The Great Grid Upgrade

Sea Link

Preliminary Environmental Information Report

Volume: 1

Part 4 Offshore Scheme

Chapter 5 Marine Mammals

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4.5 Marine Mammals

4.5.1 Introduction

4.5.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents information about the preliminary environmental assessment of the likely significant effects on marine mammals identified to date, that could result from the Proposed Project (as described in **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**).

4.5.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures and the preliminary residual significant effects on marine mammals that could result from the Proposed Project.

4.5.1.3 The draft Order Limits which illustrates the boundary of the Proposed Project, are illustrated on **Figure 1.1.1 Draft Order Limits** and the Offshore Scheme Boundary is illustrated on **Figure 1.1.4 Offshore Scheme Boundary**.

4.5.1.4 This chapter should be read in conjunction with:

- **Volume 1, Part 1, Chapter 4, Description of the Proposed Project**;
- **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**;
- **Volume 1, Part 1, Chapter 6, Scoping Opinion and EIA Consultation**;
- **Volume 1, Part 4, Chapter 1, Evolution of the Offshore Scheme**;
- **Volume 1, Part 4, Chapter 4, Fish and Shellfish**; and
- **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report.**

4.5.1.5 This chapter is supported by the following figures:

- **Volume 3, Figure 4.5.1 Marine Mammal Study Area;**
- **Volume 3, Figure 4.5.2 Harbour porpoise density and predicted distribution;**
- **Volume 3, Figure 4.5.3 Bottlenose dolphin density and predicted distribution;**
- **Volume 3, Figure 4.5.4 Minke whale density and predicted distribution;**
- **Volume 3, Figure 4.5.5 White-beaked dolphin density and predicted distribution;** and
- **Volume 3, Figure 4.5.6 At sea distribution of harbour and grey seals in the study area**.

4.5.1.6 This chapter is supported by the following appendix:

- **Volume 2, Appendix 1.4.A, Outline Code of Construction Practice;**
- **Volume 2, Appendix 1.4.F, Schedule of Environmental Commitments;** and
- **Volume 2, Appendix 4.8.B, Electromagnetic Deviation Study.**

4.5.2 Regulatory and Planning Context

4.5.2.1 This section sets out the legislation and planning policy that is relevant to the preliminary marine mammal assessment. A full review of compliance with relevant national and local planning policy will be provided within the Planning Statement, which will be submitted as part of the application for Development Consent.

4.5.2.2 Policy generally seeks to minimise effects from developments and to avoid significant adverse effects to marine biodiversity, including marine mammals. This applies particularly where project activities have the potential to interfere with protection and conservation initiatives for local populations, and species/habitats of conservation importance.

Legislation

Marine and Coastal Access Act 2009

4.5.2.3 The Marine and Coastal Access Act 2009 (Ref 5.1) 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 (amended 2019)

4.5.2.4 The Conservation of Habitats and Species Regulations 2017 (Ref 5.2) (amended 2019 (Ref 5.3)) transposes the Habitats Directive (92/43/EEC) into UK legislation out to the 12 nautical mile (NM) limit:

- All cetaceans (whales, dolphins, and porpoises) are listed as European Protected Species (EPS) on Schedule 2 of the Habitats Directive.
- Pinnipeds (seals): grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina* are listed as Annex II (as are harbour porpoise *Phocoena phocoena* and bottlenose dolphin *Tursiops truncatus*).

The Wildlife and Countryside Act 1981

4.5.2.5 The Wildlife and Countryside Act 1981 (Ref 5.4; as amended) includes provisions relating to nature conservation, including species of marine mammals.

The Marine Strategy Regulations 2010

4.5.2.6 The Marine Strategy Regulations 2010 (Ref 5.5) transposes the Marine Strategy Framework Directive (2008/56/EC) into UK legislation.

Conservation of Seals Act 1970

4.5.2.7 The Conservation of Seals Act 1970 (Ref 5.6) provides seasonal protection and, with some exceptions, prohibits the taking, injuring, and killing of seals.

Section 41 of the NERC 2006

4.5.2.8 Section 41 of the NERC 2006 (Ref 5.7) lists species of principal importance, including marine mammals, for the purpose of conservation of biodiversity.

Environment Act 2021

4.5.2.9 The Environment Act 2021 (Ref 5.8) sets 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).

National Policy

National Policy Statements

4.5.2.10 National Policy Statements (NPSs) set out the primary policy tests against which the application for a Development Consent Order (DCO) for the Proposed Project will be considered. A review of the NPS was announced in the 2020 Energy white paper: Powering our net zero future. This review was to ensure the NPSs were brought up to date to reflect the policies set out in the white paper. The below information reflects these updates currently under consultation. Table 4.5.1, Table 4.5.2 and Table 4.5.3 below provides details of the elements of NPS (EN-1) Overarching National Policy Statement for Energy (Ref 5.9), NPS for Renewable Energy Infrastructure (EN-3) (Ref 5.10) and NPS for Electricity Networks Infrastructure (EN-5) (Ref 5.11) that are relevant to this chapter, and how and where they are covered in the PEIR or will be covered within the Environmental Statement (ES).

Table 4.5.1: NPS EN-1 requirements relevant to marine mammals (Update for consultation 2023).

NPS EN-1 section	Where this is covered in the PEIR
4.4.7 "... *Applicants are encouraged to approach the marine licensing regulator (MMO in England and Natural Resources Wales in Wales) in pre-application, to ensure that they are aware of any needs for additional marine licenses alongside their DCO application".*	Consultation with Natural England was undertaken during the scoping stage. Relevant comments are provided in section 4.5.3.
4.4.8…"*Applicants for a development consent order must take account of any relevant Marine Plans and are expected to complete a Marine Plan assessment as part of their project development, using this information to support an application for development consent*"	Marine Plans are identified in Table 4.5.5 and considered in section 4.5.9 Preliminary Assessment of Effects.
4.4.9…"*Applicants are encouraged to refer to Marine Plans at an early stage, such as in preapplication, to inform project planning, for example to avoid less favourable locations as a result of other uses or environmental constraints*".	Marine Plans are identified in Table 4.5.5 and considered in section 4.5.9 Preliminary Assessment of Effects.
5.4.17 (part)"... *Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation*	Whilst a full ES is expected to occur at the next stage, preliminary identification of designated sites can be found in section 4.5.7 Baseline

NPS EN-1 section	Where this is covered in the PEIR
importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats".	Conditions and a preliminary impact assessment can be found in section 4.5.9 Preliminary Assessment of Effects. An assessment of impacts on designated sites is available in **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report**.
5.4.18…"*The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the Secretary of State consider thoroughly the potential effects of a proposed project".*	Consultation with Natural England was undertaken during the scoping stage. Relevant comments are provided in section 4.5.3.
5.4.19 *"… The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests".*	The Proposed Project will adopt a range of measures to conserve biodiversity as detailed in section 4.5.7 Mitigation.
5.4.22 (part)..." *The design of Energy NSIP proposals will need to consider the movement of mobile /migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure. As energy infrastructure could occur anywhere within England and Wales, both inland and onshore and offshore, the potential to affect mobile and migratory species across the UK and more widely across Europe (transboundary effects) requires consideration, depending on the location of development.*"	All features of conservation importance including designated sites and protected species have been considered in both the initial baseline (section 4.5.6) and preliminary assessment of effects (section 4.5.8) and in **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report**
5.4.23 *"…Energy projects will need to ensure vessels used by the project follow existing regulations and guidelines to manage ballast water".*	Relevant mitigation measures identified at this stage are provided in section 4.5.8 Mitigation.

Table 4.5.2: NPS EN-3 requirements relevant to marine mammals (Update for consultation 2023).

NPS EN-3 section	Where this is covered in the PEIR
3.3.22 *"As part of marine licensing, impacts on marine protected areas (MPAs) will be considered. Further guidance on marine licensing is set out in Section 1.2 of EN-1."*	Marine protected areas relevant to the Proposed Project are discussed in section 4.5.7 Baseline

NPS EN-3 section	Where this is covered in the PEIR
	Conditions, with a preliminary assessment of likely impacts discussed in section 4.5.9 Preliminary Assessment of Effects
3.8.146... *"The applicant should discuss any proposed noisy activities with the relevant statutory body and must reference the joint JNCC and SNCB underwater noise guidance in relation to noisy activities (alone and in-combination with other plans or projects) within HRA sites, in addition to the JNCC mitigation guidelines to piling, explosive use, and geophysical surveys".*	Section 4.5.9 presents the pre,iminary assessments of underwater noise on marine mammals and references the *JNCC and SNCB underwater noise guidance as appropriate.*
3.8.148…*"Where the assessment identifies that noise from construction and UXO clearance may reach noise levels likely to lead to noise thresholds being exceeded (as detailed in the JNCC guidance) or an offence as described in paragraph 2.8.138 above, the applicant will be expected to look at possible alternatives or appropriate mitigation".*	Section 4.5.9 presents the preliminary assessments of underwater noise on marine mammals. A separate marine licence application will be made for any unexploded ordenance (UXO) detonation in line with MMO advice to allow for appropriate consideration of potential UXO impacts once sufficient information is available to identify any potential UXO risk. Impact pathways in relation to UXO noise are therefore not considered in the current assessment. Project mitigation is presented in section 4.5.8.

Table 4.5.3: NPS EN-5 requirements relevant to marine mammals (Update for consultation 2023).

NPS EN-5 section	Where this is covered in the PEIR
2.2.10 "...*As well as having duties under Section 9 of the Electricity Act 1989, (in relation to developing and maintaining an economical and efficient network), applicants must take into account Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to "have regard to the*	The project undertook a detailed routeing and siting study (**Volume 1, Part 1, Chapter 3, Main Alternatives Considered**) which considered a wide range of environmental factors including biodiversity.

NPS EN-5 section	Where this is covered in the PEIR
desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and …do what [they] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects".	
2.13.15 *"…The sensitivities of many coastal locations and of the marine environment as well as the potential environmental, community and other impacts in neighbouring onshore areas must be considered in the identification onshore connection points."*	Landfall design is summarised in **Volume 1**, **Part 1 Chapter 4: Description of the Proposed Project** and installation methods have been selected to minimise impacts on marine mammals (e.g. the use of trenchless techniques for the transition zone between the offshore and onshore elements). Other mitigation relevant to marine mammals is provided in section 4.5.8 Mitigation.
2.14.2..."*In the assessments of their designs, applicants should demonstrate how environmental, community and other impacts have been considered and how adverse impacts have followed the mitigation hierarchy i.e. avoidance, reduction and mitigation of adverse impacts through good design; and how enhancements to the environment post construction will be achieved including demonstrating consideration of how proposals can contribute towards biodiversity net gain (as set out in Section 4.5 of EN-1 and the Environment Act 2021), as well as wider environmental improvements in line with the Environmental Improvement Plan and environmental targets (paragraph 4.2.29 of EN-1). In addition, all applicants are encouraged to demonstrate how the construction planning for the proposals has been coordinated with that for other similar projects in the area on a similar timeline*".	Landfall design is summarised in **Volume 1, Part 1 Chapter 4: Description of the Proposed Project** and installation methods have been selected to minimise impacts on marine mammals (e.g. the use of trenchless techniques for the transition zone between the offshore and onshore elements). Other mitigation relevant to marine mammals is provided in section 4.5.8 Mitigation.

National Planning Policy Framework

4.5.2.11 The National Planning Policy Framework (NPPF) (Ref 5.12) has the potential to be considered important and relevant to the Secretary of State (SoS) consideration of the

Proposed Project. Biodiversity is stated as one of the factors contributing to the core objectives of sustainable economic development. Table 4.5.4 below provides details of the elements of the NPPF that are relevant to this chapter, and how and where they are covered in the PEIR or will be covered within the ES.

Table 4.5.4: NPPF requirements relevant to marine mammals.

NPPF section	Where this is covered in the PEIR
Paragraph 174 "*Planning policies and decisions should contribute to and enhance the natural and local environment by [inter alia] … protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); … [and] recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services; … [and] minimising impacts on and providing net gains for biodiversity; …[and] preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability*".	Statutory protected sites and their associated features of interest which will be impacted by project activities are considered in section 4.5.9 Preliminary Assessment of Effects. Relevant designated sites have been further subjected to a **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report.**
Paragraph 175 *"Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries*".	Locally, nationally, and internationally designated sites have all been considered where designations include relevant populations of marine mammals. Details of relevant designated sites are provided in section 4.5.7 Baseline Conditions and **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report**.
Paragraph 179 *"To protect and enhance biodiversity and geodiversity, plans should: Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; [and] promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority*	Impacts to biodiversity are considered in section 4.5.9 Preliminary Assessment of Effects and **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report.**

NPPF section	Where this is covered in the PEIR
species; and identify and pursue opportunities for securing measurable net gains for biodiversity."	
Paragraph 180 *"When determining planning applications, local planning authorities should apply the following principles: if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused; [and] development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest; [and] development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate."*	Consideration has been given to relevant designated sites in the project design. At the time of writing, no SSSIs have been identified near the Offshore Scheme that are relevant to the protection of marine mammals.
Paragraph 181 *"The following should be given the same protection as habitats sites: possible Special Areas of Conservation; [and] listed or proposed Ramsar sites; [and] sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites."*	Routing of the Offshore Scheme has been designed to avoid protected habitats where possible. No potential sites, in addition to existing designations have been identified. Should any become designated an assessment of the new site would be included in **Volume 1, Part 5, Chapter 3, Habitat Regulations Screening Report**. A full list of sites designated for the protection of marine mammals is provided in section 4.5.7 Baseline Conditions.

National Planning Practice Guidance

4.5.2.12 No additional national planning guidance has been identified which is relevant to marine mammals.

Marine Planning Policy

The following marine plans are considered relevant to a study of marine mammals and has informed the assessment of preliminary effects in this chapter are as follows:

- The UK Marine Policy Statement (MPS) 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 (Ref 5.13);
- East Inshore and East Offshore Marine Plan (Ref 5.14); and
- South East Inshore Marine Plan (Ref 5.15).

Table 4.5.5: MPS Policies relevant to marine mammals.

Marine Plan	Where this is covered in the PEIR
The UK MPS	Where possible, consideration as been given to conserving marine mammal biodiversity and avoiding harm to marine ecology through siting, mitigation, and consideration of reasonable alternatives. Adverse effects to designated sites and protected features are avoided where possible. Species and site designations are provided in section 4.5.7 Baseline Conditions, with an assessment of potential impacts in section 4.5.8. Relevant mitigation provided in section 4.5.8 Mitigation.
East Inshore and East Offshore Marine Plan; and, South East Inshore Marine Plan	Routing of the Offshore Scheme has been selected to avoid sensitive habitats. An ecosystems-based approach has been adopted and cumulative impacts have been considered to ensure that effects from project activities do not adversely impact local and regional marine mammal populations.

Local Planning Policy

4.5.2.13 The intertidal area of the Offshore Scheme lies within the jurisdiction of Suffolk County Council, East Suffolk Council, Suffolk Coastal Local Plan, Kent County Council and within the boundary of Thanet District Council Local Plan and Dover District Local Plan. However, no activities are planned within the intertidal area as trenchless installation techniques have been proposed; as such these plans have not been considered further at this stage.

4.5.3 Scoping Opinion and Consultation

Scoping

4.5.3.1 A Scoping Report (Ref 5.16) for the Proposed Project was issued to the Planning Inspectorate on 24 October 2022 and a Scoping Opinion (Ref 5.17) was received from the SoS on 1 December 2022. Table 4.5.6 sets out the comments raised in the Scoping Opinion and how these have been addressed in this PEIR or will be addressed within the ES. The Scoping Opinion takes account of responses from prescribed consultees as appropriate.

Table 4.5.6: Comments raised in the Scoping Opinion

ID	Inspectorate's comments	Response
5.4.1	The Scoping Report seeks to scope out this matter on the grounds that embedded mitigation and good practice measures would ensure that accidental spills/leaks would be very limited. The Inspectorate agrees that, provided the measures to mitigate the risks of leaks and spills are clearly described in the ES and secured in the dDCO, this matter can be scoped out of further assessment.	Mitigation measures to be adhered to include the development of an offshore Construction Environmental Management Plan (CEMP) and compliance with International Regulations for Preventing Collisions at Sea to avoid the likelihood of any accidental spills/leaks. An outline Code of Construction Practice (CoCP) is provided in **Appendix 1.4.A Outline Code of Construction Practice**
5.4.2	The Scoping Report seeks to scope this matter out on the grounds that increases in suspended sediment concentration (SSC) are expected to be minimal and confined to the lower reaches of the water column. In addition, it cites research which indicates that marine mammals do not typically experience severe impacts from increased SSC. The Inspectorate agrees that this matter can be scoped out from further assessment in the ES.	The effect of increased SSC on marine mammals has been scoped out of this assessment.
5.4.3	The Scoping Report seeks to scope out this matter (impact from thermal effects of HVDC cable) on the grounds that cables have a negligible capacity to heat the overlying water column. The Inspectorate agrees that this matter can be scoped out of further assessment in the ES.	The effect of thermal emissions from the operational cable on marine mammals has been scoped out of the assessment.
5.4.4	The Inspectorate queries whether relying on a screening distance of 50	The screening of sites designated for marine mammals has now

ID	Inspectorate's comments	Response
	km will be sufficient to identify all the relevant designated sites with cetacean qualifying features, given that harbour porpoise and bottlenose dolphin are highly mobile. We note that Natural England shares this concern and has also flagged the potential for grey and harbour seals to travel over greater distances than have been identified in the Scoping Report (see Appendix 2 of this Opinion). The Applicant should seek to agree the species to be included in the assessments and the appropriate screening distances to be used with relevant stakeholders, particularly Natural England.	taken a regional approach rather than distance a distance of 50 km, giving consideration to relevant ecology and habitat connectivity, and marine mammal management units, to determine which sites should be included (see 4.5.5). A list of all designated sites with relevant protected features is provided in section 4.5.7 Baseline Conditions.
5.4.5	The Scoping Report only refers to published sources of data so it appears (although this is not explicitly stated) that the baseline would be entirely based on published data rather than any surveys of the study area. The Applicant's attention is drawn to the comments from Natural England (see Appendix 2 of this Opinion) on the need to clarify which species are actually being included in the assessments in the ES and the data used to characterise the baseline environment. The Applicant should seek to agree the approach to gathering baseline data with relevant stakeholders and provide evidence of that agreement in the ES. The ES must present the baseline data clearly, including information on the predicted numbers of individuals of each species likely to be affected by the Proposed Development. The ES must also explain how the baseline data has been derived from published sources.	Due to the availability of systematic marine mammal survey data collected over time (e.g. SCANS data), there is sufficient data available in the literature for a suitable marine mammal baseline and no project specific field surveys for marine mammals will be undertaken. Therefore, the baseline will rely entirely on desk-based sources as described in section 4.5.4 Baseline Data Gathering and Forecasting Methods. There are a number of cetacean and seal species that are known to occur within the study area, and these are discussed in detail in section 4.5.6 Baseline Conditions, with preliminary impact pathways discussed in section 4.5.9 Preliminary Assessment of Effects. At the ES stage, a detailed impact assessment will estimate the number of individual marine mammals, by species present in the Study Area,which will potentially be affected by the development.
5.4.6	Table 4.5.3 identifies various sources of underwater noise which could affect marine mammals but does not	A preliminary assessment of impacts from pre-installation geophysical surveys is discussed

ID	Inspectorate's comments	Response
	include any reference to noise from any underwater surveys (such as geophysical surveys). Where such surveys are proposed at the pre-construction stage then the related underwater noise impacts should be assessed in the ES.	in section 4.5.9 Preliminary Assessment of Effects. Impact assessments will be reviewed and updated in further detail in the ES.
5.4.7	The Scoping Report provides a detailed explanation of how the significance of effects would be determined, based on the CIEEM guidance. However, no description has been provided of the methods that will be used to assess impacts and whether these will be quantitative or qualitative. Unless otherwise agreed with relevant stakeholders (and evidence of that agreement is provided in the ES), the assessment should include modelling of underwater noise propagation during construction and decommissioning and the area affected by increased noise levels should be shown on figures within the ES.	Methods for assessing receptor sensitivity, impact magnitude, and overall significance are provided in section 4.5.3.2 Approach and Methodology. Sound source levels from cable installation and associated activities are significantly lower than activities such as impact piling and seismic surveys. Therefore, simple geometric spreading calculations have been used to determine Sound Pressure Levels to determine likely injury effect zones. Disturbance effects have been considered using Effective Deterrent Ranges (zone of influence) provided in JNCC guidance (Ref 5.21)

Consultation and Project Engagement

4.5.3.2 No additional stakeholder consultation in relation to marine mammals, beyond the appropriate statutory consultees, has been identified.

4.5.4 Approach and Methodology

4.5.4.1 **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology** sets out the overarching approach which has been used in developing the preliminary environmental information. This section describes the technical methods used to determine the baseline conditions, sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the preliminary marine mammal assessment.

Guidance Specific to the Marine Mammal Assessment

4.5.4.2 In addition to the legislation and policies outlined in section 4.5.2, the preliminary marine mammal assessment has been carried out in accordance with the following good practice guidance documents:

- Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and Marine (Ref 5.18);

- Guidelines for minimising the risk of injury to marine mammals from geophysical surveys (Ref 5.19);
- Guidelines for minimising the risk of injury to marine mammals from using explosives (Ref 5.20);
- Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise Special Areas of Conservation (SACs) (Ref 5.21); and
- '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 are also available on the ASCOBANS website (Ref 5.22).

Baseline Data Gathering and Forecasting Methods

4.5.4.3 Detailed baseline conditions were established by undertaking a desktop review of published and publicly available information and through consultation with relevant organisations. No marine mammal field surveys were undertaken as the information collected through the desktop review was considered sufficient for an assessment of the project activities.

4.5.4.4 Key data sources were used to inform the understanding of the relative importance and functionality of the Study Area in the regional context of marine mammal populations in the wider central and southern North Sea. The data sources reviewed include, but may not be limited to:

- SCANS (Small Cetacean Abundance in the European Atlantic and North Sea) data (Ref 5.23) – see full description of data below;
- Inter-Agency Marine Mammal Working Group (Ref 5.24);
- Sea Mammal Research Unit (Ref 5.25);
- Special Committee on Seals (Ref 5.26; Ref 5.56; Ref 5.57);
- population trends of harbour and grey seals in the Greater Thames Estuary (Ref 5.27);
- habitat-based predictions of at-sea distributions for grey and harbour seals in the British Isles (Ref 5.61);
- distribution models for 12 species of cetacean covering the North-east Atlantic (Ref 5.28);
- The Sea Watch Foundation marine mammal sightings distribution maps;
- publicly available academic journals and online reports; and
- relevant Environmental Statements.

SCANS data (I, II, and III)

4.5.4.5 The SCANS project is a large-scale ship and aerial based survey effort to quantify cetacean abundance and distribution in UK and European Atlantic Waters. It first began in 1994 (SCANS I) with boat-based line and aerial line transect surveys following methods of Hiby and Lovell 1998 (Ref 5.29), initially in the North and Celtic seas. It has since evolved and has been repeated in 2005 (SCANS II), 2016 (SCANS III), and 2022 (SCANS IV); however, as the data from the most recent survey effort is not yet available, the SCANS III data are presented here. Abundance estimates are divided into blocks. The relevant block containing the Offshore Scheme are Block L, although consideration is also given to the adjacent blocks C and O.

4.5.4.6 It should be noted that SCANS surveys are conducted in the summer (predominantly July) and therefore data are representative of summer distributions only. It is understood that the densities of cetaceans around the British Isles is likely greatest during this time period and as such, the abundances presented in section 2.1.6 are considered to represent the worst-case scenario and indicate the greatest abundances likely to be encountered within the Study Area.

Assessment Criteria

4.5.4.7 Several factors will be considered when assessing the impacts on marine mammals resulting from the Offshore Scheme including sensitivity of the receptors and the magnitude of the impact. Together these have been used to assess and the overall significance of effects. The magnitude of impacts considers both the scale and duration of the impact. Consideration is also given to whether the damage caused by an impact is reversible or not.

4.5.4.8 A prescriptive matrix for determination of significance has not been adopted, as recommended by CIEEM (Ref. 5.18) although reference has been made to sensitivity, magnitude, and significance criteria as defined in **Volume 1, Part 1, Chapter 5 PEIR Approach and Methodology**. Ecological impact assessment uses available evidence together with professional judgement and knowledge of marine mammals to determine potential impacts and significance of effects, based on discussion of receptor sensitivity, importance and magnitude. The methodologies for assessing sensitivity, magnitude and significance are described in more detail below.

Sensitivity

4.5.4.9 When defining sensitivity, the criteria levels set out in **Volume 1, Part 1, Chapter 5 PEIR Approach and Methodology** have been considered**.** To determine sensitivity of the receptor, the vulnerability of the receptor to the impact and its ability to recover and adapt are considered. Vulnerability differs between different groups and species of marine mammals and also varies depending on the impact pathway. For example, slow moving large whales may be more vulnerable to collisions with vessels than fast moving agile species such as the harbour porpoise; another example is that seals are more sensitive to visual disturbance than cetaceans.

4.5.4.10 The importance, or value, of the receptor on an international, national and local scale has also been considered in assessing sensitivity. All cetaceans are EPS species and therefore are considered to be of very high importance. The two species of pinniped, or seal, in the UK are nationally protected and are also considered to be of high importance.

Magnitude

4.5.4.11 The magnitude of an impact which could affect marine mammals is influenced by several key factors, including the scale of the change (for example at the individual or population level), the spatial extent over which the impact is likely to occur, and the duration and frequency of the impact.

4.5.4.12 Marine mammals are highly mobile species and are likely to swim away from an affected area for the duration of an impact, returning once the impact is removed. However, some life stages of seals require females and pups to remain on the shore for several weeks, and thus avoidance of an impact in the nearshore may not be possible or there may be key foraging grounds that cetacean populations may be unwilling to move away from. Thus, when determining the magnitude of impacts on marine mammals, life history and ecology of the receptor has been considered. Factors such as the distance at which effects could occur and the duration and frequency of the impact were also assessed.

4.5.4.13 When defining the magnitude of the impact, criteria detailed in **Volume 1, Part 1, Chapter 5 PEIR Approach and Methodology** has been followed: large, medium, small, and negligible.

Significance of effects

4.5.4.14 As set out in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology** the general approach taken to determining the significance of effect in this preliminary assessment is only to state whether effects are likely or unlikely to be significant, rather than assigning significance levels.

4.5.4.15 To determine whether an effect is significant or not, the nature and anticipated timeframe of the impact has been taken into account, in addition to the likely sensitivity of affected receptors. The magnitude and spatial extent of the impact have also been considered.

4.5.4.16 Professional judgment and knowledge from previous projects have been considered. In addition, a precautionary approach has been taken with the worst-case scenario assessed for each impact, in order to account for uncertainty or lack of baseline survey data in the assessment.

4.5.4.17 The criteria for assessing effects and residual significance are presented in **Volume 1, Part 1, Chapter 5,** section 1.5.4**.**

Assumptions and Limitations

4.5.4.18 The availability of data for marine mammals within the North Sea region is considered sufficient to characterise the baseline and as such provides a good understanding of the existing environment. There are, however, some limitations to marine mammal surveys, which form the basis of the baseline. This is primarily due to the highly mobile nature of marine mammal species and the potential variability in usage of the area. As a result, each survey contributing to the available library of research, realistically, only provides a snapshot.

4.5.5 Basis of Assessment

4.5.5.1 This section sets out the assumptions that have been made in respect of design flexibility maintained within the Proposed Project and the consideration that has been

given to alternative scenarios and the sensitivity of the preliminary assessment to changes in the construction commencement year.

4.5.5.2 Details of the available flexibility and assessment scenarios are presented in **Volume 1, Part 1, Chapter 4 Proposed Project Description** and **Part 1, Chapter 5 PEIR Approach and Methodology**.

Flexibility Assumptions

4.5.5.3 The main preliminary assessments have been undertaken based on the description of the Proposed Project provided in **Volume 1, Part 1 Chapter 4 Description of the Proposed Project**. To take account of the flexibility allowed in the Proposed Project, consideration has been given to the potential for preliminary effects to be of greater or different significance should any of the permanent or temporary infrastructure elements be moved within the Limits of Deviation (LoD) or draft order Limits.

4.5.5.4 The assumptions made regarding the use of flexibility for the main assessment, and any alternatives assumptions are set out in Table 4.5.7 below.

Table 4.5.7: Flexibility assumptions

Element of flexibility	Proposed Project assumption for initial preliminary assessment	Flexibility assumption considered
Lateral LoD marine HVDC cable	The extent of the the draft Order Limits for the Proposed Project (Offshore Scheme Boundary).	The worst-case scenario assessed for the Offshore Scheme is one bundled HVDC (x2) and one fibre optic cable in once trench. This bundled scenario maybe placed anywhere within the Offshore Scheme Boundary.

Coordination Including Co-Location

4.5.5.5 The Proposed Project includes an option for co-location with National Grid Ventures proposed Nautilus and LionLink interconnector projects as explained in **Volume 1, Part 1, Chapter 5 PEIR Approach and Methodology.**

4.5.5.6 Table 4.5.8 details where the option of co-location is relevant to the preliminary marine mammal assessment and how this option has been assessed and reported in section 4.5.9, preliminary assessment of effects.

Table 4.5.8: Consideration of co-location

Element of coordination	How it has been considered within the preliminary assessment
Suffolk landfall	**Sea Link Only**

Element of coordination	How it has been considered within the preliminary assessment
	Four Horizontal Directional Drilling (HDD) ducts (one per cable and one spare). **Sea Link (with co-location)** Up to ten HDD ducts.

Sensitivity Test

4.5.5.7 It is likely that under the terms of the draft DCO, construction could commence in any year up to five years from the granting of the DCO which is assumed to be 2026. Consideration has been given to whether the preliminary effects reported would be any different if the works were to commence in any year up to year five. Where there is a difference this is reported in section 4.5.9, preliminary assessment of effects.

4.5.6 Study Area

4.5.6.1 Marine mammals are highly mobile and transient species, which means there can be implications for wider populations as a result of localised impacts. As such, the Study Area has been determined at a scale that reflects the range of relevant marine mammal populations (**Figure 4.5.1 Marine Mammal Study Area**).

4.5.6.2 Given the wide-ranging nature of these species and their varying ecology, distribution and density, separate areas have been defined for each species. These areas have been delineated based on Management Units (MUs) which have been defined by relevant conservation organisations. An MU typically refers to a geographical area in which the animals of a particular species are found to which management of human activities is applied. An MU may be smaller than what is believed to be a 'population' to reflect spatial differences in human activities and their management.

4.5.6.3 For cetaceans, the Inter Agency Marine Mammal Working Group (IAMMWG) has established MUs for the seven most common species in UK waters, which were defined according to biological population structure, movement and habitat use, and relevant management boundaries (Ref 5.30).

4.5.6.4 The extent of the MU for each of the seven species is summarised in Table 4.5.9.

Table 4.5.9: IAMMWG Management Units for the seven most common cetacean species in the UK

Common name	Latin name	MU Name	MU Description
Harbour porpoise	*Phocoena phocoena*	North Sea	Entire territorial waters (TW) of east coast of England and Scotland including the Western Channel
Bottlenose dolphin	*Tursiops truncatus*	Greater North Sea	Entire TW of east coast of England and Scotland (excluding

			coastal waters of east Scotland
Short-beaked common dolphin	*Delphinus delphis*		
White-beaked dolphin	*Lagenorhynchus albirostris*	Celtic and Greater North Sea	All TW around Great Britain and beyond
Atlantic white-sided dolphin	*Lagenorhynchus acutus*		
Risso's dolphin	*Grampus griseus*	Marine Atlantic	All TW around Great Britain and beyond
Minke whale	*Balaenoptera acutorostrata*	European North Atlantic	All TW around Great Britain and beyond

4.5.6.5 Other cetacean species, for which a management unit has not been specified, are also considered based on observations for these species in the North Sea.

4.5.6.6 For pinnipeds, the Special Committee on Seals (SCOS) has outlined Seal Management Units (SMUs) based on expert knowledge and opinion of seal ecology in the UK, using a pragmatic approach to management without inferring discrete populations (Ref 5.57). The Offshore Scheme falls entirely within the South East England SMU for harbour and grey seals (Ref 5.57), within which impacts to local seal populations and relevant designated sites are considered. The North East England SMU has also been considered, as known foraging ranges of harbour and grey seals (273 km and 448 km respectively) include this SMU, and thus connectivity between these areas may occur.

4.5.6.7 As such, the initial study area is species-specific, with different sized study areas for each species relating to the MU, in conjunction with a review of species ecology to determine which sites or populations exhibit connectivity with the Offshore Scheme and the likely Zone of Influence for project activities, particularly underwater sound which is likely to be the most wide-ranging effect.

4.5.7 Baseline Conditions

4.5.7.1 This section presents the marine mammal baseline for the Offshore Scheme, which covers the two groups of marine mammals found in UK waters: cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals).

4.5.7.2 Most marine mammals are wide ranging and those recorded within the Study Area are likely to be individuals from larger biological populations originating from other points along the UK coast. This baseline characterises marine mammal species known or likely to be present within the Study Area, including the waters surrounding the Offshore Scheme.

Cetaceans

4.5.7.3 The International Council for the Exploration of the Seas (ICES) has divided European waters into ecoregions, which set boundaries for monitoring the ecosystem based on

biogeographic and oceanographic features, as well as existing political, social, economic, and management divisions. The Offshore Scheme is located within the ICES Greater North Sea ecoregion (Ref 5.31). Within this region, four cetacean species occur commonly or are resident:

- harbour porpoise;
- bottlenose dolphin;
- minke whale (*Balaenoptera acutorostrata);* and
- white-beaked dolphin (*Lagenorhynchus albirostris)*.

4.5.7.4 An additional six species occur regularly in the ecoregion but are less common: Atlantic white-sided dolphin (*Lagenorhynchus acutus*), common dolphin (*Delphinus delphis*), humpback whale (*Megaptera noveangliae*), killer whale (*Orcinus orca*), long-finned pilot whale (*Globicephala melas*), and Risso's dolphin (*Grampus griseus*). A summary of conservation protection afforded to the four most common species is presented in Table 4.5.10.Table

Table 4.5.10: Protection status for the most common cetaceans present within the Study Area

Common Name	Latin Name	Wildlife and Countryside Act, 1981	EC Habitats Directive (Annex)	Bonn Convention (Appendix)	Bern Convention (Appendix)	ASCOBANS
Harbour porpoise	*Phocoena phocoena*	✓	II, IV	II[1]	II	ü
Bottlenose dolphin	*Tursiops truncatus*	✓	II, IV	II[2]	II	✓
Minke whale	*Balaenoptera acutorostrata*	✓	IV	-	II	-
White-beaked dolphin	*Lagenorhynchus albirostris*	✓	IV	II[3]	II	✓

Harbour Porpoise

4.5.7.5 Harbour porpoise are widespread and abundant throughout UK waters including the North Sea. They most commonly occur in continental shelf waters less than 100 m deep and are frequently observed in coastal bays and estuaries. Along the east coast of the UK, the highest densities occur in the southern region of the North Sea, reflected in the Southern North Sea SAC, designated specifically for harbour porpoise. Harbour porpoise are present throughout the year with peak abundances observed in July to September (Ref 5.32). The Offshore Scheme falls within the IAMMWG North Sea MU for harbour porpoise. The most recent abundance estimates for this region as well as the relevant SCANS III (Ref. 5.23) blocks are provided in Table 4.5.11 and **Figure 4.5. 2 Harbour porpoise density and predicted distribution**.

Table 4.5.11: Abundance and density estimates for harbour porpoise in the study area

Assessment Area	Estimated Abundance	Estimated Density (individuals km^{-2})
North Sea Harbour Porpoise MU	346,601	-
SCANS Block L	19,064	0.47
SCANS Block C	17,323	0.12
SCANS Block O	53,485	0.68

4.5.7.6 Model predictions for summer and winter densities of harbour porpoise indicate high concentrations in the southern North Sea adjacent to the Offshore Scheme year-round, with the greatest densities occurring in coastal Suffolk waters in winter (**Figure 4.5.2 Harbour porpoise density and predicted distribution**, Ref 5.28). Further modelling of harbour porpoise distribution in the North Sea indicate that sea surface temperature, distance to coast, depth, and distance to sandeel grounds are important predictor variables in describing their distribution (Ref 5.33) as harbour porpoise forage mainly for sandeel (Ref 5.34). Several sandeel grounds have been identified in the central and southern North Sea, but none were identified within the Study Area (Ref 5.33).

4.5.7.7 Seasonal variation is observed in the modelled distributions as harbour porpoise are concentrated in the innermost North Sea in winter months (Ref 5.28). In spring, densities are concentrated around Dogger Bank and the northwest European coastline, with higher concentrations predicted to occur near the Offshore Scheme (Ref 5.33). In summer, hotspots shift westward towards the UK coastline (Ref 5.33). In autumn, predicted densities decline to about a third lower than spring and summer and distribution becomes spatially heterogeneous (Ref 5.33).

4.5.7.8 The greatest densities of harbour porpoise likely occur within the central SNS SAC in all seasons, with moderate densities likely to occur near the Offshore Scheme, particularly around the Suffolk landfall. Harbour porpoise were considered to be 'threatened and declining' in the Greater North Sea by the OSPAR commission (2008), however, the range and future prospect of the harbour porpoise in the UK is considered to be of 'favourable' conservation status (Ref 5.44). Globally, this species is considered 'least concern,' despite previously being considered vulnerable (Ref 5.39).

Bottlenose Dolphin

4.5.7.9 Bottlenose dolphin have a near global distribution and are common throughout UK waters. In the North Sea, resident populations exist in the Moray and Cromarty firths in Scotland but are relatively uncommon off eastern English coasts and occur only occasionally within the English Channel (Ref 5.35).

4.5.7.10 The Offshore Scheme occurs within the IAMMWG Greater North Sea MU for bottlenose dolphins. The most recent abundance estimate for this region was 1,885 individuals (Ref 5.24), however, there are very few observational records. (Ref 5.36). There were no records of bottlenose dolphins within Blocks C, L or O (Ref 5.28).

4.5.7.11 There are two recognised ecotypes of bottlenose dolphins – a coastal ecotype which primarily occurs within 30 km of the coastline and exhibits habitat fidelity, and a wide-ranging offshore ecotype (Ref 5.32). The coastal ecotype is more common in the UK,

with an estimated 700 individuals distributed across four regions: the greater North Sea, coastal southwest England, western Scotland, and coastal Wales (Ref 5.37). Predicted density and distribution of the offshore ecotype described extremely low density in the southern North Sea, with a lack of any seasonal variation (**Figure 4.5.3 Bottlenose dolphin density and predicted distribution;** Ref 5.28).

4.5.7.12 Therefore, any individuals present, are likely to be of the coastal ecotype, however, given the paucity of records for the region and predicted distribution modelling, this species is unlikely to occur within the Study Area. It is important to note that data indicate the bottlenose dolphin population along the eastern coast of England has been increasing in size and expanding in range, with future expansion and distribution shifts likely to occur, possibly resulting in future interactions with the Offshore Scheme (Ref 5.38).

4.5.7.13 At present, the range of bottlenose dolphin is considered to be at 'favourable' conservation status in UK waters (Ref 5.44) and is of 'least concern' globally (Ref 5.39).

Minke Whale

4.5.7.14 The minke whale is relatively common in UK waters. Much of its distribution is concentrated in coastal waters around Scotland, although seasonal aggregations have been observed as far south as Dogger Bank in the central North Sea, but they are considered uncommon in the southern North Sea (Ref 5.40; Ref 5.41)

4.5.7.15 The Offshore Scheme falls within the IAMMWG Celtic and Greater North Sea MU for minke whale. The most recent abundance estimates for this region as well as the relevant SCANS blocks are provided in Table 4.5.12 and **Figure 4.5.4 Minke whale density and predicted distribution**.

Table 4.5.12: Abundance and density estimates for minke whale in the study area

Assessment Area	Estimated Abundance	Estimated Density (individuals km^{-2})
Celtic and Greater North Sea MU	20,119	-
UK EEZ portion of Celtic and Greater North Sea MU	10,288	-
SCANS Block L	0	0
SCANS Block C	186	0.002
SCANS Block O	603	0.01

4.5.7.16 Predicted densities of minke whale in the North Sea indicate that their distribution is likely to be limited to the central and northern North Sea and the western English Channel (**Figure 4.5.4 Minke whale density and predicted distribution;** Ref 5.28). Furthermore, minke whale show preference for areas of high primary productivity (Ref 5.42), with their dominant prey item being sandeel, but also feed on herring, haddock, and mackerel (Ref 5.43). A number of broadscale sandeel grounds have been identified in the central and southern North Sea, with some potential sandeel grounds based on project survey data, found within the Offshore Scheme (**Volume 1, Part 4, Chapter 4: Fish and Shellfish**).

4.5.7.17 When considering the lack of observations of minke whales within the SCANS-III block containing the Offshore Scheme, the very low density of individuals in the surrounding blocks, and the predicted seasonality indicating even lower numbers of individuals in winter months, it is unlikely that minke whales will occur near the Offshore Scheme.

4.5.7.18 This species is considered to have a 'favourable' conservation status in UK waters with respect to its range (Ref 5.44) and is of 'least concern' globally (Ref 5.39).

White-beaked Dolphin

4.5.7.19 The white-beaked dolphin is endemic to the northern Atlantic and North Sea (Ref 5.45). It occurs primarily in continental shelf waters less than 200 m deep and is common in the waters of western Ireland and Scotland, and in the central and northern North Sea, rarely occurring in the southern North Sea (Ref 5.45).

4.5.7.20 The Offshore Scheme falls within the IAMMWG Celtic and Greater North Sea MU for white-beaked dolphin. The most recent abundance estimates for this region as well as the relevant SCANS blocks are provided in Table 4.5.13.

Table 4.5.13: Abundance and density estimates for white-beaked dolphin in the study area

Assessment Area	Estimated Abundance	Estimated Density (individuals km^{-2})
Celtic and Greater North Sea MU	43,951	-
UK EEZ portion of Celtic and Greater North Sea MU	34,025	-
SCANS Block L	0	0
SCANS Block C	0	0
SCANS Block O	143	0.001

4.5.7.21 In the North Sea, it is estimated that around 36,000 individuals occur (Ref 5.46). Modelling of white-beaked dolphin density in the North Sea (**Figure 4.5.5 White-beaked dolphin density and predicted distribution**) indicates that individuals are concentrated in the northern North Sea near Shetland and Orkney in both winter and summer months. Their distribution extends southwards to the Yorkshire coast year-round, with moderate to high densities noted in summer months. In the southern North Sea (including the Offshore Scheme) there is a distinct lack of individuals year-round.

4.5.7.22 When considering the lack of observations within the SCANS-III block containing the Offshore Scheme and the predicted absence of individuals in the seasonal modelling, it is unlikely that individuals of this species will be present in the study area.

4.5.7.23 At present this species is considered to have a 'favourable' conservation status in UK waters (Ref 5.44) and globally it is of 'least concern' (Ref 5.39).

Other Cetaceans

4.5.7.24 In addition to the four most common species described above, an additional six species could occur within the study area:

- Atlantic white-sided dolphin;
- common dolphin;
- humpback whale;
- killer whale;
- long-finned pilot whale; and
- Risso's dolphin.

Atlantic White-Sided Dolphin

4.5.7.25 Atlantic white-sided dolphin occur primarily in temperate and subarctic waters of the northern Atlantic, rarely present south of the English Channel (Ref 5.47). They are most common in the waters offshore of westernIreland and the waters north and northwest of Britain along the continental slope, but migrate to the coastal waters of northwest and northern Scotland in summer months.

4.5.7.26 The IAMMWG MU for this species is the Celtic and Greater North Sea, within which 12,293 individuals are believed to occur within the UK EEZ (Ref 5.48). However, no individuals were observed in the relevant SCANS-III blocks and density modelling of the region indicates they are absent from the southern North Sea and English Channel year-round (Ref 5.23; Ref 5.28). As such, they are unlikely to occur in the study area.

Common Dolphin

4.5.7.27 The common dolphin is widely distributed throughout temperate and tropical waters of the Atlantic and Pacific oceans. In the UK, they are particularly common in the Western Approaches, including the Irish Sea and Hebridean islands of Scotland. In recent years, their range has extended into the northern North Sea (Ref 5.49).

4.5.7.28 SCANS-III survey data revealed no observations within Block L nor in adjacent blocks (Ref 5.23). Density modelling indicates common dolphin are largely absent from the North Sea, but they do occur in low numbers in the English Channel (Ref 5.28). In summer months, their range extends marginally westward towards the outer Thames estuary and as such, individuals may occur near the Offshore Scheme, but likely only infrequently or in small numbers.

Humpback Whale

4.5.7.29 Humpback whales have a global distribution, with a known population in the eastern North Atlantic that occupies the continental shelf waters of northern Europe (Ref 5.50). In the UK, sightings have primarily occurred in the northern Irish Sea and western Scotland, the Celtic Sea, and the North Sea, with observations in the southern North Sea increasing in recent years (Ref 5.51).

4.5.7.30 There is currently no abundance estimate for humpback whales in the North Sea, but they are highly migratory, with observations in European waters peaking throughout May-September before declining between January and May. As such, they may occur near the Offshore Scheme, but are likely to occur only infrequently and/or in small numbers.

Orca

4.5.7.31 In UK waters, orcas are common in northern and western Scotland, with low densities observed in the northern North Sea. Modelling of their distribution throughout the North Sea indicates that they are present year-round with little seasonal variation (Ref 5.28). However, Orca are rarely observed in the central North Sea and are likely absent from the southern North Sea. Abundance or density estimates for orca were not reported in SCANS data and as such, they are unlikely to occur within the study area.

Long-finned Pilot Whale

4.5.7.32 The long-finned pilot whale is a deep-water species (greater than 200 m) typically occurring to the west of the UK. There is no established IAMMWG MU for this species nor are there any abundance or density estimates available for the relevant SCANS blocks (Ref 5.23). Modelling of their distribution in the northeast Atlantic indicates very low densities in the North Sea (Ref 5.28). These data indicate they are likely absent from the area surrounding the Offshore Scheme.

Risso's Dolphin

4.5.7.33 The Risso's dolphin is widely distributed in UK waters along the continental shelf (Ref 5.52; Ref 5.53; Ref 5.54). The IAMMWG MU for this species is Celtic and Greater North Seas MU, within which 8,687 individuals are predicted to occur within the UK EEZ (Ref 5.48).

4.5.7.34 They are most common north and west of the British Isles and in coastal waters of the western English Channel (Ref 5.55), with few records within the central and southern North Sea. SCANS-III data did not report any individuals within the relevant blocks (Ref 5.23). This is supported by density modelling in the region, which further indicates a lack of individuals within the study area, despite seasonal extensions in their distribution (Ref 5.28). As such, it is unlikely this species will be present within the study area.

Summary of Cetacean Abundance and Density Estimates

4.5.7.35 Estimated abundance and densities for the four key cetacean species by relevant SCANS-III survey block and by IAMMWG MU are provided in Table 4.5.14 and Table 4.5.15 respectively.

Table 4.5.14: Abundance and density estimates for the four key cetacean species in UK waters

SCANS III Block	Species	Estimated Abundance	Estimated Density (individuals km^{-2})
Block L	Harbour porpoise	19,064	0.47
	Bottlenose dolphin	0	0
	Minke whale	0	0
	White-beaked dolphin	0	0
Block C	Harbour porpoise	17,323	0.12

	Bottlenose dolphin	0	0
	Minke whale	186	0.002
	White-beaked dolphin	0	0
Block O	Harbour porpoise	53,485	0.68
	Bottlenose dolphin	0	0
	Minke whale	603	0.01
	White-beaked dolphin	143	0.001

Table 4.5.15: Abundance estimates within the IAMMWG MUs for the four key cetacean species of the UK

IAMMWG MU	Species	Estimated Abundance
North Sea	Harbour porpoise	346,601
Greater North Sea	Bottlenose dolphin	1,885
Celtic and Greater North Sea	Minke whale	20,119 (10,288 within UK EEZ)
Celtic and Greater North Sea	White-beaked dolphin	43,951 (34,025 within UK EEZ)

4.5.7.36 Of the cetacean species mentioned, it is likely only harbour porpoise will occur in within the Offshore Scheme Boundary.

Pinnipeds

4.5.7.37 Two seal species are known to occur in the northeast Atlantic, the harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus,* with the UK known to support important populations of both species.

Harbour Seal

4.5.7.38 Approximately 32% of the European harbour seal population are found in the UK, with a current population estimate in UK waters of 43,750 individuals (Ref 5.56). The Offshore Scheme falls within the Southeast England SCOS MU. Within this MU, the most recent harbour seal population estimate is 4,852 individuals (Ref 5.57;).

4.5.7.39 Harbour seals live in discrete regional populations, usually staying within 50 km of the coast (Ref 5.58; Ref 5.59). They come onshore at haul-out sites, where they rest, breed, and moult. On the east coast of England, the most important haul-out sites occur around the Wash and Humber estuaries (Image 4.5.1). They are, however, also known to haul-out within the Greater Thames Estuary and within Pegwell Bay.

4.5.7.40 There are an estimated 932 harbour seals within the Greater Thames Estuary. They are observed in great concentrations along the coastal sites of Dengie Flats, Hamford Water, Swale Estuary, and Pegwell Bay, as well as along the outer sandbanks of Margate Sands, Goodwin Knoll, and Goodwin Sands (Image 4.5.2). The hauling-out

of harbour seals is seasonal, peaking in August – September during the moulting season, with lower numbers in June – July during the pupping season, in which site abundance is primarily composed of breeding females.

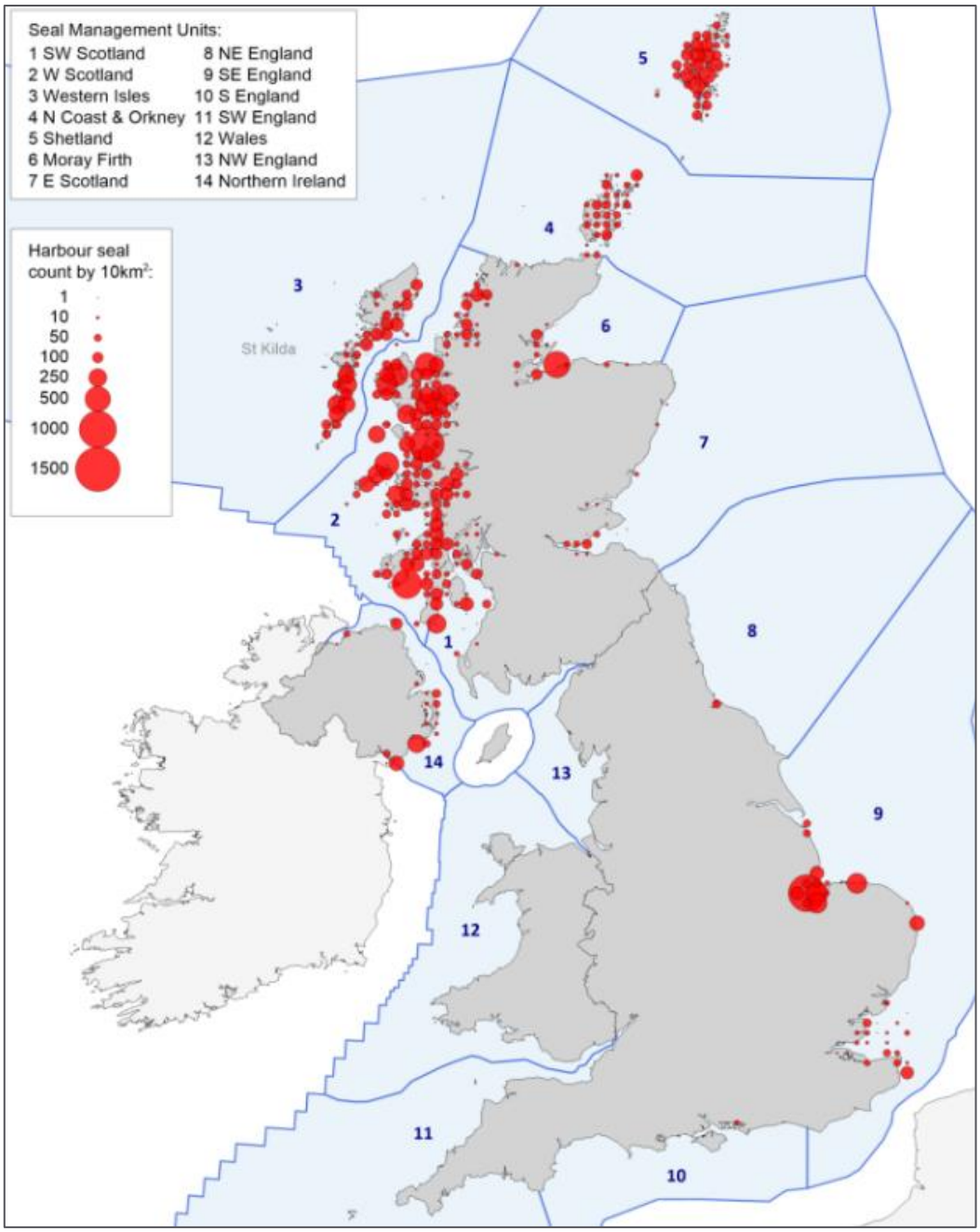

Image 4.5.1 UK haul out sites for harbour seals by MU (source: Ref 5.56)

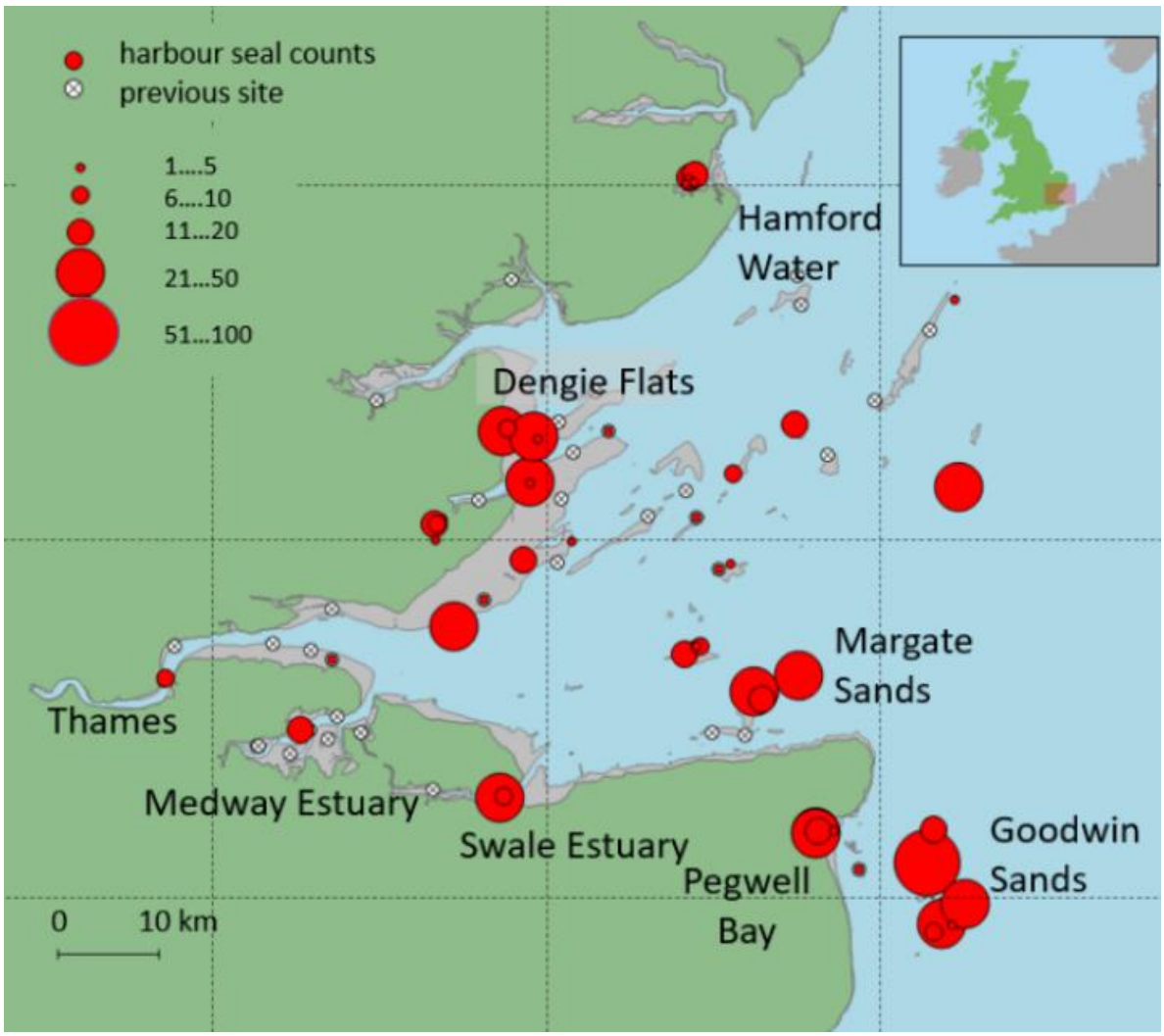

Image 4.5.2 Haul-out sites for harbour seal within the greater Thames Estuary (source: Ref 5.63)

4.5.7.41 When harbour seals leave haul-out sites to forage, they usually travel a distance of between 10 km and 60 km (Ref 5.60). The mean at-sea usage (i.e., the mean count of seals in the water at any point) for harbour seals in the Greater Thames Estuary (the area of sea between the Swale Estuary and the River Stour) is moderate to high, with 1-10 individuals per 25 km^2 occurring within the study area (**Figure 4.5.6 At sea distribution of harbour and grey seals in the study area**; Ref 5.61).

4.5.7.42 The harbour seal is an Annex II species of the EU habitats directive and is a qualifying feature for a number of SACs, the nearest of which is the Wash and North Norfolk Coast SAC (110 km). It hosts extensive tidal flats, which support harbour seal breeding and hauling-out. It is considered to host the largest colony of harbour seals in the UK, supporting approximately 7% of the total UK population (Ref 5.62). Tagged seals within the region have indicated connectivity between the Thames Estuary and the Wash populations, suggesting individuals from this site may occur within the Offshore Scheme Boundary (Ref 5.63; Ref 5.61).

4.5.7.43 As harbour seals have a strong presence within the Greater Thames Estuary, they are likely to occur near the Offshore Scheme. Locally, the population is considered to be increasing and the conservation status of this species is of 'least concern' (Ref 5.39).

Grey Seal

4.5.7.44 Approximately 36% of the world's grey seal population breeds in the UK. The most recent population estimate for grey seals in the UK is 157,300 individuals; however, approximately 86% of this population resides in Scottish waters (Ref 5.57). Within the Southeast England SCOS MU the most recent grey seal count is 8,667 individuals (Ref 5.57).

4.5.7.45 Grey seals also use haul-out sites for breeding, resting, and moulting. Most of the important haul-out sites for grey seals occur in Scotland, but there are also haul-out sites that are important for the English seal population within the Humber estuary and along the northern Norfolk coastline (Image 4.5.3).

4.5.7.46 A number of haul-out sites have also been observed within the Greater Thames Estuary (Image 4.5.4). It is estimated that 3,243 grey seals inhabit the area, with an increase in the long-term population trend (Ref 5.64; Ref 5.65;). They occur in their greatest numbers along offshore sandbanks, such as at Kentish Knock and Goodwin Sands, but are also observed on sandbanks further within the estuary and along the coast (Image 4.5.4). Grey seals are thought not to breed in the area and are likely seasonal visitors to the Greater Thames Estuary, avoiding the peak breeding season (Ref 5.66; Ref 5.64; Ref 5.65.

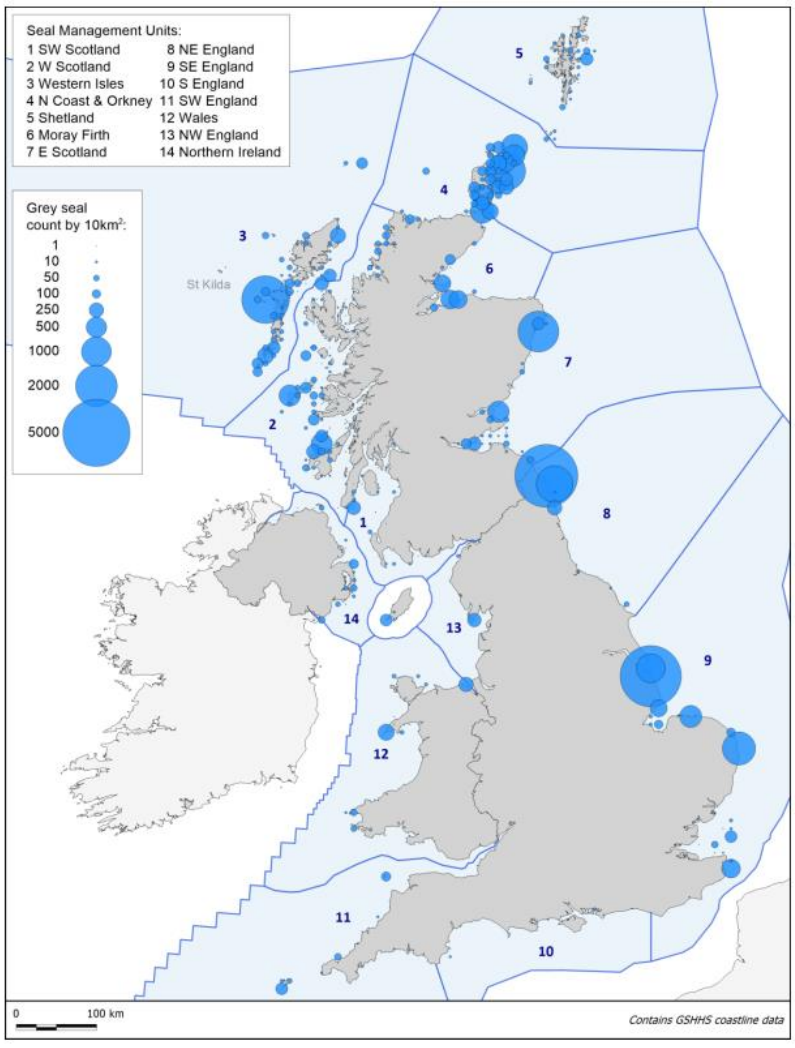

Image 4.5.3 UK haul out sites for grey seals by MU (source: Ref 5.56)

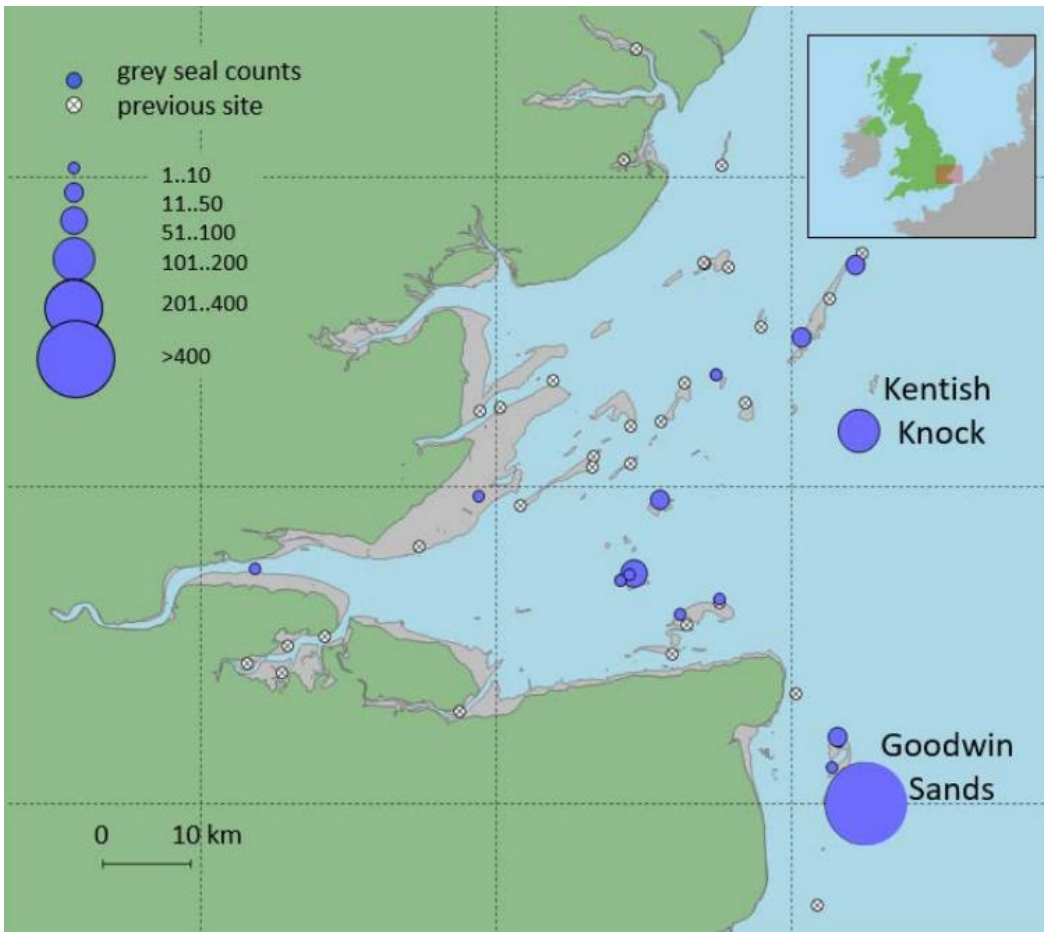

Image 4.5.4 Haul-out sites within the Greater Thames Estuary for grey seal (source: Ref 5.64)

4.5.7.47 When grey seals leave haul-out sites for foraging, they can range over much greater distances than harbour seals. They have been observed to forage up to 135 km without returning to the haul-out site, typically along the seabed up to depths of 100 m (Ref 5.56). Tagging studies have revealed some connectivity between populations of the Humber region and the Greater Thames Estuary, but that most individuals appear to migrate northward and offshore to deeper waters (Ref 5.59). Mean at-sea distributions for grey seal indicate that between 0 and 1 individuals per 25 km^2 occur within the Greater Thames Estuary and the study area (**Figure 4.5.6 At sea distribution of harbour and grey seals in the study area**; Ref 5.61).

4.5.7.48 The grey seal is an Annex II species of the EU habitats directive and is a qualifying feature for a number of SACs, though none occur within the study area for which grey seal are a primary feature. The nearest SAC in which grey seal are present as a qualifying feature, but are not the primary reason for site selection, is the Humber Estuary SAC. The Humber Estuary SAC contains some of the largest haul-out sites for grey seal (Donna Nook and the Wash), but the local pup production is thought to be declining (Ref 5.57).

4.5.7.49 Although they are not considered to breed within the Greater Thames Estuary, evidence indicates that grey seals migrate to haul-out sites within the study area and may travel across the Offshore Scheme. Given the foraging distances of this species, it is likely they are from the Humber and Wash populations, which are a nationally important population.

4.5.7.50 The UK grey seal population is considered stable and increasing, particularly within the eastern England colonies. Overall, this species is at 'favourable' conservation status in the UK (Ref 5.44). Globally, populations are also considered to be increasing and therefore the conservation status of this species is of 'least concern' (Ref 5.39).

Designated Sites

4.5.7.51 Key sites designated for the protection of marine mammals have been initially screened in using the relevant MUs defined by IAMMWG for each species. The sites within each MU have been considered, based on available knowledge of species ecology and connectivity, for relevance to project activities (see section 4.5.6 Study Area).

4.5.7.52 For cetaceans, relevant guidance regarding the disturbance from underwater sound has been used to determine a preliminary screening distance (Ref 5.21), whilst for pinnipeds, screening distances have been selected based on known foraging ranges (448 km for harbour seals, 273 km for grey seals; Ref 5.60)

4.5.7.53 The key sites designated for the protection of marine mammals, screened in for assessment, are presented in (Table 4.5.16) along with the distance from the Offshore Scheme. Marine mammal species designated as biodiversity features are highlighted in **bold**.

Table 4.5.16: Designated sites for marine mammals within the study area.

Site name	Distance from nearest cable route option	Summary
Southern North Sea SAC	0 km	The Offshore Scheme passes through the Southern North Sea (SNS) SAC, which has been designated for the protection of the Annex II species **harbour porpoise.** A total of 6 other SACs are designated for this species, however, they occur in Scotland or the Irish or Celtic Seas, with no connectivity identified between any of these populations and the SNS SAC.
Wash and North Norfolk Coast SAC	110 km	The Wash and North Norfolk Coast SAC is designated for the protection of the Annex II species **harbour seal.** This site has been included as telemetry data indicate that harbour seals from the greater Thames Estuary may be associated with this site.
Humber Estuary SAC	160 km	The Humber Estuary SAC includes **grey seal** as a qualifying feature, although not the primary reason for site selection. Telemetry data indicate that

Site name	Distance from nearest cable route option	Summary
		grey seals from this area frequent the greater Thames Estuary (Ref 5. 61).
Berwickshire and North Northumberland Coast SAC	412 km	The Berwickshire and North Northumberland Coast SAC includes **harbour seal** as a qualifying feature, although it is not the primary reason for site selection. Based on known foraging distances of this species, it is possible that individuals from this site may migrate to the Offshore Scheme during foraging activities (Ref 5.61)

Future Baseline

4.5.7.54 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.

4.5.8 Mitigation

4.5.8.1 As set out in **Volume 1, Part 1, Chapter 5, PEIR Approach and Methodology**, mitigation measures typically fall into one of the three categories: embedded measures; control and management measures; and mitigation measures.

Embedded Measures

4.5.8.2 Embedded measures have been integral in reducing effects of the Proposed Project on biodiversity. There are no embedded measures specific to marine mammals; however, where possible, the Offshore Scheme has been designed to avoid sensitive areas.

Control and Management Measures

4.5.8.3 The following measures have been included within **Appendix 1.4.A Outline Code of Construction Practice** relevant to the control and management of impacts that could affect marine mammal receptors:

- MM01 - adherence to JNCC guidelines, where appropriate, regarding the minimisation of impacts from underwater sound generated from known project activities, of geophysical surveys (Ref 5.19) and UXO detonation (Ref 5.20);
- MM02 – adherence to JNCC guidance for assessing the significance of noise disturbance against conservation objectives of the SNS SAC (Ref 5.67);
- 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;

- FSF01 - In accordance with the Department of Energy and Climate Change report and MMO recommendations, the target Depth of Lowering (DOL) will be between 1.5 m and 2.5 m (subject to local geology and obstructions), to minimise the effects of EMF;
- LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea 1972 (Ref 5.68), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78, Ref 5.69), with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS 1974) (Ref 5.70); and
- LVS05 - drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (pose little or no risk (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.

Mitigation Measures

4.5.8.4 Mitigation measures are an additional topic and site-specific measures that have been applied to mitigate or offset any likely significant effects. There are no mitigation measures included that are relevant to marine mammal receptors though these may be required followed the detailed assessment in relation to a marine licence for UXO clearance, to be undertaken post DCO submission.

4.5.9 Preliminary Assessment of Effects

4.5.9.1 The preliminary assessment of the effects of the Offshore Scheme reported in this section considers the embedded, control and management and mitigation measures described in section 4.5.8.

4.5.9.2 For the sensitivity test outlined in section 4.5.5, preliminary effects reported would not be any different if the works were to commence in any year up to year five.

4.5.9.3 The preliminary assessment of the effects of the Offshore Scheme on marine mammals is presented in Table 4.5.17.

4.5.9.4 The preliminary effects reported below are the same for the Proposed Project on its own, and the Proposed Project with co-location.

Table 4.5.17: Preliminary assessment of effects on marine mammal.

	Preliminary assessment
Receptor	**Marine mammals**
Potential Impact	**Underwater sound (excluding UXO):** Several activities undertaken during the lifetime of the project will generate underwater sound, including: • pre-installation geophysical surveys comprising multi-beam echo sounder (MBES), side-scan sonar (SSS), sub-bottom profiler (SBP) and USBL (acoustic positioning); • geotechnical sampling (vibrocore/CPT); • clearance of obstacles and debris; • sand wave sweeping; • cable trenching – may include various methods depending on seabed conditions (e.g., ploughing, jet trenching, and/or mechanical trenching); • cable protection placement (e.g., rocks, concrete mattresses); • cable repair or replacement; • cable and cable protection removal; and • vessel movements including vessels operating with dynamic positioning (DP).
Proposed Project phase	Construction, Maintenance, Decommissioning
Duration	Short term and temporary - approximately 1 year during construction and decommissioning, and intermittent during operational phase.
Mitigation	MM01, MM02
Preliminary sensitivity	The very high importance of marine mammals is reflected in their protection under a number of legislative instruments, including international legislation. Marine mammals rely on sound for a range of important ecological functions. Sound from anthropogenic activities can negatively impact marine mammals, as it can affect their ability to echolocate and communicate and can even cause physical harm (Ref 5.71). Cetaceans in particular, produce and receive sound over a wide range of frequencies for communication, orientation, predator avoidance and foraging (Ref 5.72). To determine the sensitivity of marine mammals to impacts from underwater sound, cetaceans have been categorised into three functional hearing groups:

- low frequency cetaceans (7 – 35 Hz);
- high frequency cetaceans (150 Hz – 160 kHz); and
- very high frequency cetaceans (275 Hz – 160 kHz).

Pinnipeds also produce sounds in social and reproductive interactions, although generally at a lower frequency range (75 Hz – 100 kHz).

Impacts to marine mammals from underwater sound is generally split into the following categories:

- auditory injury – a consequence of damage to the inner ear, can result in hearing loss (Temporary Threshold Shift, TTS; Permanent Threshold Shift, PTS); or
- behavioural response – variable and context specific. Can include increased alertness, alteration of movement or diving behaviour, interruption of social interactions, and temporary or permanent habitat abandonment.

The most up to date sound exposure criteria (Ref 5.73) for auditory injury defines thresholds for PTS based on instantaneous peak Sound Pressure Levels (SPL_{peak}) which are provided for each group below.

Hearing Group	SPL_{peak}
Low frequency cetaceans	219
High frequency cetaceans	230
Very high frequency cetaceans	202
Pinnipeds	218

Behavioural disturbances may also result from underwater sound impacts, although there is no widely agreed quantitative threshold at which this occurs.

Responses can vary widely, with avoidance the most well-documented response. The density of animals and vocalisations have been observed as reduced temporarily for several kilometres around a noise sources (e.g., seismic airguns and pile driving) with gradually less of an effect the further away the observations are made (Ref 5.74; Ref 5.75; Ref 5.76).

Harbour porpoise, grey seal, and harbour seal are the species most likely to be present within the vicinity of the Offshore Scheme. Considering the importance of underwater sound to marine mammals, and the high

<table>
<tr><th></th><th>Preliminary assessment</th></tr>
<tr><td></td><td>level of protection afforded to this receptor group, the sensitivity of this receptor is assessed as very high.</td></tr>
<tr><td>Preliminary magnitude</td><td>Certain project activities (e.g., MBES, SSS) will be operating at a frequency beyond hearing ranges for species of interest and therefore will not impact individuals and are not assessed further.
Project activities which are expected to operate at frequencies within the hearing range of harbour porpoise, harbour seal, and grey seal are provided below.
<table><tr><th>Activity</th><th>Operating Frequency (kHz)</th><th>SPL_{rms} (dB re 1µPa@1m)</th></tr><tr><td>SBP</td><td>0.5-12</td><td>238 (peak)</td></tr><tr><td>USBL</td><td>21-31</td><td>207 (peak)</td></tr><tr><td>Cable installation</td><td>1-15</td><td>178</td></tr><tr><td>Rock placement</td><td>N/A</td><td>172</td></tr><tr><td>Landfall activities</td><td>N/A</td><td>129.5</td></tr><tr><td>Cable lay vessel (operating with DP)</td><td>0.005-3.2</td><td>180-197</td></tr><tr><td>Support vessels – including small (<50) and medium (50-100 m) vessels</td><td>Low to high frequency</td><td>160-180</td></tr></table>
Several project activities are associated with SPL values that exceed the thresholds for auditory injury in harbour porpoise and seals; however, mitigation (MM01) is currently embedded within the project design, which involves adherence to JNCC recommended protocols for avoiding injury to marine mammals from underwater sound sources.
With regard to disturbance, the activity with the highest sound source is the operation of the SBP. The distance from sound source at which disturbance can occur, referred to as the Effective Deterrent Range (EDR) is 5 km (Ref 5.21). Thus, the area of disturbance from the project activities identified above is small in relation to the distribution range of the populations of concern. In addition, as project vessels are continuously moving, any disturbance impacts will be transient, intermittent, and short-term. The magnitude of the effect is therefore considered to be small.</td></tr>
</table>

	Preliminary assessment
Preliminary likely significance of effect	Despite the high sensitivity of the receptor, adherence to appropriate JNCC guidelines will minimise injurious impacts to marine mammals. Although behavioural responses may occur, they will be temporary and localised. When considering this in conjunction with the likely short-term and transient nature of impact, effects from underwater sound are unlikely and thus **not significant**.
Confidence in prediction	High confidence due to the application of committed mitigation.
Receptor	Marine mammals
Potential Impact	**Underwater sound from UXO**:
Proposed Project phase	Construction
Duration	At the point of UXO detonation the sound generated is a single short pulse, with a duration in the order of milliseconds. The intensity of the sound is determined by the size and nature of the UXO but this has the potential to be very high.
Mitigation	MM01, MM02
Preliminary sensitivity	The very high importance of marine mammals is reflected in their protection under a number of legislative instruments, including international legislation This receptor group rely on sound for a range of important ecological functions and could be injured or significantly disturbed by intense underwater sound from UXO detonation and thus the sensitivity of this receptor is assessed as very high.
Preliminary magnitude	High order detonation of UXO is one of the loudest sources of underwater sound that could be generated by the project. The impact radius of a high order detonation is largely influenced by the size of the charge. For the purpose of this initial assessment, a charge size up to 700 kg (net explosive quantity (NEQ)) has been assumed. This is based on the UXO survey for the East Anglia ONE project, which is located within the same region of the central/southern North Sea (Ref 5.94) and also sits within the winter area of the Southern North Sea SAC, designated for the harbour porpoise. The export corridor for East Anglia ONE is directly adjacent to the Offshore Scheme. The PTS impact range is the most appropriate to use for an assessment of injury from UXO (e.g. permanent damage to hearing PTS). The distance at which the PTS SEL (sound exposure evel) threshold (Ref. 5.95) for harbour porpoise, a VHF cetacean with the most

	Preliminary assessment
	sensitive hearing, for the maximum assumed NEQ, has been calculated to be met at 3.6 km (based on the application of this formula for the East Anglia ONE assessment (Ref 5.77). In the absence of any mitigation there is potential for injury in marine mammals during UXO detonation. However, with the standard JNCC UXO mitigation measures in place (MM01), which includes the adoption of an observation zone, acoustic deterrent devices (ADDs) a one-off explosion would probably only elicit a startle response (e.g., briefly fleeing away from the sound source) and would not cause widespread and/or prolonged displacement of cetaceans or seals. Where multiple explosive charges are present, wherever possible, the smaller charges shall be detonated first to maximise the 'soft-start' effect. Thus, with the mitigation measures identified above the risk of injury is considered to be low. There is, however, potential for disturbance behaviour in all marine mammals. The area of EDR for UXO is considered to be a distance of up to 26 km from the sound source, which has, in the absence of any empirical data, been adopted for high order detonation of UXOs (Ref 5.18). However, as there will be likely to be only a limited number of discrete very short term, fully mitigated events, it is considered that any behavioural response to UXO detonations are unlikely to have a significant effect on ecological function, such as foraging, in the area. This concurs with the JNCC guidelines (Ref 5.18). However, a portion of the Offshore Scheme, approximately 68 km in length, passes through approximately 68 km of the very southern extent of the SNS SAC which is designated for harbour porpoise (see **Figure 4.5.1 Marine Mammal Study Area**). This region of the SAC has been identified as being particularly important in the winter months when peak density will occur. An assessment of the impact on the SAC itself is considered in the HRA (**Part 5, Chapter 3, Habitat Regulations Screening Report**). The JNCC guidance for assessing the significance of noise disturbance against conservation objectives of SAC (Ref 5.67) will be adopted and the need for further migitation measures will be established during the detailed assessment.

	Preliminary assessment
Preliminary likely significance of effect	Despite the high sensitivity of the receptor, adherence to appropriate JNCC guidelines will minimise injurious impacts to marine mammals. Behavioural responses are likely and for areas of peak sensitivity such as any UXO detonation within the SNS SAC the requirement for additional mitigation measures will be determined during the detailed impact assessment to support a marine licence application for UXO clearance. However, when considering the likely short-term and transient nature of impact, and the application of relevant mitigation measures, effects from underwater UXO detonation sound are likely to be minor and thus **not significant**.
Confidence in prediction	Moderate – the presence and size of any UXO in the Offshore Scheme is currently unknown but the mitigation requirements to minise impacts are well understood.
Receptor	**Marine Mammals**
Potential impact	**Potential for indirect effects through impacts to prey species:** due to the potential impacts of project activities to benthic communities (**Volume 1, Part 4, Chapter 3, Benthic Ecology**) and fish and shellfish species (**Volume 1, Part 4, Chapter 4, Fish and Shellfish Ecology**), there is the possibility of indirect impacts to marine mammals through disturbance and loss of prey species.
Proposed Project phase	Construction, maintenance, and decommissioning
Duration	Short term (approximately 1 year) and temporary.
Mitigation	GM01
Preliminary sensitivity	The very high importance of marine mammals is reflected in their protection under a number of legislative instruments, including international legislation. The sensitivity of this receptor group is considered to be very high.
Preliminary magnitude	Construction activities which disturb the seabed could impact demersal species, including fish and shellfish, that are prey items for marine mammals. Marine mammal species that commonly occur near the Offshore Scheme include harbour porpoise, harbour seal, and grey seal. Harbour porpoise forage mainly for sandeel, whilst both harbour and grey seals in the southern North Sea forage principally for benthic fish (e.g., flatfish and sandeel) and gadoids (e.g., cod and hake) (Ref 5.78). This receptor group is very wide-ranging in their foraging trips, and there are no fish spawning or nursery grounds within the Offshore Scheme that have specific importance for foraging (**Volume 1, Part 4, Chapter 4**

	Preliminary assessment
	Fish and Shellfish). In addition, mapping of important sandeel habitats relative to harbour porpoise distribution have indicated that important sandeel habitats do not occur near the Offshore Scheme (Ref 5.33) and are thus not likely to be impacted in great enough numbers to affect the wider population of marine mammals that are reliant on this prey item. Habitat loss and disturbance impacts from project activities to the seabed are likely to be localised, and will be small in extent, confined largely to a small area around the cable installation, and in many cases temporary. Therefore, the preliminary magnitude of this impact has been assessed as negligible.
Preliminary likely significance of effect	Despite the high sensitivity of the receptor, the magnitude of impact is anticipated to be small. Therefore, effects from this impact are not likely and thus **not significant**.
Confidence in prediction	High confidence due to the application of committed mitigation
Receptor	**Marine Mammals**
Potential impact	**Vessel collision risk:** construction, maintenance and decommissioning activities will involve the deployment of a number of vessels including survey vessels, cable laying vessels, guard vessels, rock placement vessel, and additional specialised support vessels such as a jack up barge for the works at the breakout point in the nearshore.
Proposed Project phase	Construction, maintenance, and decommissioning
Duration	Short term (approximately 1 year), intermittent, and temporary.
Mitigation	None
Preliminary sensitivity	When considering the vulnerability of marine mammals to collision risk, the potential of associated mortality, and the potential for implications to wider populations, as well as the conservation status of marine mammals, the sensitivity of this receptor group is considered to be very high.
Preliminary magnitude	Whilst large marine mammals, such as whales, are considered primarily at risk of collision with vessels, many different species, including small cetaceans and seals, have been reported as involved in vessel strikes in the North Sea and wider Atlantic (Ref 5.79). Vessel strikes can result in physical impairment or even mortality, which may reduce foraging abilities and fitness

	Preliminary assessment
	at an individual level (Ref 5.80; Ref 5.73) population level. Vessel speed and draft depth are thought to be the biggest factors concerning collision risk and severity. Higher vessel speeds produce a greater impact force and larger drafts have been associated with increased mortality (Ref 5.81; Ref 5.73; Ref 5.76). Cable lay, geophysical survey, and associated support vessels typically operate at low speeds of four to six knots and transit at slightly greater speeds of 10 to 14 knots. At these speeds, it is unlikely that vessels pose a significant risk to marine mammals, as studies have indicated that serious injuries to marine mammals occur at speeds >14 knots (Ref 5.76). Marine mammals are also highly manoeuvrable, and studies of cetaceans and pinnipeds have observed vessel and construction site avoidance (Ref 5.82; Ref 5.83; Ref 5.84; Ref 5.73; Ref 5.76). Some studies have also correlated avoidance behaviour with sustained or increased vessel traffic (Ref 5.85; Ref 5.86). Therefore, it is likely individuals are habituated to vessel presence in the Greater Thames Estuary and Southern North Sea, which are subject to high levels of vessel traffic (Ref 5.87). When considering the low vessel speeds and likely habituation and avoidance behaviour of local marine mammal species, the preliminary magnitude of impact has been assessed as small.
Preliminary likely significance of effect	Although the occurrence of any collisions could cause injury or death, high traffic levels in the southern North Sea and Greater Thames Estuary suggest a likely habituation of marine mammals to vessel presence and likely avoidance. When considering this in conjunction with the slow speeds over which project vessels operate, this impact is unlikely and considered **not significant**.
Confidence in prediction	High confidence due to the application of committed mitigation
Receptor	**Marine Mammals: Seals only**
Potential impact	**Airborne sounds and visual disturbance**: disturbance to seals may occur through the movement of, and airborne sound produced by, vessels throughout the life cycle of the project.
Proposed Project phase	Construction, maintenance, and decommissioning
Duration	Short term (approximately 1 year), intermittent, and temporary.
Mitigation	None

	Preliminary assessment
Preliminary sensitivity	Seals occupying haul-out or breeding sites are considered to be most at risk of disturbance from airborne sound and vessel related visual effects associated with the project. However, the outer Thames Estuary is a busy area for vessel movements and some habituation to vessel movements in individuals in the area is considered likely. However, this receptor group can be significantly disturbed during key life cycle stages, leading to potential injury. Together with the level of protection afforded to seals sensitivity in relation to this impact pathway is considered to be high.
Preliminary magnitude	Sounds produced from shipping traffic have been associated with “flushing” of seals at haul-out sites (Ref 5.88), although other studies have indicated a reluctance to fleeing during the breeding season (Ref 5.89; Ref 5.90). Site fidelity was also observed in the pre-breeding season, with individuals returning to the same sites despite repeated disturbance (Ref 5.87). A spatial analysis indicated a high co-occurrence of seals and shipping vessels within 50 km of the coastline near haul-out sites, with no evidence of related population declines (Ref 5.91). Conversely, telemetry data has indicated avoidance behaviour in seals during offshore windfarm construction, though only during piling activities (Ref 5.92), which generate much higher sound intensity than cable related activities. However, the Thames is a highly trafficked area and although not home to major haul-out sites, hauling out still occurs regularly around the estuary, likely indicating a degree of habituation to airborne vessel noise and visual disturbance. Airborne sound produced during the project life cycle is likely to be limited to vessel operation. Given the slow speeds at which the installation vessels are known to operate during cable installation, it is unlikely that high airborne sound levels will be produced. Project activities will be taking place near Goodwin Sands, where seals are known to haul-out but activities will only take place at high tide and so disturbance is unlikely. Therefore, the preliminary magnitude has been assessed as negligible.
Preliminary likely significance of effect	When considering the low levels of sound and disturbance likely to be produced during project activities, and the likely habituation of most individuals to high vessel traffic in the area, this impact is unlikely and therefore **not significant**.
Confidence in prediction	High confidence due to the application of committed mitigation

	Preliminary assessment
Receptor	**Marine Mammals**
Potential impact	**Disturbance to marine mammals from electromagnetic field (EMF) emissions**
Proposed Project phase	Operation
Duration	Lifetime of the active cable
Mitigation	FSF01
Preliminary sensitivity	Marine mammals are highly migratory, indicating that they likely rely on the earth's magnetic field to navigate (Ref 5.93); however, this ability is poorly understood, and evidence is lacking. Whilst controlled experimentation in this regard is not feasible, studies have correlated cetacean behaviour with geomagnetic field differences (Ref 5.94). Behavioural studies observed both behavioural and physiological responses in dolphins (Delphinidae) exposed to magnetic fields, suggesting sensitivity to these fields (Ref 5.94). Depending on the magnitude of the field, this could result in temporary change in swim direction or a longer detour in migration (Ref 5.94). Considering that the likely effect from this impact is behavioural, the degree of which may vary depending on the magnitude of emissions, the preliminary sensitivity of this receptor has been assessed as medium.
Preliminary magnitude	Project specific modelling has been conducted for a bundled cable, buried to a depth of 1 m. For the bundled cable designs, the geomagnetic field and induced electric fields fall to values that are similar to the magnitude occurring naturally at about 8 m from the seabed (**Appendix 4.8.B, Electromagnetic Deviation Study**). Thus, there is potential for any marine mammals that forage on the seafloor to be exposed to these emissions though they are small in extent. The species likely to occur near the Offshore Scheme Boundary are harbour porpoise, harbour seal, and grey seal. All three forage for sandeel, whilst harbour and grey seal in the area typically also forage for flatfish, gadoids, and other sandy benthic species (Ref 5.75 Ref 5.95). Modelling of sandeel distribution in the North Sea has indicated that no important sandeel areas overlap with the Offshore Scheme (Ref 5.33). The impact of EMF on fish was considered to be **not significant** (**Volume 1, Part 4, Chapter 4. Fish and Shellfish**) with a very small footprint around the cable. Furthermore, given the wide-ranging nature of each of these species, it is likely that they will be capable of avoiding any EMF

	Preliminary assessment
	effects directly or indirectly, and can easily forage in other areas. Therefore, there is unlikely to be a noticeable effect on marine mammal foraging directly or indirectly. Also, as the target DOB for the cable is 1.5 - 2.5 m, the emissions cited above are likely the worst-case scenario. Considering the localisation of the impact and the highly mobile nature of marine mammals, the preliminary magnitude has been assessed as and the magnitude is considered to be negligible.
Preliminary likely significance of effect	Effects from EMF emissions to marine mammals vary by emission magnitude and are largely constrained to behavioural responses. Given that any emissions will be localised to the water column immediately surrounding the cable, and that local marine mammal species are highly mobile and thus capable of avoiding the area, any impact from EMF is unlikely to occur and thus is **not significant**.
Confidence in prediction	High confidence due to the application of committed mitigation and knowledge of project-specific EMF emissions through modelling.

4.5.10 Transboundary Effects

4.5.10.1 A transboundary effect is any significant adverse effect on the environment resulting from human activity, the physical origin of which is situated wholly or in part within an area under the jurisdiction of another State.

4.5.10.2 All works associated with the Proposed Project fall within the UK jurisdiction (12 NM). Given the distance of the Proposed Project from French waters (approximately 25 km), no significant transboundary effects have been identified. Predicted disturbance from the Proposed Project is short term and local and are therefore not anticipated to be sufficient to influence marine mammal receptors outside UK waters, and subsequently cause transboundary effects.

4.5.10.3 Furthermore, the PEIR has concluded no significant effects for marine mammal receptors in UK waters.

4.5.11 Summary

4.5.11.1 In summary:

- Of the cetacean species found in UK waters, harbour porpoise occurs in the greatest numbers within the study area. Bottlenose dolphin, minke whale, and 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;
- Several additional protected sites (both national and international) designated for the protection of harbour seal and grey seal, are near the Offshore Scheme. Telemetry data indicate an association between the greater Thames Estuary (including the Offshore Scheme Boundary) and designated sites up to 448 km away (Berwickshire and North Northumberland Coast SAC); and
- The preliminary assessment of effects indicates that, after embedded and additional mitigation measures, there are no likely significant effects predicted to result from project activities on marine mammal species present within and in the vicinity of the Offshore Scheme.

4.5.12 References

Ref 5.1 The Marine and Coastal Access Act 2009. [online]. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents.

Ref 5.2 The Conservation of Habitats and Species Regulations 2017. [online] Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made.

Ref 5.3 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.

Ref 5.4 The Wildlife and Countryside Act 1981. [online] Available at: https://www.legislation.gov.uk/ukpga/1981/69.

Ref 5.5 The Marine Strategy Regulations 2010. [online] Available at: https://www.legislation.gov.uk/uksi/2010/1627/contents/made.

Ref 5.6 Conservation of Seals Act 1970. [online] Available at: https://www.legislation.gov.uk/ukpga/1970/30.

Ref 5.7 Section 41 of the Natural Environment and Rural Communities Act 2006. [online] Available at: https://www.legislation.gov.uk/ukpga/2006/16/section/41.

Ref 5.8 The Environment Act 2021. [online] Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted.

Ref 5.9 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-energyen1.pdf.

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