

# Sea Link

Environmental Impact Assessment Scoping Report  
Volume 1 Main Text  
Part 4 Offshore Scheme

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# 4.1 Evolution of the Offshore Scheme

## 4.1.1 Introduction

4.1.1.1 The current stage of Project design is the result of an iterative process that commenced at project inception when the initial need to reinforce the network in the South East of England was identified in 2019.

4.1.1.2 **Part 1, Chapter 3, Main Alternatives Considered** describes National Grid's approach to options appraisal and summarises both the strategic options that have been considered for the Project as well as the routeing and siting process. This chapter provides a more detailed summary of the routeing and siting appraisal relevant to the evolution of the Offshore Scheme from the point at which a preferred strategic option was selected to definition of the Offshore Scheme Scoping Boundary as illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.

4.1.1.3 This chapter should be read in conjunction with:

- **Part 1, Chapter 3, Main Alternatives Considered;**
- **Part 2, Chapter 1, Evolution of the Suffolk Onshore Scheme;** and
- **Part 3, Chapter 1, Evolution of the Kent Onshore Scheme.**

4.1.1.4 This chapter is supported by the following figure:

- **Figure 4.1.1 Evolution of the Offshore Scheme.**

## 4.1.2 Network Connection Points

4.1.2.1 The preferred strategic option identified Richborough substation as the network connection point in Kent and the Sizewell Area as the preferred connection point in Suffolk (**Part 1, Chapter 3, Main Alternatives Considered**). This was used as the basis for defining the routeing and siting study area.

## 4.1.3 Study Area

4.1.3.1 The routeing and siting study area for the Offshore Scheme extended from Mean High-Water Spring (MHWS) on the Kent coast (from Herne Bay on the north Kent coast to Kingsdown on the east Kent Coast) to MHWS on the Suffolk Coast (from Hellesley in the south to Dunwich in the north). The routeing and siting study area is illustrated on **Figure 1.3.1 Routeing and Siting Study Area**.

## 4.1.4 Landfall Areas of Search

### Areas of Search - Suffolk

4.1.4.1 Five landfall areas of search were initially identified in Suffolk. These are illustrated on **Figure 1.3.2 Suffolk Landfall Areas of Search**. The southernmost area of search

(S1) was identified to the south of Aldeburgh, north of the Alde and Ore River. A second area of search was identified between Aldeburgh and Thorpeness (S2). A third area of search was identified between Thorpeness and Sizewell (S3). This area was further split down into two sub areas, south (S3) and north (S3N). A fourth area (S4) at Sizewell and the northern most area of search was identified to the north of Sizewell, south of Minsmere (S5).

## Areas of Search - Kent

4.1.4.2 Six landfall areas of search were identified in Kent, which were split geographically across Pegwell Bay, Broadstairs, and the north Kent coast. These are illustrated on **Figure 1.3.3 Kent Landfall Areas of Search**. One area of search (K1) was identified within Pegwell Bay, which stretched from the settlement of Ramsgate to the settlement of Deal. One area (K1a) was identified at North Foreland between the settlements of Margate and Broadstairs. Four areas of search (K2, K3, K4 and K5) were identified along the north Kent coast between the settlements of Herne Bay and Birchington.

## 4.1.5 Indicative Marine Alignments

4.1.5.1 Due to the extensive geographical study area in the marine environment and large-scale nature of many of the constraint features, in order to perform a meaningful routeing appraisal in the marine environment it was necessary to identify indicative marine alignments (500m wide, representing a typical offshore working corridor) connecting the identified landfall areas of search in Suffolk to those in Kent. These were developed based on the following criteria:

- shortest route possible to minimise the cable length, which in turn reduces the manufacturing and installation cost as well as the environmental and security footprint;
- avoidance of environmentally sensitive areas where possible;
- avoidance of areas that have restricted movement i.e., anchorages;
- avoidance of known wrecks and areas of archaeological importance;
- avoidance of offshore installations (renewable, oil/gas, wells/platforms, etc.);
- limiting the need to cross in-service cables and pipelines and, where crossings would be necessary, corridors and alignments were routed to ensure the crossing angle would be optimal and water depth would be sufficient for navigational safety;
- routed to consider shipping density, i.e., anchorage areas, high density shipping lanes;
- avoidance of hazardous seabed terrain (e.g., bedrock outcrop and mobile sediments) where possible, ensuring the cable would be protected by achieving an acceptable depth of burial; and
- limiting the impact on third-party considerations including seasonal fishing activities, local tourist trade, and military practice zones.

## Summary of Appraisal Outcomes

4.1.5.2 The Offshore Scheme and associated indicative marine alignments are divided into three main sections, the approach to landfalls in Suffolk (landfalls and alignments with

prefix S), the central section (alignments with prefix C) and the approach to the Kent landfalls (landfalls and alignments with prefix K) (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 4**).

### **Marine alignments and landfalls (up to MHWS) – Suffolk**

- 4.1.5.3 The section of the Suffolk coast within the routeing and siting study area has a number of nature conservation designations, with all potential marine alignment options interacting with these designations to varying degrees on the approach to the landfall.
- 4.1.5.4 All marine alignments approaching the Suffolk coast intersect with the Outer Thames Estuary Special Protection Area (SPA) and the Southern North Sea Special Area of Conservation (SAC).
- 4.1.5.5 Marine alignments S1 and S2 are not constrained in the offshore environment.
- 4.1.5.6 Marine alignment option S2 intersects with the Leiston-Aldeburgh Site of Special Scientific Interest (SSSI) and The Haven, Aldeburgh Local Nature Reserve (LNR) both of which extend onto the foreshore, however the use of a trenchless technique, if feasible, at the landfall could mitigate impacts.
- 4.1.5.7 Marine alignment option S3 is considered significantly constrained in the immediate offshore environment due to the rocky reefs comprised of cemented limestone-rich shells in the immediate offshore environment known as the Coralline Crag, which is an important feature for coastal processes. This alignment also intersects with the Leiston-Aldeburgh SSSI at landfall; however, the use of a trenchless technique, if feasible, at the landfall could mitigate impacts.
- 4.1.5.8 Marine alignment option S3 is also potentially constrained in the immediate offshore by the proposed export cable route of the East Anglia One North and East Anglia Two developments (**Figure 4.10.1 Offshore Infrastructure in the Study Area**).
- 4.1.5.9 Landfall area of search S3 and associated marine alignment S3N is less constrained by the Coralline Crag in the immediate offshore environment however this location is constrained by the presence of existing infrastructure, namely the Concerto submarine telecommunications cable and the export cables of Greater Gabbard and Galloper offshore windfarms as well as the proposed (and consented) Sizewell C Nuclear Power Station development.
- 4.1.5.10 Landfall area of search S4 and associated marine alignment S4 is constrained by the existing Sizewell B Nuclear Power Station site including the intake/outtake pipes located in the immediate offshore area in front of Sizewell B.
- 4.1.5.11 Landfall area of search S5 intersects with the Minsmere-Walberswick Heaths and Marshes SSSI/SAC and the Minsmere-Walberswick SPA/Ramsar at the landfall including in the intertidal area, however the use of a trenchless technique, if feasible, at the landfall could mitigate impacts.
- 4.1.5.12 Landfall areas of search S4 and S5 and associated marine alignment options S4 and S5 are considered to be more constrained than the other options due to the additional number of offshore crossings that would be required and also the proposed Sizewell C development.

## Summary of relevant terrestrial constraints – Suffolk

- 4.1.5.13 All landfall areas of search in Suffolk are within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB).
- 4.1.5.14 Whilst the marine alignment to landfall area S1 was relatively unconstrained, the terrestrial green corridor was constrained technically by two large river crossings of the Alde and Ore River, which would also require a crossing of the Alde, Ore and Butley Estuaries SAC in two places and the Alde-Ore Estuary SPA and SSSI in three places. A large proportion of this corridor is within the Flood Zone and this corridor would require the longest route within the Suffolk Coasts and Heaths AONB. Access to this corridor was also considered to be very limited, in particular in the area between the two large river crossings.
- 4.1.5.15 The marine approach to the landfall area S2 has few constraints, however the Leiston-Aldeburgh SSSI and North Warren RSPB reserve could not be avoided without the use of trenchless construction techniques at this landfall. The red terrestrial route corridor from this landfall area of search also includes the pinch-point along Leiston Road. The majority of the landfall area of search is within Flood Zone 2 and 3, depending on the installation technique, construction works within these zones are potentially avoidable.
- 4.1.5.16 Onward terrestrial routeing from landfall S3 within the blue corridor would likely require a crossing of the Sandlings SPA and Leiston-Aldeburgh SSSI although the potential for significant effects would likely be avoidable through the use of trenchless construction techniques.
- 4.1.5.17 The purple terrestrial route corridor connecting to S3 landfall area of search and marine alignment S3N could avoid the designated sites for ecological conservation but could not avoid either of the two following pinch points. The first being a pinch-point to the south of Aldringham at the crossing of the Hundred River. This area is constrained by the Hundred River itself, the crossing of the B1353 and the B1122, and an area of woodland and properties. In addition, the proposed cables for the East Anglia One North and Two Offshore Windfarms are proposed to be routed through this same pinch-point. The second being a pinch-point to the northwest of Leiston associated with the offsite works for the proposed Sizewell C Nuclear Power Station including an area which has recently been established for ecological mitigation measures related to the project.
- 4.1.5.18 Landfall area of search S4 was identified as being significantly constrained from a terrestrial perspective as no onward terrestrial route corridor was identified from this landfall area of search, as it is significantly constrained by the existing Sizewell B Nuclear Power Station.
- 4.1.5.19 Landfall area of search S5 is located to the north of the existing Sizewell Nuclear Power Station and south of Minsmere New Cut drainage channel. The whole of the intertidal area and immediate terrestrial area is designated as Minsmere-Walberswick Ramsar and SPA, Minsmere to Walberswick Heaths & Marshes SAC and SSSI and Minsmere RSPB Reserve. These designated sites are unavoidable within this area of search, but the use of trenchless construction techniques could be used to avoid potential significant effects. A second crossing of the Minsmere to Walberswick Heaths & Marshes SSSI and Minsmere RSPB Reserve would also be required for any onward terrestrial routeing. The majority of this landfall area of search is within Flood Zones 2 and 3 and construction within the Flood Zone could not be avoided. Access to this

landfall area of search is also very limited and likely to require a long temporary access road.

- 4.1.5.20 The onward terrestrial corridor for landfall area of search S5 also crosses a large area of the proposed Sizewell C Nuclear Power Station development area which could significantly constrain the ability to route through this area and also have programme implications associated with construction sequencing of the two developments.

### **Overall summary – Suffolk**

- 4.1.5.21 When considering marine constraints alone there is a preference for Landfalls S1, S2 and S3 with associated marine alignments S1, S2 and S3N respectively (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 4**).
- 4.1.5.22 When considering the constraints from both a terrestrial and marine perspective, on balance, landfall area of search S2 is preferred with associated marine alignment S2 connecting to the red corridor. An alternative marine alignment of S3N connecting to the northern part of landfall area of search S3 connecting to the terrestrial purple corridor is also being proposed at this stage, this alternative is included as there are further ground investigations required to inform final decision making (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**).

### **Marine alignments and landfalls (up to MHWS) - Kent**

- 4.1.5.23 The section of the Kent coast within the routeing and siting study area has a number of national and international nature conservation designations, with all potential marine alignment options interacting with several of these designations, to varying degrees, on approach to the landfall areas of search.
- 4.1.5.24 Detailed consideration has therefore been given to the potential activities associated with cable installation and operation on the type of features for which the sites are designated, the distribution of the features within the sites and the sensitivity and recoverability of the features. The extent of interaction and potential for mitigation were also considered.
- 4.1.5.25 Marine alignment sections connecting into landfalls K2, K3 and K4 (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 4**) were determined to be the least preferred options from a nature conservation perspective due to the length of interaction with the Margate and Long Sands SAC and the interaction with the Thanet Coast SSSI/ Marine Conservation Zone (MCZ) and the Thanet Coast & Sandwich Bay SPA/Ramsar. Sections K2 and K3 also intersect with the Thanet Coast SAC.
- 4.1.5.26 Several significant constraints were also identified around the marine alignment sections K2, K3 and K4 approaching landfalls on the North Kent coast from a physical environment perspective. It is unlikely that mobile sandbanks could be avoided, some of which may be exposed at low tide, which presents a considerable exposure and engineering risk. It is also likely that there would be some interaction with key anchorage areas offshore of Margate.
- 4.1.5.27 All routes making landfall at K1 in Pegwell Bay (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 4**) intersect with the Sandwich Bay to Hacklinge Marshes SSSI, Sandwich and Pegwell Bay NNR, Sandwich Bay SAC, Thanet Coast & Sandwich Bay SPA/Ramsar and the Goodwin Sands MCZ.

- 4.1.5.28 K1a at Broadstairs (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 4**) also intersects with areas designated for their nature conservation value - Thanet Coast SAC/SSSI/MCZ and Thanet Coast & Sandwich Bay SPA/Ramsar.
- 4.1.5.29 Although the K1a marine alignment to landfall area of search K1a and all marine alignments to landfall area of search K1 are all constrained from a biological environment perspective, there is a slight preference for K1a at Broadstairs. This is because the extent of interaction is smaller, and it would also be possible to avoid potential interaction with the Goodwin Sands MCZ in the offshore environment. There is a preference for marine alignments making landfall to the south in Pegwell bay as the extent of interaction with the designations is reduced towards the south of this landfall area.
- 4.1.5.30 Based on the available desktop information it was initially considered that the Goodwin Sands MCZ could not be avoided by the identified marine alignments connecting to landfalls in Pegwell Bay. This interaction is due to the routeing in this area being constrained, to the east, by the Goodwin Sandbank - routeing over the Goodwin Sandbank could increase the risk of cable exposure during the lifetime of the cable. This could subsequently result in the requirement for additional rock protection associated with any remedial works, potentially resulting in permanent habitat loss. To the west routeing is constrained by the Ramsgate dredged channel and an area of sandwave fields.
- 4.1.5.31 Additionally, when routeing east out from Pegwell Bay, in order to head north the route must cross the Nemo Link cable and the Thanet Offshore Windfarm export cables, requiring the placement of rock protection on the seabed at these locations, potentially resulting in permanent habitat loss, including within the Goodwin Sands MCZ. The water depths in this area are very shallow, slowly gaining depth moving to the east. In order to ensure alignment with guidance regarding reductions in water depths that could pose a hazard to marine vessels (reduction of no more than 5% of water depth – advice from Maritime Coastal Agency<sup>1</sup>) proposed crossings locations should be located in areas with a suitable water depth.
- 4.1.5.32 Considering the factors described above (dredged areas, acceptable navigational depths and seabed features) routeing within the northwest corner of the Goodwin Sands MCZ was considered likely to be unavoidable.
- 4.1.5.33 Marine routeing into Broadstairs (landfall area of search K1a) would require fewer marine cable crossings than the routes connecting into Pegwell Bay (landfall area of search K1) as there would be no requirement to cross with Thanet Offshore Windfarm export cables and the Nemo Link interconnector. However, landfall areas of search K1a is located at a popular recreational beach location, meaning there could be a greater temporary recreational impact during construction at this landfall location.
- 4.1.5.34 Although landfalls in Pegwell Bay (landfall area of search K1) would interact with designated sites, these could be largely mitigated by using trenchless techniques, such as Horizontal Directional Drilling (HDD). This would avoid/reduce the need to trench across areas of saltmarsh and intertidal habitat, which could potentially result in greater habitat loss and water quality effects.
- 4.1.5.35 It has been assumed that access to the seaward end of the potential HDD in the intertidal area will be from the sea by a marine vessel or limited terrestrially to the site

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<sup>1</sup>Maritime and Coastguard Authority (MCA) (2021). MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) safety response. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/980898/MGN\\_654\\_-\\_FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf).

of the disused hoverport, to avoid impacts to the sensitive saltmarsh habitat in the northern part of the bay.

### **Summary of relevant terrestrial constraints – Kent**

- 4.1.5.36 Of the three corridors that connect with the Pegwell Bay K1 landfall area of search, the red and blue corridors are significantly constrained from a traffic and access perspective, with key issues including access to the east of the River Stour and weight restrictions on local roads around the Sandwich Bay Estate and Royal St George and Royal Cinque Ports golf courses.
- 4.1.5.37 All three corridors that connect with the Pegwell Bay landfall area of search K1 interact with sites designated for their nature conservation value; whilst the blue corridor minimises that interaction, it is the longest corridor of the three and would require a crossing of the River Stour at a point where is it designated as a Ramsar, SAC, SPA and SSSI. Access to the red corridor is limited and this corridor would also require a crossing of the River Stour. Both the red and green corridors would require a crossing of a golf course. Whilst the green corridor interacts with a larger area of the designated sites for nature conservation this would be temporary and short term and this corridor represents the most direct connection to either of the converter site option areas and has fewer river and road crossings.
- 4.1.5.38 Both the red and the blue corridors extend across a large area of Flood Zone and would require several watercourses associated with the River Stour to be crossed. The blue corridor would require crossing the River Stour at a point where is it designated as a Ramsar, SAC, SPA and SSSI; although, if feasible, the river could be crossed using trenchless techniques.
- 4.1.5.39 Both the green and red corridors intersect with golf courses; however, it is proposed that a trenchless technique, if feasible, would be used at these locations to minimise disturbance.
- 4.1.5.40 The green corridor which connects to the landfall area of search K1a at Broadstairs crosses a linear belt of development between the settlements of Margate and Ramsgate. This would require routeing the cable along either Star Lane or Farley Road, both of which are heavily constrained by several connected planning allocations for housing as well as a proposed extension to the cemetery. These constraints span the entire corridor west of the Westwood Industrial Estate and these factors significantly constrain this corridor.
- 4.1.5.41 The three corridors connecting the landfall areas of search located on the north Kent coast (K2, K3 and K4) were all significantly constrained from a traffic and access perspective, due to weight restricted bridge, sensitive receptors, and carriageway widths that are inadequate to allow two-way Heavy Goods Vehicle (HGV) movements. It is likely that extensive mitigation would be required, even during temporary construction work to facilitate safe access and to minimise other environmental effects (congestion, delays) that could arise because of additional HGV construction traffic on poorly suited roads. Careful routeing of the cables could avoid access issues around the Minster Marshes.

### **Overall summary – Kent**

- 4.1.5.42 When considering marine constraints alone there is a preference for landfall area of search K1a with associated marine alignment K1a (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 4**).

4.1.5.43 When considering the constraints from both a terrestrial and marine perspective, on balance, landfall area of search K1 with associated marine alignment section K1c is preferred (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**).

#### **Marine alignments – central section**

4.1.5.44 The central section of the offshore route is common to both the Suffolk and Kent alignment options. All central indicative marine alignments intersect with the Outer Thames Estuary SPA and Southern North Sea SAC.

4.1.5.45 There is a particularly constrained area within the central section where the north-eastern extent of the Margate and Long Sands SAC abuts the Sunk Traffic Separation Scheme (TSS). Also present are several aggregate extraction areas and deep-water shipping channels.

4.1.5.46 In addition, there are three proposed projects in this area, namely the NeuConnect Interconnector and the proposed Five Estuaries and North Falls Offshore Windfarms and associated export cables, as well as the existing Greater Gabbard and Galloper Offshore Windfarms.

4.1.5.47 Considering the potentially conflicting constraints relating to the biological environment, shipping and navigation and existing and proposed new infrastructure in this central section the emerging marine routeing preferences were discussed with marine stakeholders, including nature conservation bodies, port authorities and other developers to obtain their feedback to help inform decision making.

4.1.5.48 The draft outputs of the marine options appraisal were presented to stakeholders to help inform the decision making and reduce potential for consenting risk. This was undertaken in advance of the planned project-specific marine survey (summer 2021), to ensure the most likely route was surveyed.

4.1.5.49 The most significant marine survey route refinements based on stakeholder feedback were in the following areas:

- northeast of the Margate and Long Sands SAC
- southwest of Thanet Offshore Windfarm

4.1.5.50 These are discussed further below.

#### **Northeast of the Margate and Long Sands SAC**

4.1.5.51 The original proposed marine alignments in this area are the black routes shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 4**. These routes provided suitable seabed conditions for cable installation (geology and topography), whilst also being the most direct route to the Suffolk landfalls.

4.1.5.52 The route alignments were refined as a result of feedback from:

- Natural England;
- Maritime and Coastguard Agency;
- Trinity House;
- Port of London Authority;
- Harwich Haven Authority;
- Port of Felixstowe;

- North Falls Offshore Windfarm (OWF);
  - Five Estuaries Offshore Windfarm; and
  - the aggregate extraction operators of Areas 508, 509/3, 510/1 and 510/2 (**Figure 4.10.1 Offshore Infrastructure in the Study Area**).
- 4.1.5.53 Natural England expressed concerns regarding the potential impacts of crossing the proposed NeuConnect cable within the Margate and Long Sands SAC as the material required for the crossing would introduce hard substrate into a naturally sandy environment, which could permanently change the protected features in this site. Natural England also advised that their preference was for the project to avoid any cable installation in the protected site.
- 4.1.5.54 The navigational bodies also expressed concerns regarding the cable routing in this area, specifically in relation to the potential for a reduction of navigable depths because of rock protection at the potential crossing with NeuConnect. Concerns were also raised relating to cable installation in this area, due to the high shipping density caused by the Long Sands Head Deep shipping channel; however, it was agreed that the implementation of a robust vessel management plan during installation could mitigate this issue.
- 4.1.5.55 The aggregate operators advised that their preference was for the route to be located to the east of Area 510/2 to minimise interaction with their operations (**Figure 4.10.1 Offshore Infrastructure in the Study Area, Sheet 1**).
- 4.1.5.56 Based on the above stakeholder feedback the black marine alignment furthest to the east (C8) was identified as this alternative (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**):
- routes to the east of aggregate extraction Area 510/2; and
  - crosses NeuConnect in deep waters outside Margate and Long Sands SAC and Long Sands Two Way Shipping Channel.
- 4.1.5.57 However, following consultation with the developers of North Falls Offshore Windfarm, it was established that they had identified the same area for their proposed export cable route, and they were undertaking their offshore survey imminently (**Figure 4.10.1 Offshore Infrastructure in the Study Area, Sheet 1**). As such, the route was reviewed again to try to avoid potential complications regarding crowding and installation and an alternative C8A (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**) was identified.
- 4.1.5.58 Discussions with Five Estuaries Offshore Windfarm highlighted potential constraints of the C8A alternative with their proposed export cable route (**Figure 4.10.1, Sheet 1 Offshore Infrastructure in the Study Area**).
- 4.1.5.59 Due to the proximity to the Sunk TSS, and the associated high shipping density to the north and east of these proposed export cable corridors, and the shallower waters and sensitive benthic habitats of the Margate and Long Sands SAC to the west, it was determined that a further deviation needed to be identified.
- 4.1.5.60 Factoring in the parameters (shipping density and water depth) provided by the navigational bodies, an additional marine alignment section, referred to as C8B (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**) was identified. This refined route alignment:
- avoids the higher density shipping areas in the Sunk TSS; and

- keeps the crossings of the proposed NeuConnect cable and North Falls and Five Estuaries offshore windfarms export cables in deeper water and out of the busy shipping lanes.

4.1.5.61 This results in a route deviating east to the centre of the Sunk TSS approach channels, where the shipping density is lower and the crossings could be in deeper water, routeing north through the centre of the Sunk TSS, where the shipping density is again lower, before routing west, north of the Harwich and Port of Felixstowe approach channel to avoid the higher shipping density in this area. The revised route received the support of the navigational bodies.

#### Southwest of Thanet OWF

4.1.5.62 The original preferred marine routeing in this area was the black route shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4** (marine alignment section C4). This route provided suitable seabed conditions for cable installation (geology and topography). However, following stakeholder engagement the route needed to be refined because of feedback from the Port of London Authority, who expressed significant concerns regarding the potential decrease in water depths that would occur where the route would cross the proposed GridLink interconnector.

4.1.5.63 The Port of London Authority advised that because this area is an important area for shipping, and water depths are too shallow, they would not be able to support the routeing as originally proposed. They also advised that the Thanet Extension Offshore Windfarm DCO application, the export cable from which was also proposed to be in this area, was refused by the Secretary of State (SoS) due to potential impacts on shipping and navigation.

4.1.5.64 An alteration to the route was established, that has required a slight deviation to the original marine alignment section C4, referred to as C4A (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**) to increase the water depth of the crossing by an additional 3.5m. The Port of London Authority and other navigational bodies were consulted on the refined route and have advised that they are satisfied with the modification made to the route.

#### Summary

4.1.5.65 Considering the above factors, the preferred option from a marine appraisal perspective is marine alignment central section's C8B and C4A (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 4**).

### 4.1.6 Offshore Scheme Description

4.1.6.1 The evolution of the Offshore Scheme is illustrated on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheets 1 – 4**.

4.1.6.2 The Offshore Scheme comprises of a marine HVDC cable from preferred landfall area of search S2 or alternative landfall area of search S3 in Suffolk to landfall area of search K1 in Kent. Marine alignment sections S2 or S3N, C8B, C4A and K1c are preferred.

4.1.6.3 Based on the outputs of the project marine geophysical and geotechnical survey undertaken summer 2021 there are a number of routeing refinements proposed within the scoping boundary. This includes potential routeing to avoid the Goodwin Sands MCZ. All route refinements will be informed by further project survey work.

- 4.1.6.4 For the purpose of scoping the Offshore Scheme Scoping Boundary, illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary** is 500m wide for the majority of the Offshore Scheme, representing a typical offshore working corridor within which the cable can be laid; however, the outputs of the project marine survey undertaken in summer 2021 have been analysed and as such there are some areas where the offshore scheme scoping boundary has been widened to allow flexibility for route optimisation. The Offshore Scheme is shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 4 of 4**.
- 4.1.6.5 The proposed scope of assessment presented in Part 4, Chapters 2-11 is for the Project as described in **Part 1, Chapter 4, Description of the Project**.

## 4.2 Physical Environment

### 4.2.1 Introduction

- 4.2.1.1 This chapter presents how the physical environment assessment will consider the potentially significant effects that may arise from the construction, operation, maintenance and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment, and how these potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).
- 4.2.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.
- 4.2.1.3 This chapter should be read in conjunction with:
- **Part 1, Chapter 4, Description of the Project;**
  - **Part 1, Chapter 5, EIA Approach and Methodology;**
  - **Part 4, Chapter 1, Evolution of the Offshore Scheme;** and
  - **Part 4, Chapter 3, Benthic Ecology.**
- 4.2.1.4 This chapter is supported by the following figures:
- **Figure 4.2.1 Physical Environment Study Area and Metocean Data Sites;**
  - **Figure 4.2.2 Significant Wave Height;**
  - **Figure 4.2.3 Wind Speed;**
  - **Figure 4.2.4 Bathymetry of the Study Area;**
  - **Figure 4.2.5 Bedrock Geology at the Kent Landfall;**
  - **Figure 4.2.6 Bedrock Geology at the Suffolk Landfalls;**
  - **Figure 4.2.7 Superficial Geology at the Kent Landfall;**
  - **Figure 4.2.8 Superficial Geology at the Suffolk Landfalls;**
  - **Figure 4.2.9 Seabed Sediments across the Study Area;** and
  - **Figure 4.2.10 Average Suspended Sediment around the UK.**

### 4.2.2 Regulatory and Planning Context

- 4.2.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on the physical environment associated

with the construction, operation, maintenance and decommissioning of the Project is presented below.

## Legislation

4.2.2.2 The following legislation is relevant to the marine physical environment:

- European Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy - commonly referred to as the Water Framework Directive<sup>2</sup>;
- European Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of environmental policy<sup>3</sup>; and
- Marine and Coastal Access Act 2009<sup>4</sup> provides the legal mechanism to help ensure clean, healthy, safe and productive and biologically diverse oceans and seas<sup>4</sup>.

## Planning Policy

4.2.2.3 The following plans and policies are relevant to the marine physical environment.

### National planning policy

- The UK Marine Policy Statement (MPS)<sup>5</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made.

### Local planning policy

- The following marine plans have been considered in the development of this Scoping Report:
  - East Inshore and East Offshore Marine Plan<sup>6</sup>
  - South East Inshore Marine Plan<sup>7</sup>

## Guidance

4.2.2.4 The following guidance is relevant to the marine physical environment:

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<sup>2</sup> Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy. OJ L327, 22.12.2000 [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32000L0060&from=en>.

<sup>3</sup> Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32008L0056&from=EN>.

<sup>4</sup> Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents>.

<sup>5</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf).

<sup>6</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>7</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan_1_.pdf).

- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment: Best Practice Guide<sup>8</sup>;
- Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms<sup>9</sup>;
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects<sup>10</sup>;
- Environmental Impact Assessment for offshore renewable energy projects<sup>11</sup>;
- Best practice guidance for assessment, evaluation and monitoring of the possible effects of marine aggregate extraction on the coast – a Coastal Impact Study<sup>12</sup>;
- Extraction by Dredging of Aggregates from England’s Seabed<sup>13</sup>;
- Guidance on Environmental Impact Assessment in Relation to Dredging Applications<sup>14</sup>;
- Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects<sup>15</sup>;
- Offshore windfarms: guidance note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2<sup>16</sup>;
- Nature Conservation Guidance on Offshore Wind Farm Development<sup>17</sup>;
- Licensing: Sediment Analysis and Sample Plans<sup>18</sup>;

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<sup>8</sup> ABPmer and HR Wallingford (2009). Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide. [online] Available at: [https://www.researchgate.net/publication/228784265\\_Coastal\\_Process\\_Modelling\\_for\\_Offshore\\_Wind\\_Farm\\_Environmental\\_Impact\\_Assessment\\_Best\\_Practice\\_Guide/link/57582e5a08aef6cbe362a6df/download](https://www.researchgate.net/publication/228784265_Coastal_Process_Modelling_for_Offshore_Wind_Farm_Environmental_Impact_Assessment_Best_Practice_Guide/link/57582e5a08aef6cbe362a6df/download).

<sup>9</sup> RenewableUK (2013). Cumulative Impacts Assessment Guidelines: Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms. [online] Available at: <https://tethys.pnnl.gov/sites/default/files/publications/Cumulative-Impact-Assessment-Guidelines.pdf>.

<sup>10</sup> Cefas (2012). Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. [online] Available at: [https://tethys.pnnl.gov/sites/default/files/publications/CEFAS\\_2012\\_Environment\\_Assessment\\_Guidance.pdf](https://tethys.pnnl.gov/sites/default/files/publications/CEFAS_2012_Environment_Assessment_Guidance.pdf).

<sup>11</sup> British Standards Institution (2015). Environmental impact assessment for offshore renewable energy projects. [online] Available at: <https://knowledge.bsigroup.com/products/environmental-impact-assessment-for-offshore-renewable-energy-projects-guide/standard>.

<sup>12</sup> British Marine Aggregate Producers Association and The Crown Estate (2013). Marine aggregate dredging and the coastline: a guidance note. Best practice guidance for assessment, evaluation and monitoring of the possible effects of marine aggregate extraction on the coast – a Coastal Impact Study. [online] Available at: [https://www.bmapa.org/documents/Coastal\\_Impact\\_Study\\_Best\\_Practice\\_Guidance.pdf](https://www.bmapa.org/documents/Coastal_Impact_Study_Best_Practice_Guidance.pdf).

<sup>13</sup> British Marine Aggregate Producers Association and The Crown Estate (2017). Good Practice Guidance Extraction by Dredging of Aggregates from England’s Seabed. [online] Available at: [https://www.bmapa.org/documents/BMAPA\\_TCE\\_Good\\_Practice\\_Guidance\\_04.2017.pdf](https://www.bmapa.org/documents/BMAPA_TCE_Good_Practice_Guidance_04.2017.pdf).

<sup>14</sup> Office of the Deputy Prime Minister (2001). Guidance on Environmental Impact Assessment in Relation to Dredging Applications.

<sup>15</sup> Brooks, A., Whitehead, P. and Lambkin, D. (2018). Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects. Cardiff: Natural Resources Wales, NRW Report No: 243,119.

<sup>16</sup> Cefas (2004). Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements, Version 2. [online] Available at: <https://www.cefas.co.uk/publications/files/windfarm-guidance.pdf>.

<sup>17</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2005). Nature Conservation Guidance on Offshore Windfarm Development A guidance note on the implications of the EC Wild Birds and Habitats Directives for developers undertaking offshore windfarm developments, Version R1.9. [online] Available at: [https://tethys.pnnl.gov/sites/default/files/publications/Nature\\_Conservation\\_Guidance\\_on\\_Offshore\\_Windfarm\\_Development.pdf](https://tethys.pnnl.gov/sites/default/files/publications/Nature_Conservation_Guidance_on_Offshore_Windfarm_Development.pdf).

<sup>18</sup> Marine Management Organisation (MMO) (2014). Marine Licensing: sediment analysis and sample plans, Details of sediment and sample analysis for marine licence applications. [online] Available at: <https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans>.

- UK Climate Projections (UKCP18): sea level rise<sup>19</sup>;
- EA ‘Flood Risk Assessments: Climate Change Allowances’<sup>20</sup>;
- Isle of Grain to South Foreland Shoreline Management Plan (SMP)<sup>21</sup>;
- Lowestoft to Felixstowe SMP<sup>22</sup>; and
- UK Government Guidance on undertaking WFD assessment in estuarine and coastal waters<sup>23</sup>.

## 4.2.3 Study Area

4.2.3.1 The study area for the physical environment follows the alignment of the Offshore Scoping Boundary as shown in **Figure 4.2.1 Physical Environment Study Area and Metocean Data Sites** up to Mean High Water Springs (MHWS) at landfalls. However, in terms of metocean conditions, environmental influences will originate outside this area and the corresponding effects are also likely to extend beyond the limits of this boundary. Consequently, the offshore Zone of Influence (ZOI) will be determined by the dimensions and orientation of the spring tidal ellipses and the location of littoral sub-cell boundaries for the nearshore region.

## 4.2.4 Baseline Conditions

4.2.4.1 In order to assess the potential impacts of the Offshore Scheme on the marine physical environment, it is important to establish the baseline conditions in the study area and assess the likely future baseline conditions over the lifespan of the Project. For the purposes of this Scoping Report, the physical environment is defined as encompassing the following elements:

- Meteorological and Oceanographic (Metocean) Conditions (Wind, Waves and Tides);
- Bathymetry and Geology;
- Geomorphology and Sediment Transport;
- Marine Sediment Quality;
- Coastal Geomorphology; and
- Water Quality.

4.2.4.2 The component physical processes include tidal currents, water levels, wind, climate change, bathymetry, geology, geomorphology and seabed sediments, suspended

<sup>19</sup> Met Office (2022). UK Climate Projections, Sea level anomalies for marine projections around UK coastline, 2007-2100 (UKCP). [online] Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index>.

<sup>20</sup> Environment Agency (2016). Guidance: Flood risk assessments: climate change allowances. [online] Available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

<sup>21</sup> Halcrow Group Limited (2010). Isle of Grain to South Foreland SMP Review. [online] Available at: <https://se-coastalgroup.org.uk/shoreline-management-plans/isle-of-grain-to-south-foreland/>.

<sup>22</sup> Oakes Associates Ltd. (2019). Shoreline Management Plan 7 - Lowestoft to Felixstowe SMP. [online] Available at: <http://www.suffolksmp2.org.uk/>.

<sup>23</sup> Environment Agency (2016). Guidance - Water Framework Directive assessment: estuarine and coastal waters. [online] Available at: <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>.

sediment, marine sediment quality, sediment transport processes and marine water quality.

## Data Sources

4.2.4.3 An initial desk-based review of literature and data sources within the study area has been undertaken. The key data sources are summarised below.

- British Geological Survey (<https://www.bgs.ac.uk/datasets>)
- Cefas Climatology Report (2016). Waters Suspended Sediment Concentrations (SSC)<sup>24</sup>
- Cefas Suspended sediment concentrations (<https://data.cefas.co.uk/view/18133>) Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters
- EMODnet Bathymetry Portal (<https://portal.emodnet-bathymetry.eu/>): bathymetry data
- ABPmer SEASTATES (<https://www.seastates.net/explore-data/>): modelled wave, wind and tidal current.
- Atlas of UK marine renewables resources (<https://www.abpmer.co.uk/experience/atlas-of-uk-marine-renewable-energy-resources/>): modelled wave, wind and tidal current.
- United Kingdom Hydrographic Office (UKHO) - Published Charts and Tide tables: tidal diamonds with current stream data.
- UK Climate Projections (UKCP): sea level rise (<https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index>)
- EA 'Flood Risk Assessments: Climate Change Allowances' (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>): increase in wave height and wind
- Environment Agency Bathing Water Quality (<https://environment.data.gov.uk/bwq/profiles/>)
- Environment Agency Catchment Data Explorer (<https://environment.data.gov.uk/catchment-planning>)
- National Coastal Erosion Risk Mapping (NCERM) - National (2018 - 2021) <https://data.gov.uk/dataset/7564fcf7-2dd2-4878-bfb9-11c5cf971cf9/national-coastal-erosion-risk-mapping-ncerm-national-2018-2021>
- East Anglia ONE North Offshore Windfarm, Marine Geology, Oceanography and Physical Processes (Royal HaskoningDHV, 2019) <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010077/EN010077-001072-6.1.7%20EA1N%20Environmental%20Statement%20Chapter%2007%20Marine%20Geology,%20Oceanography%20and%20Physical%20Processes.pdf> Marine

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<sup>24</sup> Cefas (2016). Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/584621/CEFAS\\_2016\\_Suspended\\_Sediment\\_Climatologies\\_around\\_the\\_UK.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf).

Aggregate Regional Environmental Assessment (MAREA), MarineSpace 2010-2022. <http://marine-aggregate-rea.info/>

- Southern North Sea Sediment Transport Study, Phase 2 (HR Wallingford, 2002) <https://eprints.hrwallingford.com/1461/1/SouthernNorthSeaSedimentTransport-EX4526-SNS2-main%20report.pdf>

## Metocean Conditions

- 4.2.4.4 The metocean conditions provided in UKHO Admiralty tide tables, the ABPmer SEASTATES database and the Atlas of UK marine renewables have primarily been considered at the scoping stage. Physical conditions will vary across the study area, between the offshore to nearshore and coastal environment. Metocean data provided in these data sets has been extracted close to both the Kent landfall and the two Suffolk landfalls (the resolution of the source data is not sufficient to differentiate between the two alternative landfall sites in Suffolk), along with two locations along the route (**Figure 4.2.1 Physical Environment Study Area and Metocean Data Sites**).

### Tidal currents

- 4.2.4.5 Information on tidal currents taken from the Atlas of UK marine renewables resources (subsequently referred to as ‘the Atlas’), represents conditions at mid-depth. Table 4.2.1 provides the spring and neap peak flow speeds for the four locations identified in **Figure 4.2.1 Physical Environment Study Area and Metocean Data Sites**, which are in a range of 0.52m/s to 1.15m/s. Based on the tidal excursion ellipses presented in the Atlas, the primary axis for tidal current directions is aligned north-east to south-west along the Offshore Scoping Boundary.

Table 4.2.1: Tidal current

Tidal Stage	P1 (Suffolk Landfalls)	P2	P3	P4 (Kent Landfall)
Spring Peak Flow (m/s)	1.15	1.00	0.84	0.58
Neap Peak Flow (m/s)	0.60	0.58	0.52	0.74

### Water levels

- 4.2.4.6 Table 4.2.2 presents the standard tidal planes from the UKHO Admiralty tide tables (2020) for the study area, at the Kent Landfall and Suffolk Landfalls.

Table 4.2.2: Tidal water levels

Tidal Level (m above Chart Datum)	Kent Landfall	Suffolk Landfalls
Highest Astronomical Tide (HAT)	5.7m	3.4m
Mean High Water Springs (MHWS)	5.2m	2.7m

Mean High Water Neaps (MHWN)	4.0m	2.3m
Mean Sea Level (MSL)	2.7m	1.66m
Mean Low Water Neaps (MLWN)	1.4m	0.9m
Mean Low Water Springs (MLWS)	0.6m	0.3m
Lowest Astronomical Tide (LAT)	-0.3m	-0.2m

4.2.4.7 From Table 4.2.2 it is noted that the tidal range increases along the Offshore Scoping Boundary from north to south with tidal conditions near the Suffolk landfalls being closer to an amphidromic point (a point where the tidal range is almost zero) off the Suffolk coast near Lowestoft, approximately 40km to the north.

### Wave and wind

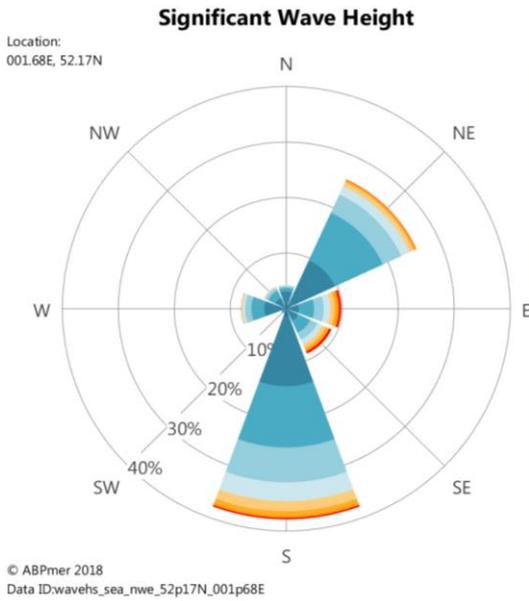
4.2.4.8 Wave and wind data have been extracted from the ABPmer SEASTATES database. The wave and wind data in Table 4.2.3 provide a useful indication of averages conditions likely to be encountered at the Kent and Suffolk landfalls, and the two locations identified. The extracted data shows the variability within the Offshore Scoping Boundary (**Figure 4.2.1 Physical Environment Study Area and Metocean Data Sites**). Annual mean wave heights are in the range of 0.6m and 0.9m, which are lower at the landfalls with the higher values found further offshore. Annual mean wind speeds are between 6.9m/s and 7.3m/s along the Offshore Scoping Boundary.

4.2.4.9 The wave and wind roses for these points are presented below in Figure 4.2.2 and Figure 4.2.3 respectively, which indicate that at the Kent landfall the dominant winds are from the north-east and south. Along the Offshore Scoping Boundary and up to the Suffolk landfalls, the dominant winds are from the south-west. The largest waves at the Kent landfall are from the north-east and south-west, along the route and towards the Suffolk landfalls they are from the north-east and south.

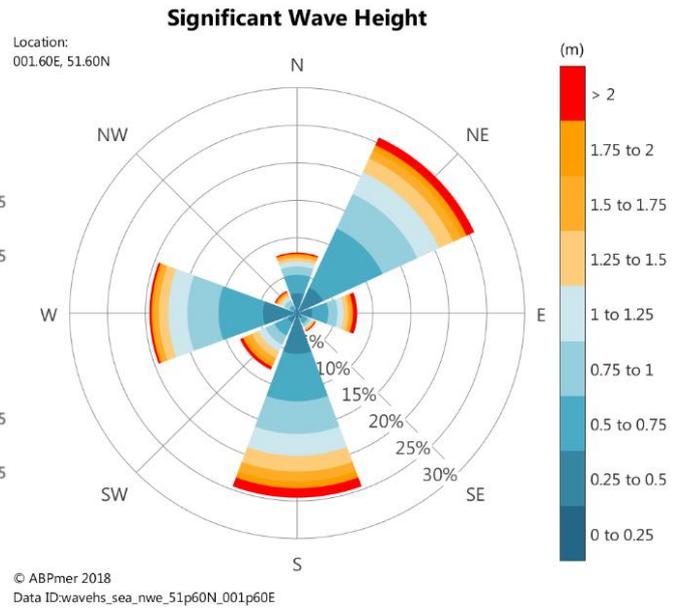
4.2.4.10 According to the Isle of Grain to South Foreland SMP, the forcing conditions that have the greatest influence on the Kent landfall shoreline are those generated by weather systems acting on the relatively shallow southern North Sea. There are two different directional sectors – although there is a greater fetch from the east and north-east leading to the generation of larger waves, the waves generated in the north-west are also associated with storm surges and higher water levels.

Table 4.2.3: Annual mean wave height and wind speed

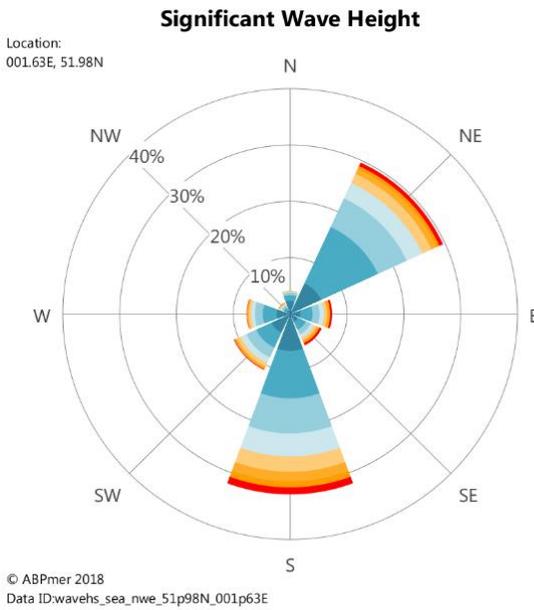
Site	P1 (Suffolk Landfalls)	P2	P3	P4 (Kent Landfall)
Mean Wave Height (m)	0.7	0.8	0.9	0.6
Wind Speed (m/s)	7.0	7.1	7.3	6.9



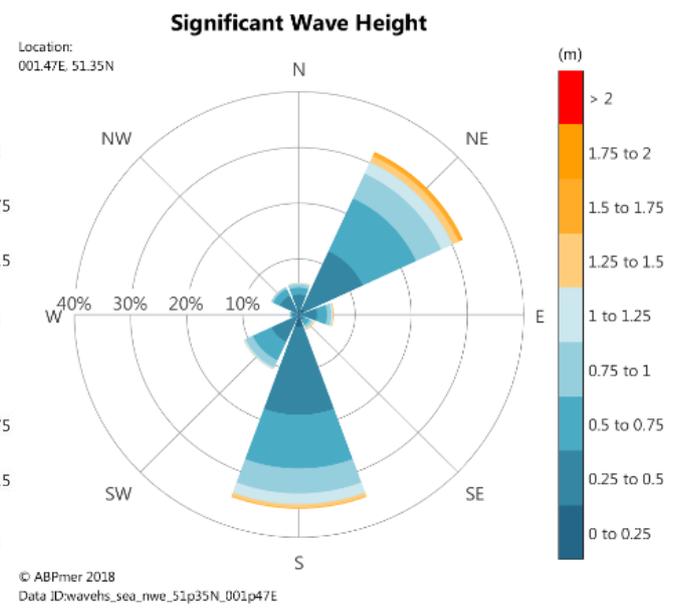
**P1**



**P2**

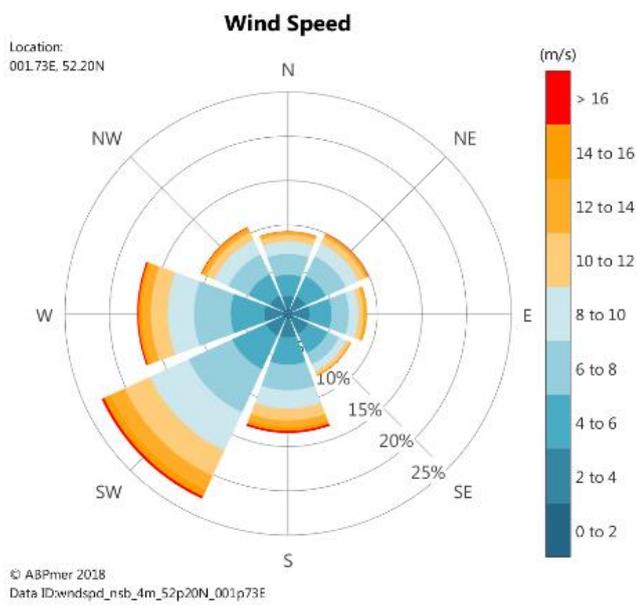


**P3**

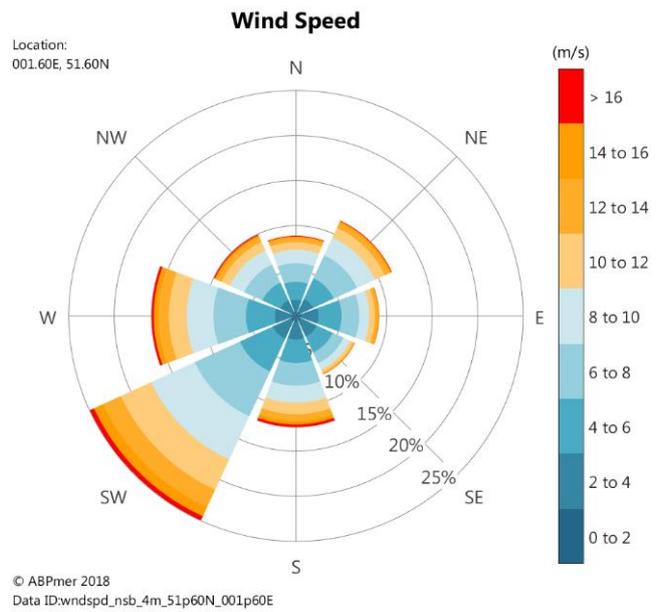


**P4**

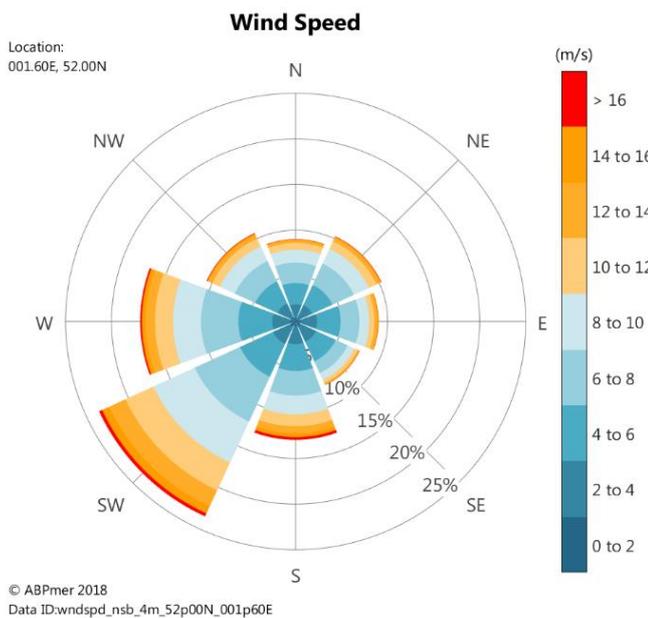
Figure 4.2.2 Significant Wave Height



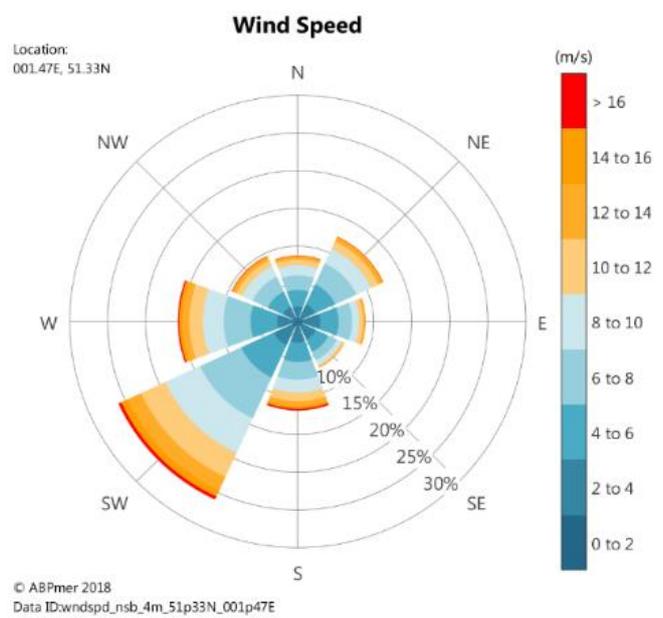
**P1**



**P2**



**P3**



**P4**

Figure 4.2.3 Wind Speed

## Climate change

- 4.2.4.11 For the assessment of the impact of climate change on the physical environment in the future, the UK guidance and projection of sea level rise and changing storm conditions are applied to the baseline.
- 4.2.4.12 Guidance on changes in future wind and wave conditions has been provided by the Environment Agency<sup>25</sup>. The guidance states that wind speeds and wave height should be increased by 5% between 1990 and 2055, then by 10% for 2056 to 2115.
- 4.2.4.13 UKCP18<sup>19</sup> provides the most up-to-date assessment of climate change up to 2100 and beyond 2100. Sea level rise data along the UK coastline is available to download from the Met Office UKCP18 website at the grid square. By 2050, sea level rise may rise by 0.25m above 2022 levels at the Kent landfall and the Suffolk landfall. This is estimated for a high emissions scenario (RCP 8.5) in the 95th percentile.

## Bathymetry and Geology

### Bathymetry

- 4.2.4.14 Water depths in the study area have been obtained from the EMODnet Bathymetry Portal<sup>26</sup> (accessed April 2022). **Figure 4.2.4 Bathymetry of the Study Area** shows that the water depths range between 5m and 25m below Lowest Astronomical Tide (LAT).

### Geology

- 4.2.4.15 The dominant bedrock types in the Offshore Scoping Boundary are shown in **Figure 4.2.5 Bedrock Geology at the Kent Landfall** and **Figure 4.2.6 Bedrock Geology at the Suffolk Landfalls** with the superficial deposits shown in **Figure 4.2.7 Superficial Geology at the Kent Landfall** and **Figure 4.2.8 Superficial Geology at the Suffolk Landfalls**. The bedrock geology at the Kent landfall comprises the Thanet Sand Formation, primarily composed of Thanet Sands along with Brickearth (silt superficial deposits). At the preferred and alternative Suffolk landfalls, the bedrock geology comprises undifferentiated gravel, sand, silt and clay of the Neogene to Quaternary rocks. The superficial deposits are Glacial Sand and Gravel.

### Geomorphology and sediment transport

- 4.2.4.16 The British Geological Survey<sup>27</sup> (BGS) provides mapping of the seabed sediments along the Offshore Scoping Boundary, as presented in **Figure 4.2.9 Seabed Sediments across the Study Area**. The seabed sediment inshore around the Kent landfall at Pegwell Bay is classified as sandy gravel, and at the preferred Suffolk landfall (between Aldeburgh and Thorpeness) is classified as sand. At the alternative Suffolk landfall near Sizewell, the seabed sediment is also classified as sand. The

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<sup>25</sup> Environment Agency (2021). Guidance - Flood Risk Assessments: Climate Change Allowances. [online] Available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

<sup>26</sup> EMODnet Bathymetry (2022). The European Marine Observation and Data Network. [online] Available at: <https://www.emodnet-bathymetry.eu/>.

<sup>27</sup> British Geological Survey (2022). GeoIndex Offshore. [online] Available at: <https://www.bgs.ac.uk/datasets/marine-sediments-250k/>.

seabed within the Offshore Scoping Boundary primarily consists of sandy gravel and gravelly sand with a range of other smaller deposits.

### Suspended sediment

4.2.4.17 The Cefas Climatology Report<sup>28</sup> provides the spatial distribution of average non-algal concentrations of Suspended Particulate Matter (SPM) between 1998 and 2015 for the majority of the UK continental shelf (Figure 4.2.10). The largest plume concentrations are associated with large rivers such as the Humber Estuary, Thames Estuary, Severn Estuary and Liverpool Bay, where the mean values of SPM are above 30 mg/l. Based on the data from Cefas, the SPM concentration associated with the Offshore Scoping Boundary has been estimated to be in the range 30-50 mg/l increasing to 40-50 mg/l at landfalls.

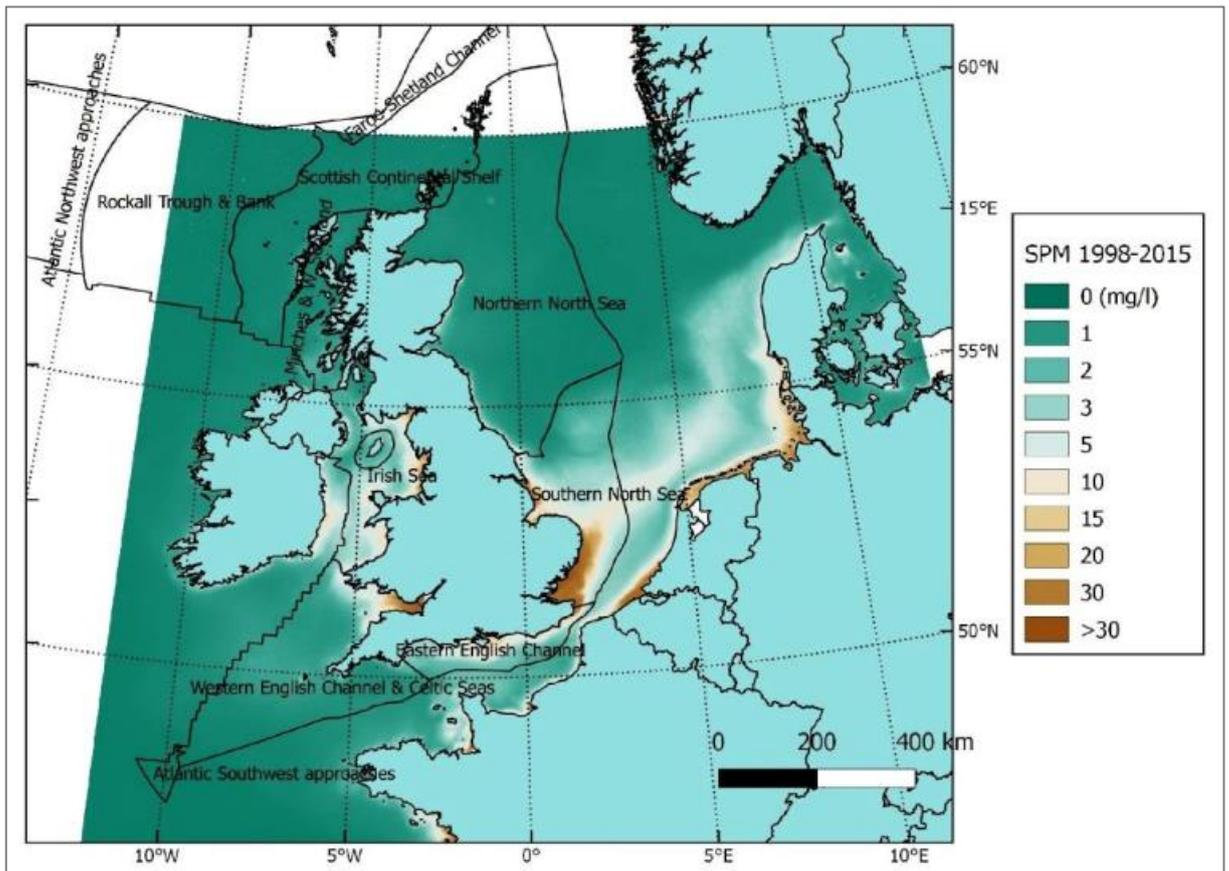


Figure 4.2.10 Average Suspended Sediment around the UK (Cefas 2016<sup>26</sup>)

### Marine sediment quality

4.2.4.18 Marine sediment quality can be affected by the deposition and accumulation of substances on the seabed. The Offshore Scoping Boundary is located in the Southern North Sea, adjacent to the Outer Thames Estuary. Historically the North Sea and its coastal zones have been heavily impacted by anthropogenic activities, which has

<sup>28</sup> Cefas (2016). Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/584621/CEFAS\\_2016\\_Suspended\\_Sediment\\_Climatologies\\_around\\_the\\_UK.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf).

resulted in significant chemical pollution<sup>29</sup> particularly relating to drilling fluids and produced waters discharged from oil and gas installations<sup>30</sup>. Additionally, the River Thames is a major input into the Southern North Sea, contributing industrial effluents and urban run-off for a large catchment<sup>31</sup>.

- 4.2.4.19 As part of the geotechnical survey undertaken<sup>32</sup>, grab samples of seabed sediment were collected along the Offshore Scoping Boundary for chemical analysis. This chemical analysis included the determination of concentrations of metals, organics, Total Hydrocarbon Content (THC), and Polycyclic Aromatic Hydrocarbons (PAHs).
- 4.2.4.20 For the purposes of scoping the following sections give an overview of general findings to be interpreted in greater detail in the Environmental Statement (ES).

### Heavy and trace metals

- 4.2.4.21 Metals occur naturally in the marine environment and are widely distributed in both dissolved and sedimentary forms. Rivers, coastal discharges and the atmosphere are the principal modes of entry for metals into the marine environment, with anthropogenic inputs occurring as a result of industrial and municipal wastes. The metals most characteristic in offshore sediments include barium (Ba), chromium (Cr), lead (Pb) and zinc (Zn). Trace metal contaminants are most prone to various environmental interactions and transformations (physical, chemical and biological), potentially increasing their biological availability. Historically, within the Thames Estuary there has been increased sediment concentrations of copper (Cu), mercury (Hg), Pb, and Zn<sup>34</sup>, while in the North Sea increased concentrations of Nickel (Ni), Cu, Zn, Cadmium (Cd), and Hg have been common<sup>33</sup>.
- 4.2.4.22 Sediment chemistry values were compared against a number of different criteria including Cefas Action Levels<sup>33</sup> and Canadian Council of Ministers of the Environment (CCME) sediment quality guidelines (ISQG)<sup>34</sup> (including probable effect levels (PEL)). These are not 'pass/fail' criteria but highlight the need for further assessment.
- 4.2.4.23 Chemical analysis of sediment quality showed that metal concentrations varied along the survey route. Arsenic (As) was often found in concentrations above threshold values. There were a small number of sample sites where, Cr, Cu, Pb, and Ni were above threshold values.

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<sup>29</sup> Logemann, A., Reininghaus, M., Schmidt, M., Ebeling, A., Zimmermann, T., Wolschke, H., Friedrich, J., Brockmeyer, B., Pröfrock, D. and Witt, G. (2022). Assessing the chemical anthropocene—development of the legacy pollution fingerprint in the North Sea during the last century. *Environmental Pollution*, 302, pp.119040.

<sup>30</sup> Cefas (2001). Contaminant Status of The North Sea: Technical Report Produced for Strategic Environmental Assessment – SEA2. Technical Report TR\_004. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/197352/TR\\_SEA2\\_Contamination.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/197352/TR_SEA2_Contamination.pdf).

<sup>31</sup> Pope, N. and Langston, W. (2011). Sources, distribution and temporal variability of trace metals in the Thames Estuary. *Hydrobiologia*, 672(1), pp. 49-68.

<sup>32</sup> Environmental Survey Report: SEA Link Marine Survey. September – October 2021.

<sup>33</sup> Cefas (2022). Use of Action Levels in Dredged Material Assessments. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/573075/Appendix\\_B\\_Action\\_Levels.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/573075/Appendix_B_Action_Levels.pdf).

<sup>34</sup> Canadian Council of Ministers of the Environment (CCME) (2022). Guidelines Canadian Environmental Quality Guidelines (CEQGs) provide science-based goals for the quality of aquatic and terrestrial ecosystems. [online] Available at: <https://ccme.ca/en/current-activities/canadian-environmental-quality-guidelines>.

## Organics

- 4.2.4.24 Total Organic Carbon (TOC) is often used as a non-specific indicator of water quality. Furthermore, organic material in disturbed sediments can act as an energy source for marine microorganisms, reducing the dissolved oxygen availability in the water.
- 4.2.4.25 TOC and organic matter varied along the survey route, with an average content of 0.3% and 1.1%.

## Total hydrocarbon content and polycyclic aromatic hydrocarbons

- 4.2.4.26 THC values are used to describe the quantity of hydrocarbon impurities present and are generally associated with compounds derived from crude oil, such as petrochemicals. PAHs are contaminants with moderate to low water solubility, generated from coal and oil combustion. They are also released during transportation or industrial use of petroleum; wastewater effluent discharge and sewer overflows; urban runoff; and natural seeps. Concentrations of THCs and PAHs are understood to be lower but still notable in the Southern North Sea, when compared the northern areas of the North Sea<sup>33</sup>.
- 4.2.4.27 THC concentrations varied along the survey route and did not exceed the Dutch RIVM intervention value<sup>35</sup> at any of the sample sites. PAH concentrations varied along the survey route with threshold values exceeded at several sites.
- 4.2.4.28 The contaminant levels will be explored more fully, and compared to regional background levels where possible, in the ES.

## Coastal geomorphology

- 4.2.4.29 The coastline between Aldeburgh and Thorpeness is characterised by the headland at Thorpeness and high ground at Aldeburgh, with the valley of the Hundred River and low-lying area situated behind the shingle bank at the foreshore. At the preferred Suffolk landfall, there is a net northerly sediment transport. Aldeburgh is situated south of the promontory of Thorpeness, which restricts the southward net littoral drift. The frontage is predominantly undefended, with a 'Hold the Line' policy where there are existing embankments and sea walls, as well as 'Managed Realignment' where there are natural defences. Where there are no defences, there is a 'No Active Intervention' policy. There is a risk of coastal erosion; 4m over the short term (20 years), 10m over the medium term (50 years) and 20m over the long term (100 years).
- 4.2.4.30 Further to the north at Sizewell, where the alternative Suffolk landfall would be located, the management policy is 'Hold the Line' changing to 'Managed Realignment' further to the north and 'No Active Intervention' to the south. Modelling studies<sup>36</sup> suggest that sand transport pathways are southwards along the Sizewell frontage but for shingle

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<sup>35</sup> Rijksinstituut Voor Volksgezondheid En Milieu (RIVM) (2001). Technical evaluation of the Intervention Values for Soil/sediment and Groundwater: Human and ecotoxicological risk assessment and derivation of risk limits for soil, aquatic sediment and groundwater. [online] Available at: <https://www.rivm.nl/bibliotheek/rapporten/711701023.pdf>.

<sup>36</sup> Electricite de France (EDF) (unknown date). Sizewell Coastal Geomorphology and Hydrodynamics: Synthesis for Environmental Impact Assessment (MSR1 – Edition 4) BEEEMS Technical Report TR311. [online] Available at: [https://consult.environment-agency.gov.uk/psc/ip16-4urnnb-generation-company-szc-ltd-cb3997ad/supporting\\_documents/SZC%20WDA%20BEEEMS%20TR311%20Ed.%204%20Sizewell%20Coastal%20Geomorphology%20Hydrodynamics%20Synthesis%20for%20Environmental%20Impact%20Assessment%20MSR1.4.%202020.pdf](https://consult.environment-agency.gov.uk/psc/ip16-4urnnb-generation-company-szc-ltd-cb3997ad/supporting_documents/SZC%20WDA%20BEEEMS%20TR311%20Ed.%204%20Sizewell%20Coastal%20Geomorphology%20Hydrodynamics%20Synthesis%20for%20Environmental%20Impact%20Assessment%20MSR1.4.%202020.pdf).

sized material, the net transport is effectively zero which explains the relatively low rates of shoreline change over recent years.

- 4.2.4.31 The Pegwell Bay frontage is a shallow inlet within the English Channel, astride the estuary of the River Stour. The frontage is characterised by a sand beach stretching to Ramsgate towards the north, and Pegwell Bay Nature Reserve to the south which features coastal habitats such as saltmarsh and mudflats. Sandbanks located off the north Kent coast are believed to influence coastal processes and sediment transport patterns. The complex pattern of offshore conditions generated by the different directional weather systems creates a range of wave energy conditions which impacts the coastal sediment transport processes. The net littoral drift is towards the south, with a drift convergence at Pegwell Bay. Transport rates reduce in the southward direction and fine sediments accumulate at this location. The frontage is predominantly undefended, with a 'Hold the Line' policy where there is an existing seawall, and a 'No Active Intervention' policy where there are no existing defences and no risk of coastal erosion<sup>37</sup>.

## **Water quality**

### **Water Framework Directive**

- 4.2.4.32 A programme of monitoring and water classification is undertaken by the Environment Agency, as part of the Water Framework Directive (WFD) requirements. The most recent classification data is available from the Environment Agency Catchment Data Explorer<sup>38</sup>.
- 4.2.4.33 The preferred Suffolk landfall and alternative Suffolk landfall sites are both within the Suffolk waterbody (Water Body ID: GB650503520002). This waterbody is classified as Moderate Overall Status, with Moderate Ecological Status and Fail Chemical Status. The waterbody is failing to achieve good status because of high concentrations of dissolved mercury containing compounds and Polybrominated diphenyl ethers (PBDE).
- 4.2.4.34 The Kent landfall site is within the Stour (Kent) waterbody (Water Body ID: GB520704004700). This waterbody is classified as Moderate Overall Status, with Moderate Ecological Status and Fail Chemical Status. The waterbody is failing to achieve good status because of high concentrations of dissolved mercury and PBDE.
- 4.2.4.35 An increase in suspended sediments is anticipated during the construction phase. The sediment plumes are likely to settle out within a short distance of the activity and limit the overall footprint of the affected area. The significance of impacts associated with temporary increases in suspended sediment will be dependent upon the habitats and communities present within the Offshore Scoping Boundary.
- 4.2.4.36 A Water Framework Directive Screening Assessment will be undertaken, and relevant stakeholders will be consulted.

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<sup>37</sup> Environment Agency (2018). National Coastal Erosion Risk Mapping (NCERM) - National (2018 - 2021). [online] Available at: <https://www.data.gov.uk/dataset/7564fcf7-2dd2-4878-bfb9-11c5cf971cf9/national-coastal-erosion-risk-mapping-ncerm-national-2018-2021>.

<sup>38</sup> Environment Agency (2021). Explore catchment data. [online] Available at: <https://environment.data.gov.uk/catchment-planning/>.

## Bathing water

- 4.2.4.37 Water quality at designated bathing water sites in England is assessed by the Environment Agency<sup>39</sup>. The data indicates the bathing water near the Kent landfall is classified as 'Good'. At the Suffolk landfalls, there is no designated bathing water.

## 4.2.5 Embedded and Control & Management Measures

- 4.2.5.1 The assessment of significant effects will take account of mitigation measures, included those which are embedded within the design and control and management measures.

### Embedded Measures

- 4.2.5.2 The identification of the Offshore Scoping Boundary has been designed to avoid areas of sensitive and mobile seabed where possible.

### Control and Management Measures

- 4.2.5.3 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the physical environment assessment are:

- GM01 - designated (and as minimal as possible) anchoring areas and protocols shall be employed during marine operations to minimise physical disturbance of the seabed;
- GM03 - an offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation;
- LVS01 - all project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention) (IMO, 2017);
- LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972) (IMO, 2019a), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 2019e) with the aim of preventing and minimising pollution from ships and the international Convention for the Safety of Life at Sea (SOLAS, 1974);
- LVS05 - drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (PLONOR substances) where practicable,

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<sup>39</sup> Environment Agency (2021). Bathing Water Quality. [online] Available at: <https://environment.data.gov.uk/bwq/profiles/>.

- drilling fluids will be tested for contamination to determine possible reuse or disposal; and
- if disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- MPE01 - during the course of cable route clearance, specific activities will be completed to remove items from the seabed. Out of Service cables will be removed as per industry guidelines, larger debris including lost fishing gear will be removed prior to cable installation and a pre-lay grapnel run will be completed to ensure smaller debris is removed. In the event that abandoned, lost or discarded fishing gear (ALDFG) is encountered, it may be necessary in certain circumstances to bring ALDFG onto the vessel deck. In these instances, marked ALDFG will be returned to the local Marine Management (MMO)/ Inshore Fisheries and Conservation Authority (IFCA) office for onward retrieval by the owner of the marked gear, in line with existing best practice. Not all gear (particularly 'active' gear) is marked; if necessary to bring onto the vessel deck, unmarked gear will be disposed of via conventional onshore waste channels;
- MPE02 - cables will be buried to a target depth of 1.0m to 2.0m for the majority of the route, depending on a number of factors including sediment type and sediment mobility; and
- MPE03 - cable protection features (e.g. rock placement, mattresses and grout bags) will be installed only where considered necessary for the safe operation of the Project.

## 4.2.6 Potential for Significant Effects

- 4.2.6.1 The physical environment assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.
- 4.2.6.2 Changes in physical processes within the study area as a result of the Offshore Scheme are considered as 'sources' of a change and 'pathways' for effects which have potential influence on other environmental receptors. In some cases, a physical process feature can also be considered directly as a receptor, such as climate change impact on metocean conditions. Change in the metocean conditions can affect sediment transport and shoreline evolution where the cable landfalls are located. In this aspect, the potential effects and risks from climate change will be explored.
- 4.2.6.3 The proposed scope of the physical environment assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

- 4.2.6.4 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.
- 4.2.6.5 The potential for the Offshore Scheme to result in potential significant effects described in this section takes into account the embedded and control and management measures described in section 5.

### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;
- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).

### Sources of operational impacts

- presence of cable protection.

### Sources of maintenance impacts

- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed;

### Potential impacts

4.2.6.6 Table 4.2.4 identifies the potential impacts that could result from the sources identified above.

Table 4.2.4: Sources and impacts

<b>Project phase</b>	<b>Source</b>	<b>Impact</b>	<b>Potential for significant effects</b>	<b>Proposed to be scoped in/out</b>
Construction, maintenance & decommissioning	Cable installation/removal including route clearance and cable lay activities	Changes in suspended sediment concentrations as a result of seabed disturbance and alteration of water quality through disturbance of potentially	Yes	Scoped in

		contaminated sediment		
Construction, maintenance & decommissioning	Cable installation, maintenance, removal activities	Disturbance of coastal morphology	Yes	<b>Scoped in</b>
Construction, operation & decommissioning	Presence of cable protection	Disturbance of coastal morphology	Yes	<b>Scoped in</b>
Construction, maintenance & decommissioning	Cable installation/removal including route clearance and cable lay activities	Alteration of water quality due to accidental leaks and spills from vessels	No - changes in water quality are likely to be temporary. The significance of potential impacts is considered to be negligible due to the measures committed to.	Scoped out
Construction, maintenance & decommissioning	Cable installation/removal including route clearance and cable lay activities	Changes to seabed morphology (bathymetry and bedforms)	Yes	<b>Scoped in</b>
Construction, maintenance, operation & decommissioning	All project activities	Changes in metocean conditions	No - installation of the subsea cable and the presence of vessels and other equipment are considered to be relatively small-scale and transient. These activities will not therefore influence metocean conditions such as water levels, currents and waves. These issues can therefore be scoped out from further consideration	Scoped out

Operation and decommissioning	Presence of cable protection	Changes in suspended sediment concentrations due to scouring around the edge of cable protection measures	Yes	<b>Scoped in</b>
Operation	Presence of cable protection	Disturbance/change to seabed morphology and coastal processes at landfall locations due to presence of cable protection measures	Yes	<b>Scoped in</b>
Operation	Climate change	Changes in metocean conditions and coastal erosion at landfall sites as a result of climate change	Yes	<b>Scoped in</b>

## Impact Pathways with Receptors (Step 2)

- 4.2.6.7 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the physical environment study area.
- 4.2.6.8 Table 4.2.5 provides a summary of the impact pathways identified and those scoped into and out of the assessment for the Offshore Scheme (**Figure 1.1.4 Offshore Scheme Scoping Boundary**).

Table 4.2.5: Impact pathways with receptors

<b>Impact pathway</b>	<b>Receptors</b>	<b>Potential for significant effect</b>	<b>Proposed to be scoped in / out</b>
Changes to suspended sediment concentrations caused as a result	Water quality – increase in suspended sediment concentration	Yes – installation, maintenance and decommissioning of cables will cause disturbance to the seabed and generate	<b>Scoped in</b>

<p>of seabed disturbance during construction, maintenance and decommissioning activities</p>	<p>additional suspended sediment into the water column. The scale of this disturbance will vary depending on the techniques utilised. There is potential to result in the re-suspension into the water column of contaminated sediments or the release of chemicals. Whilst significant impacts as a result of contaminated sediments are considered unlikely within the study area, the potential impact will be determined through analysis of seabed sediment samples and the sediment plume dispersion</p>		
<p>Changes to suspended sediment concentrations due to cable protection measures</p>	<p>Water quality – changes in suspended sediment concentration</p>	<p>Yes - cable protection measures could lead to localised erosion and the release of fine sediments into the water column</p>	<p><b>Scoped in</b></p>
<p>Changes to coastal and seabed morphology caused by cable installation, maintenance, and removal activities</p>	<p>Changes to coastal morphology/ nearshore and offshore seabed morphology</p>	<p>Yes - the use of trenchless techniques such as HDD would greatly reduce the impact to the coastal environment, though some trenching would still likely be required</p> <p>Disturbance of coastal morphology at the landfall sites is not anticipated by the buried cables if no external scour protections are required. As the requirement for external cable protection measures has not yet been confirmed, it is proposed that this is scoped in. Further surveys will clarify if there are likely to be any significant effects.</p>	<p><b>Scoped in</b></p>

Changes to seabed morphology and sediment transport processes due to presence of cable protection measures	Seabed morphology	Yes - cable protection measures could lead to localised erosion and accretion of sediment potentially affecting seabed morphology.	<b>Scoped in</b>
Change in sediment transport at the coastline due to changes to the local hydrodynamic regime as a result of climate change	Coastal erosion	Yes - there is no risk of erosion at the Kent landfall, Pegwell Bay. However; the coastline between Aldeburgh and Thorpeness at the preferred Suffolk landfall there is a risk of erosion of up to 20m over the next 100 years. This area could experience increased erosion rates due to sea level rise and increased wave action due to climate change. To ensure the landfall is located inland of the current coastline, it is recommended that a desktop study is undertaken to investigate if the impact is significant and inform appropriate mitigation.	<b>Scoped in</b>

## 4.2.7 Proposed Assessment Methodology

### Proposed Data Sources

4.2.7.1 Specific to the marine physical environment, the following will be considered:

- South East Inshore Marine Plan (DEFRA, 2021)<sup>40</sup>;
- East Inshore and East Offshore Marine Plans (DEFRA, 2021)<sup>41</sup>;
- Suspended sediment climatologies around the UK (CEFAS, 2016)<sup>42</sup>;

<sup>40</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf)

<sup>41</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>42</sup> Cefas (2016). Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/584621/CEFAS\\_2016\\_Suspended\\_Sediment\\_Climatologies\\_around\\_the\\_UK.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf).

- UK Climate Projections (UKCP): sea level rise (<https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index>);
- EA 'Flood Risk Assessments: Climate Change Allowances' (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>);
- UK Government Guidance on undertaking WFD assessment in estuarine and coastal waters - <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>
- Isle of Grain to South Foreland SMP - <https://se-coastalgroup.org.uk/shoreline-management-plans/isle-of-grain-to-south-foreland/>
- Lowestoft to Felixstowe SMP - <http://www.suffolksmp2.org.uk/>

## Proposed Assessment Methodology

- 4.2.7.2 In many cases there is no defined receptor for the physical environment but instead the physical processes act as a pathway which has the potential to impact other receptors (i.e. increased deposition resulting from the disturbance of seabed material could have an adverse impact on benthic habitats). One exception to this is coastal morphology which will be considered as a receptor in its own right.
- 4.2.7.3 The worst-case scenarios will be identified for the different elements during the construction, maintenance, operation and decommissioning phases.
- 4.2.7.4 The assessment of baseline conditions will be collated from various sources of desk-based literature and data collection. The impact assessment will be carried out using a range of evaluation techniques including desk-based study, reference, standards/guidelines, best practice and experience of other similar schemes and projects in relation to the impact of marine cable routes. A wide range of impact types will be considered, including waves, currents, sediment disturbance, water quality, shoreline erosion and climate change. These impacts will be addressed using standard desktop assessment approaches, excluding any requirement for numerical modelling.
- 4.2.7.5 For each environmental parameter, Table 4.2.6 summarises the proposed data sources and intended approach to assess the effects on the physical environment. Where it is evidenced through existing data that a potential impact is unlikely to occur, it is recommended that these matters be 'scoped out' of the EIA process for the parameter under consideration.

Table 4.2.6: Assessment methodology of potential effects

Potential Effect	<b>Increase in suspended sediment concentrations as a result of construction, maintenance, operation and decommissioning along the cable route and at the landfall sites</b>
Data	<p>To estimate the potential changes in levels of suspended sediment concentration and extent of plume during the cable construction and operation, the following data and studies will be used:</p> <ul style="list-style-type: none"> <li>• existing and planned bathymetric surveys;</li> </ul>

- existing metocean surveys: ADCP surveys and wave buoys;
- existing and planned seabed sediment samples & particle size analysis;
- existing database: Atlas of Marine Renewable Energy Resources; and,
- previous assessments of similar activities for the cable routes.

**Approach** Potentially sensitive receptors sensitive to modification of the natural concentration levels of suspended sediment. If sensitive receptors are found to be present, historical and new survey data will be used to inform conceptual understanding of the potential impact. The existing modelling and analysis results would be used as the evidence to inform assessments of direct and indirect impacts on any sensitive receptors provided that there is sufficient similarity in the environmental setting and cable burial activities causing sediment disturbance.

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**Potential Effect Disturbance of coastal morphology**

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**Data** To determine the potential changes to coastal morphology at the landfall sites during the construction and operational phases, the following data and studies at the landfall sites will be used:

- historical imagery and topographic data;
- historical descriptions and studies; and,
- previously assessments of similar activities for other projects.

**Approach** Potentially sensitive receptors include the morphology of the coastline and any designated features in areas of special protection. The desktop analysis will be undertaken to understand coastal process at the landfalls using the available data. The magnitude and extent of potential impacts will be estimated on the basis of the proposed landfall construction methods. Reference will be made to any relevant evidence or experience from actual cable landfall activities, where the environmental setting and proposed construction methods are sufficiently similar.

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**Potential Effect Changes to coastal erosion at the landfall sites**

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**Data** To qualify the significance of sea level rise, increase in wind and wave by climate change and study the potential impact on sediment transport and shoreline erosion at the landfall sites. The following data and studies will be used:

- existing and planned bathymetric surveys and sediment samples
- existing metocean surveys: wave buoys, current measurements; and,
- EA climate change guidance and database.

**Approach** Sea level rise and wave height increases due to climate change will be estimated for the defined lifespan using the EA database. If they are found to be significant, further study will be carried out.

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## Significance criteria

- 4.2.7.6 The appraisal methodology has been developed to incorporate the principles of the Institute of Environmental Management and Assessment (IEMA) guidelines for Environmental Impact Assessment. For consistency, the terms interaction, impact and effect, as defined in Table 4.2.7 below will be used throughout the appraisal.

Table 4.2.7: Terms and definitions

Terms	Definition
<b>Interaction</b>	The link between an activity and the receptor. There must be an interaction for an effect to occur.
<b>Impact</b>	The action that occurs as a result of an identified interaction. The predicted change in the baseline environment.
<b>Effect</b>	An observable consequence of impacts, usually measurable. Effects only occur when an activity or environmental impact is present within an environment that is sensitive to it.

- 4.2.7.7 The appraisal process ranks impacts according to their significance determined by considering magnitude of change and receptor sensitivity as described in the following sections.
- 4.2.7.8 The magnitude of a given impact must be ascertained to determine its significance. A summary of the magnitude criteria that are associated to specific impacts is detailed in Table 4.2.8.

Table 4.2.8: Magnitude criteria

Magnitude criteria	Definition
<b>Large</b>	Long term (>5 years) and/or regional level loss; or major alteration to key elements/features of the baseline condition such that post development character/composition of the baseline will be fundamentally changed.
<b>Medium</b>	Medium term loss and/or local level change (greater than the proposed Project footprint) or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
<b>Small</b>	Short term, site specific and/or a minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation.
<b>Negligible</b>	Very little change from baseline conditions. Change is barely distinguishable, approximating to a “no change” situation.

4.2.7.9 The criteria for assessing the sensitivity of the receptor are defined in Table 4.2.9.

Table 4.2.9: Receptor sensitivity criteria

<b>Receptor sensitivity criteria</b>	<b>Definition</b>
High	<p>Receptor has little or no ability to absorb change without fundamentally altering its character. For example:</p> <ul style="list-style-type: none"> <li>receptor has low/no capacity to return to baseline conditions within Project life, e.g., low tolerance to change and low recoverability such as a physical feature formed over a geological time scale, or loss of access with no alternatives;</li> <li>the receptor is a designated feature of a protected site, is rare or unique; or</li> <li>receptor is economically valuable.</li> </ul>
Medium	<p>Receptor has moderate capacity to absorb change without significantly altering its character. For example:</p> <ul style="list-style-type: none"> <li>receptor has intermediate tolerance to change.</li> <li>medium capacity to return to baseline condition, e.g., &gt;5 of up to 10 years.</li> <li>the receptor is valued but not protected.</li> </ul>
Low	<p>The receptor is tolerant to change without significant detriment to its character. For example:</p> <ul style="list-style-type: none"> <li>receptor has high tolerance to change, e.g., disturbance to unconsolidated seabed sediments or sandwaves;</li> <li>high capacity to return to baseline condition, e.g., within 1 year or up to 5 years; or</li> <li>the receptor is common and/or widespread.</li> </ul>
Negligible	The receptor's character, survival or viability has a high tolerance to change.

## 4.2.8 Conclusion

4.2.8.1 In summary:

- a range of activities associated with the construction, operation, maintenance and decommissioning of the offshore scheme have been identified as possible sources of impacts that may affect the physical environment.
- an overview of the potential impacts on the physical environment have been identified and scoped in and out of for further review.
- potential impacts include:

- Changes in suspended sediment concentrations as a result of seabed disturbance and alteration of water quality through disturbance of potentially contaminated sediment
- Changes to seabed morphology, including bathymetry and bedforms
- Change in the metocean conditions can affect sediment transport and shoreline evolution where the cable landfalls are located.
- the possible impact of climate change on the physical environment is also highlighted. Therefore, over the lifetime of the project the risks from climate change are to be explored.

## Proposed Scope of the Assessment

4.2.8.2 A summary of the proposed scope of assessment is provided in Table 4.2.10 below.

Table 4.2.10: Proposed scope of the assessment

Receptor	Potential for significant effect	Project phase(s)	Proposed to be scoped in/out	
			Marine Cable Route	Landfalls
Water quality – increase in suspended sediment concentration	Changes to suspended sediment concentrations caused as a result of seabed disturbance	Construction, maintenance and decommissioning	Scoped in	Scoped in
Water quality – increase in suspended sediment concentration	Changes to suspended sediment concentrations due to the presence of cable protection measures	Operation and decommissioning	Scoped in	Scoped in
Coastal morphology/ nearshore and offshore seabed morphology	Disturbance caused by activities in the intertidal zone during cable installation, maintenance and removal	Construction, maintenance, decommissioning	Scoped in	Scoped in
Seabed morphology	Localised erosion and accretion of sediment affecting seabed morphology due to presence of cable protection measures	Operation and decommissioning	Scoped in	Scoped in

Receptor	Potential for significant effect	Project phase(s)	Proposed to be scoped in/out	
			Marine Cable Route	Landfalls
Coastal erosion	Change in sediment transport at the coastline due to changes to the local hydrodynamic regime as a result of climate change	Operation	Scoped out	<b>Scoped in</b>

## 4.3 Benthic Ecology

### 4.3.1 Introduction

4.3.1.1 This chapter presents how the benthic ecology assessment will consider the potentially significant effects that may arise from the construction, operation, maintenance, and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment and how the potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).

4.3.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.

4.3.1.3 This chapter should be read in conjunction with:

- **Part 1, Chapter 4, Description of the Project;**
- **Part 1, Chapter 5, EIA Approach and Methodology;**
- **Part 4, Chapter 1, Evolution of the Offshore Scheme;** and
- **Part 4, Chapter 2, Physical Environment.**

4.3.1.4 This chapter is supported by the following figure:

- **Figure 4.3.1 Benthic Ecology Study Area and Designated Sites.**

### 4.3.2 Regulatory and Planning Context

4.3.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on benthic ecology associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

#### Legislation

4.3.2.2 The following legislation is relevant to benthic ecology:

- Marine and Coastal Access Act 2009<sup>43</sup> provides the legal mechanism to help ensure clean, healthy, safe and productive and biologically diverse oceans and seas;

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<sup>43</sup> The Marine and Coastal Access Act 2009 [online]. Available at: [https://www.legislation.gov.uk/ukpga/2009/23/contents\\_](https://www.legislation.gov.uk/ukpga/2009/23/contents_).

- The Conservation of Habitats and Species Regulations 2017<sup>44</sup> (amended 2019<sup>45</sup>) transposes the Habitats Directive (92/43/EEC) into UK legislation out to the 12 nautical mile (NM) limit;
- The Conservation of Offshore Marine Habitats and Species Regulations 2017<sup>46</sup> applies within the UK Offshore Marine Area (beyond the 12 NM limit);
- The Wildlife and Countryside Act 1981<sup>47</sup> (as amended) includes provisions relating to nature conservation;
- The Marine Strategy Regulations 2010<sup>48</sup> transposes the Marine Strategy Framework Directive (2008/56/EC) into UK legislation;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017<sup>49</sup> transposes the EU Water Framework Directive (2000/60/EC) into UK legislation;
- Section 41 of the NERC 2006<sup>50</sup> lists species of principal importance for the purpose of conservation of biodiversity; and
- Environment Act 2021<sup>51</sup>, will set clear statutory targets for the recovery of the natural world in four priority areas: air quality, biodiversity, water and waste, and includes the introduction of Biodiversity Net Gain (BNG).

## Planning Policy

4.3.2.3 The following plans and policies are relevant to benthic ecology.

### National planning policy

- National Policy Statements (NPS) - the UK Government produces NPS which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP). Those potentially relevant to benthic ecology are:
  - Overarching National Policy Statement for Energy – EN-1<sup>52</sup>;

<sup>44</sup> The Conservation of Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/ukxi/2017/1012/contents/made>.

<sup>45</sup> Amended in response to the UK's exit from the European Union (EU), making the Habitats (92/43/EEC) and Wild Birds (2009/147/EC) Directives, operable from 1 January 2021, and creating a UK natural site network in place of the EU Natura 2000 ecological network.

<sup>46</sup> The Conservation of Offshore Marine Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/ukxi/2017/1013/made>

<sup>47</sup> The Wildlife and Countryside Act 1981. [online] Available at: <https://www.legislation.gov.uk/ukpga/1981/69>

<sup>48</sup> The Marine Strategy Regulations 2010. [online] Available at: <https://www.legislation.gov.uk/ukxi/2010/1627/contents/made>.

<sup>49</sup> The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/ukxi/2017/407/contents/made>.

<sup>50</sup> Section 41 of the Natural Environment and Rural Communities Act 2006. [online] Available at: <https://www.legislation.gov.uk/ukpga/2006/16/section/41>.

<sup>51</sup> The Act has been enshrined into law; however, it is not anticipated to come into full effect until the end of 2023 (2025 for NSIPs).

<sup>52</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy (EN-1). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) [Accessed 09 August 2022].

- Renewable Energy Infrastructure – EN-3<sup>53</sup>;
  - Electricity Networks - EN-5<sup>54</sup>;
  - National Planning Policy Framework<sup>55</sup>;
  - Planning Practice Guidance – Natural Environment<sup>56</sup>; and
  - Planning Practice Guidance – Renewable and low carbon energy<sup>57</sup>.
- National Planning Framework 2 (NPF2)<sup>58</sup>, aims to co-ordinate policies of a spatial nature with investment priorities. Biodiversity is stated as one of the factors contributing to the core objectives of sustainable economic development.
  - The UK Marine Policy Statement (MPS)<sup>59</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made.

### Local planning policy

- The following marine plans have been considered in the development of this Scoping Report:
  - East Inshore and East Offshore Marine Plan<sup>60</sup>
  - South East Inshore Marine Plan<sup>61</sup>

## 4.3.3 Study Area

4.3.3.1 For intertidal ecology a study area of 2km either side of the Offshore Scoping Boundary has been considered. Although considered to be a larger study area than is likely to be needed, the study area will be reviewed as the assessment work proceeds to

<sup>53</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Renewable Energy (EN-3). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47856/1940-nps-renewable-energy-en3.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf) [Accessed 09 August 2022].

<sup>54</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Electricity Networks (EN-5). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47858/1942-national-policy-statement-electricity-networks.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf) [Accessed 09 August 2022].

<sup>55</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

<sup>56</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance – Natural Environment. [online] Available at: <https://www.gov.uk/guidance/natural-environment#biodiversity-geodiversity-and-ecosystems> [Accessed 09 August 2022].

<sup>57</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2015). Planning Practice Guidance – Renewable and Low Carbon. [online] Available at: <https://www.gov.uk/guidance/renewable-and-low-carbon-energy> [Accessed 09 August 2022].

<sup>58</sup> National Planning Framework (2021). [online] Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework-2>.

<sup>59</sup> Department for Food, Environment and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) [Accessed 09 August 2022].

<sup>60</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>61</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

ensure it remains appropriate to the likely impact pathways, which also reflect any coastal morphology that could affect the Zone of Influence (ZOI).

4.3.3.2 For subtidal benthic ecology, a distance of 10km of the Offshore Scoping Boundary has been considered, which encompasses all likely ZOI to benthic receptors within the subtidal area.

4.3.3.3 These distances have also been used to screen for designated sites.

4.3.3.4 The benthic ecology study areas are shown on **Figure 4.3.1. Benthic Ecology Study Area and Designated Sites**.

## 4.3.4 Baseline Conditions

4.3.4.1 Benthic ecology refers to the diversity, abundance, and function of organisms living on (epifauna) or in (infauna) the seabed. Benthic communities are found in all marine habitats, from the deepest parts of the ocean to the intertidal zone. Physical factors such as water depth, sediment type, and supply of organic matter determine habitat types and species present, and therefore the composition of benthic communities.

### Data Sources

4.3.4.2 The study area includes a diverse range of intertidal and subtidal benthic habitats and communities. To determine the baseline conditions of benthic ecology within the study area the following key data sources have been reviewed:

- Project-specific survey data;
- Kent Habitat Survey Partnership<sup>62</sup>;
- European Marine Observation Data Network (EMODnet) Seabed Habitats Project data for broad-scale habitat maps of the study area<sup>63</sup>;
- European Union Nature Identification System (EUNIS) for classifying benthic habitats<sup>64</sup>;
- Defra Future Coast Project<sup>65</sup>;
- Magic maps for designated and protected sites<sup>66</sup>; and
- Academic papers and online reports as available for the study area.

4.3.4.3 Consultation with stakeholders including the Marine Management Organisation (MMO), Natural England (NE), the Environment Agency (EA), and the Joint Nature

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<sup>62</sup> The Kent Habitat Survey Partnership (2003). Kent Habitat Survey 2003, GB000329. [Accessed: 06 June 2022].

<sup>63</sup> European Marine Observation and Data Network (EMODnet) (2021). EUSeaMap 2021. [online] Available from: <https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/> [Accessed 09 March 2022].

<sup>64</sup> European Environment Agency (2021). EUNIS habitat classification. [online] Available at: <https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification-1> [Accessed 09 March 2022].

<sup>65</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2002). Future coast project. National Network of Regional Coastal Monitoring Programmes. [online] Available at: <https://coastalmonitoring.org/ccoresources/futurecoast/> [Accessed 06 June 2022].

<sup>66</sup> Department of Environment, Food and Rural Affairs (DEFRA) (No Date). Magic Interactive Mapping. [online] Available at: <https://magic.defra.gov.uk/home.htm>.

Conservation Committee (JNCC) (amongst others where relevant) will take place and any additional baseline information available from these stakeholders will be taken into consideration.

## Intertidal Baseline

- 4.3.4.4 The intertidal habitat within the Offshore Scoping Boundary at the preferred Suffolk Landfall located between Aldeburgh and Thorpeness, and the alternative northern landfall location at Sizewell, both primarily consist of ‘littoral mixed sediments’ (EUNIS A2.4) along a long shingle and sand shoreline. In the upper littoral fringe, ‘littoral coarse sediment’ (EUNIS A2.1) is present<sup>67</sup>.
- 4.3.4.5 In Pegwell Bay, at the Kent Landfall, the intertidal habitats primarily consist of ‘littoral mud’ (EUNIS A2.3), whilst small patches of saltmarsh (‘coastal saltmarshes and saline reedbeds’ EUNIS A2.5) are present on the upper littoral fringe in the innermost areas of the bay and along the banks of the River Stour. At Ramsgate Sands, to the north of the landfall location, a combination of ‘littoral mud’ (EUNIS A2.3), ‘barren or amphipod-dominated mobile sand shores’ (EUNIS A2.22), and ‘polychaetes in littoral fine sand’ (EUNIS A2.231) have been identified<sup>67 68</sup>.

## Subtidal Baseline

- 4.3.4.6 Project specific benthic surveys<sup>69</sup> identified a range of subtidal benthic habitats within the Offshore Scoping Boundary. These habitats primarily consist of the following: ‘circalittoral mixed sediments’ (EUNIS A5.44), ‘circalittoral sand’ (A5.25 / A5.26), and ‘circalittoral coarse sediment’ (EUNIS A5.14). Towards the Suffolk landfall locations, the habitat was predominately ‘infralittoral sand’ (A5.23/A5.24), whilst close to the Kent landfall, the subtidal habitat was mostly ‘infralittoral mixed sediment’ (EUNIS A5.43), and ‘infralittoral / circalittoral coarse sediment’ (EUNIS A5.13 / A5.14), including large areas of the encrusting polychaete worm ‘*Pomatoceros triqueter* together with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles’ (EUNIS A5.141). Two areas of ‘*Sabellaria spinulosa* on stable circalittoral mixed sediment’ (EUNIS A5.611) were identified within the Offshore Scoping Boundary south of Thorpeness, however, these were assessed as not covering a large enough area to be classified as a reef under Annex I (REF). Additionally, ‘*Mytilus edulis* beds on sublittoral sediment’ (EUNIS A5.625) were also identified within the Offshore Scoping Boundary.
- 4.3.4.7 The benthic communities identified by the Project specific surveys were dominated, in terms of both abundance and diversity of fauna, by polychaete worms and crustaceans. Where coarse sediments were present encrusting animals such as barnacles were observed.
- 4.3.4.8 Additional benthic habitat mapping by Natural England (1995)<sup>68</sup> around Thanet Coast, identified areas of subtidal chalk reef (‘communities on soft circalittoral rock’ EUNIS A4.23) and subtidal kelp beds (‘kelp and red seaweeds (moderate energy infralittoral

<sup>67</sup> European Environment Agency (2021). EUNIS habitat classification. [online] Available at: <https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification-1> [Accessed 09 March 2022].

<sup>68</sup> Natural England (1995). Mapping the distribution of benthic biotopes around the Thanet Coast, ENRR No. 154. [online] Available at: <http://publications.naturalengland.org.uk/publication/64039>.

<sup>69</sup> Environmental Survey Report: SEA Link Marine Survey. September – October 2021.

rock)' EUNIS A3.21) within the Offshore Scoping Boundary, close to the nearshore area of the Kent landfall.

## Designated Sites and Protected Habitats

- 4.3.4.9 As part of the Project specific subtidal benthic surveys, one Annex I habitat, 'sandbanks which are slightly covered by sea water all the time' (H1110), as well as four habitats of 'principal importance', listed under Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act, consisting of 'peat and clay exposures', 'subtidal chalks', 'subtidal sand and gravels', '*Sabellaria spinulosa* reefs', and 'blue mussel beds' were identified within the Offshore Scoping Boundary. In addition, saltmarsh identified in the intertidal zone at Pegwell Bay as part of the Kent Habitat Survey Partnership<sup>70</sup>, is representative of 'coastal saltmarsh', a habitat of 'principal importance'.
- 4.3.4.10 The key sites designated for the protection of benthic features, within the benthic ecology study areas, comprise of three Special Areas of Conservation (SAC), four Marine Conservation Zones (MCZ), and two Sites of Special Scientific Interest (SSSI) and are listed in Table 4.3.1 and shown on **Figure 4.3.1 Benthic Ecology Study Area and Designated Sites**.

Table 4.3.1: Sites designated for benthic ecology within the study area

Site name	Distance from Offshore Scoping Boundary	Summary
Thanet Coast SAC	<1km	The Thanet Coast SAC is adjacent to the Offshore Scoping Boundary close to Pegwell Bay and is designated for the protection of 'reefs' and 'submerged or partially submerged sea caves'
Margate and Long Sands SAC	2km	The Margate and Long Sands SAC is located west of the Offshore Scoping Boundary and is designated for the protection of the Annex I habitat 'sandbanks which are slightly covered by sea water all the time'
Sandwich Bay SAC	0km	The Sandwich Bay SAC covers the intertidal area of Pegwell Bay, where the Kent Landfall is located. This site is designated for the protection of a range of dune habitats, including shifting dunes along the shoreline (white dunes)
Goodwin Sands MCZ	0km	The Offshore Scoping Boundary crosses the Goodwin Sand MCZ close to the Pegwell Bay landfall. The MCZ is designated for the protection of 'subtidal coarse sediment', 'subtidal sand', 'blue

<sup>70</sup> The Kent Habitat Survey Partnership (2003). Kent Habitat Survey 2003, GB000329. [Accessed: 06 June 2022].

		mussel beds', 'moderate energy circalittoral rock' and 'Ross worm <i>Sabellaria spinulosa</i> reefs'
Thanet Coast MCZ	<1km	The Thanet Coast MCZ is located north of the Pegwell Bay landfall site and is designated to protect 'blue mussel <i>Mytilus edulis</i> beds', 'moderate energy circalittoral rock', 'moderate energy infralittoral rock', 'peat and clay exposures', 'ross worm <i>Sabellaria spinulosa</i> reefs', 'stalked jellyfish <i>Calvadosia cruxmelitensis</i> ' and <i>Haliclystus</i> spp.', 'subtidal chalk', 'subtidal coarse sediment', 'subtidal mixed sediments', and 'subtidal sand'
Kentish Knock East MCZ	1km	This site is located to the east of the central part of the Offshore Scoping Boundary and is designated for the protection of 'subtidal sand', 'subtidal coarse sediment', and 'subtidal mixed sediment'
Orford Inshore MCZ	9km	This site is located to the east of both potential Suffolk landfalls and is designated for the protection of 'subtidal mixed sediments'
Sandwich Bay to Hacklinge Marshes SSSI	0km	The Sandwich Bay to Hacklinge Marshes SSSI covers the intertidal area of Pegwell Bay, where the Kent landfall is located. This site is designated for the protection of a range of benthic habitats, including saltmarsh and mudflats
Thanet Coast SSSI	1km	The Thanet Coast SSSI is located to the north of the Pegwell Bay landfall site, and is designated for the protection of foreshore habitats, such as sand and mudflats and smaller areas of saltmarsh and coastal lagoons

## Future Baseline

- 4.3.4.11 The benthic ecology chapter within the Environmental Statement (ES) will include an outline of the likely evolution of the baseline environment without the implementation of the development as far as natural changes from the baseline scenario can be assessed.

## 4.3.5 Embedded and Control & Management Measures

- 4.3.5.1 Given that many design elements of the Project have yet to be confirmed, the embedded and control and management measures have not been finalised at this stage. Measures will be discussed with statutory consultees and stakeholders throughout the EIA process.

## Embedded Measures

- 4.3.5.2 The Offshore Scoping Boundary has been designed in order to avoid environmentally sensitive areas where possible. This includes avoiding the Margate and Long Sands SAC and the Kentish Knock East MCZ, which are both designated for the protection of benthic habitats. Further consideration is being given to the possibility of avoidance of the Goodwin Sands MCZ by the Offshore Scheme, but this is dependent on the outcome of further stakeholder engagement and additional survey work.
- 4.3.5.3 As the Offshore Scheme develops and route design is progressed (informed by the Project specific offshore survey data) the Project will aim to minimise impacts by micro siting around sensitive features where possible.
- 4.3.5.4 The use of a trenchless cable installation method to minimise habitat loss and disturbance within the intertidal zone is under assessment and may be used where possible.

## Control and Management Measures

- 4.3.5.5 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the benthic ecology assessment are:
- GM01 - designated (and as minimal as possible) anchoring areas and protocols shall be employed during marine operations to minimise physical disturbance of the seabed;
  - GM03 - an offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation;
  - LVS01 - all project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine invasive non-native species (INNS)<sup>71</sup>;
  - LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972) (IMO, 2019a)<sup>72</sup>, regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78)<sup>73</sup> (IMO, 2019e) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974)<sup>74</sup>.

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<sup>71</sup> International Maritime Organisation (IMO) (2017). International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-\(BWM\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-(BWM).aspx) [Accessed 06 June 2022].

<sup>72</sup> International Maritime Organisation (IMO) (1972). Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). [online] Available at: <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx> [Accessed 10 August 2022].

<sup>73</sup> International Maritime Organisation (IMO) (1983). International Convention for the Prevention of Pollution from Ships (MARPOL). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx) [Accessed 10 August 2022].

<sup>74</sup> International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf>.

- LVS05 - drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (PLONOR substances) where practicable,
  - drilling fluids will be tested for contamination to determine possible reuse or disposal; and
  - If disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- BE01 - a biosecurity plan will be produced for the Project, following the latest guidance on INNS from the GB non-native species secretariat;
- BE02 - all project vessels shall adhere to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines)<sup>75</sup>; and
- BE03 - cable installation will be carried out on a 24-hour basis in order to reduce the overall installation time and associated disturbance of ecological receptors.

## 4.3.6 Potential for Significant Effects

- 4.3.6.1 The benthic ecology assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.
- 4.3.6.2 The proposed scope of the benthic ecology assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

- 4.3.6.3 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.
- 4.3.6.4 The potential for the Offshore Scheme to result in the potential significant effects described in this section takes into account the embedded and control and management measures described in section 5.

#### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;

<sup>75</sup> International Maritime Organisation (IMO) (2011). 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. Annex 26, Resolution MEPC.207(62), Adopted 15 July 2011. [online] Available at: [https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207\(62\).pdf](https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207(62).pdf).

- sand wave sweeping;
- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of operational impacts

- presence of activated cable.

#### Sources of maintenance impacts

- geophysical and/or Remotely Operated Vehicle (ROV) surveys;
- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed;

#### Potential impacts

4.3.6.5 Table 4.3.2 identifies the potential impacts that could result from the sources identified above.

Table 4.3.2: Sources and impacts

Project phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay; Cable repair or replacement; Removal of cable from seabed; and Removal of cable protection	Temporary physical disturbance to intertidal and subtidal benthic habitats and species	Yes	Scoped in

Construction and maintenance	Cable protection (e.g. rock placement, concrete mattresses)	Direct loss of subtidal benthic habitats and species due to placement of hard substrates on the seabed	Yes	<b>Scoped in</b>
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay; Cable repair or replacement; Removal of cable from seabed; and Removal of cable protection	Temporary increase in Suspended Sediment Concentrations (SSC) and sediment deposition leading to increased turbidity, smothering effects and contaminant mobilisation	Yes	<b>Scoped in</b>
Construction	Cable installation and cable lay	Changes to marine water quality from the use of Horizontal Directional Drilling (HDD) drilling fluids	No - the implementation of the control and management measure LVS05 means only inert (non-toxic), biodegradable drilling fluid will be used and disposed of at a licenced disposal site. As such, significant changes to water quality are highly unlikely	Scoped out
Construction, maintenance and decommissioning	Leaks and spills from vessels	Changes to marine water quality from accidental leaks and spills from	No - the implementation of control and management measures GM03 and LVS02	Scoped out

		vessels, including loss of fuel oils	create limited potential for accidental spills to occur. Relatively few vessels are expected to be involved, and potential pollutants would be limited to relatively small volumes. Should an accidental spill or leak occur, it would be small in extent and subject to immediate control measures, dilution and rapid dispersal within the marine environment	
Construction, maintenance and decommissioning	Vessels inadvertently transporting INNS	Introduction and spread of INNS via vessel hull or ballast water	No - the implementation of control and management measures (LVS01, BE01 and BE02) make the introduction of INNS through ship hulls and ballast water unlikely	Scoped out
Construction and maintenance	Cable protection (e.g. rock placement, concrete mattresses).	Introduction and spread of INNS by introducing hard substrate, creating steppingstones for INNS to become established	Yes	<b>Scoped in</b>

Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay (including piling <sup>76</sup> ); Cable repair or replacement; Removal of cable from seabed; Removal of cable protection; and Vessel traffic.	Underwater sound impacts on marine invertebrates	Yes	<b>Scoped in</b>
Operation	Presence of activated cable	Disturbance to benthic habitats and species due to subsea cable thermal emissions	Yes	<b>Scoped in</b>
Operation	Presence of activated cable	Electromagnetic field (EMF) emissions	Yes	<b>Scoped in</b>

## Impact Pathways with Receptors (Step 2)

- 4.3.6.6 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the benthic ecology study areas.
- 4.3.6.7 Table 4.3.3 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the benthic ecology assessment for the Offshore Scheme (**Figure 1.1.4 Offshore Scheme Scoping Boundary**).

Table 4.3.3: Impact pathways with receptors

<b>Impact pathway</b>	<b>Receptors</b>	<b>Potential for significant effects</b>	<b>Proposed to be scoped in/out</b>
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<sup>76</sup> At the cable landfall locations, percussive piling for the installation of a cofferdam as part of the use of trenched technologies (not the preferred method) cannot be ruled out at this stage.

Temporary physical disturbance to benthic habitats and species during construction, maintenance and decommissioning	Intertidal and subtidal habitats and species	Yes - activities associated with route preparation (i.e. route clearance and pre-sweeping, UXO clearance if required), cable installation <sup>77</sup> and removal can result in temporary physical disturbance to intertidal and subtidal benthic habitats and species which could lead to temporary loss of these habitats and associated species	<b>Scoped in</b>
Direct loss of subtidal benthic habitats and species due to placement of hard substrates on the seabed during construction and maintenance	Intertidal and subtidal ecology	Yes - cable installation, and repair may require protection, such as rock placement, concrete mattresses, rock/gravel/sand/grout bags, or protection sleeves/cast-iron shells at some locations. Introduction of hard substrate would likely replace otherwise soft substrates, leading to permanent loss of these habitats and associated species <sup>78</sup>	<b>Scoped in</b>
Temporary increase in SSC and sediment deposition leading to turbidity, smothering effects, and contaminant mobilisation during	Intertidal and subtidal ecology	Yes - construction activities associated with the Project such as route clearance, pre-sweeping, cable installation (e.g. jetting, controlled flow	<b>Scoped in</b>

<sup>77</sup> These activities may include cable burial by ploughing, trenching or excavating. To avoid the intertidal zone and sensitive features at the landfall locations, the use of trenchless technologies such as HDD is currently the preferred option. However, further ground investigation (GI) Works are required to determine the feasibility of this option and therefore trenching of the cable at these locations cannot be ruled out at this stage.

<sup>78</sup> Adams, T., Miller, R., Aleynik, D. and Burrows, M. (2014). Offshore marine renewable energy devices as stepping stones across biogeographical boundaries. *Journal of Applied Ecology*, 51(2), pp. 330-338. DOI: 10.1111/1365-2664.12207.

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construction, maintenance and decommissioning

excavation (CFE), and backfill) and protection, and UXO disposal have the potential to increase SSC which results in elevated turbidity, which can affect rates of photosynthesis via a reduction in light availability and an increase in particles in the water, may affect feeding efficiency of filter feeders if clogging of filtering systems occurs<sup>78</sup>.

Suspended sediment may also settle out, resulting in increased deposition which can smother the seabed and sessile benthic organisms. The resuspension of sediment can also release any sediment-bound contaminants, which can impact benthic communities in a variety of ways, including adverse ecotoxic effects, bio-accumulation, and potentially mortality<sup>78</sup>

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Introduction and spread of INNS via the addition of cable protection during construction and maintenance

Intertidal and subtidal ecology

Yes - cables may require protection at some locations, which may introduce hard substrates to otherwise soft seabed. This could provide additional habitat for any existing INNS populations and allow for localised spreading<sup>78</sup>. Hard substrate may also create habitat for

**Scoped in**

		many locally common species, increasing local biodiversity. Studies have indicated that the introduction of hard substrate in otherwise barren areas are quick to be colonised and used by local species <sup>79 80</sup>	
Underwater sound impacts on marine invertebrates during construction, maintenance and decommissioning	Intertidal and subtidal ecology	No - although the exact construction methods have yet to be determined, expected sources of underwater sound include geophysical surveys, UXO clearance, route preparation, cable installation (including piling) and vessel traffic.  Marine invertebrates are believed to be sensitive to particle motion rather than to sound pressure <sup>81</sup> , although few formal studies have been conducted on the impacts of underwater sound. At present there are no published sensitivity thresholds for invertebrates but effects have been recorded in some studies.  Anatomical damage was observed in rock	Scoped out

<sup>79</sup> Joschko, T., Buck, B., Gutow, L. and Schröder, A. (2008). Colonization of an artificial hard substrate by *Mytilus edulis* in the German Bight. *Marine Biology Research*, 4(5), pp. 350-360.

<sup>80</sup> Kogan, I., Paull, C., Kuhnz, L., Burton, E., Von Thun, S., Greene, H. and Barry, J. (2003). Environmental Impact of the ATOC/Pioneer Seamount Submarine Cable. Technical Report, pp. 80. [online] Available at: <https://montereybay.noaa.gov/research/techreports/trkogan2003a.html>. [Accessed 10 August 2022].

<sup>81</sup> Popper, A. and Hawkins, A. (2018). The importance of particle motion to fishes and invertebrates. *The Journal of the Acoustical Society of America*, 143(1), pp. 470-488.

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lobster up to a year following seismic surveys, but no effects were observed on snow crabs<sup>82</sup>. The crustacean *Nephrops norvegicus* and the bivalve *Ruditapes philippinarum* demonstrated behavioural responses to impact pile driving sound source levels in a controlled laboratory environment, including physiological stress responses<sup>83</sup>; however, not all species tested demonstrated any behavioural response to underwater sound (e.g., the brittlestar *Amphiura filiformis*). Furthermore, responses can be subtle and may take extended periods of time to be expressed across a population or become detectable at an ecosystem level. In other laboratory experiments, a stress response in green shore crab *Carcinus maenas* subject to ship playback sound was observed, particularly in larger individuals<sup>84</sup>, although, repeated exposure resulted in the crabs'

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<sup>82</sup> Carrol, A., Przeslawski R., Duncan, A., Gunning, M. and Bruce, B. (2017). A critical review of the potential impacts of marine seismic surveys on fish and invertebrates. *Marine Pollution Bulletin*, 114(1), pp. 9-24. [online] Available at: <https://www.sciencedirect.com/science/article/pii/S0025326X16309584>. [Accessed 30 June 2022].

<sup>83</sup> Solan, M., Hauton, C., Godbold, J., Wood, C., Leighton, T. and White, P. (2016). Anthropogenic sources of underwater sound can modify how sediment-dwelling invertebrates mediate ecosystem properties. *Scientific Reports*, 6(1), pp. 1-9.

<sup>84</sup> Wale, M., Simpson, S. and Radford, A. (2013). Size-dependent physiological responses of shore crabs to single and repeated playback of ship noise. *Biology Letters*, 9(2).

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<p>Disturbance to benthic habitats and species due to subsea cable thermal emissions during operation</p>	<p>Intertidal and subtidal ecology</p>	<p>habituation or tolerance to it.</p> <p>In the absence of suitable anatomical studies, mortality may be a useful indicator of impacts to marine invertebrates. Field-based studies revealed no evidence of increased mortality to scallops, clams, or lobsters following airgun exposure, or of reduced catch-rates for plankton, reef-associated invertebrates, snow crab, shrimp, or lobster<sup>83</sup>.</p> <p>Although there is currently very limited evidence on the effects of underwater sound on marine invertebrates, current data suggest that the type and duration of underwater sound that will be generated by the Project will not have any significant effect on benthic invertebrates or benthic communities</p>	<p><b>Scoped in</b></p>
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		properties of the substrate, such as oxygen concentration, microorganism communities, and/or bacterial activity. Physiological changes in macrobenthic organisms living at the water-sediment interface and in the top sediment layers can also potentially occur	
EMF emissions during operation	Intertidal and subtidal ecology	No - there is evidence from laboratory studies that some benthic invertebrates are able to detect EMF. For example, the brown crab <i>Cancer pagurus</i> showed a clear attraction to EMF of 2,800 $\mu$ T (microtesla) and reduced their time spent roaming <sup>85</sup> . In another study, the blue mussel, <i>Mytilus edulis</i> , the brown shrimp, <i>Crangon crangon</i> and the crab, <i>Rhithropanopeus harrisi</i> , were exposed to a static B-field of 3,700 $\mu$ T for three months, and differences in survival between experimental and control animals were detected <sup>86</sup> . In a laboratory study with the polychaete worm <i>Hediste diversicolor</i>	Scoped out

<sup>85</sup> Scott, K., Harsanyia, P. and Lyndon, A. (2018). Understanding the effects of electromagnetic field emissions from Marine Renewable Energy Devices (MREDS) on the commercially important edible crab, *Cancer pagurus* (L.). *Marine Pollution Bulletin*, 131, pp. 580-588.

<sup>86</sup> Bochert, R. and Zettler, M. (2004). Long-term exposure of several marine benthic animals to static magnetic fields. *Bioelectromagnetics. Journal of the Bioelectromagnetics Society*, 25(7), pp. 498-502.

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there was no evidence of avoidance or attraction behaviours at an EMF of 1,000  $\mu\text{T}$ <sup>87</sup>. A recent study exposed embryonic and larval brown crab and European lobster *Homarus Gammarus* to an EMF 2,800  $\mu\text{T}$  in laboratory conditions, noting increased occurrence of physical deformities in larvae, but no effect to development time or swim speed<sup>88</sup>. However, these studies used a much higher intensity of EMF, around an order of magnitude higher, than the maximum EMF produced by an active 2GW HVDC cable (predicted to be in the region of 400  $\mu\text{T}$ ).

The edible crab has been subject to EMF exposure experiments, testing stress related parameters and behavioural response to lower intensity emissions. EMF strengths of 250  $\mu\text{T}$  were found to have limited physiological and behavioural impacts<sup>89</sup>. At exposure

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<sup>87</sup> Jakubowska, M., Urban-Malinga, B., Otremba, Z. and Andrulowicz, E. (2019). Effect of low frequency electromagnetic field on the behavior and bioenergetics of the polychaete *Hediste diversicolor*. *Marine Environmental Research*, 150, pp. 104766.

<sup>88</sup> Harsanyi, P., Scott, K., Easton, B., de la Cruz Ortiz, G., Chapman, E., Piper, A., Rochas, C. and Lyndon, A. (2022). The Effects of Anthropogenic Electromagnetic Fields (EMF) on the Early Development of Two Commercially Important Crustaceans, European Lobster, *Homarus gammarus* (L.) and Edible Crab, *Cancer pagurus* (L.). *Journal of Marine Science and Engineering*, 10(5), pp. 564.

<sup>89</sup> Scott, K., Harsanyi, P., Easton, B., Piper, A., Rochas, C. and Lyndon, A. (2021). Exposure to Electromagnetic Fields (EMF) from Submarine Power Cables Can Trigger Strength-Dependent Behavioural and Physiological Responses in Edible Crab, *Cancer pagurus* (L.). *Journal of Marine Science and Engineering*, 9(7), pp. 16.

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of 500  $\mu$ T and 1000  $\mu$ T stress responses were detected in histological indicators but crabs also showed a clear attraction at these EMF levels. However, this attraction has been observed to not impact overall crab movements<sup>90</sup> and, in an experiment with American lobsters, only subtle behavioural responses to HVDC EMF were observed<sup>91</sup>. There were notable changes in movement and distribution within an enclosed space, but the EMF did not represent a barrier to lobster movements, and no significant impact was observed overall.

Therefore, after consideration of the available literature, including literature reviews<sup>92</sup> <sup>93</sup> and modelling analyses<sup>94</sup>, it is concluded that while detection by invertebrates may be

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<sup>90</sup> Love, M., Nishimoto, M., Clark, S., McCrea, M. and Bull, A. (2017). Assessing potential impacts of energized submarine power cables on crab harvests. *Continental Shelf Research*, 151, pp. 23-29.

<sup>91</sup> Hutchison, Z., Sigray, P., He, H., Gill, A., King, J. and Gibson, C. (2018). Electromagnetic Field (EMF) Impacts on Elasmobranch (Shark, Rays, and Skates) and American Lobster Movement and Migration From Direct Current Cables. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 3.

<sup>92</sup> Gill, A. and Desender, M. (2020). 2020 State of the Science Report, Chapter 5: Risk to Animals from Electromagnetic Fields Emitted by Electric Cables and Marine Renewable Energy Devices. [online] Available at: [https://tethys.pnnl.gov/sites/default/files/publications/OES-Environmental-2020-State-of-the-Science-Ch-5\\_final\\_hr.pdf](https://tethys.pnnl.gov/sites/default/files/publications/OES-Environmental-2020-State-of-the-Science-Ch-5_final_hr.pdf).

<sup>93</sup> Hutchison, Z., Gill, A., Sigray, P., He, H. and King, J. (2021). A modelling evaluation of electromagnetic fields emitted by buried subsea power cables and encountered by marine animals: Considerations for marine renewable energy development. *Renewable Energy*, 177, pp. 72-81.

<sup>94</sup> Scott, K., Piper, A., Chapman, E. and Rochas, C. (2020). Review of the effects of underwater sound, vibration, and electromagnetic fields on crustaceans. [online] Available at: [https://www.researchgate.net/publication/349173743\\_Review\\_of\\_the\\_effects\\_of\\_underwater\\_sound\\_vibration\\_and\\_electromagnetic\\_fields\\_on\\_crustaceans](https://www.researchgate.net/publication/349173743_Review_of_the_effects_of_underwater_sound_vibration_and_electromagnetic_fields_on_crustaceans).

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possible there is considered to be no realistic significant interaction between EMF emitted during the operation of the Project and benthic invertebrates or communities.

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## 4.3.7 Proposed Assessment Methodology

### Proposed Data Sources

4.3.7.1 The following data sources are proposed to be used to inform the assessment:

- Project-specific survey data;
- Kent Habitat Survey Partnership<sup>95</sup>;
- European Marine Observation Data Network (EMODnet) Seabed Habitats Project data for broad-scale habitat maps of the study area<sup>96</sup>;
- European Union Nature Identification System (EUNIS) for classifying benthic habitats<sup>97</sup>;
- Defra Future Coast Project<sup>98</sup>;
- Marine Data Exchange Offshore Wind Environmental Evidence Register (OWEER)<sup>99</sup>;
- Marine Life Information Network for habitat and species sensitivity assessments, where available<sup>100</sup>
- Cefas OneBenthic Portal<sup>101</sup>
- Magic maps for designated and protected sites<sup>102</sup>;

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<sup>95</sup> The Kent Habitat Survey Partnership (2003). Kent Habitat Survey 2003, GB000329. [Accessed: 06 June 2022].

<sup>96</sup> European Marine Observation and Data Network (EMODnet) (2021). EUSeaMap 2021. [online] Available from: <https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/> [Accessed 09 March 2022].

<sup>97</sup> European Environment Agency (2021). EUNIS habitat classification. [online] Available at: <https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification-1> [Accessed 09 March 2022].

<sup>98</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2002). Future coast project. National Network of Regional Coastal Monitoring Programmes. [online] Available at: <https://coastalmonitoring.org/ccoresources/futurecoast/> [Accessed 06 June 2022].

<sup>99</sup> Marine Data Exchange (2021). JNCC, Offshore Wind Evidence and Change Programme, Offshore Wind Environmental Evidence Register. [online] Available at: <https://www.marinedataexchange.co.uk/details/3480/2021-jncc-offshore-wind-evidence-and-change-programme-offshore-wind-environmental-evidence-register-/summary> [Accessed 10 August 2022].

<sup>100</sup> MarLIN (2022). Marine Evidence Based Sensitivity Assessment (MarESA). [online] Available at: [https://www.marlin.ac.uk/sensitivity/sensitivity\\_rationale](https://www.marlin.ac.uk/sensitivity/sensitivity_rationale) [Accessed 09 August 2022].

<sup>101</sup> Cefas (2022). OneBenthic Portal. [online] Available at: <https://openscience.cefas.co.uk/> [Accessed 09 August 2022].

<sup>102</sup> Department of Environment, Food and Rural Affairs (DEFRA) (No Date). Magic Interactive Mapping. [online] Available at: <https://magic.defra.gov.uk/home.htm>.

- Designated sites condition assessments as available;
- Academic papers and online reports as available for the study area; and
- Relevant Environmental Statements.

## Proposed Assessment Methodology

- 4.3.7.2 All ecological assessments for the Project will be completed in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019)<sup>103</sup>. The method will be tailored to reflect the specific conditions of the marine environment, in particular to ensure the high levels of movement of marine receptors between habitats and populations, are considered fully in respect of the predicted ZOI arising from the Offshore Scheme.
- 4.3.7.3 The aims of the marine EclA are to:
- identify important ecological features (e.g., designated sites, habitats or species) which have the potential to be impacted by the Offshore Scheme;
  - provide a robust assessment of the likely ecological impacts and resultant effects of the Offshore Scheme, which may be beneficial (i.e. positive) or adverse (i.e. negative);
  - facilitate determination of the consequences of the Offshore Scheme in terms of national, regional and local policies relevant to nature conservation and biodiversity, where the level of detail provided is proportionate to the scale of the development and the complexity of its impact pathways;
  - identify appropriate mitigation to reduce any likely ecological impacts; and
  - set out the steps to be taken to adhere to legal requirements relating to the relevant ecological features concerned.
- 4.3.7.4 In accordance with CIEEM (2019) guidance, not all habitats and species which have the potential to occur in the ZOI of the Offshore Scheme will be considered. Rather, focus will be placed on those features considered to be 'important' – determining importance is discussed in further detail below. To ensure compliance with National and European policy, consideration is still given to biodiversity in its entirety and the need to achieve no net loss and enhancement of biodiversity.
- 4.3.7.5 In accordance with the CIEEM guidance, the importance of an ecological feature or receptor is defined according to the following factors:
- conservation or legal status;
  - quality or health;
  - extent; and
  - rarity or endemism.

<sup>103</sup> Chartered Institute of Ecology and Environmental Management's (CIEEM) (2019). Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. [online]. Available at: <https://cieem.net/wp-content/uploads/2018/08/EClA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf>

4.3.7.6 The importance of an ecological feature has also been defined with reference to a specific geographical context. Marine features are highly connected with few boundaries and the approach therefore adopts the level of legislative designation as a proxy for the geographical importance of a marine species receptor. These and the other criteria for importance ratings are shown in Table 4.3.4 below.

Table 4.3.4: Importance criteria for marine ecology features / receptors

**Importance description\***

Very High	<ul style="list-style-type: none"> <li>designated sites and qualifying / supporting features of international importance SACs, Special Protection Areas (SPAs), Ramsar Sites)</li> <li>species which are legally protected and / or in significant decline (i.e., classified as ‘endangered’ or ‘critically endangered’ according to the International Union for Conservation of Nature (IUCN) Red List (IUCN, 2019))</li> <li>high quality examples of rare habitats that are threatened throughout their range</li> </ul>
High	<ul style="list-style-type: none"> <li>designated sites and qualifying / supporting features of national conservational importance (SSSI and MCZ)</li> <li>priority habitats and species or those considered to be of principal importance for the conservation of biodiversity in England and those species considered vulnerable to decline (i.e., classified as ‘vulnerable’ or ‘near threatened’ according to the IUCN Red List)</li> <li>high quality examples of uncommon habitats that are vulnerable throughout their range</li> </ul>
Medium	<ul style="list-style-type: none"> <li>habitats and species of regional or local importance (i.e., Annex 1 of the Habitats Regs, which are not a qualifying feature of a nearby designated site)</li> <li>those species considered to be of ‘least concern’ (according to the IUCN Red List or listed in the OSPAR104 list of threatened and / or declining species for the North-East Atlantic)</li> <li>poor quality examples of rare or uncommon habitats that are threatened or vulnerable throughout their range</li> </ul>
Low	<ul style="list-style-type: none"> <li>habitats and species of low conservation importance, such as those generally abundant and widespread around the UK with no specific local value</li> </ul>

\*Should there be any overlap in the description of a particular feature/receptor, the highest importance criteria rating shall be adopted.

- 4.3.7.7 In line with the CIEEM guidelines, the terminology used within the EclA will draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EclA, these terms are defined as follows:
- impact – actions resulting in changes to an ecological feature; for example, underwater sound disturbance leading to displacement of hearing sensitive species; and
  - effect – outcome resulting from an impact, acting upon the conservation status or structure and function of an ecological feature; for example, displacement of individuals and loss of important foraging or breeding grounds leading to effects on the reproduction and survival of the local population.
- 4.3.7.8 The significance of effects will be based on an assessment of the impact magnitude (i.e., the deviation from the baseline condition) and the sensitivity and value (which are synonymous with 'importance') of the receptor. Temporary, permanent, direct and indirect effects that may occur during the construction, operation and maintenance, and decommissioning phases of the Offshore Scheme will be considered, and any mitigation measures necessary will be identified.
- 4.3.7.9 To determine the likely significance of effects, the following parameters will be considered:
- impact type - direct or indirect, positive or negative, temporary or permanent;
  - magnitude of impact – the 'amount' or intensity of an impact. This may sometimes be synonymous with 'extent' (see below) for certain receptors, such as habitats loss. For mortality it may be the number of individuals killed;
  - spatial extent of impact – the area over which the impact will occur; and
  - temporal nature of impact – timing, frequency and duration.
- 4.3.7.10 The assessment has also given regard to the sensitivity of an ecological feature to an impact which is determined by its:
- adaptability - i.e. the capacity, or lack thereof, of a feature to avoid or adapt to a change; and
  - tolerance / resilience - i.e. capacity, or lack thereof, of a feature to accommodate temporary or permanent change or recover to pre-existing state following exposure to a change.
- 4.3.7.11 For each marine ecological receptor only those characteristics relevant to understanding the ecological effect and determining the significance are described. The determination of the significance of effects will be based on predicted effects to:
- designated sites – i.e., the conservation objectives for the site and/or its interest/qualifying features;
  - ecosystems/biodiversity – resulting in a change in ecosystem structure and/or function;
  - habitats – i.e., extent, distribution, structure, function as well as its associated species, and its conservation status within a given geographical area; and

- species – i.e., abundance, distribution (including spawning, foraging and nursery habitats) and its conservation status within a given geographical area or at a particularly sensitive time (e.g., spawning season).

4.3.7.12 The significance of effects will be reported as either:

- not significant – no or limited effect to one or more of the features described above; or
- significant – one or more features described above are affected.

4.3.7.13 The CIEEM methodology does not advocate a matrix approach to determining the significance of effects. However, to maintain consistency with other disciplines, where a matrix approach is suitable, the assessment conclusions will be transposed into the significance terminology used within the wider ES (**Part 1, Chapter 5, EIA Approach and Methodology**). See Table 4.3.5 below.

Table 4.3.5: Description of significance terminology

<b>Classification of effect based on CIEEM guidance</b>	<b>Terminology used elsewhere in the ES</b>	<b>Description in accordance with CIEEM guidance</b>
Significant (beneficial)	Major beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the international level
	Moderate beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the national level
Not-significant	Minor beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at a local level or regional level
	Negligible	No effect on designated sites, ecosystems, habitat and/or species
	Minor adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the local level or regional level
Significant (adverse)	Moderate adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the national level
	Major adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the international level

## 4.3.8 Conclusion

4.3.8.1 In summary:

- A range of potentially sensitive intertidal and subtidal habitats and species representative of Annex I habitats or listed as habitats of 'principal importance' listed under Section 41 of the 2006 NERC Act, are likely to occur within proximity to the Offshore Scheme;
- The Offshore Scoping Boundary intersects with the Goodwin Sands MCZ, Sandwich Bay SAC and the Sandwich Bay to Hacklinge Marshes SSSI, which are designated for the protection of benthic habitats. A total of six other designated sites that are in proximity to the Offshore Scoping Boundary within the study area are scoped in for further assessment;
- Project specific subtidal benthic surveys were completed in August to October 2021, whilst intertidal benthic surveys at the landfall locations are planned to be completed in 2023; and
- Underwater sound disturbance and EMF disturbance are scoped out for further consideration for benthic ecology.

## Proposed Scope of the Assessment

4.3.8.2 A summary of the proposed scope of the assessment is provided in Table 4.3.6.

Table 4.3.6: Proposed scope of the assessment

<b>Receptor</b>	<b>Potential for significant effect</b>	<b>Project phase(s)</b>	<b>Proposed to be scoped in/out</b>
Intertidal and subtidal ecology	Temporary physical disturbance to benthic habitats and species	Construction Maintenance Decommissioning	<b>Scoped in</b>
Intertidal and subtidal ecology	Direct loss of benthic habitats and species	Construction Maintenance	<b>Scoped in</b>
Intertidal and subtidal ecology	Reduction in feeding efficiency; smothering effects; bio-accumulation; and potentially mortality due to increased SSC.	Construction Maintenance Decommissioning	<b>Scoped in</b>
Intertidal and subtidal ecology	Introduction and spread of INNS via placement of hard substrate	Construction Maintenance	<b>Scoped in</b>
Intertidal and subtidal ecology	Loss, harm or disturbance to marine invertebrates from underwater sound	Construction Maintenance Decommissioning	Scoped out
Intertidal and subtidal ecology	Disturbance to benthic habitats and species due to subsea cable thermal emissions	Operation	<b>Scoped in</b>

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Intertidal and  
subtidal  
ecology

Loss, harm or disturbance to  
marine invertebrates from EMF  
emissions

Operation

Scoped out

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## 4.4 Fish and Shellfish Ecology

### 4.4.1 Introduction

4.4.1.1 This chapter presents how the fish and shellfish ecology assessment will consider the potentially significant effects that may arise from the construction, operation, maintenance and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment and how the potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).

4.4.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.

4.4.1.3 This chapter should be read in conjunction with:

- **Part 1, Chapter 4, Description of the Project;**
- **Part 1, Chapter 5, EIA Approach and Methodology;**
- **Part 4, Chapter 1, Evolution of the Offshore Scheme;**
- **Part 4, Chapter 2, Physical Environment;**
- **Part 4, Chapter 3, Benthic Ecology;** and
- **Part 4, Chapter 9, Commercial Fisheries.**

4.4.1.4 This chapter is supported by the following figure:

- **Figure 4.4.1 Fish and Shellfish Ecology Study Area and Designated Sites.**

### 4.4.2 Regulatory and Planning Context

4.4.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on fish and shellfish ecology associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

#### Legislation

4.4.2.2 The following legislation is relevant to fish and shellfish ecology:

- The Marine and Coastal Access Act 2009<sup>105</sup>, which provides the legal mechanism to help ensure clean, healthy, safe and productive and biologically diverse oceans and seas;
- The Conservation of Habitats and Species Regulations 2017<sup>106</sup> (amended 2019<sup>107</sup>), which transpose the Habitats Directive (92/43/EEC) into UK legislation, covering the marine environment to 12 nautical mile (NM) offshore;
- The Conservation of Offshore Marine Habitats and Species Regulations 2017<sup>108</sup> applies within the UK Offshore Marine Area (beyond the 12 NM limit);
- The Wildlife and Countryside Act 1981<sup>109</sup>, as amended, which includes provisions relating to nature conservation;
- The Marine Strategy Regulations 2010<sup>110</sup>, which transpose the Marine Strategy Framework Directive (2008/56/EC) into UK legislation;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD)<sup>111</sup>, which transpose the European Directive (2000/60/EC) in UK legislation and provides for the establishment of environmental objectives for water bodies, including in relation to fish;
- Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC)<sup>112</sup>, which lists species of principal importance for the purpose of conservation biodiversity;
- The Eels (England and Wales) Regulations 2009<sup>113</sup>, which implement Council Regulation (EC) No 1100/2007 (EC) No 1100/2007 establishing measures for the recovery of the stock of European eel including providing for the free passage of eels; and
- The Salmon and Freshwater Fisheries Act 1975<sup>114</sup>, which relates to the protection of salmon and freshwater fisheries, as well as preventing the obstruction of fish migratory routes; and

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<sup>105</sup> The Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents>.

<sup>106</sup> The Conservation of Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1012/contents/made>.

<sup>107</sup> Amended in response to the UK's exit from the European Union (EU), making the Habitats (92/43/EEC) and Wild Birds (2009/147/EC) Directives, operable from 1 January 2021, and creating a UK natural site network in place of the EU Natura 2000 ecological network.

<sup>108</sup> The Conservation of Offshore Marine Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1013/made>

<sup>109</sup> The Wildlife and Countryside Act 1981. [online] Available at: <https://www.legislation.gov.uk/ukpga/1981/69>.

<sup>110</sup> The Marine Strategy Regulations 2010. [online] Available at: <https://www.legislation.gov.uk/uksi/2010/1627/contents/made>.

<sup>111</sup> The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/407/contents/made>.

<sup>112</sup> Section 41 of the Natural Environment and Rural Communities Act 2006. [online] Available at: <https://www.legislation.gov.uk/ukpga/2006/16/section/41>.

<sup>113</sup> The Eels (England and Wales) Regulations 2009. [online] Available at: <https://www.legislation.gov.uk/uksi/2009/3344/contents/made>.

<sup>114</sup> The Salmon and Freshwater Fisheries Act 1975. [online] Available at: <https://www.legislation.gov.uk/ukpga/1975/51>.

- The Environment Act 2021<sup>115 116</sup>, will set clear statutory targets for the recovery of the natural world in four priority areas: air quality, biodiversity, water and waste, and includes the introduction of Biodiversity Net Gain (BNG).

## Planning Policy

4.4.2.3 The following plans and policies are relevant to fish and shellfish ecology.

### National planning policy

- National Policy Statements (NPS) - the UK Government produces NPS which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP). Those potentially relevant to fish and shellfish ecology are:
  - Overarching National Policy Statement for Energy – EN-1<sup>117</sup>;
  - Renewable Energy Infrastructure – EN-3<sup>118</sup>;
  - Electricity Networks - EN-5<sup>119</sup>;
  - National Planning Policy Framework<sup>120</sup>;
  - Planning Practice Guidance – Natural Environment<sup>121</sup>; and
  - Planning Practice Guidance – Renewable and low carbon energy<sup>122</sup>.
- National Planning Framework 2 (NPF2)<sup>123</sup>, aims to co-ordinate policies of a spatial nature with investment priorities. Biodiversity is stated as one of the factors contributing to the core objective of sustainable economic development.

<sup>115</sup> The Environment Act 2021. [online] Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>.

<sup>116</sup> The Act has been enshrined into law; however, it is not anticipated to come into full effect until the end of 2023 (2025 for NSIPs)

<sup>117</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy (EN-1). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) [Accessed 09 August 2022].

<sup>118</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Renewable Energy (EN-3). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47856/1940-nps-renewable-energy-en3.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf) [Accessed 09 August 2022].

<sup>119</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Electricity Networks (EN-5). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47858/1942-national-policy-statement-electricity-networks.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf) [Accessed 09 August 2022].

<sup>120</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

<sup>121</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance – Natural Environment. [online] Available at: <https://www.gov.uk/guidance/natural-environment#biodiversity-geodiversity-and-ecosystems> [Accessed 09 August 2022].

<sup>122</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2015), Planning Practice Guidance – Renewable and Low Carbon. [online] Available at: <https://www.gov.uk/guidance/renewable-and-low-carbon-energy> [Accessed 09 August 2022].

<sup>123</sup> National Planning Framework. [online] Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>.

## Local planning policy

- The UK Marine Policy Statement (MPS)<sup>124</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made. The following marine plans have been considered in the development of this Scoping Report:
  - East Inshore and East Offshore Marine Plan<sup>125</sup>; and
  - South East Inshore Marine Plan<sup>126</sup>.

## 4.4.3 Study Area

4.4.3.1 The study area for fish and shellfish ecology is an area of 15km from the Offshore Scoping Boundary, this has been determined in order to encompass all likely Zones of Influence (ZOI) for this receptor group. This spatial extent is somewhat arbitrary but is considered likely to be sufficient to encompass any potential effects on fish and shellfish, particularly from underwater sound. It also reflects the fact that the spatial resolution of much of the available baseline information on fish and shellfish in this region relates to the outer Thames Estuary and North Sea area.

4.4.3.2 A 50km distance has been adopted as an initial screening distance for any sites designated for migratory fish. However, to ensure any fish that may pass through the study area are considered, a regional approach has also been adopted, scoping in any sites for which an interaction may occur but is beyond this initial screening distance.

4.4.3.3 The fish and shellfish study area and designated sites screening area is shown on **Figure 4.4.1 Fish and Shellfish Ecology Study Area and Designated Sites**.

## 4.4.4 Baseline Conditions

4.4.4.1 The fish and shellfish ecology baseline has been described using several data sources, which inform the understanding of the relative importance and functionality of the study area in the regional context of the outer Thames Estuary and southern North Sea.

### Data Sources

4.4.4.2 To determine the baseline conditions of fish and shellfish ecology within the study area the following key data sources have been reviewed:

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<sup>124</sup> Department of Food, Environment and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) [Accessed 09 August 2022].

<sup>125</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>126</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

- Project-specific survey data<sup>127</sup>
- The Outer Thames Estuary Regional Environmental Characterisation<sup>128</sup>
- International Council for the Exploration of the Sea (ICES) Ecosystem Overviews, Greater North Sea Ecoregion<sup>129</sup>
- UK fleet landings by rectangle stock and estimated Exclusive Economic Zone (EEZ) 2016-2020<sup>130</sup>
- Transitional & Coastal waters fish survey relational datasets<sup>131</sup>
- Salmonid and fisheries statistics for England and Wales<sup>132</sup>
- Updated Fisheries Sensitivity Maps in British Waters<sup>133 134</sup>
- Spawning and nursery grounds of selected fish species in UK waters<sup>135</sup>
- Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Areas<sup>136</sup>
- Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat<sup>137</sup>
- Hydroacoustic seabed survey and grab sampling techniques to assess “local” sandeel population abundance<sup>138</sup>

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<sup>127</sup> Subtidal benthic surveys have been completed along the length of the Offshore Scheme in August to October 2021, consisting of five Drop-Down Video (DDV) transects and 37 grab samples (using either dual van veen or hammon grabs), including but not limited to the identification of some shellfish species.

<sup>128</sup> Sturt, F. and Dix, J. (2009). The Outer Thames Estuary Regional Environmental Characterisation (09/J/1/06/1305/0870). London, UK: ALSF/MEPF (DEFRA), p. 145.

<sup>129</sup> ICES. (2021). ICES Ecosystem Overviews, Greater North Sea Ecoregion. ICES Advice 2021. [online] Available at: <https://doi.org/10.17895/ices.advice.9434>.

<sup>130</sup> Marine Management Organisation (MMO) (2021a). UK fleet landings by rectangle stock and estimated EEZ 2016-2020. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020>.

<sup>131</sup> Environment Agency (2021a). Transitional & Coastal waters (TraC) fish survey relational datasets. [online] Available at: <https://data.gov.uk/dataset/74978f12-4b0d-4e05-8c67-631c5e33e51b/nfpd-trac-transitional-coastal-waters-fish-survey-relational-datasets>.

<sup>132</sup> Environment Agency (2021b). Salmonid and fisheries statistics for England and Wales. [online] Available at: <https://www.gov.uk/government/publications/salmonid-and-freshwater-fisheries-statistics-2020/salmonid-and-fisheries-statistics-for-england-and-wales-2020>.

<sup>133</sup> Coull, K., Johnstone, R., and Rogers, S. (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

<sup>134</sup> Aires, C., González-Irusta, J. and Watret, R. (2014). Updating Fisheries Sensitivity Maps in British Waters. *Scottish Marine and Freshwater Science*, 5(10), pp. 88.

<sup>135</sup> Ellis, J., Milligan, S., Readdy, L., Taylor, N. and Brown, M. (2012). Spawning and nursery grounds of selected fish species in UK waters. [online] Available at: <https://www.cefas.co.uk/publications/techrep/techrep147.pdf>.

<sup>136</sup> Reach, I., Latto, P., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Murphy, K., Piper, R. and Seiderer, L. (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Areas: A Method Statement produced for BMAPA. [online] Available at: <https://www.marinespace.co.uk/wp-content/uploads/2021/06/Herring-Potential-Spawning-Habitat-Method-Statement-v1.1.pdf>.

<sup>137</sup> Latto, P., Reach, I., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Murphy, K., Piper, R. and Seiderer, L. (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat: A Method Statement produced for BMAPA. [online] Available at: <https://www.marinespace.co.uk/wp-content/uploads/2021/06/Sandeel-Potential-Habitat-Method-Statement-v1.1.pdf>.

<sup>138</sup> Greenstreet, S., Holland, G., Guirey, E., Armstrong, A., Fraser, H. and Gibb, I. (2010). Combining hydroacoustic seabed survey and grab sampling techniques to assess “local” sandeel population abundance. *ICES Journal of Marine Science*, 67(5), pp. 971-984.

- Sandeel sediment habitat preferences in the marine environment<sup>139</sup>
- Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments<sup>140</sup>
- Environmental Effect Pathways between Marine Aggregate Application Areas and Sandeel Habitat: Regional Cumulative Impact Assessments<sup>141</sup>
- Salmon Stocks and Fisheries in England and Wales<sup>142</sup>;
- Cefas demersal fish data for the southern North Sea (ICES division IVc)<sup>143</sup>;
- The International Convention for the Conservation of Nature (IUCN) Red List of Threatened Species<sup>144</sup>;
- Shellfish classification zones of England and Wales<sup>145</sup>;
- East Coast Regional Environmental Characterisation<sup>146</sup> for a summary of the distribution and ecology of fish and shellfish on the East Coast; and
- Publicly available and relevant academic journal papers and reports.

4.4.4.3 No additional stakeholder consultation in relation to fish and shellfish ecology, beyond statutory consultees has been identified.

## Baseline

4.4.4.4 A number of demersal and pelagic species of commercial (discussed in further detail in **Part 4, Chapter 9, Commercial Fisheries**) and ecological importance are found within the study area.

<sup>139</sup> Holland, G., Greenstreet, S., Gibb I., Fraser, H. and Robertson, M. (2005). Identifying Sandeel *Ammodytes marinus* sediment habitat preferences in the marine environment. Marine Ecology Progress Series, 303, pp. 269-282.

<sup>140</sup> MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd. (2013a). Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association.

<sup>141</sup> MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd. (2013b). Environmental Effect Pathways between Marine Aggregate Application Areas and Sandeel Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association.

<sup>142</sup> Cefas (2021). Salmon stocks and fisheries in England and Wales, 2020. Preliminary assessment prepared for ICES, March 2021. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1019223/SalmonReport-2020-summary.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019223/SalmonReport-2020-summary.pdf).

<sup>143</sup> Parker-Humphreys, M. (2005). Distribution and Relative Abundance of Demersal Fishes from Beam Trawl Surveys in the Eastern English Channel (ICES Division VIIId) and the Southern North Sea (ICES Division IVc) 1993-2001. [online] Available at: <https://www.cefas.co.uk/publications/techrep/tech124.pdf>.

<sup>144</sup> International Union for the Conservation of Nature (IUCN) (2022). The IUCN Red List of Threatened Species Version 2021-3. [online] Available at: <https://www.iucnredlist.org> [Accessed 28 March 2022].

<sup>145</sup> Cefas (2022). Shellfish Classification Zone Maps. [online] Available at: <https://www.cefas.co.uk/data-and-publications/shellfish-classification-and-microbiological-monitoring/england-and-wales/classification-zone-maps/>.

<sup>146</sup> Limpenny, S., Barrio Froján, C., Cotterill, C., Foster-Smith, R., Pearce, B., Tizzard, L., Limpenny, D., Long, D., Walmsley, S., Kirby, S., Baker, K., Meadows, W., Rees, J., Hill, J., Wilson, C., Leivers, M., Churchley, S., Russell, J., Birchenough, A., Green, S., and Law, R. (2011). The East Coast Regional Environmental Characterisation. Cefas Open report 08/04, p. 287.

- 4.4.4.5 In general, fish species of key importance within the study area include herring *Clupea herangus*, sprat *Sprattus sprattus*, cod *Gadus morhua*, whiting *Merlangius merlangus*, plaice *Pleuronectes platessa*, mackerel *Scomber scombrus*, hake *Merluccius merluccius* and anglerfish *Lophius piscatorius*, as well as Dover sole *Solea solea*, bib *Trisopterus luscus*, dab *Limanda limanda*, thornback ray *Raja clavata*, common dragonet *Callionymus lyra* and gobies *Pomatoschistus* spp.<sup>147 148 149</sup>
- 4.4.4.6 Diadromous fish have the potential to transit through the study area during seasonal migrations between the sea and riverine environments as part of their annual life cycle. Those species known to migrate through the Thames and adjacent estuaries (such as the Blackwater and the Crouch Estuary) and coastal environments include European eel *Anguilla Anguilla*, European smelt *Osmerus eperlanus*, sea lamprey *Petromyzon maximus*, Atlantic salmon *Salmo salar*, sea trout (brown trout) *Salmo trutta*, river lamprey *Lampetra fluvialitis*, allis shad *Alosa alosa* and twaite shad *Alosa fallax*<sup>147 148</sup>.
- 4.4.4.7 Elasmobranchs found within the study area comprise thornback ray *Raja clavata*, lesser spotted dogfish *Scyliorhinus canicular*, spotted ray *Raja montagui*, blonde ray *Raja brachyura*, tope shark *Galeorhinus galeus*, spurdog *Squalus acanthias*, tope *Galeorhinus galeus*, smooth hound *Mustelus mustelus*, and starry smooth hound *Mustelus asterias*. Thornback ray and lesser spotted dogfish are the most abundant elasmobranch species in the outer Thames Estuary and southern North Sea.
- 4.4.4.8 Fisheries sensitivity maps<sup>150 151 152</sup> indicate that spawning and nursery grounds for a number of fish species are known to occur within the study area. This includes high intensity spawning grounds<sup>153</sup> for herring and sandeel, demersal spawners laying eggs which settle and develop on the seabed and are vulnerable to benthic disturbance.
- 4.4.4.9 There are also important spawning grounds for Dover sole, whiting, lemon sole *Microstomus kitt*, and sprat (Table 4.4.1). However, these species are scoped out of impacts on spawning grounds as all are pelagic spawners, releasing eggs directly into the water column where they will be transported away by water movement. The benthic spawning species, herring and sandeel are scoped into the assessment of impacts to spawning grounds.

<sup>147</sup> Environment Agency (2021a). Transitional & Coastal waters (TraC) fish survey relational datasets. [online] Available at: <https://data.gov.uk/dataset/74978f12-4b0d-4e05-8c67-631c5e33e51b/nfpd-trac-transitional-coastal-waters-fish-survey-relational-datasets>

<sup>148</sup> Environment Agency (2021b). Salmonid and fisheries statistics for England and Wales. [online] Available at: <https://www.gov.uk/government/publications/salmonid-and-freshwater-fisheries-statistics-2020/salmonid-and-fisheries-statistics-for-england-and-wales-2020>.

<sup>149</sup> Coull, K., Johnstone, R., and Rogers, S. (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

<sup>150</sup> Reach, I., Latto, P., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Murphy, K., Piper, R. and Seiderer, L. (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Areas: A Method Statement produced for BMAPA. [online] Available at: <https://www.marinespace.co.uk/wp-content/uploads/2021/06/Herring-Potential-Spawning-Habitat-Method-Statement-v1.1.pdf>.

<sup>151</sup> Latto, P., Reach, I., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Murphy, K., Piper, R. and Seiderer, L. (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat: A Method Statement produced for BMAPA. [online] Available at: <https://www.marinespace.co.uk/wp-content/uploads/2021/06/Sandeel-Potential-Habitat-Method-Statement-v1.1.pdf>.

<sup>152</sup> Greenstreet, S., Holland, G., Guirey, E., Armstrong, A., Fraser, H. and Gibb, I. (2010). Combining hydroacoustic seabed survey and grab sampling techniques to assess "local" sandeel population abundance. ICES Journal of Marine Science, 67(5), pp. 971-984.

<sup>153</sup> High intensity spawning grounds are considered to be areas for which the highest aggregation of fish for spawning are likely to occur, indicated by high catch rates of eggs and larvae

4.4.4.10 High intensity nursery grounds<sup>154</sup> of herring, and Dover sole were also identified within the study area, as were important nursery grounds of cod, whiting, sandeel, mackerel, plaice, lemon sole and sprat (Table 4.4.2). Low intensity spawning and nursery grounds included in Ellis *et al.*<sup>155</sup> will be reviewed at the baseline stage of the EIA.

Table 4.4.1: Important spawning grounds within the study area

Common name	Taxa name	High intensity spawning grounds (Ellis <i>et al.</i> , 2012) <sup>135</sup>	Spawning grounds (Coull <i>et al.</i> , 1998) <sup>133</sup>
Herring	<i>Clupea herangus</i>		✓
Sandeel	Ammodytidae		✓
Whiting	<i>Merlangius merlangus</i>		✓
Plaice	<i>Pleuronectes platessa</i>	✓	✓
Dover sole	<i>Solea solea</i>	✓	✓
Lemon sole	<i>Microstomus kitt</i>		✓
Sprat	<i>Sprattus sprattus</i>		✓

Table 4.4.2: Important nursery grounds within the study area

Common name	Taxa name	High intensity nursery grounds (Ellis <i>et al.</i> , 2012) <sup>135</sup>	Nursery grounds (Coull <i>et al.</i> , 1998) <sup>133</sup>
Herring	<i>Clupea herangus</i>	✓	✓
Cod	<i>Gadus morhua</i>		✓
Whiting	<i>Merlangius merlangus</i>		✓
Sandeel	Ammodytidae		✓
Mackerel	<i>Scomber scombrus</i>		✓
Plaice	<i>Pleuronectes platessa</i>		✓
Dover sole	<i>Solea solea</i>	✓	✓
Lemon sole	<i>Microstomus kitt</i>		✓
Sprat	<i>Sprattus sprattus</i>		✓

4.4.4.11 Due to their ecological importance as prey items, further assessment of herring spawning grounds and preferred sand eel habitat will be conducted as part of the EIA. This will use data from sediment particle size analysis (PSA) (from the Offshore

<sup>154</sup> High intensity nursery grounds are considered to be areas where the highest density of juveniles are likely to occur, indicated by high catch rates of juveniles

<sup>155</sup> Ellis, J., Milligan, S., Readdy, L., Taylor, N. and Brown, M. (2012). Spawning and nursery grounds of selected fish species in UK waters. [online] Available at: <https://www.cefas.co.uk/publications/techrep/techrep147.pdf>.

Scheme benthic characterisation survey results). For herring the classifications from Reach *et al.* (2013)<sup>136</sup> will be used. Data from the annual international herring larvae surveys (IHLS) will also be considered. For sandeel, the classification of Latta *et al.* (2013)<sup>151</sup> will be used, which considers the work by Greenstreet *et al.* (2010)<sup>152</sup> and Holland *et al.* (2005)<sup>156</sup>. Additionally, herring and sandeel spawning habitat classifications by Marinespace *et al.* (2013a; 2013b)<sup>157 158</sup> will also be considered.

- 4.4.4.12 Fisheries data from the MMO130 also show the presence of multiple commercially important shellfish species in the study area. Crustaceans include the edible crab *Cancer pagurus*, velvet swimming crab *Necora puber*, spider crab *Maja squinado*, Nephrops *Nephrops norvegicus*, brown shrimp *Crangon spp.*, and the European lobster *Homarus gammarus*. Molluscs include native oyster *Ostrea edulis*, blue mussels *Mytilus edulis*, great scallop *Pecten maximus*, common razor shell *Ensis ensis*, and in particular, common whelk *Buccinum undatum* and common cockles *Cerastoderma edule* (see: **Part 4, Chapter 9, Commercial Fisheries**). The potential grounds of these species within the study area will be identified at the EIA stage and will also be informed by the baseline data collected for **Part 4, Chapter 9, Commercial Fisheries**.

## Designated Sites and Species

- 4.4.4.13 There is potential for Annex II fish species to be present within the study area. These comprise the Atlantic salmon, sea lamprey, river lamprey, allis shad, and twaite shad. Additionally, European eel which are protected under the Eels (England and Wales) Regulations (2009)<sup>113</sup> and are an IUCN Red List critically endangered species<sup>159</sup>, are known to be present in the River Thames<sup>160</sup>. These species, as well as sea trout, lesser sandeel *Ammodytes marinus*, herring, cod, whiting, hake, smelt, plaice mackerel, and Dover sole are all priority species listed under Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act<sup>112</sup>.
- 4.4.4.14 The key sites designated for the protection of fish and shellfish within the study area comprise three Marine Conservation Zones (MCZ) (Table 4.4.3). There are no sites designated for migratory fish in the wider 50km designated sites screening area.

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<sup>156</sup> Holland, G., Greenstreet, S., Gibb I., Fraser, H. and Robertson, M. (2005). Identifying Sandeel *Ammodytes marinus* sediment habitat preferences in the marine environment. Marine Ecology Progress Series, 303, pp. 269-282.

<sup>157</sup> MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd. (2013a). Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association.

<sup>158</sup> MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd. (2013b). Environmental Effect Pathways between Marine Aggregate Application Areas and Sandeel Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association.

<sup>159</sup> Pike, C., Crook, V. and Gollock, M. (2020). *Anguilla anguilla*. The IUCN Red List of Threatened Species (2020). [online] Available at: <https://www.iucnredlist.org/species/60344/152845178> [Accessed 01 March 2022].

<sup>160</sup> Pecorelli, J., Macphie, K., Hebditch, C., Clifton-Dey, D., Thornhill, I. and Debney, A. (2019). Using citizen science to improve the conservation of the European eel (*Anguilla anguilla*) in the Thames River Basin District. Freshwater Science, 38(2), pp. 281-291.

Table 4.4.3: Designated sites for fish and shellfish within the study area

Site name	Distance from Offshore Scoping Boundary	Summary
Goodwin Sands MCZ	0km	The Offshore Scoping Boundary runs through the northwestern edge of this MCZ, designated for the protection of blue mussel, <i>Mytilus edulis</i> , beds
Thanet Coast MCZ	<1km	The Offshore Scoping Boundary passes within 100m of this MCZ, designated for the protection of blue mussel, <i>Mytilus edulis</i> , beds
Dover to Deal MCZ	12km	Native oyster, <i>Ostrea edulis</i> , and blue mussel, <i>Mytilus edulis</i> , beds are a protected feature of this site. The Offshore Scoping Boundary is located directly north of this site

## Future Baseline

- 4.4.4.15 The fish and shellfish ecology chapter within the Environmental Statement (ES) will include an outline of the likely evolution of the baseline environment without the implementation of the development as far as natural changes from the baseline scenario can be assessed.

## 4.4.5 Embedded and Control & Management Measures

- 4.4.5.1 Given that many design elements of the Project have yet to be confirmed, the embedded and control and management measures have not been finalised at this stage. Measures will be discussed with statutory consultees and stakeholders throughout the EIA process.

### Embedded Measures

- 4.4.5.2 The Offshore Scoping Boundary has been designed in order to avoid environmentally sensitive areas where possible. As the Offshore Scheme develops and route design is progressed (informed by the Project specific offshore survey data) the Project will aim to minimise impacts by micro siting around sensitive features where possible.

### Control and Management Measures

- 4.4.5.3 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the fish and shellfish ecology assessment are:

- GM01 - designated (and as minimal as possible) anchoring areas and protocols shall be employed during marine operations to minimise physical disturbance of the seabed;

- GM03 - an offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation;
- LVS01 - all project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine INNS<sup>161</sup>;
- LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972)<sup>162</sup> (IMO, 2019a), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78)<sup>163</sup> (IMO, 2019e) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974)<sup>164</sup>.
- LVS05 - drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (PLONOR substances) where practicable,
  - drilling fluids will be tested for contamination to determine possible reuse or disposal; and
  - If disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- BE01 - a biosecurity plan will be produced for the project, following the latest guidance on INNS from the GB non-native species secretariat;
- BE02 - all project vessels shall adhere to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines)<sup>165</sup>;
- BE03 - cable installation will be carried out on a 24-hour basis in order to reduce the overall installation time and associated disturbance of ecological receptors; and

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<sup>161</sup> International Maritime Organisation (IMO) (2017). International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-\(BWM\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-(BWM).aspx) [Accessed 06 June 2022].

<sup>162</sup> International Maritime Organisation (IMO) (1972). Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). [online] Available at: <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx> [Accessed 10 August 2022].

<sup>163</sup> International Maritime Organisation (IMO) (1983). International Convention for the Prevention of Pollution from Ships (MARPOL). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx) [Accessed 10 August 2022].

<sup>164</sup> International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf>.

<sup>165</sup> International Maritime Organisation (IMO) (2011). 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. Annex 26. Resolution MEPC.207(62). [online] Available at: [https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207\(62\).pdf](https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207(62).pdf).

## 4.4.6 Potential for Significant Effects

4.4.6.1 The fish and shellfish ecology assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.

4.4.6.2 The proposed scope of the fish and shellfish ecology assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

4.4.6.3 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.

4.4.6.4 The potential for the Offshore Scheme to result in the potential significant effects described in this section takes into account the embedded and control and management measures described in section 5.

#### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;
- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of operational impacts

- presence of activated cable.

#### Sources of maintenance impacts

- geophysical and/or ROV surveys;
- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed.

## Potential impacts

4.4.6.5 Table 4.4.4 identifies the potential impacts that could result from the sources identified above.

Table 4.4.4: Sources and impacts

Project phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay; Cable repair or replacement; Removal of cable from seabed; and Removal of cable protection	Temporary disturbance to areas of seabed that could be important for fish and shellfish habitat including spawning and nursery grounds	Yes	Scoped in
Construction and maintenance	Cable protection (e.g. rock placement, concrete mattresses)	Direct loss of areas of seabed that could be important for fish and shellfish habitat (including spawning and nursery grounds) due to placement of hard substrates on the seabed	Yes	Scoped in
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay;	Temporary increase in Suspended Sediment Concentrations (SSC) and sediment deposition leading to increased	Yes	Scoped in

	Cable repair or replacement; Removal of cable from seabed; and Removal of cable protection	turbidity, smothering effects and contaminant mobilisation		
Construction	Cable installation and cable lay	Changes to marine water quality from the use of Horizontal Directional Drill (HDD) drilling fluids	No - the implementation control and management measure LVS05 means only inert (non-toxic), biodegradable drilling fluid will be used and disposed of at a licenced disposal site. As such, significant changes to water quality are highly unlikely	Scoped out
Construction, maintenance and decommissioning	Leaks and spills from vessels	Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils	No - the implementation of control and management measures GM03 and LVS02 create limited potential for accidental spills to occur. Relatively few vessels are expected to be involved, and potential pollutants would be limited to relatively small volumes. Should an accidental spill or leak occur, it would be small in extent and subject to immediate control measures, dilution and rapid	Scoped out

			dispersal within the marine environment	
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay (including piling <sup>166</sup> ); Cable repair or replacement; Removal of cable from seabed; Removal of cable protection; and Vessel traffic	Underwater sound impacts on fish and shellfish	Yes	<b>Scoped in</b>
Operation	Presence of activated cable	Disturbance to benthic habitats and species due to subsea cable thermal emissions	Yes	<b>Scoped in</b>
Operation	Presence of activated cable	Electromagnetic field (EMF) emissions	Yes	<b>Scoped in</b>

## Impact Pathways with Receptors (Step 2)

- 4.4.6.6 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the fish and shellfish ecology study area.
- 4.4.6.7 Table 4.4.5 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the fish and shellfish ecology assessment for the Offshore Scheme (**Figure 1.1.4 Offshore Scheme Scoping Boundary**).

<sup>166</sup> At the cable landfall locations, percussive piling for the installation of a cofferdam as part of the use of trenched technologies (not the preferred method) cannot be ruled out at this stage

Table 4.4.5: Impact pathways with receptors

Impact pathway	Receptors	Potential for significant effect	Proposed to be scoped in/out
Temporary disturbance to fish and shellfish habitats during construction, maintenance and decommissioning	Fish and shellfish	Yes - there is a potential for temporary disturbance to areas of seabed that could be important for fish and shellfish habitat (including spawning and nursery grounds) from construction methods such as any necessary pre-sweep, preparation and installation of the cable. This could lead to temporary loss of these habitats and associated species	<b>Scoped in</b>
Direct loss of fish and shellfish habitats due to placement of hard substrates on the seabed during construction and maintenance	Fish and shellfish	Yes - there is a potential for the direct loss of areas of seabed that could be important for fish and shellfish habitat (including spawning and nursery grounds) due to the placement of hard substrates on the seabed for cable protection. Introduction of hard substrate would likely replace otherwise soft substrates, leading to permanent loss of these habitats and associated species <sup>167</sup>	<b>Scoped in</b>
Temporary increase in SSC and sediment deposition leading to increased turbidity, smothering effects and contaminant mobilisation during construction, maintenance and decommissioning	Fish and shellfish	Yes - project construction methods have the potential to disturb the seabed leading to the creation of sediment plumes with increased SSC. Consequently, increased turbidity may inhibit primary production of key food sources or providers of habitat.	<b>Scoped In</b>

<sup>167</sup> Taormina, B., Bald, J., Want, A., Thouzeau, G., Lejart, M., Desroy, N. and Carlier, A. (2018). A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations and future directions. *Renewable and Sustainable Energy Reviews*, 96, pp. 380-391.

		<p>Sediment plumes may lead to the deposition of sediments smothering areas important for fish and/or filter feeding shellfish</p> <p>The resuspension of sediment can also release any sediment-bound contaminants (if present), which can impact fish and shellfish communities in a variety of ways, including adverse ecotoxic effects, bio-accumulation, and potentially mortality.</p>	
<p>Disturbance, harm, and mortality to fish and shellfish due to underwater sound and vibration during construction, maintenance and decommissioning</p>	<p>Fish and shellfish</p>	<p>Yes - underwater sound and vibration will be generated by a range of project construction activities including geophysical survey, UXO clearance, route preparation, and cable lay.</p> <p>Man-made underwater sound sources have the potential to result in injury and/or behavioural disturbance in fish (including eggs and larvae)<sup>168</sup>. This includes the potential for underwater sound to act as a barrier to the movement of diadromous fish during key migratory periods.</p> <p>Invertebrate species, which includes shellfish, have been scoped out for this impact pathway (see <b>Part 4, Chapter 3, Benthic Ecology</b>) as they are unlikely to be adversely impacted physiologically or behaviourally by the</p>	<p><b>Scoped in</b></p>

<sup>168</sup> Popper, A., Hawkins, A., Fay, R., Mann, D., Bartol, S., Carlson, T., Coombs, S., Ellison, W., Gentry, R., Halvorsen, M., Løkkeborg, S., Rogers, P., Southall, B., Zeddies, D. and Tavolga, W. (2014). ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Cham, Switzerland: Springer and ASA Press.

		propagation of underwater sound and vibration <sup>169</sup>	
Disturbance to fish and shellfish due to subsea cable thermal emissions during operation	Fish and shellfish	Yes - electricity cables are known to produce heat during operation which could result physiological changes to shellfish, and migratory behaviour in fish, altering the community structure within the sediment <sup>170</sup> . Cables have negligible capacity to heat the overlying water column due to the high thermal capacity and movement of surrounding seawater	<b>Scoped in</b>
Disturbance to fish and shellfish due to changes in cable EMF emissions during operation	Fish and shellfish	Yes - EMF emissions from subsea cables have the potential to disturb foraging behaviour and inhibit migratory success through displacement of electro-receptive species (such as elasmobranchs) and migratory fish (such as salmon and eels) <sup>171 172 173 174</sup> . Whilst some detection by shellfish (invertebrates) may be possible <sup>175 176</sup> there is considered to be no realistic significant interaction	<b>Scoped in</b>

<sup>169</sup> Solan, M., Hauton, C., Godbold, J., Wood, C., Leighton, T. and White, P. (2016). Anthropogenic sources of underwater sound can modify how sediment dwelling invertebrates mediate ecosystem properties. [online] Available at: <https://www.nature.com/articles/srep20540> [Accessed 29 February 2022].

<sup>170</sup> Taormina, B., Bald, J., Want, A., Thouzeau, G., Lejart, M., Desroy, N. and Carlier, A. (2018). A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations and future directions. *Renewable and Sustainable Energy Reviews*, 96, pp. 380-391.

<sup>171</sup> Formicki, K., Korzelecka-Orkisz, A. and Tański, A. (2019). Magnetoreception in fish. *Journal of Fish Biology*, 95(1), pp. 73-91.

<sup>172</sup> Newton, K., Gill, A. and Kajjura, S. (2019). Electroreception in marine fishes: chondrichthyans. *Journal of Fish Biology*, 95(1), pp. 135-154.

<sup>173</sup> Gill, A. and Desender, M. (2020). 2020 State of the Science Report, Chapter 5: Risk to Animals from Electromagnetic Fields Emitted by Electric Cables and Marine Renewable Energy Devices. [online] Available at: [https://tethys.pnnl.gov/sites/default/files/publications/OES-Environmental-2020-State-of-the-Science-Ch-5\\_final\\_hr.pdf](https://tethys.pnnl.gov/sites/default/files/publications/OES-Environmental-2020-State-of-the-Science-Ch-5_final_hr.pdf).

<sup>174</sup> Hutchison, Z., Gill, A., Sigray, P., He, H. and King, J. (2021). A modelling evaluation of electromagnetic fields emitted by buried subsea power cables and encountered by marine animals: Considerations for marine renewable energy development. *Renewable Energy*, 177, pp.72-81.

<sup>175</sup> Scott, K., Harsanyia, P. and Lyndon, A. (2018). Understanding the effects of electromagnetic field emissions from Marine Renewable Energy Devices (MREDs) on the commercially important edible crab, *Cancer pagurus* (L.). *Marine Pollution Bulletin*, 131, pp. 580-588.

<sup>176</sup> Bochert, R. and Zettler, M. (2004). Long-term exposure of several marine benthic animals to static magnetic fields. *Bioelectromagnetics: Journal of the Bioelectromagnetics Society*, 25(7), pp. 498-502.

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between EMF emitted during the operation of the Project and benthic invertebrates or communities<sup>177 178 179</sup> (see **Part 4, Chapter 3, Benthic Ecology**). Thus, EMF disturbance has been scoped out for this impact pathway.

It is likely that the HVDC cable may be installed in a bundled bi-pole configuration and most EMF emissions beyond background geomagnetic levels would be cancelled out by the close proximity of the cables. However, as the design has not yet been finalised a worst-case scenario of cables in separate trenches will be assessed

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## 4.4.7 Proposed Assessment Methodology

### Proposed Data Sources

4.4.7.1 The following data sources are proposed to be used to inform the assessment:

- Project-specific survey data<sup>180</sup>
- Marine Data Exchange Offshore Wind Environmental Evidence Register (OWEER)<sup>181</sup>;
- Marine Life Information Network for habitat and species sensitivity assessments, where available<sup>182</sup>

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<sup>177</sup> Scott, K., Harsanyi, P., Easton, B., Piper, A., Rochas, C., & Lyndon, A. (2021). Exposure to Electromagnetic Fields (EMF) from Submarine Power Cables Can Trigger Strength-Dependent Behavioural and Physiological Responses in Edible Crab, *Cancer pagurus* (L.). *Journal of Marine Science and Engineering*, 9(7), pp. 16.

<sup>178</sup> Love, M., Nishimoto, M., Clark, S., McCrea, M. and Bull, A. (2017). Assessing potential impacts of energized submarine power cables on crab harvests. *Continental Shelf Research*, 151, pp. 23-29.

<sup>179</sup> Hutchison, Z., Sigray, P., He, H., Gill, A., King, J. and Gibson, C. (2018). Electromagnetic Field (EMF) Impacts on Elasmobranch (Shark, Rays, and Skates) and American Lobster Movement and Migration From Direct Current Cables. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 3. [online] Available at: <https://espis.boem.gov/final%20reports/5659.pdf>.

<sup>180</sup> Subtidal benthic surveys have been completed along the length of the Offshore Scheme in August to October 2021, consisting of five Drop-Down Video (DDV) transects and 37 grab samples (using either dual van veen or hammon grabs). Intertidal benthic phase I and II surveys at the landfall locations are planned to be completed in Autumn 2021.

<sup>181</sup> Marine Data Exchange (2021). JNCC, Offshore Wind Evidence and Change Programme, Offshore Wind Environmental Evidence Register. [online] Available at: <https://www.marinedataexchange.co.uk/details/3480/2021-jncc-offshore-wind-evidence-and-change-programme-offshore-wind-environmental-evidence-register/-summary> [Accessed 10 August 2022].

<sup>182</sup> MarLIN (2022). Marine Evidence based Sensitivity Assessment (MarESA). [online] Available at: [https://www.marlin.ac.uk/sensitivity/sensitivity\\_rationale](https://www.marlin.ac.uk/sensitivity/sensitivity_rationale) [Accessed 09 August 2022].

- Cefas OneBenthic Portal<sup>183</sup>
- The Outer Thames Estuary Regional Environmental Characterisation<sup>184</sup>;
- ICES Ecosystem Overviews, Greater North Sea Ecoregion<sup>185</sup>;
- UK fleet landings by rectangle stock and estimated EEZ 2016-2020<sup>186</sup>;
- Transitional & Coastal waters fish survey relational datasets<sup>187</sup>;
- Updated Fisheries Sensitivity Maps in British Waters<sup>188 189 134</sup>;
- Spawning and nursery grounds of selected fish species in UK waters<sup>190</sup>;
- Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Areas<sup>191</sup>;
- Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat<sup>192</sup>;
- Hydroacoustic seabed survey and grab sampling techniques to assess “local” sandeel population abundance<sup>193</sup>;
- Sandeel sediment habitat preferences in the marine environment<sup>194</sup>;
- Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments<sup>195</sup>;

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<sup>183</sup> Cefas (2022). OneBenthic Portal. [online] Available at: <https://openscience.cefas.co.uk/> [Accessed 09 August 2022].

<sup>184</sup> Sturt, F. and Dix, J. (2009). The Outer Thames Estuary Regional Environmental Characterisation (09/J/1/06/1305/0870). London, UK: ALSF/MEPF (DEFRA), p. 145.

<sup>185</sup> ICES. (2021). ICES Ecosystem Overviews, Greater North Sea Ecoregion. ICES Advice 2021. [online] Available at: <https://doi.org/10.17895/ices.advice.9434>.

<sup>186</sup> Marine Management Organisation (MMO) (2021a). UK fleet landings by rectangle stock and estimated EEZ 2016-2020. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020>.

<sup>187</sup> Environment Agency (2021a). Transitional & Coastal waters (TraC) fish survey relational datasets. [online] Available at: <https://data.gov.uk/dataset/74978f12-4b0d-4e05-8c67-631c5e33e51b/nfpd-trac-transitional-coastal-waters-fish-survey-relational-datasets>.

<sup>188</sup> Coull, K., Johnstone, R., and Rogers, S. (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

<sup>189</sup> Aires, C., González-Irusta, J. and Watret, R. (2014). Updating Fisheries Sensitivity Maps in British Waters. *Scottish Marine and Freshwater Science*, 5(10), pp. 88.

<sup>190</sup> Ellis, J., Milligan, S., Readdy, L., Taylor, N. and Brown, M. (2012). Spawning and nursery grounds of selected fish species in UK waters. [online] Available at: <https://www.cefas.co.uk/publications/techrep/techrep147.pdf>.

<sup>191</sup> Reach, I., Latto, P., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Murphy, K., Piper, R. and Seiderer, L. (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Areas: A Method Statement produced for BMAPA. [online] Available at: <https://www.marinespace.co.uk/wp-content/uploads/2021/06/Herring-Potential-Spawning-Habitat-Method-Statement-v1.1.pdf>.

<sup>192</sup> Latto, P., Reach, I., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Murphy, K., Piper, R. and Seiderer, L. (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat: A Method Statement produced for BMAPA. [online] Available at: <https://www.marinespace.co.uk/wp-content/uploads/2021/06/Sandeel-Potential-Habitat-Method-Statement-v1.1.pdf>.

<sup>193</sup> Greenstreet, S., Holland, G., Guirey, E., Armstrong, A., Fraser, H. and Gibb, I. (2010). Combining hydroacoustic seabed survey and grab sampling techniques to assess “local” sandeel population abundance. *ICES Journal of Marine Science*, 67(5), pp. 971-984

<sup>194</sup> Holland, G., Greenstreet, S., Gibb I., Fraser, H. and Robertson, M. (2005). Identifying Sandeel *Ammodytes marinus* sediment habitat preferences in the marine environment. *Marine Ecology Progress Series*, 303, pp. 269-282.

<sup>195</sup> MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd. (2013a). Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association.

- Environmental Effect Pathways between Marine Aggregate Application Areas and Sandeel Habitat: Regional Cumulative Impact Assessments<sup>196</sup>;
- Salmon Stocks and Fisheries in England and Wales<sup>197</sup>;
- Salmonid and fisheries statistics for England and Wales<sup>198</sup>;
- Cefas demersal fish data for the southern North Sea (ICES division IVc)<sup>199</sup>;
- IUCN Red List of Threatened Species<sup>200</sup>;
- Shellfish classification zones of England and Wales<sup>201</sup>;
- International Herring Larvae Surveys (IHLS)<sup>202</sup>
- East Coast Regional Environmental Characterisation<sup>146</sup> for a summary of the distribution and ecology of fish and shellfish on the East Coast;
- Magic maps for designated and protected sites;
- Designated sites condition assessments as available;
- Academic papers and online reports as available for the study area; and
- Relevant Environmental Statements.

## Proposed Assessment Methodology

4.4.7.2 All ecological assessments for the project will be completed in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019)<sup>203</sup>. The method will be tailored to reflect the specific conditions of the marine environment, in particular to ensure the high levels of movement of marine receptors between habitats and populations, are considered fully in respect of the predicted ZOI arising from the Offshore Scheme.

<sup>196</sup> MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd. (2013b). Environmental Effect Pathways between Marine Aggregate Application Areas and Sandeel Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association.

<sup>197</sup> Cefas (2021). Salmon stocks and fisheries in England and Wales, 2020. Preliminary assessment prepared for ICES, March 2021. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1019223/SalmonReport-2020-summary.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019223/SalmonReport-2020-summary.pdf).

<sup>198</sup> Environment Agency (2021b). Salmonid and fisheries statistics for England and Wales. [online] Available at: <https://www.gov.uk/government/publications/salmonid-and-freshwater-fisheries-statistics-2020/salmonid-and-fisheries-statistics-for-england-and-wales-2020>.

<sup>199</sup> Parker-Humphreys, M. (2005). Distribution and Relative Abundance of Demersal Fishes from Beam Trawl Surveys in the Eastern English Channel (ICES Division VIId) and the Southern North Sea (ICES Division IVc) 1993-2001. [online] Available at: <https://www.cefas.co.uk/publications/techrep/tech124.pdf>.

<sup>200</sup> International Union for the Conservation of Nature (IUCN) (2022). The IUCN Red List of Threatened Species Version 2021-3. [online] Available at: <https://www.iucnredlist.org> [Accessed 28 March 2022].

<sup>201</sup> Cefas (2022). Shellfish Classification Zone Maps. [online] Available at: <https://www.cefas.co.uk/data-and-publications/shellfish-classification-and-microbiological-monitoring/england-and-wales/classification-zone-maps/>.

<sup>202</sup> ICES (2020). Report of the Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2020 meeting. [online] Available at: <https://archimer.ifremer.fr/doc/00708/82030/86779.pdf> [Accessed 01 September 2022].

<sup>203</sup> Chartered Institute of Ecology and Environmental Management (CIEEM) (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. [online] Available at: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf>.

- 4.4.7.3 The aims of the marine EclA are to:
- identify important ecological features (e.g., designated sites, habitats or species) which have the potential to be impacted by the Offshore Scheme;
  - provide a robust assessment of the likely ecological impacts and resultant effects of the Offshore Scheme, which may be beneficial (i.e. positive) or adverse (i.e. negative);
  - facilitate determination of the consequences of the Offshore Scheme in terms of national, regional and local policies relevant to nature conservation and biodiversity, where the level of detail provided is proportionate to the scale of the development and the complexity of its impact pathways;
  - identify appropriate mitigation to reduce any likely ecological impacts; and
  - set out the steps to be taken to adhere to legal requirements relating to the relevant ecological features concerned.
- 4.4.7.4 In accordance with CIEEM (2019) guidance, not all habitats and species which have the potential to occur in the ZOI of the Offshore Scheme will be considered. Rather, focus will be placed on those features considered to be ‘important’ – determining importance is discussed in further detail below. To ensure compliance with National and European policy, consideration is still given to biodiversity in its entirety and the need to achieve no net loss and enhancement of biodiversity.
- 4.4.7.5 In accordance with the CIEEM guidance, the importance of an ecological feature or receptor is defined according to the following factors:
- conservation or legal status;
  - quality or health;
  - extent; and
  - rarity or endemism.
- 4.4.7.6 The importance of an ecological feature has also been defined with reference to a specific geographical context. Marine features are highly connected with few boundaries and the approach therefore adopts the level of legislative designation as a proxy for the geographical importance of a marine species receptor. These and the other criteria for importance ratings are shown in Table 4.4.6 below.

Table 4.4.6: Importance criteria for marine ecology features/receptors

<b>Importance description*</b>	
Very High	<ul style="list-style-type: none"> <li>• designated sites and qualifying/supporting features of international importance (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar Sites)</li> <li>• species which are legally protected and/or in significant decline (i.e., classified as ‘endangered’ or ‘critically endangered’ according to the IUCN Red List (IUCN, 2019))</li> </ul>

	<ul style="list-style-type: none"> <li>high quality examples of rare habitats that are threatened throughout their range</li> </ul>
High	<ul style="list-style-type: none"> <li>designated sites and qualifying/supporting features of national conservational importance (Sites of Special Scientific Interest (SSSI) and MCZ)</li> <li>priority habitats and species<sup>204</sup> or those considered to be of principal importance<sup>205</sup> for the conservation of biodiversity in England, and those species considered vulnerable to decline (i.e., classified as 'vulnerable' or 'near threatened' according to the IUCN Red List)</li> <li>high quality examples of uncommon habitats that are vulnerable throughout their range</li> </ul>
Medium	<ul style="list-style-type: none"> <li>habitats and species of regional or local importance (i.e., Annex 1 of the Habitats Regs, which are not a qualifying feature of a nearby designated site)</li> <li>those species considered to be of 'least concern' (according to the IUCN Red List or listed in the OSPAR<sup>206</sup> list of threatened and / or declining species for the North-East Atlantic)</li> <li>poor quality examples of rare or uncommon habitats that are threatened or vulnerable throughout their range.</li> </ul>
Low	<ul style="list-style-type: none"> <li>habitats and species of low conservation importance, such as those generally abundant and widespread around the UK with no specific local value.</li> </ul>

\*Should there be any overlap in the description of a particular feature/receptor, the highest importance criteria rating shall be adopted.

4.4.7.7 In line with the CIEEM guidelines, the terminology used within the EclA will draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EclA, these terms are defined as follows:

- impact – actions resulting in changes to an ecological feature; for example, underwater sound disturbance leading to displacement of hearing sensitive species; and
- effect – outcome resulting from an impact, acting upon the conservation status or structure and function of an ecological feature; for example, displacement of

<sup>204</sup> JNCC (2007). UK Biodiversity Action Plan (BAP) Priority Marine Species. [online] Available at: <https://data.jncc.gov.uk/data/98fb6dab-13ae-470d-884b-7816afce42d4/UKBAP-priority-marine-species.pdf>.

<sup>205</sup> Natural Environment and Rural Communities (NERC) Act 2006 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2006/16/contents>.<sup>6</sup>

<sup>206</sup> OSPAR refers to the Oslo and Paris Convention for the protection of the marine environment of the North-East Atlantic

individuals and loss of important foraging or breeding grounds leading to effects on the reproduction and survival of the local population.

- 4.4.7.8 The significance of effects will be based on an assessment of the impact magnitude (i.e., the deviation from the baseline condition) and the sensitivity and value (which are synonymous with 'importance') of the receptor. Temporary, permanent, direct and indirect effects that may occur during the construction, operation and maintenance, and decommissioning phases of the Offshore Scheme will be considered, and any mitigation measures necessary will be identified.
- 4.4.7.9 To determine the likely significance of effects, the following parameters will be considered:
- impact type - direct or indirect, positive or negative, temporary or permanent;
  - magnitude of impact – the 'amount' or intensity of an impact. This may sometimes be synonymous with 'extent' (see below) for certain receptors, such as habitats loss. For mortality it may be the number of individuals killed;
  - spatial extent of impact – the area over which the impact will occur; and
  - temporal nature of impact – timing, frequency and duration.
- 4.4.7.10 The assessment has also given regard to the sensitivity of an ecological feature to an impact which is determined by its:
- adaptability - i.e. the capacity, or lack thereof, of a feature to avoid or adapt to a change; and
  - tolerance / resilience - i.e. capacity, or lack thereof, of a feature to accommodate temporary or permanent change or recover to pre-existing state following exposure to a change.
- 4.4.7.11 For each marine ecological receptor only those characteristics relevant to understanding the ecological effect and determining the significance are described. The determination of the significance of effects will be based on predicted effects to:
- designated sites – i.e., the conservation objectives for the site and / or its interest / qualifying features;
  - ecosystems / biodiversity – resulting in a change in ecosystem structure and / or function;
  - habitats – i.e., extent, distribution, structure, function as well as its associated species, and its conservation status within a given geographical area; and
  - species – i.e., abundance, distribution (including spawning, foraging and nursery habitats) and its conservation status within a given geographical area or at a particularly sensitive time (e.g., spawning season).
- 4.4.7.12 The significance of effects will be reported as either:
- not Significant – no or limited effect to one or more of the features described above; or
  - significant – one or more features described above are affected.

4.4.7.13 The CIEEM methodology does not advocate a matrix approach to determining the significance of effects (CIEEM, 2019). However, to maintain consistency with other disciplines, where a matrix approach is suitable, the assessment conclusions will be transposed into the significance terminology used within the wider ES (**Part 1, Chapter 5, EIA Approach and Methodology**) See Table 4.4.7 below.

Table 4.4.7: Description of significance terminology

<b>Classification of effect based on CIEEM guidance</b>	<b>Terminology used elsewhere in the ES</b>	<b>Description in accordance with CIEEM guidance</b>
Significant (beneficial)	Major beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the international level
	Moderate beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the national level
Not-significant	Minor beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at a local level or regional level
	Negligible	No effect on designated sites, ecosystems, habitat and/or species
	Minor adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the local level or regional level
Significant (adverse)	Moderate adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the national level
	Major adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the international level

## 4.4.8 Conclusion

4.4.8.1 In summary:

- A range of potentially sensitive fish species, including those that are protected, or are species of commercial importance, occur within proximity of the Offshore Scheme;
- The study area overlaps with spawning and nursery grounds for a variety of fish species, particularly several of commercial importance;
- The study area overlaps with three MCZs designated for the protection of shellfish, there are no sites designated for migratory fish in the wider 50km designated sites screening area;
- No project specific surveys for fish and shellfish will be undertaken as available data are considered sufficient to undertake an assessment of the identified impact pathways; and
- The scoping exercise has identified a number of impact pathways that will be fully addressed in the ES.

## Proposed Scope of the Assessment

4.4.8.2 A summary of the proposed scope of the assessment is provided in Table 4.4.8

Table 4.4.8: Proposed scope of the assessment

<b>Receptor</b>	<b>Potential for significant effect</b>	<b>Project phase(s)</b>	<b>Proposed to be scoped in/out</b>
Fish and shellfish	Temporary disturbance to fish and shellfish habitats	Construction Maintenance Decommissioning	<b>Scoped in</b>
Fish and shellfish	Direct loss of fish and shellfish habitats	Construction Maintenance	<b>Scoped in</b>
Fish and shellfish	Reduction in feeding efficiency; smothering effects; bio-accumulation; and potentially mortality due to increased SSC.	Construction Maintenance Decommissioning	<b>Scoped in</b>
Fish	Disturbance, harm, and mortality to fish and shellfish due to underwater sound and vibration.	Construction Maintenance Decommissioning	<b>Scoped in</b>
Fish and shellfish	Disturbance to fish and shellfish due to subsea cable thermal emissions	Operation	<b>Scoped in</b>
Fish and shellfish	Disturbance to fish and shellfish due to cable EMF emissions	Operation	<b>Scoped in</b>

## 4.5 Marine Mammals

### 4.5.1 Introduction

4.5.1.1 This chapter presents how the marine mammal assessment will consider the potentially significant effects that may arise from the construction, operation, maintenance and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment and how the potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).

4.5.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.

4.5.1.3 This chapter should be read in conjunction with:

- **Part 1, Chapter 4, Description of the Project;**
- **Part 1, Chapter 5, EIA Approach and Methodology;**
- **Part 4, Chapter 1, Evolution of the Offshore Scheme;**
- **Part 4, Chapter 3, Benthic Ecology;** and
- **Part 4, Chapter 4, Fish and Shellfish Ecology.**

4.5.1.4 This chapter is supported by the following figure:

- **Figure 4.5.1 Marine Mammals Study Area and Designated Sites.**

### 4.5.2 Regulatory and Planning Context

4.5.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on marine mammals associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

#### Legislation

4.5.2.2 The following legislation is relevant to marine mammals:

- Marine and Coastal Access Act 2009<sup>207</sup>, which provides the legal mechanism to help ensure clean, healthy, safe and productive and biological diverse oceans and seas;
- Conservation of Habitats and Species Regulations 2017<sup>208</sup> (amended 2019<sup>209</sup>), transposes the Habitats Directive (92/43/EEC) into UK legislation, covering the marine environment to 12 nautical mile (NM) offshore;
  - All cetaceans are listed as European Protected Species (EPS) on Schedule 2 of the Habitats Directive
  - Grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina* listed as Annex II (as are harbour porpoise *Phocoena phocoena* and bottlenose dolphin *Tursiops truncatus*)
- The Conservation of Offshore Marine Habitats and Species Regulations 2017<sup>210</sup> applies within the UK Offshore Marine Area (beyond the 12 NM limit);
- Wildlife and Countryside Act 1981<sup>211</sup>, Schedule 5 states that all cetaceans are fully protected within UK territorial waters, protecting them from killing or injury, sale, destruction of a particular habitat (which they use for protection or shelter) and disturbance;
- The Marine Strategy Regulations 2010<sup>212</sup>, which transpose the Marine Strategy Framework Directive (2008/56/EC) into UK legislation;
- Conservation of Seals Act 1970<sup>213</sup>, which provides seasonal protection to seals;
- Natural Environment and Rural Communities Act 2006<sup>214</sup> (NERC), Section 41 of the NERC lists species of ‘principal importance’ for the purpose of conservation biodiversity; and
- Environment Act 2021<sup>215</sup> <sup>216</sup>, will set clear statutory targets for the recovery of the natural world in four priority areas: air quality, biodiversity, water and waste, and includes the introduction of Biodiversity Net Gain (BNG).

<sup>207</sup> The Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents>.

<sup>208</sup> The Conservation of Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1012/contents/made>.

<sup>209</sup> Amended in response to the UK’s exit from the European Union (EU), making the Habitats (92/43/EEC) and Wild Birds (2009/147/EC) Directives, operable from 1 January 2021, and creating a UK natural site network in place of the EU Natura 2000 ecological network.

<sup>210</sup> The Conservation of Offshore Marine Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1013/made>

<sup>211</sup> The Wildlife and Countryside Act 1981. [online] Available at: <https://www.legislation.gov.uk/ukpga/1981/69>.

<sup>212</sup> The Marine Strategy Regulations 2010. [online] Available at: <https://www.legislation.gov.uk/uksi/2010/1627/contents/made>.

<sup>213</sup> Conservation of Seals Act 1970. [online] Available at: <https://www.legislation.gov.uk/ukpga/1970/30>

<sup>214</sup> Section 41 of the Natural Environment and Rural Communities Act 2006. [online] Available at: <https://www.legislation.gov.uk/ukpga/2006/16/section/41>.

<sup>215</sup> The Environment Act 2021. [online] Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>.

<sup>216</sup> The Act has been enshrined into law; however, it is not anticipated to come into full effect until the end of 2023 (2025 for NSIPs)

## Planning Policy

4.5.2.3 The following plans and policies are relevant to marine mammals.

### National planning policy

- National Policy Statements (NPS) - the UK Government produces NPS which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP). Those potentially relevant to marine mammals are:
  - Overarching National Policy Statement for Energy – EN-1<sup>217</sup>;
  - Renewable Energy Infrastructure – EN-3<sup>218</sup>;
  - Electricity Networks - EN-5<sup>219</sup>;
  - National Planning Policy Framework<sup>220</sup>;
  - Planning Practice Guidance – Natural Environment<sup>221</sup>; and
  - Planning Practice Guidance – Renewable and low carbon energy<sup>222</sup>.
- National Planning Framework 2 (NPF2)<sup>223</sup>, aims to co-ordinate policies of a spatial nature with investment priorities. Biodiversity is stated as one of the factors contributing to the core objective of sustainable economic development.

### Local planning policy

- The UK Marine Policy Statement (MPS)<sup>224</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made. The following marine plans have been considered in the development of this Scoping Report:

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<sup>217</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy (EN-1). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) [Accessed 09 August 2022].

<sup>218</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Renewable Energy (EN-3). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47856/1940-nps-renewable-energy-en3.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf) [Accessed 09 August 2022].

<sup>219</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Electricity Networks (EN-5). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47858/1942-national-policy-statement-electricity-networks.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf) [Accessed 09 August 2022].

<sup>220</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

<sup>221</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance – Natural Environment. [online] Available at: <https://www.gov.uk/guidance/natural-environment#biodiversity-geodiversity-and-ecosystems> [Accessed 09 August 2022].

<sup>222</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2015). Planning Practice Guidance – Natural Environment. [online] Available at: <https://www.gov.uk/guidance/renewable-and-low-carbon-energy> [Accessed 09 August 2022].

<sup>223</sup> National Planning Framework (2021) [online] Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>.

<sup>224</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) [Accessed 09 August 2022].

- East Inshore and East Offshore Marine Plan<sup>225</sup>
- South East Inshore Marine Plan<sup>226</sup>

## Guidance

4.5.2.4 The following guidance is relevant to marine mammals:

- Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise Special Areas of Conservation (SACs) (England, Wales & Northern Ireland)<sup>227</sup>; and
- The ‘Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas’ (ASCOBANS) 1992 - makes provision for the protection of cetaceans through monitoring, research, public awareness, pollution control and data sharing. This agreement has been signed by eight European countries bordering the Baltic and North Seas (including the English Channel) and includes the United Kingdom (UK). A number of guidance documents, including in relation to mitigation for unexploded ordnance (UXO) detonation, are available on the ASCOBANS website<sup>228</sup>.

## 4.5.3 Study Area

4.5.3.1 The Offshore Scheme is located within the International Council for the Exploration of the Sea (ICES) Greater North Sea Ecoregion<sup>229</sup>.

4.5.3.2 To account for the highly mobile and transient nature of marine mammal species, and potential implications of local impacts on wider populations, the study area will take into consideration species specific marine mammal Management Units (MUs) (though MUs have not been created for all species) published by the Inter Agency Marine Mammal Working Group (IAMMWG)<sup>230</sup>.

4.5.3.3 The size of the MUs varies between species as they have been defined based on an understanding of the biological population structures and the ecological differentiation of these populations (taking into account political boundaries and the management of human activities). There are MUs defined for the following species:

- harbour porpoise *Phocoena phocoena*;

<sup>225</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>226</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

<sup>227</sup> JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). [online] Available at: <https://data.jncc.gov.uk/data/2e60a9a0-4366-4971-9327-2bc409e09784/JNCC-Report-654-FINAL-WEB.pdf> [Accessed 11 August 2022].

<sup>228</sup> Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) (2022). [online] Available at: <https://www.ascobans.org/en> [Accessed 11 August 2022].

<sup>229</sup> ICES (2021). Greater North Sea Ecoregion – Ecosystem Overview. [online] Available at: [https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2021/2021/EcosystemOverview\\_GreaterNorthSea\\_%202021.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2021/2021/EcosystemOverview_GreaterNorthSea_%202021.pdf).

<sup>230</sup> IAMMWG (2021). Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680, ISSN 0963-8091. Peterborough, UK: JNCC.

- bottlenose dolphin *Tursiops truncatus*;
- white-beaked dolphin *Lagenorhynchus albirostris*;
- minke whale *Balaenoptera acutorostrata*;
- short-beaked common dolphin *Delphinus delphis*;
- Atlantic white-sided dolphin *Lagenorhynchus acutus*; and
- Risso's dolphin *Grampus griseus*.

4.5.3.4 For the purpose of this assessment, the MUs defined by the IAMMWG<sup>231</sup> for each of these species have also been used to undertake an initial screening of designated and protected sites. The greatest likely Zone of Influence (ZOI) from project activities is likely to be in relation to underwater sound, reflecting potentially extensive propagation of underwater sound energy and the importance of sound to all marine mammals.

4.5.3.5 Joint Nature Conservation Committee (JNCC) (2020) guidance<sup>231</sup> regarding the assessment of effects from underwater sound source impacts in relation to SACs, designated for the protection of harbour porpoise (the cetacean species with the highest hearing sensitivity), indicates the maximum distance for significant disturbance from geophysical surveys is 5km, and 26km for impact piling and high order UXO detonation. Thus, all sites designated for cetaceans within 26km of the study area have been automatically scoped in for consideration.

4.5.3.6 However, both harbour porpoise and bottlenose dolphin are highly mobile and wide ranging, with some populations travelling between different habitats depending on the season<sup>232</sup>. Therefore, a review of connectivity within the IAMMWG units will also be undertaken to determine if sites beyond the screening distance should also be considered. Additionally, the known travel distances of species will be taken into consideration, with a designated sites screening distance of 50km for cetaceans (**Figure 4.5.1 Marine Mammals Study Area and Designated Sites**).

4.5.3.7 There are currently no MUs for seals, therefore instead, sites within the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention<sup>233</sup>) Seal Indicator Assessment Unit 10: Southeast England<sup>234</sup> are identified for initial consideration. The designated sites within this unit that are to be scoped in, are based on established foraging ranges for seals. In particular, grey seals are known to forage over large distances between and away from haul-out sites (where they return to rest, moult, and breed), often travelling over 100km on trips, which can last between 1 and 30 days<sup>235</sup>. To account for these foraging distances, and based on guidance from regulators on other projects, a designated sites screening distance of 135km has been used to screen in sites designated for grey seal. In contrast, harbour seals are

<sup>231</sup> JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). JNCC Report No. 654, ISSN 0963-8091. Peterborough, UK: JNCC.

<sup>232</sup> Heinänen, S. and Skov, H. (2015). The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area. Peterborough, UK: JNCC.

<sup>233</sup> OSPAR refers to the Oslo and Paris Convention for the protection of the marine environment of the North-East Atlantic

<sup>234</sup> OSPAR (2021). OSPAR Seal Indicator Assessment Units - QSR2023. [online] Available at: [https://odims.ospar.org/en/submissions/ospar\\_seal\\_au\\_2021\\_02/](https://odims.ospar.org/en/submissions/ospar_seal_au_2021_02/).

<sup>235</sup> Special Committee on Seals (SCOS) (2020). Scientific Advice on Matters Related to the Management of Seal Populations. [online] Available at: <http://www.smru.st-andrews.ac.uk/files/2020/08/SCOS-2019.pdf>.

known to forage much closer to their haul-out sites, typically within 30km and in water depths ranging from 10 - 50m<sup>236</sup> the designated sites screening distance for harbour seal has been identified as the same as for cetaceans at 50km (**Figure 4.5.1 Marine Mammals Study Area and Designated Sites**).

## 4.5.4 Baseline Conditions

4.5.4.1 There is a significant diversity and abundance of cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals) in UK waters. Most marine mammals are wide ranging and those recorded within the study area may be individuals from larger populations. This baseline characterises marine mammal species known or likely to be present within the study area defined above.

### Data Sources

4.5.4.2 Detailed baseline conditions will be established by undertaking a desktop review of published information and through consultation with relevant organisations. Key data sources that will be used to inform the baseline description include, but may not be limited to:

- Small Cetacean Abundance in the European Atlantic and North Sea (SCANS) data<sup>237</sup>;
- Inter-Agency Marine Mammal Working Group<sup>238</sup>;
- Sea Mammal Research Unit (SMRU)<sup>239</sup>;
- Habitat-based predictions of at-sea distributions for grey and harbour seals in the British Isles<sup>240</sup>;
- UK Cetacean Stranding Investigation Programme<sup>241</sup>;
- Distribution models for harbour porpoise within the UK Exclusive Economic Zone<sup>233</sup>
- Distribution models for 12 species of cetacean covering the North-east Atlantic<sup>242</sup>;

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<sup>236</sup> Tollit, D., Black, A., Thompson, P., Mackay, A., Corpe, H., Wilson, B., Van Parijs, S., Grellier, K. and Parlane, S. (1998). Variations in harbour seal *Phoca vitulina* diet and dive-depths in relation to foraging habitat. *Journal of Zoology*, 244(2), pp. 209-222.

<sup>237</sup> Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Borjesson, P., Herr, H., Oien, N. (2021). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. [online] Available at: <https://edepot.wur.nl/414756>.

<sup>238</sup> The Inter-Agency Marine Mammal Working Group (IAMMWG) (2021). Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680, ISSN 0963-8091. Peterborough, UK: JNCC.

<sup>239</sup> University of St Andrews Sea Mammal Research Unit (No Date). [online] Available at: <http://www.smru.st-andrews.ac.uk/>.

<sup>240</sup> Carter, M., Boehme, L., Duck, C., Grecian, W., Hastie, G., McConnell, B., Miller, D., Morris, C., Moss, S., Thompson, P. and Russell, D. (2020). Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Report to BEIS, OESEA-16-76/OESEA-17-78. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/959723/SMRU\\_2020\\_Habitat-based\\_predictions\\_of\\_at-sea\\_distribution\\_for\\_grey\\_and\\_harbour\\_seals\\_in\\_the\\_British\\_Isles.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf).

<sup>241</sup> UK Cetacean Stranding Investigation Programme (CSIP) (No Date). [online] Available at: <http://ukstrandings.org/csip-publications/>.

<sup>242</sup> Waggitt, J., Evans, P., Andrade, J., Banks, A. and Bolton, M. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. *Journal of Applied Ecology*, 57(2), pp. 253-269.

- The Sea Watch Foundation marine mammal sightings distribution maps<sup>243</sup>;
- Special Committee on Seals (SCOS)<sup>244</sup>;
- Magic maps (UK)<sup>245</sup> and the European Environment Agency (EU)<sup>246,247</sup> for designated and protected sites; and
- Academic journals and online reports.

4.5.4.3 No additional stakeholder consultation in relation to marine mammals, beyond the necessary statutory consultees, have been identified.

## Cetaceans

4.5.4.4 Within the ICES Greater North Sea Ecoregion, four species occur commonly or are resident<sup>248</sup>. These are: harbour porpoise, bottlenose dolphin, minke whale and white-beaked dolphin. An additional five species occur regularly in the ecoregion but are less common: short-beaked common dolphin *Delphinus delphis*, Atlantic white-sided dolphin, long-finned pilot whale *Globicephala melas*, killer whale *Orcinus orca*, and Risso's dolphin.

4.5.4.5 Cetacean distribution in the UK was surveyed in 2016 as part of the Small Cetaceans in European Atlantic waters and the North Sea (SCANS-III) surveys, involving standard boat-based line transect surveys and aerial transect surveys<sup>238</sup>. These surveys provide abundance and density estimates for the UK, divided into blocks, with the Offshore Scheme located entirely in Block L. Within Block L, only harbour porpoise was observed in high enough numbers to be able to determine estimates of total abundance and density (Table 4.5.1). The density and abundance of harbour porpoise within Block L was lower compared to the adjacent northern Block O (density = 0.888 individuals km<sup>2</sup>; abundance = 53,485 individuals).

Table 4.5.1: Density and abundance of most common cetaceans observed in SCANS-III survey area Block L

Species	Density (individuals km <sup>2</sup> )	Abundance
Harbour porpoise	0.607	19,064

Source: Hammond et al. 2021<sup>237</sup>

<sup>243</sup> Reid, J., Evans, P. and Northridge, S. (2003). Atlas of Cetacean Distribution in North-West European Waters. Joint Nature Conservation Committee. [online] Available at: <https://www.seawatchfoundation.org.uk/species-distribution-maps/> [Accessed 12 August 2022]

<sup>244</sup> Special Committee on Seals (SCOS) (2020). Scientific Advice on Matters Related to the Management of Seal Populations. [online] Available at: <http://www.smru.st-andrews.ac.uk/files/2020/08/SCOS-2019.pdf>.

<sup>245</sup> Department of Environment, Food and Rural Affairs (DEFRA) (No Date). Magic Interactive Mapping. [online] Available at: <https://magic.defra.gov.uk/>.

<sup>246</sup> European Environment Agency (EEA) (2022). Sites search. [online] Available at: <https://eunis.eea.europa.eu/sites.jsp> [Accessed 12 August 2022].

<sup>247</sup> Natura 2000 (2022). General Viewer. [online] Available at: <https://www.arcgis.com/home/webmap/viewer.html?webmap=c79e2f4856f54ed7a15ff7abc56acc1b> [Accessed 12 August 2022].

<sup>248</sup> ICES (2021). Greater North Sea Ecoregion – Ecosystem Overview. [online] Available at: [https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2021/2021/EcosystemOverview\\_GreaterNorthSea\\_%202021.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2021/2021/EcosystemOverview_GreaterNorthSea_%202021.pdf).

## Pinnipeds

- 4.5.4.6 The UK supports important populations of both seal species occurring in the North-east Atlantic – harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus*. The majority (~77%) of the population of both species occur around the west coast of Scotland. On the east coast of England the most important haul-out sites are around the Wash and Humber estuaries. There is also a population of an estimated 4,175 seals in the Greater Thames Estuary (~78% of these are grey seal). Both species are known to regularly haul-out at a number of locations within the Greater Thames Estuary<sup>249,250</sup>.
- 4.5.4.7 Harbour seals have a relatively stable resident population in the region, with haul-out sites located at (but not limited to) Foulness Island, Hamford Water, and Pegwell Bay, with larger colonies favouring coastal sandbanks<sup>252</sup>. The hauling-out of harbour seals is seasonal, peaking in August – September during the moulting season, with a decrease in June – July during the pupping season<sup>251</sup>. Tagged seals within the region have shown high variability in their movements and have shown connectivity between the Thames Estuary and the Wash<sup>252</sup>.
- 4.5.4.8 Grey seals are not thought to breed in the region and are likely to be seasonal visitors to the Greater Thames Estuary, avoiding the peak breeding season, which is August to December<sup>252 253</sup>. Approximately 75% of the grey seals recorded in the region haul out at Goodwin Sands off the Kent coast, although numbers of this species in the region are generally lower than for harbour seal<sup>244 252</sup>. Grey seals forage in open seas, frequently travelling >100 km from their haul out sites<sup>244</sup>. Tracking data has indicated that grey seals can forage up to 135 kilometres offshore and stay at sea for up to 30 days. Individuals often return to the same foraging areas but can also occasionally move to new haul out sites, thus acquiring new foraging regions<sup>246</sup>.

## Designated Sites

- 4.5.4.9 The key sites designated for the protection of marine mammals within the screening distance are two UK SACs, one SAC in Belgium, three SACs in the Netherlands and four SACs in France (Table 4.5.2).

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<sup>249</sup> Cox, T., Barker, J., Bramley, J., Debney, A., Thompson, D. and Cucknell, A. (2020). Populations trends of harbour and grey seals in the Greater Thames Estuary. *Mammal Communications*, 6, pp. 44-51.

<sup>250</sup> Barker, J. and Obregon, C. (2015). Greater Thames Estuary Harbour Seal Population Survey. Europe Conservation Programme Zoological Society of London. [online] Available at: <https://www.zsl.org/sites/default/files/media/2016-01/Harbour%20Seal%20Survey%20Report%20-%20December%202015.pdf>.

<sup>251</sup> Wilson, S. (2001). Population growth, reproductive rate and neo-natal morbidity in a re-establishing harbour seal-colony. *Mammalia*, 65(3), pp. 319-334.

<sup>252</sup> Barker, J., Seymour, A., Mowat, S., and Debney, A. (2014). Thames Harbour Seal Conservation Project. UK and Europe Conservation Programme Zoological Society of London. [online] Available at: <https://www.zsl.org/sites/default/files/media/2014-12/Thames%20Harbour%20Seal%20Conservation%20Project%20Report.pdf>.

<sup>253</sup> Barker, J. (2015). Greater Thames Estuary Seal Surveys Report. UK & Europe Conservation Programme Report, Zoological Society of London. [online] Available at: [https://www.zsl.org/sites/default/files/media/2015-07/2015\\_July\\_Greater%20Thames%20Estuary%20Seal%20Survey%20Report.pdf](https://www.zsl.org/sites/default/files/media/2015-07/2015_July_Greater%20Thames%20Estuary%20Seal%20Survey%20Report.pdf).

Table 4.5.2: Designated sites for marine mammals within the screening distance

Site name	Distance from Offshore Scoping Boundary	Summary
Southern North Sea SAC	0 km	The Offshore Scheme passes through the Southern North Sea SAC, which has been designated for the protection of the Annex II species harbour porpoise.
Bancs des Flandres SAC	~25.2 km	The Bancs des Flandres SAC is located in France. It is designated for the protection of harbour porpoise, harbour seal, and grey seal.
Ridens et Dunes Hydrauliques du Déroit du Pas-de-Calais SAC	~36.6 km	The Ridens et Dunes Hydrauliques du Déroit du Pas-de-Calais SAC is located in France. It is designated for the protection of harbour porpoise, harbour seal and grey seal.
Vlaamse Banken SAC	~48.6 km	The Vlamse Banken SAC is located in Belgium, It is designated for the protection of harbour porpoise, harbour seal, and grey seal.
Baie de Canche et Couloir des Trois Estuaires SAC	~79.9 km	The Baie de Canche et Couloir des Trois Estuaires SAC is located in France. It is designated for the protection of harbour porpoise, harbour seal, and grey seal.
Vlakte van de Raan SAC	~101.3 km	The Vlakte van de Raan SAC is located in the Netherlands, It is designated for the protection of harbour porpoise, harbour seal, and grey seal.
Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC	~102.7 km	The Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC is located in France. It is designated for the protection of harbour porpoise, harbour seal, and grey seal.
Voordelta SAC	~107.1 km	The Voordelta SAC is located in the Netherlands. It is designated for the protection of harbour porpoise, harbour seal, and grey seal.
Wash and North Norfolk Coast SAC	110 km	The Wash and North Norfolk Coast SAC is located approximately 110 km away from the Offshore Scheme. This site is designated for the protection of the Annex II species harbour seal. This site has been included as telemetry data

		indicates that harbour seals from the Greater Thames Estuary may be associated with this site.
Grevelingen SAC	~134.4 km	The Grevelingen SAC is located in the Netherlands. It is designated for the protection of harbour seal, and grey seal.

## Future Baseline

- 4.5.4.10 The marine mammal chapter within the ES will include an outline of the likely evolution of the baseline environment without the implementation of the development as far as natural changes from the baseline scenario can be assessed.

## 4.5.5 Embedded and Control & Management Measures

- 4.5.5.1 Given that many design elements of the Project have yet to be confirmed, the embedded and control and management measures have not been finalised at this stage. However, any measures will be discussed with statutory consultees and stakeholders throughout the EIA process.

### Embedded Measures

- 4.5.5.2 The identification of the Offshore Scoping Boundary has been designed to avoid sensitive areas where possible.

### Control and Management Measures

- 4.5.5.3 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the marine mammal assessment are:
- GM03 - an offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation;
  - LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972)<sup>254</sup> (IMO, 2019a), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78)<sup>255</sup> (IMO, 2019e) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974)<sup>256</sup>.

<sup>254</sup> International Maritime Organisation (IMO) (1972). Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGs). [online] Available at: <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx> [Accessed 10 August 2022].

<sup>255</sup> International Maritime Organisation (IMO) (1983). International Convention for the Prevention of Pollution from Ships (MARPOL). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx) [Accessed 10 August 2022].

<sup>256</sup> International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS). [online] Available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf>.

- LVS05 - drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (PLONOR substances) where practicable,
  - drilling fluids will be tested for contamination to determine possible reuse or disposal; and
  - If disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- BE03 - cable installation will be carried out on a 24-hour basis in order to reduce the overall installation time and associated disturbance of ecological receptors; and
- MM01 - adherence to JNCC guidelines, where appropriate, regarding the minimisation of impacts from underwater sound generated from known project activities of piling<sup>257</sup>, geophysical surveys<sup>258</sup>, and UXO detonation<sup>259</sup>.

## 4.5.6 Potential for Significant Effects

4.5.6.1 The marine mammal assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.

4.5.6.2 The proposed scope of the marine mammal assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

4.5.6.3 This section identifies the sources and impacts that could occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.

4.5.6.4 The potential for the Offshore Scheme to result in the potential significant effects described in this section takes into account the embedded and control and management measures described in section 5.

#### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;

<sup>257</sup> JNCC (2010). Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. [online] Available at: <https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf>.

<sup>258</sup> JNCC (2017). JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. [online] Available at: <https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf>.

- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).
- cable protection (e.g. rock placement, concrete mattresses);

#### Sources of operational impacts

- presence of activated cable.

#### Sources of maintenance impacts

- geophysical and/or ROV surveys;
- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed;

#### Potential impacts

4.5.6.5 Table 4.5.3 identifies the potential impacts that could result from the sources identified above.

Table 4.5.3: Sources and impacts

Project phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping Cable installation and cable lay (including piling); Cable repair or replacement;	Underwater sound impacts on marine mammals	Yes	Scoped in

	Removal of cable from seabed; Removal of cable protection; and Vessel traffic.			
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay; Cable repair or replacement; Removal of cable from seabed; and Removal of cable protection.	Temporary increase in suspended sediment concentrations and sediment deposition leading to increased turbidity and contaminant mobilisation.	Yes	<b>Scoped in</b>
Construction, maintenance and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping Cable installation and cable lay (including piling) <sup>259</sup> ; Cable repair or replacement; Removal of cable from seabed;	Indirect effects through impacts to prey species	Yes	<b>Scoped in</b>

<sup>259</sup> At the cable landfall locations, percussive piling for the installation of a cofferdam as part of the use of trenched technologies (not the preferred method) cannot be ruled out at this stage.

	Removal of cable protection; and Vessel traffic.				
Construction, maintenance and decommissioning	Vessel traffic.	Airborne sound and visual disturbance	Yes		<b>Scoped in</b>
Operation	Presence of activated cable	Disturbance marine mammals due to subsea cable thermal emissions	Yes		<b>Scoped in</b>
Operation	Presence of activated cable	Electromagnetic field (EMF) emissions	Yes		<b>Scoped in</b>
Construction, maintenance and decommissioning	Vessel traffic	Collision with project vessels	Yes		<b>Scoped in</b>
Construction, maintenance and decommissioning	Leaks and spills from vessels	Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils	No - the implementation of embedded and good practice measures (GM03 and LVS02) create limited potential for accidental spills to occur during the Project. Relatively few vessels are expected to be involved, and potential pollutants would be limited to relatively small volumes. Should an accidental spill or leak occur, it		Scoped out

would be very small in extent and subject to immediate dilution and rapid dispersal within the marine environment.

## Impact Pathways with Receptors (Step 2)

- 4.5.6.6 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the marine mammal study area.
- 4.5.6.7 Table 4.5.4 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the marine mammal assessment for the Offshore Scheme.

Table 4.5.4: Impact pathways with receptors

Impact Pathway	Receptors	Potential for significant effect	Proposed to be scoped in/out
Disturbance, harm, and mortality to marine mammals due to underwater sound and vibration during construction, maintenance and decommissioning	Marine mammals	Yes - marine mammals are highly sensitive to underwater sound (UWS) which can cause auditory injury and induce behavioural changes. The exact construction methods have yet to be determined but the expected UWS sources include geophysical surveys, UXO clearance, route preparation, cable installation (including piling) and vessel traffic	Scoped in
Temporary increase in suspended sediment concentrations and sediment deposition leading to increased turbidity and contaminant mobilisation during construction, maintenance and decommissioning	Marine mammals	No - suspended sediment is expected to be minimal and confined to the lower reaches of the water column, due to the depth at which works will occur. Furthermore, marine mammals are frequent inhabitants of turbid environments with low visibility, and studies have	Scoped out

		indicated that they do not typically experience severe impact from increased suspended sediment concentrations <sup>260</sup>	
Potential for indirect effects through impacts to prey species during construction, maintenance and decommissioning	Marine mammals	Yes - due to the potential impacts to benthic communities and fish and shellfish species, there remains the possibility of indirect impact to marine mammals through disturbance and possibly loss of prey species leading to reduced foraging success or displacement of marine mammals, in extreme cases leading to mortality. This may include impacts that have been scoped out as direct impacts to marine mammals	<b>Scoped in</b>
Airborne sound and visual disturbance during construction, maintenance and decommissioning	Marine mammals	Yes - air-borne sound from vessels has the potential to disturb seals located at coastal breeding sites and haul outs causing avoidance behaviours; in some cases, stampedes can result in pup mortality. Considering the proximity of sites known to host harbour and grey seal populations, this impact pathway has been scoped in for assessment	<b>Scoped in</b>
Disturbance to marine mammals due to cable thermal emissions during operation	Marine mammals	No - cables have negligible capacity to heat the overlying water column due to the high thermal capacity and movement of surrounding seawater. Regardless of whether the cables are buried, it is not considered likely that marine mammals will be exposed to any potential thermal effects and	Scoped out

<sup>260</sup> Todd, V., Todd, I., Gardiner, J., Morrin, E., MacPherson, N., DiMarzio, N. and Thomsen, F. (2015). A review of impacts of marine dredging activities on marine mammals. ICES Journal of Marine Science, 72(2), pp. 328-340.

		there is considered to be no interaction between this impact and marine mammals	
Disturbance to marine mammals due to cable EMF emissions during operation	Marine mammals	Yes - there is potential for EMF from subsea cables to interfere with marine mammal behaviour, as they rely on the Earth's magnetic field for navigation; however, the impacts of EMF are still poorly understood so they have been scoped in for further assessment in the EIA	<b>Scoped in</b>
Collision with project vessels during construction, maintenance and decommissioning	Marine mammals	Yes - marine mammals may be susceptible to collision with operations vessels, which can result in lethal and sub-lethal injury	<b>Scoped in</b>

## 4.5.7 Proposed Assessment Methodology

### Proposed Data Sources

4.5.7.1 The following data sources are proposed to be used to inform the assessment:

- SCANS (Small Cetacean Abundance in the European Atlantic and North Sea) data<sup>261</sup>;
- Inter-Agency Marine Mammal Working Group<sup>262</sup>;
- Sea Mammal Research Unit (SMRU)<sup>263</sup>;
- Habitat-based predictions of at-sea distributions for grey and harbour seals in the British Isles<sup>264</sup>;
- UK Cetacean Stranding Investigation Programme<sup>265</sup>;

<sup>261</sup> Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Borjesson, P., Herr, H., Oien, N. (2021). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. [online] Available at: <https://edepot.wur.nl/414756>.

<sup>262</sup> The Inter-Agency Marine Mammal Working Group (IAMMWG) (2021). Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680, ISSN 0963-8091. Peterborough, UK: JNCC.

<sup>263</sup> University of St Andrews Sea Mammal Research Unit (No Date). [online] Available at: <http://www.smru.st-andrews.ac.uk/>.

<sup>264</sup> Carter, M., Boehme, L., Duck, C., Grecian, W., Hastie, G., McConnell, B., Miller, D., Morris, C., Moss, S., Thompson, P. and Russell, D. (2020). Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Report to BEIS, OESEA-16-76/OESEA-17-78. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/959723/SMRU\\_2020\\_Habitat-based\\_predictions\\_of\\_at-sea\\_distribution\\_for\\_grey\\_and\\_harbour\\_seals\\_in\\_the\\_British\\_Isles.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf).

<sup>265</sup> UK Cetacean Stranding Investigation Programme (CSIP) (No Date). [online] Available at: <http://ukstrandings.org/csip-publications/>.

- Distribution models for harbour porpoise within the UK Exclusive Economic Zone<sup>266</sup>;
- Distribution models for 12 species of cetacean covering the North-east Atlantic<sup>267</sup>;
- The Sea Watch Foundation marine mammal sightings distribution maps<sup>268</sup>;
- Special Committee on Seals (SCOS)<sup>269</sup>;
- Designated sites assessments etc (UK and EU) as available;
- Magic maps (UK)<sup>245</sup> and the European Environment Agency (EU)<sup>246,247</sup> for designated and protected sites;
- Marine Data Exchange Offshore Wind Environmental Evidence Register (OWEER)<sup>270</sup>
- Academic journals and online reports; and
- Relevant Environmental Statements (ESs).

## Proposed Assessment Methodology

4.5.7.2 All ecological ES chapters for the project will be completed in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019<sup>271</sup>). The method will be tailored to reflect the specific conditions of the marine environment, in particular to ensure the high levels of movement of marine receptors between habitats and populations, are considered fully in respect of the predicted ZOI arising from the Offshore Scheme.

4.5.7.3 The aims of the marine EclA are to:

- identify important ecological features (e.g., designated sites, habitats or species) which have the potential to be impacted by the Offshore Scheme;
- provide a robust assessment of the likely ecological impacts and resultant effects of the Offshore Scheme, which may be beneficial (i.e. positive) or adverse (i.e. negative);

<sup>266</sup> Heinänen, S. and Skov, H. (2015). The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area. Peterborough, UK: JNCC.

<sup>267</sup> Waggitt, J., Evans, P., Andrade, J., Banks, A. and Bolton, M. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. *Journal of Applied Ecology*, 57(2), pp. 253-269.

<sup>268</sup> Reid, J., Evans, P. and Northridge, S. (2003). Atlas of Cetacean Distribution in North-West European Waters. Joint Nature Conservation Committee. [online] Available at: <https://www.seawatchfoundation.org.uk/species-distribution-maps/> [Accessed 12 August 2022]

<sup>269</sup> Special Committee on Seals (SCOS) (2020). Scientific Advice on Matters Related to the Management of Seal Populations. [online] Available at: <http://www.smru.st-andrews.ac.uk/files/2020/08/SCOS-2019.pdf>.

<sup>270</sup> Marine Data Exchange (2021). JNCC Offshore Wind Evidence and Change Programme, Offshore Wind Environmental Evidence Register. [online] Available at: <https://www.marinedataexchange.co.uk/details/3480/2021-jncc-offshore-wind-evidence-and-change-programme-offshore-wind-environmental-evidence-register-summary> [Accessed 10 August 2022].

<sup>271</sup> Chartered Institute of Ecology and Environmental Management (CIEEM) (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. [online] Available at: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf>.

- facilitate determination of the consequences of the Offshore Scheme in terms of national, regional and local policies relevant to nature conservation and biodiversity, where the level of detail provided is proportionate to the scale of the development and the complexity of its impact pathways;
- identify appropriate mitigation to reduce any likely ecological impacts; and
- set out the steps to be taken to adhere to legal requirements relating to the relevant ecological features concerned.

4.5.7.4 In accordance with CIEEM (2019) guidance, not all habitats and species which have the potential to occur in the ZOI of the Offshore Scheme will be considered. Rather, focus will be placed on those features considered to be ‘important’ – determining importance is discussed in further detail below. To ensure compliance with National and European policy, consideration is still given to biodiversity in its entirety and the need to achieve no net loss and enhancement of biodiversity.

4.5.7.5 In accordance with the CIEEM guidance, the importance of an ecological feature or receptor is defined according to the following factors:

- conservation or legal status;
- quality or health;
- extent; and
- rarity or endemism.

4.5.7.6 The importance of an ecological feature has also been defined with reference to a specific geographical context. Marine features are highly connected with few boundaries and the approach therefore adopts the level of legislative designation as a proxy for the geographical importance of a marine species receptor. These and the other criteria for importance ratings are shown in Table 4.5.5 below.

Table 4.5.5: Importance criteria for marine ecology features/receptors

<b>Importance description*</b>	
Very High	<ul style="list-style-type: none"> <li>• designated sites and qualifying/supporting features of international importance (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar Sites)</li> <li>• species which are legally protected and / or in significant decline (i.e., classified as ‘endangered’ or ‘critically endangered’ according to the International Union for Conservation of Nature (IUCN) Red List (IUCN, 2019))</li> <li>• high quality examples of rare habitats that are threatened throughout their range</li> </ul>
High	<ul style="list-style-type: none"> <li>• designated sites and qualifying / supporting features of national conservational importance (Sites of Special Scientific Interest (SSSI) and Marine Conservation Zones (MCZ))</li> </ul>

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	<ul style="list-style-type: none"> <li>• priority habitats and species or those considered to be of principal importance for the conservation of biodiversity in England and those species considered vulnerable to decline (i.e., classified as 'vulnerable' or 'near threatened' according to the IUCN Red List)</li> <li>• high quality examples of uncommon habitats that are vulnerable throughout their range</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• habitats and species of regional or local importance (i.e., Annex 1 of the Habitats Regs, which are not a qualifying feature of a nearby designated site)</li> <li>• those species considered to be of 'least concern' (according to the IUCN Red List or listed in the OSPAR272 list of threatened and / or declining species for the North-East Atlantic)</li> <li>• poor quality examples of rare or uncommon habitats that are threatened or vulnerable throughout their range</li> </ul>
Low	<ul style="list-style-type: none"> <li>• habitats and species of low conservation importance, such as those generally abundant and widespread around the UK with no specific local value</li> </ul>

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\*Should there be any overlap in the description of a particular feature/receptor, the highest importance criteria rating shall be adopted.

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4.5.7.7 In line with the CIEEM guidelines, the terminology used within the EclA will draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EclA, these terms are defined as follows:

- impact – actions resulting in changes to an ecological feature; for example, underwater sound disturbance leading to displacement of hearing sensitive species; and
- effect – outcome resulting from an impact, acting upon the conservation status or structure and function of an ecological feature; for example, displacement of individuals and loss of important foraging or breeding grounds leading to effects on the reproduction and survival of the local population.

4.5.7.8 The significance of effects will be based on an assessment of the impact magnitude (i.e., the deviation from the baseline condition) and the sensitivity and value (which are synonymous with 'importance') of the receptor. Temporary, permanent, direct and indirect effects that may occur during the construction, operation and maintenance, and decommissioning phases of the Offshore Scheme will be considered, and any mitigation measures necessary will be identified.

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<sup>272</sup> OSPAR refers to the Oslo and Paris Convention for the protection of the marine environment of the North-East Atlantic.

- 4.5.7.9 To determine the likely significance of effects, the following parameters will be considered:
- impact type - direct or indirect, positive or negative, temporary or permanent;
  - magnitude of impact – the ‘amount’ or intensity of an impact. This may sometimes be synonymous with ‘extent’ (see below) for certain receptors, such as habitats loss. For mortality it may be the number of individuals killed;
  - spatial extent of impact – the area over which the impact will occur; and
  - temporal nature of impact – timing, frequency and duration.
- 4.5.7.10 The assessment has also given regard to the sensitivity of an ecological feature to an impact which is determined by its:
- adaptability - i.e. the capacity, or lack thereof, of a feature to avoid or adapt to a change; and
  - tolerance / resilience - i.e. capacity, or lack thereof, of a feature to accommodate temporary or permanent change or recover to pre-existing state following exposure to a change.
- 4.5.7.11 For each marine ecological receptor only those characteristics relevant to understanding the ecological effect and determining the significance are described. The determination of the significance of effects will be based on predicted effects to:
- designated sites – i.e., the conservation objectives for the site and / or its interest / qualifying features;
  - ecosystems / biodiversity – resulting in a change in ecosystem structure and / or function;
  - habitats – i.e., extent, distribution, structure, function as well as its associated species, and its conservation status within a given geographical area; and
  - species – i.e., abundance, distribution (including spawning, foraging and nursery habitats) and its conservation status within a given geographical area or at a particularly sensitive time (e.g., spawning season).
- 4.5.7.12 The significance of effects will be reported as either:
- not significant – no or limited effect to one or more of the features described above; or
  - significant – one or more features described above are affected.
- 4.5.7.13 The CIEEM methodology does not advocate a matrix approach to determining the significance of effects (CIEEM, 2019). However, to maintain consistency with other disciplines, where a matrix approach is suitable, the assessment conclusions will be transposed into the significance terminology used within the wider ES (**Part 1, Chapter 5, EIA Approach and Methodology**). See Table 4.5.6 below.

Table 4.5.6: Description of significance terminology

Classification of effect based on CIEEM guidance	Terminology used elsewhere in the ES	Description in accordance with CIEEM guidance
Significant (beneficial)	Major beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the international level
	Moderate beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the national level
Not-significant	Minor beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at a local level or regional level
	Negligible	No effect on designated sites, ecosystems, habitat and/or species
	Minor adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the local level or regional level
Significant (adverse)	Moderate adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the national level
	Major adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the international level

## 4.5.8 Conclusion

### 4.5.8.1 In summary:

- Of the cetacean species found in UK waters, harbour porpoise occur in the highest numbers within the study area. Bottlenose dolphin, minke whale, white-beaked dolphin are also commonly occurring or resident UK cetacean species but are found in low density in the study area;

- Harbour seal and grey seal are known to haul-out at a number of locations within the Greater Thames Estuary, including Pegwell Bay and Goodwin Sands;
- The Offshore Scheme passes through the Southern North Sea SAC, designated for harbour porpoise;
- The Wash and North Norfolk Coast SAC designated for harbour seal has been screened in for further assessment, despite being approximately 110km away from the Project, due to the identification of the potential connectivity between the Greater Thames Estuary and this site.

## Proposed Scope of the Assessment

4.5.8.2 A summary of the proposed scope of assessment is provided within Table 4.5.7 below.

Table 4.5.7: Proposed scope of the assessment

<b>Receptor</b>	<b>Potential for significant effect</b>	<b>Project phase(s)</b>	<b>Proposed to be scoped in/out</b>
Marine mammals	Disturbance, harm, and mortality to marine mammals due to underwater sound	Construction Maintenance Decommissioning	<b>Scoped in</b>
Marine mammals	Indirectly reduced foraging success, displacement, or mortality from impacts to prey species	Construction Maintenance Decommissioning	<b>Scoped in</b>
Marine mammals	Disturbance, avoidance behaviour, and potential pup mortality due to airborne sound and visual disturbance	Construction Maintenance Decommissioning	<b>Scoped in</b>
Marine Mammals	Disturbance to marine mammals due to cable thermal emissions	Operation	Scoped out
Marine mammals	Interference with behaviour and navigation due to cable EMF emissions	Operation	<b>Scoped in</b>
Marine mammals	Injury and mortality via collision with project vessels	Construction Maintenance Decommissioning	<b>Scoped in</b>

## 4.6 Marine Ornithology

### 4.6.1 Introduction

- 4.6.1.1 This chapter presents how the marine ornithology assessment will consider the potentially significant effects that may arise from the construction, and operation, maintenance and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment and how these potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).
- 4.6.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.
- 4.6.1.3 This chapter should be read in conjunction with:
- **Part 1, Chapter 4, Description of the Project;**
  - **Part 1, Chapter 5, EIA Approach and Methodology;**
  - **Part 4, Chapter 1, Evolution of the Offshore Scheme;**
  - **Part 4, Chapter 3, Benthic Ecology;** and
  - **Part 4, Chapter 4, Fish and Shellfish Ecology.**
- 4.6.1.4 This chapter is supported by the following figure:
- **Figure 4.6.1 Marine Ornithology Study Area and Designated Sites.**

### 4.6.2 Regulatory and Planning Context

- 4.6.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on marine ornithology associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

#### Legislation

- 4.6.2.2 The following legislation is relevant to marine ornithology:
- Marine and Coastal Access Act 2009<sup>273</sup> provides the legal mechanism to help ensure clean, healthy, safe and productive and biologically diverse oceans and seas;

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<sup>273</sup> Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents>.

- The Conservation of Habitats and Species Regulations 2017<sup>274</sup> (amended 2019<sup>275</sup>) transposes the Habitats Directive (92/43/EEC) into UK legislation out to the 12 nautical mile (NM) limit;
- The Conservation of Offshore Marine Habitats and Species Regulations 2017<sup>276</sup> applies within the UK Offshore Marine Area (beyond the 12 NM limit);
- The Wildlife and Countryside Act 1981 (as amended)<sup>277</sup> includes provisions relating to nature conservation;
- The Marine Strategy Regulations 2010<sup>278</sup> transposes the Marine Strategy Framework Directive (2008/56/EC) into UK legislation;
- Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC)<sup>279</sup> lists species of principal importance for the purpose of conservation of biodiversity;
- The Countryside and Rights of Way (CRoW) Act 2000 (as amended)<sup>280</sup>, and
- Environment Act 2021<sup>281</sup>, will set clear statutory targets for the recovery of the natural world in four priority areas: air quality, biodiversity, water and waste, and includes the introduction of Biodiversity Net Gain (BNG).

## Planning Policy

4.6.2.3 The following plans and policies are relevant to marine ornithology.

### National planning policy

- National Policy Statements (NPS) - the UK Government produces NPS which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP). Those potentially relevant to marine ornithology are:
  - Overarching National Policy Statement for Energy – EN-1<sup>282</sup>;
  - Renewable Energy Infrastructure – EN-3<sup>283</sup>;

<sup>274</sup> The Conservation of Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1012/contents/made>.

<sup>275</sup> Amended in response to the UK's exit from the European Union (EU), making the Habitats (92/43/EEC) and Wild Birds (2009/147/EC) Directives, operable from 1 January 2021, and creating a UK natural site network in place of the EU Natura 2000 ecological network.

<sup>276</sup> The Conservation of Offshore Marine Habitats and Species Regulations 2017. [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1013/made>

<sup>277</sup> The Wildlife and Countryside Act 1981. [online] Available at: <https://www.legislation.gov.uk/ukpga/1981/69>.

<sup>278</sup> The Marine Strategy Regulations 2010. [online] Available at: <https://www.legislation.gov.uk/uksi/2010/1627/contents/made>.

<sup>279</sup> Section 41 of the Natural Environment and Rural Communities Act 2006. [online] Available at: <https://www.legislation.gov.uk/ukpga/2006/16/section/41>.

<sup>280</sup> Wildlife and Countryside Act 1981 (as amended) 1981 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1981/69/contents>.

<sup>281</sup> The Act has been enshrined into law; however, it is not anticipated to come into full effect until the end of 2023 (2025 for NSIPs).

<sup>282</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy (EN-1). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) [Accessed 09 August 2022].

<sup>283</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Renewable Energy (EN-3). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47856/1940-nps-renewable-energy-en3.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf) [Accessed 09 August 2022].

- Electricity Networks - EN-5<sup>284</sup>;
- National Planning Policy Framework<sup>285</sup>;
- Planning Practice Guidance – Natural Environment<sup>286</sup>; and
- Planning Practice Guidance – Renewable and low carbon energy<sup>287</sup>.
- National Planning Framework 2 (NPF2)<sup>288</sup>, aims to co-ordinate policies of a spatial nature with investment priorities. Biodiversity is stated as one of the factors contributing to the core objectives of sustainable economic development.

### Local planning policy

- The UK Marine Policy Statement (MPS)<sup>289</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made. The following marine plans have been considered in the development of this Scoping Report:
  - East Inshore and East Offshore Marine Plan<sup>290</sup>
  - South East Inshore Marine Plan<sup>291</sup>

## 4.6.3 Study Area

4.6.3.1 This study area has been defined, recognising the highly mobile and wide-ranging nature of birds in the marine environment and the potential implications of local impacts on wider populations. Considering the maximum likely Zones of Influence (ZOI) for potential effects on sensitive marine ornithological receptors from the Offshore Scheme, the study area for the baseline encompasses a buffer of 10km around the Offshore Scoping Boundary (**Figure 4.6.1 Ornithology Study Area and Designated Sites**).

4.6.3.2 In defining the study area an initial review of the following available sources has been undertaken:

<sup>284</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Electricity Networks (EN-5). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47858/1942-national-policy-statement-electricity-networks.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf) [Accessed 09 August 2022].

<sup>285</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

<sup>286</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance – Natural Environment. [online] Available at: <https://www.gov.uk/guidance/natural-environment#biodiversity-geodiversity-and-ecosystems> [Accessed 09 August 2022].

<sup>287</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2015). Planning Practice Guidance – Renewable and Low Carbon. [online] Available at: <https://www.gov.uk/guidance/renewable-and-low-carbon-energy> [Accessed 09 August 2022].

<sup>288</sup> Ministry of Housing, Communities and Local Government National Planning Framework (2012). National Planning Policy Framework. [online] Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>.

<sup>289</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) [Accessed 09 August 2022].

<sup>290</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>291</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

- The Joint Nature Conservation Committee (JNCC) atlas of seabird distribution in north-west European waters<sup>292</sup> and Distribution of seabirds in the North-East Atlantic<sup>293</sup>;
- relevant Environmental Statements (ES) and associated appendices detailing the results of project specific ornithological surveys produced for large infrastructure projects in the vicinity of the Offshore Scheme, when published into the public domain; and
- seabird foraging ranges<sup>294 295</sup>, including site and specific species studies.

4.6.3.3 This supports a 10km study area for designated sites as being proportionate, with infrequent occurrence of seabird species with extensive foraging ranges associated with more distant designated sites known or likely to be present within the Offshore Scoping Boundary. The relevant designated sites within the study area are set out in the following section.

## 4.6.4 Baseline Conditions

4.6.4.1 Birds designated as qualifying features of the National Site Network (including Special Protection Areas (SPAs) and Ramsar Sites), otherwise known as European sites, and those species listed as part of nationally designated sites (e.g., Sites of Special Scientific Interest (SSSI) and National Nature Reserve (NNR)) (all hereafter referred to as 'Designated sites') represent populations of highest conservation importance and sensitivity. Therefore, only qualifying bird species which have the potential to be present in the ZOI of the Offshore Scheme are considered further within this chapter.

### Data Sources

4.6.4.2 To determine the baseline conditions for marine ornithology within the study area the following key data sources have been reviewed:

- JNCC atlas of seabird distribution in north-west European waters<sup>294</sup> and Distribution of seabirds in the North-East Atlantic<sup>295</sup>;
- JNCC website for details of SPAs including site information and designation details, including Supplementary Advice on Conservation Objectives (SACOs)<sup>296</sup>;
- Natural England Designated Sites Viewer for designated site information and designation details<sup>297</sup>;

<sup>292</sup> Stone, C., Webb, A., Barton, C., Ratcliffe, N., Reed, T., Tasker, M., Camphuysen, C. and Pienkowski, M. (1995). An Atlas of seabird distribution in north-west European Water. [online] Available at: <https://data.jncc.gov.uk/data/c132752f-827c-41fc-b617-e681db21eaf5/atlas-of-seabird-distribution-north-west-european-waters.pdf> [Accessed 03 June 2022].

<sup>293</sup> Waggitt, J. *et al.*, (2020). Distribution maps of cetacean and seabird populations in the North-East. *Journal of Applied Ecology*, 57(2), pp. 105.

<sup>294</sup> Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolton, M., Langston, R. and Burton, M. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*, 156, pp. 53.

<sup>295</sup> Woodward, I., Thaxter, C., Owen, E. and Cook, A. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, Issue BTO Research Report No.724.

<sup>296</sup> JNCC (no date). About Marine Protected Areas. [online] Available at: <https://jncc.gov.uk/our-work/about-marine-protected-areas/>.

<sup>297</sup> Natural England (no date). Designated Sites. [online] Available at: <https://designatedsites.naturalengland.org.uk/>.

- relevant ES and associated appendices detailing the results of project specific ornithological surveys produced for large infrastructure projects in the vicinity of the Offshore Scheme, when published into the public domain.

## Baseline

- 4.6.4.3 The Offshore Scheme passes directly through six designated sites, which are internationally or nationally designated for the protection of species of seabird and waterbird, which have the potential to interact with the Offshore Scheme:
- Outer Thames Estuary SPA;
  - Thanet Coast & Sandwich Bay SPA;
  - Thanet Coast & Sandwich Bay Ramsar;
  - Sandwich & Pegwell Bay NNR;
  - Sandwich Bay to Hacklinge Marshes SSSI; and
  - Leiston – Aldeburgh SSSI.
- 4.6.4.4 The Outer Thames Estuary SPA is located on the east coast of England, between the counties of Norfolk to the north and Kent to the south and extends into the North Sea. The site comprises areas of shallow and deeper water, high tidal current streams and a range of mobile mud, sand, silt and gravely sediments extending into the marine environment, incorporating areas of sandbanks often exposed at low tide. Intertidal mud and sandflats are found further towards the coast and within creeks and inlets inland down the Blyth estuary and the Crouch and Roach estuaries. The Outer Thames Estuary SPA is designated for its aggregation of wintering red-throated diver (*Gavia stellata*) as well as to provide protection for the foraging areas of both the common tern (*Sterna hirundo*) and little tern (*Sternula albifrons*) during the breeding season.
- 4.6.4.5 Thanet Coast and Sandwich Bay SPA is located across the north and east Kent coast stretching from Swalecliffe to Deal. A large proportion of the site is intertidal consisting of large areas of intertidal mud and sand flats at Pegwell, Minnis and Sandwich Bay, with shingle and rocky shores, lagoons, maritime grassland, saltmarsh habitats, and intertidal shingle habitats. Thanet Coast and Sandwich Bay SPA is designated for breeding populations of little tern and non-breeding populations of golden plover (*Pluvialis apricaria*), and turnstone (*Arenaria interpres*). The site is also designated as a Ramsar site due to the ecological features previously mentioned and additional noteworthy species including ringed plover (*Charadrius hiaticula*), common greenshank (*Tringa nebularia*), red-throated diver, great crested grebe (*Podiceps cristatus*) and sanderling (*Calidris alba*).
- 4.6.4.6 Sandwich & Pegwell Bay NNR is located in the north-east coast of Kent. The site has largest reed bed in the south-east of England, which supports a range of specialised birds and insects. The reed beds support a wide variety of migrating birds including barn swallows (*Hirundo rustica*) and house martins (*Delichon urbicum*) in the summer and starlings (*Sturnus vulgaris*) in the winter. Other common occurring species include bittern (*Botaurus stellaris*), marsh harrier (*Circus aeruginosus*), kingfisher (*Alcedo atthis*), great crested grebe, coot (*Fulica atra*), moorhen (*Gallinula chloropus*).
- 4.6.4.7 Sandwich Bay to Hacklinge Marshes SSSI stretches between Deal and Sandwich in Kent. The site forms part of the Thanet Coast and Sandwich Bay SPA/Ramsar site and Sandwich & Pegwell Bay NNR and is designated for the same non-breeding

populations of bird species. The biological feature of interest for this site is the mudflats in Pegwell Bay which provide bird roosting and feeding grounds.

- 4.6.4.8 Leiston-Aldeburgh SSSI contains a rich mosaic of habitats, including acid grassland, heath, woodland, fen, scrub, open water and vegetated shingle. This unusual mix of habitats and associated transition communities between habitats support a diverse and abundant community of breeding and overwintering birds.
- 4.6.4.9 In addition to this, six other designated sites for the protection of marine and coastal birds are located within the 10km study area. These sites are:
- Minsmere to Walberswick SPA
  - Minsmere to Walberswick Ramsar
  - Minsmere to Walberswick SSSI
  - Alde-Ore Estuary SPA
  - Alde-Ore Estuary Ramsar
  - Alde-Ore Estuary SSSI
- 4.6.4.10 Some intertidal bird surveys of waterbirds using the intertidal habitat within and surrounding the Suffolk and Kent Onshore Schemes have been undertaken by AECOM and further surveys will be undertaken in 2022/2023. Intertidal bird surveys to date were conducted from December 2021 to January 2022 for the Suffolk Onshore Scheme and December 2021 to March 2022 for the Kent Onshore Scheme. The surveys were carried out using Wetland Bird Survey (WeBS)<sup>298</sup> core count and low tide count methodology. This involved monthly high tide and low tide surveys. Where possible, a high-water count was then followed on the same day by a low water count (or vice versa). Counts were conducted during the day within two hours (three at most) either side of the tide.
- 4.6.4.11 The intertidal bird survey was undertaken from suitable vantage points to observe all birds without causing disturbance. During the survey, one experienced ornithologist, equipped with binoculars and telescope of appropriate magnification recorded and mapped all waterbird species within the survey area. Further survey details are provided in **Part 2, Chapter 3, Ecology and Biodiversity** and **Part 3, Chapter 3, Ecology and Biodiversity**.
- 4.6.4.12 Breeding bird and wintering bird surveys along the shoreline of Suffolk and Kent Onshore Schemes have been undertaken by AECOM in 2022 and further surveys are scheduled to be undertaken in 2023. These surveys were carried out using the Common Bird Census (CBC) methodology, as described in Gilbert *et al*<sup>299</sup>. (1998). Surveys were undertaken early in the morning, commencing just after sunrise and finishing before midday. Two suitably qualified ecologists recorded all species of breeding birds present within the survey area, and detailed bird behaviour, including singing, calling, flights and movements between areas, carrying food, nest building, aggressive encounters and any other bird behaviour.

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<sup>298</sup> British Trust of Ornithology (BTO) (No Date). Wetland Bird Survey. [online] Available at: <https://www.bto.org/our-science/projects/wetland-bird-survey/taking-part/core-counts-methods>.

<sup>299</sup> Gilbert, G., Gibbons, D. and Evans, J. (1998). Bird monitoring methods: A manual of techniques for key UK species. London, UK: RSPB and Pelagic Publishing.

- 4.6.4.13 Further intertidal and breeding bird surveys have been proposed for the Suffolk and Kent Onshore Schemes. Any data collected during these surveys will be used to inform the marine ornithology chapter of the EIA, where appropriate.

## Future Baseline

- 4.6.4.14 The marine ornithology chapter within the ES will include an outline of the likely evolution of the baseline environment without the implementation of the development as far as natural changes from the baseline scenario can be assessed.

## 4.6.5 Embedded and Control & Management Measures

- 4.6.5.1 The mitigation required will be proportionate to the significance of impact to marine ornithological receptors. Given that many design elements of the Offshore Scheme have yet to be set, mitigation approaches will need to be informed by the findings of the baseline characterisation, project-specific surveys and discussed with statutory consultees and stakeholders throughout the EIA process.

### Embedded Measures

- 4.6.5.2 The identification of the Offshore Scoping Boundary has been designed to avoid sensitive areas where possible.

### Control and Management Measures

- 4.6.5.3 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the marine ornithology assessment are:
- GM03 - an offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation.
  - LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972)<sup>300</sup> (IMO, 2019a), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78)<sup>301</sup> (IMO, 2019e) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974)<sup>302</sup>.

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<sup>300</sup> International Maritime Organisation (IMO) (1972). Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGs). [online] Available at: <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx> [Accessed 10 August 2022].

<sup>301</sup> International Maritime Organisation (IMO) (1983). International Convention for the Prevention of Pollution from Ships (MARPOL). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx) [Accessed 10 August 2022].

<sup>302</sup> International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS). [online] Available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf>.

- LVS05 - drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (PLONOR substances) where practicable,
  - drilling fluids will be tested for contamination to determine possible reuse or disposal; and
  - If disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- MPE03 - cable protection features (e.g. rock placement, mattresses and grout bags) will be installed only where considered necessary for the safe operation of the Project.
- BE03 - cable installation will be carried out on a 24-hour basis in order to reduce the overall installation time and associated disturbance of ecological receptors.
- O01 - the CoCP and CEMP will outline the best practice mitigation measures required to be implemented during construction. This would include measures to prevent accidental spillages from occurring and to minimise disturbance of sediments.

## 4.6.6 Potential for Significant Effects

4.6.6.1 The marine ornithology assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.

4.6.6.2 The proposed scope of the marine ornithology assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

4.6.6.3 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme. The potential for the identified impacts to result in potential significant effects takes into account the embedded and control and management measures described in section 5.

#### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;
- cable installation and cable lay;
- cable protection (e.g. rock placement, concrete mattresses); and

- vessel presence.

### Sources of operational impacts

- N/A

### Sources of maintenance impacts

- cable repair or replacement;
- cable protection (e.g. rock placement, concrete mattresses); and
- vessel presence.

### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and
- vessel presence.

### Potential impacts

4.6.6.4 Table 4.6.1 identifies the potential impacts that could result from the sources identified above.

Table 4.6.1: Sources and impacts

Project phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance & decommissioning	All vessel activities associated with the Project	Direct disturbance and displacement of birds associated with sound, visual impacts and presence from vessels	Yes	Scoped in
Construction, maintenance, & decommissioning	Cable route preparation/installation/repair, cable protection, cable removal	Direct loss and disturbance of seabed habitat (including, associated prey) used by foraging seabirds and waterbirds	Yes	Scoped in
Construction, maintenance & decommissioning	Cable route preparation/installation/repair, cable	Alteration of water quality due to increased Suspended Sediment Concentrations	Yes	Scoped in

	protection, cable removal	(SSC) and disturbance of contaminated sediment		
Construction, maintenance & decommissioning	All vessel activities associated with the Project	Alteration of water quality due to accidental leaks and spills from vessels	No - the significance of potential impacts is considered to be negligible due to the measures committed to in the CoCP these same measures would apply to maintenance and decommissioning activities	Scoped out

## Impact Pathways with Receptors (Step 2)

- 4.6.6.5 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the marine ornithology study area.
- 4.6.6.6 Table 4.6.2 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the marine ornithology assessment for the Offshore Scheme (**Figure 1.1.4 Offshore Scheme Scoping Boundary**).

Table 4.6.2: Impact pathways with receptors

Impact Pathway	Receptors	Potential for significant effect	Proposed to be scoped in/out
Direct disturbance and displacement of birds associated with sound, visual impacts and presence from vessels during construction, maintenance and decommissioning	Marine ornithology	Yes - various activities associated with the Project such as cable route preparation, cable installation/repairs and removal require the presence of vessels. Vessel presence/movements and the associated increased noise may result in displacement and/or avoidance of birds foraging or loafing in the area.	<b>Scoped in</b>
Direct loss and disturbance of seabed habitat (including,	Marine ornithology	Yes - there is a potential for direct loss and disturbance of	<b>Scoped in</b>

associated prey) used by foraging seabirds and waterbirds from cable installation/maintenance/decommissioning activities and project infrastructure during operation.

seabird foraging habitat from cable installation, maintenance and decommissioning activities and through the placement and removal of offshore project infrastructure. This includes the potential loss of prey items (such as herring and sandeel) for which certain subtidal habitats are important. The loss of benthic habitat will be limited to the locations of the cable installation and at landfall locations as well as any placement of hard substrates on the seabed for cable protection.

Alteration of water quality due to increased SSC and disturbance of contaminated sediment.

Marine ornithology

Yes - construction, maintenance and decommissioning methods have the potential to disturb the seabed leading to the creation of sediment plumes with increased SSC. Consequently, increased turbidity may inhibit primary production of key food sources or providers of habitat. Sediment plumes may lead to the deposition of sediments to the seabed, in turn smothering areas important foraging areas for seabirds. Additionally, if present, contaminants within the sediment could be released during these works if sediment is disturbed, which could

**Scoped in**

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affect water quality  
and marine ecological  
receptors including  
ornithological features.

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## 4.6.7 Proposed Assessment Methodology

### Proposed Data Sources

- 4.6.7.1 The desk study and relevant bird surveys of the terrestrial and intertidal areas will characterise the ornithological baseline of the study area and establish the ornithological receptors taken forward for assessment.
- 4.6.7.2 The marine ornithology baseline will be determined through review of existing datasets and sources and informed by project specific intertidal and breeding bird surveys; no dedicated offshore bird surveys are proposed to be undertaken.
- 4.6.7.3 Establishment of the baseline environment will be informed using the following key data sources:
- JNCC website for details of SPAs including site information and designation details, including Supplementary Advice on Conservation Objectives (SACOs)<sup>303</sup>;
  - The British Trust for Ornithology (BTO) website<sup>304</sup> for site specific data from the WeBS, a partnership between the BTO, the Royal Society for the Protection of Birds (RSPB) and JNCC (the last on behalf of Natural England (NE), Natural Resources Wales (NRW), Scottish Natural Heritage (SNH) and the Department of the Environment Northern Ireland (DENI)) in association with the Wildfowl and Wetlands Trust (WWT);
  - JNCC Offshore Wind Evidence Environmental Evidence Register<sup>305</sup>;
  - JNCC atlas of seabird distribution in north-west European waters<sup>306</sup> and Distribution of seabirds in the North-East Atlantic<sup>307</sup>;
  - Relevant Environmental Statements and associated appendices detailing the results of project specific ornithological surveys produced for large infrastructure projects in the vicinity of the Offshore Scheme, when published into the public domain;

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<sup>303</sup> JNCC (no date). About Marine Protected Areas. [online] Available at: <https://jncc.gov.uk/our-work/about-marine-protected-areas/>.

<sup>304</sup> British Trust for Ornithology (BTO) (No Data). [online] Available at: <https://www.bto.org/our-science/data>.

<sup>305</sup> Marine Data Exchange (2021). JNCC, Offshore Wind Evidence and Change Programme, Offshore Wind Environmental Evidence Register. [online] Available at: <https://www.marinedataexchange.co.uk/details/3480/2021-jncc-offshore-wind-evidence-and-change-programme-offshore-wind-environmental-evidence-register-/summary> [Accessed 10 August 2022].

<sup>306</sup> Stone, C., Webb, A., Barton, C., Ratcliffe, N., Reed, T., Tasker, M., Camphuysen, C. and Pienkowski, M. (1995). An Atlas of seabird distribution in north-west European Water. [online] Available at: <https://data.jncc.gov.uk/data/c132752f-827c-41fc-b617-e681db21eaf5/atlas-of-seabird-distribution-north-west-european-waters.pdf> [Accessed 03 June 2022].

<sup>307</sup> Waggitt, J. et al., (2020). Distribution maps of cetacean and seabird populations in the North-East. *Journal of Applied Ecology*, 57(2), pp. 105.

- Seabird foraging ranges<sup>308 309</sup>, including site and specific species studies;
- FAME (Future of the Atlantic Marine Environment) and STAR (Seabird Tracking and Research) seabird tracking projects<sup>310</sup>; and
- Analyses of European Seabirds at Sea (ESAS) data<sup>311</sup>.

## Proposed Assessment Methodology

4.6.7.4 All ecological assessments for the project will be completed in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019). The method will be tailored to reflect the specific conditions of the marine environment, in particular to ensure the high levels of movement of marine receptors between habitats and populations, are considered fully in respect of the predicted ZOI arising from the Offshore Scheme.

4.6.7.5 The aims of the marine EclA are to:

- identify important ecological features (e.g., designated sites, habitats or species) which have the potential to be impacted by the Offshore Scheme;
- provide a robust assessment of the likely ecological impacts and resultant effects of the Offshore Scheme, which may be beneficial (i.e. positive) or adverse (i.e. negative);
- facilitate determination of the consequences of the Offshore Scheme in terms of national, regional and local policies relevant to nature conservation and biodiversity, where the level of detail provided is proportionate to the scale of the development and the complexity of its impact pathways;
- identify appropriate mitigation to reduce any likely ecological impacts; and
- set out the steps to be taken to adhere to legal requirements relating to the relevant ecological features concerned.

4.6.7.6 In accordance with CIEEM (2019) guidance, not all habitats and species which have the potential to occur in the ZOI of the Offshore Scheme will be considered. Rather, focus will be placed on those features considered to be 'important' – determining importance is discussed in further detail below. To ensure compliance with National and European policy, consideration is still given to biodiversity in its entirety and the need to achieve no net loss and enhancement of biodiversity.

4.6.7.7 In accordance with the CIEEM guidance, the importance of an ecological feature or receptor is defined according to the following factors:

<sup>308</sup> Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolton, M., Langston, R. and Burton, M. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*, 156, pp. 53.

<sup>309</sup> Woodward, I., Thaxter, C., Owen, E. and Cook, A. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, Issue BTO Research Report No.724.

<sup>310</sup> Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P. and Newell, M. (2017). Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species. *Ecological Applications*, 27(7), pp. 2074-2091.

<sup>311</sup> Kober K., Webb A., Win I., Lewis M., O'Brien S., Wilson L., and Reid, J. (2010). JNCC Report No. 431, An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. [online] Available at: <https://hub.jncc.gov.uk/assets/7db38547-5074-4136-8973-fd7d97666120>.

- conservation or legal status;
- quality or health;
- extent; and
- rarity or endemism.

4.6.7.8 The importance of an ecological feature has also been defined with reference to a specific geographical context. Marine features are highly connected with few boundaries and the approach therefore adopts the level of legislative designation as a proxy for the geographical importance of a marine species receptor. These and the other criteria for importance ratings are shown in Table 4.6.3 below.

Table 4.6.3: Importance criteria for marine ecology features/receptors

<b>Importance description*</b>	
Very High	<ul style="list-style-type: none"> <li>• designated sites and qualifying / supporting features of international importance (SACs, SPAs, Ramsar Sites).</li> <li>• species which are legally protected and / or in significant decline (i.e., classified as 'endangered' or 'critically endangered' according to the International Union for Conservation of Nature (IUCN) Red List (IUCN, 2019)).</li> <li>• high quality examples of rare habitats that are threatened throughout their range.</li> </ul>
High	<ul style="list-style-type: none"> <li>• designated sites and qualifying / supporting features of national conservational importance (SSSI and Marine Conservation Zones (MCZ))</li> <li>• priority habitats and species or those considered to be of principal importance for the conservation of biodiversity in England and those species considered vulnerable to decline (i.e., classified as 'vulnerable' or 'near threatened' according to the IUCN Red List).</li> <li>• high quality examples of uncommon habitats that are vulnerable throughout their range.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• habitats and species of regional or local importance (i.e., Annex 1 of the Habitats Regs, which are not a qualifying feature of a nearby designated site).</li> <li>• those species considered to be of 'least concern' (according to the IUCN Red List or listed in the OSPAR<sup>312</sup> list of threatened and / or declining species for the North-East Atlantic).</li> <li>• poor quality examples of rare or uncommon habitats that are threatened or vulnerable throughout their range.</li> </ul>

<sup>312</sup> OSPAR refers to the Oslo and Paris Convention for the protection of the marine environment of the North-East Atlantic.

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Low

- habitats and species of low conservation importance, such as those generally abundant and widespread around the UK with no specific local value.

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\*Should there be any overlap in the description of a particular feature/receptor, the highest importance criteria rating shall be adopted.

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- 4.6.7.9 In line with the CIEEM guidelines, the terminology used within the EclA will draw a clear distinction between the terms ‘impact’ and ‘effect’. For the purposes of the EclA, these terms are defined as follows:
- impact – actions resulting in changes to an ecological feature; for example, underwater sound disturbance leading to displacement of hearing sensitive species; and
  - effect – outcome resulting from an impact, acting upon the conservation status or structure and function of an ecological feature; for example, displacement of individuals and loss of important foraging or breeding grounds leading to effects on the reproduction and survival of the local population.
- 4.6.7.10 The significance of effects will be based on an assessment of the impact magnitude (i.e., the deviation from the baseline condition) and the sensitivity and value (which are synonymous with 'importance') of the receptor. Temporary, permanent, direct and indirect effects that may occur during the construction, operation and maintenance, and decommissioning phases of the Offshore Scheme will be considered, and any mitigation measures necessary will be identified.
- 4.6.7.11 To determine the likely significance of effects, the following parameters will be considered:
- impact type - direct or indirect, positive or negative, temporary or permanent;
  - magnitude of impact – the ‘amount’ or intensity of an impact. This may sometimes be synonymous with ‘extent’ (see below) for certain receptors, such as habitat loss. For mortality it may be the number of individuals killed;
  - spatial extent of impact – the area over which the impact will occur; and
  - temporal nature of impact – timing, frequency and duration.
- 4.6.7.12 The assessment has also given regard to the sensitivity of an ecological feature to an impact which is determined by its:
- adaptability - i.e. the capacity, or lack thereof, of a feature to avoid or adapt to a change; and
  - tolerance / resilience - i.e. capacity, or lack thereof, of a feature to accommodate temporary or permanent change or recover to pre-existing state following exposure to a change.
- 4.6.7.13 For each marine ecological receptor only those characteristics relevant to understanding the ecological effect and determining the significance are described. The determination of the significance of effects will be based on predicted effects to:
- designated sites – i.e., the conservation objectives for the site and / or its interest / qualifying features;

- ecosystems / biodiversity – resulting in a change in ecosystem structure and / or function;
- habitats – i.e., extent, distribution, structure, function as well as its associated species, and its conservation status within a given geographical area; and
- species – i.e., abundance, distribution (including spawning, foraging and nursery habitats) and its conservation status within a given geographical area or at a particularly sensitive time (e.g., spawning season).

4.6.7.14 The significance of effects will be reported as either:

- not Significant – no or limited effect to one or more of the features described above; or
- significant – one or more features described above are affected.

4.6.7.15 The CIEEM methodology does not advocate a matrix approach to determining the significance of effects (CIEEM, 2019). However, to maintain consistency with other disciplines, where a matrix approach is suitable, the assessment conclusions will be transposed into the significance terminology used within the wider ES (**Part 1, Chapter 5, EIA Approach and Methodology**) See Table 4.6.4 below.

Table 4.6.4: Description of significance terminology

<b>Classification of effect based on CIEEM guidance</b>	<b>Terminology used elsewhere in the ES</b>	<b>Description in accordance with CIEEM guidance</b>
Significant (beneficial)	Major beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the international level
	Moderate beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at the national level
Not-significant	Minor beneficial	Beneficial effect on designated sites, ecosystems, habitat and/or species at a local level or regional level
	Negligible	No effect on designated sites, ecosystems, habitat and/or species
	Minor adverse	Adverse effect on designated sites, ecosystems, habitat and/or species at the local level or regional level
Significant (adverse)	Moderate adverse	Adverse effect on designated sites, ecosystems, habitat

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and/or species at the national level

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Major adverse

Adverse effect on designated sites, ecosystems, habitat and/or species at the international level

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## 4.6.8 Conclusion

4.6.8.1 In summary:

- Seabirds and waterbirds are highly sensitive species with strong protection under UK legislation. A number of impact pathways have been identified from the Offshore Scheme that could potentially significantly affect seabirds and/or waterbirds.
- The Offshore Scheme will pass directly through the following designated sites:
  - Outer Thames Estuary SPA;
  - Thanet Coast & Sandwich Bay SPA;
  - Thanet Coast & Sandwich Bay Ramsar;
  - Sandwich & Pegwell Bay NNR;
  - Sandwich Bay to Hacklinge Marshes SSSI; and
  - Leiston – Aldeburgh SSSI.
- A detailed assessment based on the potential impacts identified above and informed by project-specific marine ornithology characterisation, will be carried out.

### Proposed Scope of the Assessment

4.6.8.2 A summary of the proposed scope of assessment is provided within Table 4.6.5 below.

Table 4.6.5: Proposed scope of the assessment

Receptor	Potential for significant effect	Project phase(s)	Proposed to be scoped in/out
Ornithology	Direct disturbance and displacement of birds associated with sound, visual impacts and presence from vessels	Construction, maintenance & decommissioning	<b>Scoped in</b>
Ornithology	Direct loss and disturbance of seabed habitat (including, associated prey) used by foraging seabirds and waterbirds	Construction, maintenance, operation & decommissioning	<b>Scoped in</b>

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Ornithology	Alteration of water quality due to increased SSC and disturbance of contaminated sediment	Construction, maintenance & decommissioning	<b>Scoped in</b>
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## 4.7 Marine Archaeology

### 4.7.1 Introduction

- 4.7.1.1 This chapter presents how the marine archaeological heritage assessment will consider the potentially significant effects on marine archaeological heritage assets that may arise from the construction, operation, maintenance and decommissioning of the Offshore Scheme (as described in **Part 1, Chapter 4, Description of the Project**). This chapter of the Scoping Report introduces the receptors relevant to marine archaeology, describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment, and how the potential significant effects will be assessed for the purpose of an EIA.
- 4.7.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.
- 4.7.1.3 This chapter should be read in conjunction with:
- **Part 1, Chapter 4, Description of the Project;**
  - **Part 1, Chapter 5, EIA Approach and Methodology;**
  - **Part 4, Chapter 1, Evolution of the Offshore Scheme;** and
  - **Part 4, Chapter 2, Physical Environment.**
- 4.7.1.4 This chapter is supported by the following figure:
- **Figure 4.7.1 Location of Recorded Seabed and Intertidal Features within, and in Proximity to, the Study Area.**

### 4.7.2 Regulatory and Planning Context

- 4.7.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on marine archaeology associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

#### Legislation

- 4.7.2.2 The following legislation applies to marine heritage:

- Marine and Coastal Access Act 2009<sup>313</sup> provides the legal mechanism to help ensure clean, healthy, safe and productive and biologically diverse oceans and seas and is the primary legislation relevant to marine development plans;
- Protection of Wrecks Act 1973, Section One and Two<sup>314</sup>, Section 1 of the act provides for wrecks to be designated because of historical, archaeological or artistic value. Section 2 provides for designation of dangerous sites. Wreck sites must have a known location in order to be designated;
- Ancient Monuments and Archaeological Areas Act 1979 (as amended)<sup>315</sup>, legislation to protect terrestrial and marine archaeological heritage of England, Wales and Scotland;
- Protection of Military remains Act 1986<sup>316</sup>, provides protection for the wreckage of military aircraft and designated military vessels; and
- Merchant Shipping Act 1995<sup>317</sup> - Part IX: Salvage and Wreck, sets out the procedures for determining the ownership of underwater material identified as 'wreck', defined as flotsam, jetsam, derelict and lagan found in or on the shores of the UK's territorial waters or any UK tidal water.

4.7.2.3 The above legislation provides a context for focussing approaches and consultation requirements. These legal frameworks provide protection for marine historic assets of historical, archaeological or artistic value, as well as allowing military wrecks and aircraft remains to be protected. Ownership of any wreck remains is determined in accordance with the Merchant Shipping Act 1995<sup>319</sup> as administered by the Receiver of Wreck.

## Planning Policy

4.7.2.4 National Policy Statements (NPS) - the UK Government produces NPS which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP). Those potentially relevant to marine archaeology are shown in Table 4.7.1.

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<sup>313</sup> Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents/enacted> [Accessed June 2022].

<sup>314</sup> Protection of Wrecks Act 1973 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1973/33/enacted> [Accessed June 2022].

<sup>315</sup> Ancient Monuments and Archaeological Areas Act 1979 (as amended) [online]. Available at: <https://www.legislation.gov.uk/ukpga/1979/46/enacted> [Accessed June 2022].

<sup>316</sup> Protection of Military Remains Act 1986 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1986/35/contents/enacted> [Accessed June 2022].

<sup>317</sup> Merchant Shipping Act 1995 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1995/21/contents/enacted> [Accessed June 2022].

Table 4.7.1: Summary of relevant NPS documents

Policy	Summary
Overarching National Policy Statement for Energy (EN-1) <sup>318</sup>	This NPS sets out national policy for energy infrastructure and the importance of archaeological assessment in the development process.
National Policy Statement for Electricity Networks Infrastructure (EN-5) <sup>319</sup>	This NPS, taken together with the overarching NPS (EN-1), provides for decision making on above ground electricity lines of 132kV and over and other electricity networks associated with a Nationally Significant Infrastructure Project e.g. substations and converted stations.

### National Planning Policy Framework

4.7.2.5 Section 15 of the National Planning Policy Framework<sup>320</sup> (NPPF) entitled ‘Conserving and enhancing the historic environment’ sets out the principal national guidance on the importance, management and safeguarding of heritage assets within the planning process. The aim of this section is to ensure that Regional Planning Bodies and Local Planning Authorities, developers, and owners of heritage assets adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them. The government guidance provides a framework that:

- recognises that heritage assets are an irreplaceable resource;
- requires applicants to provide proportionate information on the significance of heritage assets affected by the proposals and an impact appraisal of the proposed development on that significance;
- takes into account the desirability of sustaining and enhancing the significance of heritage assets and their setting;
- places weight on the conservation of designated heritage assets;
- requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and impact, and to make this evidence (and any archive generated) publicly accessible; and
- promotes the conservation of heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life for this and future generations.

<sup>318</sup> Department of Energy and Climate Change (2011) *Overarching National Policy Statement for Energy (EN-1)*. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) [Accessed May 2022].

<sup>319</sup> Department of Energy and Climate Change (2011) *National Policy Statement for Electricity Networks Infrastructure (EN-5)*. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47858/1942-national-policy-statement-electricity-networks.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf) [Accessed May 2022].

<sup>320</sup> Ministry of Housing, Communities and Local Government (2021). *National Planning Policy Framework*. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

## Marine policy

- 4.7.2.6 The Marine and Coastal Access Act 2009<sup>315</sup> (MCAA) is the primary legislation relevant to marine development plans. Under this legislation, marine plans must be consistent with the UK Marine Policy Statement<sup>321</sup> (MPS) and fully reflect the requirements of the MPS at a local level. Marine plans must also be in accordance with other UK national policy, including the NPPF<sup>322</sup>.
- 4.7.2.7 The MPS was prepared and adopted by HM Government and the devolved administrations of Scotland, Wales and Northern Ireland for the purposes of Section 44 of the Marine and Coastal Access Act 2009<sup>315</sup>. Marine Plans (see below) set out how the MPS will be implemented in specific areas.

## Local planning policy

### Marine plans

- 4.7.2.8 The following marine plans have been considered in the development of this Scoping Report:
- East Inshore and East Offshore Marine Plan<sup>322</sup>
  - South East Inshore Marine Plan<sup>323</sup>

### East Suffolk

- 4.7.2.9 East Suffolk Council's Suffolk Coastal Local Plan Adopted 2020<sup>324</sup>, sets out the strategic and non-strategic planning policies which the Council will use to determine planning applications across the former Suffolk Coastal District area. The Council will be a statutory consultee in processes relating to all proposed NSIP.
- 4.7.2.10 Table 4.7.2 summarises the relevant policies from the plan.

Table 4.7.2: East Suffolk Council's Suffolk Coastal Local Plan

Policy ref.	Title
SCLP11.3	Historic Environment
SCLP11.6	Non-Designated Heritage Assets
SCLP11.7	Archaeology

<sup>321</sup> Department for Environment, Food and Rural Affairs (2011) UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) (Accessed May 2022).

<sup>322</sup> Department for Environment, Food and Rural Affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>323</sup> Department for Environment, Food, and Rural Affairs (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

<sup>324</sup> East Suffolk Council (2020) Suffolk Coastal Local Plan Adopted 2020. [online] Available at: <https://www.eastsuffolk.gov.uk/assets/Planning/Planning-Policy-and-Local-Plans/Suffolk-Coastal-Local-Plan/Adopted-Suffolk-Coastal-Local-Plan/East-Suffolk-Council-Suffolk-Coastal-Local-Plan.pdf> [Accessed May 2022].

## Thanet, Kent

- 4.7.2.11 Thanet District Council's Local Plan (adopted July 2020<sup>325</sup>) guides and delivers the Council's plans and aspirations for growth, as desired by the Council and community, and for the delivery of development projects and infrastructure.
- 4.7.2.12 Table 4.7.3 summarises the relevant policies from the plan.

Table 4.7.3: Thanet District Local Plan policies

Policy ref.	Title
SP36	Conservation and Enhancement of Thanet's Historic Environment
HE01	Archaeology
HE03	Heritage Assets

## Guidance

- 4.7.2.13 This assessment will feed into a full desk-based assessment undertaken as part of the impact assessment process, which will be undertaken in a manner consistent with available guidance, listed below in chronological order of issue:
- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers<sup>326</sup>.
  - Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers<sup>327</sup>.
  - Military Aircraft Crash Sites: Guidance on their significance and future management<sup>328</sup>.
  - The Code of Practice for Seabed Developers<sup>329</sup>.
  - Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment<sup>330</sup>.
  - Our Seas – A shared resource: High level marine objectives<sup>331</sup>.
  - Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition)<sup>332</sup>.

<sup>325</sup> Thanet District Council (2020) Local Plan Adopted July 2020. [online] Available at: <https://www.thanet.gov.uk/wp-content/uploads/2018/03/LP-adjusted.pdf> [Accessed May 2022].

<sup>326</sup> English Heritage (1998) Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers.

<sup>327</sup> English Heritage (2000) Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers.

<sup>328</sup> English Heritage (2002) Military Aircraft Crash Sites: Guidance on their significance and future management.

<sup>329</sup> Joint Nautical Archaeology Policy Committee (2006) Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee. Available at <http://www.jnapc.org.uk/Code%20of%20Practice%20No.2.pdf> (Accessed June 2022).

<sup>330</sup> English Heritage (2008) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment. Updated consultation draft 10/11/2017.

<sup>331</sup> Department for Environment, Food and Rural Affairs (2009). Our Seas – A shared resource: High level marine objectives. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/182486/ourseas-2009update.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/182486/ourseas-2009update.pdf).

<sup>332</sup> English Heritage (2011). Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition).

- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector<sup>333</sup>.
- Ships and Boats: Prehistory to Present: Designation Selection Guide<sup>334</sup>.
- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes<sup>335</sup>.
- The Setting of Heritage Assets – Historic Environment Good Practice Advice in Planning: 3<sup>336</sup>.
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record<sup>337</sup>.
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects<sup>338</sup>.

### 4.7.3 Study Area

4.7.3.1 The study area for marine archaeology is the extent of the Offshore Scheme Scoping Boundary shown on **Figure 4.7.1 Location of Recorded Seabed and Intertidal Features within, and in Proximity to, the Study Area**. At each of the proposed landfalls, the study area extends to the Mean High Water Spring (MHWS) mark.

4.7.3.2 The boundary of the study area defines the area where any potential impact on marine archaeology receptors may occur. Marine archaeological seabed features that are located close to the boundary of the study area may be included in the scoping assessment as the features themselves, or their potential mitigation measure, may extend into the study area potentially impacting the chosen cable route. Assessment of the geophysical survey data will ascertain whether these receptors will be included in the assessment at the EIA stage of the Project.

4.7.3.3 The study area will be subject to review and may be amended for the Environmental Statement (ES) in response to the refinement of the landfalls and the identification of additional constraints, which may be environmental and/or engineering.

### 4.7.4 Baseline Conditions

4.7.4.1 The themes relevant to the marine archaeological resource are:

- Palaeogeography (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts such as handaxes) including their setting.

<sup>333</sup> COWRIE (2011). Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector. Southampton: Emu.

<sup>334</sup> English Heritage (2012). Designation Selection Guide, Ships and Boats: Prehistory to Present. London: Historic England.

<sup>335</sup> Plets, R., Dix, J. and Bates, R. (2013) Marine geophysics data acquisition, processing and interpretation: Guidance notes. London: English Heritage.

<sup>336</sup> English Heritage (2015). The Setting of Heritage Assets – Historic Environment Good Practice Advice in Planning: 3.

<sup>337</sup> English Heritage (2015). Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record.

<sup>338</sup> The Crown Estate (2021). Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects. Prepared by Wessex Archaeology. Available at <https://www.thecrownestate.co.uk/media/3917/guide-to-archaeological-requirements-for-offshore-wind.pdf> [Accessed May 2022].

- Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris) including their setting.
- Intertidal heritage receptors relating to marine activity for example fish traps, piers, sea defences located within the intertidal zone, between MHWS and Mean Low Water Spring (MLWS).
- The historic seascape character in and around the study area.

4.7.4.2 The types of archaeology listed above relate to the known marine resource, which will be discussed further in this chapter, and also the currently unknown resource. There is potential for the presence of palaeogeographic material dating from the Palaeolithic onwards. There is also potential for discoveries of maritime craft from the Mesolithic to the modern period. Post-medieval and modern wrecks, as they were generally made of more substantial material, are more likely to have been discovered through surveys undertaken by the United Kingdom Hydrographic Office (UKHO) and others, and thus recorded in the archaeological record. However, there is still potential for the discovery of previously unrecorded wreck sites, particularly of wooden wrecks, broken up wrecks or partially buried wrecks that are more difficult to detect through geophysical survey.

4.7.4.3 There is also potential for 20th century aircraft, particularly in relation to the Second World War<sup>339</sup>. Aircraft crash sites are also difficult to identify through archaeological assessments of geophysical survey, although experience indicates material from the site, such as engines or other material may be recorded as small obstructions or anomalies.

## Data Sources

4.7.4.4 For the purposes of this scoping chapter, the baseline of known heritage assets within the proposed marine survey corridor has been obtained from the following sources:

- UKHO data for charted wrecks and obstructions.
- The National Marine Heritage Record (NMHR) maintained by Historic England, comprising data for terrestrial and marine archaeological sites, find spots and archaeological events.
- Historic Environment Records for Kent, Essex and Suffolk, comprising a database of recorded archaeological sites, find spots, and archaeological events.
- The National Heritage List for England (NHLE) maintained by Historic England, comprising data of designated heritage assets including sites protected under the Protection of Military Remains Act 1986<sup>340</sup> and the Protection of Wrecks Act 1973<sup>341</sup>.
- The Historic Seascape Characterisation (HSC) report for Newport to Clacton and Adjacent Waters<sup>342</sup>.

<sup>339</sup> Wessex Archaeology (2008). Aircraft Crash Sites at Sea: A Scoping Study. Archaeological Desk-based Assessment. Salisbury: unpublished report ref. 666410.02.

<sup>340</sup> Protection of Military Remains Act 1986 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1986/35/contents/enacted> [Accessed June 2022].

<sup>341</sup> Protection of Wrecks Act 1973 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1973/33/enacted> [Accessed June 2022].

<sup>342</sup> Oxford Archaeology (2011). Historic Seascape Characterisation: Newport to Clacton and Adjacent Waters. [online] Available at: <https://doi.org/10.5284/1011887> [Accessed May 2022].

- Thames Estuary and Kent Historic Seascape Characterisation<sup>343</sup>.

4.7.4.5 The datasets used in this assessment have been presented in Universal Transverse Mercator (UTM) Zone 31 North projected from a European Terrestrial Reference System 1989 (ETRS89) datum.

## Archaeological Baseline

4.7.4.6 The baseline information presented here has been gathered following the best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment<sup>344</sup>.

4.7.4.7 The following section provides a summary of the marine archaeology and cultural heritage baseline within the study area, compiled from the data sources listed above. The aim is to establish the known historic environment resource that could be affected by the Offshore Scheme.

4.7.4.8 The distribution of the known heritage receptors discussed in this section is illustrated in **Figure 4.7.1 Location of Recorded Seabed and Intertidal Features within, and in Proximity to, the Study Area.**

### Protected sites

4.7.4.9 Wrecks protected under the Protection of Wrecks Act 1973<sup>342</sup>, the Protection of Military Remains Act 1986<sup>343</sup> or the Ancient Monuments and Archaeological Areas Act 1978<sup>345</sup> are marked on appropriate UKHO Admiralty Charts. Interference or damage to these wrecks is considered a criminal offence.

4.7.4.10 There are currently no sites within the study area that are subject to statutory protection from these acts that can be used to protect marine archaeological sites (**Figure 4.7.1 Location of Recorded Seabed and Intertidal Features within, and in Proximity to, the Study Area**).

### UKHO records within the study area

4.7.4.11 There are 44 UKHO records located inside the Offshore Scoping Boundary and an additional 124 records located within 100m of the boundary.

4.7.4.12 Within the Offshore Scoping Boundary, this total correlates to 22 wreck sites (13 of which are named or possibly named) and 22 obstructions.

4.7.4.13 Within 100m of the boundary of the Offshore Scoping Boundary, there are 70 wrecks (38 of which are named or possibly named) and 54 obstructions.

### NMHR records within the study area

4.7.4.14 There are 19 NMHR point records located inside the Offshore Scoping Boundary and an additional 48 records located within 100m of the boundary.

<sup>343</sup> Cotswold Archaeology (2013). Thames Estuary and Kent Historic Seascape Characterisation.

<sup>344</sup> Chartered Institute for Archaeologists (2020). Standard and guidance for historic environment desk-based assessment. Published December 2014, updated in 2020. Available at [https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA\\_4.pdf](https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf) [Accessed May 2022].

<sup>345</sup> Ancient Monuments and Archaeological Areas Act 1979 (as amended) [online]. Available at: <https://www.legislation.gov.uk/ukpga/1979/46/enacted> [Accessed June 2022].

- 4.7.4.15 Within the Offshore Scoping Boundary, the total correlates to 18 wreck sites (including one submarine) and one intertidal feature.
- 4.7.4.16 Within 100m of the boundary of the Offshore Scoping Boundary, there are 43 wreck sites (including one submarine), one aircraft crash site and four obstructions.
- 4.7.4.17 There are 159 NMHR polygon records located within, or intersecting, the Offshore Scoping Boundary. All but one of these refer to Recorded Losses, which are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped by area into Maritime Named Locations by the NMHR. For example, a Recorded Loss within this dataset may be based on the loss of a vessel off the coast at 'Sizewell Suffolk' or associated with a known navigational hazard such as a sand bank or rocks (which may give rise to a falsely precise geographic coordinate for the record). The positional data of these records is unreliable and serves only to provide an indication of the types of vessels that passed through the area and the wrecking incidents that are known to have occurred in the general region. Whilst the remains of these vessels and aircraft are expected to exist somewhere on the seafloor, their location is unknown. As such, they signify the potential maritime and aviation resource and are not presented on a figure.
- 4.7.4.18 The total number of polygon records correlates to 151 records relating to possible shipwreck events, seven records relating to possible aircraft crash sites and one record that refers to a findspot.

#### **Suffolk records within the study area**

- 4.7.4.19 There are seven records located inside the study area, which correlate to a shipwreck of unknown date, five terrestrial features dating to the Second World War and one modern terrestrial feature that is described as a ship's mast mounted in a metal sheath with footholds to aid climbing.

#### **Essex records within the study area**

- 4.7.4.20 There are no records relating to seabed archaeological features located within, or close to, the study area.

#### **Kent records within the study area**

- 4.7.4.21 There are no records relating to seabed archaeological features located within, or close to, the study area.

#### **Historic Seascape Characterisation**

- 4.7.4.22 Data from two HSC assessments will be used to assess the seascape character of the region. This section provides a summary of the seascape character.
- 4.7.4.23 The Newport to Clacton and Adjacent Waters<sup>346</sup> summarises the historic seascape character of the northern element of the study area as having fishing, navigation and industrial elements.
- 4.7.4.24 The Thames Estuary and Kent Historic Seascape Characterisation<sup>345</sup> divides the character of the southern element of the study area into coastal, sea surface, water

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<sup>346</sup> Oxford Archaeology (2011) Historic Seascape Characterisation: Newport to Clacton and Adjacent Waters. Available at <https://doi.org/10.5284/1011887> [Accessed May 2022].

column, sea floor and sub-sea floor. Character types for these elements of the assessment located within the study area include navigation activity and hazards, ports and docks, recreation, industries (including energy, shipping, fishing and telecommunications), palaeolandscapes, cultural topography, flood and erosion defence, and maritime safety.

## 4.7.5 Embedded and Control & Management Measures

### Embedded Measures

4.7.5.1 With specific regard to marine archaeology, the design criteria to avoid wrecks and areas of archaeological importance should be taken into consideration when developing the Offshore Scoping Boundary.

4.7.5.2 Impacts to both known and potential marine archaeological receptors are addressed through the application of additional embedded mitigation measures. The mitigation measures suggested below will either avoid an impact altogether or ensure that where impact is unavoidable, further information is obtained for posterity or finds are recovered and preserved, thus further informing the archaeological record.

### Geophysical and geotechnical survey

4.7.5.3 Geophysical and geotechnical survey data acquisition for pre-consent planning purposes will be assessed for indications of archaeology and the results used to supplement the desk-based research gathered to inform the EIA process. Any further geophysical or geotechnical surveys undertaken, for instance post-consent or post-construction, will also be archaeologically assessed and the results will be integrated with previous interpretations and reported on accordingly.

4.7.5.4 Furthermore, mitigating and offsetting impacts to palaeogeographic features such as palaeochannels may occur through further investigation of existing geotechnical samples or undertaking further samples, which can enhance the palaeogeographic record for an area.

### Archaeological Exclusion Zones

4.7.5.5 Government policy recommends the *in-situ* preservation of known archaeological remains, therefore the ideal mitigation for such material is avoidance. Appropriately sized Archaeological Exclusion Zones (AEZs) will be established around known features of higher archaeological value. No works will be undertaken within the extent of an AEZ during the construction, operation and maintenance, or decommissioning phases of the Offshore Scheme. AEZs may be amended (enlarged, reduced, moved or removed) because of further data assessment of archaeological field evaluation and must be undertaken in consultation with the Archaeological Curator, Historic England. The locations and extents of all AEZs will be presented in the Written Scheme of Investigations (WSI; see Control and Management Measure MA01),

### Other avoidance measures

4.7.5.6 AEZs will not be proposed for archaeological features of lower archaeological value, however such features will be avoided where practicable. Micro-siting of the cable route, where practicable, will help to avoid seabed features, such as geophysical anomalies of archaeological potential.

### Anomaly investigation

4.7.5.7 Where micro-siting is not possible, further assessment will be undertaken to confirm the nature of the seabed anomaly. Methods of ground truthing assessment could include Remotely Operated Vehicle (ROV) or diver survey and could be undertaken in conjunction with other surveys associated with the Offshore Scheme, for example unexploded ordnance (UXO) or obstruction surveys.

### Walkover and watching briefs

4.7.5.8 A walkover survey of the intertidal element of the study area will be undertaken to inform the understanding of the existing marine heritage assets and also the potential for unknown material to be uncovered.

4.7.5.9 Watching briefs will also be employed in the intertidal or marine areas where any intrusive works are planned. These could include pre-lay grapnel runs or intertidal cable-laying in an excavated trench. The proposed methodology will be presented in a Method Statement and agreed through consultation with the Archaeological Curator, Historic England, and the Regulator, the MMO.

### Reduction of indirect impacts

4.7.5.10 Once the design of the Offshore Scheme has been confirmed, it may be possible to ascertain measures to protect heritage assets that could be indirectly impacted, for instance by scouring, exposure or erosion, caused by direct impacts to the seabed. For instance, 'buffers' may be placed around a heritage asset to protect it from scour. This will be confirmed following review of the Physical Environment Chapter (**Part 4, Chapter 2, Physical Environment**).

## Control and Management Measures

4.7.5.11 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the marine archaeology assessment are:

- GM01 - designated (as minimal as possible) anchoring areas and protocols shall be employed during marine operations to minimise physical disturbance of the seabed.
- GM02 - as-built locations of cable and external protection will be supplied to the UKHO (Admiralty) and Kingfisher (KIS-ORCA).
- GM03 - an offshore Construction Environmental Management Plan (CEMP) and a Marine Pollution Contingency Plan (MPCP) and a dropped objects procedure will be produced prior to installation.
- MA01 - a Written Scheme of Investigation (WSI) including a Protocol for Archaeological Discoveries (PAD) will be agreed and implemented. Unavoidable impacts to potential archaeological receptors would be addressed through a series of agreed control and management measures to deal with the discoveries once impacts have occurred. These measures would be outlined in a WSI and would be in place throughout the construction, operation, maintenance and decommissioning phases. The WSI would address unavoidable impacts associated with the worst-case scenario (Rochdale Envelope) in accordance with archaeological best practice. The WSI would be agreed by the Archaeological

Curator via the Regulator prior to works commencing. A project-specific PAD will be established to support the reporting of unexpected archaeological material during the lifetime of the Project. Impact to unexpected archaeological material is reduced by promptly receiving archaeological advice and undertaking recording and/or conserving any objects that have been disturbed. Additional investigation of features with an uncertain identity or archaeological value can often mean their true nature and value can be better understood. A PAD reduces the impact on the marine historic environment by enabling Project staff to report their finds in a manner that is convenient and effective. Any additional marine geophysical survey, diver or ROV survey footage that takes place within the area will be assessed by a suitably qualified marine geophysicist or marine archaeologist, as appropriate. If an archaeologically important site is subsequently discovered during Project works, a temporary exclusion zone (TEZ) will be established to allow for further investigation to take place. The TEZ would then be re-evaluated, removed or expanded, based on the results of further investigations.

- MA02 - a Written Scheme of Investigation (WSI) will also include offsetting of archaeological impact where necessary through the completion of a palaeo-environmental assessment of deposits of high geoarchaeological potential which may be disturbed.
- MA03 - the project will be run in compliance with all relevant legislation, consents and permits, for example the Marine and Coastal Access Act 2009<sup>347</sup>, Protection of Military Remains 1986<sup>348</sup>, Merchant Shipping Act 1995<sup>349</sup>, Protection of Wrecks Act 1973<sup>350</sup> and Ancient Monuments and Archaeological Areas Act 1979<sup>351</sup>.
- MA04 - locations of known marine archaeological interest/value within the marine environment will be avoided by all marine vessels by the implementation of AEZs.
- MA05 - where a previously unknown heritage asset is discovered, or a known heritage asset proves to be more significant than foreseen at the time of application, the project will inform the MMO, as advised by Historic England, and will agree a solution that protects the significance of the new discovery, so far as is practicable, within the project parameters.
- MPE01 - during the course of cable route clearance, specific activities will be completed to remove items from the seabed. Out of Service cables will be removed as per industry guidelines, larger debris including lost fishing gear will be removed prior to cable installation and a pre-lay grapnel run will be completed to ensure smaller debris is removed. In the event that abandoned, lost or discarded fishing gear ('ALDFG') is encountered, it may be necessary in certain circumstances to bring ALDFG onto the vessel deck. In these instances, marked ALDFG will be returned to the local MMO/ Inshore Fisheries and Conservation Authority (IFCA) for onward retrieval by the owner of the marked gear, in line with existing best practice. Not all gear (particularly 'active' gear) is marked; if necessary to bring onto the vessel deck, unmarked gear will be disposed of via

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<sup>347</sup> Marine and Coastal Access Act 2009 [online]. Available at: [https://www.legislation.gov.uk/ukpga/2009/23/pdfs/ukpga\\_20090023\\_en.pdf](https://www.legislation.gov.uk/ukpga/2009/23/pdfs/ukpga_20090023_en.pdf) [Accessed 04 August 2022].

<sup>348</sup> Protection of Military Remains Act 1986 [online]. Available at <https://www.legislation.gov.uk/ukpga/1986/35/contents/enacted> [Accessed June 2022].

<sup>349</sup> Merchant Shipping Act 1995 [online]. Available at <https://www.legislation.gov.uk/ukpga/1995/21/contents/enacted> [Accessed June 2022].

<sup>350</sup> Protection of Wrecks Act 1973 [online]. Available at <https://www.legislation.gov.uk/ukpga/1973/33/enacted> [Accessed June 2022].

<sup>351</sup> Ancient Monuments and Archaeological Areas Act 1979 (as amended) [online]. Available at <https://www.legislation.gov.uk/ukpga/1979/46/enacted> [Accessed June 2022].

conventional onshore waste channels. Objects identified as 'wreck' must be reported to the Receiver of Wreck within 28 days under the obligations of the Merchant Shipping Act 1995<sup>351</sup>.

- MPE02 cables will be buried to a target depth of 1.0m to 2.0m for the majority of the route, depending on a number of factors including sediment type and sediment mobility.
- MPE03 - cable protection features (e.g. rock placement, mattresses and grout bags) will be installed only where considered necessary for the safe operation of the Project.

## 4.7.6 Potential for Significant Effects

4.7.6.1 The marine archaeology assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.

4.7.6.2 The proposed scope of the marine archaeology assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

4.7.6.3 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.

4.7.6.4 The potential for the identified impacts to result in potential significant effects takes into account the embedded and control and management measures described in section 5.

4.7.6.5 All seabed receptors have the potential to be damaged or destroyed if they directly interact with seabed preparation or construction activities. All damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial, limiting further interactions.

4.7.6.6 Potential impacts to seabed, sub-seabed and intertidal marine heritage assets include both direct and indirect impacts.

- Direct impacts can include direct damage to structures, features, deposits and artefacts, and the disturbance of relationships between these elements and the wider surroundings. The setting of known and named wreck sites may also be impacted and in turn this could potentially affect the significance of such receptors.
- The indirect interactions upon the known and potential marine archaeological receptors occur as a result of changes to hydrodynamic patterns and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the project activities. Scour has a negative or adverse impact on marine archaeological receptors whereby it can expose material which leads to increased rates of deterioration through biological, chemical and physical processes. Alternatively, the redeposition of sediments following settling of sediment plumes can be beneficial to the preservation of marine archaeological receptors as greater sediment cover increases the potential for anaerobic environment, which inhibits a range of biological, chemical and physical degradation processes.

## Sources of construction impacts

- Direct damage to intertidal archaeological receptors:
  - Pre-installation ground preparation including pre-lay surveys, cable route clearance, pre-sweeping and UXO clearance.
  - Cable installation, using either trenched or trenchless methods including horizontal directional drill, micro-tunnel or direct pipe.
- Direct damage to marine archaeological receptors:
  - Pre-installation seabed preparation including pre-lay surveys, cable route clearance, pre-sweeping and UXO clearance.
  - Trenched cable installation methods including cable lay and post lay burial, ploughs, jet trenching, mechanical trenching, MFE and CFE and simultaneous cable lay and burial.
  - External cable protection where burial cannot be achieved including rock placement, concrete mattresses, rock/gravel/sand/grout bags and/or protection sleeves/cast iron shells.
  - Cable and pipeline crossings, whereby the separation and protection structures may comprise concrete mattresses, protective sleeves on the HVDC cables and/or pre- and post-lay rock placement.
  - Vessel usage associated with the cable installation, including cable lay vessel(s), cable burial vessel(s), guard vessel(s), support vessel(s), rock placement vessel(s) and cable lay barge(s).
- Indirect damage:
  - Clearance works associated with route preparation.
  - Sediment deposition or the placement of non-burial cable protection on the seabed.
  - Seabed sediment movement caused by propellers of construction vessels.

## Sources of operational impacts

- Direct damage may occur where operational interactions contact with the seabed beyond the area already impacted during the construction phase.
- Indirect damage:
  - Sediment deposition or the placement of non-burial cable protection on the seabed.
  - Seabed sediment movement caused by propellers of operations vessels.

## Sources of maintenance impacts

- Direct damage may occur where maintenance activities contact with the seabed beyond the area already impacted during the construction phase.
- Indirect damage:
  - Cable maintenance and repair may lead to alteration of sediment transport regimes.

- Seabed sediment movement caused by propellers of maintenance vessels.

### Sources of decommissioning impacts

- Direct damage may occur where decommissioning activities contact with the seabed beyond the area already impacted during the construction phase.
- Indirect damage:
  - Cable removal may lead to alteration of seabed transport regimes.
  - Seabed sediment movement caused by propellers of decommissioning vessels.

### Potential impacts

4.7.6.7 Table 4.7.4 identifies the potential impacts that could result from the sources identified above.

Table 4.7.4: Sources and impacts

Project Phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance and decommissioning	Pre-installation seabed/ground preparation including pre-lay surveys, cable route clearance, pre-sweeping and UXO clearance. Cable installation, using either trenched or trenchless methods including horizontal drill, micro-tunnel or direct pipe.	Direct impact to the intertidal zone	Yes	Scoped in
Construction	Pre-installation seabed preparation including pre-lay surveys, cable route clearance, pre-sweeping and UXO clearance	Direct and indirect (detrimental) impact to the seabed	Yes	Scoped in
Construction, maintenance and decommissioning. Operation (indirect impact only)	Trenched cable installation/maintenance/removal activities and presence of non-burial cable protection	Direct and indirect (detrimental and beneficial) impact to the seabed and sub-seabed	Yes	Scoped in
Construction, maintenance and decommissioning.	Cable and pipeline crossings comprising concrete mattresses,	Direct and indirect (detrimental and	Yes	Scoped in

Project Phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Operation (indirect impact only)	protective sleeves on the HVDC cables and/or pre- and post-lay rock placement	beneficial) impact to the seabed		
Construction, operation, maintenance and decommissioning	Vessel usage associated with all offshore activities	Direct and indirect impact to the seabed	Yes	<b>Scoped in</b>

## Impact Pathways with Receptors (Step 2)

- 4.7.6.8 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the shipping and navigation study area.
- 4.7.6.9 Table 4.7.5 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the benthic ecology assessment for the Offshore Scheme (**Figure 1.1.4 Offshore Scheme Scoping Boundary**).

Table 4.7.5: Impact pathways with receptors

Impact pathway	Receptors	Potential for significant effect	Proposed to be scoped in/out
Physical disturbance activities causing direct damage and/or loss to the intertidal zone, caused by trenching, horizontal directional drilling, micro-tunnelling or direct pipe during construction, maintenance and decommissioning	Intertidal heritage receptors including known and potential palaeogeography, historic terrestrial, marine and aviation features	Yes - disturbance to the intertidal zone is likely to cause damage to receptors	<b>Scoped in</b>
Physical disturbance activities causing direct damage and/or loss to the sub-seabed, caused by cable installation (ploughs, jet trenching, mechanical trenching, Mass Flow Excavator (MFE), Controlled Flow Excavator (CFE)) during construction, maintenance and decommissioning	Sub-seabed heritage receptors including known and potential palaeogeography and buried maritime and aviation features	Yes - disturbance to the sub-seabed is likely to cause damage to receptors	<b>Scoped in</b>

Impact pathway	Receptors	Potential for significant effect	Proposed to be scoped in/out
Physical disturbance activities causing direct damage and/or loss to the seabed, caused by pre-lay surveys, cable route clearance, pre-sweeping, UXO survey, cable installation (ploughs, jet trenching, mechanical trenching, MFE, CFV), external cable protection (rock placement, concrete mattresses, rock/gravel/sand/grout bags, protection sleeves/cast-iron shells), vessel activities (cable lay vessel, cable burial vessel, guard vessels, support vessels, rock placement vessels - impact from anchors, jack-up platforms) during construction, maintenance and decommissioning.	Seabed heritage receptors including known and potential maritime and aviation features	Yes - disturbance to the seabed is likely to cause damage to receptors	<b>Scoped in</b>
Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed during construction, maintenance, operation and decommissioning.	Seabed heritage receptors including known and potential maritime and aviation features	Yes - indirect changes to hydrodynamic and sedimentary regimes may expose receptors leading to increased rates of deterioration through biological, chemical and physical processes	<b>Scoped in</b>
Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment accretion on the seabed during for construction,	Seabed heritage receptors including known and potential maritime and aviation features	Yes - indirect changes to hydrodynamic and sedimentary regimes may cause sediment	<b>Scoped in</b>

Impact pathway	Receptors	Potential for significant effect	Proposed to be scoped in/out
maintenance, operation and decommissioning		to cover receptors inhibiting a range of biological, chemical and physical degradation processes (beneficial effect)	
Project works that temporarily or permanently change the setting of a heritage receptor during construction, maintenance, operation and decommissioning	Buried, seabed or intertidal heritage receptors including known and potential palaeogeography, maritime and aviation features, and intertidal historic terrestrial features	Yes - change to the setting of receptors may occur during works associated with the Project	<b>Scoped in</b>
Project works that temporarily or permanently change the character of the historic seascape during construction, maintenance, operation and decommissioning	Historic Seascape Character of the region	Change to the character of the historic seascape may occur as a result of the Project	<b>Scoped in</b>

## 4.7.7 Proposed Assessment Methodology

### Proposed Data Sources

4.7.7.1 The following data sources are proposed to be used to inform the assessment:

- Geoarchaeological assessment of 69 vibrocore logs acquired along the Offshore Scoping Boundary.
- Assessment of geophysical survey datasets comprising sub-bottom profiler, sidescan sonar, magnetometer and multibeam echosounder.
- UKHO data for charted wrecks and obstructions.
- The NMHR maintained by Historic England, comprising data for terrestrial and marine archaeological sites, find spots and archaeological events.
- Historic Environment Records for Kent, Essex and Suffolk, comprising a database of recorded archaeological sites, find spots, and archaeological events.

- The NHLE maintained by Historic England, comprising data of designated heritage assets including sites protected under the Protection of Military Remains Act 1986<sup>352</sup> and the Protection of Wrecks Act 1973<sup>353</sup>.
- The HSC report for Newport to Clacton and Adjacent Waters<sup>354</sup>.
- Thames Estuary and Kent HSC<sup>355</sup>.
- Relevant background mapping of the area derived from the British Geological Survey, UKHO and Ordnance Survey along with historic maps.
- Relevant documentary sources and grey literature held by Wessex Archaeology and those available through the Archaeological Data Service and other websites.

## Proposed Assessment Methodology

- 4.7.7.2 This section provides a summary of the EIA methodology specifically relevant to marine archaeology. Cumulative impacts and impact interrelationships will be assessed within a separate chapter, however reference to these impacts with regards marine archaeology will take place at a later stage of the EIA process and are therefore not discussed further within this chapter of the Scoping Report.
- 4.7.7.3 Following submission of the Scoping Report, the baseline for marine archaeology will be further enhanced following the archaeological assessment of geophysical survey data obtained from the study area. The data will be archaeologically assessed to provide a full assessment of the known marine heritage receptors. Further desk-based research will be used to understand the potential for marine heritage receptors being located within the marine cable corridor. The setting and significance of the known and potential seabed features will also be assessed.
- 4.7.7.4 Furthermore, the palaeogeography baseline summary will be based on the geoarchaeological review of geotechnical and geophysical datasets gathered for the Offshore Scheme. This information will be further enhanced by a review of geological mapping of seabed sediments, solid geology and bathymetry from published British Geological Survey sources. The HSC of the region will also be assessed following review of current HSC reporting<sup>356 357</sup>.
- 4.7.7.5 An intertidal walkover survey will be undertaken at each of the proposed landfalls in order to ground truth previously recorded heritage receptors and to identify any new receptors that may be of relevance to the assessment.
- 4.7.7.6 The results of these surveys will be incorporated into a full desk-based technical assessment, which will be undertaken in conjunction with data obtained from the UKHO, and national and local archive sources. Relevant mapping including Admiralty Charts, historic maps and Ordnance Survey, together with documentary sources and grey literature held by Wessex Archaeology and those available through the Archaeological Data Service and other websites, will also be utilised for the marine archaeological technical assessment.

<sup>352</sup> Protection of Military Remains Act 1986 [online]. Available at <https://www.legislation.gov.uk/ukpga/1986/35/contents/enacted> [Accessed June 2022].

<sup>353</sup> Protection of Wrecks Act 1973 [online]. Available at <https://www.legislation.gov.uk/ukpga/1973/33/enacted> [Accessed June 2022].

<sup>354</sup> Oxford Archaeology (2011) Historic Seascape Characterisation: Newport to Clacton and Adjacent Waters. Available at <https://doi.org/10.5284/1011887> [Accessed May 2022].

<sup>355</sup> Cotswold Archaeology (2013) Thames Estuary and Kent Historic Seascape Characterisation.

- 4.7.7.7 The results of which will be used to prepare a robust chapter for the ES, clearly presenting the information regarding the known and potential marine heritage receptors, with a discussion as to their archaeological value and sensitivity to impact. This will be used to inform the next strategic phase of the Project in a timely and appropriate manner.

## Assessment criteria and assignment of significance

- 4.7.7.8 The UK MPS<sup>356</sup> describes a heritage asset (including archaeological receptors) as holding a degree of significance, where significance relates to the heritage interest of an asset that may be archaeological, architectural, artistic or historic.
- 4.7.7.9 For the significance of any given impact to be fully understood, the sensitivity of any receptors that may be impacted need to be considered along with the magnitude of the effect. The criteria used to assess the significance of an impact is presented below.

### Receptor sensitivity

- 4.7.7.10 The sensitivity of a historic environment receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. The sensitivity of the receptor will be assessed with regard to the following factors:
- Value – a measure of the receptor’s importance, rarity and worth.
  - Adaptability – the degree to which a receptor can avoid or adapt to an effect.
  - Tolerance – the ability of a receptor to accommodate temporary or permanent change without significant negative impact.
  - Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.
- 4.7.7.11 The NPPF states that heritage assets should be recognised as “an irreplaceable resource” and to “conserve them in a manner appropriate to their significance”<sup>357</sup>.
- 4.7.7.12 Archaeological receptors cannot typically adapt, tolerate or recover from physical impacts resulting in material damage or loss caused by development. Consequently, the sensitivity of each receptor is predominantly quantified only by their value. Where receptors are considered to be capable of adapting to, tolerating or recovering from indirect impacts, these factors were incorporated into an assessment of their sensitivity.

### Value of marine archaeological receptors

- 4.7.7.13 Based on Historic England's Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment<sup>358</sup> the significance of a historic

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<sup>356</sup> HM Government (2011). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf).

<sup>357</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

<sup>358</sup> Historic England (2008). Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment. [online] Available at: <https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/>.

asset “*embraces all the diverse cultural and natural heritage values that people associate with it, or which prompt them to respond to it*”.

- 4.7.7.14 Within this chapter, significance is weighed by consideration of the potential for the asset to demonstrate the following value criteria:
- evidential value – deriving from the potential of a place to yield evidence about past human activity.
  - historical value – deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative.
  - aesthetic value – deriving from the ways in which people draw sensory and intellectual stimulation from a place.
  - communal value – deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values but tend to have additional and specific aspects.
- 4.7.7.15 It should be noted that, while designation indicates that a receptor has been identified as being of high value, non-designated archaeological assets are not necessarily of lesser value. Consequently, non-designated receptors that can be demonstrated to be of equivalent value to designated sites are considered to be of equivalent significance.
- 4.7.7.16 The nature of the marine archaeological resource is such that there is a high level of uncertainty concerning remains on the seabed. Often data regarding the nature and extent of sites are limited or out of date and, as such, the precautionary principle has been applied to all aspects of archaeological impact assessment.
- 4.7.7.17 The value of known archaeological assets are assessed on a five-point scale using professional judgement informed by criteria provided in Table 4.7.6 below.

Table 4.7.6: Criteria to assess the archaeological value of assets

Value	Definition
High	<p>Above average example and/or high potential to contribute to knowledge and understanding and/or outreach. Assets with a demonstrable national dimension to their importance are likely to fall within this category.</p> <p>Receptors with a demonstrable international dimension to their importance are likely to fall within this category.</p> <p>All other wrecked ships and aircraft with statutory protection under the Protection of Wrecks Act 1973314, Ancient Monuments and Archaeological Areas Act 1979315 or Protection of Military Remains Act 1986316, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value.</p> <p>Palaeogeographic features with demonstrable potential to include artefactual and/or</p>

	palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	<p>Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach.</p> <p>Receptors with a demonstrable district level dimension to their importance are likely to fall within this category.</p> <p>Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation.</p> <p>Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.</p>
Low	<p>Below average example and/or low potential to contribute to knowledge and understanding and/or outreach.</p> <p>Receptors with a demonstrable local dimension to their importance are likely to fall within this category.</p> <p>Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation.</p> <p>Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.</p>
Negligible	Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach. Assets with little or no surviving archaeological interest.
Unknown	There is not presently enough information available about the site to assess its value.

4.7.7.18 The perceived value of each marine archaeological receptor is generally assessed and assigned on a site-by-site basis, using professional judgement and past experience, and with reference to the criteria listed in Table 4.7.6.

4.7.7.19 Furthermore, *On the Importance of Shipwrecks*<sup>359</sup> suggests importance can be assessed through the following criteria: build, use, loss, survival and investigation.

4.7.7.20 In general, the *Selection Guide on Boats and Ships in Archaeological Contexts*<sup>360</sup> drew some generalisations about importance based on the age of the wreck:

<sup>359</sup> Wessex Archaeology (2006). *On the importance of shipwrecks*, final report. York: Archaeology Data Service [distributor]. [online] Available at: <https://doi.org/10.5284/1000313> [Accessed June 2022].

<sup>360</sup> Wessex Archaeology (2008). *Selection Guide: Boats and Ships in Archaeological Contexts*. Salisbury: unpublished report.

- Pre-1500 AD: this covers the period from the earliest Prehistoric evidence for human maritime activity to the end of the medieval period, circa 1508. Little is known of watercraft or vessels from this period and archaeological evidence of them is so rare that all examples of craft are likely to be of special value.
- 1501-1815: this encompasses the Tudor and Stuart periods, the English Civil War, the Anglo-Dutch Wars and later the American Independence and French Revolutionary Wars. Wreck and vessel remains from this date are also quite rare, and can be expected to be of special value.
- 1816-1913: this period witnessed great changes in the way in which vessels were built and used, corresponding with the introduction of metal to shipbuilding, and steam to propulsion technology. Examples of watercraft from this period are more numerous and as such, it is those that specifically contribute to an understanding of these changes that should be regarded as having special value.
- 1914-1945: this period encompasses the First World War, the Interwar years and the Second World War. This date range contains Britain's highest volume of recorded boat and ships losses. Those which might be regarded as having special interest are likely to relate to technological changes and to local and global activities during this period.
- Post 1945: the final period extends from 1946 through the post-war years to the present day. Vessels from this date range would have to present a strong case if they are to be considered of special interest.

4.7.7.21 According to this composite timeline, vessels that pre-date 1816 are likely to be considered of special value on the basis of their rarity and subsequent national and international value in our understanding of maritime activity and shipping movements during these periods.

### **Magnitude of effect**

4.7.7.22 The magnitude of effect upon known and potential marine archaeological receptors can be outlined by the following factors:

- Extent – the area over which an effect occurs.
- Duration – the time for which the effect occurs.
- Frequency – how often the effect occurs.
- Severity – the degree of change relative to existing environmental conditions.

4.7.7.23 The magnitude of effect is defined by the criteria presented in Table 4.7.7.

Table 4.7.7: Magnitude of effect definitions

Magnitude	Definition
High	Total loss of or major alteration to key elements or features of the pre-project conditions, such that the post-project character or composition of the feature would be fundamentally changed.
Medium	Loss of or alteration to key elements or features of the pre-project conditions, such that the post-project character of the feature would be partially changed.
Low	Minor alteration from pre-project conditions.
Negligible	No or unquantifiable change to pre-project conditions.

### Significance of impact

4.7.7.24 The significance of an impact (positive or negative) on an archaeological receptor, whether a direct or indirect impact, is determined as a combination of the sensitivity of the archaeological receptor (Table 4.7.6) and the measures of the magnitude of the effect (Table 4.7.7). The matrix in Table 4.7.8 provides a guide to the assessment but is not a substitute for professional judgement and interpretation, particularly where the sensitivity or effect magnitude levels are not clear or are borderline between categories.

Table 4.7.8: Significance of impacts matrix

		Magnitude of change			
		Negligible	Low	Medium	High
Value / Sensitivity of receptor	High	Negligible	Moderate	Major	Major
	Medium	Negligible	Minor	Moderate	Major
	Low	Negligible	Negligible	Minor	Moderate
	Negligible	Negligible	Negligible	Negligible	Minor

## 4.7.8 Conclusion

4.7.8.1 In summary:

- There are no designated marine archaeological receptors within the marine survey corridor. Regarding known intertidal and seabed receptors, there are 44 UKHO records, 19 NMHR records and seven Suffolk HER records of relevance within the

Offshore Scheme Boundary and 124 UKHO records and 48 NMHR records locate within 100m of the Offshore Scheme Boundary.

- With regards to the potential resource, there are 159 NMHR polygons relating to Recorded Losses, which signify the potential maritime and aviation resource rather than existing sites. There is also potential for as yet undiscovered marine archaeological receptors within the study area, which include maritime and aviation features, as well as palaeo-geographic and intertidal heritage receptors. Two HSC assessments cover the extent of the study area and detail a range of seascape character types.
- Various mitigation measures have been presented in order to avoid, minimise and mitigate any harm to the significance of any heritage assets potentially impacted (directly or indirectly) by the proposed development.

## Proposed Scope of the Assessment

4.7.8.2 A summary of the proposed scope of assessment is provided in Table 4.7.9.

Table 4.7.9: Proposed scope of the assessment

Receptor	Potential for significant effect	Project phase(s)	Proposed to be scoped in/out
Intertidal heritage receptors including known and potential palaeogeography, historic terrestrial, marine and aviation features	Physical disturbance activities causing direct damage and/or loss to the intertidal zone, caused by trenching, horizontal directional drilling, micro-tunnelling or direct pipe	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>
Sub-seabed heritage receptors including known and potential palaeogeography and buried maritime and aviation features	Physical disturbance activities causing direct damage and/or loss to the sub-seabed, caused by cable installation (ploughs, jet trenching, mechanical trenching, Mass Flow Excavator (MFE), Controlled Flow Excavator (CFE))	Construction Maintenance Decommissioning	<b>Scoped in</b>
Seabed heritage receptors including known and potential maritime and aviation features	Physical disturbance activities causing direct damage and/or loss to the seabed, caused by pre-lay surveys, cable route clearance, pre-sweeping, UXO survey, cable installation (ploughs, jet trenching, mechanical trenching, MFE, CFV),	Construction Maintenance Decommissioning	<b>Scoped in</b>

	external cable protection (rock placement, concrete mattresses, rock/gravel/sand/grout bags, protection sleeves/cast-iron shells), vessel activities (cable lay vessel, cable burial vessel, guard vessels, support vessels, rock placement vessels - impact from anchors, jack-up platforms)		
Seabed heritage receptors including known and potential maritime and aviation features	Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>
Seabed heritage receptors including known and potential maritime and aviation features	Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment accretion on the seabed	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>
Sub-seabed, seabed or intertidal heritage receptors including known and potential palaeogeography, maritime and aviation features, and intertidal historic terrestrial features	Project works that temporarily or permanently change the setting of a heritage receptor	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>
Historic Seascape Character of the region	Project works that temporarily or permanently change the character of the historic seascape	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>



## 4.8 Shipping and Navigation

### 4.8.1 Introduction

- 4.8.1.1 This chapter presents how the shipping and navigation assessment will consider the potentially significant effects that may arise from the construction, operation, maintenance and decommissioning of the Offshore Scheme (as described in **Part 1, Chapter 4, Description of the Project**). This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment and how the potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).
- 4.8.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.
- 4.8.1.3 This chapter should be read in conjunction with:
- **Part 1, Chapter 4, Description of the Project;**
  - **Part 1, Chapter 5, EIA Approach and Methodology;**
  - **Part 4, Chapter 1, Evolution of the Offshore Scheme;** and
  - **Part 4, Chapter 9, Commercial Fisheries.**
- 4.8.1.4 This chapter is supported by the following figures:
- **Figure 4.8.1 Study Area for Shipping and Navigation;**
  - **Figure 4.8.2 Key Navigational Features;**
  - **Figure 4.8.3 Chart of Vessel Tracks by Ship Type Group;** and
  - **Figure 4.8.4 AIS Tracks Data by Ship Type Group (2019).**

### 4.8.2 Regulatory and Planning Context

- 4.8.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on shipping and navigation associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

## Legislation

4.8.2.2 The following legislation is relevant to shipping and navigation:

- United Nations Convention on the Law of the Sea (UNCLOS)<sup>361</sup>;
- Convention on the International Regulations for Preventing Collisions at Sea (COLREGs)<sup>362</sup>;
- International Convention for the Safety of Life at Sea (SOLAS) Chapter V<sup>363</sup>; and
- Marine and Coastal Access Act (2009), section 69 subsection (1)(c)<sup>364</sup>.

## Planning Policy

4.8.2.3 The following plans and policies are relevant to shipping and navigation.

### National planning policy

4.8.2.4 The sections of national policies relevant to shipping and navigation are:

- Overarching National Policy Statement for Energy (EN-1) (2021) Section 5.14 Traffic and Transport which states that “the consideration and mitigation of transport impacts is an essential part of the Government’s wider policy objectives for sustainable development”<sup>365</sup>;
- National Policy Statement for Electricity Networks Infrastructure (EN-5) (2011) Section 2.10 which considers Electric and Magnetic Fields (EMFs)<sup>366</sup>; and
- UK Marine Policy Statement (2011) Section 3.4 Ports and Shipping<sup>367</sup>.

4.8.2.5 Additionally, the following policy and guidance is relevant for shipping and navigation, insofar as applicable to cable projects:

- International Maritime Organisation (IMO) Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process (MSC-MEPC.2/Circ. 12/Rev.2)<sup>368</sup>;

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<sup>361</sup> United Nations (UN) (1982). United Nations Convention on the Law of the Sea (UNCLOS). [online] Available at: [https://treaties.un.org/doc/publication/CTC/Ch\\_XXI\\_6\\_english\\_p.pdf](https://treaties.un.org/doc/publication/CTC/Ch_XXI_6_english_p.pdf).

<sup>362</sup> International Maritime Organisation (IMO) (1972/77). Convention on the International Regulations for Preventing Collisions at Sea (COLREGs).

<sup>363</sup> International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/980898/MGN\\_654\\_-\\_FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf).

<sup>364</sup> Marine and Coastal Access Act 2009 [online]. Available at: [https://www.legislation.gov.uk/ukpga/2009/23/pdfs/ukpga\\_20090023\\_en.pdf](https://www.legislation.gov.uk/ukpga/2009/23/pdfs/ukpga_20090023_en.pdf) [Accessed 04 August 2022].

<sup>365</sup> Department for Business, Energy and Industrial Strategy (2021). Overarching National Policy Statement for Energy (EN-1). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf).

<sup>366</sup> Department of Energy and Climate Change (2011). National Policy Statement for Electricity Networks Infrastructure (EN-5). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1015238/en-5-draft-for-consultation.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015238/en-5-draft-for-consultation.pdf).

<sup>367</sup> HM Government (2011). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf).

<sup>368</sup> International Maritime Organisation (IMO) (2018). Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process (MSC-MEPC.2/Circ. 12/Rev.2). [online] Available at: [https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Assessment%20\(Fsa\)For%20Use%20In%20The%20Imo%20Rule-Making%20Proces...%20\(Secretariat\).pdf](https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Assessment%20(Fsa)For%20Use%20In%20The%20Imo%20Rule-Making%20Proces...%20(Secretariat).pdf).

- Maritime and Coastguard Agency (MCA) MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) safety response<sup>369</sup>;
- IALA Guideline G1162, Edition 1.0, The Marking of Offshore Man-Made Structures, Dec 2021<sup>370</sup>; and
- Maritime and Coastguard Agency (MCA) MGN 661 (M+F) Navigation – safe and responsible anchoring and fishing practices<sup>371</sup>.

### Local planning policy

4.8.2.6 The following regional policies are relevant for shipping and navigation:

- South East Inshore Marine Plan<sup>372</sup>; and
- East Inshore and East Offshore Marine Plans<sup>373</sup>.

## 4.8.3 Study Area

4.8.3.1 The shipping and navigation study area comprises a 10 nautical mile (NM) buffer (equivalent to an 18.5km buffer) around the Offshore Scoping Boundary, as shown in **Figure 4.8.1 Study Area for Shipping and Navigation**. This wide study area reflects the large potential Zone of Influence (ZOI) of the Project in respect to shipping and navigation receptors. The study area considers the Offshore Scheme only, from Mean High Water Springs (MHWS) at the landfall in Suffolk, to MHWS at the landfall in Kent.

## 4.8.4 Baseline Conditions

4.8.4.1 This section provides a summary of the baseline environment of the Offshore Scheme for navigational features, vessel traffic and marine incidents.

### Data Sources

4.8.4.2 A shipping and navigation baseline has been established to support this scoping exercise using publicly available and historic data sources, as detailed in Table 4.8.1.

<sup>369</sup> Maritime and Coastguard Agency (MCA) (2021a). MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) Safety Response. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/980898/MGN\\_654\\_-\\_FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf).

<sup>370</sup> International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) (2021). Guideline G1162, Edition 1.0, The Marking of Offshore Man-Made Structures. [online] Available at: <https://www.iala-aism.org/product/g1162/>.

<sup>371</sup> Maritime and Coastguard Authority (MCA) (2021b). MGN 661 (M+F) Navigation – safe and responsible anchoring and fishing practices. [online] Available at: <https://www.gov.uk/government/publications/mgn-661-mf-navigation-safe-and-responsible-anchoring-and-fishing-practices/mgn-661-mf-navigation-safe-and-responsible-anchoring-and-fishing-practices>.

<sup>372</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2021a). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

<sup>373</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2021b). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

Table 4.8.1: Data sources

Name	Description	Source authority	Year/s
Automatic Identification System (AIS) data	Historic vessel traffic tracks from AIS data	MMO, ABPmer	2019
Admiralty Sailing Directions Dover Strait Pilot (13 <sup>th</sup> Edition)	Provides details about ports and harbours, and coastal navigation	United Kingdom Hydrographic Office (UKHO)	2020
Admiralty charts	UKHO charts to provide context	UKHO	-
Offshore renewables lease data	GIS data from the Crown Estate including windfarm lease areas and cable areas	The Crown Estate	2022
Wrecks	UK wrecks and obstructions data from UKHO	UKHO	2021
Oil and gas surface structures and pipelines data	Oil and gas surface installations and pipelines GIS data	North Sea Transitional Authority (NSTA)	2022
Marine Accident Investigation Branch (MAIB) Incident Data	Maritime incidents reported to the MAIB within the study area	MAIB	1992 - 2021
Royal National Lifeboat Institution (RNLI) Incident Data	RNLI callouts data within the study area	RNLI	2008 – 2020
Search and Rescue Helicopter (SARH) taskings data	SARH taskings data within the study area	Dept for Transport, MCA	2016 – 2021
Royal Yachting Association (RYA) Coastal Atlas of Recreational Boating	Recreational boating data showing presence of recreational facilities as well as recreational AIS intensity	RYA	2019

## Baseline

### Navigational features

- 4.8.4.3 Key navigational features have been identified from a review of Admiralty Charts and the Dover Strait Pilot (N28) and are displayed together with oil and gas surface infrastructure, pipelines, offshore renewables sites and charted wrecks in **Figure 4.8.2 Key Navigational Features**.
- 4.8.4.4 The key navigational features in the study area are IMO routeing measures and offshore windfarms. Aids to Navigation (AtoN) and charted wrecks are also present throughout the study area. There are few oil and gas surface features within the study area, and no pipelines are within the study area.

- 4.8.4.5 The Kent landfall of the Offshore Scoping Boundary is in proximity to Ramsgate port, running under 100m from the port entrance southern breakwater. Ramsgate provides a cross-Channel ferry service for passengers and freight, and also services both offshore windfarms and recreational vessel traffic<sup>374</sup>.
- 4.8.4.6 The Offshore Scoping Boundary crosses through the IMO routing measures for approximately 30km, including the Sunk Traffic Separation Scheme (TSS) approaches to the Thames Estuary. The Sunk TSS comprises North, South, and East lanes with Precautionary areas and a roundabout in the centre which is an Area to Be Avoided. Additionally, the study area overlaps with the Dover Strait TSS to the southeast (**Figure 4.8.2 Key Navigational Features**).
- 4.8.4.7 There are a number of offshore windfarms in proximity to the Offshore Scoping Boundary. Greater Gabbard (in operation), North Falls (pre-planning application), London Array (in operation) and the Thanet offshore windfarm (in operation) all overlap with the 10NM study area, and a number of windfarm export cable agreement areas also intersect the Offshore Scheme (see **Figure 4.8.2 Key Navigational Features**). Greater Gabbard is located 6.6km east of the Offshore Scoping Boundary, North Falls approximately 3.3km east of the Offshore Scoping Boundary, London Array is 1.3km west and Thanet offshore windfarm is 0.7km to the east (see **Figure 4.8.2 Key Navigational Features**).
- 4.8.4.8 A total of 1,656 charted wrecks are located within the 10NM study area, 44 of which fall within the Offshore Scoping Boundary. For further detail on charted wrecks refer to **Part 4, Chapter 7, Marine Archaeology**.

#### **Vessel traffic**

- 4.8.4.9 In 2019, there were 826,690 total AIS vessel tracks across the year in the study area, with an average of 2,265 tracks per day. In terms of vessel type, 'high-speed craft' represented 42.9% of tracks in the study area, while 'port service craft' represented 25.6%. Cargo vessel tracks were 11.3% of vessel tracks in the study area (**Figure 4.8.3 Chart of Vessel Tracks by Ship Type Group**), while 'fishing vessels', 'tankers', 'passenger vessels' and 'recreational vessels' each represented a much smaller proportion of the tracks in the study area, each with under 3% of total vessel tracks in 2019.

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<sup>374</sup> United Kingdom Hydrographic Office (UKHO) (2020). NP28 - Admiralty Sailing Directions: Dover Strait Pilot (13th Edition). Taunton, UK: UKHO.

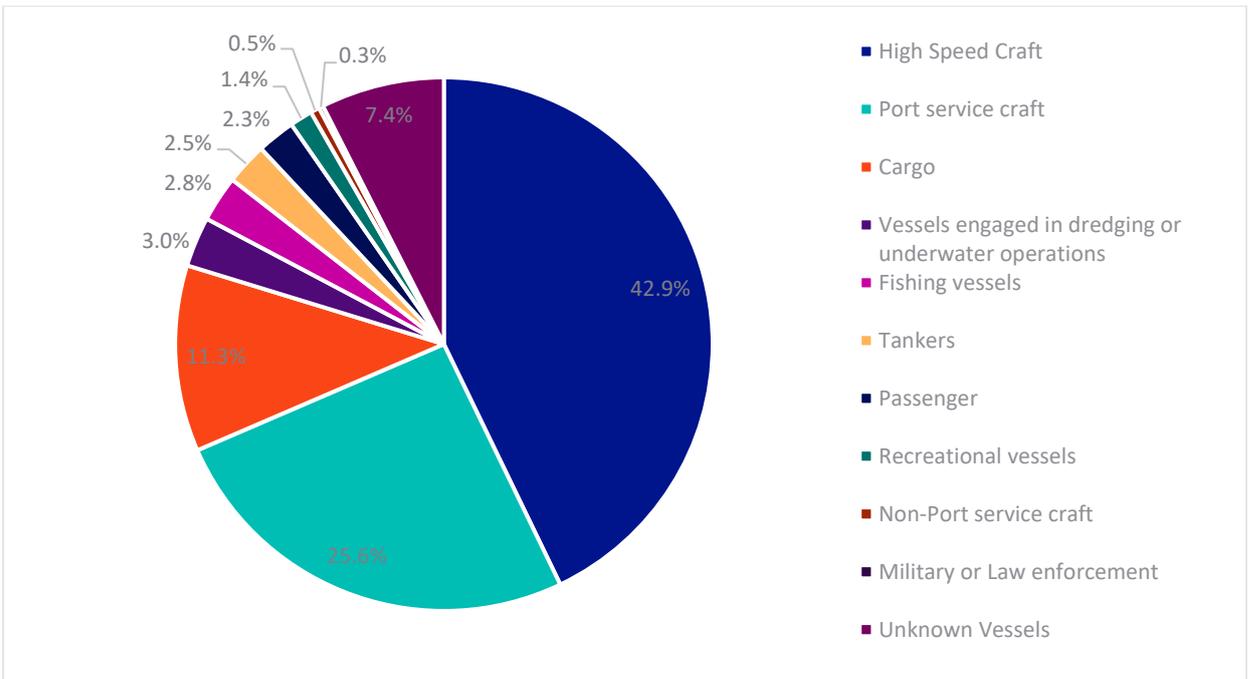


Figure 4.8.3: Chart of Vessel Tracks by Ship Type Group

4.8.4.10 An overview of the vessel activity within the study area based on MMO AIS track lines data from 2019 is shown in **Figure 4.8.4 AIS Tracks Data by Ship Type Group (2019)**.

4.8.4.11 **Figure 4.8.4 AIS Tracks Data by Ship Type Group (2019)** shows the geographic spread of vessel tracks by ship type group. The presence of cargo and tanker traffic routing in lanes north-south to and from the English coast and the Dover Strait, as well as to and from the Thames Estuary is clearly defined. Presence of regions where high-speed craft dominate, to the west and east of the Offshore Scoping Boundary, overlap with regions where windfarms are present, namely the Greater Gabbard (in operation), North Falls (pre-planning application), London Array (in operation) and Thanet (in operation) windfarms (see **Figure 4.8.2 Key Navigational Features**). Recreational traffic can be seen routing around the coastline close inshore, as well as to and from the Thames Estuary. Fishing vessel activity can be seen primarily to the east of the Offshore Scoping Boundary, particularly in the south-eastern region of the study area, and some passenger vessel tracks can be seen routing to and from the mouth of the River Orwell, crossing the Offshore Scoping Boundary in an east-west orientation. Dredging and underwater activity vessels are also present within the study area (**Figure 4.8.4 AIS Tracks Data by Ship Type Group (2019)**).

### Marine incidents

4.8.4.12 In terms of marine incidents within the study area, an analysis of RNLI launches from 2008 to 2020, SARH taskings from 2016 to 2021 and MAIB incidents from 1992 to 2021 was conducted. Within the study area, 2,607 RNLI launches which were not false alarms or hoaxes were recorded, 135 of which fell within the Offshore Scoping Boundary. Of the total RNLI launches, 21.3% stated their reason for launch as being 'machine failure'.

4.8.4.13 Within the study area, 149 SARH taskings were recorded, one of which fell within the Offshore Scoping Boundary. 'Search only' taskings represented 40.9% of taskings within the study area, and 'rescue/recovery' represented 31.5% of taskings.

- 4.8.4.14 In terms of MAIB incidents, 836 incidents were recorded within the study area, 23 of which fell within the Offshore Scoping Boundary area.

## Future Baseline

- 4.8.4.15 A future baseline will also be considered as part of the Navigational Risk Assessment (NRA) process (see Section 4.8.7), involving a discussion of possible future shipping traffic.

## 4.8.5 Embedded and Control & Management Measures

### Embedded

- 4.8.5.1 The Offshore Scoping Boundary has been identified in consideration of relevant shipping and navigation constraints. Potential impacts to shipping and navigation have been mitigated by design through avoidance of the main navigational features in the area such as charted and known anchorages, offshore installations, maintained channel depths and prohibited regions.
- 4.8.5.2 The preferred method of protection for marine cables is by burial, and the conditions will be assessed within a Cable Burial Risk Assessment (CBRA) to optimise burial along the offshore route, typically up to a depth of 1-2m or deeper in areas of greater risk. Where burial cannot be achieved, external cable protection may be required depending on soil or rock conditions. See **Part 1, Chapter 4, Description of the Project** for further details of the Project description.

### Control and Management Measures

- 4.8.5.3 Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to shipping and navigation. These include industry standard practice and any Project specific measures that are considered through the Project design. The shipping and navigation impact assessment is based on the inclusion of these measures. Additional mitigation measures will be identified to further reduce the risk if/where necessary.
- 4.8.5.4 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the shipping and navigation assessment are:
- GM02 - as-built locations of cable and external protection will be supplied to UKHO (Admiralty) and Kingfisher (KIS-ORCA);
  - LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972) (IMO, 2019a)<sup>375</sup>, regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 2019e)<sup>376</sup> with the aim of preventing and minimising

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<sup>375</sup> International Maritime Organisation (IMO) (1972). Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). [online] Available at: <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx> [Accessed 10 August 2022].

<sup>376</sup> International Maritime Organisation (IMO) (1983). International Convention for the Prevention of Pollution from Ships (MARPOL). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx) [Accessed 10 August 2022].

pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974)<sup>377</sup>.

- SN01 - a risk based burial approach will be used where cables will be buried to a target depth of 1.0m to 2.0m for the majority of the route, assessing cable protection risk factors such as sediment type, sediment mobility, fishing activity, shipping movements and anchor deployment along the route
- SN02 - relevant information will be communicated to other sea users via Notices to Mariners (NtM), Radio Navigation Warnings Navigational Telex (NAVTEX) and/or broadcast warnings;
- SN03 - all Project vessels will display appropriate marks and lights and will always broadcast their status on AIS;
- SN04 - temporary aids to navigation will be used as required to guide vessels around areas of installation activity;
- SN05 - a compass deviation report will be produced prior to installation;
- SN06 - guard vessel(s), using RADAR with Automatic RADAR Plotting Aid (ARPA) to monitor vessel activity and predict possible interactions, will be employed to work alongside the installation vessel(s) during cable installation works;
- CF02 – a Fishing Liaison Officer (FLO) and fisheries working group(s) will be maintained throughout installation to ensure project information is effectively disseminated, dialogue is maintained with the commercial fishing industry and access to home ports is maintained during the main fishing season.
- CF03 - timings of any temporary areas of exclusion from fishing grounds will be clearly communicated via a notice to mariners.
- OSU01 - Crossing Agreements with other cable and pipeline owners, and proximity agreements with windfarms in the vicinity of the Project, will be negotiated and agreed; and
- OSU02 - timely and efficient communication will be given to sea users in the area via Notices to Mariners, Kingfisher Bulletins, Navigational Telex (NAVTEX and Navigational Areas (NAVAREA) warnings.

## 4.8.6 Potential for Significant Effects

- 4.8.6.1 The shipping and navigation assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.
- 4.8.6.2 The proposed scope of the shipping and navigation assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

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<sup>377</sup> International Maritime Organisation (IMO) (1975). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx).

## Sources and Impacts (Step 1)

4.8.6.3 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.

4.8.6.4 The potential for the Offshore Scheme to result in the potential significant effects described in this section takes into account the embedded and control and management measures described in section 5.

### Sources of construction impacts

- construction vessel presence;
- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;
- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).

### Sources of operational impacts

- presence of activated cable;
- reduction in under keel clearance; and
- subsea cable producing electromagnetic field resulting in compass deviation.

### Sources of maintenance impacts

- maintenance vessel presence; and
- geophysical and/or Remotely Operated Vehicles (ROV) surveys;
- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

### Sources of decommissioning impacts

- decommissioning vessel presence; and
- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed;

### Potential impacts

4.8.6.5 Table 4.8.2 identifies the potential impacts that could result from the sources identified above.

Table 4.8.2: Sources and impacts

<b>Project Phase</b>	<b>Source</b>	<b>Impact</b>	<b>Potential for significant effects</b>	<b>Proposed to be scoped in/out</b>
Construction, maintenance and decommissioning	Vessel presence	Increased risk of vessel collisions	Yes	<b>Scoped in</b>
Construction, maintenance and decommissioning	UXO clearance Pre-installation clearance of obstacles and debris Sand wave sweeping Cable installation and cable lay Cable repair or replacement Removal of cable from seabed Removal of cable protection	Risk of disruption to vessels using the area	Yes	<b>Scoped in</b>
Construction, maintenance and decommissioning	Cable installation and cable lay Cable repair or replacement Removal of cable from seabed Removal of cable protection	Risk of introducing unmarked subsurface hazards	Yes	<b>Scoped in</b>
Operation	Presence of cable	Presents potential snagging hazard to anchoring	Yes	<b>Scoped in</b>
Operation	Presence of cable	Presents potential snagging hazard to seabed fishing	Yes	<b>Scoped in</b>
Operation	Presence of activated cable	Potential reduction in under keel clearance	Yes	<b>Scoped in</b>
Operation	Presence of activated cable producing electromagnetic field	Potential to lead to magnetic compass deviations	Yes	<b>Scoped in</b>

## Impact Pathways with Receptors (Step 2)

- 4.8.6.6 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the shipping and navigation study area.
- 4.8.6.7 Table 4.8.3 identifies the potential impacts pathways to shipping and navigation from all phases and identifies which are proposed to be scoped in or out of the assessment.

Table 4.8.3 Impact pathways with receptors

<b>Impact pathway</b>	<b>Receptors</b>	<b>Potential for significant effects</b>	<b>Proposed to be scoped in / out</b>
Displacement resulting in increased vessel-to-vessel collision risk between third-party vessels during construction, maintenance and decommissioning phases	All vessel types	Limited potential to result in significant effect due to limited temporal and spatial presence of project vessels during all phases	Scoped out
Third-party to project vessel collision during all phases	All vessel types	Offshore Scoping Boundary is within a region where shipping activity is high, therefore has potential to result in a significant effect	<b>Scoped in</b>
Deviation from established and identified vessel routes and areas during construction maintenance and decommissioning phases	All vessel types	Offshore Scoping Boundary is within a region where shipping activity is high, therefore has potential to result in a significant effect	<b>Scoped in</b>
Introduction of unmarked subsurface hazards during construction, maintenance and decommissioning phases	All vessel types	Offshore Scoping Boundary is within a region where shipping activity is high, therefore has potential to result in a significant effect	<b>Scoped in</b>
Interaction with fishing gear during all phases	Fishing vessels	Fishing vessel tracks are present within study area therefore has potential to result in a significant effect	<b>Scoped in</b>

Interaction with vessel anchors and anchoring activity during all phases	All vessel types	Offshore Scoping Boundary is within a region where shipping activity is high, therefore has potential to result in a significant effect	<b>Scoped in</b>
Reduction in under keel clearance resulting from laid cable and associated protection during operation phase	All vessel types	Offshore Scoping Boundary is within a region where shipping activity is high, therefore has potential to result in a significant effect	<b>Scoped in</b>
Interference with marine navigational equipment during operation phase	All vessel types	Offshore Scoping Boundary is within a region where shipping activity is high, therefore has potential to result in a significant effect	<b>Scoped in</b>

## 4.8.7 Proposed Assessment Methodology

### Proposed Data Sources

4.8.7.1 The following data sources are proposed to be used to inform the assessment:

- A year of AIS data (purchased from supplier)
- Vessel Monitoring System (VMS) data from the MMO;
- Marine Themes Administrative theme data (OceanWise);
- Admiralty Sailing Directions Dover Strait Pilot (13th Edition) (UKHO, 2020);
- The Shell Channel Pilot (8<sup>th</sup> Edition) (Imray, 2017);
- North Sea Passage Pilot (7<sup>th</sup> Edition) (Imray, 2022);
- Admiralty charts (UKHO);
- Offshore renewables lease data (The Crown Estate, 2022);
- UK wrecks and obstructions data (UKHO, 2021);
- Oil and gas surface structures and pipelines data (NSTA, 2022);
- RYA Coastal Atlas of Recreational Boating (RYA, 2019);
- MAIB incident data (MAIB, 1992 – 2021);
- RNLI incident data (RNLI, 2008 – 2020); and

- SARH taskings data (Dept for Transport & MCA, 2016 – 2021).

## Proposed Assessment Methodology

4.8.7.2 An NRA shall be undertaken to understand and address the potential effects of the Project on shipping and navigation. The NRA will inform the shipping and navigation assessment chapter within the Environmental Statement (ES). The NRA will comprise the following key components:

- Marine Traffic Survey (MTS);
- Consultation; and
- Formal Safety Assessment (FSA).

### Marine traffic survey

4.8.7.3 To provide a detailed understanding of shipping activity in the study area, a MTS will be undertaken as part of the NRA and shall identify navigational features and patterns of vessel activity within the vicinity of the proposed cable, to establish baseline conditions to inform the subsequent FSA.

4.8.7.4 The MTS shall acquire detailed AIS data for the region, with the following temporal and spatial extent:

- A proposed time period of one year of recent (post-COVID) AIS data; and
- A 10NM wide buffer around the proposed Project route.

4.8.7.5 IMO requires that; all ships of  $\geq 300$  gross tonnage engaged on international voyages, cargo vessels of  $\geq 500$  gross tonnage not engaged on international voyages, and all passenger ships regardless of size built on or after 1 July 2002, are fitted with an AIS. All European Union (EU) registered fishing vessels of length 15m and above are required to carry AIS equipment by EU directive. Smaller fishing vessels (below 15m) as well as recreational craft are not required to carry AIS but a proportion does so voluntarily, however these are likely to be under represented in the AIS data.

4.8.7.6 The AIS data will be used to assess the patterns and intensity of shipping activity in the vicinity of the Project. Due to the likely under representation of small fishing and recreational vessels in the AIS data, additional data sources including VMS data, the RYA Coastal Atlas, and consultation will be used to validate the findings of the AIS analysis.

4.8.7.7 Additional analysis shall consider key navigational features which will be extracted from additional sources of data such as:

- Historic AIS vessel traffic data;
- Fishing vessel traffic data (VMS and AIS), noting that additional information on fishing traffic will be available from the Commercial Fisheries assessment (**Part 4, Chapter 9, Commercial Fisheries**);
- Admiralty charts for the area;
- Maritime incident data in the area (RNLI, SARH and MAIB);
- The Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating; and

- Sailing and Pilot books (including the Dover Strait Pilot - N28 and North Sea Passage Pilot).

### **Stakeholder consultation**

- 4.8.7.8 Consultation with key maritime stakeholders relevant to the Project's location shall be undertaken to inform the baseline understanding of shipping in the area and also to obtain supplementary information which may not be available through the data sources outlined above.
- 4.8.7.9 Parties consulted will include, but may not be limited to:
- MCA;
  - Trinity House;
  - Chamber of Shipping;
  - The RYA;
  - Cruising Association;
  - Sunk Vessel Traffic Services (VTS) Manager and Sunk User Group; and
  - Relevant port and harbour authorities including Ramsgate port.
- 4.8.7.10 Pre-Scoping stakeholder engagement has already taken place between the Project and the Sunk VTS Manager and with some members of the Sunk User Group, with intention to engage further with the Sunk User Group going forward.
- 4.8.7.11 Consultee input shall be incorporated where appropriate into the NRA such that concerns, and impacts are recorded and addressed.

### **Formal safety assessment**

- 4.8.7.12 The FSA process provides a systematic method for evaluating and controlling risk, within a structured framework. Baseline shipping patterns and navigational features along with stakeholder consultations provide the basis for establishing potential hazards, or impacts. These impacts are then characterised in their magnitude and likelihood, which ultimately provides for risk categorisation against a risk matrix.
- 4.8.7.13 Additional control or mitigation measures are then identified to provide a reduction in risk. The residual effects are assessed to determine risk acceptability in accordance with the principles of ALARP (As Low As Reasonably Practicable). Where necessary or appropriate, mitigation measures are assessed to determine/justify an ALARP position.
- 4.8.7.14 The FSA comprises the following components:
- hazard identification;
  - risk assessment;
  - identification of additional mitigation measures;
  - cost-benefit analysis;
  - risk assessment table; and
  - cumulative effects and future case.

4.8.7.15 These components will be detailed in the following sections.

### Hazard identification

4.8.7.16 Taking into account the Project components and activities, baseline information provided in the MTS, consultation responses and expert judgement/industry experience, a list of relevant impacts to marine navigation shall be compiled as a desktop exercise. The list shall be captured in a table and retained as an auditable hazard log. Hazards relating to separate Project phases shall be identified.

### Risk assessment

4.8.7.17 The risk assessment process is implemented using a classic risk matrix approach. Each hazard/impact is individually evaluated against specific criteria and assigned categories for 'severity of consequence' (Magnitude) and 'frequency of occurrence' (Likelihood). This assessment of risk shall be conducted in consideration of the embedded mitigation outlined in Section 4.8.5.

4.8.7.18 The risk assessment categorisations directly reflect the UK Health and Safety Executive principles of ALARP. The approach is consistent with relevant marine guidance from the International Maritime Organisation<sup>378</sup> and the UK Maritime Coastguard Agency<sup>379</sup> as outlined in Section 4.8.2. The definitions of the categories for outcome severity/magnitude and the frequency or likelihood are captured in Table 4.8.4 and Table 4.8.5.

4.8.7.19 The likelihood and consequence categories are combined for each hazard/impact using the risk matrix shown in Table 4.8.6, which is used to derive a risk tolerability level of either Unacceptable, Tolerable or Broadly Acceptable, with unacceptable or tolerable risks being considered to be significant in EIA terms. Definitions of each risk tolerability level are provided in Table 4.8.7.

Table 4.8.4: Indicative hazard outcome severity criteria

Severity/Magnitude	Criteria
High	Loss of a crew member, or multiple serious injuries / Major/Severe damage to infrastructure or vessel / Operations / activities halted indefinitely
Medium	Serious injury to person / Notable damage to infrastructure or vessel / Protracted operational delays

<sup>378</sup> International Maritime Organisation (IMO) (2018). Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process. [online] Available at: [https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Assessment%20\(Fsa\)For%20Use%20In%20The%20Imo%20Rule-Making%20Proces...%20\(Secretariat\).pdf](https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Assessment%20(Fsa)For%20Use%20In%20The%20Imo%20Rule-Making%20Proces...%20(Secretariat).pdf).

<sup>379</sup> Maritime and Coastguard Authority (MCA) (2021a). MCA MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) safety response. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/980898/MGN\\_654\\_-\\_FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf).

Low	Minor injury(s) to person / Minor/Local damage to equipment or vessel / Minor operational delays
Negligible	No significant operational impacts

Table 4.8.5 Indicative likelihood criteria

Definition	Indicative description
Remote	Never occurred during Company's activities but has been known to occur in the wider industry
Unlikely	Has occurred in Company's activities in the past but as an isolated incident under exceptional circumstance.
Occasional	Has occurred on more than one occasion during Company's activities in the past
Likely	Occurs regularly during Company's activities

Table 4.8.6: Risk matrix

Frequency/ Likelihood	Likely	Broadly Acceptable	Tolerable	Unacceptable	Unacceptable
	Occasional	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Unlikely	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Remote	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	Low	Medium	High
	Severity of Consequence / Magnitude				

Table 4.8.7: Tolerability definitions

Tolerability	Definition
Broadly Acceptable (Low Risk - not significant)	Generally regarded as acceptable and adequately controlled. At these risk levels the opportunity for further reduction is limited.

Tolerable if ALARP (Moderate Risk - significant)	Typical of the risks from activities which people are prepared to tolerate to secure benefits. There is however an expectation that such risks are properly assessed, appropriate mitigation measures are in place, residual risks are ALARP and that risks are periodically reviewed to monitor if further controls are appropriate.
Unacceptable (High Risk - significant)	Generally regarded as unacceptable whatever the level of benefit associated with the activity. Significant risk mitigation or design modification required to reduce to tolerable (ALARP).

### Identification of additional mitigation measures

- 4.8.7.20 Where risks are assessed as being unacceptable or tolerable (significant) after factoring in the embedded mitigation measures already identified, further additional risk mitigation measures are identified and considered.

### Cost-benefit analysis

- 4.8.7.21 In order to formulate recommendations for decision-making, any additional risk mitigation measures identified are subjected to a qualitative cost-benefit comparison in order to justify the measure and establish a residual risk categorisation and basic ALARP position.

### Risk assessment table

- 4.8.7.22 The Risk Assessment shall be captured in a table such that the hazards and impacts for each of the Project phases and the relevant embedded mitigation measures and any additional mitigation measures identified, are captured to provide an auditable hazards and effects register or log shown in Table 4.8.8.

Table 4.8.8: Hazard and effects register example

<b>Hazard/ Impact</b>	Collision
<b>Phase</b>	Construction
<b>Embedded Mitigation Measures</b>	Notice to Mariners COLREGS
<b>Causes</b>	Human Error
<b>Consequence</b>	High
<b>Likelihood</b>	Remote
<b>Risk</b>	Tolerable

<b>Additional Mitigation Measures</b>	Specific Procedures
<b>CBA</b>	Measure Justified
<b>Residual Risk</b>	ALARP

### Cumulative effects and future case

4.8.7.23 Cumulative effects and future case will be included by review of future projects potentially affecting or influencing the study area and the wider general area and assumption of a general increase in traffic density. A list of potential projects and activities shall be compiled and is expected to include windfarms and offshore industry activities in the region. Each hazard/impact will be qualitatively reviewed against the potential direct and indirect cumulative effects from any of the projects listed. Any issues shall be captured, and further risk mitigation measures considered where deemed appropriate. It is noted that as a subsea cable, no infrastructure above sea surface will remain following construction therefore no lasting cumulative effect, with the exception of seabed interactions, is foreseen.

## 4.8.8 Conclusion

4.8.8.1 In summary:

- the Offshore Scheme presents a clear potential impact to shipping and navigation, as such the NRA shall be based on real shipping patterns and navigational features, from up-to date AIS data and publicly available navigational information and will cover construction and operation phases; and
- the assessment shall be centred around an FSA in line with relevant marine guidance and UK HSE principles of ALARP. The approach ultimately aims to identify effects on shipping such as collision and disruption such that they are recorded, auditable and effectively managed.

### Proposed Scope of the Assessment

4.8.8.2 A summary of the proposed scope of the assessment is provided in Table 4.8.9.

Table 4.8.9: Proposed scope of the assessment

<b>Receptor</b>	<b>Potential for significant effect</b>	<b>Project phase(s)</b>	<b>Proposed to be scoped in/out</b>
All vessel types	Displacement resulting in increased vessel-to-vessel collision risk between third-party vessels	Construction Operation Maintenance Decommissioning	Scoped out
All vessel types	Third-party to project vessel collision	Construction Operation	<b>Scoped in</b>

<b>Receptor</b>	<b>Potential for significant effect</b>	<b>Project phase(s)</b>	<b>Proposed to be scoped in/out</b>
		Maintenance Decommissioning	
All vessel types	Deviation from established and identified vessel routes and areas	Construction Maintenance Decommissioning	<b>Scoped in</b>
All vessel types	Introduction of unmarked subsurface hazards	Construction Maintenance Decommissioning	<b>Scoped in</b>
Fishing vessels	Interaction with fishing gear	Construction Operation Maintenance Decommissioning	<b>Scoped in</b>
All vessel types	Interaction with vessel anchors and anchoring activity	Construction Operation Maintenance Decommissioning	<b>Scoped in</b>
All vessel types	Reduction in under keel clearance resulting from laid cable and associated protection	Operation	<b>Scoped in</b>
All vessel types	Interference with marine navigational equipment	Operation	<b>Scoped in</b>

## 4.9 Commercial Fisheries

### 4.9.1 Introduction

- 4.9.1.1 This chapter presents how the commercial fisheries assessment will consider the potentially significant effects that may arise from the construction, and operation, maintenance and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the methodology to be used within the assessment, the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment and how these potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA).
- 4.9.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.
- 4.9.1.3 Alongside this chapter, an overview of potential impacts associated with commercially important fish and shellfish ecology is presented in **Part 4, Chapter 4, Fish and Shellfish**.
- 4.9.1.4 This chapter should be read in conjunction with:
- **Part 1, Chapter 4, Description of the Project;**
  - **Part 1, Chapter 5, EIA Approach and Methodology;**
  - **Part 4, Chapter 1, Evolution of the Offshore Scheme;**
  - **Part 4, Chapter 4, Fish and Shellfish Ecology;**
  - **Part 4, Chapter 8, Shipping and Navigation;** and
  - **Part 4, Chapter 10, Other Sea Users.**
- 4.9.1.5 This chapter is supported by the following figures:
- **Figure 4.9.1 Commercial Fisheries Study Area;** and
  - **Figure 4.9.2 Total landed weight (tonnes) and value (£) of catch by ICES rectangle (2016 – 2020).**

### 4.9.2 Regulatory and Planning Context

- 4.9.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on commercial fisheries associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

## Legislation

4.9.2.2 The following legislation is relevant to commercial fisheries:

- Marine and Coastal Access Act (MCAA) 2009<sup>380</sup> establishes fisheries management in the UK (i.e. legal duties of Inshore Fisheries Conservation Authorities (IFCAs) and the Marine Management Organisation (MMO), and identifies the UK marine area including 6 nautical mile (NM) and 12NM limits, and the Exclusive Economic Zone (EEZ);
- Fisheries Act (2020)<sup>381</sup> creates a legal requirement for the UK's national fisheries policy authorities (i.e. MMO) to produce a Joint Fisheries Statement (JFS) relating to identified fisheries objectives (e.g. sustainability, ecosystem, and access rights) (due November 2022<sup>382</sup>); and
- Salmon and Freshwater Fisheries Act 1975<sup>383</sup> establishes the duty to maintain, improve and develop freshwater fisheries of migratory species, including salmon, trout and eels through byelaws set by the Environment Agency (EA).

## Planning Policy

4.9.2.3 The following plans and policies are relevant to commercial fisheries.

### National planning policy

- National Policy Statements (NPS) - the UK Government produces NPS which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP). Those potentially relevant to commercial fisheries are:
  - Overarching National Policy Statement for Energy – EN-1<sup>384</sup>;
  - Renewable Energy Infrastructure – EN-3<sup>385</sup>;
  - Electricity Networks - EN-5<sup>386</sup>;
  - National Planning Policy Framework<sup>387</sup>;

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<sup>380</sup> The Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents>.

<sup>381</sup> The Fisheries Act 2020 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2020/22/contents/enacted>.

<sup>382</sup> Department of Environment, Food and Rural Affairs (2022). Joint Fisheries Statement Consultation 2022. [online] Available at: <https://www.gov.uk/government/consultations/draft-joint-fisheries-statement-jfs>.

<sup>383</sup> The Salmon and Freshwater Fisheries Act 1975 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1975/51>.

<sup>384</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy (EN-1). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47854/1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf) [Accessed 09 August 2022].

<sup>385</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Renewable Energy (EN-3). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47856/1940-nps-renewable-energy-en3.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf) [Accessed 09 August 2022].

<sup>386</sup> Department of Energy and Climate Change (2011). Overarching National Policy Statement for Electricity Networks (EN-5). [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/47858/1942-national-policy-statement-electricity-networks.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf) [Accessed 09 August 2022].

<sup>387</sup> Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 09 August 2022].

- Planning Practice Guidance – Natural Environment<sup>388</sup>; and
- Planning Practice Guidance – Renewable and low carbon energy<sup>389</sup>.
- Common Fisheries Policy (CFP)<sup>390</sup> - managed fisheries within UK whilst part of the European Union (EU). Following the UK's exit from the EU and the end of the associated transitional arrangement period on 1<sup>st</sup> January 2021, the UK Single Issuing Authority (UKSIA)<sup>384</sup> as part of the MMO manages fishing vessel licencing for foreign vessel access to UK waters within the British Fishery Limits on behalf of the UK sea fish licensing authorities of England, Scotland, Wales, and Northern Ireland. The UK fisheries authorities remain responsible for the administration and management of UK vessel licensing within the UK EEZ.

### Local planning policy

- The UK Marine Policy Statement (MPS)<sup>391</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made. The following marine plans have been considered in the development of this Scoping Report:
  - East Inshore and East Offshore Marine Plan<sup>392</sup>
  - South East Inshore Marine Plan<sup>393</sup>

## 4.9.3 Study Area

- 4.9.3.1 The Offshore Scheme is located within the International Council for the Exploration of the Sea (ICES) Division IVc. Fisheries data are recorded and collated by statistical rectangles within each ICES Division. The commercial fisheries study area has therefore been defined with reference to the ICES rectangles within which the Offshore Scheme is located, these are ICES rectangles 33F1, 32F1 and 31F1 as shown on **Figure 4.9.1 Commercial Fisheries Study Area**.
- 4.9.3.2 The commercial fisheries study area defined above has been used to identify fisheries activity in areas relevant to the Offshore Scheme. However, where relevant, data and information has been included to provide context and describe the wider extent of relevant fisheries activity.

<sup>388</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance – Natural Environment. [online] Available at: <https://www.gov.uk/guidance/natural-environment#biodiversity-geodiversity-and-ecosystems> [Accessed 09 August 2022].

<sup>389</sup> Department for Levelling Up, House and Communities and Ministry of Housing, Communities and Local Government (2015). Planning Practice Guidance – Renewable and Low Carbon. [online] Available at: <https://www.gov.uk/guidance/renewable-and-low-carbon-energy> [Accessed 09 August 2022].

<sup>390</sup> European Commission (2018). European Union Common Fisheries Policy (CFP). [online] Available at: [https://oceans-and-fisheries.ec.europa.eu/policy/common-fisheries-policy-cfp\\_en](https://oceans-and-fisheries.ec.europa.eu/policy/common-fisheries-policy-cfp_en).

<sup>391</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) [Accessed: 09 August 2022].

<sup>392</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2014). East Marine Plans. [online] Available at: <https://www.gov.uk/government/publications/east-inshore-and-east-offshore-marine-plans> [Accessed 11 July 2022].

<sup>393</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2016). South East Marine Plan. [online] Available at: <https://www.gov.uk/government/collections/south-east-marine-plan> [Accessed 11 July 2022].

## 4.9.4 Baseline Conditions

4.9.4.1 The Offshore Scheme is located within the southern North Sea. Commercial fishing is widely distributed in this body of water and is fished by both UK and foreign (mostly European) fishing vessels.

### Data Sources

4.9.4.2 The latest published commercial fisheries data includes:

- UK fleet landings by ICES rectangle stock and estimated EEZ 2016 - 2020<sup>394</sup>;
- UK sea fisheries annual statistics report 2020<sup>395</sup>;
- 2021 UK and foreign vessels landings by UK port and UK vessel landings abroad: provisional data<sup>396</sup>;
- 2022 UK and foreign vessels landings by UK port and UK vessel landings abroad: provisional data<sup>397</sup>; and
- Vessel lists 10m and under<sup>398</sup> and vessel lists over 10m<sup>399</sup>;

### Baseline

4.9.4.3 Two of the UK's top 20 fishing ports, ranked by quantity of landings in 2020, are located within the Greater Thames Estuary. These are the Whitstable (~24km west of the Offshore Scoping Boundary) and Leigh-On-Sea (~62km west of the Offshore Scoping Boundary); landing 2.6kt<sup>400</sup> and 4.7kt of catch in 2020<sup>397</sup>, respectively.

4.9.4.4 There are a further 23 ports located within 55km (28NM)<sup>401, 402</sup> of the Offshore Scoping Boundary (Table 4.9.1). Leigh-on-Sea and West Mersea are beyond this study area but have also been included as fishing vessels from these ports are likely to cross the Offshore Scheme. A total of 243 vessels are registered across these 26 ports, comprising 216 vessels of under 10m and 27 vessels of over 10m (Table 4.9.1). Of these, 105 vessels (43%) hold a shellfish licence<sup>400,401</sup>.

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<sup>394</sup> Marine Management Organisation (MMO) (2021a). UK landings by rectangle and estimated EEZ. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 18 May 2022].

<sup>395</sup> Marine Management Organisation (MMO) (2021b). UK sea fisheries annual statistics report 2020. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 18 May 2022].

<sup>396</sup> Marine Management Organisation (MMO) (2022c). 2021 UK and foreign vessels landings by UK port and UK vessel landings abroad: provisional data. [online] Available at: <https://www.gov.uk/government/publications/uk-and-foreign-vessels-landings-by-uk-port-and-uk-vessel-landings-abroad-provisional-data> [Accessed 06 June 2022].

<sup>397</sup> Marine Management Organisation (MMO) (2022d). 2022 UK and foreign vessels landings by UK port and UK vessel landings abroad: provisional data. [online] Available at: <https://www.gov.uk/government/publications/2022-uk-and-foreign-vessels-landings-by-uk-port-and-uk-vessel-landings-abroad-provisional-data> [Accessed 18 May 2022].

<sup>398</sup> Marine Management Organisation (MMO) (2022a). Vessel lists 10 metres and under. [online] Available at: <https://www.gov.uk/government/statistical-data-sets/vessel-lists-10-metres-and-under> [Accessed 18 May 2022].

<sup>399</sup> Marine Management Organisation (MMO) (2022b). Vessel lists over 10 metres. [online] Available at: <https://www.gov.uk/government/statistical-data-sets/vessel-lists-over-10-metres> [Accessed 18 May 2022].

<sup>400</sup> *kt denotes a metric kiloton (1000 tons = 100,000 kg)*

<sup>401</sup> 55 km is considered a reasonable distance for identifying ports fishing within the UK 12nm limit, which the Offshore Scoping Boundary is located within. Data from Scottish vessel Automatic Identification Systems (AIS) show mean distance travelled by fishing vessels to be between 24.9 km and 36.8 km from home port, with a maximum distance of 51.57km<sup>20</sup>.

<sup>402</sup> James, M., Mendo, T., Jones, E.L., Orr, K., McKnight, A. and Thompson, J. (2018). AIS data to inform small scale fisheries management and marine spatial planning. *Marine Policy*, 91, pp.113-121.

Table 4.9.1: Vessels registered with home port status in 2022 within 55km of the Offshore Scoping Boundary and weight of landed catch at each port in 2021

Home Port	Distance from Offshore Scoping Boundary (km)	No. Vessels under 10 m	No. vessels over 10 m	Total vessels	No. Shellfish licences	Weight of landed catch, 2021 (Tonnes) <sup>396</sup>
Ramsgate	0.2	18	0	18	11	456.00
Aldeburgh and Orford	1.1	10	0	10	4	14.86
Southwold	13.4	12	0	12	8	145.48
Felixstowe	17.8	20	0	20	12	24.53
Harwich	22.4	18	0	18	10	38.37
Lowestoft	30.3	20	4	24	10	790.55
<b>Whitstable</b>	<b>37.7</b>	<b>14</b>	<b>5</b>	<b>19</b>	<b>7</b>	<b>3057.06</b>
Great Yarmouth	45.3	20	1	20	10	35.68
Wivenhoe	46.8	6	0	6	1	11.08
West Mersea	52.7	27	1	28	7	349.05
Dungeness	55.0	5	0	0	4	185.02
Queenborough*	56.3	6	4	10	5	329.26
<b>Leigh-On-Sea*</b>	<b>62.6</b>	<b>8</b>	<b>12</b>	<b>20</b>	<b>4</b>	<b>3911.66</b>
Ports with <5 registered vessels**	-	29	0	29	0	46.50 <sup>†</sup>
<b>Total</b>	<b>-</b>	<b>216</b>	<b>27</b>	<b>238</b>	<b>105</b>	<b>9395.10</b>

\* Ports which exceed 55 km and are located adjacent to the Offshore Scheme within the Greater Thames Estuary. As such, it is highly likely that vessels registered here fish within the study area.

\*\* Brightlingsea (3), Burnham-On-Crouch (2), Canvey Island (3), Clacton (4), Faversham (2), Ipswich (3), Maldon (3), Rochester (1), Sheerness (1), Sizewell Beach (2), Southend-On-Sea (4), Walton-On-Naze (1).

† no 2021 landings data available for Burnham-on-Crouch.

**Note:** UK top 20 major ports by quantity of landings in bold.

4.9.4.5 In the period 2016 to 2020 UK vessels fishing in ICES rectangles 31F1, 32F1, and 33F1 landed an annual average weight of 6,168 tonnes, with an annual average value of £8,632,157. During this period the highest total landed weight and value (18,110 tonnes and £25,550,072) was obtained from ICES rectangle 31F1(Figure 4.9.2). Vessels from the Netherlands and Belgium also landed catch from ICES rectangles 33F1, 33F2 and 31F1<sup>403</sup>.

<sup>403</sup> Scientific, Technical and Economic Committee for Fisheries (2017). Fisheries Dependent Information: Data by quarter-rectangle. [online] Available at: <https://stecf.jrc.ec.europa.eu/dd/effort/graphs-quarter> [Accessed 18 May 2022].

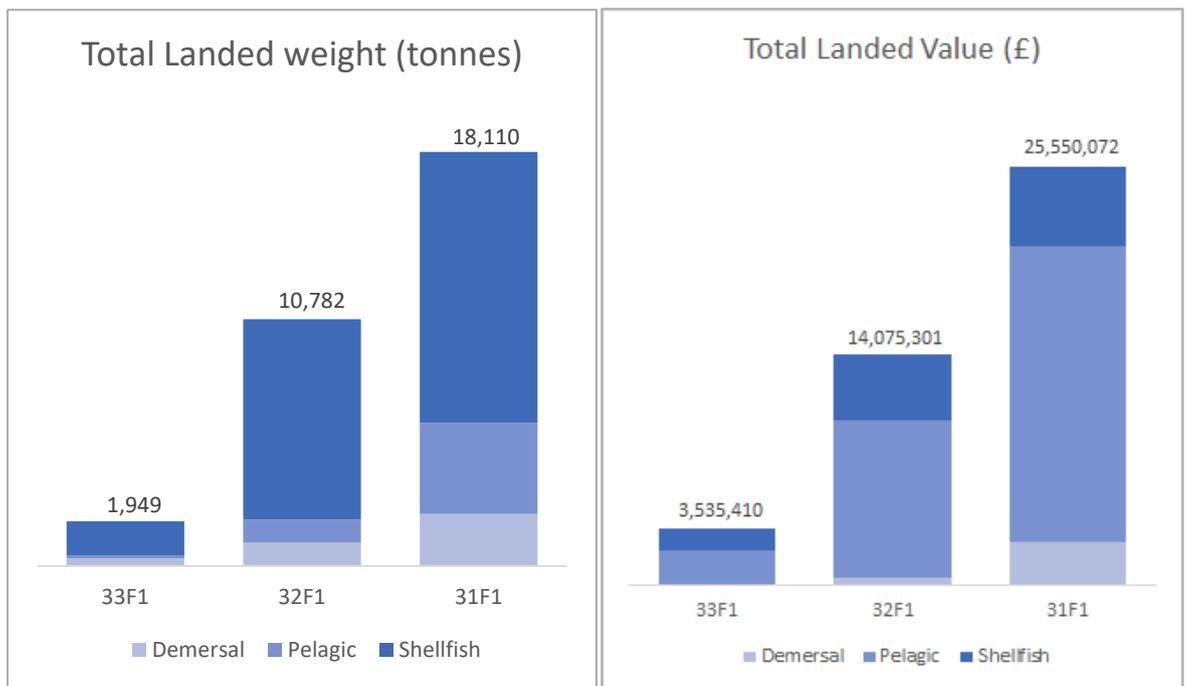


Figure 4.9.2: Total Landed Weight (tonnes) and Value (£) of Catch by ICES Rectangle (2016 – 2020)<sup>404</sup>

- 4.9.4.6 Annual statistics for the relevant ICES rectangles, and ICES Division IVc generally, show the quantity of landings (tonnes) to be greatly dominated by shellfish species, in comparison to pelagic or demersal species<sup>405</sup>. This was also the case for landings at Leigh-On-Sea and Whitstable.
- 4.9.4.7 Between 2016 and 2020 shellfish accounted for 68.9% of total landed value across all three ICES rectangles, demersal species accounted for 23.6%, and pelagic species 7.5%<sup>406</sup>. Cockles represented the highest proportion of the total landings value (39.4%), followed by whelk (18.4%), sole (9.1%), and horse mackerel (5.7%).
- 4.9.4.8 The dominance of shellfish catch reflects the importance of the Thames Cockle Fishery, located on the north Kent coast, partially within ICES 31F1. Other fisheries within the study area comprise the Thames-Blackwater Herring Drift-net Regulatory Area, located in the Thames Estuary (ICES 31F1) and the Tollesbury and Mersea Native Oyster Fishery in the Blackwater Estuary (ICES 32F1).
- 4.9.4.9 Numerous shellfish waters, protected by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017<sup>406</sup>, are located within the Thames Estuary. These include the Outer Thames and Margate designated shellfish waters, located ~8 km from the Offshore Scoping Boundary.
- 4.9.4.10 Dredges, pots and traps, and otter trawl were the most commonly used gear type across all three ICES rectangles, accounting for 48.5%, 20.8%, and 19.01% of the total 2016-2020 landed catch, respectively<sup>406</sup>. Mobile bottom gear, such as dredges and otter trawls were heavily favoured in ICES 31F1 and 32F1, whereas ICES 33F1

<sup>404</sup> Marine Management Organisation (MMO) (2021a). UK landings by rectangle and estimated EEZ. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 18 May 2022].

<sup>405</sup> Marine Management Organisation (MMO) (2021b). UK sea fisheries annual statistics report 2020. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 18 May 2022].

<sup>406</sup> The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [online]. Available at: <https://www.legislation.gov.uk/uksi/2017/407/contents/made>.

favoured static gear such as pots and traps, and gears using hook, and drift and fixed nets. Pots and traps dominated the total landed catch in ICES 33F1 (74.4%).

## Future Baseline

- 4.9.4.11 The commercial fisheries chapter within the Environmental Statement (ES) will include an outline of the likely evolution of the baseline environment without the implementation of the development as far as natural changes from the baseline scenario can be assessed.

## 4.9.5 Embedded and Control & Management Measures

- 4.9.5.1 Given that many design elements of the Project have yet to be confirmed, the embedded and control and management measures have not been finalised at this stage. However, any identified measures will need to be discussed with statutory consultees and stakeholders throughout the EIA process.

### Embedded Measures

- 4.9.5.2 The Offshore Scoping Boundary has been designed in order to avoid environmentally sensitive areas where possible. This includes avoiding the Margate and Long Sands Special Area of Conservation (SAC) and the Kentish Knock East Marine Conservation Zone (MCZ), which are both designated for the protection of benthic habitats. Further consideration is being given to the possibility of avoidance of the Goodwin Sands MCZ by the Offshore Scheme, but this is dependent on the outcome of further stakeholder engagement and additional survey work.
- 4.9.5.3 As the Offshore Scheme develops and route design is progressed (informed by the Project specific offshore survey data) the Project will aim to minimise impacts by micro siting around sensitive features where possible.

### Control and Management Measures

- 4.9.5.4 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the commercial fisheries assessment are:
- GM03 - an offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation.
  - LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972)<sup>407</sup> (IMO, 2019a), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78)<sup>408</sup> (IMO, 2019e) with the aim of preventing and minimising

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<sup>407</sup> International Maritime Organisation (IMO) (1972). Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). [online] Available at: <https://www.imo.org/en/About/Conventions/Pages/COLREG.aspx> [Accessed 10 August 2022].

<sup>408</sup> International Maritime Organisation (IMO) (1983). International Convention for the Prevention of Pollution from Ships (MARPOL). [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx) [Accessed 10 August 2022].

pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974)<sup>409</sup>.

- CF01 - cables will be buried to a target depth of 1m to 2m for the majority of the route to minimise risk of interaction with fishing gear.
- CF02 - a Fisheries Liaison Officer (FLO) and fisheries working group(s) will be maintained throughout installation to ensure project information is effectively disseminated, dialogue is maintained with the commercial fishing industry and access to home ports is maintained during the main fishing season.
- CF03 - timings of any temporary areas of exclusion from fishing grounds will be clearly communicated via a notice to mariners.

## 4.9.6 Potential for Significant Effects

4.9.6.1 The commercial fisheries assessment will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.

4.9.6.2 The proposed scope of the commercial fisheries assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources of Impacts (Step 1)

4.9.6.3 This section identifies the sources and impacts that would occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.

4.9.6.4 The potential for the Offshore Scheme to result in the potential significant effects described in this section takes into account the embedded and control and management measures described in section 5.

#### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;
- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).
- presence of marine vessels.

#### Sources of operational impacts

- presence of activated cable; and
- cable protection.

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<sup>409</sup> International Maritime Organisation (IMO) (1975). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx).

### Sources of maintenance impacts

- presence of marine vessels associated with repairs/surveys;
- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed; and
- presence of marine vessels.

### Potential impacts

4.9.6.5 Table 4.9.2 identifies the potential impacts that could result from the sources identified above.

Table 4.9.2: Sources and impacts

Project Phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance and decommissioning	Cable protection (e.g. rock placement, concrete mattresses in shallow water) Presence of marine vessels	Obstruction of navigation routes to commercial fishing grounds	Yes	Scoped in
Construction, maintenance and decommissioning	Cable installation and cable lay Cable protection Presence of marine vessels Removal of cable from seabed Removal of cable protection	Displacement of commercial fishing activities	Yes	Scoped in

Construction and maintenance	Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay Cable protection	Direct loss or damage to fishing grounds	Yes	<b>Scoped in</b>
Construction, operation, maintenance and decommissioning	Pre-installation clearance of obstacles and debris Sand wave sweeping Cable installation and cable lay Cable protection Presence of marine vessels Removal of cable from seabed Removal of cable protection	Loss or damage to fishing gear	Yes	<b>Scoped in</b>
Construction, operation, maintenance and decommissioning	UXO clearance Pre-installation geophysical surveys Pre-installation clearance of obstacles and debris Sand wave sweeping Cable installation and cable lay Cable protection Presence of marine vessels	Indirect effects on commercial fisheries as a result of impacts on the ecology of commercial species	Yes	<b>Scoped in</b>

	Presence of activated cable			
	Removal of cable from seabed			
	Removal of cable protection			
Construction, maintenance and decommissioning	Leaks and spills from vessels	Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils	No - the implementation of embedded and good practice measures (GM03 and LVS02) create limited potential for accidental spills to occur during the Project. Relatively few vessels are expected to be involved, and potential pollutants would be limited to relatively small volumes. Should an accidental spill or leak occur, it would be very small in extent and subject to immediate dilution and rapid dispersal within the marine environment.	Scoped Out

## Impact Pathways with Receptors (Step 2)

- 4.9.6.6 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the commercial fisheries study area.
- 4.9.6.7 Table 4.9.3 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the benthic ecology assessment for the Offshore Scheme (**Figure 1.1.4 Offshore Scheme Scoping Boundary**).

Table 4.9.3: Impact pathways with receptors

Impact pathway	Receptor	Potential for significant effect	Proposed to be scoped in/out
Obstruction of navigation routes to commercial fishing grounds during construction, maintenance and decommissioning.	Commercial fisheries	Yes - the presence of marine vessels could result in the temporary disruption to navigation routes, distances and times for commercial fishing vessels. This could lead to increased operational costs for fishing vessels	Scoped in

Displacement of commercial fishing activities during construction, maintenance and decommissioning	Commercial fisheries	Yes - any loss or restricted access to commercial fishing grounds during could result in increased competition if these vessels are displaced to alternative grounds and fisheries resources	<b>Scoped in</b>
Direct loss or damage to fishing grounds during construction and maintenance	Commercial fisheries	Yes – route preparation, cable burial and cable protection activities may prohibit use of some fishing grounds commonly used by commercial vessels, particularly those where cable protection is placed in areas where bottom gears are deployed	<b>Scoped in</b>
Loss or damage to fishing gear during construction, operation, maintenance and decommissioning		Yes - seabed obstacles which may arise from the Project, including for example, accidentally dropped objects; the operational presence of cable protection and of vulnerable sections of cable (i.e. should areas of trenched cable become exposed) may pose a snagging risk to fishing gear. Additionally, static gear may also be present along the cable route which if not removed could be damaged by cable installation activities	<b>Scoped in</b>
Indirect effects on commercial fisheries as a result of impacts on the ecology of commercial species		Yes - there is potential for any works associated with the Project to indirectly impact commercial	<b>Scoped in</b>

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during construction, operation, maintenance and decommissioning

fisheries as a result of impacts on the behaviour and distribution of fish. For example, changes in the underwater soundscape during construction and maintenance may result in behavioural responses in individuals of fish and shellfish which are of commercial importance and are fished in the vicinity of the Offshore Scheme. Consideration of fish and shellfish ecology is provided in **Part 4, Chapter 4 Fish and Shellfish**. The assessment will determine if any of the impact pathways to ecological receptors have the potential to affect commercial fishing

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4.9.6.8 Navigation risk and safety issues associated with the interaction between the Offshore Scheme and the operation of fishing vessels including any potential for interference with magnetic compass used by fishing vessels for has been considered under **Part 4, Chapter 8, Shipping and Navigation**.

## 4.9.7 Proposed Assessment Methodology

### Proposed Data Sources

4.9.7.1 The following data sources are proposed to be used to inform the assessment:

- Project-specific survey data (where applicable);
- ICES fisheries survey data (2021 (important species, gear type, spawning and nursery areas, species distribution))<sup>410</sup>;
- Fisheries Research & Management Plans<sup>411</sup>;

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<sup>410</sup> Cefas (No Date) Cefas Data Portal. [online] Available at: <https://data.cefas.co.uk/>.

<sup>411</sup> Kent and Essex Inshore Fisheries and Conservation Authority (KEIFCA) (No Date). Research. [online] Available at: <https://www.kentandessex-ifca.gov.uk/im-interested-in/research>.

- Non-UK landings by ICES Rectangles (2018)<sup>412</sup>;
- UK Annual fisheries Statistics<sup>413</sup>;
- UK Fishing Vessel Lists<sup>414,415</sup>;
- UK landings by rectangle and estimated EEZ<sup>416</sup>;
- UK and foreign vessels landings by UK port and UK vessel landings abroad<sup>417,418</sup>;
- Vessel Monitoring System data<sup>419,420</sup>;
- Other publicly available reports and information, including:
  - Designated site risk-based fisheries assessments;
  - The Thames Estuary Cockle Fishery Regulating Order (1994)<sup>421</sup>;
  - The Tollesbury and Mersea (Blackwater) Fishery Order (2019)<sup>422</sup>; and
  - MSC Fisheries Surveillance Reports.
- Other reports and information received from consultations.

4.9.7.2 In addition to the statutory stakeholder consultation that forms part of the assessment methodology, additional stakeholders will be identified, but are likely to include:

- Clacton Fishermen’s Association;
- Felixstowe Ferry Fishermen’s Association;
- Harwich Fishermen’s Association;
- Kent and Essex Inshore Fisheries and Conservation Authority (KEIFCA);
- Lowestoft Fishermen’s Association;
- Orford and District Fishermen’s Association;

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<sup>412</sup> Scientific, Technical and Economic Committee for Fisheries (2017). Fisheries Dependent Information: Data by quarter-rectangle. [online] Available at: <https://stecf.jrc.ec.europa.eu/dd/effort/graphs-quarter> [Accessed 18 May 2022].

<sup>413</sup> Marine Management Organisation (MMO) (2021b). UK sea fisheries annual statistics report 2020. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 18 May 2022].

<sup>414</sup> Marine Management Organisation (MMO) (2022a). Vessel lists 10 metres and under. [online] Available at: <https://www.gov.uk/government/statistical-data-sets/vessel-lists-10-metres-and-under> [Accessed 18 May 2022].

<sup>415</sup> Marine Management Organisation (MMO) (2022b). Vessel lists over 10 metres. [online] Available at: <https://www.gov.uk/government/statistical-data-sets/vessel-lists-over-10-metres> [Accessed 18 May 2022].

<sup>416</sup> Marine Management Organisation (MMO) (2021a). UK landings by rectangle and estimated EEZ. [online] Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 18 May 2022].

<sup>417</sup> Marine Management Organisation (MMO) (2022c). 2021 UK and foreign vessels landings by UK port and UK vessel landings abroad: provisional data. [online] Available at: <https://www.gov.uk/government/publications/uk-and-foreign-vessels-landings-by-uk-port-and-uk-vessel-landings-abroad-provisional-data> [Accessed 06 June 2022].

<sup>418</sup> Marine Management Organisation (MMO) (2022d). 2022 UK and foreign vessels landings by UK port and UK vessel landings abroad: provisional data. [online] Available at: <https://www.gov.uk/government/publications/2022-uk-and-foreign-vessels-landings-by-uk-port-and-uk-vessel-landings-abroad-provisional-data> [Accessed 18 May 2022].

<sup>419</sup> HM Government (2021). MMO/AnonymisedAISderivedTrackLines2019 (MapServer). [online] Available at: <https://environment.data.gov.uk/arcgis/rest/services/MMO/AnonymisedAISderivedTrackLines2019/MapServer>.

<sup>420</sup> European Marine Observatory and Data Network (EMODnet) (2020). Fishing Intensity. [online] Available at: <https://emodnet.ec.europa.eu/en/map-week-%E2%80%93fishing-intensity>.

<sup>421</sup> The Thames Estuary Cockle Fishery Regulating Order 1994 [online]. Available at: <https://www.legislation.gov.uk/uksi/1994/2329/contents/made>.

<sup>422</sup> The Tollesbury and Mersea (Blackwater) Fishery Order 2019 [online]. Available at: <https://www.legislation.gov.uk/uksi/2019/974/made>.

- Thanet Fishermen’s Association;
- The Eastern Inshore Fisheries and Conservation Authority (IFCA);
- West Mersea Fisherman’s Association; and
- Whitstable Fisherman’s Association.

## Proposed Assessment Methodology

4.9.7.3 The overall assessment methodology for commercial fisheries will follow the standard methodology outlined in **Part 1, Chapter 5, EIA Approach and Methodology**. The proposed criteria for sensitivity of receptor and magnitude of impact for the assessment of commercial fisheries is presented below.

### Sensitivity of receptor

4.9.7.4 When considering the sensitivity of commercial fisheries receptors, the following aspects are considered:

- operational range: extent of the area over which vessels normally operate;
- operational versatility: ability to deploy different fishing methods/target different species;
- adaptability: ability of vessels to adapt to the potential impact. Degree to which fishing vessels are able to avoid or adapt to changing circumstances, including their capacity to accommodate change; and
- importance: value of the fishery in the area around the Project.

4.9.7.5 The criteria used to define the sensitivity of commercial fisheries receptors are provided in Table 4.9.4.

**Table 4.9.4: Definitions of sensitivity for commercial fisheries**

Very High	Highly restricted operational range and ability to deploy only one gear type. High dependence upon a single fishing ground of high importance.
High	Limited operational range and ability to deploy only one gear type. High dependence upon a single fishing ground.
Medium	Moderate extent of operational range and/or ability to deploy an alternative gear type. Dependence upon a limited number of fishing grounds.
Low	Extensive operational range and/or ability to deploy a number of gear types or to modify gears. Ability to fish a number of fishing grounds.
Negligible	Extensive operational range and very high method versatility in terms of gear types.

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Vessels are able to exploit a large number of fishing grounds.

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### **Magnitude of impact**

- 4.9.7.6 When considering the potential magnitude of impact for commercial fisheries the following aspects are considered:
- area affected: extent of area affected in the context of available grounds and level of fishing activity that the area affected sustains;
  - duration and frequency: time and frequency of the effect; and
- 4.9.7.7 The criteria used to define the magnitude of impact on commercial fisheries receptors are provided in Table 4.9.5.

**Table 4.9.5: Magnitude criteria**

Large	The area affected by the impact sustains high levels of activity by the fleet and covers a large or moderate extent of its grounds; and/or The effect is permanent.
Medium	The area affected by the impact sustains moderate/high levels of activity by the fleet and covers a small/moderate extent of its grounds; and/or The effect is long term.
Small	The area affected by the impact sustains low/moderate levels of activity by the fleet and covers a small extent of its grounds; and/or The effect is short to medium term.
Negligible	The area affected by the impact sustains low/ negligible activity by the fleet and covers a small/negligible extent of its grounds; and/or The effect is short term.

### **Significance of effect**

- 4.9.7.8 Following the identification of receptor sensitivity and magnitude of impact, it is possible to determine the significance of effect following the approach detailed in **Part 1, Chapter 5, EIA Approach and Methodology**.
- 4.9.7.9 The approach will also refer to best practice guidance from a range of industry sectors, insofar as relevant to the installation and operation of submarine cables, noting that specific fisheries guidance for the cable sector is limited.

## **4.9.8 Conclusion**

- 4.9.8.1 In summary:

- The Offshore Scoping Boundary is located in waters which support valuable mixed fisheries. Shellfisheries are of particular importance. These fisheries support local communities providing a valuable socio-economic function;
- Two of the UK's top 20 fishing ports are situated to the west of the Offshore Scoping Boundary, with a further 24 registered 'home ports' for fishing vessels located within 55 km. A total of 243 fishing vessels are registered across these 26 ports;
- The Offshore Scoping Boundary is 8km from the protected shellfish waters of the Greater Thames Estuary. Regulated fisheries for cockles, oyster and herring are found in this area;
- Bottom gear such as dredges, and otter trawls are widely used by fishers within the study area;
- The ES baseline assessment will include a more detailed review of commercial fisheries within the ZOI of the Offshore Scheme; and
- The Project will engage with the fishing community to manage potential interactions during all phases of the Offshore Scheme.

## Proposed Scope of the Assessment

4.9.8.2 A summary of the proposed scope of the assessment is provided in Table 4.9.6.

Table 4.9.6: Proposed scope of the assessment

<b>Receptor</b>	<b>Potential for significant effect</b>	<b>Project phase(s)</b>	<b>Proposed to be scoped in/out</b>
Commercial fisheries	Obstruction of navigation routes to commercial fishing grounds	Construction Maintenance Decommissioning	<b>Scoped in</b>
Commercial fisheries	Displacement of commercial fishing activities	Construction Maintenance Decommissioning	<b>Scoped in</b>
Commercial fisheries	Direct loss or damage to fishing grounds	Construction Maintenance	<b>Scoped in</b>
Commercial fisheries	Loss or damage to fishing gear	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>
Commercial fisheries	Indirect effects on commercial fisheries as a result of impacts on the ecology of commercial species	Construction Maintenance Operation Decommissioning	<b>Scoped in</b>

## 4.10 Other Sea Users

### 4.10.1 Introduction

- 4.10.1.1 This chapter details how the assessment of other sea users will consider the potentially significant effects that may arise from the construction, operation, maintenance and decommissioning of the Offshore Scheme as described in **Part 1, Chapter 4, Description of the Project**. This chapter of the Scoping Report describes the datasets to be used to inform the assessment, an overview of the baseline conditions, the potential significant effects to be considered within the assessment, and how these potential significant effects will be assessed for the purpose of an Environmental Impact Assessment (EIA). The effect of the Project on commercial fishing is covered separately in **Part 4, Chapter 9, Commercial Fisheries**.
- 4.10.1.2 The Project Scoping Boundary is illustrated on **Figure 1.1.1 Project Scoping Boundary** and the Offshore Scheme Scoping Boundary hereafter referred to as the Offshore Scoping Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Scoping Boundary**.
- 4.10.1.3 This chapter should be read in conjunction with:
- **Part 1, Chapter 4, Description of the Project;**
  - **Part 1, Chapter 5, EIA Approach and Methodology;**
  - **Part 4, Chapter 1, Evolution of the Offshore Scheme;**
  - **Part 4, Chapter 8, Shipping and Navigation;** and
  - **Part 4 Chapter 9, Commercial Fisheries.**
- 4.10.1.4 This chapter is supported by the following figure:
- **Figure 4.10.1 Offshore Infrastructure in the Study Area.**

### 4.10.2 Regulatory and Planning Context

- 4.10.2.1 **Part 1, Chapter 2, Regulatory and Planning Context** describes the overall regulatory and planning policy context for the Project. Key legislation, policy and guidance relevant to the assessment of potential effects on other sea users associated with the construction, operation, maintenance and decommissioning of the Project is presented below.

#### Legislation

- 4.10.2.2 The following legislation is relevant to other sea users:
- Marine and Coastal Access Act 2009<sup>423</sup> provides the legal mechanism to help ensure clean, healthy, safe and productive and biologically diverse oceans and seas;

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<sup>423</sup> Marine and Coastal Access Act 2009 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents>.

## Planning Policy

4.10.2.3 The following plans and policies are relevant to other sea users.

### National planning policy

- The UK Marine Policy Statement (MPS)<sup>424</sup> was adopted in 2011 and provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made.

### Local planning policy

- The following marine plans have been considered in the development of this Scoping Report:
  - East Inshore and East Offshore Marine Plan<sup>425</sup>
  - South East Inshore Marine Plan<sup>426</sup>

## Guidance

4.10.2.4 The following guidance is relevant to other sea users:

- International Cable Protection Committee (ICPC) Recommendation No.2. Cable Routing and Reporting Criteria (ICPC, 2015);
- International Cable Protection Committee (ICPC Recommendation No.3. Cable and Oil Pipeline/ Power Cables Crossing Criteria (ICPC, 2014);
- International Cable Protection Committee (ICPC Recommendation No.13. The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013);
- Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013);
- The European Subsea Cable Association (ESCA) guideline No.6. 'The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters' (ESCA, 2016);
- The European Subsea Cable Association (ESCA guideline No.19. Marine Aggregate Extraction Proximity Guidelines (ESCA 2016); and
- Guidance on assessing the socio-economic impacts of offshore windfarms (OWFs), produced by Oxford Brookes and Vattenfall (Glasson et al., 2020).

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<sup>424</sup> Department of Environment, Food and Rural Affairs (DEFRA) (2020). UK Marine Policy Statement. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf) [Accessed 09 August 2022].

<sup>425</sup> Department for Environment, Food and Rural affairs (DEFRA) (2014). East Inshore and East Offshore Marine Plans. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/312496/east-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf).

<sup>426</sup> Department for Environment, Food, and Rural Affairs (DEFRA) (2021). South East Inshore Marine Plan. [online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004493/FINAL\\_South\\_East\\_Marine\\_Plan\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf).

### 4.10.3 Study Area

4.10.3.1 For the purpose of baseline characterisation, an area of 10km width either side of the Offshore Scoping Boundary defines the study area (**Figure 4.10.1 Offshore Infrastructure in the Study Area**). The study area is defined by the extent of potentially affected other sea users who may be directly or indirectly impacted by the Offshore Scheme.

### 4.10.4 Baseline Conditions

4.10.4.1 Where consideration has been given to offshore infrastructure, this chapter includes both existing and planned offshore infrastructure where there is a reasonable volume of information about such infrastructure to enable assessment<sup>427</sup>.

4.10.4.2 The Offshore Scheme falls within the UK marine areas covered by the East and South East Inshore Marine Plans. One of the aims of marine planning is to help ensure coexistence between a wide range of sea users whilst supporting sustainable development.

4.10.4.3 This baseline characterisation provides an overview of other sea users activities within the study area, including (but not necessarily limited to): recreational activities; marine tourism; Oil and Gas (O&G) operations; renewable energy development (i.e. offshore wind, tidal and wave deployment); marine mineral and aggregate extraction; dredging and disposal sites/activities; military practice areas; marine cables; and aquaculture.

4.10.4.4 Socioeconomic conditions, employment opportunities etc are considered within the Onshore Scheme scoping chapters.

### Data Sources

4.10.4.5 To determine the baseline conditions within the study area the following key data sources have been reviewed:

- The Crown Estate Asset Maps: including offshore windfarms, wind export cable agreements, carbon capture and storage sites, and marine aggregate digital data;
- North Sea Transmission Authority (NSTA): Digital data for oil and gas infrastructure and blocks;
- Marine Management Organisation (MMO) Public Register for marine licences and MMO Evidence Projects;
- MMO 'Explore Marine Plans' data portal, including spatial data for marine aggregates, aquaculture, dredging and disposal sites, and recreational areas
- MMO Mapping recreational sea anglers in English waters;
- UK Hydrographic Office: Military Practice and Exercise Areas;
- Environment Agency: bathing waters in England;

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<sup>427</sup> Where key information about planned or proposed third party infrastructure is not available, it is not possible to complete a detailed appraisal of potential interactions between the Offshore Scheme and that infrastructure. As the Offshore Scheme progresses through the DCO process, the applicant will review information available about third party infrastructure to ensure a robust assessment of other sea users at the time of submission.

- The Kingfisher Information Service – Offshore Renewable Cable (KIS-ORCA): Marine cables digital data;
- Marine sports websites (Professional Association of Diving Instructors (PADI), Magic Seaweed; Finstrokes);
- Automatic Identification System (AIS) vessel traffic data; and
- Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating.

## Marine Tourism and Recreation

- 4.10.4.6 The coastal and marine environment supports a wide range of tourism and recreation activities. Tourism is a general term that encompasses any time spent away from home to pursue leisure or relaxation activities, while recreation refers to leisure activities undertaken for enjoyment by local residents in their free time, near where they live.
- 4.10.4.7 The RYA UK Coastal Atlas of Recreational Boating provides a Geographical Information System (GIS) dataset of recreational boating activity around the UK. The dataset has spatial data which indicates location of RYA clubhouses, training centres and marinas, general boating areas, and AIS recreational intensity.
- 4.10.4.8 It is noted that all recreational activities are highly seasonal and dependant on certain weather conditions. Furthermore, due to the COVID-19 pandemic, contemporaneous data on recreation generally may under-predict the extent of activity in ‘normal’ periods (i.e. false-lows); the EIA will be cognisant of this risk and mitigate it through reviews of longer-term historical trends.
- 4.10.4.9 At the time of writing, the MMO has recently commissioned a series of marine recreation activity maps to help inform the management of non-licensable (recreational) activities within Marine Protected Areas<sup>428</sup>. This includes activities such as anchoring, launching and recovery of powerboats and sailing vessels, marine areas used by recreational craft, marine areas used by motorised and non-motorised personal watercraft and recreational diving sites. It is expected that these data will be published ahead of the completion of the EIA, and where available and relevant, used to inform the impact assessment. Should this resource not be available, targeted desk-based research will be completed to consider recreational activity along the Offshore Scoping Boundary, weighted toward landfall areas.
- 4.10.4.10 The East Inshore Marine Plan and South East Inshore Marine Plan recognise and emphasise the estimated economic contribution of recreational boating to the national and local economy as well as the indirect benefits for coastal towns.
- 4.10.4.11 The Three-year Report on the East Inshore and South East Inshore Marine Plans 2017 - 2020<sup>429</sup> reports that the number of coastal tourism and marine recreation businesses in these regions have increased. However, the number of people these sectors employ varies. For example, for the period between 2015 and 2018 the number of employees

<sup>428</sup> Marine Management Organisation (2021). Explore Marine Plans. [Online]. Available at: <https://explore-marine-plans.marineservices.org.uk/>.

<sup>429</sup> DEFRA. (2020). Three-year Report on the East Inshore and East Offshore Marine Plans For the period 2 April 2017 – 1 April 2020: Presented to Parliament pursuant to Sections 54 and 61 of the Marine and Coastal Access Act 2009. [Online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/875887/marine-east-plan-report1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875887/marine-east-plan-report1.pdf). [Accessed: 06/07/2022].

peaked at 54,180 in 2016 but by 2018 was 12% lower. The reason for this, however, is not given.

### **Recreational boating**

- 4.10.4.12 Many RYA clubs and training centres have been identified along the south east coast of England. Within the study area, several RYA clubs are located in coastal areas around Margate and Ramsgate, and Orford Ness.
- 4.10.4.13 In the study area, AIS data of recreational boating traffic displays high density of recreational craft through the study area. High density recreational traffic is particularly focused in nearshore coastal waters around Margate and Ramsgate, and waters along the coast of Hollesley to Dunwich. Recreational density is also concentrated in navigation channels passing through the study area towards the major estuaries located nearby, including the Thames Estuary and Harwich Harbour into the rivers Orwell and Stour.

### **Recreational fishing**

- 4.10.4.14 Recreational sea fishing is a popular activity around the UK coast. Common techniques include fishing from personal boats, charter vessels and smaller craft such as shore kayaks with a range of fishing gear. Recreational sea fishing occurs throughout the year, however there are seasonal fluctuations in sea conditions and presence of target species<sup>430</sup>.
- 4.10.4.15 In the UK, recreational sea fishing is usually synonymous with angling. Angling pertains to fishing with lines, and in the UK this is almost entirely by line with rod and reel<sup>432</sup>.

### **Other recreational activities**

- 4.10.4.16 There have been 17 bathing waters identified in the study area: Herne Bay Central, Herne Bay, Minnis Bay (Birchington), West Bay (Westgate), St Mildred's Bay (Westgate), Westbrook Bay (Margate), Margate The Bay, Margate Fulsam Rock, Walpole Bay (Margate), Botany Bay (Broadstairs), Joss Bay (Broadstairs), Broadstairs (Stone Bay), Broadstairs (Viking Bay), Ramsgate Bay, Ramsgate Western Undercliffe, Sandwich Bay, and Deal Castle<sup>431</sup>.
- 4.10.4.17 There were no PADI scuba diving sites located within the study area (PADI, 2022). There is one BSAC (British Sub-Aqua Club) called Canterbury BSAC club which dives off Goodwin Sands, just inside the study area (BSAC, 2022; PADI, 2022). Lowestoft Sub Aqua Club also dive along the east coast (BSAC, 2022). There are also a number of dive clubs, including Medway Sub Aqua Club, North West Kent BSAC, Southend on Sea Sub Aqua Club, Swale Divers, and Thanet Sub Aqua Club running diver trips around the Kent coast. Walpole tidal pool located on Margate coast is often used for diving and snorkelling<sup>432</sup>.

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<sup>430</sup> Marine Management Organisation (2020). Mapping recreational sea anglers in English waters (MMO1163): Non-technical Summary.

<sup>431</sup> Environment Agency (2021). [Online]. Available at: <https://environment.data.gov.uk/bwq/profiles/>. [Accessed: 29/06/2022].

<sup>432</sup> Finstrokes. (2022). Dive map. [Online]. Available at: <https://www.finstrokes.com/dive-map>. [Accessed: 29/06/2022].

- 4.10.4.18 There are six surfing beaches located close to the Kent landfall: these are Herne Bay, Main Sands, Joss Bay, Broadstairs – Viking Bay, Ramsgate Main Beach, Westcliff Promenade and Sandwich Bay<sup>433</sup>.

## Offshore Infrastructure

- 4.10.4.19 The following potential users of the sea have been identified within the study area.

### Oil and gas operations

- 4.10.4.20 There are no oil and gas operations located within the study area (North Sea Transition Authority, 2022). There have also been no oil and gas license blocks identified within the study area.

### Carbon capture and storage

- 4.10.4.21 There are no carbon capture and storage facilities located within the study area and no plans for future facilities were found. Based on current information it is not expected that the Offshore Scoping Boundary will cross future carbon capture and storage facilities.

### Offshore wave and tidal projects

- 4.10.4.22 There is an area located within the study area to the east of the Offshore Scoping Boundary that is an area of identified tidal stream resource (**Figure 4.10.1 Offshore Infrastructure in the Study Area, Sheet 2**). There were no offshore wave and tidal projects occurring within the study area. Based on current information it is not currently expected that any future wave and tidal projects will occur within the study area.

### Offshore windfarms

- 4.10.4.23 There are several offshore windfarms, with export cables, located in the study area. Those which are active and in operation include:
- London Array offshore windfarm, which covers an area of 122.5km<sup>2</sup>, lying 1.18km to the west of the Offshore Scoping Boundary. This also includes the Blue Transmission London Array export cable, approximately 8.34km from the Offshore Scoping Boundary.
  - Thanet offshore windfarm, which covers an area of 35km<sup>2</sup> and sits 0.62km from the Offshore Scoping Boundary. This also includes the Thanet Offshore Transmission Owner (OFTO) export cable which intersects the Offshore Scoping Boundary.
  - Greater Gabbard offshore windfarm located 6.35km from Offshore Scoping Boundary, which consists of two sites covering a total area of 146 km<sup>2</sup>, connected by the Greater Gabbard export cable which intersects the Offshore Scoping Boundary at the Suffolk landfall.

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<sup>433</sup> Magic Seaweed. (2022). UK + Ireland Surf Reports and Surf Forecasts. [Online]. Available at: <https://magicseaweed.com/UK-Ireland-Surf-Forecast/1/>. [Accessed: 29/06/2022].

- Galloper offshore windfarm, which borders the Greater Gabbard site, consists of two sites covering a total area of 113.6km<sup>2</sup>, situated 12km to the east of the Offshore Scoping Boundary. These sites are connected by the Galloper Transmission export cable, which intersects the Offshore Scoping Boundary at the Suffolk landfall.

4.10.4.24 There are also several offshore windfarms located in and/or intersecting the study area which are either in the pre-planning application stage, consented or under construction. These include:

- East Anglia Two Offshore Windfarm which is consented, covering an area of 255.6km<sup>2</sup>. This site is located approximately 30.5km to the east of the Offshore Scoping Boundary. The East Anglia Two Transmission Asset export cable agreement is also consented and intersects the Offshore Scoping Boundary. This export cable agreement also forms part of the EA1N Transmission Asset export cable agreement to a site that falls outside of the study area.
- East Anglia One Transmission Asset export cable agreement, which intersects the Offshore Scoping Boundary. This agreement is currently under construction.
- East Anglia Three Transmission Asset export cable agreement, which intersects the Offshore Scoping Boundary. This agreement is consented, but construction has not started.
- North Falls Offshore wind site extension agreement which borders the Greater Gabbard wind site agreement to the west and is located 3.5km from the offshore scoping boundary. This is in the pre-planning application stage and is expected to cover 150.06km<sup>2</sup>. The proposed export cable route intersects with the Offshore Scoping Boundary.
- Five Estuaries wind site extension agreement which borders the Galloper wind site to the east. This is also in the pre-planning application stage and is expected to cover an area of 148.7km<sup>2</sup>. The proposed export cable route intersects with the Offshore Scoping Boundary.

### Mineral and aggregate extraction

4.10.4.25 There are a number of mineral and aggregate extraction areas located within the study area. Although these areas do not overlap with the Offshore Scoping Boundary, three are located within 1km (see Table 4.10.1).

Table 4.10.1: Mineral and aggregate extraction locations within the study area

Company	Name	Type	Distance from Offshore Scoping Boundary
Hanson Aggregates Marine Ltd	Outer OTE (528/2)	Aggregate exploration and option area	<1km
Tarmac Marine Ltd	Longsand (509/1-3)	Aggregate production areas	8km
Britania Aggregates Ltd	Longsand (508)	Aggregate production area	1.2km

Company	Name	Type	Distance from Offshore Scoping Boundary
CEMEX UK Marine Ltd	Longsand (510/1-2)	Aggregate production area	<1km
Dover Harbour Board	Goodwin sands	Aggregate production area	9km
CEMEX UK Marine Ltd	Shipwash (507/1-6)	Aggregate production area	<1km

### Dredging and disposal sites

- 4.10.4.26 Several navigational dredging sites have been identified in the study area, including Harwich navigation channel, Pegwell Bay navigational dredging area, North West Shipwash dredging site, the London Gateway Port navigation channel, the Inner Gabbard dredging area, Greater Gabbard dredging area and Project 8 Windserver dredging area<sup>430</sup>.
- 4.10.4.27 Several licensed disposal sites have also been identified in the study area, including the Inner Gabbard East disposal site. EA One Route EC-3 disposal area and Harwich Haven disposal site<sup>430</sup>. A number of closed and disused disposal sites have also been identified.

### Military areas

- 4.10.4.28 Several military practice zones, specifically Navy Practice and Exercise Areas (PEXAs) for surface fleet, have been identified in the study area. Only one of these zones (Kentish Knock), covering an area of 0.2km<sup>2</sup> intersects the Offshore Scoping Boundary.
- 4.10.4.29 A historical munitions disposal site (East Swin) has also been identified as present in the study area<sup>430</sup>.

### Pipeline and cable crossing

- 4.10.4.30 The Offshore Scoping Boundary will cross a number of active, planned and out of service cables. Active cables include Nemo link and BritNed submarine power cables, Thanet Offshore Windfarm export cable, East Anglia One export cable and a number of subsea telecommunications cables. In addition, a number of proposed projects will likely involve a crossing with the Project including Gridlink power cable and the export cables of the proposed East Anglia One North and East Anglia Two Offshore windfarms and North Falls and Five Estuaries offshore windfarms, as well as a number of proposed subsea telecommunications cables. There is a possible interaction with the existing Greater Gabbard and Galloper export cables at landfall in Suffolk.

### Aquaculture

- 4.10.4.31 The study area is intersected by the Outer Thames shellfish waters<sup>434</sup>.

<sup>434</sup> Cefas. (2016). Classified Bivalve Mollusc Harvesting Areas (England and Wales). [Online]. Available at: <https://magic.defra.gov.uk/MagicMap.aspx>. [Accessed: 29/06/2022].

- 4.10.4.32 The East Inshore Marine Plan and South East Inshore Marine Plan recognise aquaculture as a key area for development through its potential to contribute to the sustainability and security of the UK food supply which, in turn, may encourage growth in small and medium enterprises supporting the industry.
- 4.10.4.33 A study published in 2019<sup>435</sup> identified areas of aquaculture potential in English waters and defined strategic areas of sustainable aquaculture production, many of which are crossed by the study area and which may provide a future potential source of employment in deprived or peripheral areas, or those with a limited numbers of alternative employment options. It is seen as an industry where development could occur particularly at local levels<sup>436</sup>. In this context, the plan defines strategic areas of sustainable aquaculture production, many of which will be intersected by the study area<sup>437 438</sup>.

### Future Baseline

- 4.10.4.34 The other sea users' chapter within the Environmental Statement (ES) will include an outline of the likely evolution of the baseline environment without the implementation of the development as far as natural changes from the baseline scenario can be assessed.

## 4.10.5 Embedded and Control & Management Measures

- 4.10.5.1 Given that many design elements of the Project have yet to be confirmed, the embedded and control and management measures have not been finalised at this stage. Measures will be discussed with statutory consultees and stakeholders throughout the EIA process.

### Embedded Measures

- 4.10.5.2 The evolution of the Offshore Scoping Boundary has been informed by consideration of a number of different marine features; where possible, interaction with features such as spoil grounds, extraction areas, harbour limits and military training areas have been minimised where possible.

### Control and Management Measures

- 4.10.5.3 An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**. Measures relevant to the control and management of impacts that could affect the other sea user's assessment are:
- OSU01 - crossing agreements will be agreed with aggregate extraction, cable and pipeline owners. The crossing agreement describes the rights and responsibilities of the parties and also the design of the crossing. Crossing design will be in line with industry standards, using procedures and techniques agreed with the cable and pipeline owners.

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<sup>435</sup> MMO. (2019). Identification of areas of aquaculture potential in English waters (MMO1184).

<sup>436</sup> DEFRA. (2021). South East Inshore Marine Plan. Department for Environment, Food & Rural Affairs.

- OSU02 - timely and efficient communication will be given to sea users in the area via Notices to Mariners, Kingfisher Bulletins, Navigational Telex (NAVTEX), and Navigational Areas (NAVAREA) warnings.

## 4.10.6 Potential for Significant Effects

4.10.6.1 The assessment of other sea users will consider the construction, operation, maintenance and decommissioning of the Offshore Scheme. Details of each of these stages are set out in **Part 1, Chapter 4, Description of the Project**.

4.10.6.2 The proposed scope of the other sea users assessment is set out below and has been determined using the approach described in **Part 1, Chapter 5, EIA Approach and Methodology**.

### Sources and Impacts (Step 1)

4.10.6.3 This section identifies the sources and impacts that could occur as a result of the construction, operation, maintenance and decommissioning of the Offshore Scheme.

4.10.6.4 The potential for the Offshore Scheme to result in potential significant effects takes into account the embedded and control and management measures described in section 5.

#### Sources of construction impacts

- unexploded ordnance (UXO) clearance;
- pre-installation geophysical surveys;
- pre-installation clearance of obstacles and debris;
- sand wave sweeping;
- cable installation and cable lay; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of operational impacts

- presence of activated cable; and
- presence of rock protection.

#### Sources of maintenance impacts

- geophysical and/or Remotely Operated Vehicle (ROV) surveys;
- cable repair or replacement; and
- cable protection (e.g. rock placement, concrete mattresses).

#### Sources of decommissioning impacts

- removal of cable from seabed;
- removal of cable protection (e.g. rock placement, concrete mattresses); and/or
- abandonment of cable in seabed;

## Potential impacts

5.10.6.4 Table 4.10.2 identifies the potential impacts that could result from the sources identified above.

Table 4.10.2: Sources and impacts

Project Phase	Source	Impact	Potential for significant effects	Proposed to be scoped in/out
Construction, maintenance and decommissioning	Presence of vessels	Vessel interaction with stationary or slow-moving traffic	Yes	Scoped in
Operation and decommissioning	Presence of in situ cable	Occupancy of seabed	Yes	Scoped in
Construction and decommissioning	UXO clearance; Pre-installation clearance of obstacles and debris; Sand wave sweeping; Cable installation and cable lay; Cable repair or replacement; Removal of cable from seabed; and Removal of cable protection	Route clearance in preparation for cable laying/removal will require the presence of specialist equipment	Yes	Scoped in
Construction, maintenance and decommissioning	Installation/removal of infrastructure	Installation/removal of infrastructure may interfere/displace other sea users	Yes	Scoped in

## Impact Pathways with Receptors (Step 2)

4.10.6.5 This section identifies whether there are any impact pathways from the impacts identified above that could give rise to potentially significant effects on the receptors within the other sea users study area.

4.10.6.6 Table 4.10.3 provides a summary of the impact pathways identified and those proposed to be scoped into and or out of the marine mammal assessment for the Offshore Scheme.

Table 4.10.3: Impact pathways with receptors

Impact Pathway	Receptors	Potential for Significant Effects	Proposed to be Scoped In/Out
Physical presence of vessels (e.g. cable lay barge and support vessels) interacting with stationary or slow-moving traffic during construction, maintenance and decommissioning	Offshore windfarm access, operating and maintenance; Recreational sports and fishing; Marine aggregate extraction; Marine dredging and disposal; Military practice areas; recreational boating; and Aquaculture	Yes - additional presence of project vessels could interfere with and provide obstacles in an area which is already characterised with high density vessel traffic	<b>Scoped in</b>
Occupancy of seabed during operation and decommissioning – below seabed	Offshore windfarm and export cable maintenance; marine aggregate extraction; dredging and disposal; and aquaculture	Yes - the cable will occupy an area of the seabed, which may disrupt the placement of future infrastructure/offshore activities	<b>Scoped in</b>
Occupancy of seabed during operation and decommissioning – above seabed	Offshore windfarm and export cable maintenance; marine aggregate extraction; dredging and disposal; and aquaculture	Yes – cable protection measures will occupy an area of the seabed, which may disrupt the placement of future infrastructure/offshore activities	<b>Scoped in</b>
Pre-clearance and pre-sweeping of seabed during construction and decommissioning	Offshore windfarms and export cable; marine aggregate extraction; dredging and disposal; aquaculture; military operations; and recreational boating.	Yes - the clearance and sweeping of the seabed in preparation for cable laying/removal will require the presence of specialist equipment, which may interfere with the operation of other sea users	<b>Scoped in</b>
Installation/removal of infrastructure during construction, maintenance and decommissioning	Operation of offshore windfarms; marine aggregate extraction; dredging and disposal; military operations; pipeline and cable crossings; aquaculture; recreational boating	Yes – installation of infrastructure could interfere/displace other sea users	<b>Scoped in</b>

## 4.10.7 Proposed Assessment Methodology

### Proposed Data Sources

4.10.7.1 The following data sources are proposed to be used to inform the assessment:

- The Crown Estate Asset Maps: including offshore windfarms, wind export cable agreements, carbon capture and storage sites, and marine aggregate digital data;
- NST: Digital data for oil and gas infrastructure and blocks;
- MMO Public Register for marine licences and MMO Evidence Projects;
- MMO 'Explore Marine Plans' data portal, including spatial data for marine aggregates, aquaculture, dredging and disposal sites, and recreational areas
- MMO Mapping recreational sea anglers in English waters;
- UK Hydrographic Office: Military Practice and Exercise Areas;
- Environment Agency: bathing waters in England;
- KIS-ORCA: Marine cables digital data;
- Marine sports websites (Professional Association of Diving Instructors (PADI), Magic Seaweed; Finstrokes);
- AIS vessel traffic data;
- Relevant Environmental Statements;
- Marine Data Exchange Offshore Wind Environmental Evidence Register (OWEER); and
- RYA UK Coastal Atlas of Recreational Boating.

4.10.7.2 The overall assessment methodology for other sea users will follow the standard methodology outlined in **Part 1, Chapter 5, EIA Approach and Methodology**.

4.10.7.3 The assessment of impacts to other sea users will focus on establishing potential for overlaps, interactions and the consequent potential for conflict between activities in both a geographical and temporal context.

### Proposed Assessment Methodology

#### Value and sensitivity of receptor

4.10.7.4 The value and sensitivity of the receptor is characterised as either very high, high, medium, low or negligible. Examples of definitions for differing levels of sensitivity of other sea user receptors are provided below in Table 4.10.4.

Table 4.10.4: Definitions of value/sensitivity for other sea users

Very High	Very high value activity/activity fundamental to the operator of an asset of international or national economic importance. No redundancy available in event of impact. Asset very sensitive to the impact. For example, gas pipeline, electrical infrastructure or telecommunication cable supporting UK or European activity or nationally important
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	aggregates area where extraction company has no access to areas of equal quality aggregates.
High	High value activity/activity key to the operator of an asset of international or national economic importance. Very little redundancy available in event of impact. Asset sensitive to the impact. For example, gas pipeline, electrical infrastructure or telecommunication cable supporting UK or European activity or nationally important aggregates area where extraction company has very limited access to areas of equal quality aggregates.
Medium	Medium value activity. Impact to asset would significantly reduce operators' activities but not result in complete failure to continue operations. Limited redundancy available. Asset regionally important. Asset has limited tolerance of impact. For example, gas pipeline, electrical infrastructure or telecommunication cable supporting a specific region, where asset owners have some potential for redundancy planning. Aggregate areas where extraction company has some access to equal quality aggregate.
Low	Low value activity. Impact to asset would have limited implications on operator/public either due to the availability of redundancy or limited pathway for impact. Asset has some tolerance of impact. For example, electrical or telecommunication cable with ability to undertake redundancy planning to limit impact. Aggregate area where extraction company has access to large area of equal quality aggregate.
Negligible	Low value activity, operators' activities would not be significantly reduced by impact. Asset generally tolerant of impact. Limited impact to asset owners or local community in case of damage or failure.

### Magnitude of impact

- 4.10.7.5 The magnitude of impact will be considered in terms of the spatial extent, duration and timing of the impact in question. The magnitude levels and definitions for other sea users are provided in Table 4.10.5.

Table 4.10.5: Example definitions of the magnitude levels for other sea users

Large	Fundamental, permanent/irreversible changes, over the whole receptor, and/or fundamental alteration to continuation of activity. For example, accidental damage to asset resulting in permanent or long-term inoperability or complete loss of access to economically important asset.
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to activity. For example, damage to an asset that results in either short term, complete inoperability or long term reduced functionality. Partial loss of access to economically important asset, or short-term complete loss of access

Small	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and/or limited but discernible alteration activity. Accidental damage to asset resulting in short term reduction of functionality but not complete loss of function. Short term disruption to access of asset.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to activity.

### Significance of effect

4.10.7.6 Following the identification of other sea user receptor value and sensitivity and magnitude of impact, it is possible to determine the significance of effect following the approach detailed in **Part 1, Chapter 5, EIA Approach and Methodology**.

## 4.10.8 Conclusion

4.10.8.1 In summary:

- Other sea users are present in the study area;
- Offshore windfarms and corresponding export cables dominate offshore infrastructure in the study area;
- There are no oil and gas, carbon capture and storage, and wave and tidal projects present in the study area; and
- There is the potential for increased use by other sea users within the study area in the near future, including consented offshore wind sites.

### Proposed Scope of the Assessment

4.10.8.2 A summary of the proposed scope of assessment is provided in Table 4.10.6 below.

Table 4.10.6: Proposed scope of the assessment

Receptor	Potential for significant effect	Project phase(s)	Proposed to be scoped in/out
Other sea users	Increased presence of stationary and slow-moving vessels	Construction Maintenance Decommissioning	Scoped in
Other sea users	Occupancy of seabed - subsurface	Operation Decommissioning	Scoped in
Other sea users	Occupancy of seabed - surface	Operation Decommissioning	Scoped in
Other sea users	Disruption due to preparation of cable route	Construction Decommissioning	Scoped in

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Other sea  
users

Disruption due to  
installation/removal of  
infrastructure

Construction  
Maintenance  
Decommissioning

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**Scoped in**

# 4.11 Cumulative Effects

## 4.11.1 Introduction

4.11.1.1 This chapter presents how the intra-project and inter-project cumulative effects assessment will consider the potentially significant cumulative effects that may arise from the Offshore Scheme. A description of intra-project and inter-project cumulative effects is presented in **Part 1, Chapter 5, EIA Approach and Methodology**.

4.11.1.2 This chapter should be read in conjunction with:

- **Part 1, Chapter 4, Description of the Project;**
- **Part 1, Chapter 5, EIA Approach and Method;** and
- **Part 4 Technical Chapters 2-10.**

4.11.1.3 This chapter is supported by the following figures:

- **Figure 4.11.1 Zone of Influence for the Offshore Scheme;**
- **Figure 4.11.2 Long List Projects within the Offshore Scheme Zone of Influence;** and
- **Figure 4.11.3 Projects proposed to be taken to Stage 2 for the Offshore Scheme.**

## 4.11.2 Intra-Project

4.11.2.1 The proposed method for assessing the intra-project cumulative effects is presented in **Part 1, Chapter 5, EIA Approach and Methodology**. This describes a proposed three staged approach that will be used to assess whether the culmination of effects on an individual receptor is likely to lead to an overall effect of greater significance.

4.11.2.2 The first stage (pre-screening) in the process is to identify whether individual or groups of receptors could be affected by more than one type of effect (usually where they are considered by more than one technical chapter).

4.11.2.3 Where this first stage identifies that either:

- there is only one type of effect for a particular receptor; or
- only one topic has identified effects on that receptor,

it is considered that there will be no potential for intra-project effects and receptors will not be taken through to the next stage (screening) of the assessment.

4.11.2.4 An initial pre-screening assessment is presented in Table 4.11.1 showing how the receptor groups are likely to interact between chapters. This will be revisited as part of the assessment to ensure all receptors considered within the Environmental Statement (ES) are taken through this pre-screening assessment.

Table 4.11.1: Pre-screening stage

Receptors by chapter	Technical chapters									
	2	3	4	5	6	7	8	9	10	
Chapter 2 Physical Environment		✓								
Chapter 3 Benthic Ecology	✓									
Chapter 4 Fish and Shellfish Ecology	✓	✓							✓	
Chapter 5 Marine Mammals		✓	✓							
Chapter 6 Marine Ornithology		✓	✓							
Chapter 7 Marine Archaeology	✓									
Chapter 8 Shipping and Navigation				✓	✓			✓	✓	
Chapter 9 Commercial Fisheries			✓				✓		✓	
Chapter 10 Other Sea Users							✓	✓		

### 4.11.3 Inter-Project

4.11.3.1 The proposed method for assessing the inter-project cumulative effects is presented in **Part 1, Chapter 5, EIA Approach and Method**. The following section sets out the methodology for Stage 1 and Stage 2 in relation to the Offshore Scheme.

#### Stage 1

4.11.3.2 Stage 1 of the approach outlined in Planning Inspectorate (PINS) Advice Note Seventeen<sup>437</sup> requires a ‘long list’ of other developments to be identified, as well as high level information, such as the location/application boundary. This initial long list is provided in **Appendix 1.5.A Inter-Project Cumulative Effects Long List** and will be continually reviewed and updated as required.

#### Establishing the Zone of Influence (ZOI)

4.11.3.3 The first step in identifying the long list is to establish the Zone of Influence (ZOI) for the Offshore Scheme. **Part 1, Chapter 5, EIA Approach and Methodology** describes how the ZOI can be defined based on the largest study area of the technical chapters and doubling that area in order to identify a long list of other developments. The study areas identified within the offshore scoping technical chapters 2-10 have been identified to determine the baseline within the marine environment. These study areas take into account environmental influences such as metocean conditions originating at distance from the Offshore Scheme and the wide-ranging nature of mobile species rather than the maximum area over which the Offshore Scheme could result in potential effects.

<sup>437</sup> Planning Inspectorate (2019). Advice Note Seventeen: Cumulative effects assessment – cumulative effects assessment relevant to nationally significant infrastructure projects. [online] Available at: <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/>.

- 4.11.3.4 Therefore, when identifying the ZOI for the assessment of cumulative effects in the marine environment, it is appropriate to consider the spatial extent of the impacts of the source activities in order to identify a proportionate and realistic ZOI rather than the study area identified to inform the baseline conditions.
- 4.11.3.5 The source activities which will have the furthest ranging spatial impacts in the marine environment are those that generate underwater noise. Guidance regarding the assessment of effects from underwater sound source impacts in relation to SACs designated for the protection of harbour porpoise (the cetacean species with the highest hearing sensitivity) indicates the maximum distance for significant disturbance from geophysical surveys is 5km and 26km for impact piling and high order unexploded ordnance (UXO) detonation<sup>438</sup>.
- 4.11.3.6 Due to the impulsive, short lived and immediate nature of UXO detonation activities the likelihood of cumulative impacts with other projects undertaking this activity at the same point in time is low and as such it is not proposed to use this as the basis for defining the ZOI to identify the long list of projects. Consideration will however be given to the programme of activities of other developments as the Project progresses and additional information becomes available, and mitigation will be identified where necessary.
- 4.11.3.7 As described above geophysical surveys can produce noise levels that can have disturbance effects on marine mammals up to 5km. Based on the proposed cumulative assessment methodology (**Part 1, Chapter 5, EIA Approach and Methodology**) this would result in a ZOI of 10km for the identification of the long list of projects. It is however, acknowledged that there are a number of proposed offshore windfarm developments in the North Sea that, if progressed, would be undertaking piling activities. Although the detailed programme of activities is currently unknown, in-order to take a precautionary approach it is proposed that the ZOI for the identification of other projects to be considered with the assessment of cumulative effects be extended to take into account the potential temporal overlap with piling activities of other developments, which can have disturbance effects on marine mammals up to 26km. Therefore, the theoretical furthest distance that another project could be from the Project that could result in a potential cumulative effect is 31km (based on the Project potentially resulting in disturbance effects up to 5km and other developments which could have disturbance effects up to 26km).
- 4.11.3.8 Considering the above an overall cumulative assessment ZOI of 31km is proposed. This is illustrated on **Figure 4.11.1 Zone of Influence for the Offshore Scheme**. This will be kept under review as the Project develops and the long list updated as required.

#### **Identify the long list of 'other developments'**

- 4.11.3.9 A long list of other developments has been established and is presented in **Appendix 1.5.A Inter-Project Cumulative Effects Long List** and those that are within the ZOI for the Offshore Scheme are shown on **Figure 4.11.2 Long List Projects within the Zone of Influence**. This has been established using the guidance provided in Advice Note Seventeen and the 'other developments' have been categorised into three Tiers as described in **Part 1, Chapter 5, EIA Approach and Methodology**.
- 4.11.3.10 The Offshore Scheme Scoping Boundary does not directly interact with any existing or proposed marine aggregate extraction areas and existing activities associated with

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<sup>438</sup> JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales and Northern Ireland), JNCC Report No. 654, ISSN 0963-8091. Peterborough: JNCC.

marine aggregate dredging are considered as part of the existing baseline, however; aggregate exploration and option areas within 10km of the Offshore Scoping Boundary are included in the long list.

- 4.11.3.11 The Offshore Scheme Scoping Boundary does not directly interact with any licensed disposal sites over and above those associated with the other developments already identified in the long list.
- 4.11.3.12 Minor planning applications have been excluded from the assessment, as these relate to projects of small scale and local significance. These projects are highly unlikely to give rise to significant cumulative environmental effects over and above the Offshore Scheme in isolation.

## Stage 2

- 4.11.3.13 The long list is presented in **Appendix 1.5.A Inter-Project Cumulative Effects Long List** and those projects relevant to the Offshore Scheme are illustrated on **Figure 4.11.2 Long List Projects within the Zone of Influence**. The projects included on the long list were then screened as to the nature and scale of development, to identify whether they would be likely to result in potential cumulative effects with the Offshore Scheme.
- 4.11.3.14 The long list of projects proposed to be taken forward to Stage 2 are listed in Table 4.11.2 below and illustrated on **Figure 4.11.3 Projects Proposed to be taken to Stage 2 for the Offshore Scheme**.

Table 4.11.2: Long list of projects to be taken forward for Stage 2

ID	Application Ref (where applicable)	Consenting body	Project	Description	Distance from Offshore Scoping Boundary (km)	Tier
1	EN10012	Planning Inspectorate	Sizewell C Nuclear Power Station	Development of new nuclear power station	<0.5	Tier 1
2	MLA/2019/00488	MMO	NeuConnect	Interconnector from UK to Germany	0	Tier 1
3	MLA/202000262	MMO	GridLink	Interconnector from UK to France	0	Tier 1
4	N/A	Planning Inspectorate	North Falls Offshore Windfarm	Offshore windfarm development	0	Tier 2
5	EN010077	Planning Inspectorate	East Anglia ONE North Offshore Windfarm	Offshore windfarm development	0	Tier 1

6	EN010078	Planning Inspectorate	East Anglia TWO Offshore Windfarm	Offshore windfarm development	0	Tier 1
7	N/A	Planning Inspectorate	Nautilus	Interconnector from UK to Belgium	0	Tier 2
9	N/A	Planning Inspectorate	Five Estuaries Offshore Windfarm	Offshore windfarm development	0	Tier 2
11	EN010056	Planning Inspectorate	East Anglia THREE Offshore Windfarm	Offshore windfarm development	0	Tier 1
287	N/A	TBC	EuroLink	Interconnector from UK to The Netherlands	TBC	Tier 3
289	N/A	MMO	Hanson Aggregates Marine Ltd Area 528/2	Aggregate exploration and option area	<500m	Tier 3

## 4.11.4 Conclusion

- 4.11.4.1 As outlined above inter and intra cumulative effects are proposed to be scoped into the EIA and the results will be presented in the ES. **Appendix 1.5.A Inter-Project Cumulative Effects Long List** considers each scoped in environmental discipline, the ZOI and whether effects associated with each of the developments could interact with the effects associated with this project. Table 4.11.2 outlines the proposed short-listed developments that further information including, design, location, programme, operation and decommissioning information and reported environmental effects will be gathered for, to inform which of those developments will be assessed as part of the inter-project cumulative effects assessment.