

**The Great Grid Upgrade**

Eastern Green Link 5 (EGL 5)

# Preliminary Environmental Information Report

Volume 1

Part 3

Chapter 19 Fish and Shellfish

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nationalgrid

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# 19. Fish and Shellfish

## 19.1 Introduction

- 19.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the Eastern Green Link 5 (EGL 5) English Offshore Scheme, with respect to fish and shellfish, including marine species, diadromous species (species which migrate between freshwater and marine environments), elasmobranchs (sharks, rays and skates), and shellfish (crustaceans and molluscs). The preliminary assessment is based on information obtained to date, [April] 2026. It should be read in conjunction with the description of the Project provided in **Volume 1, Part 1, Chapter 4: Description of the Project**.
- 19.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, environmental measures, and the preliminary fish and shellfish effects that could result from the English Offshore Scheme during the construction, operation (and maintenance), and decommissioning phases. Specifically, it relates to the English Offshore elements of the Scheme seaward of Mean High Water Springs (MHWS) where the English Offshore Scheme makes landfall at Anderby Creek on the Lincolnshire coastline to the border between English and Scottish adjacent waters.
- 19.1.3 This chapter should be notably read in conjunction and considered alongside the following technical aspect chapters found in **Volume 1**:
- **Part 1, Chapter 2: Regulatory and Policy Overview;**
  - **Part 1, Chapter 5: PEIR Approach and Methodology;**
  - **Part 3, Chapter 17: Coastal and Marine Physical Processes** due to the association with hydrodynamics and sediment transport;
  - **Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology** due to the close association between fish and shellfish receptors and their habitats;
  - **Part 3, Chapter 20: Intertidal and Offshore Ornithology** due to the close association between fish and shellfish receptors as prey species for marine birds;
  - **Part 3, Chapter 21: Marine Mammals and Marine Reptiles** due to the close association between fish and shellfish receptors as prey species for marine mammals;
  - **Part 3, Chapter 23: Commercial Fisheries** due to the close association between fish and shellfish species that are commercially caught; and
  - **Part 4, Chapter 27: Cumulative Effects.**
- 19.1.4 There is also spatial overlap with the onshore assessments that are being progressed for the English Onshore Scheme (see **Volume 1, Part 2 English Onshore Scheme**), with the Intertidal Zone sharing common receptors. This chapter should also therefore be read in conjunction with the following chapters found in **Volume 1**:
- **Part 2, Chapter 6: Biodiversity; and**
  - **Part 2, Chapter 9: Water Environment.**

19.1.5 This chapter is supported by the following figures in **Volume 3, Part 3**:

- **Figure 19-1: Fish and Shellfish Study Area;**
- **Figure 19-2: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 1);**
- **Figure 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 2);**
- **Figure 19-4: Herring Spawning and Nursery Grounds;**
- **Figure 19-5: Sandeel Spawning and Nursery Grounds; and**
- **Figure 19-6: Designated Sites within the Fish and Shellfish Study Area.**

19.1.6 This chapter is supported by the following appendices:

- **Volume 2, Part 1, Appendix 2.A: Regulatory and Planning Context;**
- **Volume 2, Part 1, Appendix 2.B: Marine Plan Policy Assessment;**
- **Volume 2, Part 1, Appendix 2.C: Habitat Regulations Assessment (HRA) Stage 1 Screening Report;**
- **Volume 2, Part 1, Appendix 4.A: Electromagnetic Field (EMF) Study;**
- **Volume 2, Part 1, Appendix 4.B: EGL 5 Heat Calculations Technical Report;**
- **Volume 2, Part 1, Appendix 5.A: Outline Register of Design Measures;**
- **Volume 2, Part 1, Appendix 5.B: Outline Code of Construction Practice;**
- **Volume 2, Part 1, Appendix 5.C: Outline Construction Environmental Management Plan (CEMP);**
- **Volume 2, Part 3, Appendix 18.A: Intertidal Environmental Survey Report;**
- **Volume 2, Part 3, Appendix 18.B: Environmental Baseline Survey Report;**
- **Volume 2, Part 3, Appendix 18.C: Project Marine Conservation Zone (MCZ) Assessment Screening;**
- **Volume 2, Part 3, Appendix 18.D: Marine Conservation Zone Stage 1 Assessment;**
- **Volume 2, Part 3, Appendix 19.A: DATRAS Survey Results; and**
- **Volume 2, Part 3, Appendix 23.B: Fisheries Liaison and Coexistence Plan (FLCP).**

19.1.7 As set out in **Volume 1, Part 1, Chapter 1: Introduction**, cable installation and some associated activities beyond 12 Nautical Miles (NM), and emergency repair of the installed cable within the draft Order Limits are exempt under the Marine and Coastal Access Act 2009 (MCAA 2009). This chapter presents a preliminary assessment of the cable route from MHWS at the Anderby Creek Landfall to the maritime boundary between England and Scotland adjacent waters. This is to ensure all likely significant effects of the English Offshore Scheme have been assessed. However, consent is not being sought for the exempt cable and only external cable protection and dredging for sandwave clearance will be included in the Deemed Marine Licence (DML) beyond 12 NM.

- 19.1.8 **Volume 1, Part 1, Chapter 4: Description of the Project** establishes that the Applicant is applying to undertake Unexploded Ordnance (UXO) identification as part of the DML. UXO Clearance would be the subject of a separate Marine Licence and Environmental Impact Assessment. A high-level preliminary assessment of the effects of UXO clearance and the potential environmental measures that would be considered as part of the separate Marine Licence application are provided in this chapter to provide a holistic overview of the effects of the English Offshore Scheme.

## Limitations

- 19.1.9 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of potential significant effects will be reported in the Environmental Statement (ES). The PEIR has been produced to fulfil National Grid Electricity Transmission plc (the 'Applicant') consultation duties in accordance with Section 42 of the Planning Act 2008 (PA 2008) and enable consultees to develop an informed view of the preliminary significant effects of the English Offshore Scheme.
- 19.1.10 This assessment has been collated based on a range of publicly available data and information, as well as marine survey data including environmental benthic survey data and environmental deoxyribonucleic acid (eDNA) survey data. Briefly, a campaign of marine ecological survey was undertaken on the Intertidal Zone at the Anderby Creek Landfall, and along a nominal 500 m corridor along the proposed cable corridor. Various sampling methodologies, including drop-down video, sediment grab sampling and eDNA sample collection, were deployed. More information is presented in **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**. It is assumed that the data collated is accurate. The data has been supplemented with additional information acquired as part of the stakeholder engagement process (see Section 19.3).
- 19.1.11 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear projects, have been used where required to inform the scope of the assessment. A precautionary approach regarding spawning and nursery grounds is largely from data published by Coull *et al.* (Ref 19.1) and Ellis *et al.* (Ref 19.2) which remain key data sources for UK waters. It is important to recognise the limitations of these sources in the context of the English Offshore Scheme.
- 19.1.12 For many demersal and pelagic fish species, the underlying data sets provide good coverage of the study area (defined in Section 19.4.1), however for others, such as elasmobranchs, there is limited information about their spawning grounds. It is also noted that more current and regional trends in fish abundance, distribution and behaviours may not be fully represented by the spawning and nursery maps due to the historic and widescale nature of the data sets.
- 19.1.13 Various technical assessments were undertaken to inform the EGL 3 and EGL 4 EIA. Where relevant (i.e., where construction methodologies are essentially identical, or where an impact pathway would occur over a similar spatial / temporal scope) the conclusions of those assessments have been used to scope 'in' or 'out' various impact pathways. These are not necessarily proposed to be repeated to inform the PEIR for this Project.
- 19.1.14 The Marine Management Organisation (MMO) annual catch statistics up to 2024 were the most recent data available at the time this chapter was being prepared. The 2024 data were published in December 2025. There are limitations on this data as smaller vessels do not legally have to share their catch data if the catch is below 30 kg. It also

assumes the species are equally spread out within ICES reporting rectangles. If newer data is published ahead of the ES this will be used. It is important to understand that catch statistics focus on the commercial species present, but other species are also found within the study area. Data from International Council for the Exploration of the Sea (ICES) biannual bottom trawl surveys, referred to as the Database of Trawl Surveys (DATRAS), and data from project-specific marine characterisation surveys have been used to fill this potential data gap.

- 19.1.15 This chapter was prepared as results from the English Offshore Scheme’s marine characterisation surveys were being made available. Not all results have been fully incorporated into the baseline description. Section 19.17 outlines where further assessment still needs to be undertaken. The assessment will be updated ahead of ES submission.

## Preliminary significance conclusions

- 19.1.16 The preliminary fish and shellfish ecology assessment presented in Section 19.10 to Section 19.15 has concluded that the potential effects assessed are either **negligible** or **minor** and therefore **not significant**. Any potential adverse effects are ones that can be adequately controlled by best practice and legal controls. Further details of the methodology behind the assessment, and a detailed narrative of the assessment itself are provided within the sections below.

## 19.2 Relevant Technical Guidance

### Technical guidance

- 19.2.1 The legislation and planning policy which has informed the assessment of effects with respect to fish and shellfish is provided within **Volume 1, Part 1, Chapter 2: Regulatory and Policy Overview** and **Volume 2, Part 1, Appendix 2.A: Regulatory and Planning Context**. Further information on policies relevant to the English Offshore Scheme is provided in **Volume 2, Part 1, Appendix 2.B: Marine Plan Policy Assessment**.
- 19.2.2 Relevant technical guidance, specific to Fish and Shellfish, that has informed this PEIR and will inform the assessment within the ES is summarised below in **Table 19-1**.

Table 19-1 Technical guidance relevant to the fish and shellfish assessment

Technical guidance document	Context
Natural England Designated Sites View (Ref 19.3)	Data and guidance about designated sites and protected species within the UK.
Joint Nature Conservation Committee UK Protected Areas (Ref 19.4)	Data and guidance about designated sites and protected species in the UK.
Popper et al. (Ref 19.5)	Sound exposure guidelines for fishes and sea turtles.

## 19.3 Consultation and Engagement

### Overview

- 19.3.1 The assessment has been informed by non-statutory consultation responses and ongoing stakeholder engagement. An overview of the approach to consultation is provided in Section 5.9 of **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**.
- 19.3.2 An overview of the technical engagement undertaken or planned to inform the fish and shellfish assessment is provided in paragraphs 19.3.5 to 19.3.6.

### Scoping Opinion

- 19.3.3 A Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 13 October 2025 (Ref 19.6). A summary of the relevant responses received in the Scoping Opinion in relation to the fish and shellfish, and confirmation of how these have been addressed within the assessment to date, is presented in **Table 19-2**.
- 19.3.4 The information provided in the PEIR is preliminary and not all of the Scoping Opinion comments have been addressed at this stage, however, all comments will be addressed within the ES.

Table 19-2 Summary of EIA Scoping Opinion responses for the fish and shellfish assessment

Consultee	Category	Consideration	How addressed in this PEIR
Planning Inspectorate ID 4.3.1	Temporary habitat loss / seabed disturbance – species with a pelagic life cycle – all phases	<p>The Scoping Report states that species with a fully pelagic lifecycle would not be affected by disturbance of the seabed.</p> <p>The Inspectorate notes that disturbance of subtidal seabed morphology has been scoped in for the construction and commissioning phases and refers to NE’s comment (see Appendix 2 of this Opinion) regarding the relationship between marine processes and changes to prey availability.</p> <p>The applicant’s attention is also drawn to ID 4.1.7 of this Opinion.</p> <p>For these reasons, the Inspectorate cannot exclude the possibility of significant effects for this matter during the construction and decommissioning phases. This matter should be assessed in the ES, or the absence of significant effects should be demonstrated with evidence of agreement from relevant consultation bodies.</p> <p>Regarding the operational phase, please refer to ID 4.1.1 of this Opinion.</p>	These impact pathways have been considered within the preliminary assessment presented in Section 19.10 and Section 19.11.
Planning Inspectorate ID 4.3.2	Permanent habitat loss during the deposit of cable protection for species with fully pelagic life cycle during construction, operation and decommissioning	<p>The Scoping Report states that species with a fully pelagic lifecycle would not be affected by localised seabed deposits.</p> <p>The Inspectorate refers to Section 4.4 of the Scoping Report which notes that the full extent of cable protection is currently unknown. Together with the NE’s comments regarding the sediment modelling (please refer to ID 4.1.7 of this Opinion), the Inspectorate cannot exclude the possibility of significant effects for this matter. This matter should</p>	

Consultee	Category	Consideration	How addressed in this PEIR
		be assessed in the ES, or the absence of significant effects should be demonstrated with evidence of agreement from relevant consultation bodies.	
Planning Inspectorate ID 4.3.3	Temporary increase and deposition of suspended sediments – presweeping - for shellfish and fish species with demersal life stage during operation	Please refer to ID 4.1.1 of this opinion.	A spreadsheet-based model has been applied to assess the potential dispersion of sediment plumes arising from pre-sweeping. Additional details on the spreadsheet-based modelling approach and results are provided in <b>Volume 1, Part 3, Chapter 17: Coastal and Marine Physical Processes</b> . A Fine Sediment Modelling Spreadsheet ( <b>Volume 2, Part 3, Appendix 17.A: Fine Sediment Modelling Spreadsheet</b> ). The potential for significant effects from these impact pathways have been considered by the EIA and assessed in the Preliminary Assessment - see Section 19.12.
Planning Inspectorate ID 4.3.4	Temporary increase and deposition of suspended sediments – presweeping - for species with fully pelagic life cycle during operation	Please refer to ID 4.3.1 of this opinion.	
Planning Inspectorate ID 4.3.5	Temporary increase and deposition of suspended sediments during: <ul style="list-style-type: none"> <li>Seabed preparation;</li> <li>HDD duct excavation;</li> <li>Cable burial and trenching;</li> <li>Anchoring / jack-up legs;</li> <li>Deposit of external cable protection; and</li> </ul>	<p>The Scoping Report refers to the sediment plume modelling for EGL 3 and EGL 4 that concluded that the spatial extent of heavy smothering is localised as fine particles will settle within 3.15 km of the disposal location.</p> <p>The applicant’s attention is drawn to NE’s comment (Appendix 2 of this Opinion) regarding the methodology and data used to inform the sediment modelling calculations. For this reason, the Inspectorate cannot exclude the possibility of significant effects for this matter. This matter should be assessed in the ES, or the absence of significant effects should be demonstrated with evidence of agreement from relevant consultation bodies.</p>	A spreadsheet-based model has been applied to assess the potential dispersion of sediment plumes arising from activities during construction, including sandwave clearance, excavation of exit pits and cable trenching operations. Additional details on the spreadsheet-based modelling approach and results are provided in <b>Volume 1, Part 3, Chapter 17: Coastal and Marine Physical Processes</b> . A Fine Sediment Modelling Spreadsheet ( <b>Volume 2, Part 3, Appendix 17.A: Fine Sediment Modelling Spreadsheet</b> ). The potential for significant effects from these impact

Consultee	Category	Consideration	How addressed in this PEIR
	<ul style="list-style-type: none"> <li>Cable removal.</li> </ul> <p>On shellfish and fish species with demersal life stage during construction, operation and decommissioning.</p>		<p>pathways have been considered by the EIA and assessed in the Preliminary Assessment - see Section 19.12.</p>
<p>Planning Inspectorate ID 4.3.6</p>	<p>ID 4.3.6 – Temporary increase and deposition of suspended sediments during:</p> <ul style="list-style-type: none"> <li>Seabed preparation;</li> <li>HDD duct excavation;</li> <li>Cable burial and trenching;</li> <li>Anchoring / jack-up legs;</li> <li>Deposit of external cable protection; and</li> <li>Cable removal.</li> </ul> <p>On herring during construction, operation and decommissioning.</p>	<p>Table 20-14 Temporary increase and deposition of suspended sediments – herring – operation. Please refer to ID 4.1.1 of this Opinion.</p>	
<p>Planning Inspectorate ID 4.3.7</p>	<p>Temporary increase and deposition of suspended sediments during:</p> <ul style="list-style-type: none"> <li>Seabed preparation;</li> </ul>	<p>The Scoping Report states that the sediment transport modelling undertaken for the EGL 3 and EGL 4 shows that any impact from SSC is expected to be small, localised and temporary, the</p>	

Consultee	Category	Consideration	How addressed in this PEIR
	<ul style="list-style-type: none"> <li>HDD excavation;</li> <li>Cable burial and trenching;</li> <li>Anchoring / jack-up legs;</li> <li>Deposit of external cable protection; and</li> <li>Cable removal.</li> </ul> <p>On species with fully pelagic life cycle during construction, operation and decommissioning.</p>	<p>Inspectorate is content to scope this matter out of further assessment.</p> <p>Please refer to ID 4.3.5 of this Opinion setting out the reason why the Inspectorate cannot exclude the possibility of significant effects for this matter. This matter should be assessed in the ES, or the absence of significant effects should be demonstrated with evidence of agreement from relevant consultation bodies.</p>	
Planning Inspectorate ID 4.3.8	Accidental spills on all species during construction, operation and decommissioning	The Inspectorate is content to scope this matter out noting the legal requirements upon vessels to manage any accidental releases or spills of materials or chemicals. The ES should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	Acknowledged. Impact pathway continues to remain scoped out as agreed. Several management plans will be provided with the ES to support the DML. These will include an Outline Construction Environmental Management Plan (CEMP) and Outline Marine Pollution Contingency Plan (MPCP). These documents will outline measures to be implemented to comply with legislation (e.g., in relation to the prevention of oil and chemical spills) during all phases of the English Offshore Scheme.
Planning Inspectorate ID 4.3.9	Introduction or spread of marine invasive nonnative species (MINNS) on shellfish	The Inspectorate notes a number of commitments in the Scoping Report to manage effects. The Inspectorate agrees that this matter can be scoped out on the basis that the mitigation measures	Acknowledged. Impact pathway continues to remain scoped out as agreed. Several management plans will be provided with the ES to support the

Consultee	Category	Consideration	How addressed in this PEIR
	during construction, operation and decommissioning	proposed within the Outline Construction and Environmental Management Plan which would detail how the biosecurity plan would be implemented during all phases of the proposed development, should be sufficient to address the likely impacts and avoid a likely significant effect. The ES should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	Deemed Marine Licence. These will include an Outline CEMP which will incorporate biosecurity measures. These documents will outline measures to be implemented to comply with legislation during all phases of the English Offshore Scheme.
Planning Inspectorate ID 4.3.10	Underwater noise changes due to the presence of Project vessels and equipment on medium and high hearing sensitivity species during construction, operation and decommissioning	For construction, the Scoping Report explains that the noise modelling undertaken for the EGL 3 and EGL 4 concluded that impacts on fish as a result of Project vessels and equipment was not significant and given that the construction activities for the proposed development will be identical and in a similar location, no significant effects are likely. In their consultation response, JNCC notes that the underwater noise modelling for EGL 3 and EGL 4 is still under discussion and has not been agreed to date. For this reason, the Inspectorate is not in a position to scope this matter out at this time. This matter should be assessed in the ES, or the absence of significant effects should be demonstrated with evidence of agreement from relevant consultation bodies.	Underwater noise modelling undertaken for the EGL 3 and EGL 4 Projects (Ref 19.7) has been used to inform the preliminary assessment presented, which is presented in Section 19.13. This modelling is appropriate to refer to given the geographical proximity of the EGL 3 and EGL 4 Projects to the English Offshore Scheme and the similarities in the construction / operation methodologies.
Planning Inspectorate ID 4.3.11	Collision risk on basking shark during construction, operation and decommissioning	The Inspectorate is content that few basking sharks have been recorded in the study area in the 20 years and therefore the potential for collision is minimal and unlikely to be significant.	Acknowledged. Impact pathway continues to remain scoped out as agreed.

Consultee	Category	Consideration	How addressed in this PEIR
Planning Inspectorate ID 4.3.12	Electromagnetic changes / barrier to species movement on electrosensitive species during construction, operation and decommissioning	<p>The Inspectorate is content to scope this matter out for construction and decommissioning as at these phases, the cables are not in operation.</p> <p>Regarding the operation phase, the applicant's attention is drawn to paragraph 3.4.2 of the MMO's response which requests certain shellfish species to be scoped in owing to the expanse of the proposed development and the fact that some shellfish species have a migratory or movement phase within their annual or life cycles.</p> <p>The applicant's attention is also drawn to ID 4.2.5 of this Opinion. For these reasons, the Inspectorate does not agree to scope this matter out at this stage. The ES should assess this matter or demonstrate an absence of likely significant effects, with evidence of agreement from relevant consultation bodies.</p>	The potential for significant effects from this impact pathway has been considered by the EIA and assessed in the PEIR – see Section 19.14.
Planning Inspectorate ID 4.3.13	Temperature increase due to the presence of cables on demersal species during construction, operation and decommissioning	<p>The Inspectorate is content to scope this matter out for construction and decommissioning as at these phases, the cables are not in operation. Regarding the operation phase, please refer to ID 4.1.6 of this Opinion.</p>	Potential significant effects resulting from temperature increases during operation have been considered within this PEIR chapter, drawing on <b>Volume 2, Part 1, Appendix 4.B: EGL 5 Heat Calculations Technical Report</b> and presented in Section 19.15.
Planning Inspectorate ID 4.3.14	Specific surveys for water vole, great crested newt and white-clawed crayfish	<p>In the absence of information such as evidence demonstrating clear agreement with relevant statutory bodies, the Inspectorate is not in a position to agree to scope these matters from the assessment. Accordingly, the ES should include an assessment of these matters or the information referred to demonstrating agreement with the</p>	Comment believed to be included on the fish and shellfish chapter in error as it relates to the English Onshore Scheme. Has been addressed in <b>Volume 1, Part 2, Chapter 6: Biodiversity</b> .

Consultee	Category	Consideration	How addressed in this PEIR
		relevant consultation bodies and the absence of a Likely Significant Effect.	
Marine Management Organisation ID 3.3.1	Study Area and receptors considered	The Scoping Report has defined a fish and shellfish study area which extends 15 km either side of the English Offshore Scheme Scoping Boundary. The report identifies that the transmission cable overlaps with important spawning areas for Atlantic herring ( <i>Clupea harengus</i> ), whiting ( <i>Merlangius merlangus</i> ), sandeel ( <i>Ammodytes</i> spp.), plaice ( <i>Pleuronectes platessa</i> ) and other species. Periods of sensitivity for species with spawning and nursery grounds overlapping the Project boundary are provided in Table 20-7. Herring and sandeel have been identified as species with a higher sensitivity to disturbance and the report has noted that twaite shad ( <i>Alosa fallax</i> ), allis shad ( <i>A. alosa</i> ), sea lamprey ( <i>Petromyzon marinus</i> ), river lamprey ( <i>Lampetra fluviatilis</i> ), Atlantic salmon ( <i>Salmo salar</i> ), European eel ( <i>Anguilla anguilla</i> ) and Smelt ( <i>Osmerus eperlanus</i> ) may also be present within the Project boundary.	The presence of diadromous species (such as shad, lamprey and salmonids) has been considered within this PEIR. More on these species is provided in Section 19.5.68.
Marine Management Organisation ID 3.3.2	Impacts of temporary increase and deposition of suspended sediments on various fish species	Temporary increase and deposition of suspended sediments arising from seabed preparation (e.g., boulder clearance, Pre-lay Grapnel Run ("PLGR"), HDD duct excavation, cable burial and trenching, anchoring / jack-up foundations, and the deposit of external cable protection has been scoped out for all stages of development for all fish species. It is noted in Table 25-9 that the most significant contributor to the temporary increase and deposition of suspended sediment will come from the sediment plume generated by cable trenching,	Temporary increase and deposition of suspended sediments arising from seabed preparation has been scoped in for herring eggs and larvae but scoped out for all other fish species. See <b>Table 19-12</b> and <b>Table 19-13</b> for more detail.

Consultee	Category	Consideration	How addressed in this PEIR
Marine Management Organisation	Scoped-out pathways	<p>with the size of the area affected being influenced by the trenching technique employed.</p> <p>It has not yet been confirmed which trenching technique will be employed, and sediment plume modelling has yet to be carried out for the Project; there is therefore some uncertainty over the extent of the sediment plume and the expected concentrations of sediment in the water column that will be generated (in contrast to typical background levels). However, the ES has referenced the EGL 3 and EGL 4 sediment plume modelling which shows that the spatial extent of heavy smothering is extremely localised, restricted to less than a couple of metres either side of the trench and that fine particles will settle within 3.15 km of the disposal location. Impacts from the temporary increase and deposition of suspended sediments arising from cable burial and trenching during the construction and decommissioning stages are scoped in for herring only. This is appropriate given the ES has identified that the cable routes pass through herring spawning grounds and has recognised that herring are sensitive to any seabed disturbance. The sensitivity of herring includes the risk to their eggs and larvae at the spawning grounds which can be smothered from the deposition of fine sediments. Given the sensitivity of herring eggs and larvae, the MMO supports this scoping decision, and is content for this impact to be scoped out for all other fish species.</p> <p>On the whole, the MMO considers that suitable justification has been provided for the scoping out of impacts / receptors in Table 20-14. Impacts</p>	Acknowledged. Impacts arising from accidental spills of contaminants and

Consultee	Category	Consideration	How addressed in this PEIR
ID 3.3.3		<p>arising from accidental spills of contaminants has been scoped out for all stages of the Project in consideration of compliance with marine pollution legislation for all fish species. The MMO has no objection to this approach. Collision risk to basking sharks has also been scoped out of further assessment on the basis that there have only been two sightings of the species within the study area in the last 20 years. The MMO agrees with this decision.</p>	<p>collision risk with Basking sharks continue to be scoped out of the assessment.</p>
<p>Marine Management Organisation ID 3.3.4</p>	<p>Approach to EIA and data gathering</p>	<p>The approach to the EIA and data gathering to characterise the environment for fisheries and fish ecology is generally appropriate. It is noted that species-specific assessments for herring and sandeel will be undertaken, with characterisations of their respective habitats undertaken following the methods outlined in Kyle-Henney (2024) for herring and Reach et al. (2024) for sandeel. The MMO considers that this is appropriate. It is also noted that additional grab sample locations will be included in the benthic surveys in areas of potential herring spawning habitat or sandeel habitat. Sediment samples for particle size analysis will be acquired every 2.5 km within these areas. This is welcomed and will assist in improving the spatial coverage of seabed sediment types in terms of their suitability as herring spawning habitat and sandeel habitat.</p>	<p>The MMO's acceptance that the approach to EIA and data gathering is appropriate is welcomed. Detail of the herring and sandeel habitat suitability within the study area is provided within Sections 19.5.28 and 19.5.31.</p>
<p>Marine Management Organisation ID 3.3.5</p>	<p>Mitigation</p>	<p>No mitigation for fish has been identified or proposed, which is to be expected at this stage. The need for specific mitigation measures for fish should be determined by appropriate evidence and the outcomes of the EIA.</p>	<p>Noted – measures will be outlined within the ES where relevant.</p>

Consultee	Category	Consideration	How addressed in this PEIR
Marine Management Organisation ID 3.3.6	Cumulative impacts	In light of the issues raised concerning potential cumulative impacts to Banks herring spawning habitat in the ongoing consultations for EGLs 1-4, the MMO recommends that the Applicant ensures their list of projects scoped into the cumulative impact assessment includes all projects in the planning, construction and operational stages of development in Central North Sea region, particularly those which occur in the vicinity of, or have elements which interact with, the Flamborough Head herring spawning ground.	Noted. This will be considered as part of the cumulative effects assessment presented at ES (presented within <b>Volume 1, Part 4, Chapter 27: Cumulative Effects</b> within this PEIR).
Marine Management Organisation ID 3.4.1 and 3.4.2	Impacts of EMF on shellfish species	<p>The MMO is in generally agreement with the justification for the scoping out of most impacts / receptors in Table 20-14. However, we would hesitate with the scoping out of Electromagnetic changes as barrier to species movement during operation. Please see comment 3.4.2 below.</p> <p>Whilst Electromagnetic Fields (“EMF”) calculations are noted as ‘not significant’, the expanse of the full North Sea project will be unique in its extent, so the MMO considers EMF should be ‘scoped in’.</p> <p>Some shellfish species have a migratory or movement phase within their annual or life cycles such as the edible crab (<i>Cancer pagurus</i>) so scoping in some form of shellfish monitoring during the operational phases to verify the assumptions that EMF output would be no barrier to movement for benthic shellfish species. This monitoring in its most simple form could be as an assessment of fishing activity and landings data trends from shellfish fisheries pre, during and post the operational lifetime. Section 29.3.5. notes that “comprehensive information on EMFs will be</p>	The potential for significant effects from this impact pathway has been considered by the EIA and assessed in the PEIR – see Section . The results of the EMF study are presented in <b>Volume 2, Part 1, Appendix 4.A: Electromagnetic Field (EMF) Study.</b>

Consultee	Category	Consideration	How addressed in this PEIR
		provided in a separate document submitted alongside the ES”.	
Marine Management Organisation ID 3.4.8	Baseline data sources	Section 20.8 Assessment Limitations and Assumptions 20.8.2 highlights the limitations of species maps for spawning and nursery grounds based largely on data published by Coull <i>et al.</i> ,(1998), and Ellis et al. (2012). It should be clearly stated that these do not adequately cover shellfish species. Only Nephrops is included in these publications.	A full description of the baseline data sources used to inform the assessment is presented in <b>Table 19-3</b> . The limitation of the Coull <i>et al.</i> and Ellis <i>et al.</i> data is acknowledged in Section 19.5.6. The baseline presented is considered a robust characterisation of the fish and shellfish community.
Marine Management Organisation ID 3.4.9	Mitigation	No specific mitigation for shellfish and fisheries is proposed at this scoping stage, other than consultation of fishers and consideration of data to identify appropriate mitigation. The need for specific mitigation measures for shellfish should be determined by appropriate evidence and detailed in the EIA and ES.	Noted – measures will be outlined within the ES where relevant.
Marine Management Organisation ID 3.4.10	Spawning and nursery grounds	The main references given relating to the location of fish and shellfish spawning and nursery grounds (Coull et al., 1998 and Ellis et al., 2012) are limited for shellfish in that they only mention one shellfish species ( <i>Nephrops norvegicus</i> ). For this reason, these references do not address spawning and nursery areas for all the other main commercial shellfish species in the assessed area (such as whelk ( <i>Buccinum undatum</i> ), edible crab ( <i>Cancer pagurus</i> ), and scallop ( <i>Pecten maximus</i> )). For these shellfish species, the current observed fishery grounds (indicating adult presence) can be used as a proxy for the spawning and nursery grounds for these shellfish species as they are generally sessile	MMO catch data (Ref 19.8) and DATRAS survey results (Ref 19.9) have been used to inform the shellfish ecology baseline.

Consultee	Category	Consideration	How addressed in this PEIR
		with limited migrations when compared to fish species.	
Marine Management Organisation ID 3.4.11	Mitigation	Mitigations could include the considerations of sediment curtains and choice of a methodology of least suspension (dependant on seabed substrate and shellfish prevalence indicated by fishing intensity).	Noted – measures will be outlined within the ES where relevant.
Marine Management Organisation ID 3.4.12	Cumulative effects	With respect to National Planning policy relevant to cumulative effects, it notes that “Applicants are encouraged to work collaboratively with those other developers and sea users on co-existence / co-location opportunities, shared mitigation, compensation and monitoring where appropriate. Where applicable, the creation of statements of common ground between developers is recommended”. In those areas where shellfish are prevalent, fishing intensity is elevated and other cumulative project density is high such as ICES rectangles 37F0, 36F0, then the dialogue to ensure common mitigation and monitoring is promoted and documented between the projects.	Noted. Consideration of relevant schemes will be presented in the ES (presented within <b>Volume 1, Part 4, Chapter 27: Cumulative Effects</b> within this PEIR).
Marine Management Organisation ID 3.4.13	eDNA survey results	Table 20-8 shows the ‘Top ten most populous species in eDNA water samples (sampled during EGL 4 environmental surveys)’. It should be clearly stated whether the sampling was assessing shellfish as well as piscine species.	eDNA results obtained during the Environmental Baseline Surveys are presented in <b>Table 19-5</b> . It is clarified that this analysis was specific to fish species.
Marine Management Organisation ID 3.4.14	MMO Shellfish catch data	Table 20-10 ‘Top five shellfish species caught in 2023 within the Study Area’ by landed weight (tonnes) and value (£), values are missing weight and value figures. These should be added to the report.	This data has been presented within Section 19.5.

Consultee	Category	Consideration	How addressed in this PEIR
Marine Management Organisation ID 3.4.15	Shellfish baseline	Section 20.4.30 notes that ‘the top five shellfish species by catch value in 2023’ were Crabs (C.P Mixed Sexes), Lobster, Nephrops (Norway Lobster), Scallops and Cockles. ‘A brief description of the most sensitive species is presented below’ Lobster ( <i>Homarus gamarus</i> ) and Scallops are missing from these descriptions in Sections 20.4.32 to 36 and should therefore be added to the report.	Discussion of these species is presented within this PEIR in Section 19.5.
Marine Management Organisation ID 3.4.16	Shellfish baseline	In Section 20.4.39 [of the Scoping Report] shellfish i.e., crab and lobsters should be included in the spawning ground sentence.	This has been updated in the equivalent Section of this PEIR 19.5.93.
Marine Management Organisation ID 3.4.17	Sensitive receptors	shellfish In Section 20.6.1, the statement notes sensitive Shellfish with demersal life stages yet only lists ‘cockles’. All shellfish will have demersal life stages and other commercial shellfish would be classed as sensitive i.e., burrowing female crabs. Therefore, this should be amended.	This has been updated and is presented in <b>Table 19-11</b> and <b>Table 19-12</b> .
Natural England	Receptors and England Remit	Natural England’s remit is to focus on fish and shellfish where they are designated features or in terms of prey availability to features of designated sites.  Natural England also defers to the expertise of Cefas on matters of fish and shellfish ecology.	Acknowledged.
Environment Agency	Fisheries	Sea trout ( <i>Salmo trutta</i> ) not included in the scope. Impacts from the scheme on this fish species may not be considered. Sea trout are a diadromous species listed as a priority species on S41 of the NERC Act. They are present in a number of watercourses such as the Humber Estuary, River Trent and River Ouse and spend their marine life in	Acknowledged, sea trout have been considered as part of the preliminary assessments presented in Section 19.11.

Consultee	Category	Consideration	How addressed in this PEIR
Environment Agency	Fisheries	<p>coastal regions of the North Sea. They must be included in the scope of the Environmental Impact Assessment (EIA) to ensure impact-pathways are assessed.</p> <p>European eel and Atlantic salmon not being noted as present in the Humber Estuary, River Trent and River Ouse. Impacts from the scheme on protected fish species may not be considered. Both these protected fish species are present in the Humber Estuary and migrate through to the River Trent and Ouse and should be noted in the EIA.</p>	Acknowledged, European eel and Atlantic salmon have been considered as part of the preliminary assessments presented in Section 19.11.

## Technical engagement

- 19.3.5 Technical engagement with consultees in relation to various chapters within this PEIR is ongoing. To date no engagement relating to Fish and Shellfish has occurred.
- 19.3.6 Ongoing engagement with stakeholders will take place through the duration of the English Offshore Scheme with regular meetings taking place with the MMO, Cefas and the Northeastern and Northumberland Inshore Fisheries and Conservation Authorities (IFCAs).

## 19.4 Data Gathering Methodology

- 19.4.1 This assessment has been collated based on a range of publicly available data and information only. It is assumed that the data collected is accurate. The data has been supplemented with additional information acquired as part of the Stakeholder engagement process. The sources of data used are noted in **Table 19-3**.

### Study Area

- 19.4.2 The English Offshore Scheme will route from Anderby Creek across the Southern and Central North Sea to the boundary between the English and Scottish adjacent waters. The draft Order Limits for the English Offshore Scheme are illustrated in **Volume 3, Part 3, Figure 19-1: Fish and Shellfish Study Area**.
- 19.4.3 The study area for this receptor includes the draft Order Limits plus an additional 19.8 km each side. This buffer is informed by the tidal excursion, which varies along the English Offshore Scheme. It acts a precautionary maximum zone of influence (Zoi) and incorporates the area within which there is the potential for direct impacts associated with the deposition of suspended sediments. It is consistent with **Volume 1, Part 3, Chapter 17: Coastal and Marine Physical Processes** and has been validated through reference to fine sediment modelling calculations **Volume 2, Part 3, Appendix 17.A: Fine Sediment Modelling Spreadsheet**, which should be read in conjunction with this technical aspect chapter.

### Desk study

- 19.4.4 Desk-based review of publicly available data sources (literature and geographical information science (GIS) mapping files) have been used to describe the baseline environment. A summary of the organisations from which data has been sourced, together with the nature of that data is outlined in **Table 19-3**.

Table 19-3 Data sources used to inform the fish and shellfish assessment

Organisation	Data source	Data provided
Department for Energy & Climate Change (DECC)	Offshore Energy Strategic Environmental Assessment 4 (Ref 19.10)	Baseline information on the fish and shellfish literature review.
Centre for Environment, Fisheries and Aquaculture Science (Cefas)	Coull <i>et al.</i> (Ref 19.1) & Ellis <i>et al.</i> (Ref 19.2)	Fish Sensitivity Maps showing spawning and nursery grounds of selected fish species in UK waters.
International Council for the Exploration of the Sea (ICES)	<a href="https://www.ices.dk/">https://www.ices.dk/</a> (Ref 19.11)	(Ref International Herring Larvae Surveys (IHLS) and international research reports and publications from ICES.
ICES	<a href="https://www.ices.dk/data/data-portals/pages/datras.aspx">https://www.ices.dk/data/data-portals/pages/datras.aspx</a> (Ref 19.9)	DATRAS online database of trawl surveys. Data used from surveys in 2024.
MarineSpace Report prepared for the British Marine Aggregate Producers Association (BMAPA)	Marine Space (Ref 19.12)	Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments. Version 1.0.
MarineSpace report for UK marine aggregate industry	Kyle-Henney <i>et al.</i> (Ref 19.13)	MarineSpace report: Identifying and Mapping Atlantic Herring [ <i>Clupea harengus</i> ] Potential Spawning Habitat: An Updated Method Statement.
MarineSpace report for UK marine aggregate industry	Reach <i>et al.</i> (Ref 19.14)	MarineSpace report: Identifying and Mapping Sandeel Potential Supporting Habitat: An Updated Method Statement.
Environment Agency	Transitional and Coastal Waters (TraC) Fish Monitoring Programme (Ref 19.15)	Data from the TraC Fish Monitoring Programme.
Inshore Fisheries and Conservation Authority (IFCA)	<a href="https://association-ifca.org.uk">https://association-ifca.org.uk</a>	Website with information about fishing and the species in the different regional IFCA.
FishBase	<a href="https://www.fishbase.org">https://www.fishbase.org</a>	Species reference website.

Organisation	Data source	Data provided
European Marine Observation and Data Network (EMODnet)	<a href="https://www.emondnet.eu/biology">https://www.emondnet.eu/biology</a>	Interactive reference website which shows fish abundance and distribution.
Marine Management Organisation (MMO)	UK Sea Fisheries annual statistics (Ref 19.16)	UK Sea Fisheries annual statistics report 2023 and accompanying datasets which includes species catch list for the relevant ICES rectangles.
International Convention for the Conservation of Nature (IUCN)	<a href="https://www.iucnredlist.org/">https://www.iucnredlist.org/</a>	The IUCN Red List of Threatened Species.
National Grid	Eastern Green Link (EGL) 3 and EGL 4 (Ref 19.17, 18)	PEIR chapters on Fish and Shellfish and Commercial Fisheries for the EGL 3 and EGL 4 Projects.
Joint Nature Conservation Committee (JNCC)	<a href="https://data.jncc.gov.uk/data/98fb6dab-13ae-470d-884b-7816afce42d4/UKBAP-priority-fish.pdf">https://data.jncc.gov.uk/data/98fb6dab-13ae-470d-884b-7816afce42d4/UKBAP-priority-fish.pdf</a> (Ref 19.19)	Species specific data of native species of conservation importance.
British Geological Society (BGS)	GeoIndex Offshore Portal (Ref 19.20)	Marine Sediment Particle Size dataset sourced from the BGS GeoIndex Offshore portal.
Article published in the journal Fisheries Research	Eaton <i>et al.</i> (Ref 19.21)	Summarising results of edible crab <i>Cancer pagurus</i> larvae surveys undertaken along the English east coast to inform species distribution.
Article published in the Journal of the Marine Biological Association of the United Kingdom assessing	Tallack (Ref 19.22)	The seasonality of the reproductive cycle for edible crab in the Shetland Islands, Scotland.
FishSource	FishSource (Ref 19.23)	Summary of the distribution of the Norway lobster <i>Nephrops norvegicus</i> in the Farn Deeps fishery within the North Sea.
The Working Group on Nephrops Surveys (WGNEPS)	WGNEPS Data (Ref 19.24)	International coordination group on Nephrops surveys both underwater and trawl surveys.

## Survey work

- 19.4.5 Data was acquired across a 300 m wide corridor in water depths <70 m and a 500 m wide corridor in water depths >70 m between for the EGL 5 Project between 28 May to 25 June 2025 (subtidal) and 03 to 05 December 2025 (intertidal). The scope of the geophysical and ongoing geotechnical surveys is described in **Volume 1, Part 3, Chapter 17: Coastal and Marine Physical Processes**. The scope of the environmental surveys is described in **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**. It should be noted that draft survey reports were being received as the preliminary environmental assessment was being drafted. Preliminary particle size analysis has been used to determine the suitability of sediments for herring (*Clupea harengus*) and sandeel (Ammodytidae). A full assessment identifying sediments suitable for Atlantic herring spawning and nursery and habitat suitable for sandeel within the draft Order Limits will be presented in the ES.
- 19.4.6 It is anticipated that for the ES further information will be available to inform the baseline description. Where preliminary information could be incorporated into this chapter, it has been, with any gaps identified.

## 19.5 Overall Baseline

- 19.5.1 The following section outlines the existing baseline conditions for Fish and Shellfish within the study area.
- 19.5.2 The section focuses on spawning and nursery grounds within the study area, as well as general fish and shellfish recorded within the study area originating from commercial fisheries and relevant survey data, commercial fish species (from an ecology perspective), protected species and relevant designated sites.

### Current baseline

- 19.5.3 This section provides a characterisation of the current baseline environment and describes the key fish and shellfish receptors including information on spawning and nursery grounds within the English Offshore Scheme draft Order Limits and study area. It also includes the designated sites and protected species identified to be present within the study area.
- 19.5.4 Over 330 species of fish have been recorded in UK waters, with the North Sea supporting a wide variety of both pelagic (species that live within the water column) and demersal (species that live or feed on the seabed) species (Ref 19.10). The species most likely to be affected by the English Offshore Scheme are those with demersal life stages, and those sensitive to underwater noise changes e.g., hearing specialists such as clupeoids (e.g., Atlantic herring, shad (*Alosa* spp.), sprat (*Sprattus sprattus*)). The North Sea is home to important fishing grounds used not only by the local English and Scottish fleet but also by international vessels from Belgium, the Netherlands, Denmark, France, Ireland, Spain and Germany. To enable accurate monitoring the sea is divided into rectangles by ICES. Each ICES rectangle is approximately 30 NM squared and is 30 min latitude and 1° longitude in size (Ref 19.11). Analysis of the fishing data from these ICES rectangles has been used as an indication of the commercial fish species present in the study area, but it is recognised that it does not provide a definitive list of species present.

### **Spawning and nursery grounds within the study area**

- 19.5.5 **Table 19-4** summarises the species which use the study area as spawning and / or nursery grounds and the months within which this occurs. Spawning grounds are described as the location(s) where eggs are laid, and nursery grounds are the location(s) where juveniles of a species are common. Information is taken from the Cefas fisheries sensitivities maps (Ref 19.1, 2). It also shows the intensity of 0 group aggregations, which are fish within the first year of their lives (Ref 19.25). Nursery periods have been assumed to be the same as spawning but continue for two further months.
- 19.5.6 Where information is available in the form of mapped data this has been presented in **Volume 3, Part 3, Figures 19-2 and 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Maps 1 and 2)**. It is acknowledged that these data do not adequately cover shellfish species, but this group is well represented in the eDNA, MMO and DATRAS data presented below.

Table 19-4 Spawning and nursery grounds within the study area

		Spawning only		Nursery only			Both											
Species	Latin names	Spawning zone	Intensity	Nursery zone	Intensity	** Presence of Group 0 aggregations	J	F	M	A	M	J	J	A	S	O	N	D
Anglerfish	<i>Lophius piscatorius</i>	N/A	N/A	Demersal	Low	Low												
Atlantic Cod	<i>Gadus morhua</i>	Pelagic	Low	Demersal	High	Low		*	*									
Atlantic Herring (Banks / Dogger Stock)	<i>Clupea harengus</i>	Demersal	High	Pelagic	High	Low / Medium												
Atlantic Mackerel	<i>Scomber scombrus</i>	Pelagic	Low	Pelagic	Low	Low					*	*	*					
Blue Whiting	<i>Micromesistius poutassou</i>	N/A	N/A	Pelagic	Low					*	*							
Edible Crab	<i>Cancer pagurus</i>	Demersal	Unknown	Demersal	Unknown	Unknown												
Common Sole	<i>Solea solea</i>	Pelagic Demersal	/ Low	Demersal	Low	Low					*							
European Hake	<i>Merluccius merluccius</i>	N/A	N/A	Demersal	Low	Low		*	*									
European Plaice	<i>Pleuronectes platessa</i>	Pelagic Demersal	/ High	Demersal	Low	Low	*	*										
European Sprat	<i>Sprattus sprattus</i>	Pelagic	Low	Pelagic	Low	Low / Medium					*	*						
Haddock	<i>Melanogrammus aeglefinus</i>	N/A	N/A	Demersal	Low	Medium / High		*	*	*								

Species	Latin names	Spawning only		Nursery only			Both											
		Spawning zone	Intensity	Nursery zone	Intensity	** Presence of Group 0 aggregations	J	F	M	A	M	J	J	A	S	O	N	D
Lemon Sole	<i>Microstomus kitt</i>	Demersal	Low	Demersal	Low													
Ling	<i>Molva molva</i>	N/A	N/A	Demersal	Low													
Lobster	<i>Homarus gammarus</i>	Demersal	Unknown	Demersal	Unknown	Unknown												
Nephrops	<i>Nephrops norvegicus</i>	Demersal	Low	Demersal	Low				*	*	*							
Norway Pout***	<i>Trisopterus esmarkii</i>	Demersal	Low	N/A	N/A	Low		*	*									
Sandeels	<i>Ammodytidae</i> spp.	Demersal	Low	Demersal	Low													
Spurdog	<i>Squalus acanthias</i>	N/A	N/A	Viviparous	Low													
Thornback ray	<i>Raja clavata</i>	Demersal	Low	Demersal	Low				*	*	*	*	*					
Whiting	<i>Merlangius merlangus</i>	Pelagic	Low	Pelagic	High	Low												
Whelk	<i>Buccinum undatum</i>	Demersal	Unknown	Demersal	Unknown	Unknown												

\*Peak spawning, \*\* 0 Group fish defined as fish in the first year of their lives. N/A: No data. Data originate from Coull *et al.* (Ref 19.1) and Ellis *et al.* (Ref 19.2).

## eDNA Results

19.5.7 During the EGL 5 environmental survey (see **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology** for more detail on this survey) environmental DNA (eDNA) samples were acquired. A total of 69 fish taxa were detected in the samples. **Table 19-5** presents the ten species identified in the eDNA water samples with the highest number of Operational Taxonomic Units (OTUs). An OTU is analogous to a species, but ‘OTU’ is used instead of ‘species’ because there are instances when eDNA results may differ from what is defined as a species. Analysis of the water samples was specific to fish and vertebrate eDNA.

Table 19-5 Species identified in the eDNA water samples during the environmental baseline survey with the highest number of OTUs

Family / species	Common name
<i>Scomber scombrus</i>	Atlantic mackerel
<i>Ammodytidae</i>	Sand lance (sand eel)
<i>Echiichthys vipera</i>	Lesser weaver
<i>Ciliata septentrionalis</i>	Northern rockling
<i>Sprattus sprattus</i>	European Sprat
<i>Pleuronectidae</i>	Righteye flounders
<i>Gadidae</i>	Cods and haddocks
<i>Merlangius merlangus</i>	Whiting
<i>Limanda limanda</i>	Common dab
<i>Clupea harengus</i>	Herring
<i>Chelidonichthys sp.</i>	Gurnards

## Landing Information

- 19.5.8 The draft Order Limits crosses twelve ICES Rectangles (South-North: 35F0, 36F0, 36F1, 37F0, 38E9, 38F0, 39E9, 39F0, 40E9, 40F0, 41E9, and 42E9) (visible in **Volume 3, Part 3, Figures 19.2 and 19.3: Fish nursery and spawning grounds with intensity in the Study Area (Maps 1 and 2)**). Analysis of the fishing data from the ICES rectangles has been used as an indication of the commercial fish species caught in these regions, but it is recognised that it does not provide a definitive list of species present.
- 19.5.9 The MMO produces an annual report and accompanying supporting data on UK sea fisheries statistics (Ref 19.8). The most recent data available at the time of production of this report is the 2024 data (which was published in December 2025). The ES will use the most up-to-date data available at the time.
- 19.5.10 **Table 19-6** and **Table 19-7** shows the top five species caught by catch value and landed weight within the study area. 43 different species were caught within these rectangles in 2024. The highest diversity of landed species are from the demersal group (27 species), followed by shellfish (13 species) and pelagic fish (three species). The majority of the

landings in terms of weight (92.9%) and value (97.5%) are of shellfish, with very small proportions arising from demersal and pelagic landings. Shellfish were the most valuable group in all ten ICES rectangles considered, with crabs (*C. pagurus*) and Norway lobster *N. norvegicus* top in four of twelve, and European lobster *H. gammarus*. In terms of landed weight, whiting were the only non-shellfish top species (within 42E9 at the far north of the study area).

Table 19-6 Top five landed species by value (£'000 GBP) in 2024 in ICES rectangles within the study area

ICES rectangles													
35F0		36F0		36F1		37F0		38E9		38F0			
<b>Landed species</b>	1	Crabs (C.P. Mixed Sexes)	£48,460	Crabs (C.P. Mixed Sexes)	£185,659	Crabs (C.P. Mixed Sexes)	£112,569	Lobsters	£152,099	Lobster	£93,089	Crabs (C.P. Mixed Sexes)	£19,196
	2	Brown shrimp	£19,762	Lobsters	£184,751	Lobsters	£31,856	Crabs (C.P. Mixed Sexes)	£51,616	Scallops	£20,855	Lobsters	£12,093
	3	Lobsters	£18,210	Scallops	£60,960	Scallops	£14,732	Scallops	£5,992	Crabs (C.P. Mixed Sexes)	£19,823	Scallops	£1,885
	4	Whelks	£7,245	Whelks	£8,319	Whelks	£2,854	Squid	£1,240	Nephrops (Norway Lobster)	£6,138	Cod	£1,632
	5	Green Crab	£651	Mackerel	£6,094	Crabs - Velvet (Swim)	£1,858	Haddock	£916	Brown Shrimps	£5,908	Monks or Anglers	£315
	39E9		39F0		40E9		40F0		41E9		42E9		
	1	Nephrops (Norway Lobster)	£224,368	Nephrops (Norway Lobster)	£8,089	Nephrops (Norway Lobster)	£7,972	Nephrops (Norway Lobster)	£616	Nephrops (Norway Lobster)	£554	Lobsters	£2,377

ICES rectangles												
2	Lobsters	£6,400	Crabs (C.P. Mixed Sexes)	£4,008	Lobsters	£2,971	Cod	£101	Gurnards - Grey	£9	Nephrops (Norway Lobster)	£2,287
3	Haddock	£4,346	Halibut	£1,255	Squid	£378	Saithe	£68	Haddock	£7	Whiting	£206
4	Monks or Anglers	£3,330	Shortfin squids	£1,172	Monks or Anglers	£210	Turbot	£4	Halibut	£1	Witch	£63.01
5	Halibut	£2,694	Haddock	£778	Whiting	£207					Turbot	£31.59

Source: MMO (Ref 19.8)

Table 19-7 Top five landed species by landed weight (T) in 2024 in ICES rectangles within the study area

ICES rectangles													
35F0		36F0		36F1		37F0		38E9		38F0			
Landed species	1	Crabs (C.P. Mixed Sexes)	28.54	Crabs (C.P. Mixed Sexes)	89.28	Crabs (C.P. Mixed Sexes)	37.41	Crabs (C.P. Mixed Sexes)	26.62	Scallops	14.09	Crabs (C.P. Mixed Sexes)	6.69
	2	Brown shrimp	6.14	Scallops	29.47	Whelks	12.5	Lobsters	9.28	Crabs (C.P. Mixed Sexes)	8.52	Lobsters	0.85
	3	Lobsters	1.14	Lobsters	11.4	Scallops	6.24	Scallops	3.45	Lobster	5.54	Scallops	0.7
	4	Whelks	5.31	Whelks	5.82	Lobsters	1.6	Haddock	2.01	Cod	3.3	Cod	0.61

**ICES rectangles**

5	Green Crab	28.54	Mackerel	2.2	Crabs - Velvet (Swim)	1.02	Squid	0.12	Nephrops (Norway Lobster)	1.08	Monks or Anglers	0.09
	<b>39E9</b>		<b>39F0</b>		<b>40E9</b>		<b>40F0</b>		<b>41E9</b>		<b>42E9</b>	
1	Nephrops (Norway Lobster)	35.73	Crabs (C.P.Mixed Sexes)	1.37	Nephrops (Norway Lobster)	1.19	Nephrops (Norway Lobster)	0.09	Nephrops (Norway Lobster)	0.05	Whiting	0.52
2	Haddock	6.94	Nephrops (Norway Lobster)	1.22	Lobsters	0.17	Saithe	0.05	Gurnards - Grey	0.03	Nephrops (Norway Lobster)	0.32
3	Whiting	4.63	Dabs	1.2	Squid	0.09	Cod	0.03	Haddock	0.01	Lobster	0.19
4	Monks or Anglers	0.68	Haddock	1.08	Monks or Anglers	0.06	Turbot	0	Halibut	0	Witch	0.07
5	Plaice	0.57	Whiting	1.07	Whiting	0.38					Crabs (C.P Mixed Sexes)	0.01

Source: MMO (Ref 19.8)

- 19.5.11 The previous paragraphs were focussed on the commercial aspect of fish and shellfish species, however, it is important to understand that these are not the only species found within the study area. Biannually, ICES undertake bottom trawl surveys within the ICES rectangles of the North Sea, referred to as DATRAS surveys (Ref 19.9). These surveys undertaken in quarter 1 (Q1) and quarter 3 (Q3) each year. These surveys do not just focus on commercially important species but identify all species present unlike the MMO catch statistics.
- 19.5.12 The DATRAS surveys undertaken in Q1 and Q3 of 2025 identified 86 different species of fish or shellfish within the ICES rectangles that intersect the draft Order Limits. The most abundant species caught were European sprat, followed by haddock, whiting, herring and haddock. A single Ammodytes (sandeel) was caught in rectangles 39E9 (in the northern part of the study area) and 36F0 (the southern part of the study area) in Q1 of 2025.

## General Species Information

### Shellfish species

- 19.5.13 Shellfish is a collective term for crustaceans (e.g., shrimp, lobsters, crabs) and molluscs (e.g., cockles, mussels, oysters, whelk) - animals which have a shell or shell-like exterior. A variety of shellfish species are targeted in the waters of the North Sea by commercial fisheries or are present as part of the ecosystem. The below descriptions focus on five of the more important commercial species and the Ocean quahog which is on the OSPAR list of threatened and / or declining species and habitats (Ref 19.26) and is a protected feature of several designated sites in the study area.

#### Whelk

- 19.5.14 Whelk (*Buccinum undatum*) is frequently found off all British coasts and inhabits a range of seabed types including hard and soft subtidal substrates and occasionally intertidal fringes (Ref 19.27). There are no known specific whelk migrations for spawning, though they can show aggregating behaviour. The distribution of young whelk tends to be limited to areas close to the adult stock (Ref 19.28)
- 19.5.15 Breeding occurs in late autumn where demersal egg-cases are laid in masses from November until April. Egg development is intracapsular, meaning clumps of demersal egg-cases are laid, from which young hatch as a fully formed whelk during February and March (Ref 19.29). Whelk is a highly valued species and is caught mostly in the southernmost ICES rectangles 35F0, 36F0 and 36F1 within the study area.

#### Edible crab

- 19.5.16 Edible crab (*Cancer pagurus*) is found in a range of intertidal (usually when juvenile) and subtidal habitats, on bedrock, under boulders, mixed coarse grounds and offshore in muddy sand (Ref 19.30).
- 19.5.17 Edible crab migrate long distances to offshore overwintering grounds where eggs then hatch (Ref 19.31). After pairing and mating (July to September) and subsequent spawning (October to December), egg bearing females move to offshore over-wintering grounds and are largely inactive over the brooding period until their eggs hatch in the spring and summer. The adult females then return from their migration inshore during spring and summer for pairing and mating to commence again.

19.5.18 The species had the highest landing weight of commercial shellfish species within the study area based on 2024 MMO catch data. The majority of these landings originated from ICES rectangles in the southern part of the Study Area.

#### European lobster

19.5.19 European lobster (*Homarus gammarus*) is an opportunistic scavenger with their diet consisting of small crustaceans, molluscs and polychaetes. European lobster is cosmopolitan to rocky areas of UK and Europe coasts, from below mean low water to depths of 150 m (Ref 19.32). Both sexes are thought to be sedentary and have not been found to undertake extensive migrations.

19.5.20 Egg bearing females tend to appear from September to December in areas where lobster is normally present with eggs carried externally on females until April / May. As they do not carry out extensive migrations, hatching normally takes place in the same grounds (in spring and early summer) (Ref 19.33). Primary nursery grounds for lobster are thought to be on rocky grounds in coastal waters, and juveniles can inhabit crevices and are capable of burrowing into soft sediment (Ref 19.34).

19.5.21 Lobster is another highly targeted and valuable species which is caught year-round. Similar to edible crab the greater catch is within the southern part of the study area.

#### Norway lobster

19.5.22 Norway lobster (*Nephrops norvegicus*) commonly known as Nephrops are present in muddy habitats, with high concentrations of silt and clay. The species are known to occur in the Farn Deeps area, which is an essential winter fishery running from September to March (Ref 19.23).

19.5.23 Nephrops feed primarily on crustaceans but also molluscs and to a lesser extent polychaetes and echinoderms (Ref 19.35). Sexually mature Nephrops of both sexes moult towards the end of spring and into the summer. Mating takes place whilst the female is still 'soft' (Ref 19.36) directly after the female has moulted and before the hardening of the new exoskeleton. Once fertilized the eggs are then carried on the females abdomen for 8-9 months, during which time the females tend to remain in their burrows.

19.5.24 Nephrops are commercially caught within ICES rectangles in the northern parts of the study area. Nephrops burrows were observed along the cable route, but no individuals were recorded.

#### Ocean quahog

19.5.25 Ocean quahog (*Artica islandica*) are listed on the OSPAR list of threatened and / or declining species and habitats (Ref 19.26). It is a protected species in several designated sites within the study area including the Holderness Offshore Marine Conservation Zone (MCZ), north east of Farnes Deep MCZ and Highly Protected Marine Areas (HPMA) and Firth of Forth Banks Complex Nature Conservation Marine Protected Areas (NCMPA). As a protected benthic species, ocean quahog are considered in detail in **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**.

#### Scallop

19.5.26 The great Scallop (*Pecten maximus*) are relatively rare on the eastern coast of Great Britain relative to western coasts, although they are still widely distributed. They are

found in clean firm sand, fine or sandy gravel and occasionally muddy sand (Ref 19.37). Mobility is limited to escape reactions. Mature scallops spawn over summer months (May – September).

- 19.5.27 They are a popular commercial species, landed from five ICES rectangles in 2024 (36F0, 36F1, 37F0, 38E9 and 38F0) and being the most valuable species at 38E9. They were recorded during EBS within the biotope Faunal communities in Atlantic offshore circalittoral mixed sediment MD421.

### Marine species with demersal life stages

#### Atlantic herring (*Clupea harengus*)

- 19.5.28 Atlantic herring is a pelagic species which spawns on the seabed. As benthic spawners, the species has a specific habitat preference of gravel and partly sandy gravel (Ref 19.13) which limits the spatial extent of their spawning grounds. As a result, they are particularly sensitive to any seabed disturbance. A programme of annual International Herring Larvae Surveys (IHLS) has taken place since 1967 to monitor the abundance of herring larvae (Ref 19.38). Atlantic herring numbers fluctuate annually, with Atlantic herring often abandoning and then returning to suitable areas. As a result, availability of all suitable areas of spawning habitat are necessary to maintain a resilient population.
- 19.5.29 There are four main autumn / winter-spawning populations of herring located across the North Sea alongside several discrete spring-spawning stocks. The autumn-spawning grounds include the Orkney-Shetland population, the Buchan population, the Banks (or Dogger) population and the Downs / Southern Bight population (Ref 19.2) and are characterised by different growth rates, recruitment patterns and migration routes. The study area crosses the Banks (off North-eastern England) Atlantic herring spawning grounds identified by Coull, Johnstone and Rogers (Ref 19.1). Typically, the Banks herring stocks spawn over summer and autumn, from August to October (Ref 19.2). This spawning ground is an important area for a large population of Atlantic herring stock in the North Sea. **Volume 3, Part 3, Figure 19-4: Herring Spawning and Nursery Grounds** illustrates the spawning and nursery grounds for Atlantic herring in the context of the study area.
- 19.5.30 Based on the sediment classifications assigned to sediment samples collected as part of the environmental baseline survey (EBS) (**Volume 2, Part 3, Appendix 18.B: Environmental Baseline Survey Report**), sand and gravel fractions were assessed to identify the presence of preferred spawning grounds for herring. A total of 24 of 207 stations (11.6%) stations were classified as 'preferred' habitat based on having <5% muds and >50% gravels. 16 stations (7.7%) were classified as 'marginal' habitat based on having <5% muds and >10% gravels. 167 stations (80.7%) were classified as being 'Unsuitable' based on having >5% muds and <10% gravel.

#### Sandeel (*Ammodytes spp.*)

- 19.5.31 Sandeel have been recorded within the study area and are significant due to their importance as prey species for a number of bird, fish and marine mammal species. Sandeel hibernate in specific types of seabed during the autumn and winter, particularly coarse sand or fine gravel where they bury themselves in up to 50 cm of sediment (Ref 19.39). They briefly emerge from hibernation between December and January to spawn. During the spring and summer, they feed in the water column during the day and then bury themselves in the seabed at night. Their lifecycle makes them sensitive to seabed disturbance, especially during hibernation. Studies have found that sandeel are largely

resident and do not disperse over distances greater than 30 km (Ref 19.40), and that they do not migrate between grounds, suggesting that they are not successful re-colonisers (Ref 19.41). Sandeel are not however considered to be sensitive to increased suspended sediment concentrations and deposition (Ref 19.39).

- 19.5.32 There are three predominant species of sandeel which inhabit the North Sea, Greater sandeel (*Hyperoplus lanceolatus*), Lesser sandeel (*Ammodytes tobianus*) and Raitt's sandeel (*Ammodytes marinus*). A further two species have also been identified as potentially present within the North Sea, although they are less abundant, Corbin's sandeel (*Hyperoplus immaculatus*) and smooth sandeel (*Gymnammodytes semisquamatus*).
- 19.5.33 The sandeel species Raitt's sandeel is listed as a principal species of importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006), meaning that they are of principal importance for the purpose of conserving or enhancing biodiversity (Ref 19.42). Sandeel are also noted in UK Biodiversity Action Plan (BAP) priority marine species of principal importance, requiring conservation due to their ecological importance as a prey species and their marked decline within the UK (a decline of 50% or more over the past 25 years or deterioration or loss of habitat) (Ref 19.43).
- 19.5.34 The draft Order Limits crosses several known sandeel spawning grounds which are illustrated in **Volume 3, Part 3, Figure 19-5: Sandeel Spawning and Nursery Grounds**.
- 19.5.35 Based on the sediment classifications assigned to sediment samples collected as part of the environmental baseline survey, sand and gravel fractions were assessed to identify the presence of preferred spawning grounds for sandeel. A total of 104 of 207 stations (50.2%) were classified as being 'Preferred' Habitat due to having <10% muds and ≤30% gravels. 22 stations (10.6%) were classified as 'Marginal' based on having <10% muds and between 30% and 80% gravels. 81 stations (39%) were classified as being 'Unsuitable' based on having >10% muds or >80% gravels.

#### Whiting

- 19.5.36 Whiting (*Merlangius merlangus*) is a fast growing commercially important demersal species, which is widespread across the North Sea and common to inshore waters. It is found mostly at depths of 30 m and 100 m and inhabits a variety of substrates including mud, sand, gravel and rock (Ref 19.44).
- 19.5.37 The location of spawning grounds appears not to be determined on sediment type but tends to be at depths between 50 – 100 m. The factors that determine spawning ground selection are considered limited. Whiting are thought to have one of the longest spawning periods among North Sea species, from February to June, with a peak in April as shown in **Table 19-4**.
- 19.5.38 Whiting have a mixed diet which consists of decapods (e.g., *Crangon crangon*), amphipods, copepods, and fish, including small fish species such as sprat, sandeel, herring, cod, and haddock (Ref 19.45). Juvenile whiting feed primarily on small crustaceans such as shrimp. Whiting is the most abundantly caught demersal species within the study area. Whiting were also amongst the most abundantly caught species in the DATRAS surveys in 2025.
- 19.5.39 Coull *et al.* (Ref 19.1) suggest that nursery grounds for whiting encompasses the whole English Offshore Scheme with the exception of approximately 50 km from the Anderby

Creek Landfall. Low Intensity spawning ground (Ellis *et al.* (Ref 19.2)) begins at KP 183 and extends to the boundary with Scottish waters. KP 0 – 38 are low intensity nursery grounds, whereas KP 39 – 412 are high intensity nursery areas. Spawning and nursery areas in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 2)**.

#### Sole

- 19.5.40 Sole (*Solea solea*) is associated with a habitat of sandy and muddy sediments at depths up to 70 m where their favoured food source, polychaetes, are most abundant (Ref 19.46). Sole prey upon small crustaceans, small molluscs and fish. They are particularly sensitive to temperature which defines their distribution. They are caught all year round and are most abundant in ICES rectangles 38F0, 38E9 and 39E9 according to the MMO catch data. Whereas within the DATRAS survey data there are ICES rectangles where they have not been recorded, but they are most abundant in the Q3 surveys in 35F0 and 40E8.
- 19.5.41 Mature sole return to shallow inshore waters such as the mouths of estuaries, which have relatively higher water temperatures, during spring to spawn. Shallow waters like sand banks also act as nursery areas for juveniles. The 0-groups (fish in their first year of life) are relatively abundant at all depths (Ref 19.47).
- 19.5.42 Low intensity spawning and nursery grounds (based on Ellis *et al.*) are found from KP 0 – KP 38 (there are no high intensity spawning / nursery grounds). Sole spawning / nursery grounds in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 2)**.

#### Plaice

- 19.5.43 Plaice (*Pleuronectes platessa*) is associated with a seabed habitat of sand and gravel substrates in depths between 10 m to 50 m (Ref 19.48). Spawning in the North Sea occurs over a wide area, across most of the offshore and deeper areas of the southern North Sea. Juvenile nursery areas are generally in shallow areas of depths less than 10 m with sandy or muddy area habitat.
- 19.5.44 High intensity plaice spawning grounds (based on Ellis *et al.*) are found from KP38 – 183. Low intensity spawning grounds are found from KP184 – 412. Plaice spawning / nursery grounds in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 2)**.

#### Cod

- 19.5.45 Both juvenile and adult Atlantic cod (*Gadus morhua*) are a demersal species and are generally found in either, shallower (depths less than 50 m), colder and less saline waters of the southern North Sea, or, deeper (depths greater than 100 m), warmer and more saline waters of the northern North Sea (Ref 19.49). Cod are pelagic spawners; therefore, their spawning grounds are not substrate specific. Their peak spawning is February and March as shown in **Table 19-4**. Juvenile cod inhabit a wide variety of habitats but are often found in shallower waters than adults.
- 19.5.46 The results of quarterly DATRAS surveys reveal that adult cod are widely distributed during the colder, winter months but their range contracts during spring and summer as

they retreat northwards in response to increasing temperatures in the English Channel and Southern Bight. Adult cod have a diet of crustaceans, molluscs, and fish including sandeel, haddock, herring and several flatfish species and there is also evidence of cannibalism (Ref 19.50). Cod are thought to be responsible for significant mortality on commercial fish stocks of clupeid, gadoid and flatfish species (Ref 19.51).

- 19.5.47 Cod are caught all year round in the further north ICES rectangles of the study area such as 39E9 and 40E8, further south they are typically caught in winter or early spring. There are nursery grounds for cod along much of the draft Order limits which vary between high and low intensity, the highest intensity is found in the central section of the English Offshore Scheme.
- 19.5.48 There are no high intensity Cod spawning areas within the draft Order Limits (Ref 19.2). Low intensity spawning grounds are found from KP 38 to KP 130, and from KP 246 – KP 412. High intensity nursery grounds are found from KP 38 – KP 246. Low intensity nursery grounds are found in all other areas of the draft Order Limits. Cod spawning and nursery areas in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-2: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 1)**

#### Haddock

- 19.5.49 Haddock (*Melanogrammus aeglefinus*) is a member of the cod-like fish family commonly found throughout the North Sea. Spawning takes place from March to May, at depths of 100 - 150 m (Ref 19.51) as shown in **Table 19-4**. In their larval stages, haddock mainly feed on the immature stages of copepods, ostracods and limacina with their diet changing as they grow, moving on to larger pelagic prey such as amphipods, euphausiids, eggs of invertebrates, zoea larvae of decapods and increasing numbers of copepods (Ref 19.52).
- 19.5.50 Once they have reached the settled, demersal, post-larval stage, they gradually switch from pelagic to benthic prey. Adults primarily feed on benthic invertebrates such as sea urchins, brittlestars, bivalves and worms (Ref 19.53), however, they will feed opportunistically on smaller fish such as capelin (*Mallotus villosus*), sandeels and Norway pout (*Trisopterus esmarkii*). Juvenile haddock are an important prey for larger demersal fish, including other gadoids, while seals prey on the larger fish.
- 19.5.51 Haddock nursery grounds (based on Coull *et al.*) are found from KP 230 – KP 412, though there are no spawning grounds within the draft Order Limits. No data on this species from the more recent Ellis *et al.* (Ref 19.2) is available. Haddock spawning and nursery areas in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-2: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 1)**.
- 19.5.52 Haddock is a commercially valuable species which is caught mostly in the central and northernmost part of the study area according to the MMO catch data. However, haddock was the second most abundant species recorded in the DATRAS surveys being identified in all locations and both the Q1 and Q3 surveys.

#### Angler fish

- 19.5.53 The angler fish *Lophius piscatorius* (also known as monk fish) are a common, large demersal fish. They are found in waters from the low intertidal (although rarely shallower than 18 m) through to c. 550 m. They occasionally migrate as deep as 2,000 m for spawning (Ref 19.54). They target a range of smaller fish as prey including spurdogs

(*Squalus* spp.), rays (Batomorphi), sand eels, sculpins (Cottoidea), sea snails (Gastropoda), cod, whiting, pouting, haddock and flatfishes, and have occasionally been known to target crustacea such as crab and lobster. The species is listed on the UK BAP.

- 19.5.54 They are commonly targeted commercial species and have been landed from five ICES rectangles within the study area (38E9, 38F0, 39E9, 40E9 and 42E9). The most landings originated from 39E9, in the mid-part of the study area.

#### Halibut

- 19.5.55 Atlantic halibut (*Hippoglossus hippoglossus*) is the largest flatfish in the world and a prized commercial species (Ref 19.55). They are usually found on sand, gravel, or clay substrates and not on soft mud or on a rocky seabed. Atlantic halibut feed mainly on other fish (cod, haddock, pogge (*Agonus cataphractus*), sand-eels, herring, capelin) but also targets cephalopods, large crustaceans and other bottom-living animals. Due to slow growth rates and late onset of sexual maturity, *H. hippoglossus* populations can be seriously affected by overfishing.
- 19.5.56 They have been landed from within three ICES rectangles within the study area, 38E9, 39E9 and 41E9, and were amongst the five most valuable species landed from 41E9.

#### Marine species with a fully pelagic life cycle

##### Mackerel

- 19.5.57 Mackerel (*Scomber scombrus*) are distributed throughout the North Sea. Within the study area, mackerel migrate north in June and July to spawn and then disperse to feed within central North Sea. In October, some of the stock migrate to western Shetland and some to the Norwegian Trench, where they overwinter. The following spring, they then return south to the spawning grounds.
- 19.5.58 Mackerel has a varied diet with adults eating large quantities of pelagic crustaceans. They also prey on schools of smaller fish, particularly sprat, herring and sandeel. Juvenile mackerel eat fish larvae, crustacean larvae and their own larvae. Mackerel are the prey species for sharks, marine mammals, and a variety of seabirds.
- 19.5.59 Mackerel are typically caught between June and October. Spawning and nursery areas in relation to the English Offshore Scheme are illustrated in **Volume 3, Part 3, Figure 19-2: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 1)**; though the draft Order Limits do not go through the spawning grounds, they do go through low intensity nursery grounds. The species is amongst the top ten most abundant species recorded in the DATRAS survey data queried.

##### Sprat

- 19.5.60 European sprat (*Sprattus sprattus*) are found throughout the North Sea, although they tend to remain within the 50 m depth contour. They are common in inshore waters during summer months where they spawn, before migrating to winter feeding grounds. Spawning is thought to occur between May and August, peaking between May and June, in both coastal waters and up to 100 km offshore in deep basins (Ref 19.1). Sprat are pelagic spawners with their eggs and larvae being subject to larval drift, moving to inshore nursery areas. Young sprat are often found close inshore in schools with juvenile herring.

- 19.5.61 Sprat are important prey species for several species, including piscivorous fish, marine mammals and seabirds. Sprat themselves tend to feed on small planktonic crustaceans, including copepod nauplii and bivalve larvae (Ref 19.56).
- 19.5.62 This species was the most abundant based on DATRAS surveys undertaken in 2025. Sprat spawning are found from KP 51 – KP 412 and nursery grounds from KP 42 – 265. Spawning and nursery areas in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 2)**.

#### Elasmobranchs (Sharks, Rays and Skates)

- 19.5.63 Elasmobranchs are amongst the most vulnerable marine fish, due to their slow growth rates, late maturity, and low fecundity which limits their ability for population recovery should it decline. All sharks and rays are on the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) list of threatened or declining species. There are a number of elasmobranchs which are regularly caught by commercial fisheries in the study area. These include thornback ray (*Raja clavata*), small-spotted catshark / lesser-spotted dogfish (*Scyliorhinus canicula*), spotted ray (*Raja montagui*), starry smooth-hound (*Mustelus asterias*), blue skate (*Dipturus flossada*) as well as white skate (*Rostroraja alba*) which is on the IUCN Red list.
- 19.5.64 The DATRAS survey recorded several elasmobranchs including: small-spotted catshark (*S. canicula*), starry smooth-hound (*M. asterias*), cuckoo ray (*Leucoraja naevus*), and thornback ray.
- 19.5.65 Elasmobranchs are the predominant electroreceptive species present within the study area. The species have specialist electroreceptive organs (Ref 19.57) which are sensitive to 5 to 20 nano volts per metre (nV/m) (Ref 19.58) and are used to detect the bioelectric fields of prey and predators as well as being used for navigational purposes.
- 19.5.66 Skates and rays are amongst the most common bottom-dwelling fish. Thornback ray are known to use the study area as spawning and nursery grounds. The species peak spawning is between April and August (see **Table 19-4**). Spawning and nursery areas for Thornback ray in relation to the draft Order Limits are illustrated in **Volume 3, Part 3, Figure 19-3: Fish Nursery and Spawning Grounds with Intensity of Activity within the Study Area (Map 2)**.

#### Basking shark

- 19.5.67 The basking shark (*Cetorhinus maximus*) is the largest fish to visit UK waters measuring up to 12 m in length. Despite its size it feeds exclusively on plankton (Ref 19.59). There are regular sightings in the summer months from southern Cornwall to the Scottish Isles, however sightings of basking shark within the study area are rare with only two sightings in the last 10 years.

#### Diadromous and Catadromous Fish

- 19.5.68 Diadromous fish migrate between saltwater and freshwater, normally at the time of spawning. Catadromous fish spend most of their life cycle in fresh water and migrate to saltwater to spawn. Species known to be present in the study area, either because they have been recorded in the MMO catch statistics, DATRAS bottom trawl surveys, eDNA results or are listed as protected species in relevant designated European sites are:

- Twaité shad (*Alosa fallax*)
- Allis shad (*Alosa alosa*)
- Sea lamprey (*Petromyzon marinus*)
- River lamprey (*Lampetra fluviatilis*)
- Atlantic salmon (*Salmo salar*)
- European eel (*Anguilla anguilla*)
- Smelt (*Osmerus eperlanus*)
- Sea trout (*Salmo trutta*)

19.5.69 Diadromous species including Atlantic salmon, sea lamprey and river lamprey are sensitive to noise and are electrosensitive. These species do not have specialised electroreceptors but are able to detect induced voltage gradients associated with water movement through the geomagnetic field (Ref 19.60).

#### Sea Lamprey

19.5.70 The sea lamprey (*Petromyzon marinus*) is a primitive, jawless fish resembling an eel. It is the largest of the lampreys found in the UK. It occurs in estuaries and easily accessible rivers, over much of the Atlantic coastal area of western and northern Europe and eastern North America. It has declined in some parts of its European range.

19.5.71 It is an anadromous species. Sea lamprey are the largest of the three lamprey species, reaching a size of approximately one meter in length. After spending 18-24 months feeding at sea, adult sea lamprey migrate into rivers during the spring and early summer. Sea lamprey need clean river gravel for spawning and after the eggs hatch the juvenile larval stage, known as ammocoetes, burrow in marginal silt or sand. Sea lamprey have a preference for warm waters in which to spawn.

19.5.72 Sea lamprey are present in the Humber Estuary SAC, River Tweed SAC and Tweed Estuary SAC.

19.5.73 There were no recorded sea lamprey within the DATRAS survey, the MMO statistical catch data or the eDNA data sets.

#### River Lamprey

19.5.74 The river lamprey (*Lampetra fluviatilis*) is found in coastal waters, estuaries and accessible rivers. The species is normally anadromous, and pollution or artificial obstacles such as weirs or dams impede migration.

19.5.75 River lamprey need clean gravel for spawning, and marginal silt or sand for the burrowing ammocoete larval stage. River lamprey are qualifying features in the Humber Estuary SAC and Tweed Estuary SAC. The river lamprey use the designated site as a transitional point between freshwater and sea water. There was no recorded river lamprey within the DATRAS survey, the MMO statistical catch data or the eDNA data sets.

#### Atlantic salmon

19.5.76 The Atlantic salmon (*Salmo salar*) is a diadromous species which is also found within the study area. Spawning takes place in shallow excavations called redds, found in shallow gravelly areas in clean rivers and streams where the water flows swiftly. The young that emerge spread out into other parts of the river. After a period of 1-6 years the young salmon migrate downstream to the sea as 'smolts'. Salmon have a homing instinct that draws them back to spawn in the river of their birth after 1-3 years in the sea (Ref 19.61).

19.5.77 Rivers in England considered important for salmon, which are in proximity to the English Offshore Scheme draft Order Limits, include the River Tyne. These species may move through the study area during migrations. Atlantic salmon were recorded one of the eDNA samples (ST020\_TOP). They are most likely to be recorded in the northernmost section of the draft Order Limits.

#### Sea trout

19.5.78 Sea trout (*S. trutta*) are a UK BAP priority species. They are the same species as brown trout, but differ in their life history, spending a period of their lives at sea. A range of life histories can often be observed in the same population, with some individuals remaining in freshwater for their entire life, whilst others migrate to estuarine or fully marine environments. It is generally understood that during their marine / estuarine life stages, sea trout typically remain close to their natal rivers, though substantial long-distance migrations have been recorded. Like the closely related salmon, sea trout spend a variable number of years in freshwater before migrating to sea, but unlike salmon they frequently return to freshwaters to over-winter.

19.5.79 This species was not recorded in the DATRAS surveys, the MMO 2024 catch statistics or the eDNA survey data. They are most likely to be recorded in the northernmost section of the draft Order Limits near the estuaries that are known to be important migration corridors (such as the River Tweed).

#### European eel

19.5.80 European eel (*Anguilla anguilla*) are highly sensitive to noise and likely to be present within the draft Order Limits. The River Tweed has an important population of European eel (Ref 19.62), and it is possible that individuals will be present in the English Offshore Scheme draft Order Limits during their migration through the North Sea and from the Sargasso Sea; they are not a qualifying feature of this designated site. The species is a UK BAP species European eel were not recorded in the DATRAS surveys, the MMO 2024 catch statistics or the eDNA survey data. They are most likely to be recorded in the northernmost section of the draft Order Limits.

#### Smelt

19.5.81 Once widespread in the UK, smelt (*Osmerus eperlanus*) is now in decline and subject to protection at certain key locations. The Northeast of Farnes Deep Highly Protected Marine Area (HPMA) and Marine Conservation Zone (MCZ) provides a critical habitat for this species where it can complete some of its life cycle (Ref 19.63). The English Offshore Scheme draft Order Limits passes to 12 km to the east of the HPMA and MCZ, at the closest point.

19.5.82 Smelt have been observed congregating in shoals in lower estuaries as they migrate into freshwater where they spawn in spring. The species lay their eggs onto the seabed where they adhere to coarse substrates and vegetation to prevent dispersal during incubation. Smelt are known to congregate near river mouths during winter and then ascend the river between February and April for spawning before returning to the sea (Ref 19.44). The disturbance of seabed substrates or changes in siltation rates will directly impact smelt populations by causing physical damage and mortality of embryos before hatching and reducing spawning habitat (Ref 19.64).

19.5.83 The species was not recorded in the eDNA samples, DATRAS surveys or MMO catch statistics.

## Shad

- 19.5.84 Shad (*Alosa* spp.) are large migratory fish related to herrings, which live in coastal waters and spawn in freshwaters. There are two species of shad that occur in UK waters; the Allis Shad *A. alosa* and Twaite Shad *A. fallax*. Like many diadromous species, shad populations have declined as a result of anthropogenic impacts including poor water quality, barriers (damns and weirs) to spawning grounds and habitat loss. As a result of population declines, both shad species are protected under the Wildlife and Countryside Act 1981 (as amended) and are listed on Annexes II and V of the EU Habitats Directive. They are also listed in Appendix III of the Bern Convention and are on the UKBAP Priority List.
- 19.5.85 The species are generally found in the southwest of the United Kingdom and the species were not recorded in eDNA samples DATRAS surveys or MMO catch data.

## Prey species and food webs

- 19.5.86 Several species which occur within the study area have an important role in the North Sea's food web being prey to predators such as birds, marine mammals and piscivorous fish, and, depending on the species, predators of other fish and shellfish. Food webs should also be considered on a global rather than regional basis, though regional changes can have far reaching effects (Ref 19.65).
- 19.5.87 Sandeel are a UK Biodiversity Action Plan (BAP) priority species (Ref 19.19) and are preyed upon by several predators which vary depending on whether sandeel are buried or swimming. Whilst active, sandeel are part of the diet of many sea birds including kittiwake (*Rissa* spp.), razorbill (*Alca torda*), puffin (*Fratercula* spp.) and tern (Sternidae) species. Usually when buried, sandeel are prey species to herring, sea trout, cod, whiting and grey gurnard. Additionally, they are prey species for several marine mammals including seal and harbour porpoise (*Phocoena phocoena*).
- 19.5.88 Like sandeel, herring are a UK BAP species (Ref 19.19) and are a prey item for several species of sea bird and fish species such as whiting, cod, mackerel and horse mackerel. Herring eggs are also known to attract predators such as haddock, spurdog, mackerel, lemon sole and other herring.
- 19.5.89 Sprat are also important prey for other fish species including cod, grey gurnard (*Eutrigla gurnardus*), herring, sandeel, spurdog, horse mackerel, sea trout and whiting, and seabirds.

## Protected Species

- 19.5.90 **Table 19-8** lists the protection afforded to species which have been identified within the study area. Some fish species are protected by several national and international conventions including:
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The aim is to protect endangered plant and animal species from illegal trade and over exploitation.
  - Convention for the Protection of the Marine Environment of the North-East Atlantic – OSPAR Convention. The OSPAR Convention aims to protect the marine environment of the North-East Atlantic.
  - IUCN. The IUCN Red Data list catalogues and highlights those animals and plants at high risk of global extinction.

- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (COMHSR).
- The NERC Act.
- Wildlife and Countryside Act 1981 (as amended in 1985).

Table 19-8 Protected fish / shellfish species observed within the study area

Species	International			UK		England
	OSPAR	CITES	IUCN	Wildlife and Countryside Act	COMHSR	Features of Conservation Interest (FOCI)
Pelagic Species						
Herring ( <i>Clupea harengus</i> )			Least concern			Y
Horse mackerel ( <i>Trachurus trachurus</i> )			Least concern			Y
Mackerel ( <i>Scomber scombrus</i> )			Least concern			Y
Demersal Species						
Atlantic cod ( <i>Gadus morhua</i> )	Y		Vulnerable			Y
Atlantic halibut ( <i>Hippoglossus hippoglossus</i> )			Endangered			Y
Angler fish ( <i>Lophius piscatorius</i> )						Y
Bass ( <i>Dicentrarchus labrax</i> )			Least concern			
Haddock ( <i>Melanogrammus aeglefinus</i> )			Vulnerable			
Ling ( <i>Molva molva</i> )			Least concern			Y
Plaice ( <i>Pleuronectes platessa</i> )			Least concern			Y
Saithe ( <i>Pollachius virens</i> )			Least concern			
Sole ( <i>Solea solea</i> )			Data deficient			
Whiting ( <i>Merlangius merlangus</i> )			Least concern			Y

Species	International			UK		England	
	OSPAR	CITES	IUCN	Wildlife and Countryside Act	COMHSR	Features of Conservation Interest (FOCI)	Species of Principal Importance
Elasmobranch species							
Basking shark ( <i>Cetorhinus maximus</i> )	Y	Appendix II	Endangered	Schedule 5			Y
Blonde Ray ( <i>Bathyraja brachyurops</i> )			Near threatened				
Common Skate ( <i>Dipturus batis</i> )	Y		Critically endangered				Y
Flapper skate ( <i>Dipturus intermedius</i> )	Y		Critically endangered				Y
Cuckoo Ray ( <i>Leucoraja naevus</i> )			Least concern				
Small-spotted catshark / lesser spotted dogfish ( <i>Scyliorhinus canicula</i> )			Least concern				
Nurse hound ( <i>Scyliorhinus stellaris</i> )			Near threatened				
Starry smooth-hound ( <i>Mustelus asterias</i> )			Near threatened				
Spotted ray ( <i>Raja montagui</i> )	Y		Least concern				
Starry Ray ( <i>Amblyraja radiata</i> )			Least concern				
Thornback Ray ( <i>Raja clavata</i> )	Y		Near threatened				
White Skate ( <i>Rostroraja alba</i> )	Y		Endangered				

Species	International			UK		England	
	OSPAR	CITES	IUCN	Wildlife and Countryside Act	COMHSR	Features of Conservation Interest (FOCI)	Species of Principal Importance
<b>Diadromous species</b>							
Allis shad ( <i>Alosa alosa</i> )	Y		Least concern	Schedule 5	Annex II & V		Y
River Lamprey ( <i>Lampetra fluviatilis</i> )			Least concern		Y		Y
Sea Lamprey ( <i>Petromyzon marinus</i> )	Y						Y
Smelt ( <i>Osmerus eperlanus</i> )			Least concern			Y	Y
Twaite shad ( <i>Alosa fallax</i> )			Least concern	Schedule 5	Annex II and V		Y
<b>Anadromous species</b>							
Atlantic salmon ( <i>Salmo salar</i> )	Y		Vulnerable		Annex II		Y
<b>Shellfish species</b>							
Cuttlefish ( <i>Sepia officinalis</i> )			Least concern				
Ocean quahog ( <i>Arctica islandica</i> )	Y					Y	

Sources: (Ref 19.19, 26, 66)

## Designated sites

19.5.91 **Volume 3, Part 3, Figure 19-6: Designated Sites within the Fish and Shellfish Study Area** illustrates the relevant designated sites for the protection of fish or shellfish species within the study area. Further descriptions of these sites are in the below section.

### Holderness Offshore MCZ

19.5.92 The draft Order Limits for EGL 5 overlaps the southeastern corner of the Holderness MCZ for approximately 4.5 km between KP 65 – KP 70.

19.5.93 The MCZ covers an area of 1,176 km<sup>2</sup> and is located approximately 11 km offshore from the Holderness coast in the Southern North Sea region. It crosses the 12 NM territorial seas limit and overlaps with the Southern North Sea SAC (Ref 19.67). The seabed of the Holderness Offshore MCZ is predominantly composed of sediment habitats ranging from subtidal sand to subtidal coarse sediment and contains part of a glacial tunnel valley. The varied nature of the seabed means it supports a wide range of species, both on and in the sediment, including multiple species of worms, mussel beds, sponges, starfish and crustaceans (such as crabs and shrimp). The site is also a spawning and nursery ground for several fish species, including lemon sole, plaice and European sprat, as well as shellfish (i.e., crab and lobster). Ocean quahog has also been recorded within the site. The conservation objective for the site is to maintain and / or restore the favourable conservation status of the species.

### Humber Estuary SAC

19.5.94 The draft Order Limits lie approximately 7.5 km from the Humber Estuary European Marine Site, which is comprised of the Humber Estuary SAC, Humber Estuary Special Protection Area (SPA), Humber Estuary Ramsar Site and Humber Estuary Site of Special Scientific Interest (SSSI). The site extends for 366.57 km<sup>2</sup> and includes the second largest coastal plain estuary in the UK (Ref 19.68). The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. Significant Annex II migratory fish species are present and include river lamprey and sea lamprey, which breed in the River Derwent, a tributary of the River Ouse and are a protected species of the SAC. The conservation objective for the site is to maintain and / or restore the favourable conservation status of the species. **Table 19-9** summarises the seasonality of sea and river lamprey within the SAC.

Table 19-9 Seasonality of protected species in the Humber Estuary SAC

Feature	Life stage	J	F	M	A	M	J	J	A	S	O	N	D
River Lamprey	Downstream Migration (Juveniles)	■	■	■	■	■	■	■	■				
River Lamprey	Spawning (Freshwater)			■	■								
River Lamprey	Upstream migration (Adults)	■	■	■	■			■	■	■	■	■	■

Feature	Life stage	J	F	M	A	M	J	J	A	S	O	N	D
River Lamprey	Estuarine feeding	■	■	■	■	■	■	■	■	■	■	■	■
Sea Lamprey	Downstream Migration (Juveniles)	■	■	■	■						■	■	■
Sea Lamprey	Spawning (Freshwater)					■	■	■					
Sea Lamprey	Upstream migration (Adults)		■	■	■	■							

Source: (Ref 19.69)

### North East of Farnes Deep HMPA and MCZ

- 19.5.95 The English Offshore Scheme draft Order Limits does not pass through the North East of Farnes Deep HMPA and MCZ, though the two sites do fall within the study area (12 km west of the draft Order Limits at the nearest point). The HPMA and MCZ are located approximately 55 km offshore from the north Northumberland coast, in the northern North Sea. The habitats within the sites are relatively stable and support a diverse range of marine flora and fauna such as anemones, worms, molluscs, echinoderms and fish species. Also found here is the ocean quahog which is a Feature of Conservation Importance (FOCI) and smelt (Ref 19.63).
- 19.5.96 The conservation objective for the MCZ is to maintain and / or restore the favourable conservation status of the species, and the conservation objective for the HPMA is to a) achieve full recovery of the protected feature, including its structure and functions, its qualities and the composition of its characteristic biological communities present within the North East of Farnes Deep HPMA, to a natural state, and b) prevent further degradation and damage to the protected feature, subject to natural change. The protected feature of the HPMA is the 'whole marine ecosystem of the area', defined as: All marine flora and fauna, all marine habitats and all geological or geomorphological interests, including all abiotic elements and all supporting ecosystem functions and processes, in or on the seabed, water column and the surface of the sea.

### Future baseline

- 19.5.97 As the Project's lifespan 40 years it is difficult to provide accurate predictions of the future baseline scenario for fish and shellfish ecology, given the spatiotemporal changes to the marine environment. The baseline environment for fish and shellfish will change, due to natural coastal processes and weather events (such as storms), and effects of climate change.
- 19.5.98 It is therefore important to consider these changes which may directly or indirectly affect fish and shellfish species and populations in the short, mid, and long-term future. For example, one of the most responsive shellfish receptor groups to environmental change are squids; expansion ranges of squids have been shown to have increased throughout the North Sea in the last 35 years (Ref 19.70) due to increases in water temperatures. Indirectly, it could be expected that large fish populations could add additional impacts

on prey species (such as mackerel, herring, whiting and haddock; (Ref 19.71)) And also provide additional prey resources for squid predators such as spurdog and whiting.

- 19.5.99 Research has suggested that there have been significant changes in fish communities in the northeast Atlantic over several decades as a result of a number of factors including climate change and fishing activities (Ref 19.10). These communities consist of species that have complex interconnections with one another and the natural environment.
- 19.5.100 Fish and shellfish populations are prone to natural variations in population size and distributions, largely as a result of year-to-year variation in recruitment success and these population trends will be influenced by broad-scale climatic and hydrological variations, as well as anthropogenic effects such as climate change and overfishing.
- 19.5.101 Fish and shellfish play a crucial role in the transfer of energy from lowest to the highest trophic levels within the ecosystem and serve to recycle nutrients from higher levels through the consumption of detritus. Therefore, their populations will be decided by both top-down factors such as predation, and bottom-up factors such as ocean climate and plankton abundance.

## 19.6 Environmental Measures

- 19.6.1 As set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**, the environmental measures are characterised as design measures or control and management measures. A range of environmental measures would be implemented as part of the English Offshore Scheme and will be secured through the DML and in the Development Consent Order (DCO) as relevant. **Table 19-10** outlines how these design and control measures would influence the fish and shellfish assessment.
- 19.6.2 Design measures that are relevant to the fish and shellfish assessment are denoted by a (D) in the ID reference column in **Table 19-10**. These are also included in **Volume 2, Part 1, Appendix 5.A: Outline Register of Design Measures**. Compliance with these measures will be secured by way of the DCO.
- 19.6.3 Several management plans will be provided as Outline Management Plans with the DCO application to support the DML. These include an Outline CEMP and Outline MPCP. These documents will outline measures to be implemented to comply with legislation (e.g., in relation to the prevention of oil and chemical spills) during all phases of the English Offshore Scheme. Final management plans will be submitted in accordance with the DML to discharge the licence conditions. Control and management measures that are relevant to the fish and shellfish assessment are denoted by a (C) in the ID reference column in **Table 19-10**. These control and management measures are also included within the Outline CEMP that can be found in **Volume 2, Part 1, Appendix 5.D: Outline Construction Environmental Management Plan (CEMP)**.

Table 19-10 Summary of the environmental measures

Receptor	Potential changes and effects	Environmental measures	ID reference
Shellfish and marine species with demersal life stage(s)	Temporary and Permanent habitat loss Electromagnetic changes	The cables shall be buried in the seabed, except in areas where burial is not possible e.g., where ground conditions do not allow or at infrastructure crossings.	OMT03 (D)
Ocean quahog		No cable burial trial trenching will be undertaken within the Holderness Offshore Marine Conservation Zone, unless otherwise agreed in writing by the MMO.	OMT08 (D)
Shellfish and marine species with demersal life stage(s)	Permanent habitat loss due to the deposit of external cable protection	External cable protection features would only be installed where considered necessary for the safe operation of the English Offshore Scheme. This includes the repair of cables due to accidental damage, where depth of lowering is not achieved and at infrastructure crossings.	OMT04 (D)
		In sites designated for benthic features, external cable protection materials would be selected to match the environment (e.g., when cables are installed in areas of cobbles or other natural rock features, rock of similar diameter as the receiving environment should be used as an alternative to the current normal approach of using terrestrially sourced granite, where feasible).	OMT05 (D)
Shellfish and marine species with demersal life stage(s)	Electromagnetic changes	High Voltage Direct Current (HVDC) poles would be bundled to minimise the effects of Electromagnetic Fields (EMF).	OMT06 (D)
Shellfish and marine species with demersal life stage(s)	Temporary habitat loss / seabed disturbance	Drilling fluids required for trenchless operations would be carefully managed to minimise the risk of breakouts into the marine environment. This would include the use of biodegradable drilling fluids (pose little or no risk (PLONOR) substances) where practicable.	OMT01 (C)
Fish and shellfish species	Accidental spills	All oil, fuel and chemical spills would be reported to the Marine Management Organisation (MMO) Marine Pollution response team in accordance with the MPCP.	OMT03 (C)

<b>Receptor</b>	<b>Potential changes and effects</b>	<b>Environmental measures</b>	<b>ID reference</b>
Fish and shellfish species	Accidental spills	Chemicals will be chosen from the list of chemicals approved under the Offshore Chemical Notification Scheme (OCNS).	OMT04 (C)
Fish and shellfish species	Underwater noise changes	In accordance with the UK Government (2025) guidance “ <i>Supporting minimising environmental impacts from unexploded ordnance clearance</i> ” the UXO mitigation hierarchy would be followed for any targets identified during the UXO survey and confirmed as UXO.	OMT06 (C)
Fish and shellfish species	Underwater noise changes	The Applicant would apply for a separate Marine Licence and European Protected Species Licence for UXO clearance.	OMT07 (C)
Shellfish and marine species with demersal life stage(s)	Temporary habitat loss / seabed disturbance	Micro-routeing within the English Offshore Scheme draft Order Limits will be deployed to avoid sensitive seabed features where possible.	OMT13 (C)

## 19.7 Scope of the Assessment

### Spatial scope and Study Area

- 19.7.1 The spatial scope of the assessment of fish and shellfish covers the area of the English Offshore Scheme contained within the draft Order Limits, together with the study area as described in Section 19.4.3 and illustrated in **Volume 3, Part 3, Figure 19-1: Fish and Shellfish Study Area**.

### Temporal scope

- 19.7.2 The temporal scope of the assessment of coastal and marine physical processes is consistent with the period over which the English Offshore Scheme would be carried out. It assumes construction of the English Offshore Scheme will commence in 2030 and cover a period of approximately five years. Operation would commence in 2035, with periodic maintenance required during the Operation and Maintenance phase of the English Offshore Scheme. It is assumed that maintenance and repair activities could take place at any time during the life span of the English Offshore Scheme.
- 19.7.3 The English Offshore Scheme is expected to have a life span of more than 40 years. If decommissioning requires full or partial removal of the English Offshore Scheme at this point in time, then activities and effects associated with the decommissioning phase are expected to be of a similar level to those during the construction phase, albeit with a lesser duration. The Project could also remain operational for a period after the 40 years or be taken out of service and left within the draft Order Limits after 40 years. Acknowledging the complexities of completing a detailed assessment for decommissioning works up to 40 years in the future, based on the information available, the Project has concluded that impacts from decommissioning would be no greater than those during the construction phase. Furthermore, should decommissioning take place it is expected that an assessment in accordance with the legislation and guidance at the time of decommissioning would be undertaken. In addition, it is expected that the DCO will include a requirement for a written scheme of decommissioning for approval by the relevant consenting authority.

### Identification of receptors

- 19.7.4 The principal fish and shellfish receptors that have been identified as being potentially impacted by the English Offshore Scheme are summarised in **Table 19-11**.
- 19.7.5 Impacts on European designated sites (e.g., SACs, Ramsar Wetlands, SPAs) are assessed within **Volume 2, Part 1, Appendix 2.C: Habitats Regulations Assessment (HRA) Stage 1 Screening Report** and impacts on MCZs / HPMAs are considered within **Volume 2, Part 3, Appendix 18.D: Marine Conservation Zone Stage 1 Assessment**. Where species are specifically designated as a feature of a site, an assessment is presented within this PEIR.
- 19.7.6 Impacts on Ocean quahog are presented in **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**.

Table 19-11 Fish and shellfish receptors subject to potential effects

Receptor	Reason for consideration
Shellfish and marine species with demersal life stages (including sandeel, herring, molluscs and crustacea)	Fish and shellfish species which have life stages where they are in contact with the seabed are more sensitive to seabed disturbance and activities associated with cable installation, operation and maintenance and decommissioning.
High and medium hearing sensitivity species (e.g., those with a swim bladder connected to their hearing apparatus; Atlantic cod, herring and other clupeids) and those with a swim bladder but do not use it to support hearing (Atlantic salmon, sea trout, European eel)	High and medium hearing sensitivity species of fish are sensitive to changes in underwater noise levels and therefore must be considered by the environmental impact assessment.
Electrosensitive species (e.g., elasmobranchs, some species of shellfish)	Electrosensitive species of fish and shellfish are known to occur in the study area. During operation the cables will emit an electromagnetic field and therefore impacts on these species must be considered by the environmental impact assessment.

### Potential effects considered within this assessment

19.7.7 The effects on fish and shellfish receptors, which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 19-12**.

Table 19-12 Fish and shellfish receptors scoped in for further assessment

Receptor	Likely Significant Effects
	<b>Temporary habitat loss / seabed disturbance</b> from activities such as pre-sweeping of sand-waves, cable burial and trenching, cable repair and cable removal.
Shellfish and marine species with demersal life stages	<b>Permanent habitat loss</b> due to the deposit of external cable protection.
	<b>Temporary increase and deposition of suspended sediments</b> due to pre-sweeping during construction and decommissioning.
Shellfish and marine species with demersal life stages (including herring, molluscs and crustaceans)	<b>Temporary increase and deposition of suspended sediments</b> due to other activities during construction and decommissioning.
Shellfish and marine species with a fully pelagic life cycle	

Receptor	Likely Significant Effects
High and medium hearing sensitivity species	<b>Temporary underwater noise changes</b> due to the presence of Project vessels and equipment during all Project phases and geophysical survey. <b>Temporary underwater noise changes</b> from UXO detonation.
Electrosensitive species	<b>Permanent electromagnetic changes</b> / barrier to species movement due to the presence of operational cables throughout the lifespan of the English Offshore Scheme.
Shellfish and marine species with demersal life stages	<b>Permanent temperature increase</b> due to the presence of operational cables throughout the lifespan of the English Offshore Scheme.

19.7.8 The receptors / effects detailed in **Table 19-13** have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant.

Table 19-13 Summary of effects scoped out of the fish and shellfish assessment

Receptors / potential effects	Justification
All species (except certain shellfish and herring) <b>Temporary deposition of sediments</b> <b>increase of suspended</b> <b>and</b> <b>suspended</b>	The activity that would lead to the most significant contributor (relatively) to an increase is suspended sediment concentrations and subsequent deposition is cable trenching (pre-sweeping is assessed separately). The Scoping Report (Ref 19.6) provided evidence from analogous cable projects that the spatial extent of heavy smothering is restricted to several metres either side of the trench and changes in water clarity from sediment plumes are limited in extent and duration; potential significant effects are unlikely. The Applicant proposed to scope out this impact on most species with the exception of certain sensitive shellfish such as cockles. The Planning Inspectorate agreed with this decision but requested that assessment be also provided for herring, which have been considered within this assessment.
All species <b>Accidental spills due to presence of Project vessels and equipment</b>	Project vessels and contractors will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 which relate to pollution from oil from equipment, fuel tanks, and other ship-based sources, and release of sewage (black and grey water). It is a legal requirement that all vessels have a SOPEP. Compliance with Regulations will be sufficient to minimise the risk to the environment.

Receptors / potential effects	Justification
Shellfish <b>Introduction or spread of marine invasive non-native species (MINNS)</b>	Although the introduction of Project vessels, equipment, and external cable protection have the potential to introduce and spread MINNS, all relevant guidelines will be followed (Ref 19.72) including vessel cleaning facilities and the use of anti-fouling paint. Project vessels and contractors will comply with the International Convention for the Control and Management of Ships' Ballast water and Sediments. All seabed deposits will be inert with no biologically active material. Project vessels will complete a biosecurity risk assessment prior to arriving on site which will include factors such as origins of the vessels and ensuring that relevant equipment is cleaned before use. Compliance with Regulations will be sufficient to minimise the risk to the environment.
Basking Shark <b>Collision risk</b>	There have only been two sightings of basking shark within the waters of the study area during the last 10 years (Ref 19.73). This impact pathway has been scoped out due to the scarcity of the species within the study area. The Planning Inspectorate agreed with this decision (Ref 19.6).

## 19.8 Key Parameters for Assessment

### Realistic worst-case design scenario

- 19.8.1 The assessment has followed the Rochdale Envelope approach as outlined in **Volume 1, Part 1, Chapter 4: Description of the Project** and **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**. The assessment of effects has been based on the description of the Project and parameters outlined in **Volume 1, Part 1, Chapter 4: Description of the Project**. However, where there is uncertainty regarding a particular design parameter, the realistic worst-case design parameters are provided below with regards to fish and shellfish along with the reasons why these parameters are considered worst-case. The preliminary assessment for fish and shellfish has been undertaken on this basis. Effects of greater adverse significance are not likely to arise should any other development scenario, based on details within the Rochdale Envelope (e.g., different infrastructure layout within the draft Order Limits), to that assessed here be taken forward in the final design.
- 19.8.2 In relation to fish and shellfish **Table 19-14** summarises the assumptions made regarding the English Offshore Scheme design parameters in order to ensure a realistic worst-case assessment has been undertaken.

Table 19-14 Key parameters for assessment

Impact	Phase	Maximum Design Scenario (MDS)	Justification
	C O D		
Temporary Habitat Loss / Seabed Disturbance	✓ ✓ ✓	<p><b><u>Construction</u></b></p> <p><b>Total subtidal temporary habitat disturbance = 13.42 km<sup>2</sup></b></p> <p><b>Seabed Preparation</b></p> <p><b>Trenchless technique exit pits – 2 x 750 m<sup>2</sup></b></p> <p><b>Boulder clearance – 8.46 km<sup>2</sup></b>, with swathe of 20 m assumed across approximately 423 km of the English Offshore Scheme (20 m x 423 km of route) (assumed to be within footprint of pre-lay grapnel run (PLGR)).</p> <p><b>Pre-Sweeping – 1.2 km<sup>2</sup></b> precautionary footprint for use of trailing suction hopper dredger and / or Controlled Flow Excavation (CFE). Precautionary estimate assuming clearance along 60 m width x 20.04 km).</p> <p><b>Pre-Lay Grapnel – 12.9 km<sup>2</sup></b> footprint with swathe of 30 m x 423 km route length.</p> <p><b>Cable Burial Trial Trenching – 125,000 m<sup>2</sup></b> footprint of cable burial trial trenching (25 m x 5,000 m length).</p>	<p>The MDS for temporary habitat loss / seabed disturbance relates activities associated with seabed preparation and cable lay and burial.</p> <p>It should be noted that boulder clearance overlaps with the PLGR footprint.</p> <p>The subtidal habitat disturbance MDS includes other de-minimis footprints such as from the jack-up barge, anchors and temporary deposits.</p>
		<p><b>Cable Installation</b></p> <p>Impact will occur fully within combined footprint from seabed preparation activities.</p>	
		<p><b><u>Operation and Maintenance</u></b></p> <p><b>Total subtidal temporary habitat disturbance = 0.525 km<sup>2</sup></b></p> <p>13 km long by 25 m wide for cable repair.</p> <p>8 km long by 25 m wide for remedial works.</p>	<p>Assumes 13 cable repairs and 8 cable remediations over Project lifetime.</p>
		<b><u>Decommissioning</u></b>	<p>MDS is similar (or less) to that of the construction phase.</p>

Impact	Phase			Maximum Design Scenario (MDS)	Justification
	C	O	D		
				Refer to the construction phase MDS.	
Permanent Habitat Loss	✓	✓	✓	<p><b>Construction</b></p> <p><b>Total permanent habitat loss = 1.94 km<sup>2</sup></b></p> <p><b>Cable Protection</b></p> <p><b>Cable Crossings</b> – 464,000 m<sup>2</sup> assuming rock berm 16 m width and 29,000 m in total length (58 crossings).</p> <p><b>External Cable Protection</b> – 1,472,000 m<sup>2</sup> assuming rock berm (16 m width x 92 km remedial external cable protection length).</p> <hr/> <p><b>Operation and Maintenance</b></p> <p><b>Total permanent habitat loss = 0.336 km<sup>2</sup></b></p> <p><b>External cable protection remediation</b> – 128,000 m<sup>2</sup> total length of remediation 8,000 m x 16 m width.</p> <p><b>Cable repairs</b> – 208,000 m<sup>2</sup> total length of external cable protection for cable repairs (13,000 m x 16 m width).</p> <hr/> <p><b>Decommissioning</b></p> <p>No additional external cable protection will be placed during decommissioning.</p>	Maximum effect of permanent habitat loss will occur because of the maximum area of seabed covered by external cable protection and cable crossings protection.
Temporary increase in suspended sediments and sediment deposition	✓	✓	✓	<p><b>Construction</b></p> <p><b>Total sediment volume = 736,199 m<sup>3</sup></b></p> <p><b>Seabed Preparation</b></p> <ul style="list-style-type: none"> <li>Pre-sweeping [TSHD] – Suspension of 33,715 m<sup>3</sup> during placement and 26,972 m<sup>3</sup> during dredging.</li> </ul> <p><b>Cable Installation</b></p> <ul style="list-style-type: none"> <li>Cable Trenching [jet trencher or CFE] – Suspension of</li> </ul>	For seabed preparation the MDS results from placement of dredged sediment from a TSHD. While the overall volume of sediment suspended is less than that disturbed by CFE, the rate of release and height of release are such that clearance by TSHD is the MDS. While all dredged sediment is released in suspension, only 10% will form a passive plume (with

Impact	Phase	Maximum Design Scenario (MDS)	Justification
	C O D		
		<p>666,225 m<sup>3</sup> (30% of CSA x route length).</p> <p><b>Trenchless Operations</b></p> <ul style="list-style-type: none"> <li>Exit Pit Excavation – Suspension of 1,687.5 m<sup>3</sup> (30% of volume for three exit pits).</li> <li>Trenchless Technique Drilling Fluid Release – Maximum volume and mass of drilling fluid released per trenchless technique – 7,600 m<sup>3</sup> (304 m<sup>3</sup> of bentonite) over 12 hours with estimated release rate of 19.7 kg/s.</li> </ul>	<p>the other 90% descending rapidly to the bed as a dynamic plume). Only a small proportion of this sediment will disperse more than 100 m from the placement site (the fine sediment fractions). The quoted volumes include a 20% contingency.</p> <p>For cable installation, the MDS results from cable trenching with a jet trencher or CFE with 30% of sediment expected to be suspended. Only a small proportion of this sediment will disperse more than 100 m from the placement site (the fine sediment fractions). Length of 423 km x 1.5 m wide x 3.5 m deep rectangular trench.</p>
			<p>For trenchless technique operations, the MDS results from using a CFE for exit pit excavation with 30% of sediment expected to be suspended.</p>
			<p>Maximum release: 7,600 m<sup>3</sup> of drilling fluid at punch-out. Drilling fluid 4% bentonite, 96% water. Density of bentonite 2,800 kg/m<sup>3</sup>.</p>
		<p><b><u>Operation and Maintenance</u></b></p> <p>De-burial and re-burial of cable failure points across 13 km of bundled cables (25 m wide x 13,000 m length). Remediation 8,000 m x 25 m width.</p>	<p>Impacts during operation and maintenance will be less than those during construction.</p>
		<p><b><u>Decommissioning</u></b></p> <p>Refer to the construction phase MDS.</p>	<p>If the English Offshore Scheme is removed, temporary increase in</p>

Impact	Phase C O D	Maximum Design Scenario (MDS)	Justification
Underwater noise changes	✓ ✓ ✓	<p><b><u>Construction</u></b>  Maximum of 17 vessels on each of nearshore and offshore campaigns at any one time.  Maximum of nine vessels involved in trenchless technique enabling and cable pull in in nearshore.  UXO clearance – high order detonation (maximum charge 697 kg).  UXO clearance – low order detonation (maximum charge 0.5 kg).</p>	<p>suspended sediment concentrations and subsequent deposition will be the same as during construction.</p>
		<p><b><u>Operation and Maintenance</u></b>  Maximum of five vessels per cable repair operation.</p>	<p>Maximum number of vessels required for simultaneous cable repair in several locations.</p>
		<p><b><u>Decommissioning</u></b>  Refer to the construction phase MDS.</p>	<p>MDS is similar (or less) to that of the construction phase.</p>
Marine Invasive Non-Native Species (MINNS)	✓ ✓ ✓	<p><b><u>Construction</u></b>  Where equipment or structures are introduced to the water column there is risk of introduction and spread of MINNS. Includes MDS associated vessels outlined above for underwater noise and all external cable protection that leads to permanent habitat loss.</p>	<p>Most likely pathway for MINNS is via vessel movements, therefore maximum number of vessels will represent the maximum risk of introduction of MINNS. MDS also includes all external cable protection that leads to permanent habitat loss.</p>
		<p><b><u>Operation and Maintenance</u></b>  Maximum of five vessels per cable repair operation.</p>	
		<p><b><u>Decommissioning</u></b>  Refer to the construction phase MDS.</p>	<p>MDS is similar (or less) to that of the construction phase.</p>

Impact	Phase C O D	Maximum Design Scenario (MDS)	Justification
Electromagnetic changes / barrier to species movement	✓	<u>Operation and Maintenance</u> Two cables (bundled) up to 423 km operating up to 525 kV. Target burial depth of 1.5 m (minimum 0 m but covered by external cable protection).	Maximum scenario for EMF is defined by the maximum length of cables installed. The operation of the cable could result in the generation of EMFs which could affect benthic invertebrates. Maximum EMF values emitted from cable and extent of the EMFs will vary in relation to a number of aspects including the maximum cable voltage, burial depth, distance from the seafloor and length of the cable.
Temperature increase	✓	<u>Operation and Maintenance</u> Two cables (bundled) up to 423 km operating up to 525 kV. Target burial depth of 1.5 m (minimum 0 m but covered by external cable protection).	The maximum heat change will result from the maximum cable voltage. Maximum extent of heat change will result from the maximum length of cable bundles.

## 19.9 Assessment Methodology

### Overview

- 19.9.1 The fish and shellfish assessment generally follows the assessment approach framework as set out in **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology**. However, while this has informed the approach, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the fish and shellfish assessment.
- 19.9.2 In line with the industry standard approach across offshore EIAs, a four-category sensitivity and magnitude scale, from "Negligible" to "High" has been used. While **Volume 1, Part 1, Chapter 5: PEIR Approach and Methodology** provides for a "Very High" category, this is based on onshore specific guidance, rather than being applicable to offshore receptors.
- 19.9.3 The criteria for characterising the value and sensitivity and magnitude for fish and shellfish are outlined in **Table 19-15** and **Table 19-16** respectively.
- 19.9.4 The assessment of sensitivity will be made with consideration of the vulnerability of the receptor to an impact and its ability to recover and adapt. Vulnerability can differ between different groups and species of fish and shellfish and will also vary depending on the impact pathway. For example, certain mobile demersal species are less sensitive to temporary habitat loss than shellfish species with limited mobility, whilst sensitivity to underwater noise changes differs between fish species depending on their anatomy.

- 19.9.5 Several species identified as present within the Study Area are protected by international and national legislation and are therefore considered to be of very high importance. These species will also be considered in the HRA and MCZ assessment processes. Screening has been provided with this preliminary environmental assessment as **Volume 2, Part 1, Appendix 2.C: Habitat Regulations Assessment (HRA) Stage 1 Screening Report, Volume 2, Part 3, Appendix 18.C: Project Marine Conservation Zone (MCZ) Assessment Screening** and **Volume 2, Part 3, Appendix 18.D: Marine Conservation Zone Stage 1 Assessment**. Where potential significant effects cannot be ruled out, the impacts on a relevant designated site would be considered in a Report to Inform Appropriate Assessment (RIAA), to be submitted with the ES. If a species is a designated feature of a given site, then an assessment of potential impacts is presented within this PEIR.
- 19.9.6 The assessment of magnitude will be made with consideration of the extent of the area impacted, the duration and frequency of the impact and the scale of the change i.e., whether it has an effect at an individual or population level. When determining the magnitude of impacts the life history and ecology of the receptors is important. Factors such as seasonality of presence or whether specific areas are required for a certain life stage which the species may be unwilling or unable to move away from are considered.
- 19.9.7 The ecological impact assessment will use available evidence, professional judgement and knowledge of fish and shellfish ecology and behaviour to determine the level of impact.
- 19.9.8 The significance of an effect, either adverse or beneficial, will be determined using a combination of the magnitude of the impact and the sensitivity of the receptor. A matrix approach is used throughout all topic areas to ensure a consistent approach within the assessment as shown in **Table 19-17**.

Table 19-15 Criteria for characterising the sensitivity of receptors

<b>Receptor sensitivity / value</b>	<b>Definition</b>
High	Equivalent to MarLIN MarESA sensitivity category High. Receptor has high vulnerability and low recoverability to change (i.e., recovery will take longer than 10 years following the cessation of activity or will not occur).
Medium	Equivalent to MarLIN MarESA sensitivity category Medium. Receptor has intermediate vulnerability and / or recoverability to change i.e., recovery to pre-impact conditions is possible between 5-10 years.
Low	Equivalent to MarLIN MarESA sensitivity category Low. Receptor has high recoverability, with recovery to pre-impact conditions between 1-5 years.
Negligible	Equivalent to MarLIN MarESA sensitivity category Not Sensitive. The receptor has low vulnerability to change without detriment to its character. Recovery expected to be relatively rapid (i.e., less than approximately six months following cessation of activity).

Table 19-16 Criteria for characterising the magnitude of impact

Magnitude	Definition
High	Loss of resource and / or quality and integrity of resource; severe damage to key characteristics, features or elements.
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of / damage to key characteristics, features or elements.
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements.

Table 19-17 Significance matrix

Sensitivity or value	Magnitude of change			
	High	Medium	Low	Negligible
High	Major (significant)	Major (significant)	Moderate (potentially significant)	Minor (not significant)
Medium	Major (significant)	Moderate (potentially significant)	Minor (not significant)	Minor (not significant)
Low	Moderate (potentially significant)	Minor (not significant)	Minor (not significant)	Negligible (not significant)
Negligible	Minor (not significant)	Minor (not significant)	Negligible (not significant)	Negligible (not significant)

## Preliminary Assessment of Cumulative Effects

- 19.9.9 At the current stage of the English Offshore Scheme (PEIR stage), design information is insufficient to allow for a robust cumulative assessment to be undertaken. Therefore, a cumulative assessment has not been undertaken at this stage; however, **Volume 1, Part 4, Chapter 27: Cumulative Effects** and **Volume 2, Part 4, Appendix 27.A: Long List of other Developments** present the long and short lists of ‘other developments’ for the inter-project cumulative effects which will be considered at the ES stage (with updates as necessary), and the methodology which allowed for the identification of these other developments, to allow consultation bodies to form a view and provide comment on the other developments included. The long-list will be reviewed and if necessary, updated, in the lead up to the ES, as Project design further evolves and in response to any comments raised at statutory consultation.

## 19.10 Preliminary Assessment of Temporary Habitat Loss / Seabed Disturbance Effects – All Phases

- 19.10.1 Several of the pressures established by the JNCC Marine Pressures-Activities Database v1.5 (2022) (Ref 19.74) have been considered under this overarching category, namely: abrasion / penetration of the substrate on the surface of the seabed; penetration and / or disturbance of the substratum below the surface of the seabed including abrasion; changes in suspended solids (water clarity); and smothering and siltation rate changes.
- 19.10.2 Aspects of the English Offshore Scheme that physically disturb the seabed e.g., seabed preparation (including UXO identification and pre-sweeping of sandwaves), cable burial, cable repair, and eventual cable removal upon decommissioning, have the potential to disturb habitats and prey species that live in contact with the seabed. **Table 19-14** presents the maximum design scenario for each phrase of the English Offshore Scheme.
- 19.10.3 Most Project activities that penetrate the seabed will present a temporary impact (i.e., will only be undertaken once and the seabed will be able to recover after the activity. Some activities will occur in the same footprint and will be separated by several months (e.g., seabed preparation followed by trenching). Certain fish and shellfish species may be more sensitive to the impact than others due to their ability to recover.
- 19.10.4 Abrasion and penetration of the substrate could result in the localised loss or damage to sediment habitats but does not directly change habitats from one type to another. However, disturbance to the habitat even temporarily could lead to an impact on species with demersal life stages. Less mobile fish, most shellfish species with the exceptions of squids and cuttlefish, larvae, and eggs are the most susceptible to the effects of this impact.

### Shellfish and fish species with demersal life stages

- 19.10.5 Demersal fishes such as cod, whiting, Dover sole, plaice and sandeel (and their eggs and larvae), pelagic species with a demersal life stage (e.g., herring), and shellfish that are sessile or have low mobility are most sensitive to seabed disturbance effects. During construction adults may be displaced, or juveniles, eggs and larvae may be damaged and / or killed. The preliminary assessment focuses on three key receptors, herring, sandeel, and shellfish. Herring and sandeel have specific sediment requirements for spawning and habitat and certain shellfish are sedentary or less mobile and are likely to be among the more sensitive receptors to temporary habitat loss / seabed disturbance.
- 19.10.6 Other fish species with demersal life stages are considered to be less sensitive to all impact pathways as they are mobile and therefore would be expected to show a degree of natural avoidance behaviour. In all cases the sensitivity would therefore be low or negligible. The magnitude of the impact has been assessed as low because any seabed disturbance will be of temporary duration and highly localised.
- 19.10.7 The overall significance of the effect on other fish species with demersal life stages for all phases has been assessed as **minor** and **not significant**.

### Herring

- 19.10.8 This receptor has been identified as having a sensitivity of medium because of the fragility and importance of successful egg hatching and recruitment. If spawning is interrupted or Atlantic herring eggs are damaged this could lead to a decrease in recruitment for the year, leading to decreased fish stocks and lack of prey availability for

the species preying upon Atlantic herring. The construction, operation and maintenance, or decommissioning works could take place during a sensitive season (e.g., August to October), with the potential to detrimentally affect eggs in a highly localised area. However, it should be noted that Atlantic herring behaviour shows a lack of site fidelity in terms of annual return to spawning locations. In addition, they are of national conservation importance, are of commercial importance and ecologically important as a prey species.

- 19.10.9 The baseline has established that the English Offshore Scheme crosses the Yorkshire section of the Banks herring spawning grounds. Preliminary analysis of sediment particle size data suggests 19% of stations considered within the herring assessment would classify as preferred or marginal herring spawning habitat, noting that not all of this habitat lies within the spawning grounds as defined by Coull *et al.* (Ref 19.1). A full herring habitat assessment has not been completed at the time of writing, and the full results will be presented within the ES. However, given that the temporary habitat disturbance would only occur over a 30 m wide corridor, it is likely that the percentage of the Yorkshire Spawning ground that overlaps the cable corridor is likely to be small. The Banks herring stock spawns from August to October.
- 19.10.10 The majority of the North Sea is considered 'low intensity' herring nursery grounds by Ellis *et al.* (Ref 19.2), though there is area of high intensity in ICES rectangle 35F0 and 40E8. The spatial extent of temporary habitat loss / seabed disturbance to herring grounds is considered low, given the availability of alternative available habitat surrounding the English Offshore Scheme, and the wider North Sea. The construction works are not of a continuous nature (e.g., compared to marine aggregate extraction which causes continuous seabed disturbance). The magnitude of the impact has been assessed as low because any seabed disturbance will be of temporary duration and highly localised.
- 19.10.11 The overall significance of the effect on herring for all phases has been assessed as **minor and not significant**.

#### Sandeel

- 19.10.12 This receptor has been identified as having a value and sensitivity of medium because of its strong habitat preferences and ecology. Sandeel bury themselves in sediments and hibernate within the sediment during winter months. Significant seabed disturbance during the period November to February in areas of Preferred sandeel habitat has the potential to be detrimental to population numbers. In addition, they are of national conservation importance, are of commercial importance and ecologically important as a prey species.
- 19.10.13 The baseline has established that the English Offshore Scheme passes through discrete areas of Preferred and Marginal sandeel habitat (60.8% of stations assessed). These areas were generally at the northern end and middle of the cable corridor. The middle section of the cable corridor is within the Lincolnshire spawning grounds as defined by Coull *et al.* (Ref 19.1).
- 19.10.14 A full sandeel habitat assessment has not been completed at the time of writing, and the full results will be presented within the ES. However, given that the temporary habitat disturbance would only occur over a 30 m wide corridor, it is likely that the percentage of the Lincolnshire Spawning ground that overlaps the draft Order Limits is likely to be small. The spawning grounds that the English Offshore Scheme cross are considered 'low intensity' spawning grounds by Ellis *et al.* (Ref 19.2).

- 19.10.15 The spatial extent of temporary habitat loss / seabed disturbance to sandeel grounds is considered low, given the availability of alternative available habitat surrounding the English Offshore Scheme, and the wider North Sea. The works are not of a continuous nature (e.g., compared to marine aggregate extraction which causes continuous seabed disturbance). The magnitude of the impact has been assessed as low because any seabed disturbance will be of temporary duration and highly localised. Recovery would be expected over the short to medium term (1-5 years) with individuals recolonising suitable substrates following completion of cable installation.
- 19.10.16 The overall significance of the effect on sandeel during all phases has been assessed as **minor** and **not significant**.

#### Shellfish

- 19.10.17 There is potential for shellfish to be affected by temporary habitat loss / seabed disturbance during construction. Within the study area, Nephrops, European lobster and crabs are the most landed shellfish. Crabs and lobsters are more limited in their mobility than demersal fish and are therefore often less able to avoid or move away from sources of disturbance.
- 19.10.18 Some species can disperse over short distances whilst others are sessile. At all life stages, shellfish are considered to have a medium sensitivity to physical damage due to limited dispersal. In addition, many species are of high economic value in the study area.
- 19.10.19 The magnitude of the impact has been assessed as low due to the temporary nature of activities, the small localised footprint of disturbance, the fact that the seabed would not be altered and species would be able to use it again after disturbance, and once the cables are installed the seabed would not be routinely disturbed.
- 19.10.20 The overall significance of the effect on shellfish during all phases has been assessed as **minor** and **not significant**.

#### Fish species with a fully pelagic life cycle

- 19.10.21 There is no direct impact pathway for temporary habitat loss on pelagic species, as at no part of their life cycle do they rely on specific 'grounds'. As such their sensitivity is negligible. Herring and sandeel are pelagic species but have been considered under fish with demersal life stages.
- 19.10.22 There may be an indirect impact pathway associated with a loss of food resource resulting from direct impacts to prey species that have a demersal life stage. However, as described above there are not predicted to be significant impacts on these receptors, and the magnitude of this effect is therefore negligible.
- 19.10.23 The overall significance of effect is therefore **negligible** and **not significant**.

### 19.11 Preliminary Assessment of Permanent Habitat Loss – Construction and Operation and Maintenance

- 19.11.1 This impact relates to the permanent change of one marine habitat type to another marine habitat type, through the change in substratum, including to artificial material (e.g., concrete). This involves the permanent loss of one marine habitat type but the creation of another. Associated activities include the installation of cables within the seabed (and eventual decommissioning if they remain in-situ) and the deposition of

external cable protection. External cable protection would be used in the construction of infrastructure crossings and for burial remediation where full cable burial into sediment has not been achieved. Whilst most external cable protection would be installed during construction, it would also be required during the operation and maintenance phase, either for the maintenance of infrastructure crossings or for remedial burial e.g., associated with a cable repair, or if the cables become exposed.

- 19.11.2 The maximum footprint of permanent habitat loss will occur because of the maximum area of seabed covered by external cable protection and cable crossings protection (i.e., rock berms) and is anticipated to be 1.94 km<sup>2</sup> during construction and a further 0.336 km<sup>2</sup> during operation and maintenance.
- 19.11.3 The deposition of external cable protection will result in a permanent change of habitat type within the footprint of the activity. The change in substrate would make it unsuitable habitat for fish species or unsuitable for fish spawning grounds.
- 19.11.4 As migratory fish are only transient within the English Offshore Scheme, they do not have functional associations with seabed types; therefore, this receptor group has not been considered further. Similarly, whilst demersal species high and low intensity nursery and / or spawning grounds are present throughout the study area, most are highly mobile, with capabilities to avoid any disturbance and utilise nearby available habitats, with grounds stretching over large areas of the North Sea; therefore, this receptor group has not been considered further. This section therefore focuses on more vulnerable species groups such as shellfish and fish with demersal life stages that have specific habitat preferences.
- 19.11.5 Two options will be considered at decommissioning: leaving the cables in-situ and removing them. If the cables are left in-situ there will be no additional effects on herring during decommissioning. No additional external cable protection will be installed, but the existing external cable protection would not be removed meaning the localised change in habitat is permanent. However, if the option to remove the cables (and any associated protection) is selected, this process would essentially be the same as installation activities but in reverse. Depending on water depth, the type of external cable protection deployed, technological advances and the structural integrity of the external cable protection it may or may not be possible to remove it from the seabed. Removing it from the seabed would remove the anthropogenic impact allowing the seabed to return to natural conditions, but it may also remove an ecologically important habitat that has become established (e.g., similar to an artificial reef). The environmental impact of decommissioning would be assessed at the time, but it is predicted that it would not be more significant than effects during construction.

## Shellfish and fish species with demersal life stages

- 19.11.6 Research has shown that some fish and shellfish species utilise rocky areas for shelter when guarding eggs / nests, and protection from predators (Ref 19.75). The English Offshore Scheme is primarily sand, gravelly sand and slightly gravelly sand habitat, meaning to the addition of new hard structures (external cable protection) could be beneficial, notwithstanding the change in habitat type. Some species such as small fishes from the gobiidae and bleniidae families, may utilise the hard structures for shelter / protection; or larger fishes may utilise any increased prey availability on / near to the hard structures.
- 19.11.7 Demersal fishes such as cod, whiting, Dover sole, plaice and sandeel (and their eggs and larvae), pelagic species with a demersal life stage (e.g., herring), and shellfish that

are sessile or have low mobility are most sensitive to habitat loss. During construction adults may be displaced, or juveniles, eggs and larvae may be damaged and / or killed. The preliminary assessment focuses on three key receptors, herring, sandeel and shellfish. Herring and sandeel, have specific sediment requirements for spawning and habitat and certain shellfish are sedentary or less mobile and are likely to be among the more sensitive receptors to temporary habitat loss / seabed disturbance.

- 19.11.8 Other fish species with demersal life stages are considered to be less sensitive to all impact pathways as they are mobile and therefore would be expected to show a degree of natural avoidance behaviour. In all cases the sensitivity would therefore be low or negligible. The magnitude of the impact has been assessed as low because the spatial extent of permanent habitat loss in herring grounds is localised, given the availability of alternative available habitat surrounding the English Offshore Scheme, and within the wider North Sea.
- 19.11.9 The significance of the effect on other fish species with demersal life stages has been assessed as **minor** and **not significant** during construction and operation and maintenance.

### Herring

- 19.11.10 The sensitivity of herring to the impact has been assessed as medium. Herring have specific habitat specialism and a change in habitat in a preferred spawning ground could be detrimental to stock recruitment. In addition, they are of national conservation importance, are of commercial importance and ecologically important as a prey species.
- 19.11.11 A preliminary assessment of the requirement for rock placement for habitats within the MCZ indicates that only one station (ST097, near the southern boundary of the Holderness Offshore MCZ) contains 'preferred' herring spawning habitat and is within an area requiring rock placement. These are high intensity nursery grounds as identified by Coull *et al.* (Ref 19.1) and Ellis *et al.* (Ref 19.2). Whilst it is possible that external cable protection, especially rock berm, has the potential to provide functional habitat for spawning activities, this cannot be guaranteed., although the Herring spawning assessment presented in the EBS states that 80% of the stations considered are not suitable as herring habitat. On the basis of the information available, the magnitude of the impact has been assessed as low because the spatial extent of permanent habitat loss in herring grounds is localised, given the availability of alternative available habitat surrounding the English Offshore Scheme, and within the wider North Sea. Localised changes will not have a potential significant effect on overall herring abundance.
- 19.11.12 The significance of the effect has been assessed as **minor** and **not significant** during construction and operation and maintenance.

### Sandeel

- 19.11.13 The sensitivity of sandeel to this impact is medium because the species is associated with habitat types where they can bury. A change to a hard substrate limits these opportunities. In addition, they are of national conservation importance, are of commercial importance and ecologically important as a prey species.
- 19.11.14 A preliminary assessment of the requirement for rock placement for habitats within the MCZ indicates that only one station (ST097, near the southern boundary of the Holderness Offshore MCZ) contains 'marginal' sandeel spawning habitat and is within an area requiring rock placement. An assessment of the requirement for rock placement across the rest of the English Offshore Scheme has not yet been undertaken, though

the EBS indicates that approximately 50% of the cable route contains preferred sandeel habitat. The magnitude of the impact has been assessed as low because the availability of alternative available habitat surrounding the English Offshore Scheme, and within the wider North Sea is high. The localised change in habitat is unlikely to alter overall sandeel abundance.

19.11.15 The significance of the effect has been assessed as **minor** and **not significant** during construction and operation and maintenance.

### Shellfish

19.11.16 This receptor has been identified as having a sensitivity of medium because of its commercial and / or conservation importance. In addition, some shellfish species, such as edible crab and scallop, are moderately sensitive to habitat loss, as these species tend to be associated with habitat types in which they can partially bury. A change to a hard substrate would limit these opportunities. Although it is acknowledged that some species such as crab and lobster may benefit from the addition of artificial hard substrates, providing additional refuge and new potential food sources.

19.11.17 The magnitude of the impact has been assessed as low. This is due to the small scale of the predicted footprints compared to the wider suitable habitat areas of sand, gravelly sand and slightly gravelly sand habitat seabed within, and outside of the English Offshore Scheme.

19.11.18 The significance of the effect on shellfish has been assessed as **minor** and **not significant** during construction and operation and maintenance.

### Fish species with a fully pelagic life cycle

19.11.19 There is no direct impact pathway for temporary habitat loss on pelagic species, as at no part of their life cycle do they rely on specific 'grounds'. As such their sensitivity is negligible.

19.11.20 There may be an indirect impact pathway associated with a loss of food resource resulting from direct impacts to prey species that have a demersal life stage. However, as described above there are not predicted to be significant impacts on these receptors, and the magnitude of this effect is therefore negligible.

19.11.21 The overall significance of effect is therefore **negligible** and **not significant**.

## 19.12 Preliminary Assessment of Temporary Increase and Deposition of Suspended Sediments – All Phases

19.12.1 Temporary increases and deposition of suspended sediments are likely to occur from any activities which disturb the seabed e.g., seabed clearance works such as pre-sweeping, PLGR, boulder clearance, UXO identification, as well as anchoring. The activities that will have the highest magnitude of impact are associated with cable trenching and pre-sweeping. This assessment therefore focuses on these activities.

19.12.2 The pre-sweeping of sand waves involves the re-positioning of large quantities of sediment from the cable route to either immediate alongside the cable route, or to a separate disposal location. Depending on the technique used and the size of sand waves requiring pre-sweeping, the redeposition of sediment can cause smothering >10 cm deep over relatively wide areas of seabed (in the order of tens of thousands

square metres). Effects could potentially be significant if the disposal site contains sensitive spawning grounds or shellfish beds. It should be noted that the baseline established no cockle, oyster or mussel beds are present within the draft Order Limits.

- 19.12.3 During cable trenching, suspended sediments will be increased in the immediate vicinity of the installation tool. If a jetting tool is used for installation (worst case), the majority of sediment is expected to fall back within the installation trench. For plough trenching sediment disturbance is far less but as there is no publicly available information on likely proportion it has been assumed that similar proportions of sediment will be suspended. While the larger grain sediments such as gravel and sand will settle quickly within metres of the cable trench, finer grain sediment will be dispersed further and remain in the water column for a longer period, potentially reducing water clarity and increasing the concentration of suspended solids over a wider area.
- 19.12.4 Project specific data, presented in **Volume 1, Part 3, Chapter 17: Coastal and Marine Physical Processes** suggests coarse sediment plumes, created from seabed preparation and cable trenching activities, will settle from the water column within the draft Order Limits and will cause light smothering of <5 cm, and fine sediment will cause lighter smothering of <2 mm up to 13.6 km from the draft Order Limits arising from pre-lay and cable trenching activities. For TSHD activities, coarse sediment will settle within the draft Order Limits and cause light smothering of <5 cm (from one pass of the TSHD), and fine sediment will cause lighter smothering of <2 mm out to a maximum distance of 10.4 km, dependent upon peak flow speed. There will be no heavy smothering as a result of the English Offshore Scheme and heavy smothering will not be considered in this assessment.
- 19.12.5 Coarse sediment plumes, created from seabed preparation and cable trenching activities, will settle from the water column within the draft Order Limits and will cause light smothering of <5 cm, and fine sediment will cause lighter smothering of <2 mm up to 13.6 km from the draft Order Limits arising from pre-lay and cable trenching activities. The maximum distance from trenching activities where suspended sediment concentrations exceed 10 mg/l is 8.8 km at KP 10 and is <4 km beyond KP 46. Suspended sediment concentrations exceed 10 mg/l for a maximum distance of 2.8 km from TSHD activities.
- 19.12.6 As such, any impact from elevated suspended sediment concentrations (SSC) is expected to be small and highly localised, and any measurable change in SSC will be temporary and localised (i.e., mostly within the bottom 5 m of the water column). For fish and shellfish species increased turbidity reduces visibility and could cause reduced feeding success or clog gills, whilst an increase in sediment deposition may clog feeding apparatus, or cause mortality in eggs / larvae through smothering or damage / mortality if toxic sediments are disturbed and deposited.

## Shellfish and fish species with demersal life stages

- 19.12.7 Demersal fishes such as cod, whiting, Dover sole, plaice and sandeel (and their eggs and larvae), pelagic species with a demersal life stage (e.g., herring), and shellfish that are sessile or have low mobility are most sensitive to increases and deposition of suspended sediment. The preliminary assessment focuses on three key receptors, herring, sandeel and shellfish. Herring and sandeel, have specific sediment requirements for spawning and habitat and certain shellfish are sedentary or less mobile and are likely to be among the more sensitive receptors to temporary habitat loss / seabed disturbance.

- 19.12.8 Other fish species with demersal life stages are considered to be less sensitive to all impact pathways as they are mobile and therefore would be expected to show a degree of natural avoidance behaviour. In all cases the sensitivity would therefore be low or negligible. The magnitude of the impact has been assessed as low, given the small spatial scale.
- 19.12.9 The overall significance of the effect on other fish species with demersal life stages for all phases has been assessed as **minor** and **not significant**.

### Shellfish

- 19.12.10 Many crustacean species, including the edible crab, are known to be tolerant of, and have low sensitivity to temporary increases and deposition of suspended sediments. Some shellfish could be impacted when hunting for prey; increased turbidity has been shown to increase the time crabs search for prey which would increase their vulnerability to predators (Ref 19.76). Whilst species such as the edible crab and European lobster bury into sediment on occasion, both rely on sufficient aeration to their eggs which may be difficult to achieve with increases in deposited suspended sediments.
- 19.12.11 When not buried, edible lobster, European lobster, and king scallops are considered mobile, capable of tolerating a sediment smothering depth of 5 cm (Ref 19.30). Furthermore, these species show avoidance when conditions become too inclement, moving away from an impacted area. As such, these receptors are considered to have low sensitivity to temporary increases and deposition of suspended sediments.
- 19.12.12 Bivalve species such as such as cockles, scallops and ocean quahog are adapted to a sedimentary environment and changes in suspended sediment concentrations do not necessarily lead to adverse effects. Juvenile and adult scallop are likely able to lift themselves clear of a new layer of sediment <5 cm, since they are capable of jumping and swimming (Ref 19.37). Ocean quahog are not considered sensitive to light or heavy smothering (Ref 19.77) (see **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**) for more detail of the impact(s) on this protected species. It should be noted that the commercial cockle area is approximately 20 km from the draft Order Limits (at the closest point) in The Wash and will therefore not experience any direct impacts.
- 19.12.13 Modelling of the disposal of dredged material from pre-sweeping for the NeuConnect project (an analogous activity; modelling of deposition of 175,000 m<sup>3</sup>) predict that instantaneous values of <15 mg/l are predicted proximal to the release location from a trailing suction hopper dredger. This increase is transient, decreasing rapidly as the sand sized particles settle out of suspension. At the disposal locations, deposits of dredge material are predicted in the order of several metres, but these deposits are extremely localised (immediately beneath the dredger) and reduce to <0.25 cm as a result of associated sediment plumes, as discussed further below (Ref 19.78).
- 19.12.14 Whilst it is acknowledged that the sediment deposition in the pre-sweeping disposal areas will cause mortality of shellfish and species with demersal life stages due to the depth of sediment deposition, the footprint will be very localised. Outside of these disposal locations, which will be defined in the ES, the sediment deposition will be minimal (2 mm), within levels that species can tolerate. The magnitude of the impact has been assessed as low, given the small spatial scale.
- 19.12.15 The significance of the effect has been assessed as **minor** and **not significant**, during construction. During operation and maintenance and decommissioning, the level of pre-sweeping required, if at all will be lower or the same in magnitude than required during

construction and therefore this preliminary conclusion is also relevant for the other English Offshore phases.

### **Fish with demersal life stages**

- 19.12.16 The baseline has established that the English Offshore Scheme crosses the Yorkshire section of the Banks herring spawning grounds. Preliminary analysis of sediment particle size data suggests 19% of stations considered within the herring assessment would classify as Preferred or Marginal herring spawning habitat. The Banks herring stock spawns from August to October. As identified by the assessment there is Preferred and Marginal habitat outside of the identified spawning grounds, meaning that alternative habitats are available over a wider area.
- 19.12.17 With respect to sandeel, the baseline has established that the English Offshore Scheme passes through discrete areas of Preferred and Marginal sandeel habitat (60.8% of stations assessed). These areas were generally at the northern end and middle of the cable corridor. The middle section of the draft Order Limits is within the Lincolnshire spawning grounds as defined by Coull *et al.* (Ref 19.1).
- 19.12.18 Herring and sandeel are demersal spawners with specific habitat preferences and are regarded as having medium sensitivity to smothering effects from suspended sediment concentrations. Herring larvae and eggs have been identified as very tolerant to high levels of suspended sediment concentrations (as high as 300 mg/l) and can tolerate short term exposure to 500 mg/l (Ref 19.79). Sandeel deposit eggs on the seabed and can become covered with sand under normal tidal conditions. Studies have shown eggs can develop normally and hatch as soon as the currents uncover them, although there can be a delay to the hatching period.
- 19.12.19 It is considered that the sensitivity of herring and sandeel represent the worst case. Taking the above discussion into consideration, the commercial importance of shellfish to the region, the national conservation and ecological importance of species such as herring and sandeel, the sensitivity of the receptors has been assessed as medium.
- 19.12.20 The area where fine sediments may be re-deposited is negligible in the context of the overall distribution of the North Sea stocks for herring and sandeel. If activities were to take place during the most sensitive period for the species (August to October for herring, November to February for sandeel) the affected area would be small due to the extremely small settling depths and suspension distances. Therefore, a significant proportion of herring eggs / larvae or sandeel would not be affected. Shellfish (including cockles) have a natural tolerance to moderate changes in suspended sediment concentrations, due to temporary localised natural changes during storm events and periods of strong wave action when sediment is mobilised. The magnitude of the impact has therefore been assessed as low.
- 19.12.21 The significance of the effect has been assessed as **minor** and **not significant**, during construction. During operation and maintenance and decommissioning, the level of seabed disturbance required and subsequent suspended sediment concentrations and sediment deposition, will be lower or the same in magnitude to that required during construction therefore this preliminary conclusion is also relevant for the other Project phases.

## 19.13 Preliminary Assessment of Underwater Noise Changes – All Phases

- 19.13.1 All works undertaken during the construction, operation and maintenance and decommissioning of the English Offshore Scheme will generate underwater sound. Sound is readily transmitted in the underwater environment and can be categorised into impulsive sources or continuous sources. Impulsive sources are typically transient, brief (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and decay (Ref 19.80, Ref 19.81). This category includes sound sources such as seismic surveys and underwater explosions. Continuous (non-impulsive) noises can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent and typically do not have a high peak sound pressure with rapid rise / decay time that impulsive noises do. This category includes sound sources such as continuous running machinery, sonar, and vessels.
- 19.13.2 Underwater noise propagation modelling was undertaken for the PEIR for Eastern Green Link 3 and Eastern Green Link 4 projects and has been used to inform this PEIR chapter given the English Offshore Scheme's geographical proximity and the similarity of the construction methodologies. The report provides a summary of acoustic concepts and terminology, acoustic assessment criteria, estimated source noise levels and provides the approach taken and results of the underwater noise propagation modelling (Ref 19.7). The report uses sound propagation models to calculate the impact ranges for fish from each phase of the English Offshore Scheme for three key modelled sources, referencing them back to impact criteria from Popper *et al.* (Ref 19.5) and the Washington State Department of Transport (Ref 19.82):
- Geophysical surveys – non-impulsive sound sources;
  - Vessels and equipment – non-impulsive sound sources; and
  - Clearance of UXO – an impulsive sound source.
- 19.13.3 Sound allows fish to communicate and detect prey and predators. Fish sensitivity to sound depends upon the sound frequency, and their responses depend on the noise levels within the frequency ranges the fish is sensitive to. Generally, most fish do not detect frequencies above 1 kHz, except for shads, which are known to detect frequencies above this (Ref 19.5).
- 19.13.4 Fish are not all equally sensitive to noise. Three categories of fish hearing sensitivity groups have been assigned, based on their physiologies:
- **High hearing sensitivity fish:** these species which rely on a swim bladder to assist hearing. As swim bladders are gas-filled, these fish are susceptible to barotrauma (a condition seen in many fish caught at depths greater than 50 feet caused by pressure changes leading to an expansion of gases in the swim bladder) and can detect particle motion and sound pressure (includes Atlantic cod, herring and other clupeids).
  - **Medium hearing sensitivity fish:** those species which have swim bladders, but do not rely on said swim bladders for hearing. Like high hearing sensitivity fish, these fish may be susceptible to barotrauma (includes Atlantic salmon, sea trout, European eel).
  - **Low hearing sensitivity fish:** those species which lack a swim bladder and detect particle motion rather than sound pressure (includes flatfish, elasmobranchs, and lampreys).

- 19.13.5 Shellfish tend to be more sensitive to particle motion rather than sound pressure (Ref 19.83), though the impacts of underwater noise upon these receptors has been seldom researched. It is known that some crustaceans have tactile hairs which respond to particle displacement of an impinging sound, though not to the sound's pressure component (Ref 19.83). This sense is important for intraspecific communication, limited research has found potential for injury in adult / developmental stages of crustacea from underwater noises, only when they are in very close proximity a few metres away to high intensity sounds.
- 19.13.6 The preliminary assessment focuses on species regarded as having high to medium hearing sensitivity. In all of the assessments presented below, fish species have been assessed as having a sensitivity of medium due to the hearing sensitivity, commercial, conservation and ecological importance within the study area.

## Geophysical survey

- 19.13.7 During construction, operation and maintenance and decommissioning, several sonar-like survey types would be used e.g., Multi-Beam Echosounder (MBES), Side Scan Sonar (SSS), Sub-Bottom Profiler (SBP) and ultra-short baseline (USBL). These are classed as non-impulsive noise because they generally comprise a single (or multiple discrete) frequency as opposed to a broadband signal. The equipment can typically work at a range of signal frequencies, depending on the distance to the bottom and the required resolution. The signal is highly directional and acts as a beam, with the energy narrowly concentrated within a few degrees of the direction in which it is aimed.
- 19.13.8 SBP, MBES, and SSS equipment operate at frequencies over 3 kHz. As fish are not sensitive to noises over 1 kHz (Ref 19.83), these three equipment types have not been assessed further. USBL systems operate at frequencies within the hearing range of fish; between 0.2-14 kHz, with a Sound Pressure Level (SPL) of 200 dB re 1 $\mu$ Pa re 1 m. Whilst conservative (the actual thresholds are likely to be significantly higher), the Popper *et al.* (Ref 19.5) threshold criteria for mid-frequency sonar (1-10 kHz) can be used as a proxy for the USBL. For medium to high hearing sensitivity fish the threshold for injury is a SPL<sub>rms</sub> of 210 dB re 1 $\mu$ Pa with a threshold for behavioural responses at a SPL<sub>rms</sub> of >209 dB re 1 $\mu$ Pa. As the source level for USBL is less than the onset thresholds for injury or behavioural change, the magnitude of the impact has been assessed as negligible. The significance of the effect has been assessed as **negligible** and **not significant**, during all phases of the English Offshore Scheme where geophysical survey is used.

## Vessels and equipment

- 19.13.9 Underwater noise propagation modelling was undertaken for the Eastern Green Link 3 and Eastern Green Link 4 projects; that report details impact ranges for fish medium and high sensitivity fish species from the various vessels and construction equipment that could be deployed within the English Offshore Scheme. The report concludes that the range for a temporary threshold shift in medium and high sensitivity hearing fish species is 17 m. It should be noted that fish would need to be exposed within this potential impact range for a period of 48 hours continuously in the case of recoverable injury and 12 hours continuously in the case of Temporary Threshold Shift (TTS) for the effect to occur. It is therefore considered that these ranges are highly precautionary, and injury is unlikely to occur.

- 19.13.10 The magnitude of the impact has been assessed as low as impact ranges are negligible, the zone of impact will be transient as the construction vessels move slowly at a constant speed and direction along the draft Order Limits.
- 19.13.11 The significance of the effect has been assessed as **minor** and **not significant**, during all phases of the English Offshore Scheme.

## UXO Clearance

- 19.13.12 UXO clearance is not being consented under the DCO; a separate Marine Licence would be applied for.
- 19.13.13 The below high-level assessment is provided for information only to provide an understanding of all impacts associated with the English Offshore Scheme.
- 19.13.14 UXO clearance is a term used to describe finding, removing and safely disposing of unexploded ordnance (e.g., bombs, shells and landmines). It follows a systematic process and mitigation hierarchy, whereby avoidance is the first option and in-situ controlled detonation of the UXO using a high order method is the last option; only undertaken if all other options have failed or if there is an exceptional circumstance.
- 19.13.15 A high order clearance is a traditional method used, whereby a donor charge is placed next to the UXO and detonated, causing a chain reaction that detonates the UXO. High order detonations are characterised by a rapid, strong shock wave.
- 19.13.16 Low order clearance methods like deflagration are designed to render UXO harmless by burning out the explosive content so that the UXO does not detonate in a high order manner. A single charge of 30 g to 80 g Net Explosive Quantity is placed proximal to the UXO. When detonated, a shaped charge penetrates the casing of the UXO to introduce a small, clinical plasma jet into the main explosive filling. The intention is to excite the explosive molecules within the main filling to generate enough pressure to burst the UXO casing, producing a deflagration of the main filling and neutralising the UXO. It is possible that some residual explosive material remains on the seabed following deflagration. In this case, recovery will be performed which may require a small (500 g) 'clearing shot'.
- 19.13.17 In January 2025, guidance from the UK Government was published - "*Supporting minimising environmental impacts from unexploded ordnance clearance*". This sets out that when applying for a Marine Licence if no alternatives in the UXO mitigation hierarchy exist the default method of clearance should be low noise methods in the first instance (e.g., low order / deflagration) as opposed to high order clearance, though high order may be considered on exception as per Department for Environment, Food and Rural Affairs (Defra) guidance.
- 19.13.18 The precise details and locations of potential UXOs is unknown at this time. A UXO survey and identification campaign would be completed as part of the seabed preparation works during pre-construction activities. Any confirmed UXO will be marked and the below UXO mitigation hierarchy would be followed:
- Avoid the UXO by micro-routeing the cables a safe distance away;
  - Safely remove UXO to an alternative seabed position;
  - Safely remove UXO to surface for onshore disposal;
  - Disposal of in-situ using low order method; and
  - Disposal of in-situ using high order method.

- 19.13.19 High order clearance would only be considered if the low order method was not suitable for the UXO or it had failed after a minimum of three attempts and there is prior agreement with the MMO.
- 19.13.20 **Volume 2, Part 3, Appendix 21.A: Underwater Noise Assessment** models impact ranges for fish medium and high sensitivity fish species from several scenarios including low order disposal (0.08 kg donor charge), clearance charge (0.5 kg charge) and high order disposal (295 kg charge and 697 kg charge). It predicts that impact ranges for injury range from 27 m - 81 m for the low order disposal and clearance charge and to 405 m - 900 m for a high order disposal. Recoverable injury effects are likely in the near (tens of metres) to intermediate (hundreds of metres) fields.
- 19.13.21 The magnitude of the impact has been assessed as low as impact ranges indicate that injury is highly localised with low order detonation (considered to be the mitigated approach).
- 19.13.22 The significance of the effect has been assessed as **minor and not significant**.
- 19.13.23 Mitigation would need to be agreed with JNCC / Natural England / Cefas once the details of the UXO is known but would likely include some or all of the following:
- No UXO clearance between August and October in areas identified as Preferred herring spawning ground to avoid impact to Banks herring spawning ground. Further work would be undertaken to define the exact locations along the draft Order Limits that this restriction would apply.
  - The use of noise abatement systems (such as bubble curtains) would be discussed with the MMO, JNCC, Natural England and Cefas.
  - High order detonation would only be considered if the low order method has failed after a minimum of three attempts and there is prior agreement with the Marine Management Organisation.

## **19.14 Preliminary Assessment of Electromagnetic Changes / Barrier to Species Movement Due to the Presence of Cables**

- 19.14.1 During the operation of an HVDC cable electromagnetic fields are generated. To inform the assessment, a number of scenarios were modelled to calculate the EMF emissions. The calculations are presented in **Volume 2, Part 1, Appendix 4.A: Electromagnetic Field (EMF) Study**. They show that for bundled HVDC poles the magnetic field dissipates to below background geomagnetic levels within 20 m. The magnetic field directly above the cables at the seabed is 124.3  $\mu\text{T}$  (or 74.7  $\mu\text{T}$  without the earth's magnetic field).

### **Shellfish and fish species with demersal life stages**

- 19.14.2 Sensitivity to EMF is species dependant. Any impacts would mostly affect those species on the seabed, such as flatfish and shellfish species rather than pelagic species or demersal species which tend to swim a few meters above the seabed, and which will be out of the range of EMF emissions (Ref 19.85). There is very limited information about the sensitivity of species with demersal life stages to EMF, but there have been a small number of investigations in laboratory experiments and field observations.
- 19.14.3 Flatfishes like plaice can use magnetic fields as navigational cues (Ref 19.86), although their sensitivities to EMFs are not documented. Surveys which investigated the effect of

an offshore windfarm in the Baltic Sea, concluded that EMF was unlikely to alter cod behaviour, as cod were observed near the cable during both active and inactive transmissions, over several years (Ref 19.87).

- 19.14.4 Research on edible crab and lobster responses to EMFs have found effects only at strengths well beyond those modelled for the English Offshore Scheme; at 250  $\mu$ T, edible crab were found to have a behavioural response, and at 2,800  $\mu$ T, effects were noticed on crab and lobster embryonic development, with significant differences in egg volume and consequently, decreased carapace length, total length, and maximum eye diameter in the larvae of both species (Ref 19.88). In another study, the blue mussel, *Mytilus edulis*, the brown shrimp, *Crangon crangon* and the crab, *Rhithropanopeus harrisi*, were all exposed to a static field of 3,700  $\mu$ T for three months, and no differences in survival between experimental and control animals were detected.
- 19.14.5 The effects of EMFs on whelks are not conclusive due to the lack of research. However, the first study of EMFs on another small gastropod, the common periwinkle (*Littorina littorea*), found no significant difference in behavioural or physiological responses when in a control environment (baseline 60  $\mu$ T) compared to an experimental environment (500  $\mu$ T) (Ref 19.89). Research suggests that edible crab show reduced foraging activity when exposed to strong EMF (40,000  $\mu$ T) (Ref 19.90), but does not disrupt larval release in either edible crab or European lobster (Ref 19.88).
- 19.14.6 Based on the discussions above, the sensitivity of shellfish and fish species with a demersal life stage has been assessed as low.
- 19.14.7 For bundled HVDC poles buried at 1 m the magnetic field dissipates to below background geomagnetic levels within 20 m, however the target burial depth will be 1.5 m and where the cable cannot be buried to that depth, it would be covered by external cable protection, so effects of EMF would be further reduced. The magnitude of the impact of EMF changes and barriers to movement has been assessed to be negligible, as the EMFs emitted from the bundled cables would only cause a localised insignificant increase in the background magnetic field which is not of ecological importance for these species.
- 19.14.8 The significance of the effect on these receptors is assessed to be **negligible** and **not significant** during operation and maintenance.

## Diadromous species

- 19.14.9 The English Offshore Scheme is approximately 7.5 km from the mouth of the Humber Estuary SAC at the nearest point. This river is used by migratory fish including sea and river lamprey but is not noted for the presence of salmonids or other diadromous species listed above.
- 19.14.10 There is very little information on the sensitivity of lamprey to EMF, but it is thought that they do not respond to magnetic B fields (Ref 19.92). There are likely to be some migratory salmonids within the general area of the English Offshore Scheme. Studies on salmonids have shown evidence that EMFs from cables can affect the behaviour of migratory fish; tagged European eel swimming speeds were reduced (Ref 19.93), and swimming trajectories during passage over a cable differed to their normal behaviour. Conversely, another study in the USA found no significant difference to migration success in juvenile salmon in response to a HVDC cable (Ref 19.94) though some specimens were intrigued by the cable, and some took a longer route to cross the cable. Regardless, the impacts of EMFs on salmon in this were deemed to be neither adverse nor beneficial. Long-term exposure studies of fish to EMFs have found greater water

permeability in salmon eggs than at control sites, though embryonic development and survival were not hindered (Ref 19.95). and further, this water permeability was observed at an EMF strength of 2,000  $\mu$ T. It should be noted that Salmon spawn in rivers and Salmon eggs would not be present within the draft Order Limits.

- 19.14.11 The research cited above suggests that despite diadromous species being considered EMF sensitive, they would not be sensitive to the highly localised, low-level change in geomagnetic fields associated with the English Offshore Scheme operational cables. Species mentioned above have been shown to spend most of their time in the top 10 m of the water column, rather than on the seabed where the EMF changes would be more noticeable. The sensitivity of the receptor has therefore been assessed as low.
- 19.14.12 For bundled HVDC poles buried at 1 m the magnetic field dissipates to below background geomagnetic levels within 20 m, however the average burial depth will be 1.5 m and where the cable cannot be buried to that depth, it would be covered by external cable protection, so effects of EMF would be further reduced. The magnitude of the impact of EMF changes and barriers to movement has been assessed to be negligible, as the EMFs emitted from the bundled cables would only cause a localised insignificant increase in the background magnetic field which would not affect the behaviour of these species.
- 19.14.13 The significance of the effect on these receptors is assessed to be **negligible** and **not significant** during operation and maintenance.

## Elasmobranchs

- 19.14.14 The English Offshore Scheme passes through areas of suitable habitat for a range of elasmobranchs including blonde ray, spotted ray, and thornback ray. Whilst research on the impacts of EMFs on these species are limited, in general, elasmobranchs can detect and respond to EMFs due to their electro-sensory systems which are used for hunting and navigation (Ref 19.96).
- 19.14.15 When exposed to EMFs generated by cables, little skate (*Leucoraja erinacea*), an American ray which is similar to UK rays travelled 20% to 90% further than those in control enclosures. They swam at lower average speeds, made more frequent turns, and spent more time near the seabed. This behaviour was considered exploratory, indicating that the cable did not act as a barrier to their movement (Ref 19.96), and rather, the species was intrigued by the introduced EMFs. Since, studies have observed similar responses, with little skate travelling longer distances at slower speeds when exposed to EMF levels of 65.3  $\mu$ T. Avoidance and / or repulsion from EMFs has been demonstrated among elasmobranchs, though the behaviour is species-specific. For example, spurdog have been documented to avoid direct current electric field at emission intensities at 10  $\mu$ V/cm (Ref 19.97), though it is acknowledged that 10  $\mu$ V/cm is higher than typical offshore cable levels. Spurdog were, however, noted to be attracted to DC emissions at emission levels like their prey.
- 19.14.16 Both lesser spotted dogfish and thornback ray have exhibited increased searching effort to find prey around operational subsea cables (Ref 19.98), though this behaviour did not always occur, and subsequently, from the study of Gill *et al.*, the Scottish Government has concluded there being neither a beneficial nor adverse effect on elasmobranchs as a result of EMF encounter (Ref 19.99). Furthermore, research on dogfish responses to EMF emissions (Ref 19.100) found that the species could potentially confuse EMF emissions from subsea cables with those naturally produced from their prey.

- 19.14.17 In an Australian study, embryonic bamboo shark (*Chiloscyllium punctatum*), which have a similar life-history to dogfish, showed avoidance behaviour when electric fields were similar to their predators (0-20 Hz), by a 'freeze response', whereby they stop their respiratory gill movements (and as such, reduce their own electrosensory output to minimise detection from predators) whilst inside their egg cases (Ref 19.101). As bamboo shark share the same family as dogfish (Scyliorhidae), it is plausible that behaviour may be similar.
- 19.14.18 The sensitivity of elasmobranchs to EMF changes has been assessed as medium, due to the discussion above.
- 19.14.19 For bundled HVDC poles buried at 1 m the magnetic field dissipates to below background geomagnetic levels within 20 m, however the average burial depth will be 1.5 m and where the cable cannot be buried to that depth, it would be covered by external cable protection, so effects of EMF would be further reduced. The magnitude of the impact of EMF changes and barriers to movement has been assessed to be negligible, as the EMFs emitted from the bundled cables would only cause a localised insignificant increase in the background magnetic field which is below the levels which cause behavioural changes in elasmobranchs.
- 19.14.20 The significance of the effect on these receptors is assessed to be **minor** and **not significant** during operation and maintenance.

## 19.15 Preliminary Assessment of Temperature Increase – Operation and Maintenance

- 19.15.1 During the operation of an HVDC cable heat losses occur because of the resistance in the cable / conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the interstitial spaces of external cable protection). There are no specific regulatory limits applied to temperature changes in the seabed, although a two-degree Celsius change between seabed surface and 0.2 m depth is used as a guideline in Germany. The benchmark for sensitivity used by MarESA is a five-degree Celsius increase in temperature for one month, or two Celsius for one year.
- 19.15.2 Species that could be particularly affected by this impact pathway are species that bury themselves in the top layer of sediment e.g., shellfish like cockles, *Nephtrops* and crab. A review of information on the MarLIN pages for shellfish species in the study area identified that adult crab are not tolerant of temperatures over 20 Celsius, whilst spiny lobster (proxy for European lobster) has a high sensitivity to temperature changes with egg loss positively correlated with to an increase in temperature and mortality observed at temperatures above 24 Celsius. *Nephtrops* are known to inhabit unlined branching burrows (Ref 19.102). These burrow systems typically extent do a depth of approximately 20 cm. However bottom temperatures within their inhabited distribution ranges from 7 - 15 Celsius, although the maximum and minimum temperatures limiting *Nephtrops* are not known (Ref 19.103).
- 19.15.3 Sandeel and herring lay their eggs on top of the seabed. Juvenile and adult sandeel burrow into the sediment, however this also in the surface sediments, as they must not go beyond the 'oxic' layer in order to survive (Ref 19.104).
- 19.15.4 Overall, the receptor shellfish and species with a demersal life stage have been assessed as having a sensitivity of medium to thermal emissions. This is partly precautionary due to the limited information on physiology and how species respond to

the changes in temperature, but also due to the commercial and ecological importance of the identified sensitive species in the study area.

- 19.15.5 The heat loss from the cable is related to the physical and thermal properties of the cables. To inform the assessment, a number of scenarios were modelled to evaluate the thermal performance of the cables, including directly buried in a bundle to differing depths and contained within a duct at the Anderby Creek Landfall at various depths. These calculations are presented in **Volume 2, Part 1, Appendix 4.B: EGL 5 Heat Calculations Technical Report**. They show that for cables operating at full power, the temperature is raised in the immediate vicinity of the cable but reduces with distance. Assuming an ambient seabed temperature of 12 Celsius, seabed temperatures at 0.2 m immediately above the cables are estimated to be 13 - 14 Celsius, with the cables operating at maximum operating temperatures. The actual system is unlikely to reach these temperatures as the system would have to operate at full load continuously for an extended period of time (months / years) to meet these temperatures. In reality the system will not be at full load for this long and therefore the temperature will fluctuate and be unlikely to reach these maximums. Although thermal effects would be long-term and occurring continuously for the operational lifetime of the English Offshore Scheme, the temperature increase is low level and likely to be only slightly higher than ambient at the shallow sediment depths (<20 cm) at which shellfish and sandeel bury themselves. Where the cables are buried at a shallower depth, or surface laid with external cable protection, there is the potential for fauna to be exposed to higher temperature gradients. However, there is negligible capacity to heat the overlying water, meaning there will be no effects on demersal species.
- 19.15.6 Due to natural seasonal changes in water temperature, a sediment temperature change of a few degrees higher than ambient is regarded as an insignificant temperature increase. Coupled with the fact that temperature changes will be isolated to immediately above the cables, the magnitude of the impact on shellfish and fish species with demersal life stages has been assessed as low.
- 19.15.7 The significance of the effect on shellfish and fish species with demersal life stages has been assessed as **minor** and **not significant**.

## 19.16 Transboundary Effects

- 19.16.1 The EIA Regulations (Ref 19.105) require an ES to consider the transboundary effects of a development (paragraph 5 of Schedule 4). Given the nature of the English Onshore Scheme and its proposed location, significant transboundary effects are unlikely as there are no pathways for effects to occur outside of the UK. Similarly, the English Offshore Scheme lies wholly within UK waters. Separate applications will be submitted to the relevant statutory authority for the Scottish Schemes. Where the English and Scottish Schemes meet, collaborative environmental assessments will ensure impacts are fully assessed. As outlined in the Planning Inspectorate's Advice Note Twelve (Ref 19.106) the screening process for transboundary effects will be carried out by the Planning Inspectorate. Information to inform this screening assessment will be provided as part of the application for the DCO. No transboundary impacts are predicted for fish and shellfish.

## 19.17 Further Work to be Undertaken

19.17.1 The information provided within this PEIR is preliminary, the final assessment of potential significant effects will be reported in the ES. This section describes the further work to be undertaken to support the fish and shellfish assessment presented in the ES.

### Baseline

19.17.2 An extensive programme of marine characterisation surveys has been undertaken for the English Offshore Scheme as outlined in **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**. Survey outlined in **Volume 1, Part 3, Chapter 18: Intertidal and Subtidal Benthic Ecology**. Survey reports were being issued by the survey contractor as the Preliminary Environmental Assessment was nearing completion. Whilst efforts have been made to include initial survey findings, further work will be undertaken for the ES to ensure all survey results and analyses are incorporated and cross referenced. It is expected that for the final ES the following would be provided for fish and shellfish:

- Reference to shellfish or fish species identified in drop down video data.

19.17.3 The DATRAS survey data and MMO catch statistics are updated annually and the latest version of the data sets will be included within the ES.

### Assessment

19.17.4 A preliminary herring and sandeel habitat suitability assessment has been undertaken for the English Offshore Scheme, based on particle size distribution data presented in the Environmental Baseline Report. Further work will be undertaken to refine this assessment, the approach to which will be discussed with Cefas. The herring and sandeel assessment will be included as part of the ES.

19.17.5 The assessments undertaken for this PEIR will be reviewed following stakeholder consultation feedback, further design refinement and review of final marine characterisation survey results and the most recent publicly available data. However, a worst-case scenario has been adopted for this PEIR and preliminary environmental survey results have informed the assessments presented.

### Further environmental measures

19.17.6 If it is identified that additional environmental measures are required, these will be discussed and agreed with technical stakeholders and detailed as part of the ES. These could take the form of a seasonal restriction for certain activities within discrete locations within the draft Order Limits to avoid herring spawning. Whilst the preliminary assessment presented above has concluded that impacts on herring will be not significant, it is recognised that the cumulative effects assessment has not been completed.

19.17.7 Further consultation with relevant statutory consultees will be undertaken to define the scope and extents of the environmental measures set out in the assessment above. If, following stakeholder consultation feedback, further design refinement and further assessment, it is identified that additional measures are required, these will be detailed as part of the ES.

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