DOGGER BANK D
WIND FARM
Preliminary Environmental Information Report

Volume 1
Chapter 9 Marine Water and Sediment Quality

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Prepared By: **Royal HaskoningDHV**	Prepared For: **Dogger Bank D Offshore Wind Farm**

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Glossary

Term	Definition
Additional Mitigation	Measures identified through the EIA process that are required as further action to avoid, prevent, reduce or, if possible, offset likely significant adverse effects to acceptable levels (also known as secondary (foreseeable) mitigation). All additional mitigation measures adopted by the Project are provided in the Commitments Register.
Array Area	The area within which the wind turbines, inter-array cables and offshore platform(s) will be located.
Centre for the Environment, Fisheries and Aquaculture (Cefas) Action Levels (ALs)	Guideline contaminant concentration levels used as part of a weight of evidence approach for decision-making on the suitability of dredged material for disposal to sea.
Commitment	Refers to any embedded and additional mitigation, enhancement or monitoring measures identified through the EIA process and any commitments outside the EIA process. All commitments adopted by the Project are provided in the Commitments Register.
DBD	Dogger Bank D Offshore Wind Farm, also referred to as the Project in this PEIR.
Deemed Marine Licence (DML)	A consent required under the Marine and Coastal Access Act 2009 for certain activities undertaken within the UK marine area, which may be granted as part of the Development Consent Order.
Design	All of the decisions that shape a development throughout its design and pre-construction, construction / commissioning, operation and, where relevant, decommissioning phases.
Development Consent Order (DCO)	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.
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.

Term	Definition
Embedded Mitigation	Embedded mitigation includes: • Measures that form an inherent part of the project design evolution such as modifications to the location or design of the development made during the pre-application phase (also known as primary (inherent) mitigation); and • Measures that will occur regardless of the EIA process as they are imposed by other existing legislative requirements or are considered as standard or best practice to manage commonly occurring environmental impacts (also known as tertiary (inexorable) mitigation). All embedded mitigation measures adopted by the Project are provided in the Commitments Register.
Enhancement	Measures committed to by the Project to create or enhance positive benefits to the environment or communities, as a result of the Project. All enhancement measures adopted by the Project are provided in the Commitments Register.
Environmental Impact Assessment (EIA)	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 (ES)	A document reporting the findings of the EIA which describes the measures proposed to mitigate any likely significant effects.
Evidence Plan Process (EPP)	A voluntary consultation process with technical stakeholders which includes a Steering Group and Expert Topic Group (ETG) meetings to encourage upfront agreement on the nature, volume and range of supporting evidence required to inform the EIA and HRA process.
Expert Topic Group (ETG)	A forum for targeted technical engagement with relevant stakeholders through the EPP.
Gravel	Loose, rounded fragments of rock larger than sand but smaller than cobbles. Sediment larger than 2mm (as classified by the Wentworth scale used in sedimentology).
Impact	A change resulting from an activity associated with the Project, defined in terms of magnitude.
Inter-Array Cables	Cables which link the wind turbines to the offshore platform(s).

Term	Definition
Landfall	The area on the coastline, south-east of Skipsea, at which the offshore export cables are brought ashore, connecting to the onshore export cables at the transition joint bay above Mean High Water Springs.
Mean High Water Spring	MHWS is the average of the heights of two successive high waters during a 24-hour period.
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 by the Project 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 EIA, the effectiveness of mitigation or enhancement measures or ensure remedial action are taken should adverse effects above a set threshold occur. All monitoring measures adopted by the Project are provided in the Commitments Register.
Offshore Development Area	The area in which all offshore infrastructure associated with the Project will be located, including any temporary works area during construction, which extends seaward of Mean High Water Springs. There is an overlap with the Onshore Development Area in the intertidal zone.
Offshore Export Cable Corridor (ECC)	The area within which the offshore export cables will be located, extending from the DBD Array Area to Mean High Water Springs at the landfall.
Offshore Export Cables	Cables which bring electricity from the offshore platform(s) to the transition joint bay at landfall.
Offshore Platform(s)	Fixed structures located within the DBD Array Area that contain electrical equipment to aggregate and, where required, convert the power from the wind turbines, into a more suitable voltage for transmission through the export cables to the Onshore Converter Station. Such structures could include (but are not limited to): Offshore Converter Station(s) and an Offshore Switching Station.

Term	Definition
Project Design Envelope	A range of design parameters defined where appropriate to enable the identification and assessment of likely significant effects arising from a project's worst-case scenario. The Project Design Envelope incorporates flexibility and addresses uncertainty in the DCO application and will be further refined during the EIA process.
Safety Zones	A statutory, temporary marine zone demarcated for safety purposes around a possibly hazardous offshore installation or works / construction area.
Scoping Opinion	A written opinion issued by the Planning Inspectorate on behalf of the Secretary of State regarding the scope and level of detail of the information to be provided in the Applicant's Environmental Statement. The Scoping Opinion for the Project was adopted by the Secretary of State on 02 August 2024.
Scoping Report	A request by the Applicant made to the Planning Inspectorate for a Scoping Opinion on behalf of the Secretary of State. The Scoping Report for the Project was submitted to the Secretary of State on 24 June 2024.
Scour Protection	Protective materials used to avoid sediment erosion from the base of the wind turbine foundations and offshore platform foundations due to water flow.
Sediment	Particulate matter derived from rock, minerals or bioclastic matter.
Silt	Sediment particles with a grain size between 0.002mm and 0.063mm, i.e. coarser than clay, but finer than sand.
Study Areas	A geographical area and / or temporal limit defined for each EIA topic to identify sensitive receptors and assess the relevant likely significant effects.
Suspended sediment	Sediment moving in suspension in a fluid kept up by the upward components of the turbulent currents or by the colloidal suspension.
The Applicant	SSE Renewables and Equinor acting through 'Doggerbank Offshore wind Farm Project 4 Projco Limited'.
The Project	Dogger Bank D Offshore Wind Farm Project, also referred to as DBD in this PEIR.
Transition Joint Bays (TJB)	An underground structure at the landfall that houses the joints between the offshore and onshore export cables.

Term	Definition
Trenchless Techniques	Trenchless cable or duct installation methods used to bring offshore export cables ashore at landfall, facilitate crossing major onshore obstacles such as roads, railways and watercourses and where trenching may not be suitable. Trenchless techniques included in the Project Design Envelope include Horizontal Directional Drilling (HDD), auger boring, micro-tunnelling, pipe jacking / ramming and Direct Pipe.
Wind Turbines	Power generating devices located within the DBD Array Area that convert kinetic energy from wind into electricity.

9 Marine Water and Sediment Quality

9.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the Environmental Impact Assessment (EIA) of the Dogger Bank D (DBD) Offshore Wind Farm Project (hereafter 'the Project' or 'DBD') on marine water and sediment quality.

2. **Chapter 4 Project Description** provides a description of the design of infrastructure components and construction, operation and maintenance, and decommissioning activities for DBD, presented in **Section 4.5**.

3. The primary purpose of the PEIR is to support the statutory consultation activities required for a Development Consent Order (DCO) application under the Planning Act 2008. The information presented in this PEIR chapter is based on the baseline characterisation and assessment work undertaken to date. The feedback from the statutory consultation will be used to inform the final project design where appropriate and presented in an Environmental Statement (ES), which will be submitted with the DCO application.

4. This PEIR chapter:

   - Describes the baseline environment relating to marine water and sediment quality;
   - Presents an assessment of the likely significant effects on marine water and sediment quality during the construction, operation and maintenance, and decommissioning phases of the Project;
   - Identifies any assumptions and limitations encountered in compiling the environmental information; and
   - Sets out proposed mitigation measures to avoid, prevent reduce or, if possible, offset potential significant adverse environmental effects identified during the EIA process and, where relevant, monitoring measures or enhancement measures to create or enhance positive effects.

5. The assessment process has been informed by the following, as explained in more detail throughout the chapter:

   - Interpretation of sediment survey data specifically collected for the Project;
   - The existing evidence base regarding the effects of offshore wind farm developments on the physical environment; and
   - Application of expert-based assessment and judgement by Royal HaskoningDHV.

6. This chapter should be read in conjunction with the following related chapters:

   - **Chapter 8 Marine and Physical Processes**;
   - **Chapter 10 Benthic and Intertidal Ecology**;
   - **Chapter 11 Fish and Shellfish Ecology**;
   - **Chapter 14 Commercial Fisheries**; and
   - **Chapter 21 Water Resources and Flood Risk**.

7. Additional information to support the marine water and sediment quality assessment includes:

   - **Volume 2, Appendix 9.1 Consultation Responses for Marine Water and Sediment Quality**; and
   - **Volume 2, Appendix 9.2 Sediment Quality Analysis Report**.

9.2 Policy and Legislation

9.2.1 National Policy Statements

8. Planning policy on energy National Significant Infrastructure Projects is set out in the National Policy Statements (NPS). The following National Policy Statements are relevant to the marine water and sediment quality assessment:

   - Overarching NPS for Energy (EN-1) (DESNZ, 2023a); and
   - NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023b).

9. The marine water and sediment quality chapter has been prepared with reference to specific requirements in the above National Policy Statement. The relevant parts of the National Policy Statements are summarised in **Table 9-1**, along with how and where they have been considered in this PEIR chapter.

Table 9-1 Summary of Relevant National Policy Statement Requirements for Marine Water and Sediment Quality

NPS Reference and Requirement	How and Where Considered in the PEIR
NPS for Energy (EN-1)	
Paragraph 5.16.1-5.16.2: "Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters, coastal and marine waters. During the construction, operation, and decommissioning phases, development can lead to increased demand for water, involve discharges to water, and cause adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on protected species and habitats (see Section 4.3) and could result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Marine Strategy Regulations 2010."	Potential impacts to the water quality of coastal and transitional waters are assessed in **Section 9.7** and **Section 9.8**. Potential impacts to groundwater and inland surface waters are assessed within **Chapter 21 Water Resources and Flood Risk**.
Paragraph 5.16.3: "Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the ES or equivalent (see Section 4.3 and 4.10)."	The existing baseline is presented in **Section 9.6.1**. Potential impacts of the Project on water quality receptors are assessed within **Section 9.7**.
Paragraph 5.16.5: "Where possible, applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation."	Potential impacts to water quality are assessed in **Section 9.7** and in the WER Compliance Assessment (**Volume 2, Appendix 21.4 Water Environment Regulations Compliance Assessment**).
Paragraph 5.16.6: "Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in River Basin Management Plans and Groundwater Protection Zones – this could include, for example, the use of protective barriers."	Potential impacts to groundwaters are assessed within **Chapter 21 Water Resources and Flood Risk**.
Paragraph 5.16.7: "The ES should in particular describe: • the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges • existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics • any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions • how climate change could impact any of the above in the future • any cumulative effect"	The existing baseline is presented in **Section 9.6.1,** with a future baseline presented in **Section 9.6.2** that considers how climate change may impact the water quality baseline. Potential impacts to water resources are assessed within **Chapter 21 Water Resources and Flood Risk**. Existing physical characteristics of the water environment are assessed within **Chapter 8 Marine and Physical Processes**. The offshore Export Cable Corridor (ECC) passes through Yorkshire South WFD water body. Impacts to this water body are assessed within the Water Environment Regulations (WER) Compliance Assessment (**Volume 2, Appendix 21.4 Water Environment Regulations Compliance Assessment**).

NPS Reference and Requirement	How and Where Considered in the PEIR
Paragraph 5.16.8: The Secretary of State should consider whether mitigation measures are needed over and above any which may form part of the project application. A construction management plan may help codify mitigation at that stage.	As part of the DCO application, plans detailing mitigation measures during the construction phase will be included as part of the application. Such documents include an Outline Code of Construction Practice, Project Environmental Management Plan and Construction Traffic Management Plan among others.
Paragraph 5.16.9: "The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked."	**Table 9-3** presents the commitment to following best practice and due diligence for pollution control.
Paragraph 5.16.10: "The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If a development needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA or NRW."	Potential impacts to water resources are assessed within **Chapter 21 Water Resources and Flood Risk**. Consultation in regard to water resources has been undertaken within Expert Topic Group (ETG)10 with Beverley and North Holderness Internal Drainage Board (IDB), East Riding of Yorkshire Council and the Environment Agency, as detailed in **Chapter 7 Consultation**.
NPS for Renewable Energy Infrastructure (EN-3)	
Paragraph 2.8.104: "Applicants should consult at an early stage of pre-application with relevant statutory consultees and energy not-for profit organisations / non-governmental organisations as appropriate, on the assessment methodologies, baseline data collection, and potential avoidance , mitigation and compensation options which should be undertaken."	Consultation with relevant statutory consultees is detailed in **Chapter 7 Consultation**.
Paragraph 2.8.111: "The construction, operation and decommissioning of offshore energy infrastructure, including the preparation and installation of the cable route and any electricity networks infrastructure can affect the following elements of the physical offshore environment, which can have knock on impacts on other biodiversity receptors: • water quality – disturbance of the seabed sediments or release of contaminants can result in direct or indirect effects on habitats and biodiversity, as well as on fish stocks thus affecting the fishing industry."	Potential impacts are assessed in **Section 9.7**. Contaminant analysis of samples collected from the seabed within the Project wind farm site indicate low levels of contaminants are present (**Section 9.6** and **Volume 2, Appendix 9.2 Sediment Quality Analysis Report**). Effects on habitats are assessed in **Chapter 10 Benthic and Intertidal Ecology**, and on fish in **Chapter 11 Fish and Shellfish Ecology** and **Chapter 14 Commercial Fisheries**.

9.2.2 Other Policy and Legislation

10. Other policy and legislation relevant to the marine water and sediment quality assessment is summarised in the following sections.

9.2.2.1 National

9.2.2.1.1 Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

11. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as amended, transpose the Water Framework Directive (WFD) (2000/60/EC) into United Kingdom (UK) and Welsh law. The WFD specifies the factors, referred to as quality elements, which must be used in determining the ecological status or ecological potential of a surface waterbody. The Environment Agency is the responsible authority for WFD compliance in England. The WFD applies to one nautical mile offshore.

9.4.1.2.2 Marine Policy Statement

12. The Marine Policy Statement (MPS) is a framework for preparing Marine Plans and taking decisions affecting the marine environment, as further discussed in **Chapter 3 Policy and Legislative Context**. The MPS highlights the need for developments to consider impacts to water quality, including by considering the potential for reduced water quality associated with construction, operation and decommissioning to create adverse ecological effects (His Majesty's (HM) Government, 2011).

9.2.2.2 Local

9.2.2.1 Marine Plans

13. Marine Plans set out how the MPS will be implemented in specific areas. As discussed in **Chapter 3 Policy and Legislative Context**, the Marine Plans of relevance for this Project are the East Inshore and East Offshore Marine Plans and the North East Inshore and North East Offshore Marine Plans. The East Inshore and East Offshore Marine Plans highlight that ecological considerations for proposals include "*water quality characteristics critical to supporting a healthy ecosystem and pollutants that may affect these*" (HM Government, 2014). The North East Inshore and Offshore Marine Plans state that proposals should demonstrate that they will "*a) avoid, b) minimise c) mitigate deterioration of water quality in the marine environment*" as part of policy NE-WQ-1 (HM Government, 2021).

9.3 Consultation

14. Topic-specific consultation in relation to marine water and sediment quality has been undertaken in line with the process set out in **Chapter 7 Consultation**. A Scoping Opinion from the Planning Inspectorate was received on 2nd August 2024, which has informed the scope of the assessment presented within this chapter (as outlined in **Section 9.4.2**).

15. Impacts arising from the Project on marine water and sediment quality has not been and will not be included within a specific EPP meeting. However, agreements on contaminated sediments are captured within the Marine Physical Processes, Fish and Shellfish and Benthic Ecology ETG (ETG1).

16. **Volume 2, Appendix 9.1 Consultation Responses on Marine Water and Sediment Quality** summarises how consultation responses received to date are addressed in this chapter.

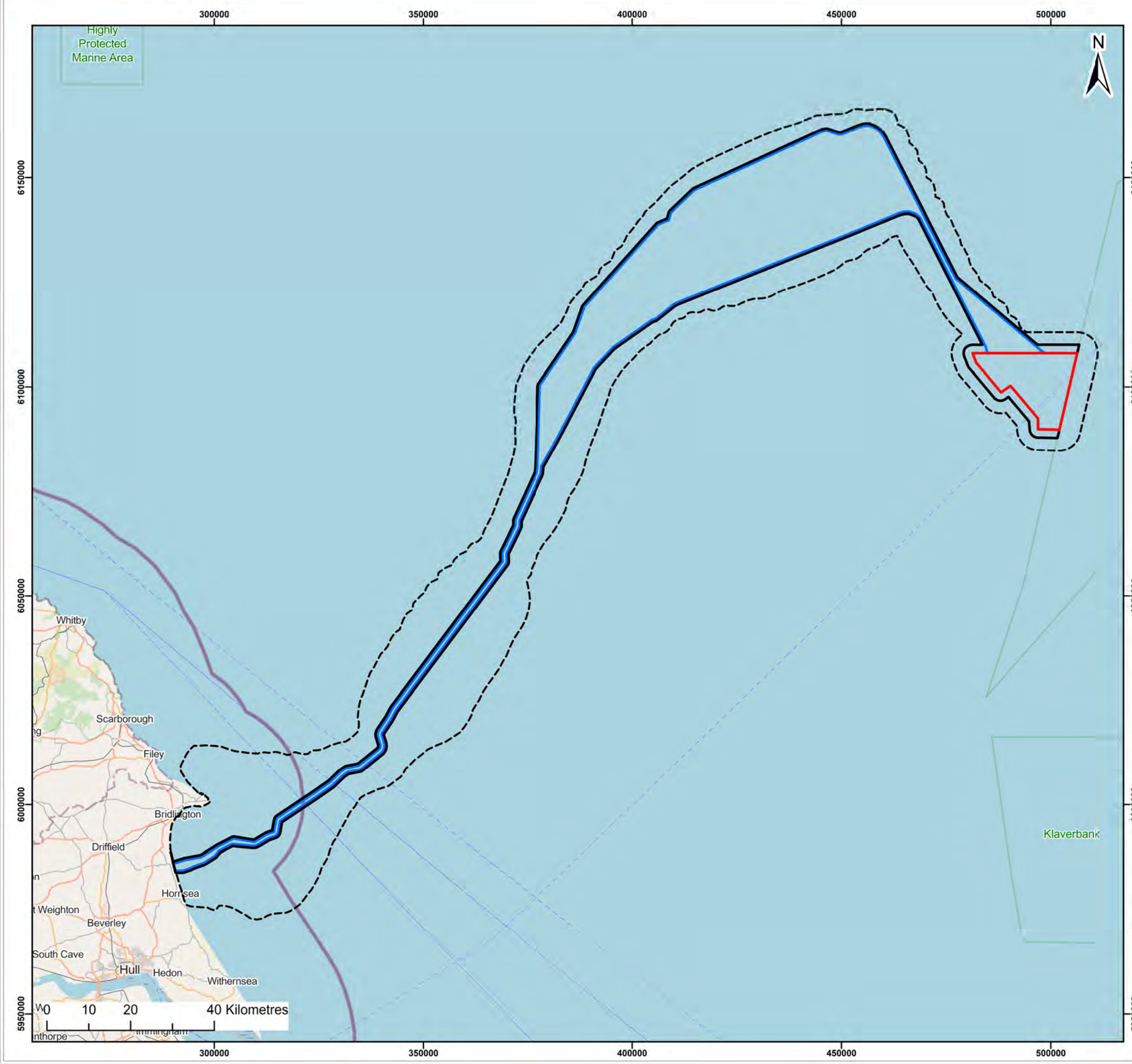
17. This chapter will be updated based on refinements made to the Project Design Envelope and to consider where appropriate stakeholder feedback on the PEIR. The updated chapter will form part of the ES to be submitted with the DCO application.

9.4 Basis of the Assessment

18. The following sections establish the basis of the assessment of likely significant effects, which is defined by the Study Area(s), assessment scope, and realistic worst-case scenarios. This section should be read in conjunction with **Volume 2, Appendix 6.2 Impacts Register** and **Volume 2, Appendix 6.3 Commitments Register** which are provided alongside the PEIR.

9.4.1 Study Area

19. The marine water and sediment quality Study Area (as shown on **Figure 9-1**) has been defined as the extent of any sediment plume that may arise during the construction of the Project. This would also encompass the potential operational and decommissioning impacts that may arise, as these would be lesser in magnitude than construction impacts.



Legend:

- Dogger Bank D Array Area
- Offshore Development Area
- Offshore Export Cable Corridor
- Predicted Maximum Sediment Plume Extent

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Marine Water and Sediment Quality Study Area

Figure:	Drawing No:				
9.1	PC6250-RHD-XX-OF-DR-GS-0310				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
01	02/12/2024	FC	APG	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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20. Based on the results of the Suspended Sediment Dispersion modelling (see **Volume 2, Appendix 8.3 Marine Physical Processes Modelling Report**), it is predicted that any sediment plumes that may arise nearshore (presumed to be within 40km of shore) would extend to a maximum of 35.3km around the offshore ECC. Any sediment plumes that may arise offshore are predicted to extend to a maximum of 17.6km around the offshore ECC, and to 9.1km when closer to the Array Area. Sediment plumes are predicted to be larger nearshore due to increased tidal currents nearer the coast.

9.4.2 Scope of the Assessment

21. A number of impacts have been scoped out of the marine water and sediment quality assessment, including effects arising from the remobilisation of existing contaminated sediments in the Array Area and accidental pollution events. These impacts are outlined in **Volume 2, Appendix 6.2 Impacts Register**, along with supporting justification and are in line with the Scoping Opinion (discussed in **Section 9.3**) and the project description outlined in **Chapter 4 Project Description**.

22. Impacts scoped into the assessment relating to marine water and sediment quality are outlined in **Section 9.6** and **Table 9-2**, and are discussed further in **Section 9.7**.

Table 9-2 Marine Water and Sediment Quality – Impacts Scoped into the Assessment

Impact ID	Impact and Project Activity	Rationale
Construction		
MWS-C-01	Effects on water quality arising suspended sediment concentrations – during the construction phase.	There is the potential for suspended sediments during construction in the offshore ECC and Array Area to adversely affect water quality and Bathing Water quality.
MWS-C-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the construction phase.	There is potential for existing contaminants within the sediments to be remobilised during the installation of cables in the offshore ECC.
Operation and Maintenance		
MWS-O-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the operation and maintenance phase.	There is potential for existing contaminants within the sediments to be remobilised during scour and routine maintenance in the offshore ECC.
Decommissioning		
MWS-D-03	Remobilisation of existing contaminated sediments in the offshore ECC – decommissioning activities not yet defined.	Decommissioning impacts are scoped in; however, details of offshore decommissioning activities are not known at this stage. As discussed in **Section 9.7.3**, decommissioning impacts will be assessed in detail through the Offshore Decommissioning Programme (see Commitment ID CO21 in **Volume 2, Appendix 6.3 Commitments Register**) where relevant, which will be developed prior to the construction of the offshore works. In this assessment, it is assumed that most decommissioning activities would be the reverse of their construction counterparts, and that their impacts would be of similar nature to, and no worse than, those identified during the construction phase.

23. A full list of impacts scoped in / out of the marine water and sediment quality assessment is summarised in **Volume 2, Appendix 6.2 Impacts Register**. A description of how the Impacts and Effects Register should be used alongside the PEIR chapter is provided in **Chapter 6 Environmental Impact Assessment Methodology**.

24. Decommissioning impacts are scoped in; however, details of offshore decommissioning activities are not known at this stage. As discussed in **Section 9.7.3**, decommissioning impacts will be assessed in detail through the Offshore Decommissioning Programme (see Commitment ID CO21 in **Volume 2, Appendix 6.3 Commitments Register**) where relevant, which will be developed prior to the construction of the offshore works.

25. In this assessment, it is assumed that most decommissioning activities would be the reverse of their construction counterparts, and that their impacts would be of similar nature to, and no worse than, those identified during the construction phase.

9.4.3 Embedded Mitigation Measures

26. **Volume 2, Appendix 6.3 Commitments Register** is provided at PEIR stage to provide stakeholders with an early opportunity to review and comment on the proposed commitments. Proposed commitments may evolve during the pre-application phase as the EIA progresses and in response to refinements to the Project Design Envelope and stakeholder feedback. The final commitments will be confirmed in the Commitments Register submitted along with the DCO application.

27. Full details of all commitments made by the Project are provided within **Volume 2, Appendix 6.3 Commitments Register**. A description of how the Commitments Register should be used alongside the PEIR chapter is provided in **Chapter 6 Environmental Impact Assessment Methodology**. In addition, a list of draft outline management plans which are submitted with the PEIR for consultation is provided in **Section 1.10** of **Chapter 1 Introduction**. These documents will be further refined and submitted along with the DCO application

28. The Commitments Register is provided at PEIR stage to provide stakeholders with an early opportunity to review and comment on the proposed commitments. Proposed commitments may evolve during the pre-application phase as the EIA progresses and in response to refinements to the Project Design Envelope and stakeholder feedback. The final commitments will be confirmed in the Commitments Register submitted along with the DCO application.

29. The Project has made several commitments to avoid, prevent, reduce or, if possible, offset potential adverse environmental effects through mitigation measures embedded into the evolution of the Project Design Envelope. These embedded mitigation measures include actions that will be undertaken to meet other existing legislative requirements and those considered to be standard or best practice to manage commonly occurring environmental effects. The assessment of likely significant effects has therefore been undertaken on the assumption that these measures are adopted during the construction, operation and decommissioning phases. **Table 9-3** identifies proposed embedded mitigation measures that are relevant to the marine water and sediment quality assessment.

9.4.4 Realistic Worst-Case Scenarios

30. To provide a precautionary, but robust, assessment at this stage of the Project's development process, a realistic worst-case scenario has been defined in **Table 9-4** for each impact scoped into the assessment (as outlined in **Section 9.7**). The realistic worst-case scenarios are derived from the range of parameters included in the design envelope. They ensure that the assessment of likely significant effects is based on the maximum potential impact on the environment. Should an alternative development scenario be taken forward in the final design of the Project, the resulting effects would not be greater in effect significance. Further details on the design envelope approach are provided in **Chapter 6 Environmental Impact Assessment Methodology**.

Table 9-3 Embedded Mitigation Measures Relevant to Marine Water and Sediment Quality

Commitment ID	Proposed Embedded Mitigation	How the Embedded Mitigation Will be Secured	Relevance to Marine water and Sediment Quality Assessment
CO7	The Project will ensure compliance with Marine Guidance Note (MGN) 654 and its annexes, where applicable, including implementation of an Emergency Response Cooperation Plan (ERCoP) for all phases of the Project and completion of a Search and Rescue (SAR) checklist.	DML Condition - Emergency Response and Cooperation Plan	Limits the risk of accidental pollution associated with the Project.
CO23	At the landfall, trenchless installation techniques will be implemented and exit pits will be located beyond Mean Low Water Springs (MLWS). Installation will be at a suitable depth below the base of the cliff to avoid potential impacts to the Withow Gap Site of Special Scientific Interest (SSSI).	DCO Works DCO Requirement - Code of Construction Practice	Minimises the remobilisation and resuspension of suspended sediments and any associated contaminants.
CO25	A Project Environmental Management Plan (PEMP) will be provided in accordance with the Outline PEMP and will include: • A Marine Pollution Contingency Plan (MPCP), which will include plans to address the risks, methods and procedures to deal with any spills and collision incidents in relation to all activities carried out below Mean High Water Springs (MHWS) to safeguard the marine environment; • Best practice measures for the storage, use and disposal of lubricant and chemicals will be undertaken throughout the construction phase; • A Chemical Risk Assessment (CRA) to ensure any chemicals, substances and materials to be used will be suitable for use in the marine environment and in accordance with the Health and Safety Executive and the Environment Agency Pollution Prevention Control Guidelines or latest relevant available guidelines; • A marine biosecurity plan detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Details of waste management and disposal arrangements.	DML Condition - Project Environmental Management Plan	Limits the risk of accidental pollution associated with the Project.
CO26	Micro-siting of the offshore cables will be used to minimise the requirement for seabed preparation as far as is practicable.	DML Condition - Cable Specification and Installation Plan	Minimises the amount of seabed disturbance and therefore minimises the remobilisation and resuspension of suspended sediments and any associated contaminants.
CO28	An Offshore Operations and Maintenance Plan (O&M) will be provided prior to commencement of operation and will outline the reasonably foreseeable O&M offshore activities.	DML Condition - Offshore Operations and Maintenance Plan	Limits the risk of accidental pollution associated with the Project.

Table 9-4 Realistic Worst-Case Scenarios for Impacts on Marine Water and Sediment Quality

Impact ID	Impact and Project Activity	Realistic Worst-Case Scenario	Rationale
Construction			
MWS-C-01	Effects on water quality arising suspended sediment concentrations – during the construction phase.	**Array Area** **Wind Turbines** Drill arisings at 50% of WTGs ((60m average drill depth x 254.5m^2 drill area (18m drill diameter)) x 57 WTGs (rounded up 50%)) = 870,390m^3. Seabed preparation volume for a single turbine foundation = 35,785m^3 (suction bucket foundation plus scour protection footprint 14,314m^2 x 2.5m levelling depth). Seabed preparation volume for 113 turbine foundations = 4,043,705m^3. **Offshore Platforms** Drill arisings from two OPs (100m average drill depth x 176.7m^2 drill area (15m drill diameter) based on maximum 12 piles, 50% requiring drilling) = 106,020m^3. Seabed preparation volume for two offshore platform foundations (monopile foundation plus scour protection footprint 25,000 m^2 x 4m levelling depth x 2 Ops) = 200,000m^3. Array Area worst-case total displaced sediment during construction = 4,243,705m^3. **Inter-Array Cables** Displaced sediment volume during sand wave levelling for Inter-Array Cables = 56,000,000m^3 (400,000m length x 4m depth x 35m width). Displaced sediment volume during Inter-Array Cable installation = 7,000,000m^3 (400,000m length x 3.5m depth x 5m width). Overall (Array Area + Offshore Export Cable + Landfall + Inter-Array Cables) worst-case total displaced sediment during construction (4,243,705m^3 + 46,256,000m^3 +26,250m^3 + 63,000,000m^3) = 113,525,955m^3. See below for the Offshore Export Cable (including landfall) worst-case total displaced sediment during construction calculations.	These calculations assume that 50% of all wind turbines (57) and offshore platform foundations (6) will be drilled, and that all wind turbines (113) and offshore platforms (two) locations will require seabed preparation. The worse case scenario for OP is two small platforms as opposed to one large platform, both in terms of extent and volumes, hence only the worst case parameters shown. It is assumed 100% of inter-array cables will require sand wave levelling. As installation (trenching) results in further disturbance though within the same footprint is an additional activity resulting in movement of sediment and is considered in the modelling scenario. Maximum burial depth for cables is 3.5m (target burial depth of 2.5m with 1m over-burial allowance). This depth has been assumed across the entire length of each cable type to determine the worst-case volume of sediment disturbed. A pre-grapnel run would be required during cable installation. However, this is run along the surface of the seabed and would have minimal suspended sediment concentration volume.

Impact ID	Impact and Project Activity	Realistic Worst-Case Scenario	Rationale
MWS-C-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the construction phase.	**Offshore Export Cable** Displaced sediment volume during sand wave levelling for Offshore Export Cables (length 230,400m) = 32,256,000m^3 (230,400m length x 4m depth x 35m width). Displaced sediment volume during trenching for Offshore Export Cable installation (length 800,000m) = 14,000,000m^3 (800,000m length x 3.5m depth x 5m width). Worst-case scenario volume for export cables (sand wave levelling + trenching for offshore export cable installation) = 46,256,000m^3. Landfall (trenchless exit pits): • Number of trenchless duct installations = 3 (includes 2 + 1 spare). • Size of each exit pit – 100m length x 25m width x 3.5m depth. • Maximum extent of temporary disturbance for exit pits – 7,500m3. • Total volume of sediment disturbed by exit pits – 26,250m^3.	For the purposes of modelling, two Offshore Export Cable route options were considered within the Characterisation Area: Option 1 (a route at the northern extent of the Characterisation Area) and Option 2 (the Project's primary route at the southern extent of the Characterisation Area) (**Figure 9-4**). The routes were selected to understand sediment dispersion at the outer limits of the offshore ECC thus capturing the greatest area potentially affected by changes in suspended sediment concentrations. The southernmost extent of the cable corridor has been assessed in the PEIR. . Any potential changes to the cable route would be within these bounds. Inter-array cable routes are currently not sufficiently defined to progress sediment dispersion modelling from construction at PEIR, however inter-array cable modelling will be presented for DCO submission. It is assumed that 28.8% of the export cables will require sand wave levelling. Target burial depth for cables is 3.5m. This depth has been assumed across the entire length of each cable type to determine the worst-case volume of sediment disturbed. Maximum width of disturbance is 35m. A pre-grapnel run would be required during cable installation. However, this is run along the surface of the seabed and would have minimal suspended sediment concentration volume. Technique for trenchless cable installation is not yet decided, however Horizontal Directional Drilling (HDD) is preferred.
Operation and Maintenance			
MWS-O-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the operation and maintenance phase.	Seabed footprint of repairs and reburial is unknown but will be less than during construction (see above).	Remedial reburial and repair of cables may be required. As original protection will be repaired or replaced, there will be no changes in the total seabed footprint of cable protection measures.
Decommissioning			
MWS-D-O3	Remobilisation of existing contaminated sediments in the offshore ECC – decommissioning activities not yet defined.	The final decommissioning strategy of the Project's offshore infrastructure has not yet been decided. For a description of potential offshore decommissioning works, refer to **Chapter 4 Project Description**. It is recognised that regulatory requirements and industry best practice change over time. Therefore, the details and scope of offshore decommissioning works will be determined by the relevant regulations and guidance at the time of decommissioning. Specific arrangements will be detailed in an Offshore Decommissioning Plan (see Commitment ID CO21 in **Volume 2, Appendix 6.3 Commitments Register**), which will be submitted and agreed with the relevant authorities prior to the commencement of offshore decommissioning works. For this assessment, it is assumed that decommissioning is likely to operate within the parameters identified for construction (i.e. any activities are likely to occur within the temporary construction working areas and require no greater amount or duration of activity than assessed for construction). The decommissioning sequence will generally be the reverse of the construction sequence. It is therefore assumed that decommissioning impacts would likely be of similar nature to, and no worse than, those identified during the construction phase.	

9.5 Assessment Methodology

9.5.1 Guidance Documents

31. The following guidance documents have been used to inform the baseline characterisation, assessment methodology and mitigation design for marine water and sediment quality:

- The Convention for the Protection of the Marine Environment of the North East Atlantic (the 'OSPAR Convention') Quality Status Report.

32. The realistic worst-case scenarios used to assess impacts on marine water and sediment quality are defined in **Section 9.4.4**. Following the PEIR publication, further design refinements will be made based on ongoing engineering studies and considerations of the EIA and stakeholder feedback. Therefore, realistic worst-case scenarios presented in the PEIR may be updated in the ES. The design envelope will be refined where possible to retain design flexibility only where it is needed.

9.5.2 Data and Information Sources

9.5.2.1 Desk Study

33. A desk study has been undertaken to compile baseline information in the previously defined Study Area(s) (see **Section 9.4.1**) using the sources of information set out in **Table 9-5**.

Table 9-5 Desk-Based Sources for Marine Water and Sediment Quality Data

Data Source	Spatial Coverage	Year(s)	Summary of Data Contents
Environment Agency's Catchment Data Explorer (https://environment.data.gov.uk/catchment-planning)	Across most of the UK	2024	Information on the status of coastal and transitional water bodies.
Marine Management Organisation (MMO) Public Register	Across the UK	2024	Other plans or projects within the scoping area and Humber Estuary.
Environment Agency	N/A	Most recently available information	Background concentration data for the discharge location.
Dogger Bank Teesside A & B Environmental Statement	Dogger Bank, North Sea	2014	Sediment quality data.
Dogger Bank Creyke Beck A & B Environmental Statement	Dogger Bank, North Sea	2013	Sediment quality data.
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 Project sits.

9.5.2.2 Site-Specific Surveys

34. In addition to desk-based sources, site-specific surveys were undertaken as part of the wider benthic ecology survey requirement to provide detailed baseline information on sediment quality within the Array Area and offshore ECC. **Table 9-6** summarises surveys that have been completed which are relevant to the marine water and sediment quality baseline characterisation. Sampling of the water column was not undertaken, as is standard for projects in the open coastal environment.

35. Results from the 2023 survey of the Array Area are not discussed further in this chapter as effects associated with the remobilisation of contaminated sediment within the Array Area is scoped out of the assessment. The results are provided in full in **Volume 2, Appendix 9.2 Sediment Quality Analysis Report**. Effects on water quality within the Array Area arising from suspended sediment concentrations during the construction phase are assessed in **Section 9.7.1.1** (MWS-C-01, MWS-C-02, MWS-O-02, MWS-D-02 as shown in **Volume 2, Appendix 6.2 Impacts Register**).

Table 9-6 Site-Specific Survey Data for Marine Water and Sediment Quality

Survey	Spatial Coverage	Year(s)	Summary of Survey Data
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	Offshore ECC	2024	Sediment contaminant concentrations and Particle Size Distribution (PSD) analysis

9.5.3 Impact Assessment Methodology

36. **Chapter 6 Environmental Impact Assessment Methodology** sets out the overarching approach to the impact assessment methodology. The topic-specific methodology for the marine water and sediment quality assessment is described further in this section.

37. For Marine Water and Sediment Quality, where no significant impacts are identified for the construction phase (i.e. negligible / minor adverse significance), there is no need to assess impacts during the operation and maintenance phase and decommissioning phase. This is because impacts associated with operation and maintenance phase and decommissioning phases are anticipated to be lesser in magnitude than those of the construction phase.

9.5.3.1 Impact Assessment Criteria

38. For each potential impact, the assessment identifies receptors sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts (i.e. magnitude) on given receptors. The definitions of sensitivity and magnitude for the purpose of the marine water and sediment quality assessment are provided below.

9.5.3.1.1 Receptor Sensitivity / Value

39. The sensitivity of a receptor (marine water and sediment quality) is dependent upon its:

- Tolerance to an impact (i.e. the extent to which the receptor is adversely impacted);
- Adaptability (i.e. the ability of the receptor to accommodate adverse impacts that would otherwise arise from a particular effect);
- Recoverability (i.e. a measure of a receptor's ability to return to a state at, or close to, that which existed before the project caused a change); and
- Value (i.e. for example if the receptor is a protected element).

40. The definitions of sensitivity for the purpose of the marine water and sediment quality assessment are provided in **Table 9-7**.

Table 9-7 Definitions of Sensitivity

Sensitivity	Definition
High	Supports, or contributes towards, the designation of an internationally or nationally important feature and / or has very low capacity to accommodate any change to current water quality status, compared to baseline conditions.
Medium	Supports high biodiversity and / or has low capacity to accommodate change to water quality status.
Low	Has a high capacity to accommodate change to water quality status due, for example, to large relative size of the receiving water and capacity for dilution and flushing. Background concentrations of certain parameters already exist.
Negligible	Specific conditions are likely to be able to tolerate proposed change with very little or no impact upon the baseline conditions detectable.

9.5.3.1.2 Impact Magnitude

41. The descriptions of magnitude are specific to the assessment of impacts and are considered in addition to the generic descriptors of impact magnitude presented in **Chapter 6 Environmental Impact Assessment Methodology**. Potential impacts have been considered in terms of permanent or temporary, and adverse or beneficial effects. The magnitude of an effect is dependent upon its:

- Scale (i.e. size or extent or intensity);
- Duration;
- Frequency of occurrence; and
- Reversibility (i.e. the capability of the environment to return to a condition equivalent to the baseline after the effect ceases).

42. The definitions of magnitude for the purpose of the marine water and sediment quality assessment are provided in **Table 9-8**.

Table 9-8 Definitions of Magnitude

Magnitude	Definition
High	Fundamental, permanent / irreversible changes and / or fundamental alteration to key characteristics or features of the particular receptor's character or distinctiveness. Water quality status degraded to the extent that a permanent or long term change occurs. Inability to meet (for example) environmental Quality Standards (EQS) is likely.
Medium	Considerable, permanent / irreversible changes, over a majority of the receptor, and / or discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness. Water quality likely to take considerable time to recover to baseline conditions.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness. Activity not likely to alter local status to the extent that water quality characteristics change considerably or EQSs are compromised.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and / or slight alteration to key characteristics or features of the particular receptor's character or distinctiveness. Any change to quality would be quickly reversed once activity ceases.

9.5.3.1.3 Effect Significance

43. The assessment of significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact (see **Chapter 6 Environmental Impact Assessment Methodology** for further details). The determination of significance is guided using a significance of effect matrix, as shown in **Table 9-9**. Definitions of each level of significance are provided in **Table 9-10**.

Table 9-9 Significance of Effect 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

Table 9-10 Definitions of Effect Significance

Significance	Definition
Major	Very large or large changes in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate changes in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as a local issue.
Negligible	No discernible change in receptor condition.
No Change	No impact, therefore, no change in receptor condition.

44. Potential effects are described, followed by a statement of whether the effect is significant in terms of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended). Potential effects identified within the assessment as either major or moderate are regarded as significant in terms of the The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended). Whilst minor effects (or below) are not significant in EIA terms in their own right, it is important to distinguish these, as they may contribute to significant effects cumulatively or through interactions.

45. Following initial assessment, if the effect does not require additional mitigation (or none is possible), the residual effect would remain the same. If, however, additional mitigation is proposed, an assessment of the post-mitigation residual effect is provided.

9.5.4 Cumulative Effects Assessment Methodology

46. The cumulative effects assessment (CEA) considers other plans and projects that may act collectively with the Project to give rise to cumulative effects on marine water and sediment quality receptors. The general approach to the CEA for marine water and sediment quality involves screening for potential cumulative effects, identifying a short list of plans and projects for consideration and evaluating the significance of cumulative effects. **Chapter 6 Environmental Impact Assessment Methodology** provides further details on the general framework and approach to the CEA.

9.5.5 Transboundary Effects Assessment Methodology

47. The transboundary effects assessment considers the potential for effects to occur as a result of the Project on marine water and sediment quality receptors within the Exclusive Economic Zone (EEZ) of other European Economic Area (EEA) member states or other interests of EEA member states. **Chapter 6 Environmental Impact Assessment Methodology and Volume 2, Appendix 6.4 Cumulative Effects Screening Report – Offshore provides** further details on the general framework and approach to the transboundary effects assessment.

48. No potential for significant transboundary effects regarding marine water and sediment quality from the Project on receptors within the EEZ of other EEA member states or other interests of EEA member states have been identified. Therefore, a transboundary effects assessment has been scoped out of the EIA.

9.5.6 Assumptions and Limitations

49. This chapter provides a preliminary assessment of the likely significant effects of the Project in relation to marine water and sediment quality using information available at the time of drafting as described in Chapter 6 Environmental Impact Assessment Methodology. This assessment will be refined where relevant and presented in the ES to be submitted with the DCO application.

50. Due to a lack of water quality data specific to the Array Area and offshore ECC; desk-based sources including OSPAR's monitoring programmes and the WFD Water Body status 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 (**Paragraph 66**).

9.6 Baseline Environment

9.6.1 Existing Baseline

9.6.1.1 Sediment Quality

9.6.1.1.1 Sediment Characterisation

51. 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.

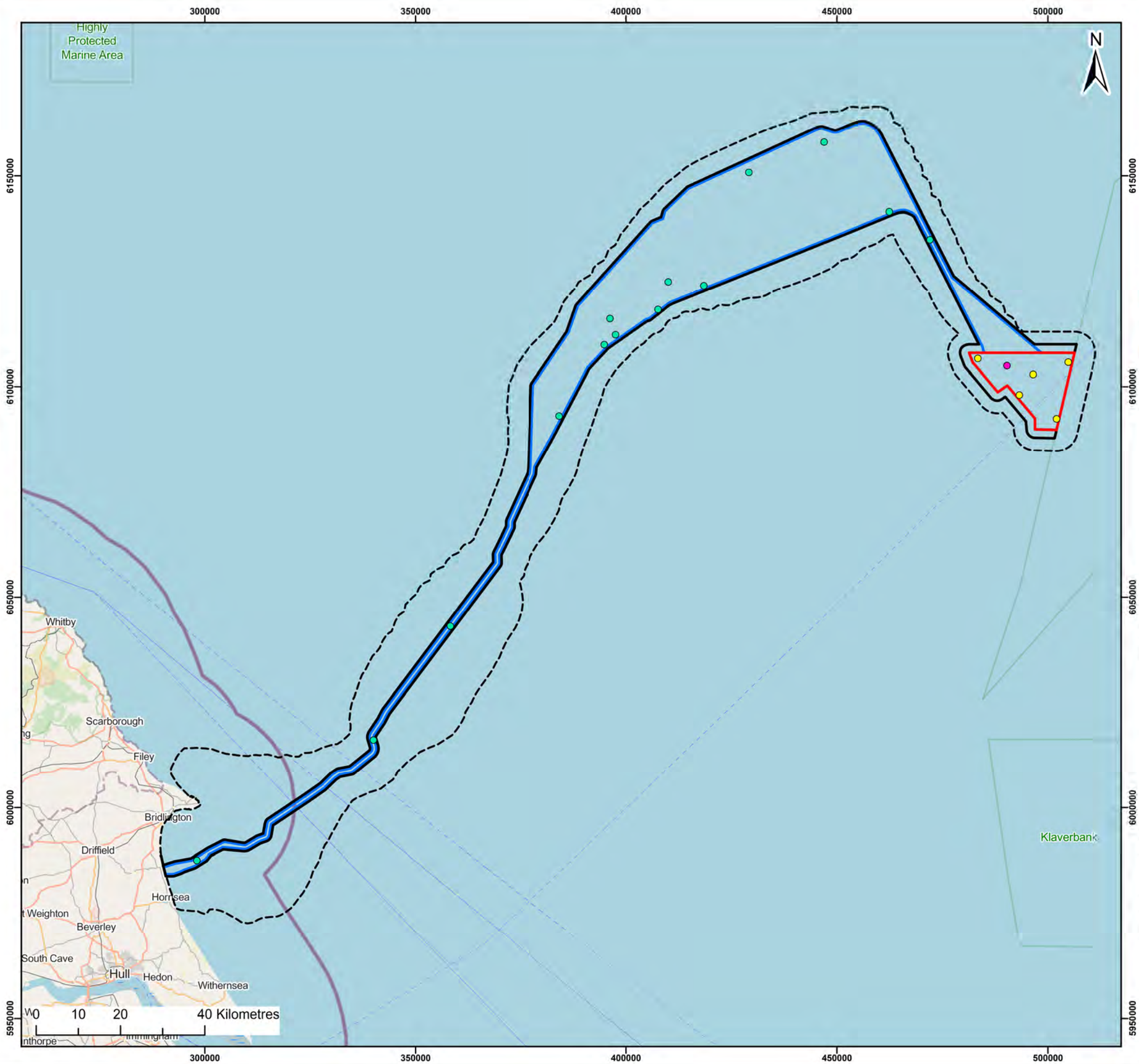
52. Seabed habitats within the vicinity of the Array Area are comprised of coarser grained sediments, namely sand and mixed coarse substrates. The rest of the Study Area and along the Holderness coast is characterised by sand, with some areas, namely those closer to the coast, which are dominated by coarser, gravelly sediments (BGS, 2024).

53. Site-specific sediment sampling within the Array Area and offshore ECC was undertaken in 2023 and 2024, respectively (see **Figure 9-2** and **Volume 2, Appendix 10.3 Benthic Ecology Baseline Characterisation Report** for more information). PSD analysis of these samples found that sediments within offshore survey area were predominantly sandy; with high variation of gravel and cobbles. Based on the Folk (BGS modified) classification system, 65% of the samples were typified as 'sand', 34% as mixed sediments (with varying content of sand, gravel, and mud), and 1% as 'gravel'. These results support the predictive BGS sediment data shown on **Figure 9-3**.

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

9.6.1.1.2 Sediment Chemistry

55. Understanding of sediment chemical composition within the offshore ECC is informed by the site-specific survey undertaken in 2024, (**Volume 2, Appendix 10.3 Benthic Ecology Baseline Characterisation Report**). The locations of these sediment samples, along with the 2023 sample locations within the Array Area, are shown on **Figure 9-2**.



Legend:

- Dogger Bank D Array Area
- Offshore Development Area
- Offshore Export Cable Corridor
- Predicted Maximum Sediment Plume Extent
- Sediment Contaminant Sample Locations (Fugro, 2023)
- Sediment Contaminant Sample Locations (Fugro, 2024)
- Sediment Contaminant Locations Sampled in 2023 and Resampled in 2024 (Fugro, 2023; Fugro, 2024)

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

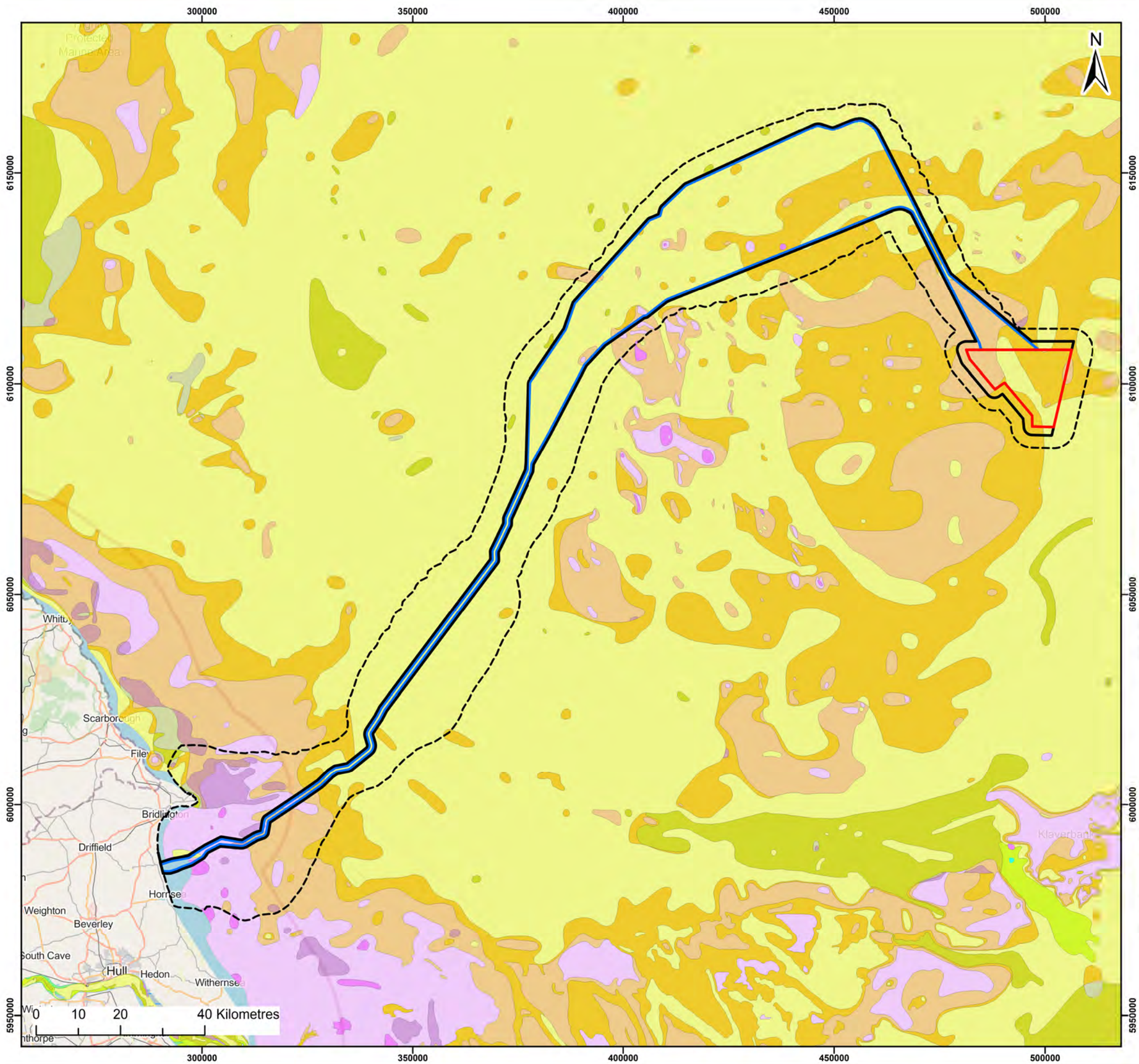
Title:

Sediment Contaminant Sampling within the Offshore Development Area

Figure:	Drawing No:				
9.2	PC6250-RHD-XX-OF-DR-GS-0494				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
01	24/01/2025	AB	APG	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor



Legend:

- Dogger Bank D Array Area
- Offshore Development Area
- Offshore Export Cable Corridor
- Predicted Maximum Sediment Plume Extent

Seabed Sediment

- Gravel
- Gravelly Muddy Sand
- Gravelly Sand
- Mud
- Muddy Sand
- Muddy Sandy Gravel
- Sand
- Sandy Gravel
- Sandy Mud
- Slightly Gravelly Mud
- Slightly Gravelly Muddy Sand
- Slightly Gravelly Sand
- Slightly Gravelly Sandy Mud
- Undifferentiated Solid Rock

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
BGS 250k Seabed Sediments within the Study Area

Figure:	Drawing No:				
9.3	PC6250-RHD-XX-OF-DR-GS-0311				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
01	02/12/2024	FC	APG	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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

57. 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.

58. A summary of the minimum, mean and maximum concentrations of contaminants from the survey is presented in **Table 9-11**.

Table 9-11 Minimum, Mean and Maximum Concentration of Contaminants within the DBD Export Cable Corridor.

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)	4.90	7.09	11.70	20.00	100.00
Cadmium (Cd)	0.04	0.07	0.10	0.40	5.00
Chromium (Cr)	6.80	9.81	18.60	40.00	400.00
Copper (Cu)	1.80	3.05	8.00	40.00	400.00
Mercury (Hg)	0.01	0.03	0.07	0.30	3.00
Nickel (Ni)	3.10	5.65	15.00	20.00	200.00
Lead (Pb)	3.50	7.62	28.40	50.00	500.00
Zinc (Zn)	9.90	18.89	56.30	130.00	800.00
Organotins					
Dibutyltin (DBT)	<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	<1.10	3.51	6.71	88.90
Acenaphthylene	<LOD	<1.09	3.14	5.87	128.00
Anthracene	<LOD	<1.28	7.09	46.90	245.00
Benz[a]anthracene	<LOD	<1.87	20.00	74.80	693.00
Benzo[a]pyrene	<LOD	<1.75	14.60	88.80	763.00
Benzo[b]fluoranthene	<LOD	<8.02	17.90	N/A	N/A
Benzo[g,h,i]perylene	<LOD	<6.79	14.40	N/A	N/A
Benzo[e]pyrene	<LOD	<7.46	16.30	N/A	N/A
Benzo[k]fluoranthene	<LOD	<6.74	14.10	N/A	N/A
C1-Napthalenes	<LOD	<11.22	70.30	N/A	N/A
C1-Phenanthrenes	<LOD	<3.84	53.20	N/A	N/A
C2-Napthalenes	<LOD	<15.20	82.00	N/A	N/A
C3-Napthalenes	<LOD	<15.10	91.50	N/A	N/A
Chrysene	<LOD	<2.22	24.60	108.00	846.00
Dibenz[a,h]anthracene	<LOD	<1.09	3.23	6.22	135.00
Fluoranthene	<LOD	<8.27	36.90	113.00	1,494.00
Fluorene	<LOD	<1.14	4.30	21.20	144.00

Contaminant	Minimum (mg/kg dry weight)	Mean (mg/kg dry weight)	Maximum (mg/kg dry weight)	Lower quality guideline	Upper quality guideline
Indeno[123-c,d]pyrene	<LOD	<7.35	9.76	N/A	N/A
Naphthalene	<LOD	<2.12	16.50	34.60	391.00
Perylene	<LOD	<1.10	3.32	N/A	N/A
Phenanthrene	<LOD	<8.16	38.80	86.70	544.00
Pyrene	<LOD	<7.22	32.00	153.00	1,398.00
Total Hydrocarbon Content (THC) (mg/kg)	<LOD	<1.84	21.20	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
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

Contaminant	Minimum (mg/kg dry weight)	Mean (mg/kg dry weight)	Maximum (mg/kg dry weight)	Lower quality guideline	Upper quality guideline
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

59. These results show that there are no exceedances of Cefas AL1/TEL by any of the samples from within the offshore ECC. Concentrations of trace metals within the offshore ECC are considerably lower than their respective Cefas AL1s. Concentrations of PAHs within the offshore ECC 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 in the offshore ECC.

60. Overall, sediments within the offshore ECC have slightly higher contaminant concentrations than the Array Area (see **Volume 2, Appendix 9.2 Sediment Quality Analysis Report**), but sediment contamination across the Offshore Development Area is negligible.

61. 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 Array Area, offshore ECC and landfall, are not located within or in close proximity to an industrial area 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 DBD for there to be a pathway for an effect arise.

9.6.1.2 Water Quality

9.6.1.2.1 Suspended Sediment Concentrations

62. 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. 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.

9.6.1.2.2 Chemical and Physico-Chemical Parameters

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

64. Water quality is an important component for compliance with the requirements of the WFD and therefore the information collected for the transitional and coastal water bodies is relevant for characterising the offshore ECC.

65. Within 1 nautical mile (nm) off the coast, the offshore ECC passes through the Yorkshire South coastal water body (GB640402491000) (**Figure 9-4**). This water body is classified as heavily modified due to coast protection and flood defence measures, and navigation, ports and harbours, and has an overall current status of 'Moderate'. It has an ecological status of 'Moderate', due to the quality of surface water supporting elements within the water body. It has a 2019 chemical status of 'Fail' due to levels of benzo[ghi]perylene, mercury and its compounds, polybrominated diphenyl ethers (PBDE) and TBT compounds (Environment Agency, n.d.). The 2022 chemical status does not require assessment. It should be noted that all water bodies received a chemical status of 'fail' in 2019 due to a change in the Environment Agency's methodology and an increase in evidence base. **Table 9-12** provides further information about this water body.

Table 9-12 Yorkshire South WFD Coastal Water Body Classification

Water body parameter	Water body data
Water body name	Yorkshire South
Water body ID	GB640402491000
Water body type	Coastal
Surface area (km^2)	163.312
Overall status	Moderate
Ecological status	Moderate – due to the quality of surface water supporting elements
Chemical status	2022 – Does not require assessment 2019 – Fail, due to high concentrations of Benzo(g-h-i)perylene, mercury and its compounds, PBDE and TBT compounds
Target water body status and deadline	Ecological – Good by 2027 Chemical – Good by 2063
Hydromorphology status	Not assessed
Is it a heavily modified water body?	Yes, due to coast protection and flood defence measures, and navigation, ports and harbours.
WFD protected areas within 2km of the Project	Skipsea Bathing Waters

Legend:

- Dogger Bank D Array Area
- Offshore Development Area
- Offshore Export Cable Corridor
- Predicted Maximum Sediment Plume Extent

WFD Coastal Water Body

- Yorkshire North
- Yorkshire South

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

WFD Coastal and Eustarine Water Bodies within the Study Area

Figure: 9.4

Drawing No: PC6250-RHD-XX-OF-DR-GS-0312

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	02/12/2024	FC	APG	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

66. The Yorkshire North coastal water body (GB650401500004) is located approximately 9.5km north of the landfall area. This water body has an overall status of 'Moderate' and an ecological status of 'Moderate' due to the quality of the surface water supporting elements. It has a 2019 chemical status of 'Fail' due to levels of mercury and its compounds and PBDEs. The 2022 chemical status does not require assessment. It should be noted that all water bodies received a chemical status of 'fail' in 2019 due to a change in the Environment Agency's methodology and an increase in evidence base. **Table 9-13** provides further information about this water body.

Table 9-13 Yorkshire North WFD Coastal Water Body Classification

Water body parameter	Water body data
Water body name	Yorkshire North
Water body ID	GB650401500004
Water body type	Coastal
Surface area (km^2)	180.716
Overall status	Moderate
Ecological status	Moderate - due to the quality of surface water supporting elements
Chemical status	2022 – Does not require assessment 2019 – Fail, due to high concentrations of mercury and its compounds and PBDE
Target water body status and deadline	Ecological – Good by 2027 Chemical – Good by 2063
Hydromorphology status	Not assessed
Is it a heavily modified water body?	Yes, due to coastal protection, flood protection and navigation, ports and harbours.
WFD protected areas within 2km of the Project	None

67. OSPAR's Quality Status Reports (QSR) evaluate the 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 are in Region II 'Greater North Sea' (**Figure 9-4**).

68. For this region, the 2010 QSR concluded that concentrations of metals, PAH and PCB were unacceptable at many, notably coastal monitoring sites. Recommendations included targets to reduce pollution from nutrients and hazardous substances, and the oil and gas sector focussing on problem areas and regional hotspots.

69. Since the QSR 2010, the OSPAR Intermediate Assessment 2017 found that contaminant concentrations have continued to decrease in the majority of areas assessed, especially for PCB. Although concentrations 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.

70. The most recent 2023 QSR 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.

9.6.2 Predicted Future Baseline

71. As discussed in **Section 8.6.2.2** of **Chapter 8 Marine Physical Processes**, due to increased rates of sea level rise, under the future baseline scenario there is projected to be increased cliff erosion rates in the landfall area. Subsequently, it is probable that there will be increased suspended sediment concentrations in the coastal waters around the cliffs in the future.

72. Baseline conditions for marine water and sediment quality are also influenced by anthropogenic activities in the area, including those that cause pollution. These activities are likely to continue to influence the area in the future and conditions are likely to remain in the same range as past patterns. Where additional regulations controlling pollutions have been implemented, concentrations of pollutants would reduce.

9.7 Assessment of Effects

9.7.1 Potential Effects during Construction

9.7.1.1 Effects on Water Quality Arising Suspended Sediment Concentrations – Array Area and Offshore ECC (MWS-C-01)

73. During construction, sandwave levelling, foundation installation and trenching methods (jet-trenching, ploughing and / or mechanical dredging) for offshore export cable and inter-array cable installation are predicted to suspend sediment into the water column, which may result in the formation of sediment plumes. The plume may be transported away from the source by tidal currents, causing changes in suspended sediment concentration, transport, and seabed level.

9.7.1.1.1 Receptor Sensitivity

74. The following nationally designated Bathing Waters are also located within the Study Area:

- Skipsea;
- Fraisthorpe;
- Wilsthorpe;
- Bridlington South Beach;
- Bridlington North Beach;
- Danes Dyke, Flamborough; and
- Flamborough South Landing.

75. However, due to the size of the water body and its ability to flush and dilute, this receptor has a high capacity to adapt, a high tolerance to change and can recover from changes to water quality parameters.

76. The sensitivity of the receptor is therefore considered to be **low.**

9.7.1.1.2 Impact Magnitude

77. Suspended sediment dispersion modelling was carried out to determine the extent, magnitude, and the length of time any sediment plume would remain in suspension that may arise during construction activities (see **Section 8.4.8** of **Volume 2, Appendix 8.3 Marine Physical Processes Modelling Report** for more information). The maximum predicted extent of any sediment plume is encapsulated by the Study Area (as shown in **Figure 9-1 Marine Water and Sediment Quality Study Area**

78.).

79. PSD analysis determined that seabed habitats within the Study Area are comprised of coarser-grained sediments, namely sand and mixed coarse substrates, and those closer to the coast dominated by coarse, gravelly sediments. The PSD analysis found that 65% of the samples were typified as ‘sand’, 34% as mixed sediments and 1% as ‘gravel’. Therefore, it is likely that any sediment plume arising from seabed preparation, sandwave levelling and trenching activities in the offshore ECC or Array Area would remain close to the seabed and settle rapidly. This is supported by the sediment dispersion modelling results. Time series data extracted from two points along the nearshore ECC and one point at Flamborough Head indicate suspended sediment concentrations in the bottom layer peak at 20mg/l along the ECC and 15mg/l at Flamborough Head and in the surface layer peak at 12mg/l along the ECC and 2mg/l at Flamborough Head (**Volume 2, Appendix 8.3 Marine Physical Processes Modelling Report, Appendix F**). These values are well within the baseline suspended sediment concentrations recorded along the Holderness coast of 30mg/l (**Section 9.6.1.2.1**).

80. Overall, the modelling concludes that any sediment plume produced by construction activities in the Array Area or offshore ECC at concentrations greater than 5mg/l would remain in the water column for no longer than four hours once the activity ceases. The potential effect on water quality and the Bathing Waters within the Study Area is therefore short-term, temporary and within baseline conditions.

81. The magnitude of impact is therefore considered to be **negligible**.

9.7.1.1.3 Effect Significance

82. Overall, it is predicted that sensitivity of the receptor **low** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, this therefore is **not significant** in EIA terms.

9.7.1.2 Remobilisation of Existing Contaminated Sediments in the Offshore ECC (MWS-C-03)

83. Remobilisation of existing contaminated sediments in the offshore ECC could occur during the construction phase due to sandwave levelling and trenching methods (jet-trenching, ploughing and/or mechanical dredging) for offshore export cable and inter-array cable installation.

84. As outlined in **Section 9.6.1.1**, recent sediment survey results show that contaminant concentrations within the sediments within the offshore ECC are below levels of concern. Therefore, should sediment be disturbed during any phase of the Project, there is no pathway for adverse effects on water quality.

9.7.1.2.1 Receptor Sensitivity

85. The water within 1nm offshore is internationally designated under the WER, so these waters are considered to be of high value. However, the water column is not restricted to a confined area and experiences nearly continuous motion due to tidal currents and other hydrodynamic movements. The water column therefore quickly dilutes and disperses suspended sediments away from the source. As a result, the receptor has a high capacity to adapt, a high tolerance to change and can recover from changes to water quality parameters.

86. The sensitivity of the receptor is therefore considered to be **low**.

9.7.1.2.2 Impact Magnitude

87. The results from the 2024 sediment sampling within the offshore ECC show that contaminant concentrations within the Offshore Development Area are all below levels of concern for each contaminant.

88. The magnitude of impact is therefore considered to be **negligible**.

9.7.1.2.3 Effect Significance

89. Overall, it is predicted that sensitivity of the receptor **low** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, this therefore is **not significant** in EIA terms.

9.7.2 Potential Effects during Operation

9.7.2.1 Remobilisation of Existing Contaminated Sediments - Offshore ECC (MWS-O-03)

90. Remobilisation of existing contaminated sediments in the offshore ECC could occur during the operation and maintenance phase due to jack-up activities, and cable repair, replacement and reburial activities. The assessment presented in **Chapter 8 Marine Physical Processes** found that the worst-case volumes of sediment released by operation activities are considerably less than those of the construction phase.

91. As outlined in **Section 9.6.1.1**, recent sediment survey results show that contaminant concentrations within the sediments within the offshore ECC are below levels of concern. Therefore, should sediment be disturbed during any phase of the Project, there is no pathway for adverse effects on water quality.

9.7.2.1.1 Receptor Sensitivity

92. The water within 1nm offshore is internationally designated under the WER, so these waters are considered to be of high value. However, the water column is not restricted to a confined area and experiences nearly continuous motion due to tidal currents and other hydrodynamic movements. The water column therefore quickly dilutes and disperses suspended sediments away from the source. As a result, the receptor has a high capacity to adapt, a high tolerance to change and can recover from changes to water quality parameters.

93. The sensitivity of the receptor is therefore considered to be **low**.

9.7.2.1.2 Impact Magnitude

94. The results from the 2024 sediment sampling within the offshore ECC show that contaminant concentrations within the Offshore Development Area are all below levels of concern for each contaminant.

95. The magnitude of impact is therefore considered to be **negligible**.

9.7.2.1.3 Effect Significance

96. Overall, it is predicted that sensitivity of the receptor **low** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

9.7.3 Potential Effects during Decommissioning

9.7.3.1 Remobilisation of Existing Contaminated Sediments - Offshore ECC (MWS-D-03)

97. Remobilisation of existing contaminated sediments in the offshore ECC could occur during the decommissioning phase due to removal of infrastructure from the seabed. It is expected that sediment release during the decommissioning phase will be considerably less than that of the construction phase.

98. As outlined in **Section 9.6.1.1**, recent sediment survey results show that contaminant concentrations within the sediments within the offshore ECC are below levels of concern. Therefore, should sediment be disturbed during any phase of the Project, there is no pathway for adverse effects on water quality.

9.7.3.1.1 Receptor Sensitivity

99. The water within 1nm offshore is internationally designated under the WER, so these waters are considered to be of high value. However, the water column is not restricted to a confined area and experiences nearly continuous motion due to tidal currents and other hydrodynamic movements. The water column therefore quickly dilutes and disperses suspended sediments away from the source. As a result, the receptor has a high capacity to adapt, a high tolerance to change and can recover from changes to water quality parameters.

100. The sensitivity of the receptor is therefore considered to be **low**.

9.7.3.1.2 Impact Magnitude

101. The results from the 2024 sediment sampling within the offshore ECC show that contaminant concentrations within the Offshore Development Area are all below levels of concern for each contaminant.

102. The magnitude of decommissioning effects will be comparable to, or less than, those as assessed during the construction and operation and maintenance phase. Accordingly, marine water and sediment quality receptors during the construction, and operation and maintenance phases, it is anticipated that the same would be valid for the decommissioning phase regardless of the final decommissioning methodologies.

103. The magnitude of impact is therefore considered to be **negligible**.

9.7.3.1.3 Effect Significance

104. No decision has been made regarding the final decommissioning strategy for the offshore infrastructure, as it is recognised that regulatory requirements and industry best practice change over time.

105. Commitment ID CO21 in **Volume 2, Appendix 6.3 Commitments Register** requires an Offshore Decommissioning Plan to be prepared and agreed with the relevant authorities prior to the commencement of offshore decommissioning works. This will ensure that decommissioning marine water and sediment quality impacts will be assessed in accordance with the applicable regulations and guidance at that time of decommissioning where relevant, with appropriate mitigation implemented as necessary to avoid significant effects.

106. The detailed activities and methodology for decommissioning will be determined later within the Project's lifetime, but would be expected to include:

- Removal of all the wind turbine components and part of the foundations (those above seabed level);
- Removal of some or all of the array and export cables; and
- The inter-array and offshore export cables will likely be cut at the cable ends and left in-situ below the seabed, and scour and cable protection would likely be left in-situ other than where there is a specific condition for its removal.

107. Whilst a detailed assessment of decommissioning impacts cannot be undertaken at this stage, for this assessment, it is assumed that decommissioning is likely to operate within the parameters identified for construction (i.e. any activities are likely to occur within the temporary construction working areas and require no greater amount or duration of activity than assessed for construction). The decommissioning sequence will generally be the reverse of the construction sequence. It is therefore assumed that decommissioning impacts would likely be of similar nature to, and no worse than, those identified during the construction phase.

108. Overall, it is predicted that sensitivity of the receptor **low** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

9.8 Cumulative Effects

109. Four impacts were scoped in for assessment at PEIR (as presented in **Table 9-2**). These were increased suspended sediment concentrations in the Array Area and offshore ECC during the construction phase, and remobilisation of contaminated sediments in the offshore ECC during the construction phase, operation and maintenance phase and decommissioning phase, respectively (MWS-C-02, MWS-C-03, MWS-O-03, and MWS-D-03).

110. Modelling results (see **Section 8.4.8** of **Volume 2, Appendix 8.3 Marine Physical Processes Modelling Report**) indicate that any sediment plume arising during construction activities would be short-lived (in the order of hours) and within baseline suspended sediment concentrations for the area. Additionally, as outlined in **Section 9.6.1.1**, recent sediment survey results show that contaminant concentrations within the sediments within the offshore ECC are below levels of concern. As such, any effects on water quality are limited spatially and temporally.

111. The assessment above concludes that all impacts by the Project on marine water and sediment quality receptors are considered **negligible**. Therefore, there is no pathway for significant adverse cumulative effects with other plans or projects.

112. There is insufficient information available on other plans and projects which could have a spatial and temporal overlap with the Project's offshore decommissioning works. The details and scope of offshore decommissioning works will be determined by the relevant regulations and guidance at the time of decommissioning and provided in the Offshore Decommissioning Plan (see Commitment ID CO21 in **Volume 2, Appendix 6.3 Commitments Register**). This will include a detailed assessment of decommissioning impacts and appropriate mitigation measures to avoid significant effects, including cumulative effects.

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

9.9 Transboundary Effects

114. Four impacts were scoped in for assessment at PEIR (as presented in **Table 9-2**). These were increased suspended sediment concentrations in the Array Area and offshore ECC during the construction phase, and remobilisation of contaminated sediments along the offshore ECC during the construction phase, operation and maintenance phase and decommissioning phase, respectively (MWS-C-02, MWS-C-03, MWS-O-03, and MWS-D-03).

115. As summarised in **Section 9.8**, modelling results (see **Section 8.4.8** of **Volume 2, Appendix 8.3 Marine Physical Processes Modelling Report**) indicate that any sediment plume arising during construction activities would be short-lived (in the order of hours) and within baseline suspended sediment concentrations for the area. Additionally, as outlined in **Section 9.6.1.1**, recent sediment survey results show that contaminant concentrations within the sediments within the offshore ECC are below levels of concern. Therefore, should sediment be disturbed during any phase of the Project, there is no pathway for adverse transboundary effects on water quality.

9.10 Summary

116. The assessment concludes that effects on water quality arising from the Project during construction, operation and decommissioning phases are negligible and no topic specific mitigation measures are required. This is summarised in **Table 9-14**.

9.11 Next Steps

117. It is proposed that further assessment of potential effects on marine water and sediment quality is not required in the subsequent ES. Therefore, no further steps are required for marine water and sediment quality. Feedback received through the consultation will be considered where appropriate in the updates of the chapter for ES.

*Table 9-14 Summary of Potential Effects Assessed for Marine Water and Sediment Quality**

Impact ID	Impact and Project Activity	Embedded Mitigation Measures	Receptor	Impact Magnitude	Effect Significance	Additional Mitigation Measures	Residual Effect	Monitoring Measures
Construction								
MWS-C-01	Effects on water quality causing increased suspended sediment concentrations – during the construction phase.	CO7 CO23 CO25 CO26	The water column	**Negligible**	**Negligible (not significant)**	N/A	N/A	Not required
MWS-C-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the construction phase.	CO7 CO23 CO25 CO26	The water column	**Negligible**	**Negligible (not significant)**	N/A	N/A	Not required
Operation and Maintenance								
MWS-O-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the operation and maintenance phase.	CO7 CO25 CO26 CO28	The water column	**Negligible**	**Negligible (not significant)**	N/A	N/A	Not required

Impact ID	Impact and Project Activity	Embedded Mitigation Measures	Receptor	Impact Magnitude	Effect Significance	Additional Mitigation Measures	Residual Effect	Monitoring Measures
Decommissioning								
MWS-D-03	Remobilisation of existing contaminated sediments in the offshore ECC - during the decommissioning phase.	All those in **Table 9-3**	The details and scope of offshore decommissioning works will be determined by the relevant regulations and guidance at the time of decommissioning and provided in the Offshore Decommissioning Programme (see Commitment ID CO21 in **Volume 2, Appendix 6.3 Commitments Register**). For this assessment, it is assumed that interactions during the decommissioning phase would be of similar nature to, and no worse than, those identified during the construction phase.					
* It is proposed that marine water and sediment quality is not considered further in the EIA, as a result of the negligible effects that the Project will have on the relevant receptor(s).								

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List of Acronyms

Acronym	Definition
AL	Action Levels
BGS	British Geological Survey
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CRA	Chemical Risk Assessment
DBC	Dogger Bank C
DBD	Dogger Bank D
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
ECC	Export Cable Corridor
EEA	Exclusive Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
EQS	Environmental Quality Status
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
HM	His Majesty
HRA	Habitats Regulations Assessment
IDB	Internal Drainage Board
ISQG	Interim Sediment Quality Guidelines
MGN	Marine Guidance Note
MMO	Marine Management Organisation
MPS	Marine Policy Statement
NPS	National Policy Statement
O&M	Operation and maintenance
OHA	Offshore Hybrid Asset
PBDE	Polybrominated Diphenyl Ethers
PEIR	Preliminary Environmental Information Report
PEL	Probable Effect Level
PEMP	Project Environmental Management Plan
PSD	Particle Size Distribution
QSR	Quality Status Reports
SQG	Sediment Quality Guidelines
SSSI	Sites of Special Scientific Interest
TBT	Tributyltin
TJB	Transition Joint Bay
WER	Water Environment Regulations
WFD	Water Framework Directive