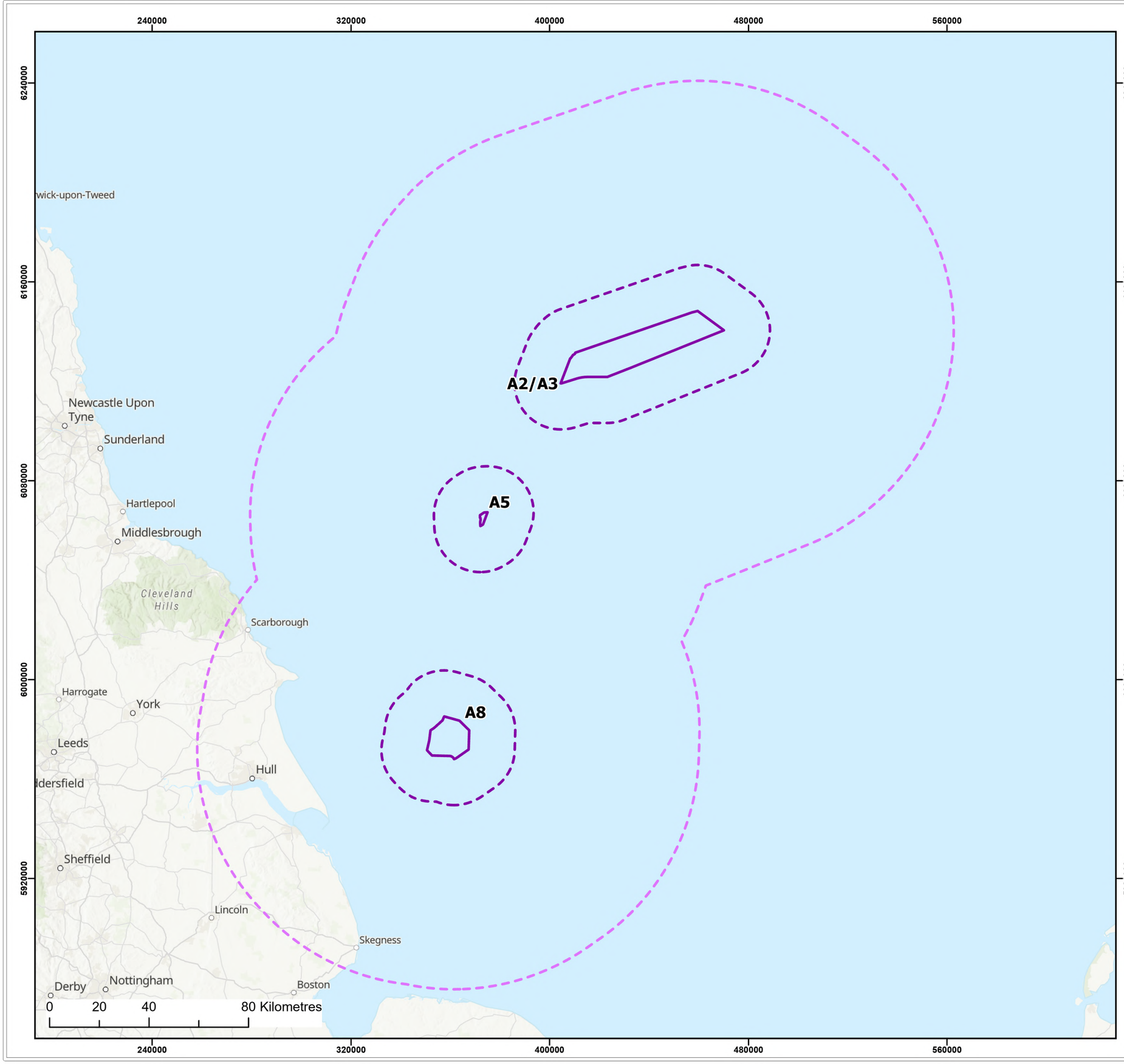
503. Small craft transits, including fishing and recreational vessels, are infrequent within the vicinity of the AoS.

14.4. Shipping and Navigation Scoping

164. **Table 14-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 14-3 Summary of impacts proposed to be scoped in (✓) and out (X) for Shipping and Navigation

Potential Impact	Construction	Operation	Decommissioning
Vessel displacement	✓	✓	✓
Third-party to third-party vessel collision	✓	✓	✓
Vessel to structure allision	✓	✓	✓



Legend:

- ANS AoS
- Shipping and Navigation Study Area for Assessment (ANS AoS 10nm Buffer)
- Shipping and Navigation Cumulative Assessment Study Area (ANS AoS 50nm Buffer)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Shipping and Navigation Study Areas

Figure: 14.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0066

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/11/2025	AB	GC	A3	1:1,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

14.5. Assessment Methodology

504. Assessment of effects in this chapter will be based on the Formal Safety Assessment (FSA) methodology noting this is the international standard for marine assessment, and is the approach required by the MCA under MGN 654 specifically Annex 1 (MCA, 2021). This approach differs to the general approach and standard EIA methodology outlined in **Chapter 6 Methodology**.

505. The IMO FSA process (IMO, 2018) as approved by the IMO in 2018 under Maritime Safety Committee (MSC) – Marine Environment Protection Committee (MEPC).2/circ. 12/Rev.2 is applied to the assessment of potential effects within this chapter. The FSA process is a structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (CBA) to reduce impacts to As Low as Reasonably Practicable (ALARP).

506. The process for determining the significance of effects is a two-stage process that involves defining the severity of consequence of the potential effect and the frequency of occurrence of the receptors. The severity of consequence and frequency of occurrence are then used to define the significance of effect via a tolerability matrix approach where the significance of effect is defined as Broadly Acceptable (low risk), Tolerable with Mitigation (intermediate risk) or Unacceptable (high risk).

14.6. Potential Effects

507. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to shipping and navigation. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M, and decommissioning activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out above and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worst-case scenario. Design commitments adopted for this assessment are described for each potential effect and listed in **Appendix C Commitments Register** (see Design Commitments CO7, CO9, CO11, CO12, CO16 and CO115).

14.6.1. Potential Effects during Construction

14.6.1.1. Impact on Vessel Displacement Due to the Presence of the ANS (SN-C-01)

508. Activities associated with the installation of the ANS as well as the presence of the ANS may displace third-party vessels from their existing routes or activity.

509. For each ANS AoS, there are commercial routes identified passing within or in proximity and therefore there may be a need for routeing deviations to ensure commercial vessels maintain a safe passing distance from the ANS. In particular, commercially sensitive timetabled routes noted in proximity include DFDS Seaways operated RoRo and RoPax routing in proximity to AoS A8, as well as regular oil and gas transits to the neighbouring oil and gas platforms to AoS A8. Less routine RoRo operated Sea-Cargo and Smyril Lines vessels also route in proximity to A5. These routes were detailed further in **Section 14.3.2** AoS A2/3 has less defined routeing and with the same Sea-Cargo routing through this AoS as AoS A5.

510. Given the scale of the ANS, any deviation is likely to be manageable with consequences limited to minor disruption to schedules. However, for AoS A2/3 and A5 the presence of the Dogger Bank Offshore Wind Farm developments to the south and south-east, respectively, may also influence routeing deviations given the reduced navigable sea room. Likewise, for A8, the presence of oil and gas installations may also influence routeing deviations given the reduced navigable sea room. In these instances, the resulting disruption may be more substantial, especially where the vessels impacted are sensitive to schedule changes, i.e., RoRo and RoPax vessels aforementioned, again especially in proximity to A8.

511. There is also potential for small craft (fishing vessels and recreational vessels) to be displaced from existing transits. Given the distance offshore of each AoS, such instances are likely infrequent, especially for A2/3 which is in a particularly remote location.

512. Design commitments will raise awareness of the ANS and subsequently allow mariners to passage plan accordingly to minimise the disruption associated with displacement around the ANS. This will include promulgation of information relating to the installation and deployment of a lighting and marking scheme in accordance with the latest relevant available industry guidance and as advised by Trinity House, MCA, CAA and Ministry of Defence (MOD) as appropriate. Trinity House have indicated that the ANS will be treated as an isolated structure for lighting and marking purposes including use of a fog signal and potentially AIS. Disruption due to installation activity will also be mitigated by compliance of project vessels with international and flag state regulations.

513. Assessment of this impact, in the main assessment submitted with the DCO application, will be supported by further stakeholder consultation and quantitative modelling of vessel displacement for main commercial routes based on an indicative worst case ANS location for each AoS and up-to-date vessel traffic data. The preliminary summary of effects is outlined for each AoS under consideration but will be revisited after further assessment.

514. At this preliminary stage, for AoS A2/3, the frequency of occurrence is considered to be **Remote** while the severity of consequence is considered to be **Minor**. Overall, the significance of effect for this impact for AoS A2/3 is **Broadly Acceptable**, which is **not significant** in EIA terms.

515. For AoS A5, the frequency of occurrence is considered to be **Reasonably Probable** while the severity of consequence is considered to be **Minor**. Overall, the significance of effect for this impact for AoS A5 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

516. For AoS A8, the frequency of occurrence is considered to be **Frequent** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A8 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

14.6.1.2. Increased Vessel to Vessel Collision Risk Between Third-Party Vessels (Route-Based) Due to Displacement (SN-C-02)

517. Activities associated with the installation of the ANS as well as the presence of the ANS may displace third-party vessels from their existing routes or activity, increasing the collision risk with other third-party vessels.

518. With the displacement of third-party vessels as described for SN-C-01, the reduced navigable sea room may result in more encounters which require collision avoidance action in line with the COLREGs. It is generally expected that such action will mitigate the risk of collision.

519. Given the volume of third-party transits, the potential for collision situations to arise is likely to be low for AOS A2/3. For AOS A5 and A8 the volume of third-party transits is much greater, and subsequently there is greater potential for encounters, especially when accounting for main commercial routes which cross in proximity to the AoS. Lower use routes are also of relevance in this respect, as highlighted by the MCA during consultation.

520. In the event that a collision occurs, the consequences may include vessel damage, injury to persons and/or pollution. As a worst case there is potential for a vessel to founder with Potential Loss of Life (PLL), which is heightened with the presence of RoPax in proximity to A8.

521. The same embedded mitigation measures outlined for SN-C-01 also apply for this impact. In addition, information for fishing vessels will be promulgated through ongoing liaison with fishing fleets via an appointed Fisheries Liaison officer (FLO). This may assist with addressing any limitations regarding visual identification of other third-party vessels when passing on another side of the construction operations, which could lead to increased collision risk.

522. Assessment of this impact in the main assessment submitted with the DCO application will be supported by further stakeholder consultation and quantitative modelling of vessel to vessel collision risk for main commercial routes based on an indicative worst case ANS location for each AoS and up-to-date vessel traffic data. The preliminary summary of effects is outlined for each AoS under consideration but will be revisited after further assessment.

523. At this preliminary stage, for AoS A2/3, the frequency of occurrence is considered to be **Extremely Unlikely** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A2/3 is **Broadly Acceptable**, which is **not significant** in EIA terms.

524. For AoS A5, the frequency of occurrence is considered to be **Remote** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A5 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

525. For AoS A8, the frequency of occurrence is considered to be **Reasonably Probable** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A8 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

14.6.1.3. Vessel to Structure Allision Risk for Third-Party Vessels Due to the Presence of the ANS (SN-C-04)

526. The presence of a partially constructed ANS may result in the creation of a risk of allision for vessels.

527. The ANS will introduce a new surface piercing hazard both for third-party vessels under power and for third-party vessels which are adrift in proximity.

528. As an isolated structure, the ANS will be more exposed than structures associated with an offshore wind farm array since there is no combined benefit of multiple structures for mariners to identify. The ANS will be particularly exposed in the event of an aids to navigation failure in low visibility as this will limit the means through which a mariner may identify its presence whilst on passage. Given the distance offshore of the AoS, the ability to maintain aids to navigation availability may be challenging and require further consideration.

529. To help aid local and international mariner awareness, details of authorised minimum advisory safe passing distances, as defined by a risk assessment, may be applied, with advanced warning and accurate locations of any minimum advisory passing distances provided by Notifications to Mariners and Kingfisher Bulletins. This information promulgated alongside the details of any ongoing activity will maximise awareness for all third-party receptors, including in both day and night conditions. On approach, use of guard vessel and the lighting and marking of the structures in accordance with requirements from Trinity House and MCA will also assist in maximising marine awareness. Trinity House have indicated that the ANS will be treated as an isolated structure for lighting and marking purposes including use of a fog signal and potentially AIS.

530. For a drifting vessel, there are actions which may be taken to prevent the drift incident developing into an allision situation. Any vessel at the distance offshore of the AoS will likely be powered and may be able to regain power prior to reaching the ANS by rectifying any fault. Failing this, the vessel's emergency response procedures may be implemented including use of thrusters where available and emergency anchoring. For ANS in A5 and A8 this may be influenced by the presence of subsea cables which represent an anchor snagging risk. If on-site, project vessels associated with the construction works may be able to render assistance in liaison with the MCA and under SOLAS obligations.

531. In the event that an allision occurs, the consequences may include vessel damage, injury to persons and/or pollution. As a worst case there is potential for a vessel to founder with PLL, which is heightened with the presence of RoPax in proximity to A8. Consequences are likely to be more severe for a powered allision than a drifting allision given that for a drifting allision the speed at impact would be defined by the metocean conditions at the time and therefore likely lower than that for a powered allision.

532. Assessment of this impact in the main assessment submitted with the DCO application will be supported by further stakeholder consultation and quantitative modelling of vessel to structure allision risk for main commercial routes based on an indicative worst case ANS location for each AoS with both powered and drifting scenarios considered and up-to-date vessel traffic data. The preliminary summary of effects is outlined for each AoS under consideration but will be revisited after further assessment.

533. At this preliminary stage, for AoS A2/3, the frequency of occurrence is considered to be **Extremely Unlikely** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A2/3 is **Broadly Acceptable**, which is **not significant** in EIA terms.

534. For AoS A5, the frequency of occurrence is considered to be **Extremely Unlikely** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A5 is **Broadly Acceptable**, which is **not significant** in EIA terms.

535. For AoS A8, the frequency of occurrence is considered to be **Remote** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A8 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

14.6.2. Potential Effects during Operation

14.6.2.1. Impact on Vessel Displacement Due to the Presence of the ANS (SN-O-01)

536. Activities associated with the maintenance of the ANS as well as the presence of the ANS may displace third-party vessels from their existing routes or activity.

537. The nature of this impact is considered similar to that considered for the construction phase (SN-C-01), noting that familiarity with the ANS will be greater than during the construction phase and will continue to increase throughout the O&M phase. Alternative routeing patterns established during the construction phase are likely to remain during the O&M phase.

538. The same mitigations outlined for this impact during construction (SN-C-01) are also relevant for this impact during the O&M phase, noting that maintenance activities (and corresponding promulgation of information) are expected to be infrequent.

539. Assessment of this impact in the main assessment submitted with the DCO application will be supported by further stakeholder consultation and quantitative modelling of vessel displacement for main commercial routes based on an indicative worst case ANS location for each AoS and up-to-date vessel traffic data. The preliminary summary of effects is outlined for each AoS under consideration but will be revisited after further assessment.

540. At this preliminary stage, for AoS A2/3, the frequency of occurrence is considered to be **Remote** while the severity of consequence is considered to be **Minor**. Overall, the significance of effect for this impact for AoS A2/3 is **Broadly Acceptable**, which is **not significant** in EIA terms.

541. For AoS A5, the frequency of occurrence is considered to be **Reasonably Probable** while the severity of consequence is considered to be **Minor**. Overall, the significance of effect for this impact for AoS A5 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

542. For AoS A8, the frequency of occurrence is considered to be **Frequent** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A8 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

14.6.2.2. Increased Vessel to Vessel Collison Risk Between Third-Party Vessels (Route-Based) Due to Displacement (SN-O-02)

543. Activities associated with the maintenance of the ANS as well as the presence of the ANS may displace third-party vessels from their existing routes or activity, increasing the collision risk with other third-party vessels.

544. The same mitigations outlined for this impact during construction (SN-C-02) are also relevant for this impact during the O&M phase, noting that maintenance activities (and corresponding promulgation of information) are expected to be infrequent.

545. Assessment of this impact in the main assessment submitted with the DCO application will be supported by further stakeholder consultation and quantitative modelling of vessel to vessel collision risk for main commercial routes based on an indicative worst case ANS location for each AoS and up-to-date vessel traffic data. The preliminary summary of effects is outlined for each AoS under consideration but will be revisited after further assessment.

546. At this preliminary stage, for AoS A2/3, the frequency of occurrence is considered to be **Extremely Unlikely** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A2/3 is **Broadly Acceptable**, which is **not significant** in EIA terms.

547. For AoS A5, the frequency of occurrence is considered to be **Remote** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A5 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

548. For AoS A8, the frequency of occurrence is considered to be **Reasonably Probable** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A8 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

14.6.2.3. Vessel to Structure Allision Risk for Third-Party Vessels Due to the Presence of the ANS (SN-O-04)

549. The presence of the ANS may result in the creation of a risk of allision for vessels.

550. The same mitigations outlined for this impact during construction (SN-C-04) are also relevant for this impact during the O&M phase. The ability for a project vessel to assist will be limited given the infrequent number of routine or unplanned visits anticipated during the O&M phase.

551. Assessment of this impact in the main assessment submitted with the DCO application will be supported by further stakeholder consultation and quantitative modelling of vessel to structure allision risk for main commercial routes based on an indicative worst case ANS location for each AoS with both powered and drifting scenarios considered and up-to-date vessel traffic data. The preliminary summary of effects is outlined for each AoS under consideration but will be revisited after further assessment.

552. At this preliminary stage, for AoS A2/3, the frequency of occurrence is considered to be **Extremely Unlikely** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A2/3 is **Broadly Acceptable**, which is **not significant** in EIA terms.

553. For AoS A5, the frequency of occurrence is considered to be **Extremely Unlikely** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A5 is **Broadly Acceptable**, which is **not significant** in EIA terms.

554. For AoS A8, the frequency of occurrence is considered to be **Remote** while the severity of consequence is considered to be **Moderate**. Overall, the significance of effect for this impact for AoS A8 is **Tolerable with Mitigation**, which is **not significant** in EIA terms.

14.7. Inter-Relationships

555. Potential inter-relationships between shipping and navigation and other environmental topics have been considered, where relevant, in **Table 14-4**.

Table 14-4 Shipping and Navigation – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
SN-C-01, SN-C-02	Impact on vessel displacement due to the presence of the project and increased vessel to vessel collision risk between third-party vessels (route-based) due to displacement.	**Commercial Fisheries**	Displacement of third-party traffic may impact existing fishing grounds.	This chapter informs **Chapter 13 Commercial Fisheries**.
		Other Marine Users	Displacement of third-party traffic may impact non-transit activities undertaken by third-party vessels.	This chapter informs **Chapter 17 Other Marine Users**.
		Marine Mammals	Displacement of third-party traffic may impact areas of sensitivity for marine mammals.	This chapter informs **Chapter 11 Marine Mammals**.
		Offshore Ornithology	Displacement of third-party traffic may impact areas of sensitivity for ornithology.	This chapter informs **Chapter 12 Offshore Ornithology**.
Operation and Maintenance				
SN-O-01, SN-O-02		**Commercial Fisheries**	Displacement of third-party traffic into existing fishing grounds may exacerbate collision risk.	This chapter informs **Chapter 13 Commercial Fisheries**.

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
	Impact on vessel displacement due to the presence of the project and increased vessel to vessel collision risk between third-party vessels (route-based) due to displacement.	**Other Marine Users**	Displacement of third-party traffic into areas used for non-transit activities may exacerbate collision risk.	This chapter informs **Chapter 17 Other Marine Users**.

14.8. Interactions Assessment

556. The impacts identified and assessment in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 14-5.** Where there is potential for interactions between impacts, these are considered below.

557. During both the construction and O&M phases the need for third-party vessels to take collision avoidance action in proximity to the ANS may increase the potential for allision. However, given the mitigation measures previously noted, the likelihood of a vessel requiring to take such collision avoidance action is considered low. In particular, the promulgation of information will ensure that third-party vessels are aware of the ANS and associated works so as to allow adequate passage planning in advance of the transit in line with good seamanship. In the extreme circumstance of collision avoidance action being required it is expected that the ANS and any associated works would be accounted for to ensure a safe passing distance is maintained.

Table 14-5 Shipping and Navigation – potential interactions between impacts

Construction and Operation and Maintenance				
Impact ID	**SN-C-01, SN-C-02**	**SN-C-04**	**SN-O-01, SN-O-02**	**SN-O-04**
Impact on vessel displacement due to the presence of the project and increased vessel to vessel collision risk between third-party vessels (route-based) due to displacement. (SN-C-01 /SN-C-02)		Yes	No	No
Vessel to structure allision risk for third party vessels due to the presence of partially constructed structures – Presence of the ANS and Project as a whole (SN-C-04)	Yes		No	No
Impact on vessel displacement due to the presence of the project and increased vessel to vessel collision risk between third-party vessels (route-based) due to displacement. (SN-O-01) / SN-O-02)	No	No		Yes
Vessel to structure allision risk for third party vessels due to the presence of operational structures (SN-O-04)	No	No	Yes	

14.8.1. DBD Project Effect Interactions

558. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

14.8.1.1. Construction Impacts (SN-C-01, SN-C-02, SN-C-04)

559. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of seabed preparation activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

14.8.1.2. Operational Impacts (SN-O-01, SN-O-02, SN-O-04)

560. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Shipping and Navigation, there is no potential for within-Project effects during operation.

14.9. Cumulative Effects

561. The ZoI for the cumulative effects within which project and plans will be screened will be within a maximum 50nm surrounding the AoS. A 50nm buffer is standard to assess other offshore wind farms cumulatively to a Project. However, once cumulative developments have been identified and the nature of developments understood; such as other ANS, subsea cables and pipelines, and oil and gas infrastructure, smaller ZoIs may be applied to these cumulative categories on a case-by-case basis.

562. As work to refine the AoS is ongoing, dependant on the AoS taken forward and final location of the ANS, cumulative effects may occur. As they cannot be ruled out at this preliminary stage, there remains the potential for cumulative effects (as a worst-case) and this will be further considered in the NRA. Where there is potential for cumulative effects with other plans and projects within the ZoI, this is addressed in **Table 14-6.**

14.10. Summary and Next Steps

563. The preliminary assessment set out in **Section 14.6** identifies that all of the potential effects are non-significant in EIA terms when considered alone. However, the assessment presented in **Section 14.9** identifies the potential for cumulative effects with other plans and projects dependant on where the ANS is ultimately located.

564. The summary of effects presented in **Table 14-7,** indicates that the following potentially significant effects could occur cumulatively and these potential effects will therefore be considered within the NRA:

- Vessel displacement (SN-C-01) (SN-O-01);
- Third-party to third-party vessel collision (SN-C-O2) (SN-O-02); and
- Vessel to structure allision (SN-C-04) (SN-O-04).

565. At this preliminary stage, it is anticipated all impacts for each AoS are deemed to be **ALARP**. A NRA for the ANS will be carried out to validate the conclusions of this PEIR, including quantification of main commercial route deviations, vessel to vessel collision risk, and vessel to structure allision risk.

Table 14-6 Shipping and Navigation – Potential Cumulative Effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
SN-C-01	Vessel displacement – Construction activities associated with the ANS and Project as a whole	Yes	Activities associated with the installation of the ANS and other cumulative developments may displace third-party vessels from their existing routes or activity.	The Ossian Offshore ECC spatially overlaps the majority of A8. Other cumulative subsea cables including Eastern Green Link 3 (EGL3), Eastern Green Link 4 (EGL4), and Eastern Green Link 5 (EGL5), have the potential to intersect A8 also. The potential for simultaneous construction activities in a refined area may increase the chance of third-party displacement, especially for heavy RoRo/RoPax routeing in proximity to A8, in combination with oil and gas installations already in-situ. The presence of other OWF (primarily the Dogger Bank and Sofia developments) to the south/south-east of A2/3 and A5 could mean further reduced sea room for any deviations required, potentially increasing passage time and distance.
SN-C-02	Increased vessel to vessel collision risk between third-party vessels due to vessel displacement – Construction activities associated with the ANS and Project as a whole	Yes	Activities associated with the installation of the ANS and other cumulative developments may displace third-party vessels from their existing routes or activity, increasing the collision risk with other third-party vessels.	The potential spatial overlap of Ossian Offshore ECC, EGL3, EGL4, and EGL5, and the presence of oil and gas installations already in-situ, with A8 may increase collision risk due to the displacement of vessels during simultaneous construction activities including the risk of creation of temporary bottlenecks. The presence of cumulative offshore wind farms to the south/south-east of A2/3 and A5 may lead to increased collision risk as vessels may be displaced into limited sea room.
SN-C-04	Vessel to structure allision risk for third party vessels due to the presence of partially constructed structures – Presence of the ANS and Project as a whole	Yes	The presence of a partially constructed ANS during the construction phase associated with the Project and other cumulative developments may result in the creation of a risk of allision for vessels.	The displacement of third-party vessels due to construction activities of the Ossian Offshore ECC, EGL3, EGL4, or EGL5 may shift vessels closer to the ANS increasing exposure to the risk of allision if located in A8. The presence of multiple subsea cables and existing offshore wind farm developments may also reduce anchoring availability in the case of a vessel drifting in proximity to an ANS.
Operation and Maintenance				
SN-O-01	Vessel displacement – Maintenance activities or the presence of the ANS and Project as a whole	Yes	Activities associated with maintenance of the ANS as well as the presence of the ANS and other cumulative developments may displace third-party vessels from their existing routes or activity.	As the cables are in-situ, maintenance operations will be fewer than that of construction. However, there is still the potential for simultaneous operations for potential spatially overlapping cable developments; Ossian, EGL3, EGL4, and EGL5, especially for heavy RoRo/RoPax routeing in proximity to A8, in combination with oil and gas installations already in-situ. The presence of other OWF (primarily the Dogger Bank and Sofia developments) to the south/south-east of A2/3 and A5 could mean further reduced sea room for any deviations required, potentially increasing passage time and distances.
SN-O-02	Increased vessel to vessel collision risk between third-party vessels due to vessel displacement – Maintenance activities associated with and the presence of the ANS and Project as a whole	Yes	Activities associated with maintenance of the ANS as well as the presence of the ANS and other cumulative developments may displace third-party vessels from their existing routes or activity, increasing the collision risk with other third-party vessels.	The spatial overlap of Ossian Offshore Export Cable, EGL3, EGL4, and EGL5 with A8 may increase collision risk due to the displacement of vessels during simultaneous maintenance activities including the risk of creation of temporary bottlenecks The presence of cumulative offshore wind farms to the south/south-east of A2/3 and A5 may lead to increase collision risk as the displacement of vessels into limited sea room.
SN-O-04	Vessel to structure allision risk for third party vessels due to the presence of operational structures – Presence of the ANS and Project as a whole	Yes	The presence of the ANS during the O&M phase associated with the Project and other cumulative developments may result in the creation of a risk of allision for vessels.	The displacement of third-party vessels due to maintenance activities of the Ossian Offshore ECC, EGL3, EGL4, or EGL5 may shift vessels closer to the ANS increasing exposure to the risk of allision if located in A8. The presence of multiple subsea cables and existing offshore wind farm developments may as well reduce anchoring availability in the case of a vessel drifting in proximity to an ANS.

Table 14-7 Shipping and Navigation – summary of effects

Impact	AoS	Receptor	Frequency of Occurrence	Severity of Consequence	Significance of Effect	Mitigation Measures	Residual Effect	Further Assessment at ES?
Construction								
Impact on Vessel Displacement Due to the Presence of the ANS (SN-C-01)	A2/3	All third-party vessels	Remote	Minor	Broadly Acceptable	• Promulgation of information; • Lighting and marking; • Appropriate charting of infrastructure; • Project vessel compliance with international and flag state regulations; and • MGN 654.	Broadly Acceptable	Yes (in a NRA)
	A5		Reasonably Probable	Minor	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
	A8		Frequent	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
Increased Vessel to Vessel Collision Risk Between Third-Party Vessels (Route-Based) Due to Displacement (SN-C-02)	A2/3	All third-party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	• Promulgation of information; • Lighting and marking; • Appropriate charting of infrastructure; • Fishing liaison; • Project vessel compliance with international and flag state regulations; and • MGN 654.	Broadly Acceptable	Yes (in a NRA)
	A5		Remote	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
	A8		Reasonably Probable	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
Vessel to Structure Allision Risk for Third-Party Vessels Due to the Presence of the ANS (SN-C-04)	A2/3	All third-party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	• Promulgation of information; • Lighting and marking; • Guard vessel(s) (via risk assessment); • Project vessel compliance with international and flag state regulations; • Consultation with Trinity House and MCA; and • MGN 654.	Broadly Acceptable	Yes (in a NRA)
	A5		Extremely Unlikely	Moderate	Broadly Acceptable		Broadly Acceptable	Yes (in a NRA)
	A8		Remote	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
Operation and Maintenance								
Impact on Vessel Displacement Due to the Presence of the ANS (SN-O-01)	A2/3	All third-party vessels	Remote	Minor	Broadly Acceptable	• Promulgation of information; • Lighting and marking; • Appropriate charting of infrastructure;	Broadly Acceptable	Yes (in a NRA)
	A5		Reasonably Probable	Minor	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)

Impact	AoS	Receptor	Frequency of Occurrence	Severity of Consequence	Significance of Effect	Mitigation Measures	Residual Effect	Further Assessment at ES?
	A8		Frequent	Moderate	Tolerable with Mitigation	• Project vessel compliance with international and flag state regulations; and • MGN 654.	Tolerable with Mitigation	Yes (in a NRA)
Increased Vessel to Vessel Collison Risk Between Third-Party Vessels (Route-Based) Due to Displacement (SN-O-02)	A2/3	All third-party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	• Promulgation of information; • Lighting and marking; • Appropriate charting of infrastructure; • Fishing liaison; • Project vessel compliance with international and flag state regulations; and • MGN 654.	Broadly Acceptable	Yes (in a NRA)
	A5		Remote	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
	A8		Reasonably Probable	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)
Vessel to Structure Allision Risk for Third-Party Vessels Due to the Presence of the ANS (SN-C-04)	A2/3	All third-party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	• Promulgation of information; • Lighting and marking; • Guard vessel(s) (via risk assessment); • Project vessel compliance with international and flag state regulations; • Consultation with Trinity House and MCA; and • MGN 654.	Broadly Acceptable	Yes (in a NRA)
	A5		Extremely Unlikely	Moderate	Broadly Acceptable		Broadly Acceptable	Yes (in a NRA)
	A8		Remote	Moderate	Tolerable with Mitigation		Tolerable with Mitigation	Yes (in a NRA)

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase.

15. Aviation, Radar and Military

567. This chapter of the Preliminary Environmental Report presents the existing environment and the potential effects of the construction, O&M, and decommissioning of the ANS associated with Aviation, Radar and Military. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

15.1. Study Area

568. In defining the spatial coverage of the aviation, radar and military Study Area, the technical safeguarding of aviation communication, navigation and surveillance (CNS) facilities, and the physical safeguarding of airspace within which aircraft manoeuvre must be considered.

569. The International Civil Aviation Organisation (ICAO) document EUR Doc 015 European Guidance Material on Managing Building Restricted Areas (ICAO, 2015) details safeguarding criteria to protect the radio signals of CNS facilities from interference caused by buildings or other large objects. For surveillance facilities such as radars, the safeguarded zone extends from the facility to a radius of 15km. Safeguarded zones for other CNS facilities do not extend further than 6km. The Met Office applies a safeguarded zone of radius 20km around its weather radar sites.

570. The closest AoS to the UK mainland is A8, which is 46km from the shore at its closest point. As a result, potential impacts on CNS facilities and weather radar are not considered further for this AoS.

571. Aircraft taking off, landing or flying in the vicinity of an aerodrome are protected from obstacles by the aerodrome's Obstacle Limitation Surfaces (OLS). The OLS are the lower limits of blocks of protected airspace which surround the aerodrome. OLS typically extend to approximately 15km from the aerodrome. The closest aerodrome to A8 is Humberside Airport, which is 77km to the west-southwest (see **Figure 15.1**).

572. Instrument Flight Procedures (IFPs) are pre-defined manoeuvres that pilots follow with reference to aircraft flight instruments when flying to and from aerodromes. IFPs can extend further from the aerodrome than the OLS and have associated protected surfaces that must not be infringed by obstacles. The AoS do not lie within airspace coincidental with any published IFPs (see **Figure 15.1**).

573. The lateral separation between the three AoS and any aerodromes and their associated OLS and IFPs is such that these aviation receptors are not considered further.

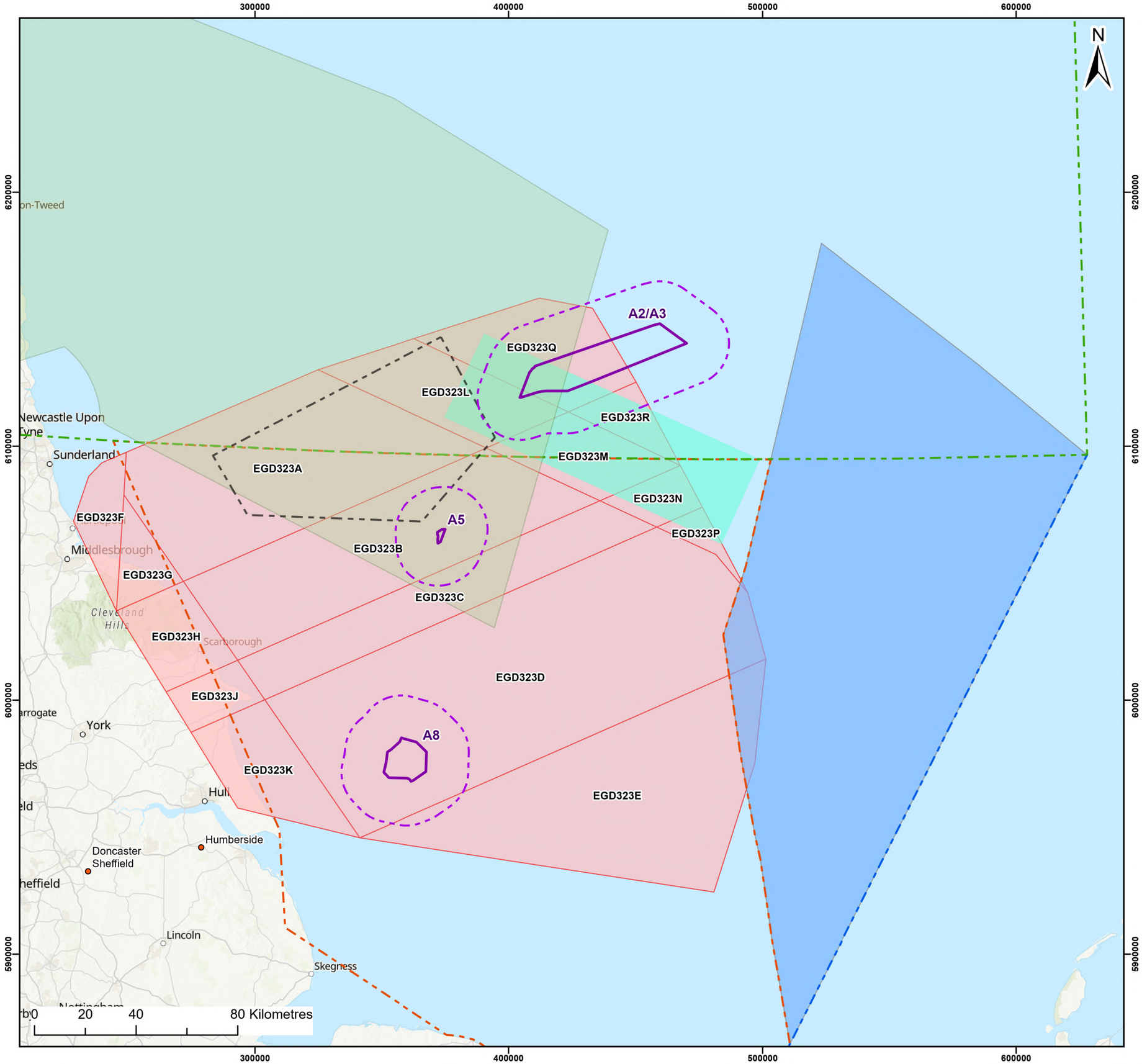
574. The Study Area for aviation, radar and military is defined as the airspace and aviation receptors within a 9nm (16.7km) radius around ANS A2/3, A5, and A8 (see **Figure 15.1**). The Study Area for aviation, radar and military is defined as the airspace and aviation receptors within a 9nm (16.7km) radius around ANS A2/3, A5, and A8 (see **Figure 15.1**). The buffer would typically be defined around the footprint within which the development related activities could occur; however, given that the ANS location within the areas of search is not yet known, a precautionary approach of applying buffers to the entire AoS has been taken. These 9nm buffers account for potential obstacle impacts on the safe operation of helicopter low visibility approaches in poor weather conditions to offshore helidecks and is discussed further in **Section 15.3.4.** The buffers are also considered to be a conservative range for encompassing other aviation receptors that could be impacted by the construction, operation (and decommissioning) of the ANS.

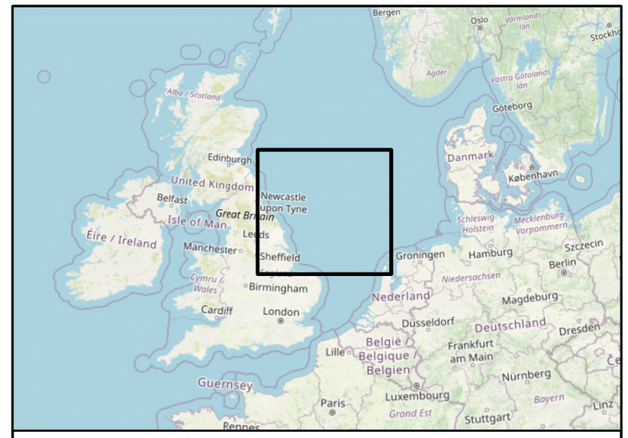
15.2. Data Sources

575. A desk study has been undertaken to compile baseline information within the defined Study Area using the sources of information set out in **Table 15-1**.

Table 15-1 Desk-based sources used to inform the baseline for Aviation, Radar and Military

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Civil Aviation Publication (CAP) 032: UK Aeronautical Information Publication (AIP)	Full coverage of the aviation, radar and military study area.	2025	Contains information on facilities, services, rules, regulations, and restrictions in UK airspace.
UK Military AIP	Full coverage of the aviation, radar and military study area.	2025	The main resource for information and flight procedures at all UK military aerodromes.
North Sea Transition Authority (NSTA) offshore infrastructure data	Full coverage of the aviation, radar and military study area.	2025	Regularly updated NSTA offshore shapefiles.
Office of Communications (Ofcom) Protected Radar List	Full coverage of the aviation, radar and military study area.	2024	Lists the locations and antenna heights of UK civil and military radar sites.
Met Office planning maps	Full coverage of the aviation, radar and military study area.	2015	Online maps of consultation zones for safeguarding UK weather radar sites.





Legend:

- ANS AoS
- Aviation, Radar and Military Study Area
- Air to Air Refuelling Area (AARA) Area 07
- Anglia Radar Area of Responsibility
- Combat Airspace
- London Flight Information Region Boundary
- North Sea Area V
- Scottish Flight Information Region Boundary
- Southern Complex Danger Area
- Staxton Danger Area
- Civil Airport

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Aviation, Radar and Military Study Area
and Existing Airspace Environment

Figure:	Drawing No:				
15.1	PC6250-HAS-XX-OF-DR-GS-0067				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
01	11/11/2025	JH	AB	A3	1:1,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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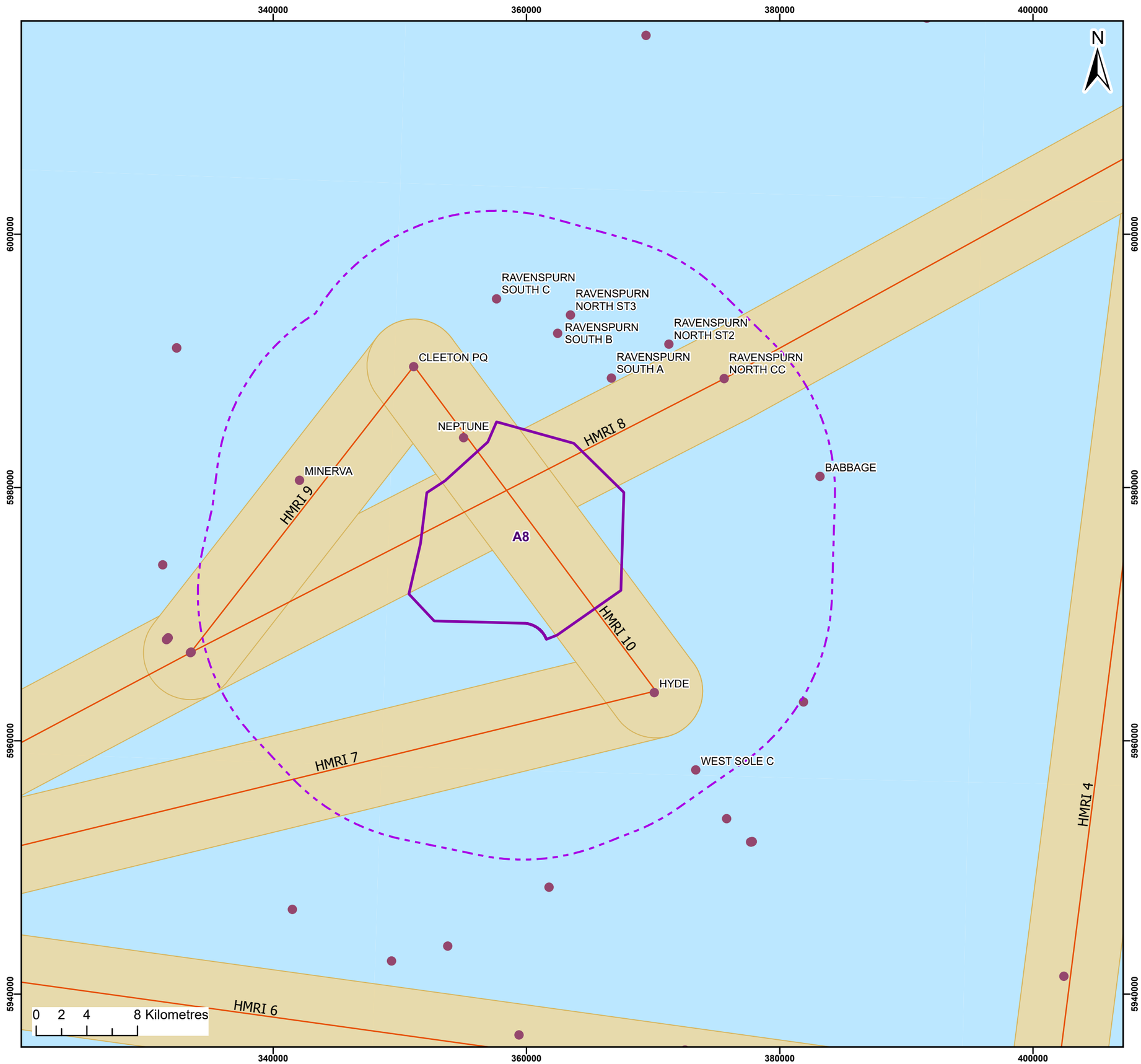

Legend:

- ANS AoS
- Aviation, Radar and Military Study Area
- HMRI 2nm Consultation Buffer
- Helicopter Main Routing Indicators (HMRIs)
- Existing Oil and Gas Offshore Infrastructure

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Helicopter Main Routing Indicators and Offshore Helidecks in the Vicinity of the oANS A8

Figure: 15.2

Drawing No: PC6250-HAS-XX-OF-DR-GS-0068

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/11/2025	JH	AB	A3	1:300,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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15.2.1. Assumptions and Limitations

576. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**. This assessment will be refined where relevant and presented in the ES to be submitted along with the DCO application.

15.3. Existing Environment

15.3.1. Civil Aviation

577. The airspace above the aviation, radar and military Study Area is used by civil and military aircraft and lies within the Lonon and Scottish Flight Information Regions (FIRs) which together form the UK FIR. This airspace is regulated by the UK Civil Aviation Authority (CAA). Of the three AoS under consideration, A2/3 is within the Scottish FIR, while A5 and A8 are within the London FIR (see **Figure 15.1**). From sea level to Flight Level (FL) 195, approximately 19,500 feet (ft) above mean sea level (amsl), the airspace is Class G uncontrolled airspace. Above FL195 is Class C controlled airspace.

578. The boundary between the Scottish FIR and the Copenhagen FIR (regulated by the Danish Civil Aviation and Railway Authority) lies 156km east of A2/3 at its nearest point. The boundary between the London FIR and the Amsterdam FIR (regulated by the Netherlands Inspectie Leefomgeving en Transport) lies 212km to the southeast of A5 and 176km southeast of A8 at their nearest points. A portion of UK FIR airspace known as North Sea Area V is delegated to the Netherlands. The northwestern boundary of North Sea Area V is 42km from A2/3 at its nearest point (see **Figure 15.1**). Within this airspace the Netherlands provides an Air Traffic Service (ATS) to all aircraft between sea level and FL55 (approximately 5,500ft amsl).

579. NATS (En-Route) plc (NERL) provides en-route civil ATS within the UK FIR, except in areas such as Area V, where responsibility for ATS has been formally delegated to the Netherlands. NERL services are supported by a network of radar facilities which provide en-route information for both civil and military aircraft.

580. To enhance flight safety and expedite SAR operations over the southern North Sea, various Flight Information Services are provided by NATS Anglia Radar based at Aberdeen Airport. These services are available to helicopters operating in support of the offshore oil and gas and renewables industries and other civil and military aircraft transiting the airspace. The Anglia Radar Area of Responsibility, in which these services are available, extends from sea level to FL65 (approximately 6,500ft amsl). A5 and A8 are within the Anglia Radar Area of Responsibility (see **Figure 15.1**).

15.3.2. Military Aviation

581. Staxton Danger Area EGD412 lies 16km southwest of A2/3 and 7km northwest of A5 (see **Figure 15.1**). This airspace extends from the sea surface to 10,000ft amsl. Activities within Staxton Danger Area include use of ordnance, munitions and explosives.

582. Most of A2/3, and A5 and A8, lie beneath the Southern Complex Danger Area EGD323 (see **Figure 15.1**), one of four such complexes that provide segregated airspace for military flying training. Specifically, A2/3 lies beneath danger areas EGD323L and EGD323Q which have vertical limits of no less than FL100 (approximately 10,000ft amsl) up to FL660 (approximately 66,000ft amsl). A5 and A8 lie beneath EGD323B and EGD323D, respectively, with vertical limits between FL50 (approximately 5,000ft amsl) and FL660. Activities within the Southern Complex include high-energy manoeuvres, use of ordnance, munitions and explosives, electrical/optical hazards, and unmanned aircraft systems operating beyond visual line of sight.

583. A5 and the western extent of A2/3 lie beneath the EGD514 Combat Airspace Danger Area, which supports large-scale military training exercises predominantly over the North Sea (see **Figure 15.1**). EGD514's vertical limits extend from FL85 (approximately 8,500ft amsl) to FL660 and activities within the airspace include high-energy manoeuvres, use of ordnance, munitions and explosives, and electrical/optical hazards.

584. These danger areas are not permanently active but are activated on request and notified by appropriate agencies such as the MoD or the CAA, via a Notice to Aviation (NOTAM).

585. The western extent of A2/3 lies beneath airspace designated as Area 07, an Air-to-Air Refuelling Area (AARA) with vertical limits of FL100 (approximately 10,000ft amsl) to FL290 (approximately 29,000ft amsl) (see **Figure 15.1**). Within AARA airspace fuel is transferred from tanker aircraft to receiver aircraft under a radar control service provided by military air traffic controllers based at NATS Swanwick Centre in Hampshire.

15.3.3. Helicopter Operations

586. A network of offshore routes over the southern North Sea are flown by civilian helicopters supporting the oil and gas installations. These routes are published on charts as Helicopter Main Routing Indicators (HMRIs) and serve to alert other airspace users of the potential for frequent low-level helicopter traffic.

587. The routes have no lateral dimensions; however, CAP 764: Policy and Guidelines on Wind Turbines (CAA, 2016) states that planned obstacles within 2nm (3.7km) of the route centreline should be consulted upon with helicopter operators and the Air Navigation Service Provider. The 2nm distance is based upon operational experience, the accuracy of navigation systems, and practical considerations. The distance provides helicopter pilots with time and space to descend safely to an operating altitude below the icing level. The icing level is the height of the 0° isotherm where ice can form on airframes and engine intakes, adversely affecting helicopter performance.

588. A8 is crossed by two HMRIs (see **Figure 15.2**). HMRI 8 routes from the coast east of Humberside Airport to the Munro offshore platform via the Rough 'A' and Ravenspurn North platforms, while HMRI 9 routes from the Rough 'A' platform to the Hyde platform via the Cleeton 'PQ' platform. HMRIs over the southern North Sea extend vertically from 1,500ft amsl to FL60 (approximately 6,000ft amsl), although helicopter icing conditions or other flight safety considerations may force helicopters to operate below 1,500ft amsl.

15.3.4. Offshore Helidecks

589. To help achieve a safe operating environment, and in accordance with CAP 764 (CAA, 2016), a 9nm (16.7km) consultation zone for planned obstacles exists around offshore helicopter destinations. There are 12 offshore helidecks within 9nm of A8, as listed in **Table 15-2** and shown on **Figure 15.2**.

Table 15-2 Offshore helideck ranges from AoS A8

Helideck	Operator	Range from A8 (nm)
Babbage	ODE Asset Management	8.40
Cleeton PQ	Perenco	4.25
Hyde	Perenco	4.38
Minerva	Perenco	5.45
Neptune	Perenco	0.83
Ravenspur South A	Perenco	3.21
Ravenspur South B	Perenco	4.34
Ravenspur South C	Perenco	5.25
Ravenspur North CC	Perenco	6.46
Ravenspur North ST2	Perenco	5.86
Ravenspur North ST3	Perenco	5.23
West Sole C	Perenco	8.10

590. As stated in CAP 764 (CAA, 2016), the 9nm zone does not prohibit development but triggers 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.

15.3.5. Search and Rescue

591. There are ten helicopter SAR bases, incorporating 22 aircraft, around the UK with Bristow Helicopters providing helicopters and aircrew. The nearest SAR base is at Humberside Airport. Its helicopters are capable of providing rescue services up to approximately 460km from base.

15.4. Aviation, Radar and Military Scoping

592. **Table 15-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 15-3 Summary of impacts proposed to be scoped in (✓) and out (X) for Aviation, Radar and Military

Potential Impact	Construction	Operation	Decommissioning
Impacts on military and civil radar	X	X	X
Impacts on radio navigation aids	X	X	X
Creation of an aviation obstacle environment	✓	✓	✓
Bird strike risk	X	✓	X

15.5. Potential Effects

593. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to aviation, radar and military. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worst case scenario. Design commitments adopted for this assessment are listed in **Appendix C Commitments Register** (Design Commitments CO7, CO8 and CO9). Assumptions and definitions are provided below and in line with the methodology described in **Chapter 6 Methodology**.

15.5.1. Potential Effects during Construction

15.5.1.1. Creation of an Aviation Obstacle Environment (ARM-C-03)

594. Construction of the ANS would involve tall installation vessels and the construction of infrastructure above sea level which could pose a physical obstruction to low-flying aircraft utilising the airspace in the vicinity.

595. Specifically, permanent or temporary obstacles could increase the possibility of collision for:

- General military low-flying training and operations;
- Helicopter traffic transiting to and from offshore helidecks;
- Helicopters utilising HMRIs 8 and 9; and
- Other low-level fixed-wing or helicopter operations, including those undertaking SAR missions over the southern North Sea.

596. Embedded mitigation in the form of:

- notification of any temporary obstacles exceeding a height of 100m (**Appendix C Commitments Register** (Design Commitment CO8); and
- marking and lighting of obstacles (Commitment ID CO9).

would make pilots aware of temporary tall installation vessels and new permanent above sea level infrastructure.

597. Within uncontrolled Class G airspace the ultimate responsibility for seeing and avoiding obstacles rests with the pilots of civilian and military aircraft. Civilian aircraft must avoid all structures by a minimum distance of 500ft and military aircraft must ensure a minimum separation distance of 250ft from any person, vessel, vehicle or structure. The charting and lighting of obstacles would also be taken into account by offshore helicopter operators, MoD low flying units and SAR operators.

598. Aviation receptors have a high commercial value, but assuming that all relevant CAA and MoD safety guidance in the conduct of their specific operations is adhered to, they should have high tolerance, adaptability and recoverability in the presence of new permanent or temporary obstacles. The receptors have a **medium** sensitivity.

599. The extent of the impact would be localised, short to medium-term duration, and would represent a small change to the existing baseline. The magnitude of the impact is **low**.

600. With a sensitivity of **medium** and a magnitude of **low**, the potential effect is of **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

15.5.2. Potential Effects during Operation

15.5.2.1. Creation of an Aviation Obstacle Environment (ARM-O-03)

601. During the O&M phase, the presence of the ANS could pose a physical obstruction to low-flying aircraft utilising the airspace in the vicinity.

602. Specifically, permanent or temporary obstacles could increase the possibility of collision for:

- General military low-flying training and operations;
- Helicopter traffic transiting to and from offshore helidecks;
- Helicopters utilising HMRIs 8 and 9; and
- Other low-level fixed-wing or helicopter operations, including those undertaking SAR missions over the southern North Sea.

603. Embedded mitigation in the form of marking and lighting of obstacles (Commitment ID CO9) would make pilots aware of new permanent above sea level infrastructure. In consideration of SAR requirements, compliance with MGN 654 will be ensured, where applicable (Commitment ID CO7).

604. Aviation receptors have a high commercial value, but assuming that all relevant CAA and MoD safety guidance in the conduct of their specific operations is adhered to, they should have high tolerance, adaptability and recoverability in the presence of a new permanent obstacle. The receptors have a **medium** sensitivity.

605. The ANS infrastructure would measure a maximum of 30m in both width and length, and extend up to 65m above LAT (or 80m above LAT inclusive of lighting protection), therefore the extent of the impact would be highly localised. The duration of impact would be long-term but would be a small change to the existing baseline. The magnitude of the impact is **low**.

606. With a sensitivity of **medium** and a magnitude of **low**, the potential effect is of **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of assessment.**

15.5.2.2. Bird Strike Risk (ARM-O-07)

607. Flocks of birds in the vicinity of the ANS could potentially increase the likelihood of bird strikes for flight operations in the same area. If the ANS is deployed in A8 it would attract birds to airspace in which multiple low-level helicopters are routinely operating to and from the offshore helidecks listed in **Table 15-2**.

608. The ANS is designed to provide nesting for kittiwakes. A study of seabird flight height data collected around Beatrice Offshore Wind Farm (published as Collection of Seabird Flight Height Data at an Operational Offshore Wind Farm Using Aircraft Mounted LiDAR (Scottish Government, 2022)) found that for the majority of species, including kittiwake, birds were typically found flying at less than 25m (82ft) above sea surface level and during the surveys no birds were found above 200m (656ft).

609. Helicopters supporting oil and gas platforms transiting within A8 via HMRIs 8 and 9 would likely be at altitudes of 1,500ft or more. The nearest offshore helideck to the A8 boundary is on the Neptune platform at a range of 0.83nm. The Neptune helideck height is approximately 100ft amsl.

610. Seabirds are attracted to offshore installations, so helicopter pilots are already cognizant of the risk of bird strikes and can be expected to be taking appropriate precautions to mitigate the risk. Embedded mitigation in the form of marking and lighting of obstacles **Appendix C Commitments Register** (Design Commitment CO9) would make pilots aware of new permanent above sea level infrastructure and the possibility of associated increased bird activity.

611. Aviation receptors have a high commercial value, but awareness of potential increased bird activity in the vicinity of the ANS would mean a high tolerance, adaptability and recoverability from potential bird strike risk. The receptors have a **medium** sensitivity.

612. The extent of the impact would be localised, and the duration would be long-term. The likelihood of a bird strike occurring in A8 would be low as helicopter pilots would be aware of the presence of the ANS and so be expected to take appropriate precautions, and there would be considerable vertical separation between birds and helicopters under most circumstances. Regular low-level helicopter traffic would not be expected to be operating within A2/3 or A5. The magnitude of the impact in A8 is **low**. The magnitude of the impact in A2/3 and A5 is **negligible**.

613. With a sensitivity of **medium** and a magnitude of **low** or **negligible**, the potential effect is of **minor adverse** significance. **This impact will therefore not be considered in more detail at the next stage of the assessment.**

15.6. Inter-Relationships

614. Potential inter-relationships between aviation, radar and military and other environmental topics have been considered, where relevant, in **Table 15-4.**

Table 15-4 Aviation, Radar and Military – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
ARM-C-03	Creation of an aviation obstacle environment – installation of above sea level infrastructure	**Shipping and Navigation**	Aviation lighting could be mistaken for maritime lighting	Marking and lighting will be in accordance with both aviation and maritime requirements, as per Design Commitment CO4 as detailed in **Appendix C**.
		Other Marine Users	Also considers impacts on MoD activities.	This chapter informs **Chapter 17 Other Marine Users**.

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Operation and Maintenance				
ARM-O-03	Creation of an aviation obstacle environment – presence of ANS	**Shipping and Navigation**	Aviation lighting could be mistaken for maritime lighting	Marking and lighting will be in accordance with both aviation and maritime requirements, as per Commitment ID CO9 as detailed in **Appendix C**.
		Other Marine Users	Also considers impacts on MoD activities.	This chapter informs **Chapter 17 Other Marine Users**.

15.7. Interactions Assessment

615. The impacts identified and assessed in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 15-5**.

Table 15-5 Aviation, Radar and Military – potential interactions between impacts

Construction and Operation and Maintenance			
	ARM-C-03	**ARM-O-03**	**ARM-O-07**
Creation of an aviation obstacle environment – installation of above sea level infrastructure (ARM-C-03)		No	No
Creation of an aviation obstacle environment – presence of ANS (ARM-O-03)	No		Yes
Bird strike risk (ARM-O-07)	No	Yes	

15.7.1. DBD Project Effect Interactions

616. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

15.7.1.1. Construction Impacts (ARM-C-03)

617. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of construction activities, the potential effect from the ANS will be highly localised and all AoS are a significant distance from the DBD Array Area. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

15.7.1.2. Operational Impacts (ARM-O-03, ARM-O-07)

618. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Aviation, Radar and Military, there is no potential for within-Project effects during operation.

15.8. Cumulative Effects

619. The ZoI(s) for the cumulative effects within which project and plans will be screened are:

- 40km from the AoS. This is considered a maximum range for other offshore infrastructure to have a potential for creating a cumulative aviation obstacle environment for aircraft and restricting available airspace.

620. Potential cumulative effects with other plans and projects are presented in **Table 15-6.**

15.9. Summary and Next Steps

621. **Table 15-7** summarises the impacts on aviation, radar and military receptors. The preliminary assessment above indicates that there are no potentially significant effects which could occur, and therefore no effects to be further assessed at the ES stage.

Table 15-6 Aviation, Radar and Military – potential cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
ARM-C-03	Creation of an aviation obstacle environment – installation of above sea level infrastructure	Yes	The wind turbines and high crane installation vessels associated with other developments such as Dogger Bank A, B and C and the Dogger Bank South East and West Projects create obstacles, restricting the available airspace.	The same standard embedded mitigations would be expected to apply to other offshore wind farm developments in the vicinity of the ANS. The cumulative magnitude is **low** and the potential cumulative effect is of **minor adverse** significance.
Operation and Maintenance				
ARM-O-03	Creation of an aviation obstacle environment – presence of ANS	Yes	The wind turbines and high crane installation vessels associated with other developments such as Dogger Bank A, B and C and the Dogger Bank South East and West Projects create obstacles, restricting the available airspace.	The same standard embedded mitigations would be expected to apply to other offshore wind farm developments in the vicinity of the DBD Array Area and ANS. The cumulative magnitude is **low** and the potential cumulative effect is of **minor adverse** significance.
ARM-O-07	Bird strike risk to helicopters flying in the vicinity of the ANS.	No	The area of potential bird strike risk would be in the immediate vicinity of the ANS, therefore a cumulative effect on aviation receptors is considered unlikely.	N/A

Table 15-7 Aviation, Radar and Military – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Assessed in ES
Construction							
Creation of an Aviation Obstacle Environment (ARM-C-03)	A2/3	*Receptors*: Military low-flying aircraft Helicopter traffic transiting to and from offshore helidecks Other low-level fixed-wing or helicopter operations including SAR *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No
	A5	*Receptors*: Military low-flying aircraft Helicopter traffic transiting to and from offshore helidecks Other low-level fixed-wing or helicopter operations including SAR *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No
	A8	*Receptors*: Military low-flying aircraft Helicopter traffic transiting to and from offshore helidecks Helicopters utilizing HMRIs 8 and 9 Other low-level fixed-wing or helicopter operations including SAR *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Assessed in ES
Operation and Maintenance							
Creation of an Aviation Obstacle Environment (ARM-O-03)	A2/3	*Receptors*: Military low-flying aircraft Helicopter traffic transiting to and from offshore helidecks Other low-level fixed-wing or helicopter operations including SAR *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No
	A5	*Receptors*: Military low-flying aircraft Helicopter traffic transiting to and from offshore helidecks Other low-level fixed-wing or helicopter operations including SAR *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No
	A8	*Receptors*: Military low-flying aircraft Helicopter traffic transiting to and from offshore helidecks Helicopters utilizing HMRIs 8 and 9 Other low-level fixed-wing or helicopter operations including SAR *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Assessed in ES
Bird Strike Risk (ARM-O-07)	A2/3	*Receptors*: Helicopter traffic transiting to and from offshore helidecks *Value*: High *Sensitivity*: Medium	Negligible	Minor adverse	None required	Minor adverse	No
	A5	*Receptors*: Helicopter traffic transiting to and from offshore helidecks *Value*: High *Sensitivity*: Medium	Negligible	Minor adverse	None required	Minor adverse	No
	A8	*Receptors*: Helicopter traffic transiting to and from offshore helidecks Helicopters utilizing HMRIs 8 and 9 *Value*: High *Sensitivity*: Medium	Low	Minor adverse	None required	Minor adverse	No

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase

16. Offshore Archaeology

622. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS on Offshore Archaeology. As outlined in **Section 4 Description of the Associated Development**, three locations for the ANS are being considered at this stage: A2/3, A5, and A8.

623. For the purposes of this preliminary assessment, the existing environment within the Study Area is defined as the known archaeological and cultural heritage resource and the potential for previously unrecorded heritage assets and finds to be present within the Study Area with respect to:

- Seabed prehistory (i.e. archaeological remains on the seabed corresponding to the activities of prehistoric populations that may have inhabited what is now the seabed when sea levels were lower);
- Maritime archaeology (i.e. the remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities);
- Aviation archaeology (i.e. the remains of crashed aircraft and archaeological material associated with historic aviation activities); and
- Historic seascape character (i.e. the attributes that contribute to the formation of the historic character of the seascape.

16.1. Study Area

624. The Study Area should correspond to the footprint within which development related activities could occur and, consequently, the area of potential impact to Offshore Archaeology. However, as it is not known at this stage where the ANS will be located within the identified AoS, the Study Area for offshore archaeology has been defined as the three AoS (A2/3, A5, and A8), the locations of which are shown on **Figure 3.1**).

16.2. Data Sources

625. The offshore archaeology baseline has been informed by the data sources shown in **Table 16-1**.

Table 16-1 Desk-based sources used to inform the baseline for Offshore Archaeology

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Wrecks and Obstructions (Shapefile and Text File)	Global	2025	Data set containing details of charted, uncharted, live, and dead wrecks and obstructions and shared on the Admiralty Marine data Portal by the United Kingdom Hydrographic Office (UKHO).
The National Heritage List for England (NHLE) maintained by Historic England	England	2025	Official, up to date, register of all nationally protect-ed historic buildings and sites in England - listed buildings, scheduled monuments, protected wrecks, registered parks and gardens, and battlefields. (including sites protected under the Protection of Military Remains Act 1986 and the Protection of Wrecks Act 1973).
Consolidated National Historic Seascape Characterisation (HSC)	England	2017	GIS data and character texts for the HSC of coastal and marine areas around England, mapped through a series of projects funded by Historic England and consolidated into a single national database.
Relevant documentary sources and grey literature	UK	Various	Includes reports and survey data gathered from previous offshore wind farm projects in the wider Dogger Bank area.

16.3. Assumptions and Limitations

626. This preliminary assessment uses information available at the time of writing as described in **Section 6.5.** This assessment will be refined where relevant and presented in the EIA submitted with the DCO application

627. Any key assumptions, data limitations or technical difficulties encountered during baseline characterisation with the above data sources are identified in **Table 16-2.**

*Table 16-2 Assumptions or limitations identified from the data sources for Offshore Archaeology in **Table 16-1***

Data Source	Assumption/Limitation	Potential Implications on Assessment?
UKHO Wrecks and Obstructions and NHLE Designated Heritage Assets	The records held by the UKHO are not a record of all surviving cultural heritage assets, rather a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these datasets is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.	The potential for further, previously discovered heritage assets within the AoS will be considered in more detail within the EIA. This will be informed by the archaeological assessment of marine geophysical data which has been acquired from the AoS.

16.4. Existing Environment

16.4.1. Seabed Prehistory

628. There are no known submerged prehistoric sites within the AoS. However, the Dogger Bank region is an area of high prehistoric archaeological significance where archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved.

629. The potential for prehistoric sites to be present within the AoS either exposed on or buried below the seabed, is primarily associated with surviving terrestrial features and deposits corresponding to times when sea levels were lower and prehistoric hominin populations may have inhabited what is now the seabed.

630. A series of ongoing geoarchaeological and marine geophysical assessments are being undertaken for the consented Dogger Bank A, Dogger Bank B, Dogger Bank C, and Sofia offshore wind farms. These are providing high resolution maps of the extensive prehistoric landscape and palaeoenvironmental assessment and dating of deposits from wetland, riverine, lake and coastal environments is ongoing (see Wessex Archaeology, 2024). The results will be available in early 2026 and will be used to inform the assessment of submerged prehistory in the Environmental Statement for DBD and the AoS.

631. In addition, a total of 44 co-located shallow vibrocores, cone penetration tests and thermal conductivity tests, with a target depth of 5m below sea floor were acquired during geotechnical surveys undertaken in June and July 2025 within the export cable corridor and Array Area of DBD. Geotechnical vibrocore logs and photographs were assessed to identify deposits of archaeological and palaeoenvironmental interest. Organic alluvium and peat were recorded at the base of the alluvial sequence in two vibrocores (VC-21 and VC-27), and a repeat vibrocore (VC-27Arc) was retained for geoarchaeological purposes at the location of VC-27. Geoarchaeological recording of VC-27Arc has been carried out and samples retained for palaeoenvironmental assessment. Six of the geotechnical locations, including VC-21, are located within A2/3. These results will inform the assessment of submerged prehistory in the ES for the main development and the AoS.

16.4.2. Maritime Archaeology

632. There are no designated / protected wrecks within any of the ANS AoS.

633. There are 19 UKHO records of previously recorded wrecks and obstructions across A5 and A8, as listed in **Table 16-3** and shown on **Figure 16.1**. AoS-specific details are presented on **Figure 16.2** and **Figure 16.3**. No wrecks have been recorded within A5.

Table 16-3 UKHO wrecks and obstructions within the AoS

UKHO ID	Category	Summary
A2/3		
4897	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4898	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4901	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4903	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4904	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4906	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4909	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4910	Fisherman's Fastener	Obstruction (fishermen's fastener) shown on Kingfisher Chart KE 155-1B (May 1970 edition). Not subsequently found and charted as 'dead'.
4913	Fisherman's Fastener	Wreck recorded in this position on Kingfisher Charts Corr NO 94 (1974).
4956	Non-dangerous wreck (marked on chart, not detected)	Wreck recorded in this position on Kingfisher Chart KE 155-1B (May 1970 edition).
4946	Obstruction	Physical snag reported by Fishery Research Vessel 'Scotia' in 1998 with a significant 'mark' seen on the echosounder. Height of obstruction estimated at 6m-8m and length 10m-20m in a general depth of 40m. The trawl was immediately hauled but there was some net damage.
4973	Reported position of sinking	Wooden hulled fishing vessel Olympic abandoned on 28/02/1980. Recorded as sunk after an explosion in the engine room. The crew were rescued 3 days later having drifted in a life raft c. 70 miles east. The vessel was recorded as 17.4m long with a gross tonnage of 38.
4912	Reported position of sinking	British fishing vessel Angol, reported as sinking in this position on 12/03/1979. The crew were picked up by fishing vessel Martinique and HMS Hermes. The vessel is recorded as having taken on water in gale force winds, and eventually sank. The vessel was 18.3m long with a gross tonnage of 50.

UKHO ID	Category	Summary
4896	Reported position of sinking, fishermen's fastener recorded at position.	Reported position of the sinking of the Swedish steam ship Lister (possibly), mined whilst en-route from Skutskar to Antwerp on 16/12/1939 with a cargo of wood (unprocessed and products). All crew were saved. Obstruction (fishermen's fastener) shown at this position on Kingfisher Chart KE 155-1B (May 1970 edition). Vessel is recorded with a gross tonnage of 1362.
A8		
9069	Foul ground	Foul recorded at this location in 1988.
8981	Non-dangerous wreck (possibly the Devonshire)	Wreck of the British trawler Devonshire, built in 1898 by Cochrane & Cooper Ltd, Beverley with one boiler and a triple expansion engine on 24/09/1916 of 40hp with a single shaft. Machinery by C D Holmes & Co, Hull. Owned at time of loss by North Lincolnshire Steam Fishing Co Ltd and on passage to Goole for fishing when it was captured by a German submarine and sunk by gunfire 33 miles north-east of the Spurn light vessel. Recorded during survey in 1987 in a general depth of 45m with scour depth 1.5m, 40m long and 2m high, lying 000/180deg, and partially buried in a sandwave. Vessel is recorded with a gross tonnage of 148.
81021	Obstruction	250kg gearbox recorded in 2013 on the seabed at the site of an abandoned and plugged well (5m x 4m x 3m).
8980	Reported position of sinking	1918 wreck recorded at this position and shown on Danish Fisheries Chart 5300 (1965 edition). Not found at this position and considered not to exist. Record amended to 'dead'.
8968	Reported position of sinking (Devonian)	Reported sinking position (Grimsby Loss List) of the British trawler Devonian, built by Edwards Brothers, North Shields with one boiler and a triple expansion engine of 35 nhp and a single shaft. Machinery by Grimsby Co-operative B & F Co Ltd. Owned at time of loss by Allen Steam Fishing Co Ltd when the vessel was mined in First World War on 18/09/1915. Sinking position given as 30 miles north-east of the Spurn light vessel. Position recorded ‘for filing only’ and considered not to exist in this position. Record was amended to ‘dead’. Vessel is recorded with a gross tonnage of 128.

634. All recorded positions within the AoS will be reviewed as part of the archaeological assessment of site-specific survey data. This assessment will also inform an evaluation of the potential for additional maritime archaeological material to be present within the offshore archaeology Study Area that has not been previously recorded.

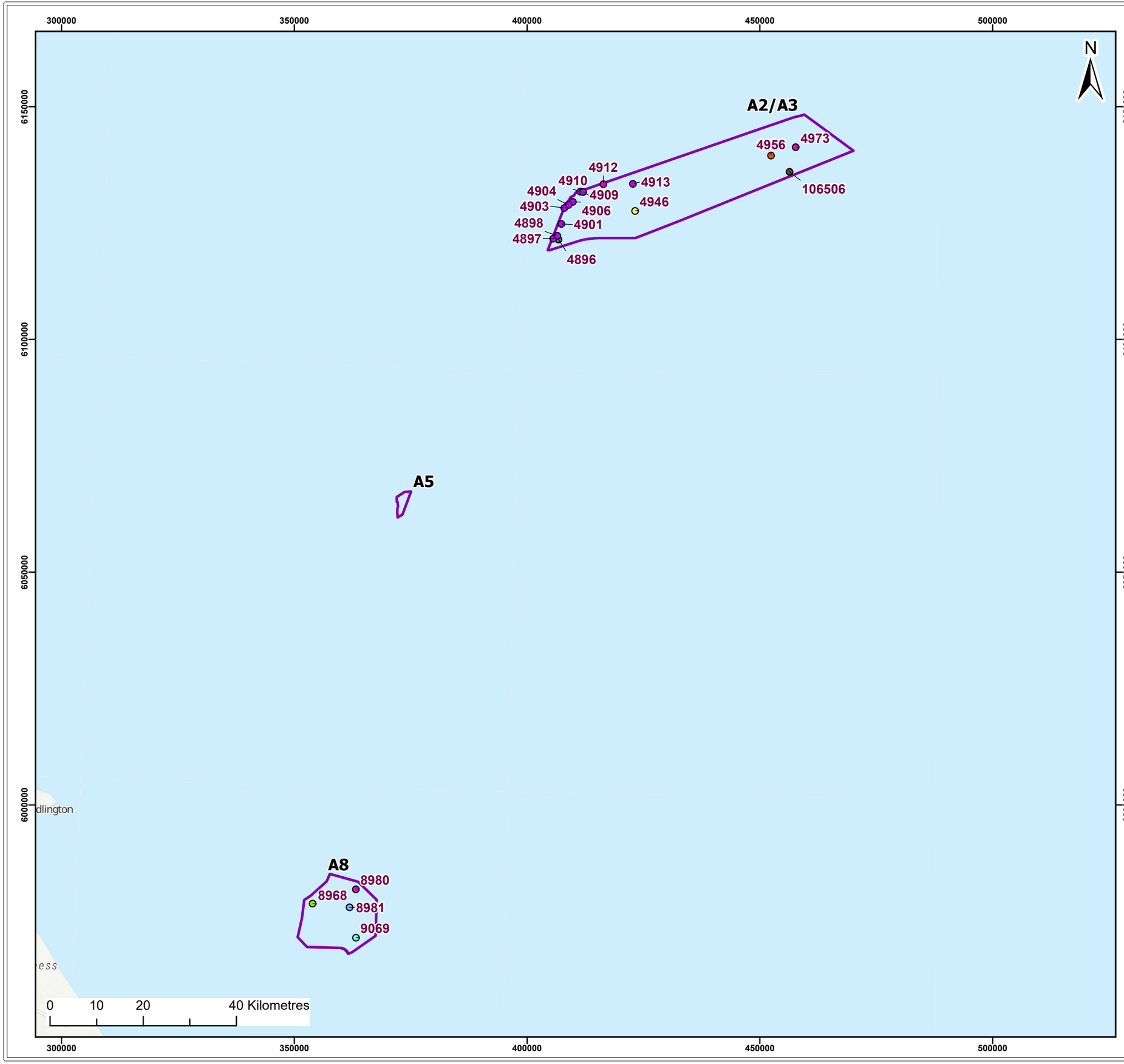
16.4.3. Aviation Archaeology

635. There are no designated or protected aircraft crash sites, and no records of aircraft remains within the AoS.

636. All recorded positions in (**Figure 16.3**) will be reviewed as part of the archaeological assessment of site-specific survey data. This assessment will also inform an evaluation of the potential for aviation related archaeological material to be present within the offshore archaeology Study Area that has not been previously recorded.

16.4.4. Historic Seascape Character

637. The historic seascape character of coastal and marine areas around England has been mapped through a series of eight separate Historic Seascape Characterisation (HSC) projects funded by Historic England and undertaken between 2008 and 2014. These projects have since been consolidated into a single national database (LUC, 2017a, 2017b, 2017c). The programme uses Geographical Information Systems (GIS) to map data that can be queried to identify the key cultural processes that have shaped the historic seascape within a given area.



Legend:

ANS AoS

UKHO Record

- Fisherman's Fastener
- Foul ground
- Non-dangerous wreck (marked on chart, not detected)
- Non-dangerous wreck (possibly the Devonshire)
- Obstruction
- Reported position of sinking
- Reported position of sinking (Devonian)
- Reported position of sinking, fishermen's fastener recorded at position
- N/A

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Distribution of UKHO Records

Figure: 16.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0048

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

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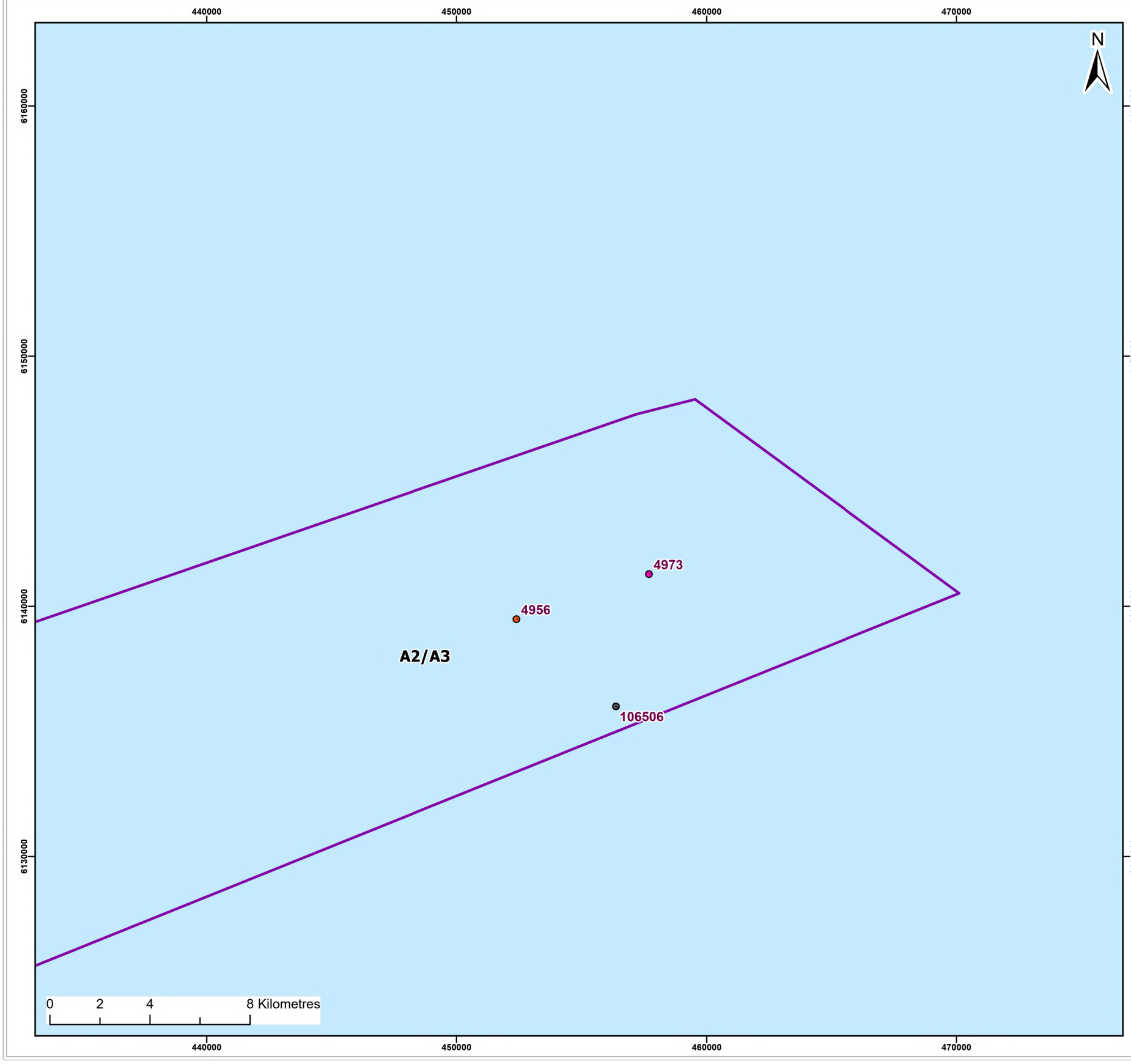

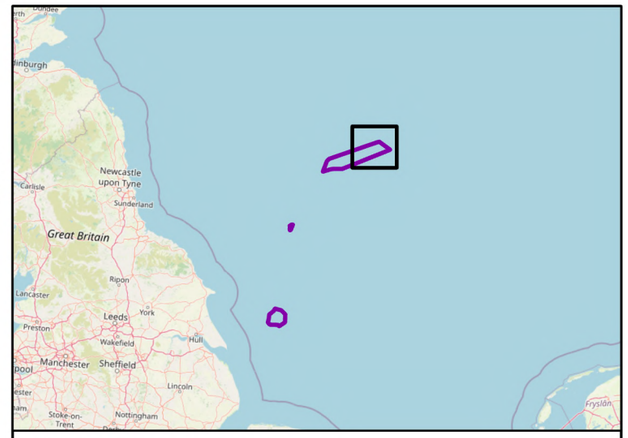

Legend:

ANS AoS

UKHO Record

- Non-dangerous wreck (marked on chart, not detected)
- Reported position of sinking
- N/A

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Distribution of UKHO Records
(East Half of A2/A3)

Figure: 16.2

Drawing No: PC6250-HAS-XX-OF-DR-GS-0048

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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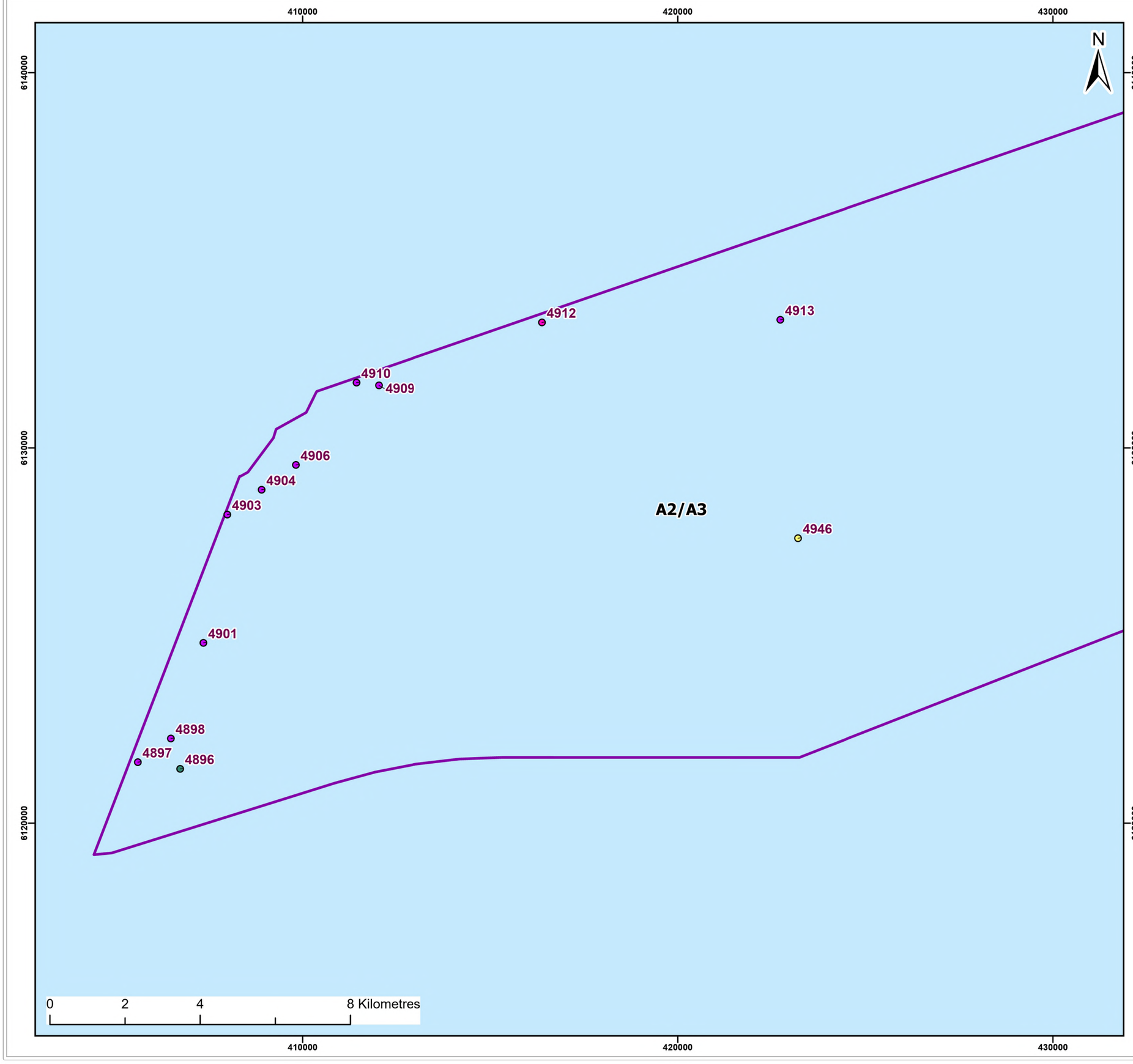

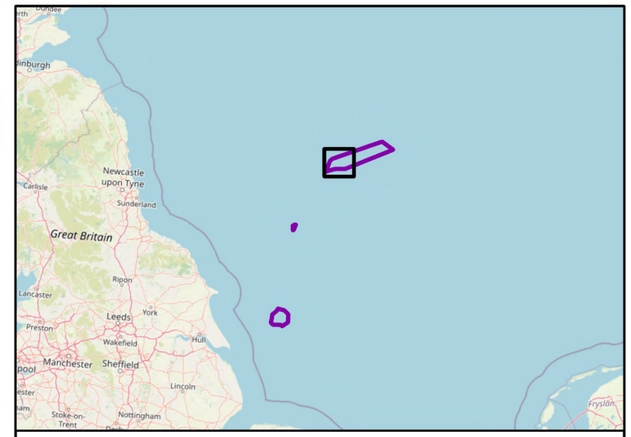

Legend:

ANS AoS

UKHO Record

- Fisherman's Fastener
- Obstruction
- Reported position of sinking
- Reported position of sinking, fishermen's fastener recorded at position

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Distribution of UKHO Records
(West Half of A2/A3)

Figure: 16.3

Drawing No: PC6250-HAS-XX-OF-DR-GS-0048

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

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638. The consolidated GIS dataset was mapped against the AoS to identify the primary cultural processes which have shaped the historic seascape of the area (see **Figure 16.4**). This includes both current character types and the previous (prehistoric and historic) character types for which information is available. AoS-specific focus is shown on **Figure 16.5** to **Figure 16.8**.

639. The conflated character types for the HSC, derived from all marine levels, sea surface/water column/sea floor/sub-sea floor, are summarised in **Table 16-4**. The previous character types are summarised in **Table 16-5**.

Table 16-4 Summary of conflated historic seascape character types within the AoS

Conflated Character Types	Conflated Character Period	Conflated Character Summary from HSC
A2/3		
Fishing - Bottom Trawling	Modern (AD1900 – Present)	/
Fishing - Seine netting	Post Medieval (AD1540 – 1750)	/
Energy industry - Hydrocarbon installation	Modern (AD1900 – Present)	Installation involved in the extraction of oil and natural gas. Navigation usually prohibited within 500m.
Navigation hazard - Hazardous water	Unknown	Concentrations in obstructions, where more than one obstruction recorded within 250m sq.
Recreation - Leisure sailing	Modern (AD1900 – Present)	Royal Yachting Association (RYA) North East Region Route Overseas.
A5		
Military facility - Military practice area	Modern (AD1900 – Present)	Submarine exercise area.
A8		
Fishing - Fishing ground	Unknown	Assumed small levels of mixed maritime activity including fishing, leisure activities and navigation.
Fishing - Longlining	Post Medieval (AD1540 – 1750) Modern (AD1900 – Present)	Documentary sources suggest longlining activities took place from the 1650s onwards.
Energy industry - Hydrocarbon installation	Modern (AD1900 – Present)	Installation involved in the extraction of oil and natural gas. Navigation usually prohibited within 500m.
Maritime safety - Buoyage	Modern (AD1900 – Present)	/
Navigation activity - Navigation route	Modern (AD1900 – Present)	Main commercial shipping routes, drawn from datasets derived from shipping density analyses.
Recreation - Leisure sailing	Modern (AD1900 – Present)	RYA North East Region Route Overseas.

Table 16-5 Summary of previous historic seascape character types within the AoS

Previous Character Types	Previous Character Period	Previous Character Summary from HSC
A2/3		
Named Location Dogger Bank	/	Site of several naval actions including the Battle of Dogger Bank in 1781.
Longlining	Post Medieval (AD1540 – 1750)	Documentary sources suggest longlining activities took place off the Dogger Bank during the 18th century.
Pelagic trawling	Early Modern (AD1750 – 1900)	/
Seine netting	Post Medieval (AD1540 – 1750)	/
Fishing ground	Unknown	/
Palaeolandscape component	Mesolithic (10,000BC – 4000BC)	High potential for the existence and survival of archaeological evidence for Mesolithic human habitation within these areas based on documentary research and available models.
A5		
Bottom trawling	Early Modern (AD1750 – 1900)	According to Starkey *et al* (2003), cod was fished around Dogger Bank during the 14th century.
Longlining	Post Medieval (AD1540 – 1750)	Documentary sources suggest longlining activities took place off the Dogger Bank during the 18th century.
Seine netting	Post Medieval (AD1540 – 1750)	/

Previous Character Types	Previous Character Period	Previous Character Summary from HSC
Palaeolandscape component	Mesolithic (10,000BC – 4000BC)	High potential for the existence and survival of archaeological evidence for Mesolithic human habitation within these areas based on documentary research and available models.
A8		
Bottom trawling	Early Modern (AD1750 – 1900)	Beam trawlers worked the Yorkshire coast in the 19th century.
Longlining	Post Medieval (AD1540 – 1750)/ Modern (AD1900 – Present)	Historically, longlining for white fish from cobles was the most common fishing activity in the North East. Documentary sources suggest longlining activities took place off the Dogger Bank during the 18th century.
Seine netting	Post Medieval (AD1540 – 1750)/ Modern (AD1900 – Present)	/
Fishing ground	Modern (AD1900 – Present)	/
Navigation route	Modern (AD1900 – Present)	/
Palaeolandscape component	Mesolithic (10,000BC – 4000BC)	A part of the 10,000 year old land mass that bridged England with what is now main land Europe.

640. Both the conflated and previous character types are representative of the importance of commercial fishing as a primary cultural and historic feature of the Dogger Bank area. While the region's coastal economy is more strongly associated with fishing, navigation activity is also an important element of the offshore region, with the main port of Hull to the south. For centuries, local communities have made their living from their proximity to the North Sea and its connecting routes, linking the region to other parts of Britain and the continent.

641. The North Sea has long been important to the energy industry, most notably for its natural oil and gas resources which have been heavily exploited since the 1960s (hydrocarbon installations). A5 is primarily characterised as a military practice area (submarine exercise area) whilst areas of recreational leisure sailing are also mapped within A5 **(Figure 16.7)** and A8 **(Figure 16.8).**

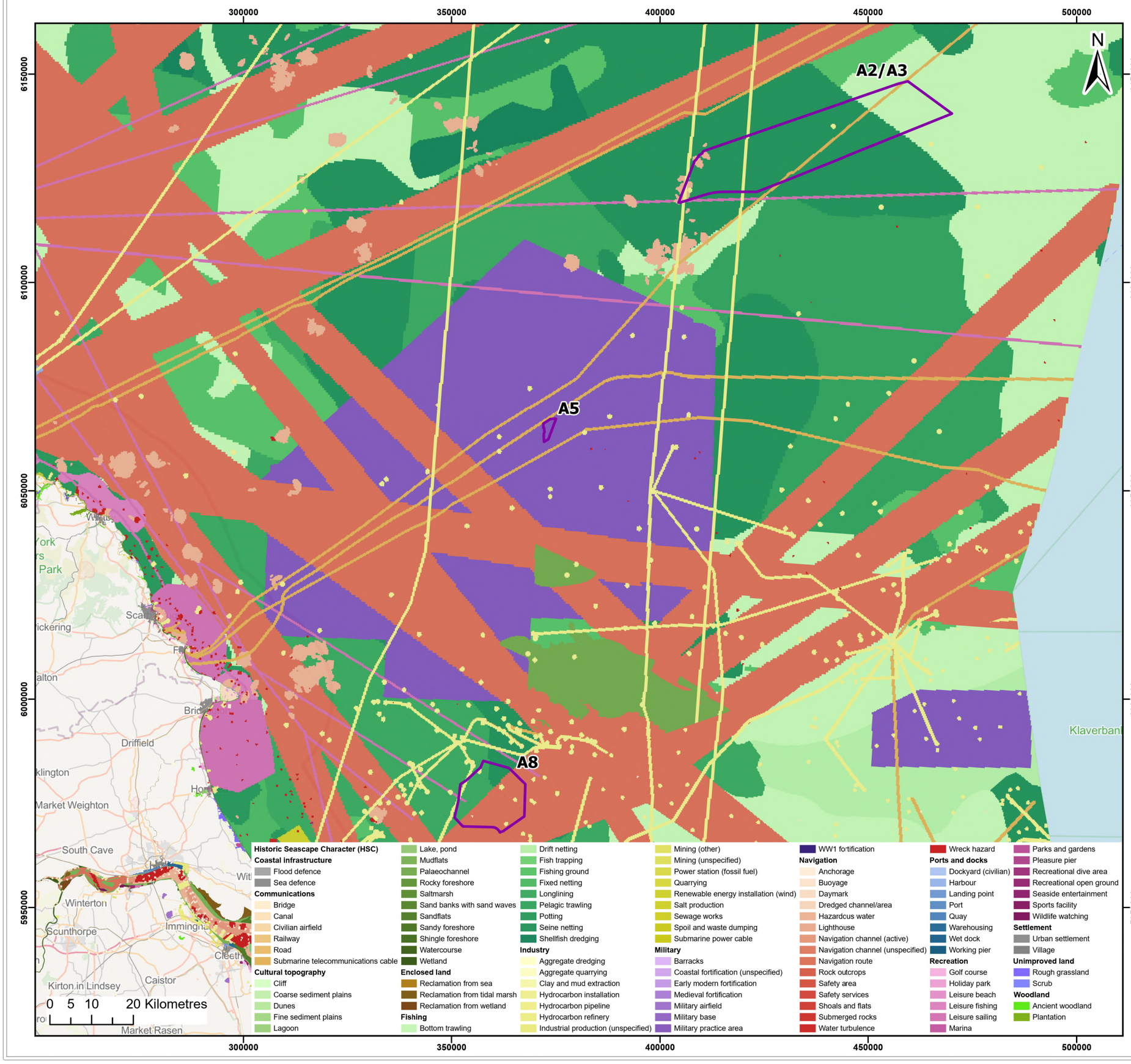
642. Palaeolandscape components are a key part of the character of each area, as further demonstrated by the submerged prehistoric potential summarised in **Section 16.4.1**.

16.5. Offshore Archaeology Scoping

643. **Table 16-6** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 16-6 Summary of impacts proposed to be scoped in (✓) and out (X) for Offshore Archaeology

Potential Impact	Construction	Operation	Decommissioning
Direct Physical Impacts to Known Heritage Assets	✓	x	x
Direct Physical Impacts to Potential Heritage Assets	✓	x	✓
Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes	✓	✓	✓
Changes to the Setting of Heritage Assets and Historic Seascape Character	x	✓	x



Historic Seascape Character (HSC)

Coastal infrastructure
- Flood defence
- Sea defence

Communications
- Bridge
- Canal
- Civilian airfield
- Railway
- Road
- Submarine telecommunications cable

Cultural topography
- Cliff
- Coarse sediment plains
- Dunes
- Fine sediment plains
- Lagoon
- Lake, pond
- Mudflats
- Palaeochannel
- Rocky foreshore
- Saltmarsh
- Sand banks with sand waves
- Sandflats
- Sandy foreshore
- Shingle foreshore
- Watercourse
- Wetland

Enclosed land
- Reclamation from sea
- Reclamation from tidal marsh
- Reclamation from wetland

Fishing
- Bottom trawling
- Drift netting
- Fish trapping
- Fishing ground
- Fixed netting
- Longlining
- Pelagic trawling
- Potting
- Seine netting
- Shellfish dredging

Industry
- Aggregate dredging
- Aggregate quarrying
- Clay and mud extraction
- Hydrocarbon installation
- Hydrocarbon pipeline
- Hydrocarbon refinery
- Industrial production (unspecified)
- Mining (other)
- Mining (unspecified)
- Power station (fossil fuel)
- Quarrying
- Renewable energy installation (wind)
- Salt production
- Sewage works
- Spoil and waste dumping
- Submarine power cable

Military
- Barracks
- Coastal fortification (unspecified)
- Early modern fortification
- Medieval fortification
- Military airfield
- Military base
- Military practice area
- WW1 fortification

Navigation
- Anchorage
- Buoyage
- Daymark
- Dredged channel/area
- Hazardous water
- Lighthouse
- Navigation channel (active)
- Navigation channel (unspecified)
- Navigation route
- Rock outcrops
- Safety area
- Safety services
- Shoals and flats
- Submerged rocks
- Water turbulence
- Wreck hazard

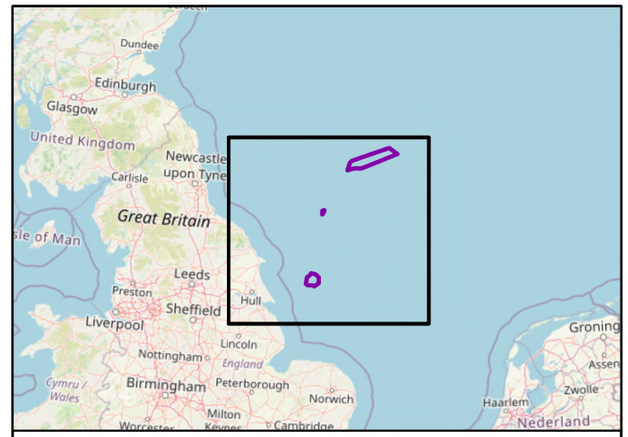
Ports and docks
- Dockyard (civilian)
- Harbour
- Landing point
- Port
- Quay
- Warehousing
- Wet dock
- Working pier

Recreation
- Golf course
- Holiday park
- Leisure beach
- Leisure fishing
- Leisure sailing
- Marina
- Parks and gardens
- Pleasure pier
- Recreational dive area
- Recreational open ground
- Seaside entertainment
- Sports facility
- Wildlife watching

Settlement
- Urban settlement
- Village

Unimproved land
- Rough grassland
- Scrub

Woodland
- Ancient woodland
- Plantation



Legend:
- ANS AoS

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Historic Seascape Character Types

Figure: 16.4

Drawing No: PC6250-HAS-XX-OF-DR-GS-0049

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

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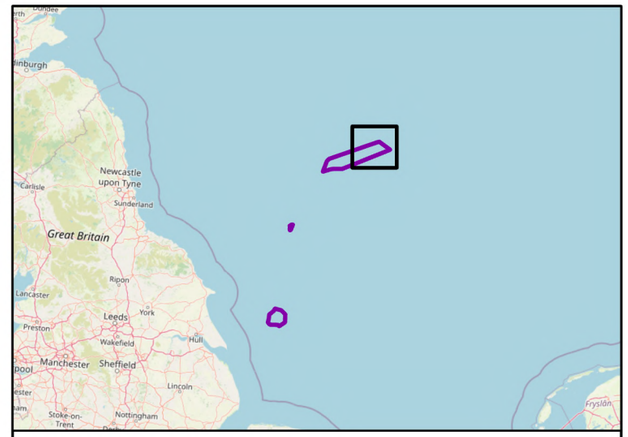

Legend:

ANS AoS

Historic Seascape Character (HSC)

Communications

Submarine telecommunications cable

Fishing

Bottom trawling

Fishing ground

Seine netting

Industry

Hydrocarbon installation

Navigation

Navigation route

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Historic Seascape Character Types
(East Half of A2/A3)

Figure: 16.5

Drawing No: PC6250-HAS-XX-OF-DR-GS-0049

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

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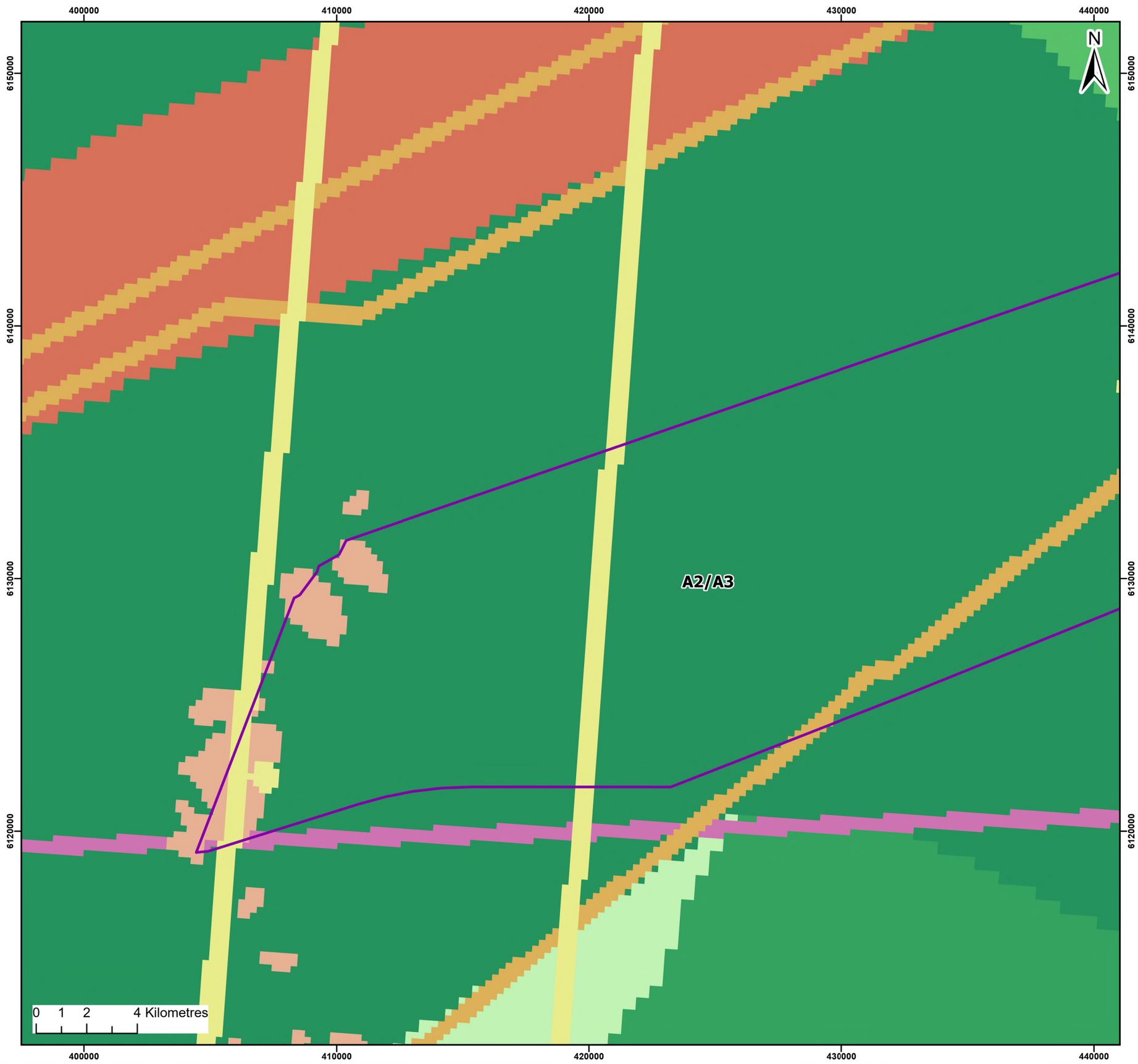

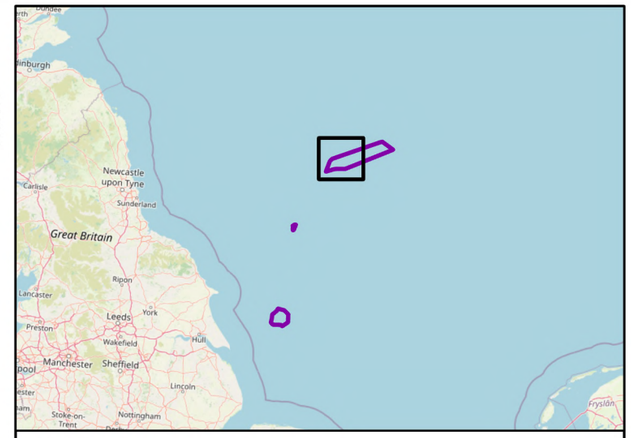

Legend:

- ANS AoS

Historic Seascape Character (HSC)

Communications
- Submarine telecommunications cable

Fishing
- Bottom trawling
- Fishing ground
- Pelagic trawling
- Seine netting

Industry
- Hydrocarbon installation
- Hydrocarbon pipeline

Navigation
- Hazardous water
- Navigation route

Recreation
- Leisure sailing

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Historic Seascape Character Types
(West Half of A2/A3)

Figure: 16.6

Drawing No: PC6250-HAS-XX-OF-DR-GS-0049

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

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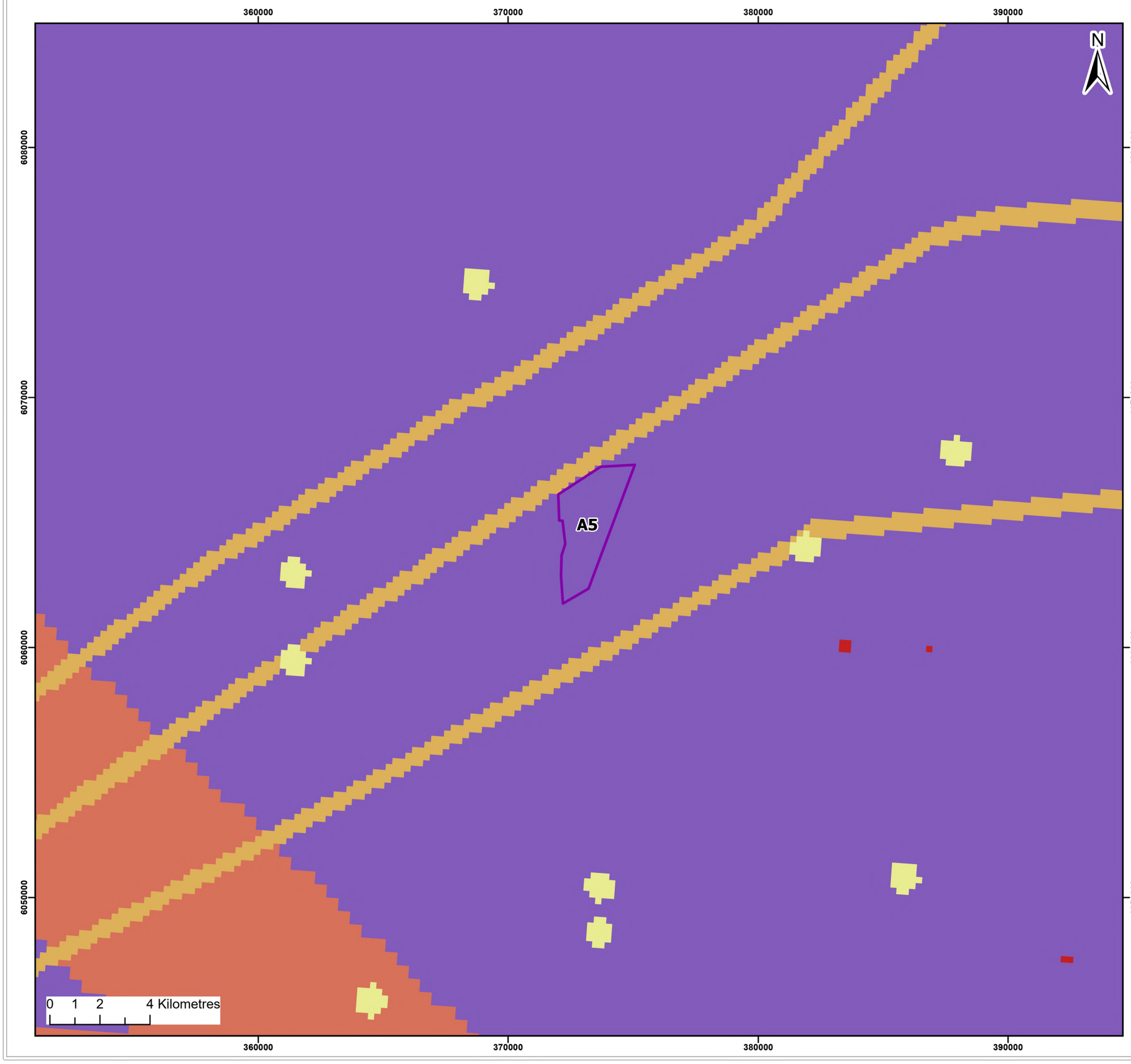

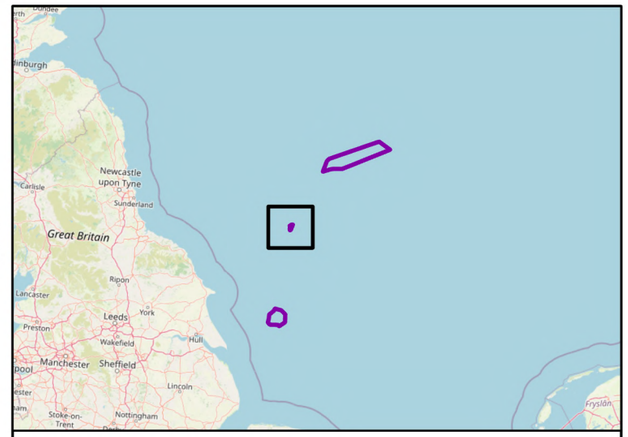

Legend:

ANS AoS

Historic Seascape Character (HSC)

Communications

Submarine telecommunications cable

Industry

Hydrocarbon installation

Military

Military practice area

Navigation

Navigation route

Wreck hazard

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Historic Seascape Character Types
(A5)

Figure: 16.7

Drawing No: PC6250-HAS-XX-OF-DR-GS-0049

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

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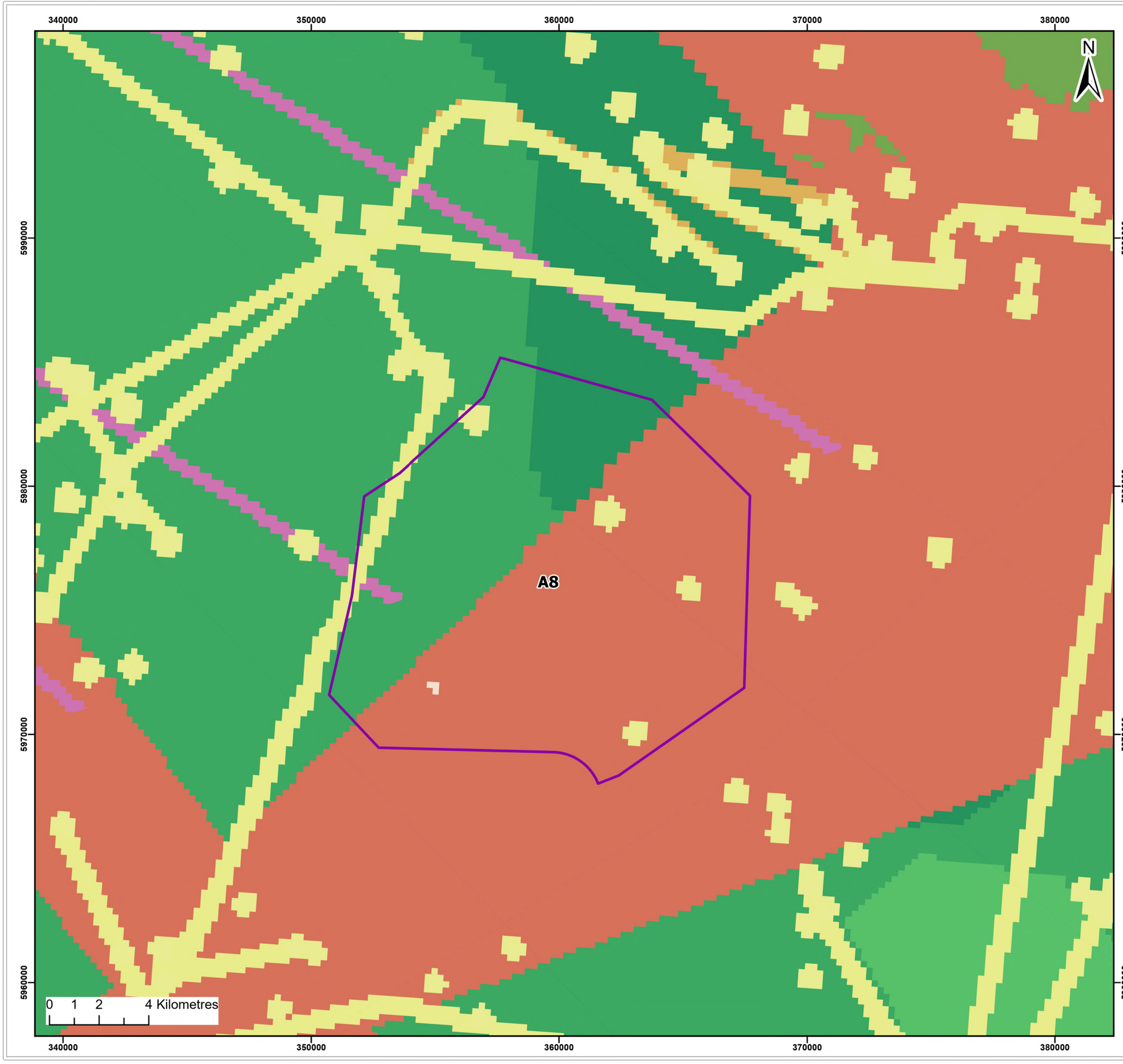

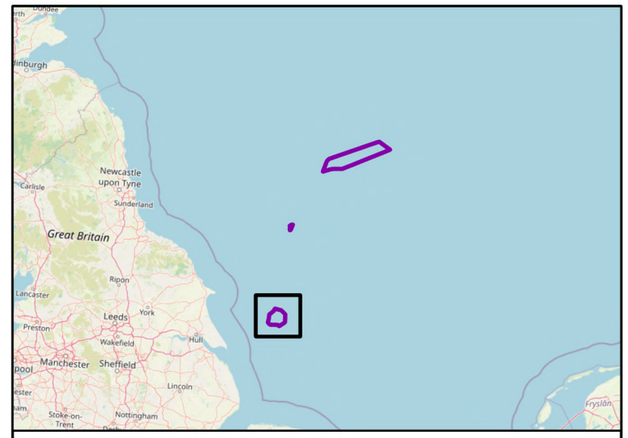

Legend:

- ANS AoS

Historic Seascape Character (HSC)

Communications
- Submarine telecommunications cable

Cultural topography
- Palaeochannel

Fishing
- Fishing ground
- Longlining
- Seine netting

Industry
- Hydrocarbon installation
- Hydrocarbon pipeline

Navigation
- Buoyage
- Navigation route

Recreation
- Leisure sailing

Project:
Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Historic Seascape Character Types
(A8)

Figure: 16.8
Drawing No: PC6250-HAS-XX-OF-DR-GS-0049

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

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16.6. Potential Effects

644. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to offshore archaeology receptors. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worst-case scenario. Design commitments adopted for this assessment are described in **Appendix C Commitments Register** (Design Commitment CO112).

16.6.1. Potential Effects during Construction

16.6.1.1. Direct Physical Impacts to Known Heritage Assets (OFA-C-01)

645. Direct (physical) impacts, as stated in the NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023a: 59), refer to the direct effects caused by the physical placement of the Project. These impacts can affect heritage assets located on the seafloor or buried within seabed deposits, potentially leading to damage or complete destruction of archaeological materials and their contextual relationships with the surrounding environment. These relationships are crucial to developing a full understanding of an asset. Such impacts may occur if heritage assets are within the footprint of ANS elements (e.g. foundation and scour protection) or within areas affected by activities like seabed clearance, anchoring, or the placement of jack-up barges.

646. All direct physical impacts to known heritage assets during construction (OFA-C-01) will be avoided through the use of Archaeological Exclusion Zones (AEZs). All development related activities will be prohibited within the boundary of an AEZ and the placement of the ANS foundation and scour protection will be micro sited to ensure avoidance of AEZs during all activities see **Appendix C Commitments Register** (Design Commitment CO112).

647. With this embedded mitigation, the effect of direct physical impacts to known heritage assets during construction (OFA-C-01) be **no impact**.

648. The location and extent of recommended AEZs will be set out in the ES, following completion of the archaeological assessment of marine geophysical data in order to confirm the conclusion that, with embedded mitigation, no impacts will occur. The approach to the implementation of, adherence to and monitoring of AEZs, and any requirements for further investigation to inform this approach will be set out in the DBD Outline Written Scheme of Investigation (WSI) (Offshore) which will be submitted with the DCO application (Design Commitment CO112).

16.6.1.2. Direct Physical Impacts to Potential Heritage Assets (OFA-C-02)

649. It is not possible to avoid heritage assets that have not yet been discovered. Therefore, unavoidable direct impacts may occur if archaeological material is present within the footprint of ANS elements (e.g. foundation and scour protection) or areas affected by activities like seabed clearance, anchoring, or the placement of jack-up barges.

650. Until the final design and layouts are confirmed, there will remain uncertainty regarding the precise nature and extent of direct impacts. However, direct impacts that result in damage to, or disturbance of, in situ prehistoric, maritime and aviation sites and potentially submerged landscape features and potential palaeoenvironmental evidence (where associated with palaeolandscape features or archaeological material) could be significant.

651. Further archaeological assessment of high-resolution geophysical data and geoarchaeological assessment of geotechnical data will be undertaken to reduce, as far as possible, potential unintended impacts during construction (Design Commitment CO112).

652. Features of archaeological interest identified during these assessments will be subject to the same mitigation as known heritage assets (i.e. avoided through the use of AEZs) (Design Commitment CO112).

653. Features of uncertain or potential archaeological interest identified through geophysical surveys, for example, would be avoided through micro-siting where practicable (Design Commitment CO112).

654. Where features cannot practicably be avoided, then post-consent additional work would be undertaken to establish their archaeological interest (e.g. investigation of individual anomalies (ground-truthing) using divers or a Remotely Operated Vehicle (ROV) (Design Commitment CO112).

655. Once the character, nature and extent of selected features are more fully understood, appropriate mitigation measures (proportionate to the significance of the asset) to avoid, reduce or off-set impacts can be determined and applied on a case-by-case basis. For example, features of archaeological interest considered to be of sufficient significance to warrant preservation in situ, will be subject to the same mitigation as described for known heritage assets (AEZs) (Design Commitment CO112).

656. While measures will be taken to reduce, as far as possible, the potential for impact to previously undiscovered heritage assets, unexpected discoveries may still be encountered during construction. To further reduce the significance of such impacts, prompt archaeological advice will be sought if a discovery is made, and any objects that have been disturbed will be recorded and conserved.

657. If an unexpected discovery occurs, whether an isolated find or multiple finds from a specific location might indicate a wider debris field of previously unknown in situ archaeological material, this will be reported through a formal Protocol for Archaeological Discoveries (PAD). This protocol is based on the established Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014) (ORPAD) (Commitment ID CO112). The PAD will establish whether recovered objects are of archaeological interest and ensure appropriate mitigation measures are applied, where necessary.

658. With these commitments, if further seabed features are identified during the course of post-consent investigation, these will be subject to the same embedded mitigation measures as known heritage assets and the effect will be **no impact**.

659. With regard to unexpected discoveries, it is acknowledged that the precise nature of the impact, and the heritage significance of any material impacted, cannot be fully understood until the impact has occurred. However, with these commitments and the appropriate application of additional mitigation measures, the effect of direct physical impacts to potential heritage assets during construction (OFA-C-02) will be reduced. Following additional investigation, unexpected discoveries of archaeological material during construction are most likely to be limited to isolated finds from secondary contexts which would be considered of medium importance (sensitivity) as a worst case. Their removal from the marine environment will result in a slight loss of cultural significance although with the application of the PAD to ensure that they are captured and recorded, the magnitude of the impact would be considered **low.** As such the effect is considered non-significant in EIA terms (i.e. anticipated to be no worse than **minor adverse** significance).

660. Following completion of the archaeological assessment of marine geophysical data, the ES will present an evaluation of the potential for additional archaeological material to be present within the Study Area in order to confirm the conclusions of this preliminary assessment.

16.6.1.3. Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes (OFA-C-03)

661. The construction of the ANS has the potential to interact with both local and regional hydrodynamic and sedimentary processes which in turn may result in impacts of an indirect (physical) nature occurring upon heritage assets. Changes in marine physical processes can lead to redistribution of erosion and accretion patterns while changes in tidal currents, for example, may affect the stability of nearby morphological and archaeological features.

662. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to marine processes, due to increased wave / tidal action for example, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.

663. As described in **Chapter 7 Marine Physical Processes**, potential impacts during construction could include:

- Changes in suspended sediment concentration, transport, and seabed level due to drilling for ANS foundation installation (MPP-C-03);
- Changes in suspended sediment concentration, transport, and seabed level due to seabed preparation for ANS foundation installation (MPP-C-04); and
- Indentations on the seabed due to the presence of installation vessels (MPP-C-07).

664. The potential for installation vessel to directly impact the seabed (MPP-C-07), and heritage assets within those footprints, will be addressed as direct impacts to heritage assets (OFA-C-01 and OFA-C-02).

665. There is no potential for indirect impacts on heritage assets, resulting from changes in seabed level associated with drilling for ANS foundation installation (MPP-C-03) and seabed preparation for ANS foundation installation (MPP-C-04). **Chapter 7 Marine Physical Processes** concludes, for both MPP-C-03 and MPP-C-04, that the potential impact will be of **negligible** adverse significance. Therefore, there is no pathway for indirect impacts on heritage assets. **This impact will therefore not be considered in more detail at the next stage of assessment**.

16.6.2. Potential Effects during Operation

16.6.2.1. Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes (OFA-O-03)

666. The operation of the ANS also has the potential to interact with both local and regional hydrodynamic and sedimentary processes which in turn may result in impacts of an indirect (physical) nature occurring upon heritage assets due to the presence of the structure.

667. As described in **Chapter 7 Marine Physical Processes,** potential impacts during operation could include:

- Changes in the tidal current regime due to the presence of infrastructure (ANS foundation) (MPP-O-01);
- Changes in the wave regime due to the presence of infrastructure (ANS foundation) (MPP-O-02);
- Changes in water circulation due to the presence of infrastructure (ANS foundation) (MPP-O-03); and
- Changes in bedload sediment transport and seabed morphology due to the presence of infrastructure (ANS foundation) (MPP-O-04).

668. However, there is no potential for indirect impacts on heritage assets, resulting from changes in seabed level and seabed morphology arising from these impacts. **Chapter 7 Marine Physical Processes** concludes, for each of MPP-O-01, MPP-O-02, MPP-O-03 and MPP-O-04, that the potential impact will be of **negligible** adverse significance. Therefore, there is no pathway for indirect impacts on heritage assets. **This impact will therefore not be considered in more detail at the next stage of assessment**.

16.6.2.2. Changes to the Setting of Heritage Assets and Historic Seascape Character (OFA-O-04)

669. The construction of an ANS will introduce a change to the Historic Seascape Character. However, given the scale of the proposed works and ANS once in operation. the primary character types, as summarised in **Section 16.4.4,** have capacity to accommodate this change. A5 is primarily characterised as a military practice area (submarine exercise area) whilst A2/3 and A8 are primarily associated with commercial fishing (also a primary cultural and historic feature of the wider Dogger Bank area) navigation activities, the energy industry and recreational leisure sailing.

670. Changes to Historic Seascape Character will therefore not be considered in more detail at the next stage of assessment.

671. Similarly, whilst changes within the setting of heritage assets will occur, the scale of this change will not result in a significant effect on the cultural significance of heritage assets.

672. With respect to coastal heritage assets, the closest ANS structure would be within A8 which is 46km from shore. The ANS topside will measure a maximum of approximately 30m in both width and length, reach up to 40m in height, and extend up to 65m above LAT (or 80m above LAT inclusive of lighting protection) after accounting for required sea surface level clearance. As such, the structure would be insufficiently perceptible in any views from coastal heritage assets for the change in their setting to affect their cultural significance.

673. With respect to offshore heritage assets the setting of individual assets corresponds more broadly to their location (and collective research value) within wider palaeolandscapes and maritime and aviation networks. As above, given the scale of the proposed works and ANS once in operation, changes to the setting of offshore heritage assets during operation will not affect their cultural significance.

674. The effect of changes to the setting of heritage assets during operation (OFA-C-04) will be **no impact**. **This impact will therefore not be considered in more detail at the next stage of assessment.**

16.7. Inter-Relationships

675. Potential inter-relationships between Offshore Archaeology and other environmental topics have been considered, where relevant, in **Table 16-7.**

Table 16-7 Offshore Archaeology – inter-relationships with other topics

Receptor	Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction					
Known and potential heritage assets	OFA-C-03	Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes	Marine Physical Processes	Indirect impacts to heritage assets may occur if changes in marine physical processes result in buried heritage assets becoming exposed, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.	**Chapter 7 Marine Physical Processes** concludes that there are no significant effects resulting from changes in seabed level associated with drilling for ANS foundation installation (MPP-C-03) and seabed preparation for ANS foundation installation (MPP-C-04). Therefore, there is no pathway for indirect impacts on heritage assets. (see **Section 16.6.1.3** above).
Operation and Maintenance					
Known and potential heritage assets	OFA-O-03	Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes	Marine Physical Processes	Indirect impacts to heritage assets may occur if changes in marine physical processes result in buried heritage assets becoming exposed, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.	The potential for indirect impacts on heritage assets, resulting from changes in seabed level and seabed morphology arising from changes in the tidal current regime (MPP-O-01), changes in the wave regime (MPP-O-02), changes in water circulation (MPP-O-03) and changes in bedload sediment transport and seabed morphology (MPP-O-04), will be assessed in the ES with refence to the outputs of the assessment to be undertaken for **Chapter 7 Marine Physical Processes**.

16.8. Interactions Assessment

676. The impacts identified and assessment in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 16-8**. However, as the preliminary assessment above indicates that there are no potentially significant effects on offshore archaeology receptors, there is no potential for interactions between impacts.

Table 16-8 Offshore Archaeology – potential interactions between impacts

Construction

	OFA-C-01	OFA-C-02	OFA-C03	OFA-C-04
Direct Physical Impacts to Known Heritage Assets (OFA-C-01)		No	No	No
Direct Physical Impacts to Potential Heritage Assets (OFA-C-02)	No		No	No
Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes (OFA-C-03)	No	No		No
Changes to the Setting of Heritage Assets and Historic Seascape Character (OFA-C-04)	No	No	No	

Operation and Maintenance

	OFA-O-01	OFA-O-02	OFA-O-03	OFA-O-04
Direct Physical Impacts to Known Heritage Assets (OFA-O-01)		No	No	No
Direct Physical Impacts to Potential Heritage Assets (OFA-O-02)	No		No	No
Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes (OFA-O-03)	No	No		No
Changes to the Setting of Heritage Assets and Historic Seascape Character (OFA-O-04)	No	No	No	

16.8.1. DBD Project Effect Interactions

677. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

16.8.1.1. Construction Impacts (OFA-C-01, OFA-C-02, OFA-C-03, OFA-C-04)

678. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of construction activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

16.8.1.2. Operational Impacts (OFA-O-01, OFA-O-02, OFA-O-03, OFA-O-04)

679. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Offshore Archaeology, there is no potential for within-Project effects during operation.

16.9. Cumulative Impacts

680. Where there is potential for cumulative effects with other plans and projects within the ZoI, this is addressed in **Table 16-9.**

Table 16-9 Offshore Archaeology – potential cumulative effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
OFA-C-01	Direct Physical Impacts to Known Heritage Assets	No	Direct cumulative impacts to known heritage assets will not occur due to the application of AEZs identified through EIA for the DBD OWF Project and the ANS.	N/A
OFA-C-02	Direct Physical Impacts to Potential Heritage Assets	Yes	Although the effect of unavoidable impacts will be mitigated by agreed measures, the impacts will still have occurred, and permanent damage or destruction will have taken place. The assessment of cumulative impacts, therefore, will consider the effect of multiple unavoidable impacts upon the archaeological resource.	When considered alongside existing projects including Dogger Bank A, Dogger Bank B and Dogger Bank C, and the potential for the construction of future projects such as Dogger Bank South East and Dogger Bank South West, multiple unavoidable impacts may be considered of greater adverse significance. It is possible, for example, that unique aspects of former landscapes, or of the in situ maritime and aviation archaeological resource, may be lost, as a result. Conversely, the cumulative effect of the significant data that is being produced through the consenting process, is often considered a beneficial impact in terms of both professionally undertaken and published scientific research, as well as the potential for discoveries within the offshore to be of significant interest to the public, creating opportunities for outreach and education. This work, however, is also essential, to capture knowledge and understanding prior to the loss of access for further study within the offshore region, as a result of multiple offshore windfarms and exclusion zones associated with the operation of the installed infrastructure. However, with the commitments to ensure appropriate investigation and mitigation, as summarised in **Section 16.6.1.2**, and given the scale of the ANS development, it is anticipated that the cumulative effect will be reduced and considered non-significant in EIA terms (i.e. anticipated to be no worse than **minor adverse** significance, which is **not significant** in EIA terms). Following completion of the archaeological assessment of marine geophysical data, the ES will present an evaluation of the potential for additional archaeological material to be present within the Study Area in order to confirm the conclusions of this preliminary assessment.
OFA-C-03	Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes	No	As set out in **Chapter 7 Marine Physical Processes** given that the construction phases of the ANS would not overlap with the DBD Project, cumulative construction-related effects are scoped out of further assessment. Similarly, therefore, there is no pathway for cumulative indirect impacts to heritage assets.	N/A
Operation and Maintenance				

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
OFA-O-03	Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes	No	As set out in **Chapter 7 Marine Physical Processes**, given the distance of the AoS from the DBD Project and other offshore windfarms in the region, and the small-scale of the Project, cumulative effects during operation are scoped out of assessment. Similarly, therefore, there is no pathway for cumulative indirect impacts to heritage assets.	N/A
OFA-O-04	Changes to the Setting of Heritage Assets and Historic Seascape Character	No	Any changes during operation would be of limited scale, such that they would not give rise to a significant cumulative effect on the cultural significance of heritage assets associated with changes to their setting, nor to a change in Historic Seascape Character.	N/A

16.10. Summary and Next Steps

681. As outlined in **Table 16-10**, the preliminary assessment above indicates that there are no potentially significant effects on offshore archaeology receptors.

682. It is demonstrated that with embedded and additional mitigation, the effect of direct physical impacts to known heritage assets during construction (OFA-C-01) will be no impact, and the effect of direct physical impacts to potential heritage assets during construction (OFA-C-02) will be non-significant in EIA terms (i.e. anticipated to be no worse than minor adverse significance).

683. The location and extent of recommended AEZs will be set out in the ES, following completion of the archaeological assessment of marine geophysical data. The approach to the implementation of, adherence to and monitoring of AEZs, and any requirements for further investigation to inform this approach will be set out in the DBD Outline WSI (Offshore) which will be submitted with the DCO application (CO112 in **Appendix C**). Similarly, the ES will further qualify the potential for previously undiscovered heritage assets to be present within the footprint of the ANS and scour protection, and associated installation activities. The approach to further assessment, investigation and mitigation for these potential features will also be set out in the DBD Outline WSI (Offshore), including the commitment to a PAD to account for any unexpected discoveries (CO112). The PAD will establish whether recovered objects are of archaeological interest and ensure appropriate mitigation measures are applied, where necessary.

684. The assessment will also update the cumulative assessment with other projects, based on any new information, as well as the ANS' inter-relationships.

Table 16-10 Offshore Archaeology – summary of effects

Impact	AoS	Receptor Type/Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Assessed in ES
Construction							
Direct Physical Impacts to Known Heritage Assets (OFA-C-01)	All	There will be **no impact** to known heritage assets due to embedded mitigation. The location and extent of recommended AEZs will be set out in the ES.	N/A	N/A	N/A	N/A	No (although further information will be required and included in the ES chapter)
Direct Physical Impacts to Potential Heritage Assets (OFA-C-02)	All	If further seabed features are identified during the course of post-consent investigation, these will be subject to the same embedded mitigation measures as known heritage assets and the effect will be **no impact.** The ES will further qualify the potential for previously undiscovered heritage assets to be present and the approach to additional assessment, investigation and mitigation. Unexpected discoveries during construction are considered most likely to comprise isolated finds from secondary contexts of medium importance (sensitivity).	Low adverse	Minor adverse	PAD	Minor adverse	No (although further information will be required and included in the ES chapter)
Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes (OFA-C-03)	All	As **Chapter 7 Marine Physical Processes** has concluded that there will be no significant effects, there is no pathway for indirect impact to heritage assets.	N/A	N/A	N/A	N/A	No
Operation and Maintenance							
Indirect Impacts to Heritage Assets Associated with Changes to Marine Physical Processes (OFA-O-03)	All	As **Chapter 7 Marine Physical Processes** has concluded that there will be no significant effects, there is no pathway for indirect impact to heritage assets.	N/A	N/A	N/A	N/A	No
Changes to the Setting of Heritage Assets and Historic Seascape Character (OFA-O-04)	All	Given the scale of the proposed works and ANS once in operation, changes to the setting of offshore heritage assets during operation will not affect their cultural significance and the effect will be **no impact**.	N/A	N/A	N/A	N/A	No

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase

* Not including designations.

17. Other Marine Users

685. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS on Other Marine Users. As outlined in **Section 4 Description of the Associated Development**, three AoS for the ANS are being considered at this stage: A2/3, A5, and A8.

17.1. Study Area

686. The Other Marine Users Study Area is typically defined as covering the potential effects associated with interactions between other marine users and the development related activities, which would include a 10nm buffer around the footprint of the ANS and any associated construction buffer. However, as it is not known at this stage where the ANS will be located within the AoS, the Study Area for other marine users has been defined as the full three potential ANS search areas (A2/3, A5 and A8) plus a 10nm buffer.

687. The buffer of 10nm was chosen to ensure that all receptors reasonably likely to be significantly influenced by the ANS was included in this assessment, given the large number of plans, projects and activities (operational or in planning) within the Dogger Bank and Southern North Sea. This Other Marine Users Study Area is aligned with that defined in **Chapter 14 Shipping and Navigation (Figure 14.1),** and considers the movement of other marine users' activitiesFigure 17.1.

17.2. Data Sources

688. The following information has been considered during the production of this report and will be considered further within the ES where relevant matters are 'scoped in' to the EIA process.

689. The Other Marine Users assessment will be informed by the latest GIS datasets including, but not limited, to the datasets shown in **Table 17-1** and shown on **Figure 17.1 to 17.3**.

Table 17-1 Desk-based sources used to inform the baseline for Other Marine Users

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Centre for Environment, Fisheries and Aquaculture Science (Cefas)	100% Study Area / AoS	2023	Marine disposal sites.
The Crown Estate	100% Study Area / AoS	2025	Offshore wind farms and associated offshore export cables, and marine aggregate sites.
Marine Themes	100% Study Area / AoS	2019	Military PEXA.
Oil & Gas Authority, North Sea Transition Authority	100% Study Area / AoS	2025	Wells, surface infrastructures, sub-surface infrastructures and pipelines.
Kingfisher Information Service – Offshore Renewable & Cable Awareness Project (KIS-ORCA)	100% Study Area / AoS	2023	Subsea cables.

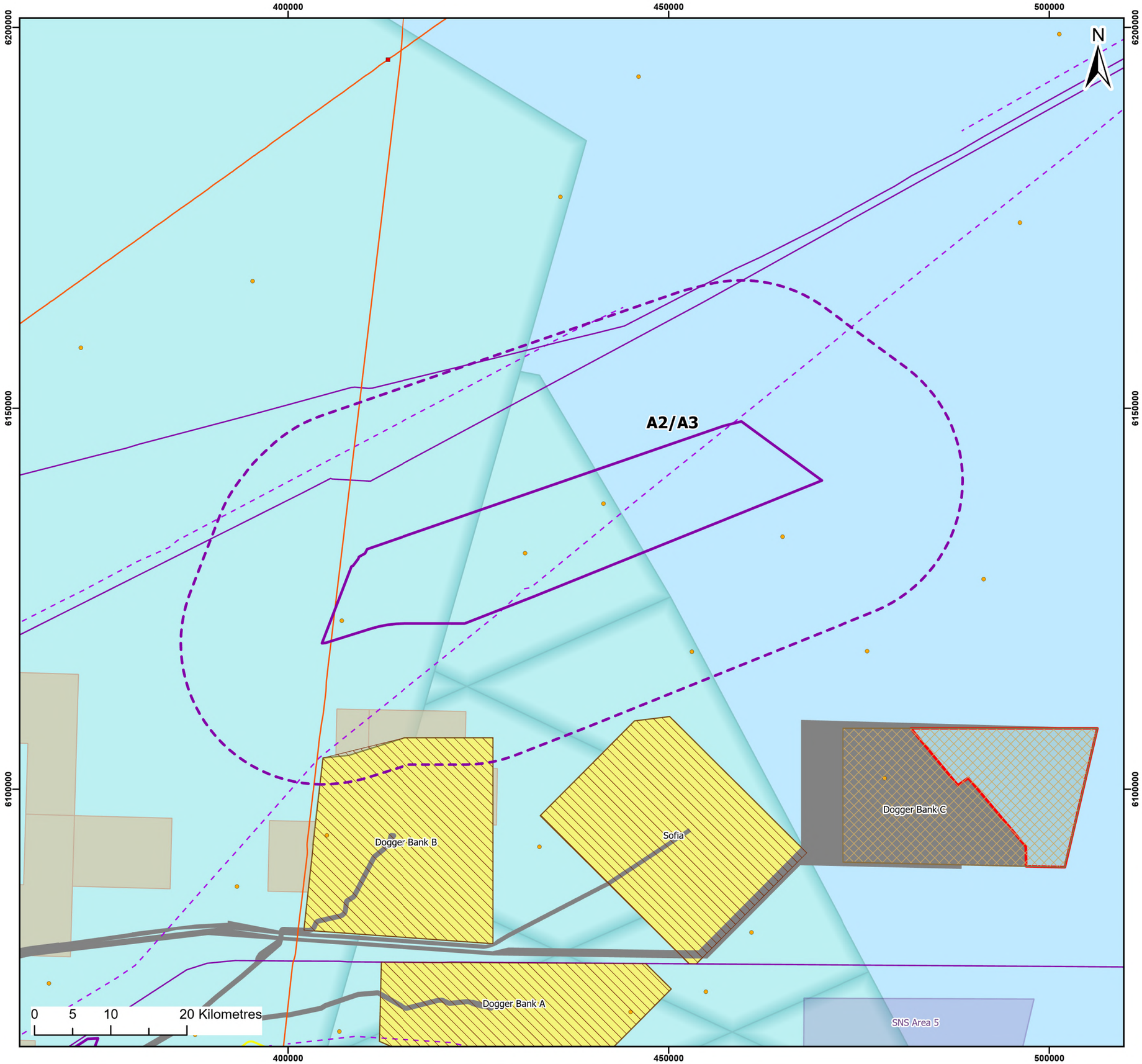
690. Where there is potential for interactions with other marine users, engagement with the relevant infrastructure owners / operators will be carried out.

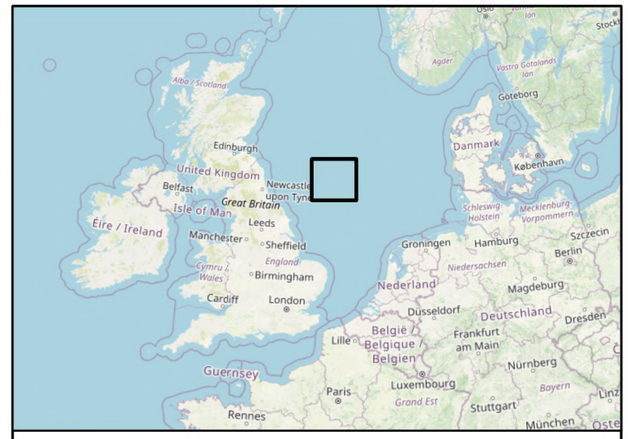
17.3. Assumptions and Limitations

691. This preliminary assessment uses information available at the time of writing as described in **Section 6.5**. The characterisation of the baseline environment and the resulting impact assessment is based on publicly available information, purchased data, or information gained directly from the relevant operators / organisations during consultation. There may be elements of uncertainty associated with the locations of some existing infrastructure and where this is the case, this will be discussed with the owners and operators and confirmed, if required, during pre-construction surveys.

17.4. Existing Environment

692. This section considers interactions within the Other Marine Users Study Area with industries not already covered as EIA topics in their own right, such as **Chapter 13 Commercial Fisheries, Chapter 14 Shipping and Navigation**, and **Chapter 15 Aviation, Radar and Military**.





Legend:

- ANS AoS
- ANS AoS 10nm Buffer
- Dogger Bank D Array Area
- PEXA Danger Areas
- Oil & Gas Licence Block
- Carbon Capture Storage Licencing Round

Surface Infrastructure

- Active

Wells

- Abandoned

Cables & Pipelines

- Active Pipeline
- Telecommunications Cable
- Out of Use Cable
- Dogger Bank South Offshore Boundary
- Offshore Wind Export Cable Corridor

Other Offshore Wind Farms

- Under Construction

Marine Disposal Site

- Open
- Closed

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Other Marine Users within the Study Area of A2/A3

Figure: 17.1

Drawing No: PC6250-HAS-XX-OF-DR-GS-0061

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
04	06/02/2026	AB	GC	A3	1:500,000
03	15/01/2026	JH	AB	A3	1:500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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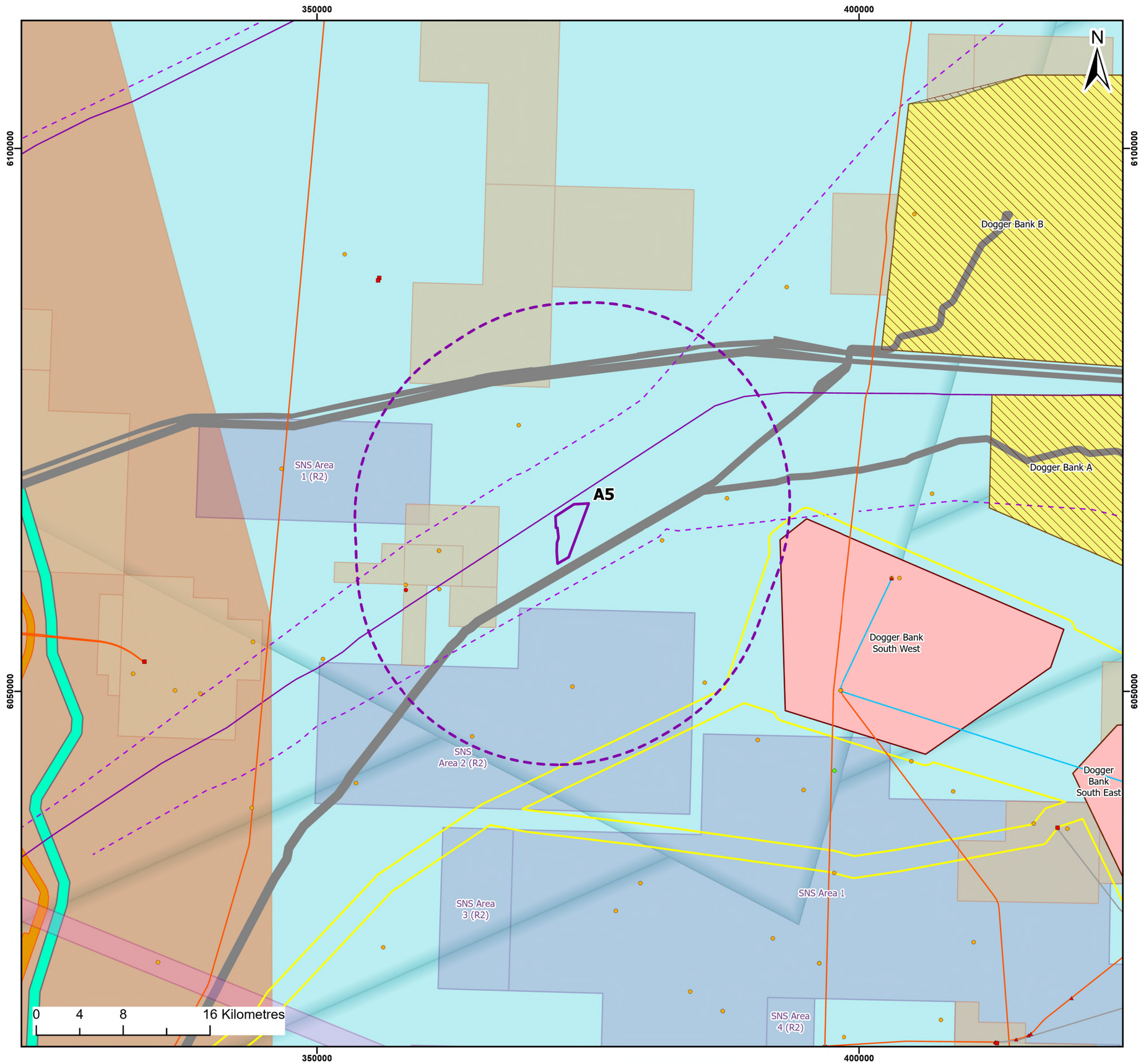

Legend:

- ANS AoS
- ANS AoS 10nm Buffer
- Oil & Gas Licence Block
- Carbon Capture Storage Licencing Round

Surface Infrastructure

- Active

Sub-surface Infrastructure

- Active

Wells

- Drilling
- Completed (Operating)
- Plugged
- Abandoned

Cables & Pipelines

- Abandoned Pipeline
- Active Pipeline
- Not in Use
- Telecommunications Cable
- Out of Use Cable
- Dogger Bank South Offshore Boundary
- EGL3 and EGL4 Proposed Cables
- EGL5 Proposed Cables
- Ossian Scoping Boundary
- Offshore Wind Export Cable Corridor

Other Offshore Wind Farms

- Under Construction

Marine Disposal Site

- Open

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Other Marine Users within the Study Area of A5

Figure: 17.2

Drawing No: PC6250-HAS-XX-OF-DR-GS-0080

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

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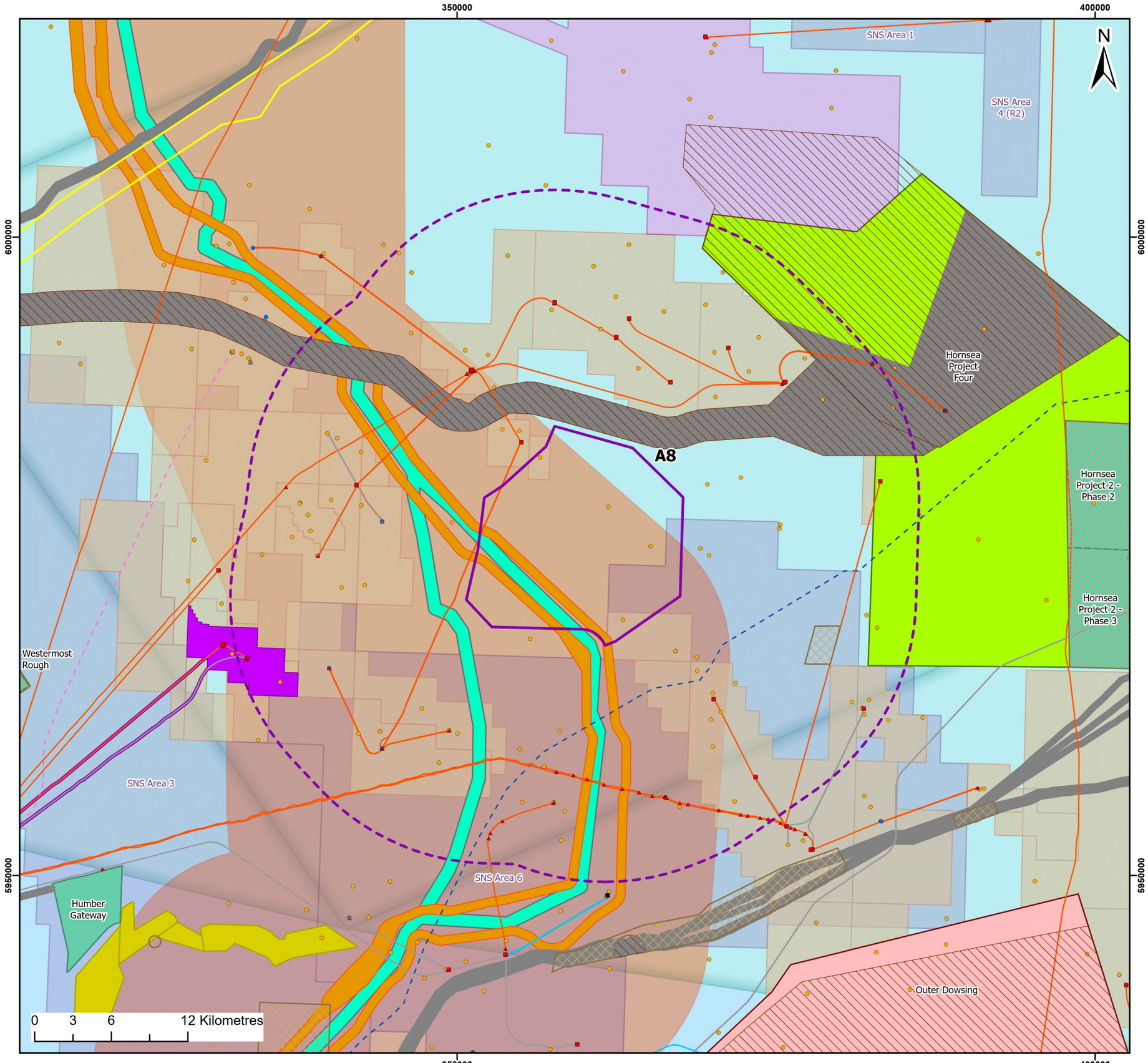

Legend:

- ANS AoS
- ANS AoS 10nm Buffer
- Oil & Gas Licence Block
- Carbon Capture Storage Site
- Carbon Capture Storage Licencing Round

Surface Infrastructure

- Abandoned
- Active
- Not in Use
- Precommissioned

Sub-surface Infrastructure

- Active
- Not in Use

Wells

- Drilling
- Completed (Operating)
- Plugged
- Abandoned

Cables & Pipelines

- Abandoned Pipeline
- Active Pipeline
- Not in Use
- Precommissioned Pipeline
- Viking Link Interconnector
- Dogger Bank South Offshore Boundary
- EGL3 and EGL4 Proposed Cables
- EGL5 Proposed Cables
- Ossian Scoping Boundary
- Natural Gas Storage Site
- Marine Aggregate Site
- Offshore Wind Export Cable Corridor

Other Offshore Wind Farms

- Active/In Operation
- Consented
- Pre-planning Application

Marine Disposal Site

- Open
- Closed
- Offshore Wind Farm Export Cable
- PEXA Danger Areas

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Other Marine Users within the Study Area of A8

Figure: 17.3

Drawing No: PC6250-HAS-XX-OF-DR-GS-0081

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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02	15/01/2026	JH	AB	A3	1:300,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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17.4.1. Offshore Wind Infrastructure

693. Offshore wind developments that have been consented or are known projects in development within a 10nm buffer of the AoS are summarised in **Table 17-2** and shown on **Figure 17.1 to Figure 17.3**.

Table 17-2 Offshore wind farm projects within 10nm (18.52km) of the AoS

Offshore Wind Farm Array Area	Distance from the ANS boundary (km)			Status
	A2/3	A5	A8	
Dogger Bank South (DBS)	>50	15	>50	Examination
Hornsea Project 4	>50	>50	15	Consent granted, on hold.
Dogger Bank A (DBA)	15	37	>50	Under construction

694. There is one planned OWF export cable that may overlap with A8. However, it is noted that A5 is 500m away from the export cable corridors of Dogger Bank A (DBA) and Dogger Bank B (DBB) and A8 is 500m away from Hornsea Project 4's export cable corridor.

17.4.2. Oil and Gas Infrastructure

695. The southern North Sea has significant oil and gas (O&G) infrastructure. This includes surface (platforms and buoys) and sub-surface (wells, wellheads, manifolds and pipelines) infrastructure.

696. There is surface infrastructure within two of the AoS: three wells within A2/3, none within A5 and five within A8. There are a number of O&G platforms within the Other Marine Users Study Area, which is none located in A2/3, three platforms in A5 and 47 platforms in A8.

697. There is no active sub-surface infrastructure within the any of the AoS. However, there is one active well within 10nm of A5 and five active wells within 10nm of A8. There are no active wells within 10nm of A2/3.

698. As mentioned in **Chapter 12 Offshore Ornithology**, some existing above-water oil and gas structures may be used by bird species for resting or breeding e.g. breeding kittiwake were confirmed at three platforms (Boulton n=99 Apparently Occupied Nests (AON), Cygnus-B n=88 AON and Munro MH n=49 AON).

699. Within the 10nm buffer of each AoS, there are no pipelines that cross A2/3 or A5. There are 41 pipelines that cross A8's 10nm buffer. These are displayed on **Figure 17.1**.

700. The Other Marine Users Study Area also overlaps with the following O&G blocks, licensed for exploration and production:

- **A2/3** - 37/29a and 37/28a;
- **A5** - 42/10a, 42/15c, 42/10c, 42/5b, 42/15a, 42/9a; and
- **A8** - 47/9c, 47/3d, 47/4a, 47/3c, 47/5c, 47/5a, 47/3e, 47/3b, 47/3i, 42/29a, 47/3h, 47/8b, 47/3a, 43/27a, 47/4b, 47/4c, 47/9b, 43/26a, 47/10b, 48/6a, 42/30a, 47/8c, 48/7b, 48/2a, 42/28d, 47/3f.

17.4.3. Subsea Cables

701. The southern North Sea contains a considerable number of cables, primarily telecommunication connections between the UK and continental Europe. Within the Other Marine Users Study Area, three active subsea cables, three out-of-use cables and three planned subsea cables cross the Other Marine Users Study Area:

- Eastern Green Link 3, 4 and 5 (EGL) – overlaps A8;
- Pangea North telecommunications cable – 8.3km from A2/3;
- Tata North Europe telecommunications cable – 500m from A5;
- Havhingsten Seaton Sluice telecommunications cable – 16.6km from A2/3;
- The out-of-use Nordeney to Scarborough telecommunications cable – 2.4km from A5;
- The out-of-use UK to Denmark telecommunications cable – overlaps A2/3 and 4.9km from A8; and
- The out-of-use Faroese telecommunications cable – 12.7km from A2/3.

702. There are no existing cables present within A5. The list above excludes the offshore wind export cables discussed in **Section 17.4.1**.

17.4.4. Carbon Capture and Storage

703. Leasing rounds were opened by the North Sea Transition Authority (NSTA) for Carbon Capture and Storage (CCS) in June 2022 and December 2025, and interact with the ZoIs as follows:

- No CCS areas present in A2/3 ZoI;
- Southern North Sea (SNS) Areas 1 and 2 overlaps with A5 ZoI (but not the AoS itself); and
- SNS Area 6 overlaps with A8 ZoI and AoS.

704. Outside of the NSTA leasing round, the export cable corridor of the proposed Northern Endurance CCS Project lies approximately 26km north of A8. The Northern Endurance CCS area itself lies approximately 16km north of A8.

17.4.5. Marine Aggregates and Mining

705. There are no aggregate production or mining areas within the AoS themselves or the 10nm buffer for any of the ANS zones.

706. Dredging vessels may transit through the AoS. However, any interactions between ANS vessel traffic and other vessel traffic are addressed in **Chapter 14 Shipping and Navigation**.

17.4.6. Disposal Sites

707. There are no open disposal sites within any of the AoS. However, there are three open disposal sites within the Other Marine Users Study Area, namely:

- A2/3 –DBB;
- A5 – No active disposal area present; and
- A8 – Hornsea 4 Export Cable Corridor and Hornsea 4 Array Area.

708. Furthermore, the closed disposal sites nearby are:

- A2/3 and A5: None.
- A8: Babbage.

17.4.7. Ministry of Defence Activities

709. The following Practice and Exercise Areas (PEXA) encompass the AoS:

- D323B – A5; and
- D323C – A8.

710. These areas are designated Royal Airforce (RAF) Danger Areas for Air Combat Training and High-Energy Manoeuvres between 5,000 ft and 66,000 ft. which are considered in **Chapter 13 Aviation, Radar and Military,** and therefore is not considered further in this section.

711. Due to activities during World War I and World War II, there is potential for UXO within the Other Marine Users Study Area and the wider southern North Sea region. Locations of any UXO would be determined post-consent during detailed pre-construction surveys, with mitigation agreed in consultation with Natural England, the JNCC and the MMO. Any assessments for UXO clearance in the EIA will be for information only and will not be included in the DCO application. A separate Marine Licence Application(s) will be made prior to construction for UXO investigation and clearance works, with an accompanying assessment of UXO clearance impacts on other marine users.

17.5. Other Marine Users Scoping

712. **Table 17-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 17-3 Summary of impacts proposed to be scoped in (✓) and out (X) for Other Marine Users

Potential Impact	Construction	Operation	Decommissioning
Potential interference with other offshore wind farms	X	X	X
Potential interference with oil and gas activities	X	X	X
Physical impacts on sub-sea cables and pipelines	X	X	X
Impacts on CCS sites	X	X	X
Impacts on aggregate dredging activities	X	X	X
Impacts on disposal sites	X	X	X
Impacts of MoD activities	X	X	X
Cumulative impacts	X	X	X

17.6. Potential Effects

713. It is proposed to scope out all impacts on other marine users and therefore it is considered that there are no potential effects to consider further for this topic. The reasoning for the scoping decision is as follows:

- Offshore Wind Infrastructure: Given the distance of offshore wind infrastructure from the ANS, there is not considered to be any potential impacts and therefore it is scoped out of the assessment;

- O&G infrastructure: Given the ability within the AoS to microsite, there will be no potential impact of the ANS on the presence of the O&G infrastructure. Therefore, this is scoped out of the assessment;
- Subsea Cables: Given the ability within the AoS to microsite, there will be no potential impact of the ANS on the presence of the subsea cables. Therefore, this is scoped out of the assessment;
- Carbon Capture and Storage: Given the ability within the AoS to microsite, there will be no potential impact of the ANS on the presence of the CCS projects. Therefore, this is scoped out of the assessment;
- Marine Aggregates and Mining: Given the distance of marine aggregate and mining infrastructure from the ANS, there is not considered to be any potential impacts and therefore it is scoped out of the assessment;
- Disposal Sites: Given the distance of disposal sites from the ANS, there is not considered to be any potential impacts and therefore it is scoped out of the assessment; and
- Ministry of Defence Activities: Due to the nearby activities being for RAF Air Combat Training and being considered in **Chapter 13 Aviation, Radar and Military**, this is not considered further here and is scoped out for Other Marine Users.

17.7. Inter-Relationships

714. Potential inter-relationships between other marine users and other environmental topics have been considered, where relevant, in **Table 17-4**. These inter-relationships and how they are addressed will be detailed in the relevant chapters of the main assessment submitted with the DCO application.

Table 17-4 Other Marine Users – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction, Operation and Decommissioning				
OMU-C-01, OMU-O-01, OMU-D-01	Potential interference with other offshore wind farms in relation to the shipping associated with the Project.	Shipping and Navigation	Displacement of shipping and navigation associated with other offshore wind farms.	This chapter is informed by **Chapter 14 Shipping and Navigation.**
OMU-C-02, OMU-O-02, OMU-D-02	Potential interference with oil and gas activities in relation to the shipping associated with the Project.	Shipping and Navigation	Displacement of shipping and navigation associated with oil and gas activities.	
OMU-C-07, OMU-O-07, OMU-D-07	Potential interaction with MOD activities relating to aviation associated with the Project.	Aviation, Radar and Military	Interference with MOD activities.	This chapter is informed by **Chapter 15 Aviation, Radar and Military**.

17.8. Interactions Assessment

715. Potential interactions between impacts are identified in **Table 17-5**. However, as all impacts are proposed to be scoped out there is not considered to be any potential for interactions between impacts.

17.8.1. DBD Project Effect Interactions

716. The potential within-Project effects (i.e. effect interaction across both the DBD Project and the ANS) have been considered and assessed below.

17.8.1.1. Construction Impacts (OMU-C-01, OMU-C-02, OMU-C-07)

717. The DBD Project and the ANS are unlikely to have overlapping construction phases on account of the need to install the ANS a minimum of two breeding seasons prior to commencement of the turbine operations. In the event that there is overlap of construction activities, the potential effect from the ANS will be highly localised and temporary. When considering the small-scale of the ANS development, there is no potential for within-Project effects during construction.

17.8.1.2. Operational Impacts (OMU-O-01, OMU-O-02, OMU-O-07)

718. Although both the DBD Project and the ANS will be operational at the same time, there will be significant distance between the infrastructure present for both (minimum distance of 34km from the DBD Array Area). Given only a single structure would be required for the ANS of insignificant scale relative to the receptor of Other Marine Users, there is no potential for within-Project effects during operation.

17.9. Cumulative Effects

719. Given all impacts are scoped out, there is not considered to be any potential for cumulative effects.

17.10. Summary and Next Steps

720. All impacts for other marine users are proposed to be scoped out for assessment at this stage and therefore, no preliminary assessment has been undertaken, and no further assessment of other marine users is required at ES stage.

Table 17-5 Other Marine Users – potential interactions between impacts

Construction and Operation and Maintenance

	OMU-C-01	OMU-C-02	OMU-C03	OMU-C-04	OMU-C-05	OMU-C-06	OMU-C07	OMU-O-01	OMU-O-02	OMU-O-03	OMU-O-04	OMU-O-05	OMU-O-06	OMU-O-07
Potential interference with other wind farms (OMU-C-01)		No	No	No	No	No	No	No	No	No	No	No	No	No
Potential interference with oil and gas activities (OMU-C-02)	No		No	No	No	No	No	No	No	No	No	No	No	No
Physical impacts on sub-sea cables and pipelines (OMU-C-03)	No	No		No	No	No	No	No	No	No	No	No	No	No
Impacts on CCS sites (OMU-C-04)	No	No	No		No	No	No	No	No	No	No	No	No	No
Impacts on aggregate dredging activities (OMU-C-05)	No	No	No	No		No	No	No	No	No	No	No	No	No
Impacts on disposal sites (OMU-C-06)	No	No	No	No	No		No	No	No	No	No	No	No	No
Impacts of MoD activities (OMU-C-07)	No	No	No	No	No	No		No	No	No	No	No	No	No
Potential interference with other wind farms (OMU-O-01)	No	No	No	No	No	No	No		No	No	No	No	No	No
Potential interference with oil and gas activities (OMU-O-02)	No	No	No	No	No	No	No	No		No	No	No	No	No
Physical impacts on sub-sea cables and pipelines (OMU-O-03)	No	No	No	No	No	No	No	No	No		No	No	No	No
Impacts on CCS sites (OMU-O-04)	No	No	No	No	No	No	No	No	No	No		No	No	No
Impacts on aggregate dredging activities (OMU-O-05)	No	No	No	No	No	No	No	No	No	No	No		No	No
Impacts on disposal sites (OMU-O-06)	No	No	No	No	No	No	No	No	No	No	No	No		No
Impacts of MoD activities (OMU-O-07)	No	No	No	No	No	No	No	No	No	No	No	No	No	

18. Socio-Economics, Tourism and Recreation

721. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS on Socio-economics, Tourism and Recreation. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

18.1. Study Area

722. Socio-economic impacts, including employment related and any potential tourism and recreation effects, are less constrained by geography than other environmental impacts, such as noise or ecology.

723. The Study Area for the assessment of socio-economic impacts have been defined in line with the guidance on identification of 'local areas' for offshore developments published by the Scottish Government (2022). Although this guidance will not apply in England, the principles for identifying the areas are universal and can be applied anywhere. The core principle of this guidance is that the 'local areas' identified should be specific to the socio-economic impact identified. Therefore, the Study Areas used for the assessment of economic impacts, such as employment and Gross Value Added (GVA), are different from those used to assess the impacts on tourism and recreational assets.

724. The Socio-economics, Tourism and Recreation Study Areas are defined based on the following six principles:

- Principle 1 (Dual Geographies) - The local area for the supply chain and investment impacts should be separate from the local area(s) for wider socio-economic impacts, including tourism and recreation;
- Principle 2 (Appropriate Impacts) - The appropriate impacts to be considered for assessment should be identified before defining the local areas;
- Principle 3 (Epicentres) - The local areas should include all the epicentres of the appropriate impacts, where an epicentre is defined as an onshore location where major activities occur such as a port, supply chain cluster or the location of onshore infrastructure;
- Principle 4 (Accountability) - The local areas used in the assessment should comprise of pre-existing economic or political geographies (parish and town 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.

725. The ports that will be used during the construction and operation of the ANS have not been decided yet, however the location of the ANS is known and this has been used to define the Study Areas. Given the ANS is entirely offshore, three Study Areas are included within the assessment of economic impacts to capture both regional and national impacts.

726. Based on the guidance on local areas for offshore developments, the following Study Areas will be considered with respect to socio-economic impacts (see **Figure 18.1**):

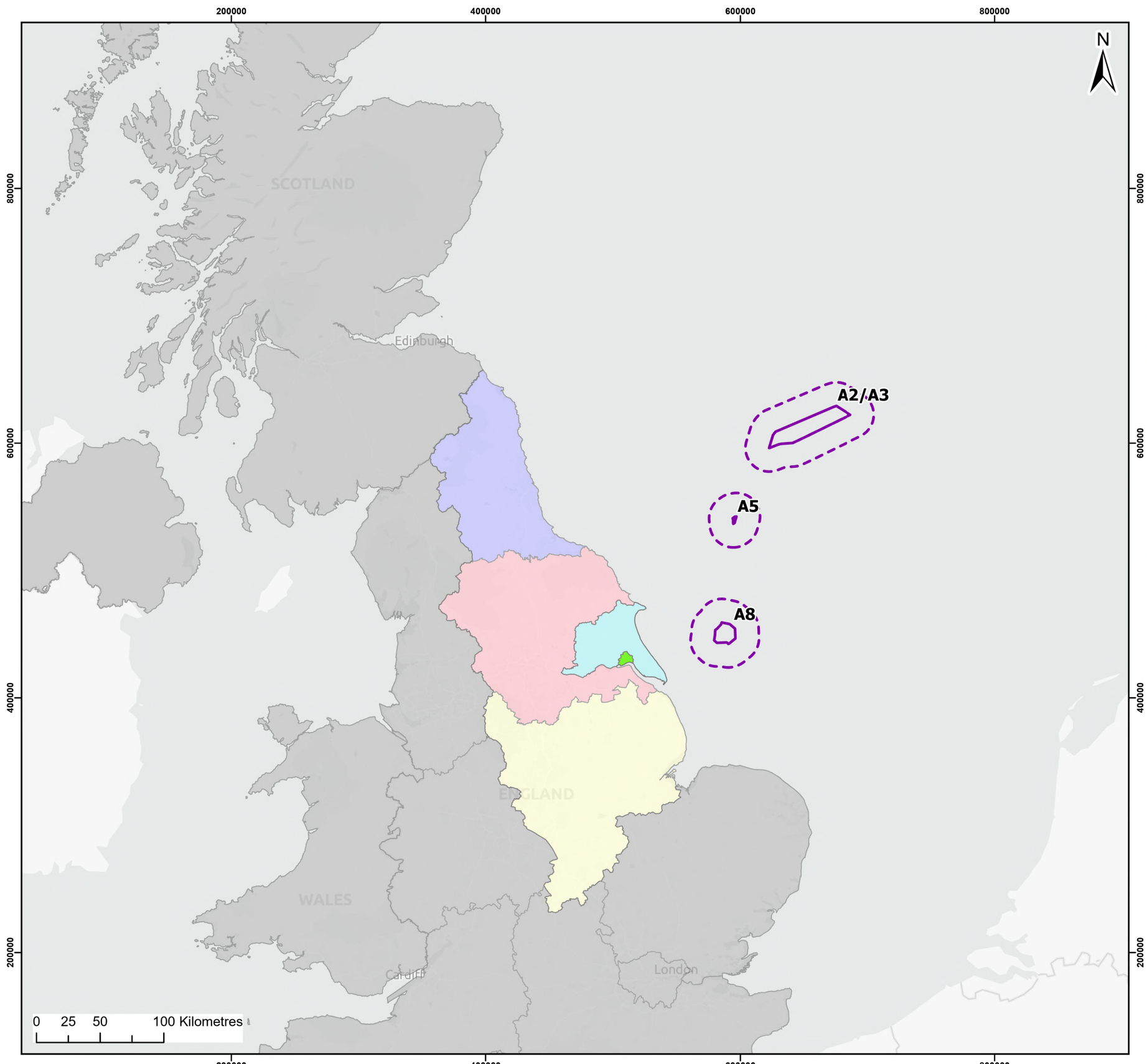
- The local Study Area (considering tourism and recreation only):
  - The offshore areas within 10nm (pertinent to Shipping and Navigation) of the ANS;
- The regional Study Area (considering socio-economics only), including:
  - East Midlands;
  - North East of England; and
  - Yorkshire and the Humber.
- The UK Study Area (considering socio-economics only).

727. Note that all impacts will be considered inclusively, for example the impacts in the UK will include those within the regional Study Area.

728. The regional Study Area will enable consideration of wider impacts from construction activities. Including the UK as a Study Area makes it possible to appraise the full scope of economic impacts associated with the ANS and will align the assessment with future economic analysis of the Project, such as potential Contracts for Difference (CfD) Supply Chain Plans.

729. If the primary construction port is located outside the regional Study Area, the Study Areas will be redefined accordingly.

730. For the purposes of the tourism and recreation assessment, the Study Area is more localised and defined by an assumed 10nm buffer around the AoS (see **Figure 18.1**). This has been identified on the basis that given the ANS is one singular structure, the potential for large scale effects on a locality is limited. Recreational activity within the AoS is expected to relate primarily to vessel movements, so the Study Area aligns with the Study Area for Shipping and Navigation.



Legend:

- ANS AoS
- Socio-economics and Tourism and Recreation Study Area
- United Kingdom

Local Socio-Economic Study Area (LSESA)

- East Riding of Yorkshire
- Kingston Upon Hull

Regional Study Area (RSA)

- East Midlands
- North East of England
- Yorkshire and the Humber

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Socio-economics and Tourism and Recreation Study Area

Figure: 18-1

Drawing No: PC6250-RHD-XX-ON-DR-GS-0084

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Co-ordinate system: British National Grid

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18.2. Data Sources

731. **Table 18-1** presents the list of data sources used to inform the socio-economics, tourism and recreation baseline environment.

Table 18-1 Desk-based sources used to inform the baseline for Socio-economics, Tourism and Recreation

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
ONS, Business Register and Employment Survey.	East Riding of Yorkshire, Kingston upon Hull, Yorkshire and the Humber, Northeast of England, East Midlands, UK	2024	Information on the turnover, employment and GVA of sectors across the economy.
ONS, Earnings and hours worked, place of residence by local authority.	East Riding of Yorkshire, Kingston upon Hull, Yorkshire and the Humber, Northeast of England, East Midlands, England	2024	Information on average annual gross income for full-time workers.
ONS, Regional gross value added (balanced) per head and income components	East Riding of Yorkshire, Kingston upon Hull, Yorkshire and the Humber, Northeast of England, East Midlands, UK	2024	Estimates of GVA generated by the regional areas of the UK.
Visit Britain, Annual Survey of Visits to Visitor Attractions.	East Riding of Yorkshire and Great Britain	2023	Information on key tourist attractions in Great Britain.
Visit East Yorkshire, Explore East Yorkshire.	East Riding of Yorkshire	2024	Information on local attractions in East Yorkshire.
Visit Hull and East Yorkshire	East Riding of Yorkshire, Kingston upon Hull, Yorkshire and the Humber	2025	Reviewed to ensure coverage of major tourist destinations in the LTRA.
Automatic Identification System (AIS)	Full coverage of Study Areas	2025-26	Two 14-day seasonal periods of vessel traffic data collected via terrestrial, offshore and / or satellite receivers. Periods will cover 14-days from Summer 2025 and 14-days from Winter 2025-2026.

18.2.1. Assumptions and Limitations

732. This report uses information available at the time of writing as described in **Section 6.5**. This assessment will be refined where relevant and presented in the ES to be submitted in support of the DCO application. Any key assumptions, data limitations or technical difficulties encountered during baseline characterisation with the above data sources are identified in **Table 18-2**.

Table 18-2 Assumptions or limitations identified from the data sources for Socio-economics in Table 18-1

Data Source	Assumption / Limitation	Potential Implications on Assessment?
AIS	The carriage of AIS is required on board all vessels of greater than 300GT engaged on international voyages, cargo vessels of more than 500GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1st July 2002, and fishing vessels over 15m LOA.	Small craft may be underrepresented in the vessel traffic data but given the distance offshore, it is unlikely small craft (recreational vessels and fishing vessels under 15m) would be transiting without AIS installed. A proportion of smaller vessels also carry AIS voluntarily.

18.3. Existing Environment

18.3.1. Socio-economics, Recreation and Tourism Study Area

733. As described above (**Section 18.1**) the local Study Area is not considered relevant as the AoS are located a significant distance offshore, therefore the socio-economic data presented is based on the Regional and UK Study Areas. As shown in **Table 18-3**, in 2022, the GVA generated within the regional was £236.9 billion, and 1% of the total GVA generated in the UK (£1,531.6 billion) (ONS, 2024). Over the period since 2012, GVA has grown by 45% in the region and 47% in the UK as a whole. In the same year, GVA per head of population supported by the region was £25,643, which is lower than the UK figure (£33,227). This highlights a gap of over £7,400 per person compared to the UK figure which indicates weaker economic performance.

Table 18-3 GVA and GVA per head, 2022 (ONS, 2024)

Economic Indicator	RSA	UK
2012 GVA (£ billion)	236.9	1,531.6
2022 GVA (£ billion)	343.2	2,246.0
Change (2012-2022)	45%	47%
GVA per Head (£)	25,643	33,227

18.3.2. Tourism and Recreation Study Area

734. There are no visitor attractions in or adjacent to the AoS. The following sub-sections present the informal recreational activities which occur within the wider marine environment.

18.3.2.1. Boating

735. Away from the adjacent coastlines of the Study Area, recreational boating activity is minimal. The main vessel types within or adjacent to the AoS are cargo vessels, tankers, commercial fishing vessels, oil and gas related vessels, passenger ships, and OWF construction vessels. Recreational vessels were the least accounted for vessel and use type, which is expected given the challenging sea conditions in the Dogger Bank region. Over the data period, an average of one unique recreational vessel per week was recorded within the Study Area.

736. Vessel usage heatmapping, which represents AIS recreational vessel data provided by the RYA Coastal Atlas (2021) shows very low recreational activity further offshore, with little to no recorded use. This is largely due to unsuitable weather conditions in this region and associated safety concerns.

18.3.2.2. Angling

737. Recreational fishing, including shore and sea angling, is a popular recreational activity throughout English waters. Offshore sea angling in the coastal areas operates mainly out of Bridlington, with trips mainly targeting wrecks, ground and rough areas. Common species caught mainly include cod, bass and flatfish. Chartered boats from Bridlington run trips less frequently than other areas, typically between 20 to 60 days per year. However, given the distance offshore for all the AoS and the limited evidence from RYA and AIS data (whilst not fully informative) the potential for this activity to occur is extremely low.

18.3.2.3. Scuba Diving

738. Unlike many parts of England's coast, scuba diving activity off these coastal areas is very limited, as is reflected by nature conservation diving reports over multiple years (Seasearch, 2021). Although these are carried out by volunteers in their personal leisure time, these serve as a proxy for general levels of diving activity and locations. Where diving does occur, it is mainly concentrated off the coast of Barmston, in the north of the coastal areas of the adjacent coastline. Given there are no know wrecks or dive sites within the AoS, and given the distance offshore, this activity is likely to be non-existent in any of the AoS.

18.4. Socio-economics Scoping

739. **Table 18-4** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Table 13.1** in **Appendix D Scoping Rationale**.

Table 18-4 Summary of impacts proposed to be scoped in (✓) and out (X) for Socio-economics

Potential Impact	Construction	Operation	Decommissioning
Direct economic benefit (supply chain)	✓	✓	✓
Increased employment	✓	✓	✓
Disruption to recreational activities	X	X	X
Disruption to the tourism industry	X	X	X
Disruption to the Fishing Industry	✓ In Commercial Fisheries	✓ In Commercial Fisheries	✓ In Commercial Fisheries

18.5. Potential Effects

740. The following subsections provide a preliminary assessment of the potential effects identified for each of the AoS under consideration in relation to socio-economic receptors. This assessment draws on available baseline data available at this stage as described above, and considers the details of ANS construction, O&M activities set out in **Chapter 4 Description of the Associated Development**. The preliminary assessment utilises the methodology set out in **Chapter 6 Methodology** and uses the ANS construction and operational description (**Chapter 4 Description of the Associated Development**) as the basis for the worst-case scenario. Embedded mitigation adopted for this assessment are described in the sections above and listed in **Appendix C Commitments Register**. Assumptions and definitions are provided below and in line with the methodology described in **Chapter 6 Methodology**.

18.5.1. Potential Effects during Construction

741. The construction of offshore infrastructure can have beneficial socio-economic effects in terms of providing employment. However, it may also create potential adverse impacts on social infrastructure if Project construction activities affect specific receptors, unless these are identified and avoided through micro-siting and mitigation measures.

742. Construction of the ANS may result in the following potential impacts, which are considered further below:

- Direct economic benefit (supply chain); and
- Increased employment.

18.5.1.1. Direct Economic Benefit from Supply Chain Expenditure (SOC-C-01)

743. Construction of the ANS is expected to generate direct economic benefit through its supply chain, including spending on goods and services in the socio-economic Study Areas. However, as a standalone development, this benefit would be negligible in scale at the regional and national level. Given the negligible magnitude and low sensitivity of these receptors a **negligible beneficial effect** is expected. **This impact will therefore not be considered in more detail at the next stage of assessment**.

18.5.1.2. Increase in Employment (SOC-C-02)

744. Construction of the ANS is expected to have an impact through increased employment as well as potential changes to demographics due to national migration and immigration. Employment impacts and considerations surrounding temporary migration will likely influence recruitment strategies. However, as a standalone development though this would be negligible in scale at the regional and national level. Given the negligible magnitude and low sensitivity of these receptors a **negligible beneficial effect** is expected. **This impact will therefore not be considered in more detail at the next stage of assessment**.

18.5.2. Potential Effects during Operation

745. The impacts assessed for the operation phase of the ANS will be as described above for construction. However, it is anticipated that any impacts to the economy will be significantly lesser in scale than the construction phase, as there are lower levels of vessel activity and lesser scale of exclusion of activities.

18.5.2.1. Direct Economic Benefit from Supply Chain Expenditure (SOC-O-01)

746. There will be economic benefits during the operation phase associated with the maintenance activities for the ANS which will result in increased expenditure. As a standalone development this benefit would be minimal (negligible in scale) at the regional and national level. Given the negligible magnitude and low sensitivity of these receptors a **negligible beneficial effect** is expected in the operation phase. **This impact will therefore not be considered in more detail at the next stage of assessment**.

18.5.2.2. Increase in Employment (SOC-O-02)

747. There will be an increase in employment arising from the increased expenditure during the operation phase associated with the maintenance activities for the ANS. As a sole development this would be negligible in scale at the regional and national level. Given the negligible magnitude and low sensitivity of these receptors a **negligible beneficial effect** is expected during the operation phase. **This impact will therefore not be considered in more detail at the next stage of assessment**.

18.6. Inter-Relationships

748. Potential inter-relationships between socio-economics, tourism and recreation and other environmental topics have been considered, where relevant, in **Table 18-5**.

Table 18-5 Socio-economics – inter-relationships with other topics

Impact ID	Impact and Project Activity	Related Topic	Consideration	Where addressed
Construction				
SOC-C-01	Direct economic benefit (supply chain)	**Commercial Fisheries** **Shipping and Navigation**	The extremely small scale temporary exclusion of fishing and shipping and navigation area is not expected to have measurable economic or employment effects therefore these elements are not scoped in. Safety of navigation and fishing is therefore considered in those topics alone.	Temporary exclusion effects are assessed in **Chapter 13 Commercial Fisheries** and **Chapter 14 Shipping and Navigation**.
SOC-C-02	Increased employment	**Commercial Fisheries** **Shipping and Navigation**		
Operation and Maintenance				
SOC-O-01	Direct economic benefit (supply chain)	**Commercial Fisheries** **Shipping and Navigation**	The extremely small scale exclusion of fishing and shipping and navigation by the ANS is not expected to have measurable economic or employment effects therefore these elements are not scoped in. Safety of navigation and fishing is therefore considered in those topics alone.	Temporary exclusion effects are assessed in **Chapter 13 Commercial Fisheries** and **Chapter 14 Shipping and Navigation**.
SOC-O-02	Increased employment	**Commercial Fisheries** **Shipping and Navigation**		

749. The inter-relationships for direct economic and employment effects are negligible and unlikely to be measurable given the scale of the scale of the impact and size of the commercial fisheries and shipping and navigation receptors. Therefore, no further consideration of the inter-relationships is considered necessary.

750. The indirect effect of the disruption / obstruction to commercial fisheries during construction and operation have the potential for a negligible and immeasurable magnitude negative influence (due to the regional and national scale) on the economic benefits (SOC-C-01 and SOC-O-01) and employment impacts (SOC-C-02 and SOC-O-02). These are therefore not considered further.

18.7. Interactions Assessment

751. The impacts identified and assessment in this topic have the potential to interact with each other. Potential interactions between impacts are identified in **Table 18-6**. The economic benefits (SOC-C-01 and SOC-O-01) interact very closely with the employment impacts (SOC-C-02 and SOC-O-02). However, given the negligible scale of the impacts as assessed above, no additional increase in impact magnitude will arise.

Table 18-6 Socio-economics – potential interactions between impacts

Impact	SOC-C-01	SOC-C-02
Construction		
Direct economic benefit (supply chain) (SOC-C-01)		Yes
Increased employment (SOC-C-02)	Yes	
Operation and Maintenance		
Direct economic benefit (supply chain) (SOC-O-01)		Yes
Increased employment (SOC-O-02)	Yes	

18.7.1. DBD Project Effect Interactions

752. Given the negligible scale of potential socio-economic effects as a result of the ANS development compared to the DBD project as a whole, interactions with DBD Project effects (i.e. effect interaction across both the DBD Project and the ANS) there is no potential for within-Project effects during construction, O&M, and decommissioning. **This impact will therefore not be considered in more detail at the next stage of assessment**.

18.8. Cumulative Effects

753. The scale of the direct economic benefits and increased employment of the ANS alongside other plans and projects are small. Given this, the conclusions presented in the **DBD PEIR Chapter 30 Socio-economics, Tourism and Recreation** would be unlikely to change in terms of magnitude (negligible to low) and effect (**negligible** to **minor beneficial**). Where there is potential for cumulative effects with other plans and projects, this is addressed in **Table 18-7**.

Table 18-7 Socio-economics – Potential Cumulative Effects

Impact ID	Impact and Project Activity	Potential for Cumulative Effects	Rationale	Assessment
Construction				
SOC-C-01	Direct economic benefit (supply chain)	Yes	ANS expenditure will accumulate with other offshore Projects. However, this will be considered in the Project Socio-economic assessment at ES Stage.	The ANS development and other projects lead to significant investment and positive economic benefit considered to be **moderate beneficial** at the regional and national scale.
SOC-C-02	Increased employment	Yes	Increased employment from the ANS will accumulate with other offshore Projects. However, this will be considered in the Project Socio-economic assessment at ES Stage.	The ANS development and other projects lead to significant investment and increased employment opportunities and growth considered to be **moderate beneficial** at the regional and national scale.
Operation and Maintenance				
SOC-O-01	Direct economic benefit (supply chain)	Yes	ANS expenditure will accumulate with other offshore Projects. However, this will be considered in the Project Socio-economic assessment at ES Stage.	The ANS development and other projects lead to significant investment and positive economic benefit considered to be **moderate beneficial** at the regional and national scale.
SOC-O-02	Increased employment	Yes	Increased employment from the ANS will accumulate with other offshore Projects. However, this will be considered in the Project Socio-economic assessment at ES Stage.	The ANS development and other projects lead to significant investment and increased employment opportunities and growth considered to be **moderate beneficial** at the regional and national scale.

754. However, given the negligible scale of influence of the ANS on socio-economic receptors compared to the DBD Project and other projects, and that there are no potentially significant effects, it is proposed that no effects are to be further assessed at the ES stage.

18.9. Summary and Next Steps

755. **Table 18-8** outlines the impacts of the ANS on socio-economic receptors. Based on the preliminary assessment all potential effects are of **negligible beneficial** significance.

756. Given the negligible scale of influence of the ANS on socio-economic receptors, and that there are no potentially significant effects which could occur, it is proposed that **effects on socio-economic, tourism and recreation are not assessed at the ES stage**.

Table 18-8 Socio-economics – summary of effects

Impact	AoS	Receptor Type / Value* and Sensitivity	Magnitude of Impact	Significance of Effect	Mitigation Measure	Residual Effect	Assessed in ES
Construction							
Direct economic benefit (supply chain) (SOC-C-01)	All AoS	*Receptor*: Regional Study Area and UK *Sensitivity*: Low	Negligible	Negligible	Not required	Negligible	No
Increased employment (SOC-C-02)	All AoS	*Receptor*: Regional Study Area and UK *Sensitivity*: Low	Negligible	Negligible	Not required	Negligible	No
Operation and Maintenance							
Direct economic benefit (supply chain) (SOC-C-01)	All AoS	*Receptor*: Regional Study Area and UK *Sensitivity*: Low	Negligible	Negligible	Not required	Negligible	No
Increased employment (SOC-C-02)	All AoS	*Receptor*: Regional Study Area and UK *Sensitivity*: Low	Negligible	Negligible	Not required	Negligible	No
Decommissioning							

Notes: For this assessment, it is assumed that impacts during the decommissioning phase would be of similar nature to, and lesser in scale than, those identified during the construction phase

19. Human Health

757. This chapter of the ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS on Human Health. As outlined in **Section 4 Description of the Development**, three locations for the ANS are being considered at this stage: A2/3, A5, and A8.

758. Effects on human health linked to health and safety are governed by legislation, guidance and management practices that are requirements of any offshore construction activity and infrastructure presence. The key effects relate to employees (during construction, operation, and decommissioning) and users of the offshore environment (whether for commercial or recreational activities). The former is protected by health and safety legislation, whilst the latter are protected by navigational safety requirements (see **Chapter 14 Shipping and Navigation**) indicated in the inter-relationships below. There are no temporary or permanent human residence within the marine environment adjacent to the AoS.

19.1. Study Area

759. For offshore activities relating to the construction, operation and decommissioning of the ANS infrastructure, the likely significant population health effects relate to the port activities required to support the construction and operational activities associated with the ANS. As a specific port location to support construction, operation and decommissioning has not currently been identified, this is indicatively the Regional Health Study Areas of Yorkshire and the Humber, which link with these regions identified for socio-economics assessment in **Chapter 18**.

19.2. Data Sources

760. **Table 19-1** presents the list of data sources used to inform the baseline environment for human health.

Table 19-1 Desk-based sources used to inform the baseline for Human Health

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Office for Health Improvement and Disparities (OHID) Fingertips Local Health data tool	Yorkshire and Humber Region / National	2023 / 2024	Various health indicators for the Region and England.
Office for National Statistics	Yorkshire and Humber Region / National	2021	Various socio-economic indicators including related health indicators from 2021 Census.

19.3. Assumptions and Limitations

761. This preliminary assessment uses information available at the time of preparation as presented in **Table 19-1**. The data provides an understanding of trends over time. However, it is considered sufficient to understand the characteristics of the human health environment for the Study Area.

19.4. Existing Environment

19.4.1. General Health

762. This section discusses key public heath indicators for the Region (Yorkshire and the Humber) compared to England as a whole, within which the port related activities for the ANS will be considered. **Table 19-2** presents the relevant key indicators, indicating that the region is on average slightly poorer in health than the England average.

Table 19-2 Health baseline (OHID, 2023 & 2024; ONS, 2021)

Indicators	Yorkshire and Humber	England
General Health		
% Very good health	46.2	48.5
% Good health	34.3	33.7
% Fair health	13.7	12.7
% Bad health	4.5	4.0
% Very bad health	1.3	1.2
Life Expectancy		
Healthy Life expectancy at birth for males (year)	61.1	63.1
Healthy Life expectancy at birth for females (year)	62.1	63.9
Preventable Mortality		
Deaths from all causes, under 75 years (Standardised Mortality Ratio (SMR))	110.1	100.0
Deaths from causes considered preventable, under 75 years (SMR)	113.5	100.0

Note: Latest dataset used where available.

19.4.2. Vulnerable Groups Including Social Disadvantage Equality Considerations

763. Relevant protected characteristics and indicators of social disadvantage are presented in **Table 19-3** to consider the potential for disproportionate effects. Protected characteristics not shown in **Table 19-3** have been reviewed and are not considered to have relevant links to health outcomes that may be influenced by the construction or operation of the ANS. Key issues and vulnerable groups include slightly higher-than-average disability levels and greater income deprivation in the Region compared to the England average.

Table 19-3 Vulnerable groups and relevant social disadvantage indicators (OHID, 2023 & 2024; ONS, 2021)

Indicators	Yorkshire and Humber	England
Sex		
Male %	49.1	51.0
Female %	50.9	49.0
Age		
% age 0 to 15	18.5	18.5
% age 16 to 64	62.3	63.0
% aged 65 and over	19.0	18.3
Long term health problem or disability		
Disabled under the Equality Act: Day-to-day activities limited a lot (%)	8.1	7.3
Disabled under the Equality Act: Day-to-day activities limited a little (%)	10.5	10.0
Not disabled under the Equality Act: Has long term physical or mental health condition but day-to-day activities are not limited (%)	6.9	6.8
Not disabled under the Equality Act: No long term physical or mental health conditions (%)	74.4	75.9
Lower Income		
Income Deprivation (%)	14.6	12.9
Language proficiency		
Population who cannot speak English well or at all (%)	1.6	1.7
Social isolation		
Older people living alone (%)	32.2%	31.5%
Ethnicity		
Asian, Asian British or Asian Welsh %	8.9	9.6
Black, Black British, Black Welsh, Caribbean or African %	2.1	4.2
Mixed or Multiple Ethnic groups %	2.1	3.0
White %	85.4	81.0
Other ethnic group %	1.4	2.2

Note: Latest dataset used where available.

19.4.3. Baseline Healthcare Capacity

764. Whilst centred on the local area, General Practice (GP) capacity appears sufficient in the Region (NHS Digital, 2024).

19.5. Human Health Scoping

765. **Table 19-4** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 19-4 Summary of impacts proposed to be scoped in (✓) and out (X) for Human Health

Potential Impact	Construction	Operation	Decommissioning
HH-C-03 / HH-D-03 - Social environment: open space, leisure and play	X	X	X
HH-C-05 / HH-D-05 - Impacts on transport modes, access and connections (onshore) - onshore construction activities and associated road vehicle movements	X	X	X
HH-O-08 - Social environment: community identity, culture, resilience and influence	X	X	X
HH-C-09 / HH-O-09 / HH-D-09 - Economic environment: education and training	X	X	X

Potential Impact	Construction	Operation	Decommissioning
HH-C-10 / HH-O-10 / HH-D-10- Economic environment: employment and income	X	X	X
HH-O-12 - Bio-physical environment: climate change and adaptation	X	X	X
HH-C-14 / HH-O-14 / HH-D-14 - Impacts on air quality (onshore) - dust and fine particulate emissions, plant, equipment and road vehicle exhaust emissions associated with onshore construction activities	X	X	X
HH-C-15 / HH-O-15 / HH-D-15 - Impacts on water quality and availability (onshore) - accidental pollution associated with onshore construction activities.	X	X	X
HH-C-19 / HH-O-19 / HH-D-19 - Impacts from noise and vibration (onshore) - noise and vibration associated with onshore construction activities and associated road vehicle movements	X	X	X
HH-O-21 - Impacts from public perception of electro-magnetic field risk (onshore) - presence of onshore electrical infrastructure during operation	X	X	X
HH-O-25 - Impacts on built environment (onshore) - disruption to third-party assets during onshore routine and unplanned O&M activities and presence of onshore infrastructure during operation	X	X	X
HH-O-26 - Impact on wider societal infrastructure and resources (offshore) - provision of renewable energy during operation of the wind farm	X	X	X

19.6. Potential Effects

766. Given the limited scale during construction and operation, the intermittency of the O&M phase activities, the offshore location of the activities (or where onshore within existing ports), and the large scale of the potential receptors, the effects of the ANS on human health have been scoped out**,** and therefore no further assessment for the ANS alone has been undertaken. Additionally, supporting this scoping out, are the protections provided by health and safety legislation for the offshore workforce, and by navigational safety requirements for vessels (see **Chapter 14 Shipping and Navigation**).

19.7. Inter-Relationships

767. No additional inter-related impacts associated with human health have been identified that would change the conclusions of the scoping outcome.

19.8. Interactions Assessment

768. The ANS does comprise activities that have the potential to interact additively with the DBD Project as a whole in the port environment. However, it is noted again that due to the scale of the ANS and the existing port environment, management and activities the interaction would be minimal and immeasurable against the background activities.

769. Consequently, human health will not be assessed alone or within the DBD Project ES.

19.9. Cumulative Effects

770. The human health effects related to the ANS and the DBD Project with other projects is not expected to result in a significant additive and / or synergistic manner due to the scale of the ANS alone. However, cumulatively there is the potential for significant benefit to employment with other projects (see **Table 18-7**) as indicated in the socio-economic assessment (see **Section 18.8**).

771. However, given the negligible scale of influence of the ANS on human health receptors compared to the DBD Project and other projects, and that there are no potentially significant effects, it is proposed that no effects are to be further assessed at the ES stage.

19.10. Summary and Next Steps

772. The scoping above indicates that the human health effects of the ANS are scoped out from further assessment.

773. Given the negligible scale of influence of the ANS on human health receptors, and that there are no potentially significant effects which could occur, it is proposed that effects on human health are not assessed at the ES stage.

20. Major Accidents and Disasters

774. This section considers the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS with respect to Major Accidents and Disasters. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

775. Following guidance published by the IEMA on Major Accidents and Disasters in EIA (IEMA, 2020), it is proposed that consideration of major accidents and disasters within the EIA process is based on assessments conducted within individual technical chapters where this can be adequately covered by the scope of these chapters.

776. This topic is based on the worst-case scenario for construction, operation and decommissioning, as well as the structure design as set out in **Chapter 4 Description of the Associated Development**.

777. With regards to the Study Area, in-line with the IEMA guidance (IEMA, 2020), the following potential accident / disasters will be considered within their respective topic chapters, and no separate major accidents and disasters assessment will be considered in the PEIR and ES with regards to offshore infrastructure. These topics include:

- Vessel collision and allision is considered within **Chapter 14 Shipping and Navigation** and **Chapter 19 Human Health**;
- Aviation safety is considered within **Chapter 15 Aviation, Radar and Military**; and
- Accidental pollution is considered within **Chapter 95 Marine Water and Sediment Quality** and **Chapter 19 Human Health**.

20.1. Study Area

778. The Major Accidents and Disaster Study Area (hereafter referred to as 'the Study Area') includes the AoS. Any major incidents, accidents or disasters which may arise have the potential for consequences to arise within and beyond the boundaries of the infrastructure locations.

20.2. Existing Environment

779. The baseline in respect of major accidents and disasters is defined based on the major accident hazard risks presented by existing operational installations, and external natural and anthropogenic factors (such as the vulnerability of the ANS to natural disasters or to future climate change) which may give rise to effects on the ANS.

780. The ANS will not be located within an area generally known for natural disasters such as hurricanes, tornadoes, volcanic eruptions, earthquakes or tsunamis.

20.3. Major Accidents and Disasters Scoping

20.3.1. Potential Effects during Construction

781. Health and safety during the construction phase within and outside (vessel movements) the AoS will be subject to relevant legislation (e.g. the Construction Design and Management (CDM) Regulations 2023), and best practice. Vessel movements and related activity fall under the precepts of navigational safety requirements.

782. The potential environmental impacts associated with a major accident or disaster during construction are likely to be absent as the construction activities would be carried out by vessels (see above). No discharges or other 'activities would occur during construction.

783. Impacts of major accidents and disasters during the construction phase of the Project has therefore been scoped out, and therefore no further assessment has been undertaken.

20.3.2. Potential Effects during Operation

784. During the O&M phase no notable storage of explosive or flammable liquids (other than batteries for electricity storage and diesel for the diesel generator) will be present. The only other activity would be the movement of vessels to and from the ANS.

785. The potential risk of incidents resulting from a major accident or disaster are therefore extremely limited and unlikely given the stationary and inert nature of the ANS with no discharges or activities occurring.

786. Given the navigational safety requirements required by law, any major accidents or disasters would be managed and prevented under existing legislative requirements.

787. Overall, therefore given the nature of the ANS, there are unlikely to be receptors present to any significant degree, and impacts resulting from major accidents and disasters are highly unlikely during the operation phase. Operational impacts on human health has been scoped out, and therefore no further assessment has been undertaken.

20.4. Interactions

788. Given the distance between DBD Project and the AoS and that no potential for major accidents or disasters arises from the construction, O&M, and decommissioning of the ANS no interactions are predicted.

20.5. Cumulative Impacts

789. Given that no related impacts are predicted for the construction, operation, and decommissioning stages of the ANS, cumulative impacts are therefore scoped out and will not be considered further at ES stage.

20.6. Summary and Next Steps

790. Given that no related impacts are predicted for the construction, operation, and decommissioning stages of the ANS, and given that the potential for measurable effects has been scoped out, Major Accidents and Disasters will not be considered further at ES stage.

21. Climate Change

791. This chapter of this ANS PEIR presents the existing environment and the potential effects of construction, O&M, and decommissioning of the ANS associated with Climate Change. As outlined in **Chapter 4 Description of the Associated Development**, three potential locations for the ANS are being considered at this stage: A2/3, A5 and A8.

792. A whole-life GHG assessment which considers the GHG emissions released over the Project's lifecycle has been committed to through the main DBD PEIR. It is intended to include the ANS as part of this assessment at the point of DCO application, to ensure all elements of the Project are accounted for.

793. A Climate Change Resilience (CCR) assessment was also included within the main DBD PEIR which considers future trends in climate change impacts and the Project's vulnerability and resilience to such changes. The ANS will not be included in the CCR assessment on account of the small-scale of the development and the nature of the topside structure being placed significantly above the sea surface. Therefore, it is considered the ANS will be resilient to the effects of climate change and the CCR assessment is not considered further in respect to the ANS.

21.1. Study Area

794. All GHG emissions will affect the same receptor, the global atmosphere, as opposed to directly affecting any specific local receptor. Emissions which are released or avoided due to the ANS will have the same effect on atmospheric GHG concentrations and its net effect on climate change, regardless of where they occur. Therefore, the Study Area for the GHG assessment is not geographically defined (IEMA, 2022).

795. The scope of the GHG assessment will be limited to quantifying GHG emissions from the whole Project (including the ANS) over its lifecycle: construction (including pre-construction activities and upstream embodied carbon), operation and decommissioning. The assessment will also account for avoided emissions from the Project's operations, including the provision of renewable energy generated by the wind farm to the UK grid.

796. Therefore, the Study Area for the assessment will encompass all associated GHG emitting activities and carbon benefits beyond the infrastructure system. Emission sources which will be considered in the GHG assessment are detailed under **Section 21.5.**

21.2. Desk Study

797. Desk-based sources used to characterise the existing environment and inform the GHG assessment will consist primarily of publicly available datasets and reports from government and industry sources. No baseline surveys are proposed for the GHG assessment. **Table 21-1** identifies desk-based sources for the GHG assessment, which will be updated throughout the EIA process.

Table 21-1 Desk-based sources for the GHG assessment

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Greenhouse Gas Reporting Conversion Factors (DESNZ, 2025a)	UK	2025	Emission factors for UK-based operations for various activities such as fuel consumption.
Digest of UK Energy Statistics (DESNZ, 2025b)	UK	2025	Up-to-date statistics for the UK power sector, including the operational GHG intensity of each form of electricity generation.
Contracts for Difference (CfD) Standard Terms Notice for the Sixth Allocation Round (DESNZ, 2024a)	UK	20244	Most recent predicted capacity factor for new build offshore wind farms.
Treasury Green Book Supplementary Guidance: Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal and supporting data tables (DESNZ, 2023)	UK	2023	Projected grid-average and long run marginal operational GHG intensity of the UK electricity transmission network up to 2100.
Reducing the UK Carbon Footprint (CCC, 2013)	UK	2013	Lifecycle GHG intensities of various forms of electricity generation.
Inventory of Carbon and Energy (ICE) Database V4.0 (Circular Ecology, 2025)	International	2025	Emission factors for embodied carbon in materials such as steel and concrete.
Lifecycle Costs and Carbon Emissions of Offshore Wind Power (Thompson and Harrison, 2015)	UK	2015	Industry benchmarks for offshore wind developments to inform assumptions used in the GHG assessment regarding the likely contribution of emissions sources to the total emissions.

21.3. Existing Environment

798. To contextualise the GHG assessment, existing and emerging national carbon budgets, net zero policies and targets will be reviewed and compared against the predicted GHG impacts of the ANS. The baseline review will also cover national and local emission statistics, as well as the emission contribution and decarbonisation trajectory of the power sector.

799. In 2015, the UK signed the Paris Agreement, an international climate treaty committing all parties to the goal of limiting global warming to well below 2°C, and preferably below 1.5°C, compared to pre-industrial levels. All parties are required to submit national climate action plans every five years, which are known as Nationally Determined Contributions (NDC). The most recent NDC commits the UK to at least 68% reduction in GHG emissions by 2030 compared to 1990 levels (BEIS, 2022a).

800. The Climate Change Act 2008 provides a framework for the UK to decarbonise and meet its long-term goal of achieving net zero emissions. The CCC sets a series of legally binding carbon budgets, which establish a limit on the total amount of GHG emissions that can be emitted within the UK over five-year periods until 2050. Following the Paris Agreement, the 2050 Target Amendment Order 2019 revised the previous long-term target from 80% to 100% reduction in GHG emissions by 2050 compared to 1990 levels.

801. Seven carbon budgets have been set to date, as shown in **Table 21-2**, which demonstrates a phased reduction in future permissible GHG emissions. Any emission source will have an increasing impact on the UK's ability to meet its carbon budget, the further they are in the future. The UK is currently in the fourth carbon budget period (2023 to 2027).

Table 21-2 UK carbon budgets

Budget Period	Carbon Budget (Mt of carbon dioxide equivalents (CO_2e)	Reduction Below 1990 Levels
First Carbon Budget (2008 to 2012)	3,018	26%
Second Carbon Budget (2013 to 2017)	2,782	32%
Third Carbon Budget (2018 to 2022)	2,544	38%
Fourth Carbon Budget (2023 to 2027)	1,950	52%
Fifth Carbon Budget (2028 to 2032)	1,725	58%
Sixth Carbon Budget (2033 to 2037)	965	78%
Seventh Carbon Budget (2038 to 2042)*	535	87%
Net Zero Target (by 2050)		100%

*The 7th Carbon Budget was proposed by the CCC in February 2025 but is pending approval by the UK Government, which must be undertaken prior to the end of June 2026.

802. The UK Government has outlined its intention to decarbonise all sectors of the UK economy, including the power sector, within the Clean Growth Strategy (BEIS, 2017). Reaffirmation of this ambition was provided as a commitment within the Offshore Wind Sector Deal to advance offshore wind generation as an integral part of a future low-cost, low-carbon and flexible grid system (BEIS, 2019a). The UK's Clean Power Strategy aims to transition to a clean power system by 2030.

803. To determine avoided emissions from offshore wind generation during the operation phase, a baseline scenario ("Do Nothing" scenario) will be established which assumes the Project is not developed. UK grid electricity is currently generated using several energy sources with varying GHG intensities, including fossil fuels, nuclear, renewables and bioenergy. The uptake of renewable energy, coupled with a transition away from fossil fuel-based generation, is therefore critical to achieving the UK's net zero targets.

804. The GHG assessment will assume that the renewable energy supplied by the wind farm would replace an equivalent amount of grid electricity that would have otherwise been generated using non-renewable fuel sources. Although there is uncertainty on which form of conventional electricity generation the Project will replace, this assumption is in line with national energy policies, specifically NPS EN-1, which support the replacement of fossil fuel-based generation with renewables and other low carbon alternatives. In addition, this approach is advocated for use by offshore wind farms by RenewableUK (2023).

21.4. Climate Change Scoping

805. **Table 21-3** summarises the impacts that have been scoped in and out of this preliminary assessment, with rationale supporting the scoping decision presented in **Appendix D Scoping Rationale**.

Table 21-3 summary of impacts proposed to be scoped in (✓) and out (x) for Climate Change

Potential Impact	Construction	Operation	Decommissioning
ANS whole lifecycle GHG emissions	X	X	X
Vulnerability and resilience of ANS to marine climate change impacts	X	X	X

21.5. Potential Effects

806. Given the limited scale of the ANS and associated activities during construction and operation, the intermittency of the O&M phase activities, and the large scale of the potential receptors, the effects of the ANS on climate change have been scoped out, and therefore no further assessment has been undertaken.

21.6. Inter-Relationships

807. No inter-relationships are identified for the GHG assessment, as no other environmental effects arising from the development have the potential to influence the Earth's climate.

21.7. Interactions Assessment

21.7.1. DBD Project Effect Interactions

808. The GHG assessment is a quantitative estimate of the inputs of greenhouse gases and therefore does not interact with other effects. The resilience of the ANS construction and infrastructure to marine climate does not interact with other topics and effects as it is in-built into the ANS design and associated methodologies.

809. The ANS is an Associated Development of the DBD Project, therefore whilst the magnitude of the impacts and effects resulting from the ANS alone are insignificant, it is proposed that the ANS materials and activities will be incorporated into the DBD Project GHG at the ES stage. Consequently, **Table 21-4** identifies emission sources over the ANS lifecycle which will be included / excluded from the GHG assessment, in accordance with the PAS2080:2023 modules (BSI, 2023). PAS 2080:2023 is a specification for whole-life carbon management when delivering infrastructure projects. The scope of the assessment will be revisited at later stages to align with the most up-to-date project design and are subject to information availability.

Table 21-4 Potential ANS emission sources included / excluded from the DBD project wide GHG assessment

Phase	PAS2080 Module	Rationale for Inclusion (✓) / Exclusion (X)	
Construction	A0: Preliminary Studies, Design and Engineering	✓	Emissions from design and engineering activities are unlikely to be significant. It is anticipated that most works will be office-based. However, pre-construction surveys and activities (e.g. geotechnical surveys, seabed preparation and enabling works) will be considered where possible.
	A1: Raw Materials Supply A2: Transport to Manufacturing Facility A3: Manufacturing	✓	Embodied carbon in materials used to construct the ANS (the foundation and topside) is likely to contribute to lifecycle emissions.
	A4: Transport to / from Site	✓	Fuel consumption from the movement of the ANS to the construction site is likely to contribute to lifecycle emissions. This will include marine vessels travelling from their origin location to the construction port(s) and between the port(s) and the offshore construction site.
	A5: Construction	✓	Fuel and electricity consumption during construction activities is likely to contribute to lifecycle emissions.
Operation	B1: Use	X	The use of the ANS will not result in the generation of any emissions.
	B2: Maintenance B3: Repair B4: Replacement	✓	Fuel and electricity consumption associated with transport use during ANS O&M activities is likely to contribute to lifecycle emissions.
	B5: Refurbishment	X	The ANS is unlikely to undergo refurbishment during its operational lifetime, therefore this emission source is not relevant.
	B6: Operational Energy Use B7: Operational Water Use B8: Other Operational Processes	X	There will be minimal energy use at the ANS (lighting only) which will be self-powered using solar panels and therefore there will be no emissions from operational energy use. There will be no other operational processes or water usage at the ANS.
	B9: User's Utilisation of Infrastructure	X	There will be no user utilisation of the ANS.
	D: Benefits and Loads beyond the Infrastructure System	X	There are no further benefits and loads beyond the infrastructure system to consider related to the ANS.

Phase	PAS2080 Module	Rationale for Inclusion (✓) / Exclusion (X)	
Decommissioning	C1: Deconstruction C2: Transport to / from Site C3: Waste Processing for Recovery C4: Disposal	✓	End-of-life emissions associated with the deinstallation of infrastructure and processing for reuse, recycling or disposal are likely to contribute to lifecycle emissions.

810. Impacts scoped into the GHG assessment for the DBD Project ES resulting from the ANS are outlined in **Table 21-5.**

Table 21-5 GHG assessment – impacts scoped into the DBD project wide GHG assessment

Impact ID	Impact and Project Activity	Rationale
Construction		
GHG-C-01	Construction GHG emissions – construction activities	Construction activities and upstream supply chain activities associated with materials used to construct the ANS will result in GHG emissions. These include lifecycle modules A1 to A5 (see **Table 21-4**).
Operation and Maintenance		
GHG-O-01	O&M GHG emissions – O&M activities	O&M activities and upstream supply chain activities will result in GHG emissions. These include lifecycle modules B2 to B4 (see **Table 21-4**).
Decommissioning		
GHG-D-01	Decommissioning GHG emissions	Decommissioning activities and downstream end-of-life processes will result in GHG emissions. These include lifecycle modules C1 to C4 (see **Table 21-4).**

21.8. Cumulative Effects

811. As the receptor is the global atmosphere, it is not relevant to individually assess the cumulative effects of GHG emissions arising from other developments. GHG emissions, wherever they occur, have the potential to contribute to climate change, and therefore their effects are global and cumulative by nature. In line with guidance (IEMA, 2022), cumulative effects are scoped out of the GHG assessment, as there is no basis for selecting any particular project to assess cumulatively over any other.

21.9. Summary and Next Steps

812. The scoping above indicates that the climate change effects on and associated with the ANS are scoped out from further assessment. It is noted however that the DBD Project wide GHG assessment will include the ANS (as Associated Development) in the ES stage.

22. Summary and Conclusions

813. In conclusion, many of the topics assessed in this preliminary report have either been scoped out entirely or the assessment concluded no significance of any effect and therefore will not be considered at ES. However, potential effects remain for some topics that will be considered at ES stage where additional information may be available, either in the form of site-specific modelling or information relating to the wider development. These topics are as follows:

- Fish and Shellfish Ecology;
- Marine Mammals;
- Commercial fisheries (A8 only); and
- Shipping and Navigation;
- Climate change (considered within the DBD project ES chapter).

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List of Acronyms

Acronym	Definition
AARA	Air-to-Air Refueling Area
AD	Anno Domini
AEol	Adverse Effect on Integrity
AEZ	Archaeological Exclusion Zones
AIP	Aeronautical Information Publication
AIS	Automatic Identification System
AL	Action Level
amsl	Above mean sea level
ANS	Artificial Nesting Structure
AoS	Area of Search
ATS	Air Traffic Service
AtN	Aids to Navigation
BAP	Biodiversity Action Plan
BC	Before Christ
BDE	Polybrominated Diphenyl Ethers
BEIS	Department for Business, Energy and Industrial Strategy
BERR	Department for Business, Enterprise and Regulator Reform
BGS	British Geological Survey
BRAG	Black-Red-Amber-Green
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CCR	Climate Change Resilience
CfD	Contract for Difference
CL	Confidence Limit
CNS	Communication, Navigation and Surveillance
COLREGs	Convention on International Regulations for Preventing Collisions at Sea
COWRIE	Collaborative Offshore Windfarm Research into the Environment
CPA	Coast Protection Act
CPUE	Catch Per Unit Effort
CRA	Chemical Risk Assessment
CTV	Crew Transport Vessel
CNS	Communication, Navigation and Surveillance
DAS	Digital Aerial Survey
DBA	Dogger Bank A
DBB	Dogger Bank B
DBC	Dogger Bank C
DBD	Dogger Bank D
DBS	Dogger Bank South
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DP	Dynamic Positioning
ECC	Export Cable Corridor
eDNA	Environmental DNA

Acronym	Definition
EDR	Effective Deterrence Ranges
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Field
EMODnet	European Marine Observation and Data Network
EMSA	European Maritime Safety Agency
EPP	Evidence Plan Process
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
EU DCF	European Data Collection Framework
EUNIS	European Nature Information System
FEPA	Food and Environmental Protection Act
FFC	Flamborough and Filey Coast
FIR	Flight Information Region
FL	Flight Level
FLO	Fisheries Liaison Officer
FLOWW	Fisheries Liaison with Offshore Wind and Wet Renewables group
ft	Feet
GHG	Greenhouse Gas
GIS	Geographical Information Systems
GP	General Practice

Acronym	Definition
GT	Gross Tonnage
GVA	Gross Value Added
HLV	Heavy Lift Vessel
HMRI	Helicopter Main Routing Indicators
HMS	His Majesty's Ship
HRA	Habitats Regulations Assessment
HSC	Historic Seascape Characterisation
IAMMWG	Inter-Agency Marine Mammal Working Group
IBTS	International Bottom Trawl Survey
IBTSWG	International Bottom Trawl Survey Working Group
ICAO	International Civil Aviation Organisation
ICE	Inventory of Carbon and Energy
ICES	International Council for the Exploration of the Sea
IFP	Instrument Flight Procedures
IHLS	International Herring Larvae Surveys
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
ISQGs	Interim Sediment Quality Guidelines
IUCN	International Union for Conservation of Nature
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
JUV	Jack-Up Vessel
KIS-ORCA	Kingfisher Information Service – Offshore Renewable & Cable Awareness
km	kilometers

Acronym	Definition
LAT	Lowest Astronomical Tide
LOA	Length Overall
m	meters
MAIB	Marine Accident Investigation Branch
MarLIN	The Marine Life Information Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MCZA	Marine Conservation Zone Assessment
MEDIN	Marine Environmental Data and Information Network
MGN	Marine Guidance Note
MMMP	Marine Mammal Mitigation Protocol
MPCP	Marine Pollution Contingency Plan
MMO	Marine Management Organisation
MoD	Ministry of Defence
MU	Management Unit
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NDC	Nationally Determined Contributions
NERL	NATS En Route Licence
NHLE	National Heritage List for England
nhp	Nominal Horse Power
nm	nautical miles

Acronym	Definition
NOTAM	Notice to Aviation
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NSTA	North Sea Transition Authority
OBIS	Ocean Biodiversity Information System
OCV	Offshore Construction Vessels
Ofcom	Office of Communications
OHID	Office for Health Improvement and Disparities
OLS	Obstacle Limitation Surfaces
ONS	Office for National Statistics
OoM	Order of Magnitude
O&G	Oil and Gas
O&M	Operation and Maintenance
ORCA	Organisation Cetacea
ORPAD	Offshore Renewables Protocol for Archaeological Discoveries
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farm
PAH	Polycyclic Aromatic Hydrocarbons
PAD	Protocol for Archaeological Discoveries
PCB	Polychlorinated Biphenyls
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PEL	Probable Effect Level
PEMP	Project Environmental Management Plan

Acronym	Definition
PEXA	Practice and Exercise Area
PINS	Planning Inspectorate
PSA	Particle Size Analysis
PSD	Particle Size Distribution
PTS	Permanent Threshold Shift
QSR	Quality Status Reports
RIAA	Report to Inform Appropriate Assessment
RNLI	Royal National Lifeboat Institution
RoPax	Roll-On/Roll-Off Passenger Vessels
RoRo	Roll-On/Roll-Off Cargo Vessels
ROV	Remotely Operated Vehicle
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SCANS	Small Cetaceans in the European Atlantic and North Sea
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SMR	Standardised Mortality Ratio
SNS	Southern North Sea
SOLAS	International Convention for the Safety of Life at Sea
SOV	Service Operation Vessels
SPA	Special Protection Area
SQG	Sediment Quality Guidelines
SSC	Suspended Sediment Concentration

Acronym	Definition
SSSI	Site of Special Scientific Interest
SWF	Sea Watch Foundation
TEL	Threshold Effects Level
THC	Total Hydrogen Content
TP	Transition Piece
TTS	Temporary Threshold Shift
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMS	Vessel Monitoring System
WER	Water Environment Regulations
WSI	Written Scheme of Investigation
ZoI	Zone Of Influence