Preliminary Environmental Information Report Volume 1

Chapter 22 Marine Mammals

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LIONLINK

Contents

Glossary of Project Terminology

This Glossary has been provided to define terms used across a number of the LionLink Proposed Scheme documents

Term	Definition
Applicant, the	National Grid Lion Link Limited (NGLLL)
Co-ordination	The process of people or entities working together.
Co-location	Where different elements of a project, or various projects, are located in one place.
Development Consent Order (DCO)	An order made by the Secretary of State pursuant to the Planning Act 2008 (as amended) granting development consent for a Nationally Significant Infrastructure Project. It grants consent to develop the approved project and may include (among other things) powers to compulsorily acquire land and rights where required and deemed marine licences for any offshore works.
Draft Order Limits	The area of land identified as being subject to the DCO application. The Draft Order Limits are made up of the land required both temporarily and permanently to allow for the construction, operation and maintenance, and decommissioning of the Proposed Scheme. All onshore parts of the Proposed Onshore Scheme are located within England and offshore parts of the Proposed Offshore Scheme are located within English territorial waters to 12 Nautical Miles and then up to the United Kingdom (UK) Exclusive Economic Zone (EEZ) boundary at sea.
Dutch Offshore Components	Is the term used when referring to the offshore elements of the Project within Dutch waters.
Environmental Impact Assessment (EIA)	The EIA is a systematic regulatory process that assesses the potential likely significant effects of a proposed project or development on the environment.
EIA Scoping Report	An EIA scoping report defines the proposed scope and methodology of the EIA process for a particular project or development. The EIA Scoping Report for the Proposed Scheme was submitted to the Planning Inspectorate with a request for the Secretary of State to adopt a scoping opinion in relation to the Proposed Scheme on 6 March 2024.

Term	Definition
Environmental Statement (ES)	The ES is a document that sets out the likely significant effects of the project on the environment. The ES is the main output from the EIA process. The ES is published as part of the DCO application.
Exclusive Economic Zone (EEZ)	The zone in which the coastal state exercises the rights under Part V of the United Nations Convention on the Law of the Sea. These rights relate principally to the water column and may extend to 200 nautical miles from baselines. This is distinct from territorial waters, which for the UK extend 12 nautical miles from the coast.
Landfall	The proposed Landfall is where the proposed offshore HVDC Submarine Cables are brought ashore and meets with the onshore proposed Underground HVDC Cables. This includes the Transition Joint Bay (TJB). The proposed Landfall will be located at Walberswick, and there will be no permanent above ground infrastructure at the proposed Landfall.
Landfall Site	The area where the Landfall may be located.
Multi-purpose interconnector (MPI)	A project where GB interconnection is combined with transmission of offshore generation within GB (and optionally within a connecting state).
National Grid Lion Link Limited (NGLLL)	The Applicant, a joint venture between National Grid Ventures and TenneT. NGLLL is a business within the wider National Grid Ventures portfolio.
National Grid Ventures (NGV)	Operates and invests in energy projects, technologies and partnerships to accelerate the development of a clean energy future. This includes interconnectors (such as the LionLink Project), allowing trade between energy markets and the efficient use of renewable energy resources.
Nationally Significant Infrastructure Projects (NSIP)	Major infrastructure developments in England and Wales for which development consent is required, as defined within Section 14 of the Planning Act 2008 (as amended). This includes any development which is subject to a direction by the relevant Secretary of State pursuant to Section 35 of the Planning Act 2008.
Offshore Hybrid Asset (OHA)	A project that combines cross-border interconnection with the transmission of offshore generation, this is an overarching term which covers both multi-purpose interconnectors (MPI) and non-standard interconnectors (NSI).
Order Limits	The maximum extent of land within which the Proposed Scheme may take place, as consented.

Term	Definition
Outline Offshore Construction Environmental Management Plan (Outline Offshore CEMP)	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Offshore Scheme.
Outline Onshore Code of Construction Practice (Outline Onshore CoCP)	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Onshore Scheme.
Planning Act 2008	The Planning Act 2008 being the relevant primary legislation for national infrastructure planning.
Planning Inspectorate (PINS)	The Planning inspectorate review DCO applications and make a recommendation to the Secretary of State, who will then decide whether to approve the DCO.
Preliminary Environmental Information Report (PEIR)	The PEIR is a document, compiled by the Applicant, which presents preliminary environmental information, as part of the statutory consultation process. This is defined by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 as containing information which "is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)" (Section 12 2. (b)). This PEIR describes the Proposed Scheme, sets out preliminary findings of the EIA undertaken to date, and the mitigation measures proposed to reduce effects. The PEIR is published at Statutory Consultation stage for information and feedback.
Project (the)	The LionLink Project (hereafter referred to as the 'Project') is a proposal by National Grid Lion Link Limited (NGLLL) and TenneT. The Project is a proposed electricity link between Great Britain (GB) and the Netherlands with a capacity of up to 2.0 gigawatts (GW) of electricity and will connect to Dutch offshore wind via an offshore platform in Dutch waters. The Project is the collective term used to refer to the proposal for all aspects (onshore and offshore) of the proposed interconnector between GB and the Netherlands.
Proposed Offshore Scheme	The term used when referring to the offshore elements of the Proposed Scheme, seaward of the

Term	Definition
	mean high-water springs to the EEZ boundary at sea.
Proposed Scheme	Used when referring to the GB scheme components of the Project, not including Dutch components. This includes both the onshore and offshore scheme components which are within UK territorial waters and up to the UK EEZ boundary at sea.
Scoping Opinion	A scoping opinion is requested from the Planning Inspectorate on behalf of the Secretary of State, to inform the requirements of EIA process and ultimately the ES which will be submitted as part of the application for development consent. Through the scoping process, the views of the statutory consultees and other relevant organisations on the proposed scope of the EIA are sought. A Scoping Opinion for the Proposed Scheme was issued by the Planning Inspectorate (on behalf of the Secretary of State) on 16 April 2024. The Applicant received a separate EIA Scoping Opinion from the Marine Management Organisation (MMO) (Reference DCO/2024/00005, dated 04 September 2024) as the MMO were unable to provide opinion to the Planning Inspectorate in time for the April 2024 deadline.
Scottish Power Renewables (SPR) East Anglia One North (EA1N) and East Anglia 2 (EA2) Consents (SPR EA1N and EA2 Consents)	The Orders made following the Scottish Power Renewables applications for development consent for the following projects: The East Anglia ONE North Offshore Wind Farm Order 2022; and East Anglia TWO Offshore Wind Farm Order 2022
Statutory Consultation	Consultation undertaken with the community and stakeholders in advance of the application for development consent being submitted to the Planning Inspectorate, on behalf of the Secretary of state, in accordance with the PA 2008.
TenneT	Operator of the electricity transmission network across the Netherlands.
Transition Joint Bay (TJB)	An underground structure at the Landfall Site that house the joints between the offshore cables and the onshore cables.

Terms and abbreviations specific to this technical chapter contained herein are provided at the end of the document in the **Topic Glossary and Abbreviations.**

22 Marine Mammals

22.1 Introduction

22.1.1 This chapter provides a preliminary assessment of the potential likely significant effects in relation to marine mammals from the construction, operation and maintenance and decommissioning of LionLink (here after referred to as 'the Proposed Scheme').

22.1.2 This chapter outlines legislation, policy and guidance that is relevant to marine mammals, summarises the engagement undertaken to date, sets out the scope and methodology of assessment, and describes the baseline environment. Following this, the likely significant effects of the Proposed Offshore Scheme on marine mammals are assessed taking account of mitigation measures within the design. The need for any additional mitigation is then considered along with any proposals for monitoring and/or enhancement. The chapter concludes with a summary of residual effects.

22.1.3 Marine mammal aspects considered within this chapter for the Proposed Offshore Scheme are:

a. Cetaceans (whales, dolphins and porpoise);
b. Pinnipeds (harbour/common and grey seal); and
c. European otter.

22.1.4 The Environmental Impact Assessment (EIA) Scoping Report baseline environment concluded that marine turtles are rarely present in the Southern North Sea (**paragraph 22.3.34** and **Table 22-3**). The proposed scope of the assessment (**Table 22-5**) did not include marine turtles as a receptor. Whilst the Natural England response to the EIA Scoping Report made a general comment that the Environmental Statement (ES) should assess the impacts on Protected Species (including marine turtles in the examples given) the Scoping Opinion (Ref EN020033) did not comment on the proposed scope with respect to marine turtles. This chapter therefore continues to scope marine turtles out of the assessment on the basis that they are rarely present, but if present, design and control measures proposed for cetaceans and pinnipeds would adequately mitigate any impacts. Marine turtles have therefore not been assessed in this Chapter.

22.1.5 This chapter should be read in conjunction with **Chapter 2 Description of the Proposed Scheme** of this Preliminary Environmental Information Report (PEIR), which describes the development parameters against which the effects considered in this chapter have been assessed, and **Chapter 5 EIA Approach and Methodology** of this PEIR where the project-wide approach to the assessment methodology is set out.

22.1.6 In addition, there may be interrelationships related to the potential effects on marine mammals and other disciplines. Therefore, this chapter should be read alongside relevant parts of other chapters; namely:

a. **Chapter 8 Ecology and Biodiversity** of this PEIR - Considers impacts on European otter (*Lutra lutra*) from the Proposed Onshore Scheme;
b. **Chapter 18 Marine Physical Environment** of this PEIR - Identifies the spatial extent of impacts from temporary sediment suspension and subsequent redeposition;
c. **Chapter 19 Intertidal and Subtidal Benthic Ecology** of this PEIR - Identifies the potential impacts on supporting habitats and key prey species for marine mammals; and
d. **Chapter 20 Fish and Shellfish** of this PEIR - Identifies the potential impacts on key prey species for marine mammals.

22.1.7 This chapter is supported by the following appendices and figures, contained within Volume 2 and Volume 3 of this PEIR, respectively:

a. **Habitats Regulation Assessment (HRA) Evidence Plan** provided with this PEIR;
b. **Habitats Regulations Assessment (HRA) Screening Report** provided with this PEIR;
c. **Appendix 2.2 Outline Offshore Construction Environmental Management Plan** of this PEIR;
d. **Appendix 29.1 Outline Schedule of Environmental Commitments and Measures** of this PEIR;
e. **Appendix 2.3 Electromagnetic Field Assessment** of this PEIR;
f. **Appendix 2.4: Offshore Thermal Emissions Technical Note** of this PEIR;
g. **Appendix 4.1 Legislation and Policy Register** of this PEIR;
h. **Appendix 4.2 Marine Plan Assessment** of this PEIR;
i. **Appendix 5.3 Transboundary Screening** of this PEIR;
j. **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR; and
k. **Figure 22.1 to Figure 22.5** of this PEIR.

22.1.8 As set out in **Chapter 4 Policy & Legislation** of this PEIR, cable installation and some associated activities beyond 12 nautical miles (NM) are exempt under the Marine and Coastal Access Act (MCAA) as well as repair of the installed cable. This chapter presents a preliminary assessment of the Proposed Offshore Scheme from mean high water springs (MHWS) at the proposed Landfall Site to the boundary between the UK and Netherlands Exclusive Economic Zone (EEZ), including all exempt elements which will not be consented as part of the Development Consent Order (DCO). This is to provide a complete and holistic view of the Proposed Offshore Scheme and any associated impacts Beyond 12NM only cable protection and dredging for sandwave levelling will be included in the Deemed Marine Licence (DML).

22.2 Legislation and policy framework

22.2.1 This section identifies the legislation, policy and guidance that has informed the assessment of the likely significant effects on marine mammals.

22.2.2 **Table 22.1** lists the legislation relevant to the assessment of the likely significant effects on marine mammals. The legislation and planning policy which has informed the assessment of effects with respect to marine mammals is provided within **Appendix 4.1 Legislation and Policy Register** of this PEIR. A preliminary marine plan assessment is provided as **Appendix 4.2 Marine Plan Assessment** of this PEIR.

Table 22.1: List of relevant legislation for marine mammals

Legislation	Relevance to assessment
The Wildlife and Countryside Act 1981 (Ref 1)	This Act allows for the protection of specifically listed wild animals, including marine species. The Act makes it an offence to intentionally harm, kill, capture, or disturb species listed in Schedule 5. This includes marine mammals including cetaceans (dolphins, whales and porpoises) and otter.
Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 2)	These Regulations, along with The Wildlife and Countryside Act are collectively referred to as the Habitats Regulations. The Conservation of Habitats and Species Regulations 2017 applies out to 12NM from the coastline; the Conservation of Offshore Marine Habitats and Species Regulations 2017 applies from 12NM to the boundary of the UK EEZ. The Habitats Regulations provide a framework for the protection of European Sites, which include Special Areas of Conservation (SACs). These sites are designated to protect species and habitats listed in the Annexes of the Regulations. Under the Regulations, Applicants must demonstrate that a proposed development will not adversely affect the integrity of a European site either alone or in combination with other plans or projects. This is done through the Habitats Regulations Assessment (HRA) process. In addition, the regulations give certain species the designation of a European Protected Species (EPS) and make it offence to deliberately disturb, injure or kill individuals within this category. All cetaceans and European otter are classified as EPS. Several SACs are present within the Study Area which have been designated to protect marine mammals.
Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (Ref 3)	
Conservation of Seals Act 1970 (as amended) (Ref 4)	This Act provides specific regulations for both harbour seals and grey seals, ensuring their welfare and regulating activities that may harm them. Licensing conditions ensure that any authorised actions involving seals are justified and do not negatively impact seal populations in the long term.
Natural Environment and Rural Communities Act 2006 (NERC) (Ref 5)	The Act requires competent authorities to have due regard for protecting and enhancing species and habitats when making public decisions. In particular, Section 41 refers to a published list of habitats and species which are of principal importance for the

Legislation	Relevance to assessment
	conservation of biodiversity in England. Otter, 16 species of cetacean and common/harbour seal are included on the list.
The Planning Act 2008 (Ref 6)	An Act to establish the Infrastructure Planning Commission and make provision about its functions; to make provision about, and about matters ancillary to, the authorisation of projects for the development of nationally significant infrastructure.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 7)	This Act transposes EU Directive 2011/92/EU (the EIA Directive) into UK law for nationally significant infrastructure projects, ensuring environmental safeguards while potentially streamlining the process.
Marine and Coastal Access Act 2009 as amended (Ref 8)	The MCAA provides a framework for managing and protecting marine and coastal areas, promoting sustainable development, enhancing public access to the coast, and conserving marine biodiversity and habitats, including establishing marine protected areas and coastal access routes.
Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (Ref 9)	The Marine Works (Environmental Impact Assessment) Regulations 2007 require certain types of projects that have the potential to significantly affect the environment to submit an EIA before a marine licence decision is made.

National policy

22.2.3 The primary policy basis for deciding whether to grant a DCO for the Proposed Scheme are the National Policy Statements (NPSs) and of primary relevance the Overarching NPS for Energy (NPS EN-1)(Ref 15), the NPS for Renewable Energy Infrastructure (NPS EN-3)(Ref 16) and the UK Marine Policy Statement. These set out policies to guide how applications for development consent for energy infrastructure should be decided and how the effects of such infrastructure are considered.

22.2.4 NPS EN-1 requires Applicants to take account of any relevant Marine Plans and complete a Marine Plan Assessment to support an application for development consent. In addition, the policy requires that consideration is given to mobile and migratory species, which is of particular relevance to this marine mammal assessment.

22.2.5 NPS EN-3 goes further and details the type of assessments that should be carried out for marine mammals (paragraphs 3.8.139 – 3.8.148), although it should be noted that these assessments are focused on offshore wind development and underwater noise impacts and whilst applicable to the Proposed Offshore Scheme a level of proportionality should be applied. This chapter takes these requirements into consideration.

22.2.6 The UK Marine Policy Statement does not specifically reference marine mammals but reiterates the UK aims to halt, and if possible, reverse, biodiversity loss; and

the policy that all relevant public, private and non-governmental policies should accept biodiversity's essential role in enhancing the quality of life.

Table 22.2: List of relevant national policy for marine mammals assessment

Relevant paragraph reference	Summary of policy requirement	Where addressed in PEIR
NPS EN-3		
Section 2.8.127	Notes the potential impacts on marine mammals. Although this is written in regard to offshore windfarms, the impacts of direct habitat loss, disturbance, displacement and impacts on prey species and prey habitat are relevant to the Proposed Scheme.	The potential impacts of changes in prey are included in the preliminary assessment in **Section 22.8.**
Section 2.8.238	Refers to the avoidance or minimisation of construction vessels operation in areas where marine mammals are present, especially during sensitive periods.	The minimisation of construction vessels operating in areas where marine mammals are present is covered in additional mitigation in **Section 22.7**.
Section 2.8.313	Notes the relevance of the conservation status of marine mammals and that when the Secretary of State makes a decision, they should be satisfied that cumulative and in-combination impacts have been considered.	The conservation status of each marine mammal species is set out in **Section 22.6.**

22.2.7 The local policies listed in **Table 22.3** are considered relevant to the marine mammals assessment of the Proposed Scheme.

Table 22.3: List of relevant local policy for marine mammals

Local planning authority	Relevant local policy	Relevance to assessment
Marine Management Organisation (MMO)	East Inshore and East Offshore Marine Plans (Ref 9)	Marine plans set out the priorities and direction for future planning within the plan area and provide guidance on activities to avoid or promote. **Appendix 4.2 Marine Plan Assessment** of this PEIR outlines how the Proposed Offshore Scheme complies with the policies and objectives for the East Inshore and East Offshore Marine Plan area. Whilst marine mammals

Local planning authority	Relevant local policy	Relevance to assessment
		are not specifically referenced, applicable policies are those relating to biodiversity (BIO1, BIO2) and marine protected areas (MPA1) which requires Applicants to consider the need to protect biodiversity as a whole. The preliminary assessment of effects is presented in **Section 22.8** and embedded design mitigation and control measures are presented in **Section 22.7** of this chapter.

22.3 Consultation and engagement

22.3.1 This section describes the outcome of, and response to, the EIA Scoping Report (Ref 10) and the EIA Scoping Opinion (Ref 11) in relation to the marine mammal assessment.

22.3.2 It also provides details of the ongoing technical engagement that has been undertaken with key stakeholders and provides a brief overview of the non-statutory public consultation undertaken to date.

22.3.3 Feedback from engagement and consultation are used to define the assessment approach and to ensure that appropriate baseline information is used.

22.3.4 It should be noted that feedback is also used to drive the design of the Proposed Scheme to avoid, prevent and reduce any likely environmental effects. **Chapter 3 Alternatives and Design Evolution** of this PEIR reports how the Proposed Scheme design has evolved in response to feedback and details of proposed embedded design (Primary) mitigation and standard good practice (Tertiary) mitigation measures relevant to the marine mammals assessment are provided in **Section 22.7** of this chapter.

Consultation

Non-Statutory Consultation

22.3.5 Feedback received from stakeholders following the close of our 2022 and 2023 consultation is outlined within the **Interim Non-Statutory Consultation Feedback Summary Report 2023** (Ref 13) and **Supplementary Non-Statutory Consultation Summary Report 2024** (Ref 14). No feedback was received from either consultation in relation to the marine mammal assessment.

EIA Scoping Opinion

22.3.6 An EIA Scoping Opinion was adopted by the Planning Inspectorate on behalf of the Secretary of State on 16 April 2024 (Ref 11). The Applicant received a separate EIA Scoping Opinion from the MMO (Ref 12)as the MMO were unable to provide opinion to the Planning Inspectorate in time for the April 2024 deadline. MMO deferred to Natural England's comments received by the Planning

Inspectorate with respect to the suitability of the assessment with regards to Marine Protected Areas

22.3.7 Comments received from the Planning Inspectorate and the MMO in relation to marine mammals are provided in **Table 22.4**.

Table 22.4: Preliminary response to Planning Inspectorate and MMO Scoping Opinion comments for marine mammals

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
Planning Inspectorate ID 3.17.1	Visual disturbance to otter during construction and operation should be scoped in for otters using intertidal areas. This can be justified with an assessment or an explanation in the ES of the evidence (in agreement with relevant consultation bodies) why significant effects are unlikely to occur to otters in intertidal areas.	Visual disturbance to otter has been scoped 'in' to the PEIR. An assessment of likely significant effects is included in **Section 22.8** of this chapter.
Planning Inspectorate ID 3.17.2	Underwater noise change to cetaceans and pinnipeds from presence of vessels and equipment during construction and operation. The ES should include an assessment of effects on marine mammals arising from noise levels from seabed preparation and cable lay and burial activities, together with baseline noise levels (accounting for cable installation methods too). Should include evidence of agreement from relevant consultation bodies that significant effects are unlikely to occur. Underwater noise associated with pre- and post-installation surveys should also be assed in the ES.	Modelling of underwater noise propagation during construction, operation and maintenance and decommissioning of the Proposed Offshore Scheme has been undertaken by the Applicant and is presented in **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR. The modelling approach was agreed with JNCC in September 2024 and the Centre for Environment, Fisheries and Aquaculture Science (Cefas) in October 2024. The results of the modelling, combined with literature review have been used to inform the assessment of likely significant effect of underwater noise on marine mammals presented in **Section 22.8** of this chapter.
Planning Inspectorate ID 3.17.3	Effects to cetaceans and pinnipeds from collision with vessels during construction and operation. The ES should clearly describe the likely number of vessels to be used during construction and the associated risk	The Applicant has provided evidence to assess the likelihood for significant effects on cetaceans and pinnipeds from collision with vessels during construction

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	to marine mammals. An assessment of collision impacts on marine mammals should be included where significant effects are likely to occur.	and operation and maintenance, with inclusion of the number of vessels likely to be used at each stage in **Section 22.8**
Planning Inspectorate ID 3.17.4	Effects from accidental spills to all species during construction and operation. This matter can be scoped out on the basis that the control and management measures should be sufficient to address the likely impacts and avoid a likely significant effect. The ES should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	Details of control measures and how these will be secured through the DCO have been included in **paragraph 22.7.7**.
Inspectorate ID 3.17.5	The EIA Scoping Report seeks to scope out this matter on the grounds that temperature changes will be localised to the immediate environment surrounding the cable and undetectable against fluctuations in the water column. The Inspectorate agrees that this matter can be scoped out of further assessment in the ES.	No further action – this impact pathway remains scoped out.
Planning Inspectorate ID 3.17.6	Transboundary effects from the impact pathway described at **ID 3.17.2.** The Inspectorate is unable to agree to scope this matter out until it has undertaken its own transboundary screening **(see ID 2.2.2)**.	The Applicant has undertaken a transboundary assessment in **Section 22.8.**
Planning Inspectorate ID 3.17.7	Control measures. It should be clear in the ES how implementation of the JNCC suite of mitigation guidelines to reduce impacts from impulsive noise and recording of activities that produce loud, low to medium frequency impulsive noise in the UK Marine Noise Registry would be secured through the DCO.	Clarity on how control measures would be secured through the Deemed Marine Licence is provided in **Section 22.7, paragraph 22.7.3.**
Planning Inspectorate ID 3.17.8	Effects arising from changes in prey availability. Consideration should be given to the potential for prey availability to be affected by permanent habitat loss due to	The Applicant has considered this point in its assessment of the effects of the Proposed Offshore Scheme on marine mammals in **Section 22.8.**

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	external cable protection in the Southern North Sea SAC.	
Planning Inspectorate ID 3.17.9	Receptor value and sensitivity criteria. The ES should provide a justification as to why the proposed criteria is appropriate as a basis for determining likely significant effects, including reference to relevant guidance. It should be evident how value would be assigned for species that relate to international/nationally designated sites and/or species that benefit from other legal protections (e.g., priority species).	The Applicant has provided justification on the receptor value and sensitivity criteria in **Section 22.4.**
Planning Inspectorate ID 3.17.10	The EIA Scoping Report states that no site-specific surveys are proposed given the extensive information available from public data sources. The Inspectorate is content with this approach.	No further action – this impact pathway remains scoped out.
Planning Inspectorate ID 3.17.11	Proposed assessment methodology. Unless otherwise agreed with the relevant consultation bodies, and evidence of that agreement is provided in the ES, the assessment should include modelling of underwater noise propagation during construction and the area affected by increased noise levels should be shown on figures within the ES.	Modelling of underwater noise propagation during construction, operation and maintenance and decommissioning of the Proposed Offshore Scheme was undertaken by the Applicant and is presented in **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR. The modelling approach was agreed with JNCC in September 2024 and Cefas in October 2024. The results of the modelling have been used to inform the assessment of likely significant effect of underwater noise on marine mammals. **Figure 22.4** of this PEIR provides buffers showing the Effective Deterrence Ranges used in the assessment.
MMO Section 3.9	**Table 22-5** of the EIA Scoping Report proposed to scope out underwater noise changes due to	Modelling of underwater noise propagation during construction, operation and

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	presence of project vessel and equipment (including cable trenching). Whilst the MMO agree that the risk of significant impact from underwater noise associated with cable laying is likely to be low, sufficient evidence should be provided to demonstrate why the effects of underwater noise will not be significant. The MMO do not believe the current justification provided in **Table 22-5** is adequate for scoping out the impacts of underwater noise therefore this should be updated. The MMO would expect underwater noise to be scoped in and some form of an assessment to be undertaken. The assessment does not have to include (complex) underwater modelling necessarily, but it should, at the very least, draw upon relevant literature where appropriate to support assessment conclusions.	maintenance, and decommissioning of the Proposed Offshore Scheme has been undertaken by the Applicant and is presented in **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR. The modelling approach was agreed with JNCC in September 2024 and Cefas in October 2024. The results of the modelling, combined with literature review have been used to inform the assessment of likely significant effect of underwater noise on marine mammals presented in **Section 22.8**.
MMO Section 3.9.5	The MMO recommend that any geophysical surveys that are not exempt are also scoped in and considered (in terms of potential underwater noise impacts).	Geophysical survey is considered in **paragraph 22.8.14**.

Engagement

22.3.8 This section provides details of the ongoing technical engagement that has been undertaken with stakeholders in relation to marine mammals and is outlined below. Engagement on the topic has been undertaken since 2023 with the Statutory Nature Conservation Bodies (SNCBs).

Key stakeholders

22.3.9 Key stakeholders with views and concerns regarding marine mammals have been identified as including:

a. Joint Nature Conservation Committee (JNCC);
b. Natural England;
c. Cefas; and
d. MMO.

22.3.10 A summary of the technical engagement undertaken to May 2025 is outlined in **Table 22.5.**

Table 22.5: Key stakeholder engagement for marine mammals

Stakeholder	Comment	Applicant response
JNCC 09 May 2023	JNCC recommended that the following should be considered and only scoped out with strong justification: • Increased collision with vessels • Changes in prey distribution potentially associated with electromagnetic fields (EMF).	Increased collision with vessels addressed in **paragraph 22.8.88**. Changes in prey distribution and potential effects from EMF is addressed in **paragraph 22.8.82**.
JNCC 12 January 2024	Advice on LionLink Marine Survey Scope JNCC Ref: OIA-09878 • Identified that the southern portion of the Southern North Sea Special Area of Conservation (SNS SAC) site, where the Proposed Offshore Scheme lies has higher abundances of harbour porpoise during the winter months. Recommended that consideration given to seasonal periods within survey design for the sub-bottom profiler. • JNCC recommends that adequate geotechnical sampling is undertaken to ensure confidence in the successful burial of the cable for the lifetime of the asset (taking account of potential changes in climate). This will minimise the requirement for future intervention and any subsequent cable protection measures into the future. JNCC would be looking for justification for any requested external rock protection within the Southern North Sea SAC to be supported by sufficient evidence of its requirement.	A detailed response to the NE advice was provided on 15 March 2024. With respect to the two points highlighted as relevant for this topic: • Clarification was provided that the Proposed Offshore Scheme crosses both the summer and winter grounds for harbour porpoise within the SNS SAC. Whilst consideration is given to the higher abundances within the site it was considered unlikely that the survey can be timed to avoid activity within a particular relevant season. The Applicant confirmed that the JNCC 2017 guidelines for minimising the risk of injury to marine mammals from geophysical surveys would be followed. • Confirmed that the intention is to bury the cables as far as possible and confirmed that the geophysical and geotechnical survey data will inform a Cable Burial Risk Assessment and Burial Assessment Studies which would be used to inform the ES and HRA.
JNCC 08/07/2024	UXO Clearance should not be included in the Deemed Marine Licence. A separate Marine Licence would be required.	**Chapter 2 Description of the Proposed Scheme** of this PEIR establishes that the Applicant is applying to undertake UXO identification as part of the Deemed Marine Licence. Activities associated with the lift and shift of any confirmed UXO are to be included in the application for development consent. UXO Clearance (e.g., low order detonation, high order detonation) would be the subject of a separate

Stakeholder	Comment	Applicant response
		Marine Licence and environmental impact assessment. A high-level assessment of the effects of UXO Clearance has been included in this chapter.
JNCC 12/11/2024	Advised all marine mammal mitigation guidelines for geophysical surveys should be followed to reduce the potential for injury.	Control measure (OC13) commits the Proposed Offshore Scheme to implementing the JNCC guidelines for geophysical surveys for sub-bottom profiling surveys (see **paragraph 22.8.19**)
JNCC 12/11/2024	Advised that consideration should be given to periods of peak harbour porpoise abundance within the southern portion of the Southern North Sea SAC where the Proposed Offshore Scheme is located.	The current baseline presented in this PEIR Chapter has established the seasonality and abundance of harbour porpoise across the Draft Order Limits. The preliminary assessment presented in **paragraph 22.8.24** has concluded that the Proposed Offshore Scheme alone would not have a significant effect on the Southern North Seas SAC. However, there is the potential that the Proposed Offshore Scheme in combination with other projects in the SAC could exceed the thresholds established by JNCC (Ref 46) for a significant effect. The ES will present an assessment of cumulative impacts and will determine if additional mitigation is required. This could include timing restrictions if a significant adverse impact is identified. Mitigation measures will be discussed with JNCC.
Cefas 07/10/2024	Cefas agreed with proposed modelling approach, the high order of assessment of UXO clearance should be the worst-case scenario at PEIR stage. Cefas prefers use of low order detonation.	A high-level assessment of UXO clearance is provided in the preliminary assessment, **paragraph 22.8.38**. Low order disposal is assessed as the preferred option. High order disposal would only be considered in exception circumstances, and the relevant assessment has been provided.

22.4 Assessment methodology

22.4.1 This section outlines the methodology followed to assess the potential likely significant effects of the Proposed Offshore Scheme in relation to marine mammals including:

a. Scope of the assessment;

b. Study area;
c. Assessment scenarios;
d. Methodology;
e. Assessment criteria; and
f. Assessment of cumulative effects.

22.4.2 This section provides a description of how receptor sensitivity, magnitude of impact and significance of effects are described and assigned to the assessment.

22.4.3 The project-wide approach to the assessment methodology is set out in **Chapter 5 EIA Approach and Methodology** of this PEIR.

Scope of the assessment

22.4.4 Potential likely significant effects requiring assessment may be temporary or permanent and may occur during construction, operation, maintenance and decommissioning. Potential likely significant effects on marine mammal receptors within the scope of the assessment are summarised in **Table 22.6**. The scope of the assessment has responded to feedback received as detailed in **Section 22.3.**

Table 22.6: Summary of the scope for marine mammal assessment

Receptor	Construction	Operation and Maintenance	Decommissioning
Otters in Intertidal Zone	Visual Disturbance	Visual Disturbance	Visual Disturbance
Cetaceans and Pinnipeds	Underwater Noise Changes due to geophysical survey (including transboundary effects)	Underwater Noise Changes due to geophysical survey (including transboundary effects)	Underwater Noise Changes due to geophysical survey (including transboundary effects)
Cetaceans and Pinnipeds	Underwater Noise Changes due to presence of project vessels and equipment (including transboundary effects)	Underwater Noise Changes due to presence of project vessels and equipment (including transboundary effects)	Underwater Noise Changes due to presence of project vessels and equipment (including transboundary effects)
Cetaceans and Pinnipeds	Collision with project vessels	Collision with project vessels	Collision with project vessels
Cetaceans and Pinnipeds	Changes in prey availability (including transboundary effects)	Changes in prey availability (including transboundary effects)	Changes in prey availability (including transboundary effects)
Cetaceans and Pinnipeds	-	Electromagnetic Changes	-

Receptor	Construction	Operation and Maintenance	Decommissioning
High-level assessment provided for information only			
Cetaceans and Pinnipeds	Underwater Noise Changes due to UXO Clearance	-	-

Study area

22.4.5 This section describes the spatial scope (the area which may be impacted) for the assessment as it applies to marine mammals.

22.4.6 The spatial scope of the impact assessment for marine mammals covers the area of the Proposed Offshore Scheme contained within the Draft Order Limits, together with the study area, described as follows.

22.4.7 The Proposed Offshore Scheme routes from Walberswick across the Southern North Sea to the boundary between the English and Dutch EEZ. The Draft Order Limits for the Proposed Offshore Scheme is illustrated in **Figure 22.1** of this PEIR.

22.4.8 Given the highly mobile and transient behaviour of marine mammals, the study area for these species has been delineated according to their mobility and geographic range, as detailed in **Table 22.7**.

22.4.9 Separate areas for each cetacean species have been defined using Management Units (MUs). These are delineated by the Inter-Agency Marine Mammal Working Group (which comprises representatives from the UK Statutory Nature Conservation Bodies (SNCBs) i.e., Natural England, NatureScot, Natural Resources Wales and the Department of Agriculture, Environment and Rural Affairs). The boundaries of an MU do not necessarily reflect the full range of a species but instead shows areas within their territory where management of human activities is undertaken. These units were defined by considering several factors including the known population structure, movement and habitat use, as well as jurisdictional boundaries and divisions already used in the management of human activities. MUs are used to inform SNCB advice and are therefore the appropriate spatial scale for assessment of environmental impacts on species from marine development projects. The seven most commonly occurring cetacean species in UK waters have defined MUs, which are reviewed at least every five years. These included harbour porpoise, white-beaked dolphin, bottlenose dolphin, common-short beaked dolphin, minke whale, Risso's dolphin and white-sided dolphin. The latest review of MUs was published in March 2023 (Ref 73).

Table 22.7: Study area for marine mammal assessment

Receptor	Extent of Study Area	Justification
Cetaceans (whales, porpoises and dolphins)	Management Units (MUs) 250km from the Draft Order Limits for transboundary European sites	The relevant MUs for the five commonly occurring species have been used to define the study area, noting that the study area will change per species. **Figure 22.1** of this PEIR illustrates the spatial scale of the management units through which the Draft Order Limits pass. The EIA determined that the maximum zone of influence from potential impacts on cetaceans relates to underwater noise changes. Underwater noise modelling, provided as **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR concludes disturbance effects could be experienced up to 5.3km from the Draft Order Limits (a maximum precautionary distance arising from vessel noise) and 5km for geophysical survey. The spatial scale of the MUs is therefore sufficient to encompass this zone of influence. A buffer of 250km from where the Draft Order Limits meet the UK-Netherlands border (EEZ) has been used to identify relevant transboundary European sites. In UK waters harbour porpoise are observed to have seasonal grounds which stretch longitudinally for approximately 250km. Therefore, a study area of 250km is considered to be an appropriate distance to screen sites for mobile marine mammal species. Given that the spatial scale of impacts will be restricted to 5.3km from the Draft Order Limits this is a

Receptor	Extent of Study Area	Justification
		precautionary and conservative search area.
Grey seal (*Halichoerus grypus*)	Assessment Unit: Southeast England	Animals are known to go on foraging trips up to 100km from haul-out sites on the coast outside of the breeding season. (Ref 18, Ref 19) During the breeding season they typically only forage 20km from their haul out sites (Ref 22). Telemetry data indicates that there is exchange of grey seals between colonies in the Netherlands, France, England, Wales, Scotland, and Ireland (Ref 24). As a precaution, both values have been considered by the assessment, but the 100km has been used to identify relevant designated sites.
Harbour seal (*Phoca vitulina*)	50km radius from Landfall and coastline	Harbour seals are not known to make trips greater than 50km from haul out sites. (Ref 25). JNCC advises that a 50km buffer is used for assessment purposes (Ref 47, Ref 24).
European otter (*Lutra lutra*)	Up to 80m from MHWS and seaward. 32km along the coastline from Landfall	The European otter is a semi-aquatic mammal which occurs in a wide variety of aquatic habitats such as rivers, streams, lakes, estuaries and on the coast. In freshwater habitats, otters are largely (but not exclusively) nocturnal and occupy very large home ranges (around 32km for males and 20km for females). Coastal otters generally have much smaller home ranges than their riverine counterparts, these can be as little as 4-5km of coastline, because of the abundance of fish and crustacean prey in inshore waters (Ref 22). It has been suggested that the otter's range is approximately 80m

Receptor	Extent of Study Area	Justification
		seaward from the coast (Ref 23).

Assessment scenarios

22.4.10 **Chapter 5 EIA Approach and Methodology** of this PEIR, provides an overview of the project's approach to the temporal scope (the time scales over which impacts may occur) of the EIA. This section describes the temporal scope for the assessment as it applies to marine mammals.

22.4.11 The temporal scope has been informed by **Chapter 2 Description of the Proposed Scheme** of this PEIR. The temporal scope of the assessment of marine mammals is consistent with the period over which the Proposed Offshore Scheme would be carried out. It covers the period from award of consent to the anticipated end of the Proposed Scheme lifespan.

22.4.12 It assumes construction of the Proposed Offshore Scheme would commence at the earliest in 2028 and complete by 2032. Operation would commence in 2032 with periodical maintenance required during the operational phase of the Proposed Offshore Scheme. It is assumed that maintenance and repair activities could take place at any time during the life span of the Proposed Offshore Scheme.

22.4.13 It is during the construction phase of the Proposed Offshore Scheme that direct impacts to marine mammal receptors are most likely to occur. Indirect impacts may also occur during construction-related activities such as seabed preparation which would cause habitat loss to prey species.

22.4.14 The Proposed Offshore Scheme would be licensed for 40 years. At this point, either an extension to the licence would be requested, supported by the necessary environmental assessment, or decommissioning would take place. If decommissioning is required, then activities and effects associated with the decommissioning phase are expected to be of a similar level to those during the construction phase works, albeit with a lesser duration of two years and, with the removal of visible infrastructure, effects would reduce over the course of that period.

22.4.15 Acknowledging the complexities of completing a detailed assessment for decommissioning works up to 40 years in the future, based on the information available, the Applicant has concluded that impacts from decommissioning would be no greater than those during the construction phase. Furthermore, should decommissioning take place, it is expected that an assessment in accordance with the legislation and guidance at the time of decommissioning would be undertaken. In addition, it expected that the DCO will include a requirement for a written scheme of decommissioning for approval by the MMO and in line with The Crown Estate requirements.

Baseline methodology

Data collection

22.4.16 Baseline data collection has been undertaken to obtain information over the study area. This section provides the approach to collecting baseline data.

22.4.17 The following sources of data have been utilised to inform the baseline with respect to marine mammals (**Table 22.8**). In addition to these data sources, the marine mammal assessment draws on environmental baseline data collated for other topics, specifically, baseline data presented in **Chapter 18 Marine Physical Environment** of this PEIR.

Table 22.8: Data sources used to inform the marine mammal assessment

Source of data	Baseline data
SCOS 2022 (Ref 19)	Seal populations data from the UK seals Monitoring Programme – Annual Report 2022.
ICES 2022 (Ref 32)	Portal collating at-sea effort-related data collected via ship-based or aerial methods,
DECC (2022) (Ref 20)	Summarises the environmental baseline for UK seas, including for marine mammals. Summarises UK Regional Seas. The Southern North Sea SAC falls within Regional Sea 2 (Southern North Sea).
The Environment Agency Crawford (2010) (Ref 21)	Fifth otter survey of England 2009 – 2010, Sixth otter survey of England was conducted in 2022-2023 but results have not been published
JNCC 2019 (Ref 26)	Conservation advice package provided jointly by Natural England and the JNCC. Advice package provides information on the Southern North Sea SAC, its designated features and advice on operations and maintenance.
Reid et al 2003 (Ref 28)	Atlas of Cetacean distribution in north west European waters. Species Distribution Maps
Hammond et al 2021 (Ref 29)	Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.
Gilles et al 2023 (Ref 30)	Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys.
Waggitt et al 2019 (Ref 33)	Distribution maps from 12 cetacean and 12 seabird species at 10km and monthly resolution in the northeast Atlantic.
Heinänen and Skov 2015 (Ref 34)	The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area.
Carter et al 2020 (Ref 35)	Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Predicted distribution maps

Source of data	Baseline data
	using seal tracking data provide estimates per species, on a 5km x 5km grid, of relative at-sea density for seals hauling-out in the British Isles.
NBN Atlas (Ref 27)	Interactive map of occurrence records for cetaceans, pinnipeds and Eurasian otter.
Sea Watch Foundation (Ref 65)	Sightings of all marine mammals in eastern England from 2023-2024.
The Marine Life Information Network (Ref 67)	Species information for Cetaceans.
IAMMWG (Ref 51)	Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 734.
Five Estuaries Offshore Wind Farm Environmental Statement. Volume 6, Part 5, Annex 4.12: Digital Video Aerial Surveys of Seabirds and Marine Mammals at VE Annual Report March 2019 to February 2021 (Ref 64)	Digital video aerial surveys of seabirds and marine mammals at Five Estuaries Windfarm for period March 2019 to February 2021.
East Anglia ONE North Windfarm Appendix 11.2 Marine Mammal Information and Survey Report (Ref 61)	Report presenting information from 24 months (September 2016 to August 2018) aerial survey data for the East Anglia ONE North windfarm site plus 4km buffer. Document as outlines survey results from other offshore wind farms in the former East Anglia Zone to provide regional context.
East Anglia TWO Windfarm Chapter 11 Marine Mammals: Preliminary Environmental Information Report Volume 1 (Ref 100)	The chapter summaries the existing environment with regard to marine mammals and assesses the potential impacts during all project phases.
East Anglia THREE Offshore Wind Farm Environmental Statement Chapter 12 Marine Mammals and Supporting Appendices (Ref 31)	The chapter summaries the existing environment with regard to marine mammals providing the results of aerial surveys undertaken across the windfarm site.
Norfolk Vanguard Offshore Wind Farm Environmental Statement Volume 1, Chapter 12 Marine Mammals. Volume 3, Appendix 12.1 Marine Mammal Survey Report (Ref 62)	The appendix provides the marine mammal data during the marine mammal site specific surveys within the Norfolk Vanguard Offshore Wind Farm sites (Norfolk Vanguard East (NV East) and Norfolk Vanguard West NV West)) with a 4km buffer area between March 2012 and August 2017.
Norfolk Boreas Offshore Wind Farm Environmental Statement, Volume 3, Appendix 12.2 Marine Mammal Information and Survey Data (Ref 63)	The appendix provides the survey data collected from August 2106 to July 2018 through aerial surveys across the array site and 4km buffer.

Site surveys

22.4.18 Extensive contemporary and historic information is available regarding abundance and distribution of marine mammals in the North Sea. Following a detailed review to inform the scope of the data and assessment, as presented, no site-specific marine mammal surveys were undertaken for this topic.

22.4.19 Marine mammal observations were carried out between the 03 and 21 September 2024 in compliance with the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys, for the Proposed Offshore Scheme geophysical survey campaigns. There were no marine mammal sightings or detections during the period of geophysical survey activity in 2024 and no instances of mitigation action required. The geophysical survey was completed in full compliance with JNCC guidelines.

Assessment methodology

22.4.20 The approach to assessment is set out in **Chapter 5 EIA Approach and Methodology** of this PEIR. However, whilst this has informed the approach that has been used in this marine mammal assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this assessment. Details are provided below.

22.4.21 The criteria for characterising the value and sensitivity and magnitude for marine mammals are outlined in **Table 22.9** and **Table 22.10** respectively.

22.4.22 Cetaceans and otter are European Protected Species, protected by the Habitats Regulations, and are therefore considered to be of very high value. The two species of pinniped present in the UK are nationally protected and are also considered to be of high value. Recognising the high value of the receptors, the assessment of value/sensitivity would be made with consideration of the vulnerability of the receptor to an impact and its ability to recover and adapt. Vulnerability can differ between different groups and species of marine mammal and would also vary depending on the impact pathway. For example, seal species are more sensitive to visual disturbance than cetaceans, whilst sensitivity to underwater noise changes differs between cetacean species depending on their ability to hear and detect certain frequencies. Sensitivity to the impact pathway has been used as the main differentiator in the assessment. It should be noted that due their value, these species are also considered in the HRA process as required by the Habitats Regulations.

22.4.23 The assessment of magnitude would be made with consideration of the extent of the area impacted, the duration and frequency of the impact and the scale of the change i.e., whether it has an effect at an individual or population level. When determining the magnitude of impacts the life history and ecology of the receptors is important. Factors such as seasonality of presence or whether specific areas are required for a certain life stage which the species may be unwilling or unable to move away from are considered.

22.4.24 The ecological impact assessment will use available evidence, professional judgement and knowledge of marine mammal ecology and behaviour to determine the level of impact.

22.4.25 The significance of an effect, either adverse or beneficial, would be determined using a combination of the magnitude of the impact and the sensitivity of the receptor. A matrix approach is used throughout all topic areas to ensure a consistent approach within the assessment. This is described further in **Chapter 5 EIA Approach and Methodology** of this PEIR and is replicated for ease in **Table 22.11**.

Table 22.9: Definitions of value and sensitivity for Marine Mammals

Receptor Value and Sensitivity	Description
High	No tolerance and ability to adapt behaviour so that survival and reproduction rates are affected, and animal cannot recover. Recovery would take longer than 10 years following the cessation of activity or will not occur. The licensable activity is taking place during a sensitive season.
Medium	Limited tolerance and ability to adapt behaviour so that survival and/or reproduction rates may be affected and/or limited ability for the animal to recover. Recovery to pre-impact conditions is possible between 5 and 10 years.
Low	Some tolerance such as ability to adapt behaviour or recover from any impact so that survival is not affected, and reproduction rates are not affected in the medium term. Recovery to pre-impact conditions between 1 and 5 years.
Negligible	Receptor is able to adapt behaviour so that survival and reproduction rates are not affected. Recovery expected to be relatively rapid, i.e., up to one year, following cessation of activity.

Table 22.10: Definitions of impact magnitude criteria for marine mammals

Impact Magnitude	Definition
High	The impact will affect the behaviour and distribution of sufficient numbers of a species, so that the favourable conservation status for the relevant management unit/population is permanently adversely affected.
Medium	Temporary changes in behaviour and/or distribution of individuals during a key season

Impact Magnitude	Definition
	such that it would result in potential reductions to reproductive success for the population. Permanent effects on individuals that my influence survival but not at a level that would affect the favourable conservation status of the population.
Low	Short-term and/or intermittent and temporary behaviour effects in a small proportion of the population. Survival and reproductive rates very unlikely to be impacted to the extent that population effects are measured.
Negligible	Very short term, recoverable effect on the behaviour and/or distribution in a very small proportion of the population.

Table 22.11: Significance matrix

Magnitude of Impact	Receptor value and sensitivity			
	High	**Medium**	**Low**	**Negligible**
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Cumulative assessment

22.4.26 **Chapter 28 Cumulative Effects** of this PEIR defines the methodology for the assessment of cumulative effects. The marine mammal assessment of intra- and inter-project cumulative effects will be carried out and reported within the ES to be submitted with the application for development consent.

22.4.27 The Zone of Influence for the inter-project cumulative effects assessment of marine mammals comprises the Draft Order Limits plus a 5km buffer to account for the effects of underwater noise from geophysical survey (the widest underwater noise zone of influence). For assessment of effects on the Southern North Sea SAC the search area for relevant other developments would consist of the relevant seasonal ground plus a 5km buffer around the seasonal ground.

Guidance

22.4.28 In addition, the marine mammals assessment has been undertaken in accordance with relevant guidance and has been compiled in accordance with professional standards. The guidance and standards which relate to this assessment are:

a. 2024 Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (Ref 37);
b. 2021 Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects (Ref 38);
c. 2019 Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise (Ref 39);
d. 2018 Revisions to: Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (Version 2.0) (Ref 36);
e. 2020 Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales and Northern Ireland) (Ref 46);
f. 2017 JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (Ref 47);
g. 2025 JNCC guidelines for minimising the risk of disturbance and injury to marine mammals from unexploded ordinance (UXO) clearance in the marine environment (Ref 48); and
h. 2025 UK Government Guidance supporting minimising environmental impacts from unexploded ordinance clearance (Ref 69).

22.5 Assessment assumptions and limitations

22.5.1 This section provides a description of the assumptions and limitations to the marine mammals assessment.

22.5.2 The information provided in this PEIR is preliminary and the final assessment of significant effects will be reported in the ES. The PEIR has been produced to fulfil Applicant's consultation duties in accordance with Section 42 of the PA2008 and enable consultees to develop an informed view of the likely significant effects of the Proposed Offshore Scheme.

22.5.3 This PEIR has been collated based on publicly available data and information only. It is assumed that the data collected is accurate. However, there are limitations to the original marine mammal surveys used to form this data. Namely that most marine mammals are wide ranging and uninhibited by anthropogenic borders. Those recorded within the study area are likely to be individuals from larger biological populations originating from other points along the UK coast, internationally or the High Seas. Therefore, each survey provides a synopsis of wider marine mammal populations in the North Sea and beyond. Data from the Small Cetacean Abundance in the North Sea and Adjacent Waters surveys (SCANS) used in this assessment is collected during the summer months (mainly July) of a given survey year, representing summer distributions of cetacean species only. Summer distributions are generally higher than winter, meaning the

assessment is based upon a worst-case scenario of cetacean presence in the study area.

22.5.4 The data has not been supplemented by additional project specific marine mammal field surveys as the publicly available information collated as part of the desktop review was considered sufficient for the nature of the Proposed Offshore Scheme. Although marine mammal observers were present and active during the Proposed Offshore Scheme geophysical surveys in 2024 no marine mammals were observed or detected during the survey.

22.5.5 The assessment has been undertaken based on the description of the Proposed Offshore Scheme presented in **Chapter 2 Description of the Proposed Scheme** of this PEIR. To allow flexibility due to changing seabed conditions or features, it is assumed that the Proposed Offshore Scheme could be installed anywhere within the Draft Order Limits. Indicative locations would be provided for external cable protection within the Environmental Statement.

22.5.6 Where publicly available data is absent, a precautionary approach has been taken based on experience of similar linear schemes and professional judgement, to inform the scope of the assessment.

22.5.7 It is assumed that the data available for existing literature, relevant surveys and the proposed assessments will provide an appropriate evidence base for marine mammals within the study area. It is recognised that there is limited data available on the behaviour and extent of some species but given the linear nature of the Proposed Offshore Scheme and the temporary nature of most potential impacts, it is not anticipated this limitation will adversely affect the assessment.

22.6 Baseline conditions

22.6.1 To provide an assessment of the likely significance of the Proposed Offshore Scheme (in terms of marine mammals), it is necessary to identify and understand the baseline conditions in the study area. This provides a reference point against which potential changes to marine mammals can be assessed.

22.6.2 The baseline section should be read in conjunction with the following supporting Appendices and Figures as found within Volume 2 and Volume 3 of this PEIR respectively:

a. **Habitats Regulation Assessment (HRA) Evidence Plan** provided with this PEIR;
b. **Habitats Regulation Assessment (HRA) Screening Report** provided with this PEIR;
c. **Figure 22.1 Marine Mammal Study Area;**
d. **Figure 22.2 Designated Sites Relevant to the Marine Mammals Assessment;**
e. **Figure 22.3 SCANS III and SCANS IV Survey Blocks;**
f. **Figure 22.4 Harbour Porpoise Seasonal Distribution;** and
g. **Figure 22.5 Seal Densities.**

Current baseline

22.6.3 The current baseline has been sub-divided into cetaceans (whales, dolphins and porpoise), pinniped (seals) and the European otter (*Lutra lutra*). Over 28 species of cetacean have been recorded in UK waters, either from observations or stranding records. Of these species, only four occur regularly in the study area, with a further six recorded occasionally. Two species of pinniped are resident in UK waters; grey seal (*Halichoerus grypus*) and harbour seal/common seal (*Phoca vitulina*). European otter although largely terrestrial can inhabit coastal areas and have been seen foraging in a narrow zone close to shore (<80m) (Ref 23).

22.6.4 Marine mammals are protected by several national and international conventions including:

a. Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES. Aims to protect endangered plant and animal species from illegal trade and over-exploitation;
b. Convention for the Protection of the Marine Environment of the northeast Atlantic – OSPAR Convention. The OSPAR Convention aims to protect the marine environment of the northeast Atlantic;
c. International Union for Conservation of Nature and Natural Resources- IUCN; The IUCN Red Data list catalogues and highlights those animals and plants at high risk of global extinction;
d. The Habitats Regulations – collective term for The Conservation of Habitats and Species Regulations 2017 (as amended) and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended);
e. Natural Environment and Rural Communities (NERC) Act; and
f. Wildlife and Countryside Act 1981 (as amended in 1985).

22.6.5 Most notably, all cetaceans and otter are listed as European Protected Species (EPS) under the Habitats Regulations. The legislation applies to inshore and offshore waters and prohibits the "*deliberate and reckless capture, injury, killing and disturbance of marine EPS*". (Ref 49)

22.6.6 'Deliberate' has been interpreted by the European Commission (EC), in its 2007 'Guidance document on the strict protection of animal species of community interest under the Habitats Directive 92/43/EEC', as:

22.6.7 *"'Deliberate' actions are to be understood as actions by a person who knows, in light of the relevant legislation that applies to the species involved, and the general information delivered to the public, that his action will most likely lead to an offence against a species, but intends this offence or, if not, consciously accepts the foreseeable results of his action".*

22.6.8 Therefore, anyone carrying out an activity which they should reasonably have known could cause injury as defined in the Regulations, could be committing an offence.

22.6.9 It is important to note, that JNCC et al., (Ref 40) guidance also considers that the potential for disturbance from some activities can be considered "trivial".

Activities which might be considered trivial include those that lead to "*sporadic disturbances without any likely negative impact on the species".* For an activity to be considered "non-trivial", the JNCC et al., (Ref 40) guidance states that "*the disturbance to marine EPS would need to be likely to at least increase the risk of a certain negative impact on the species' [Favourable Conservation Status] (FCS)".*

22.6.10 The purpose of this section is to provide a characterisation of the baseline environment with respect to the range, abundance, density and seasonality of marine mammal species within and surrounding the Draft Order Limits. This section has been split into the following sub-sections to provide an overview of the ecological baseline in the study area:

a. Designated sites;
b. Cetaceans;
c. Pinnipeds;
d. European otter; and
e. Future baseline.

Designated sites

22.6.11 Within the study area, there are several designated sites which protect marine mammals. These are outlined in **Table 22.12**: Relevant designated sites and illustrated in **Figure 22.2** of this PEIR.

22.6.12 The **Habitats Regulations Assessment (HRA) Screening** provided with this PEIR concluded that a likely significant effect is not predicted for any of the transboundary sites identified. Further information on these sites is therefore not provided in this baseline description.

22.6.13 Site details for the relevant UK European sites are provided under the relevant qualifying feature baseline description in the following sub-sections.

Table 22.12: Relevant designated sites

Site Name and ID	Country	Relevant Qualifying Feature
Southern North Sea SAC [UK0030395]	UK	Harbour porpoise
Klaverbank SAC [NL2008002]	Netherlands	Harbour porpoise Grey seal Harbour seal
Vlaamse Banken SAC [BEMZ0001]	Belgium	Harbour porpoise
Doggersbank SAC [NL2008001]	Netherlands	Harbour porpoise
Bancs des Flandres SCI [FR3102002]	France	Harbour porpoise
Voordelta SAC [NL4000017]	Netherlands	Harbour porpoise

Site Name and ID	Country	Relevant Qualifying Feature
Noordzeekustzone SAC [NL9802001]	Netherlands	Harbour porpoise
Vlatke van de Raan SAC [BEMNZ0005]	Belgium	Harbour porpoise
Vlatke van de Raan SAC [NL2008003]	Netherlands	Harbour porpoise
Westerschelde and Saeftinghe SAC [NL9803061]	Netherlands	Harbour porpoise
Dunes de la plaine maritime flamande SAC [FR3100474]	France	Harbour porpoise
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant SAC [FR3100478]	France	Harbour porpoise
Recifs Gris-Nez Blanc-Nez SCI [FR3102003]	France	Harbour porpoise
Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC [FR3102004]	France	Harbour porpoise
Unterelbe SAC [DE20218331]	Germany	Harbour porpoise
Baie de Canche et couloir des trois estuaires SAC [FR3102005]	France	Harbour porpoise
Borkum-Riffgrund SCI [DE2104301]	Germany	Harbour porpoise
Doggerbank SAC [DE1003301]	Germany	Harbour porpoise
Nationalpark Niedersächsisches Wattenmee SAC [DE2306301]	Germany	Harbour porpoise
Littoral Cauchois SAC [FR2300139]	France	Harbour porpoise

Cetaceans

Overview

22.6.14 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

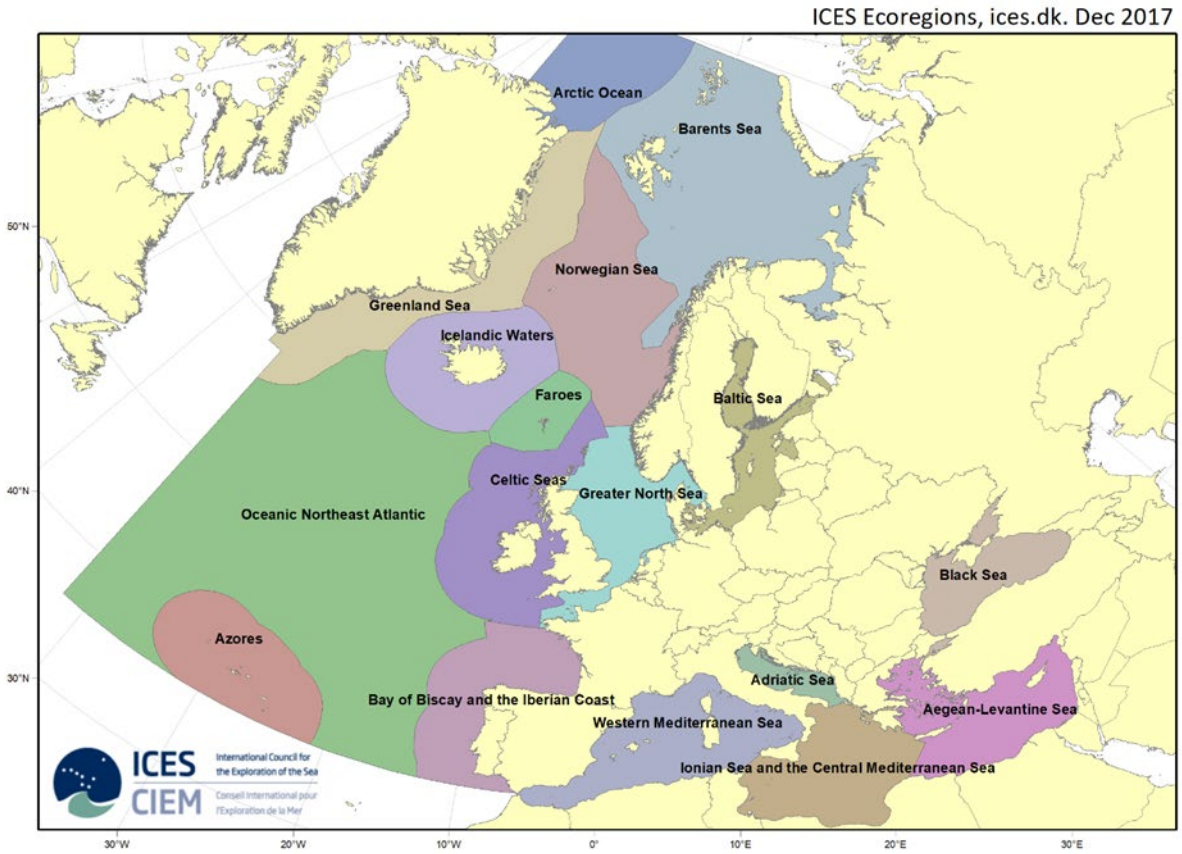
existing political, social, economic and management divisions. The Proposed Offshore Scheme is located within the ICES Greater North Sea ecoregion (see **Inset 22.1**). Within this region, four cetacean species occur commonly or are resident:

a. Harbour porpoise (*Phocoena phocoena*);
b. Bottlenose dolphin (*Tursiops truncatus*);
c. White-beaked dolphin (*Lagenorhynchus albirostris*); and
d. Minke whale (*Balaenoptera acutorostrata*).

22.6.15 Six additional species occur regularly within the ecoregion but are less common:

a. Atlantic white-sided dolphin (*Lagenorhynchus acutus*);
b. Common dolphin (*Delphinus delphis*);
c. Humpback whale (*Megaptera noveangliae*);
d. Killer whale (*Orcinus orca*);
e. Long-finned pilot whale (*Globicephala melas*); and
f. Risso's dolphin (*Grampus griseus*).

Inset 22.1: ICES ecoregions of Europe (Ref 32)



22.6.16 Large scale surveys to monitor cetacean population size have been carried out in UK Waters. These surveys were undertaken by the Small Cetacean Abundance in the European Atlantic and North Seas (SCANS) and Cetaceans Offshore Distribution and Abundance in the European Atlantic (CODA) and were conducted in 1994, 2005 (SCANS II), 2016 (SCANS III)(Ref 29) and 2022 (SCANS IV) (Ref 30). The Draft Order Limits are located in the NS-B and NS-C blocks of

the most recent SCANS IV (Ref 30) survey. These surveys provided density estimates for the region for specific species. The SCANS blocks in relation to the Proposed Offshore Scheme are illustrated in **Figure 22.3** of this PEIR. Since the SCANS programme began, the area covered by each block has changed, making abundance and density estimates comparison between surveys difficult (Ref 33).

Harbour porpoise (*Phocoena phocoena*)

22.6.17 The harbour porpoise is the smallest and most common marine mammal recorded within northwestern European continental shelf waters (Ref 53). It has the highest population of any cetacean in the North Sea. Individuals can grow up to 1.6 m in length with females often slightly larger. Group sizes are small, typically comprising of 1 to 3 animals. Shy in nature, they rarely interact with boats and other animals so can be difficult to spot. Harbour porpoise must consume up to 10% of their body weight per day (Ref 54, Ref 55) since they have a high metabolism and smaller body size, they need a constant source of energy. The dominant prey species are sandeel, herring, whiting, gobies and sprat (Ref 56 Ref 118).

22.6.18 Harbour porpoises are inclined to distribute themselves based on prey availability. Seasonal movements are linked to the maturity of their calves, with most mating and calving occurring between May and July (Ref 116,Ref 57). Increases in inshore waters during the summer months is linked to the need for shelter and increase in energetic demand during calving, and lactation and distribution of prey (Ref 58).

22.6.19 Harbour porpoise populations are divided into management units around the UK; the area of the Proposed Offshore Scheme is in the North Sea MU (Ref 52). These management units are only for conservation and purposes of monitoring human activity.

22.6.20 In offshore waters, harbour porpoise like to avoid high current speeds, flat seafloor, and well mixed sediment (Ref 34). Frequently, they are encountered in shallower continental shelf waters with a preference for waters at 50m to 150m depth (Ref 59, Ref 60).

22.6.21 Harbour porpoise density estimates from previous SCANS surveys can be found in **Table 22.13** along with sightings data from other data sources.

22.6.22 The only site designated for harbour porpoise in the UK portion of the North Sea MU is the Southern North Sea SAC (see below). Relevant transboundary sites are listed in **Table 22.12.**

Table 22.13: Harbour porpoise sightings and seasonality

Relevant MU	Seasonality	NBN Atlas 2007 to 2015	Sea Watch Foundation Sightings 2024/07 to 2025/03 (Ref 65)	SCANS IV Abundance NS-B and NS-C (Ref 30)	SCANS IV Density (animals/km²)	OWF Observations
North Sea	All year	160 sightings	75 sightings with a max group of 6	7,982 and 36,286	0.31 and 0.60	East Anglia: 167 sightings from April 2024 to January 2025

Southern North Sea SAC

22.6.23 This SAC is an area of great importance to harbour porpoise in the UK. This site stretches from the central North Sea (North of Dogger Bank) to the Straits of Dover in the south, covering an area of 36,951km² (Ref 50). It is estimated the site supports 17.5% of the UK North Sea population (Ref 76). The population size was estimated to be between 11,864 and 28,889 individuals in 2019 (Ref 124). Animals are believed to move latitudinally across the site between seasons; in the summer they are more commonly observed in the north section of the SAC, in winter they move to the south. The Draft Order Limits cross the SAC for approximately 138.6km; and of this 87.9km is within the summer grounds and 85.9km is within the winter grounds (see **Figure 22.4** of this PEIR).

22.6.24 **Figure 22.4** of this PEIR shows the at sea density of harbour porpoise in the winter grounds and summer ground respectively. In the southern winter grounds, there is a predicted 0.75 to 1.25 animals per km² at the highest during winter. In the northern summer grounds, there is a predicted 0.75 animals per km² throughout.

Bottlenose dolphin (*Tursiops truncatus*)

22.6.25 The bottlenose dolphin is the largest dolphin to frequently inhabit UK territorial waters. Pod size ranges from 2 to over 25 individuals, with larger groups more common in deep waters (Ref 1). In the UK the only resident populations of this species are found in Cardigan Bay, Wales and Moray Firth, Scotland (Ref 67). Bottlenose dolphin can be sensitive to anthropogenic disturbance, particularly vessel traffic, when with young. However, populations can often compensate for behavioural changes in relation to increases in commercial shipping activity if this is the sole anthropogenic pressure within their range (Ref 68). The Project lies

within the Greater North Sea MU (NSMU) for bottlenose dolphin as defined by the Inter-Agency Marine Mammal Working Group (IAMMWG) (2015; 2022).

22.6.26 The transient bottlenose dolphin populations in the North Sea aggregate in different areas of the MU at different times of year. In the Greater North Sea, this species has been most frequently observed in the spring and summer months (Ref 69, Ref 70). Despite increases in anthropogenic activity in this area, known populations have remained stable (Ref 71). There is some evidence of bottlenose dolphin using feeding grounds in Cornwall in the winter and moving to the east coast of England in the summer (Ref 72). However, studies are limited on the seasonal distribution of bottlenose dolphin in the central North Sea, in vicinity to the Proposed Offshore Scheme, but it should be assumed they are present in small numbers year-round.

22.6.27 The SCANS IV survey in 2022 did not observe any bottlenose dolphin within the Draft Order Limits, although individuals were sighted in the wider North Sea ecoregion. Block NS-B, within which most of the Draft Order Limits are located, had no recorded observations of bottlenose dolphin. Block NS-C had an estimated abundance of 2,520 individuals. This equates to a density of 0.04 animals/km^2 in block NS-C (Ref 30). There were no observations of bottlenose dolphin in the surrounding offshore wind farms. Considering the low observations of bottlenose dolphin, it can be concluded that this species has a low-density population on the majority of the east coast of the UK, particularly within the Draft Order Limits.

Table 22.14: Bottlenose dolphin sightings and seasonality

Relevant MU	Seasonality	NBN Atlas 1967 to 2005	Sea Watch Foundation Sightings 2024/07 to 2025/03 (Ref 65)	SCANS IV Abundance (Ref 30)	SCANS IV Density (animals/km^2) (Ref 30)	OWF Observations
Greater North Sea (GNU)	Summer	2 sightings	2 sightings with a max group of 6	0 and 2,520	0 and 0.0149	-

White-beaked dolphin *(Lagenorhynchus albirostris)*

22.6.28 The white-beaked dolphin has a short, often white beak. It can grow up to 3.2m in length. This species is known to be sociable and mix with other dolphins and whales to assist in feeding. They are also known to display vertical or side breaches with vessels as well as bow riding. They are frequently recorded in the

European continental shelf, mostly in the central and northern North Sea, but are occasionally observed in the southern North Sea. Sightings for white beaked-dolphin are highest in June and October, this is because of calving where females and males will travel inshore (Ref 63). The seasonal distribution of this species is driven by prey, since there are more feeding and nursing grounds located inshore.

22.6.29 A single MU was identified for the species comprising of all UK waters; the Celtic and Greater North Seas MU. The frequency of white-beaked dolphin strandings has declined in the southern North Sea, while either remaining stable or increasing along the central and northern coasts (Ref 75). It is suggested the decline is a result of a change in habitat use and population from the Southern to northern regions, potentially due to climate change effects on prey availability and distribution (Ref 74).

Table 22.15 : White-beaked dolphin sightings and seasonality

Relevant MU	Seasonality	NBN Atlas 1994 to 2013	Sea Watch Foundation Sightings 07/2024 to 03/2025 (Ref 65)	SCANS IV Abundance (Ref 30)	SCANS IV Density (animals/km^2) (Ref 30)	OWF Observations
Celtic and Greater North Seas MUs	Summer	4 sightings	0 sightings	0 and 894	0 and 0.0149	Norfolk Vanguard West 2015/09 to 2017/08: 4 sightings

Minke whale (*Balaenoptera acutorostrata*)

22.6.30 The minke whale is the most frequently observed and widely distributed of the baleen whales in UK waters. They are recorded throughout the northern and central North Sea but rarely visit the southern North Sea. One of the smallest baleen whales, they average at 8.5m. Spy hopping and breaching are common for this whale, and they tend to form groups of three. Although animals are sighted year-round, most sightings have been recorded between May and September (Ref 76). Minke whale perform winter migrations between higher latitude summer feeding grounds and low latitude winter breeding grounds (Ref 77).

22.6.31 Common minke whales off the east coast of England and Scotland are considered part of the Celtic and Greater North Sea (CGNS) MU. The current estimate of abundance is 20,118 (Confidence Interval 14,061 - 28,786), of which 10,288 (CI 6,210 - 17,042) are considered as the UK portion (Ref 51).

Table 22.16: Minke whale sightings and seasonality

Relevant MU	Seasonality	NBN Atlas 1982 to 2021	Sea Watch Foundation Sightings 2024/07 to 2025/03	SCANS IV Abundance (Ref 30)	SCANS IV Density (animals/km²) (Ref 30)	OWF Observations
North Sea	Summer	2 sightings	1 sighting	0 and 412	0 and 0.0068	-

Short-beaked common dolphin (*Delphinus delphis*)

22.6.32 The short-beaked common dolphin is easily identified at sea by the hourglass pattern on their lower flank. They can grow up to 2.4m in length and commonly breach and bow ride with vessels. Short-beaked common dolphin travel in groups of between 6 and 10, though some larger schools have been sighted (Ref 41). They are mainly sighted during summer months (June to September). Common dolphins tend to feed on pelagic fish in the North Sea, such as whiting, mackerel, sandeel and sprat (Ref 42). Their seasonal movements and higher densities in summer are driven by prey availability and higher sea surface temperatures. (Ref 43, Ref 44, Ref 45).

22.6.33 Common dolphin are rarer on the east coast of the UK than the west coast, although sustained occurrence has been recorded for example in the Moray Firth (Ref 78) and there are sightings recorded offshore in the central and northern North Sea (Ref 79). Very occasional sightings are recorded in coastal areas along the north east coast of England, with limited sightings in the study area around the Draft Order Limits. (Ref 80, Ref 81).

22.6.34 A single MU is defined for common dolphins, within which abundance is estimated at 102,656 (CI 58,932 - 178,822). Of this 57,417 (CI 30,850 - 106,863) are estimated to occur within UK waters of the MU (Ref 51). No common dolphin were encountered in the SCANS III and SCANS IV surveys for blocks NS-C and NS-B. The surrounding windfarms had no recordings of short-beaked common dolphin (**Table 22.17**).

Table 22.17: Short-beaked common dolphin sightings and seasonality

Relevant MU	Seasonality	NBN Atlas	Sea Watch Foundation Sightings 2024/07 to 2025/03	SCANS IV Abundance (Ref 30)	SCANS IV Density (animals/km²) (Ref 30)	OWF observations
North Sea	Summer	0 sightings	5 Sightings with a max group of 20	-	-	-

Humpback whale (*Megaptera noveangliae*)

22.6.35 Humpback whales are present worldwide in temperate, tropical and polar seas, typically favouring continental shelf waters and oceanic islands. They can reach up to 16m in length and migrate annually from high latitude cold water feeding grounds in the summer to low latitude warm waters for breeding in the winter (Ref 82). They are usually observed individually or in a pair; groups rarely exceed 4 or 5 individuals when not feeding or breeding.

22.6.36 Over the past 20 years the number of humpback whales recorded in UK waters has increased (Ref 83). This includes an increase in the number of whales sighted in the North Sea (Ref 84, Ref 85). Whales have been recorded in all months of the year in the southern North Sea, with no apparent seasonality.

22.6.37 There is no MU for humpback whales in UK waters, with no individuals recorded during the SCANS III survey or SCANS IV surveys.

Table 22.18: Humpback whale sightings and seasonality

Relevant MU	Seasonality	NBN Atlas 2013-2016	Sea Watch Foundation Sightings 2024/07 to 2025/03	SCANS IV Abundance	SCANS IV Density	OWF observations
N/A	Summer	47 sightings	2 sightings of individuals	-	-	-

Other species

22.6.38 Occasional sightings of killer whale (*Orcinus orca*) and long finned pilot whale (*Globicephala melas*) are recorded for the southern North Sea (Ref 88, Ref 33,

Ref 89). Both species are widely distributed around the continental shelf and in oceanic waters. Orca tend to venture further south in summer towards the east coast of the UK, from the northern North Sea. Long finned pilot whales tend to move into deeper waters during summer months.

22.6.39 Risso's dolphin *(Grampus griseus)* is not usually seen in the Southern North Sea and the English Channel, they favour deep offshore waters on the West Coast of Ireland, and off the coast of the Hebrides and Shetland (Ref 89).

22.6.40 Atlantic white-sided dolphin (*Lagenorhynchus acutus)* has occasional sightings in the North Sea and English Channel (Ref 90), with 1 sighting from the Sea Watch Foundation between 2024/07 to 2025/03. Like Risso's dolphin they prefer deeper waters.

22.6.41 No sightings of these species were recorded in the SCANS III or SCANS IV survey in the survey blocks that the Draft Order Limits cross. No sightings recorded in any of the surrounding offshore wind projects these four species.

22.6.42 There were no sightings recorded in the North Sea (Ref 91) although some records are presented in the Moray Firth (Ref 87). Very occasional records are recorded along the south east coast of England (Ref 86).

Pinnipeds

22.6.43 Two species of pinniped are known to inhabit the waters off the east coast of England; the harbour seal (also known as the common seal), and the grey seal. The UK supports internationally significant populations of both species (Ref 92, Ref 93).

22.6.44 Aerial and boat based surveys of the offshore wind farms adjacent to the Draft Order Limits i.e., East Anglia TWO, East Anglia ONE North and Norfolk Vanguard East And West recorded low numbers of seal within the proposed array areas; with a total of 47 seal observed between 2015 and 2018 over the four sites (Ref 100, Ref 101, Ref 102).

Harbour seal (*Phoca vitulina)*

22.6.45 Harbour seal are permanent residents in the southern North Sea, with key haul out and breeding sites in The Wash and North Norfolk Coast SAC due to the presence of extensive tidal flats (Ref 94). An estimated 30% of the European population of harbour seals exist in the UK, with the most recent surveys suggesting 30,855 individuals are present (Ref 95, Ref 96). It is unusual for harbour seals to travel further than 50km from the coastline and they exhibit high site fidelity when leaving haul out sites to forage.

22.6.46 The harbour seal has a slightly shorter gestation period than the grey seal of 10 months. Pupping occurs on land from June to July while the moult is centred around August and extends into September. Harbour seals do not tend to congregate at breeding colonies, with pups able to swim from birth. Rather, they spend most of the time hauled out during the annual moult (Ref 97). Females will

lactate for 21 days after birth in June or July before weaning, during this time the female will forage at sea, returning regularly to the pup, limiting at sea distribution. Population counts are conducted in moult and are representative of the highest proportion of the population (Ref 98). They feed on a variety of prey species including sandeel, gadoids, herring, sprat, flatfish, octopus and squid. Their diet varies between seasons and regions, off the coast of South East England their prey is mainly sandeel, gadoids and flatfish (Ref 99).

22.6.47 The harbour seal is protected as an Annex II species under the Habitats Regulations and as such, qualifies as a protected feature for several SACs in UK waters. The nearest SAC designated for harbour seal to the Draft Order Limits is The Wash and North Norfolk Coast which is approximately 89km northwest of the Draft Order Limits.

22.6.48 The Draft Order Limit is entirely within the south east England Seal Management Unit (SMU). The most notable population of harbour seals within this SMU is The Wash and North Norfolk Coast population, particularly at Donna Nook and Scroby Sands. The closest of these populations is the Scroby Sands haul out site, which is 25km north of the Draft Order Limits. although this has been significantly impacted by phocine distemper virus (PDV), seeing a 73% decrease in August seal numbers between 2014 and 2018 (Ref 115).

22.6.49 conducted in the moult and are representative of the highest proportion of population. The most recent counts of hauled out harbour seals in the southwest England SMU is 3947 in total (Ref 19). **Figure 22.5** of this PEIR shows at sea populations of harbour seal during the spring months, the inshore region of the Draft Order Limits is 0.0025-0.0075 animals per 5km^2. This drops to 0 - 0.0025 animals per 5km^2 further offshore.

Grey seal (*Halichoerus grypus)*

22.6.50 Grey seal are relatively common in the southern North Sea, with haul out sites present along the east coast such as at Donna Nook, Lincolnshire, and Orford Ness, Suffolk (approximately 26km from the Landfall). The harbour seal is protected as an Annex II species under the Habitats Regulations and as such, qualifies as a protected feature for several SACs in UK waters. There are no SACs designated for grey seal on the south east coast of England, with the largest grey seal populations existing further north along the east coast and into Scotland.

22.6.51 Grey seal prefer remote islands, bays and caves as haul out areas, where they can give birth to pups and forage for food. They have larger foraging ranges than harbour seal, usually within 100km of their haul out sites but they can travel further offshore than this. Foraging areas tend to be connected to the haul out by a corridor of use. They also show lower site fidelity to haul out sites than harbour seal outside breeding season (Ref 33).

22.6.52 Breeding takes place during the autumn period and gestation takes around 11 months. Exact pupping varies between year and location; in eastern England pupping occurs between November and December. A large proportion of the grey seal population will be on land and in coastal waters from October to December during pupping season, then again in February and March during the annual moult. During this time, they are particularly vulnerable to disturbance.

22.6.53 Presently, the overall assessment of conservation status of grey seal in UK waters is considered to be 'Favourable (FV)' by conservation bodies and they are listed as 'Least Concern' globally on the IUCN Red List (Ref 106).

22.6.54 The Draft Order Limits are entirely within the south east England SMU. The latest estimate of the total UK grey seal population is 162,000 (at the start of the 2022 breeding season) (Ref 33). Notable populations within this management unit include the Donna Nook haul out site, which is the largest concentration of grey seals in Europe, Blakeney Point, The Wash, Horsey and Scroby Sands.

22.6.55 The most recent counts of hauled out grey seals in the south east England SMU is 8,224 in total (Ref 19). **Figure 22.5** of this PEIR shows at sea populations of grey seal during the summer months; the inshore region of the Draft order limits is 0.005 – 0.0075 animals per 5km^2 at its highest in the inshore region. This drops to 0 - 0.0025 animals per 5km^2 further offshore.

European otter (*Lutra lutra*)

22.6.56 European otter are a solitary, semi-aquatic mammal which occurs in a variety of aquatic habitats such as rivers, streams, lakes, estuaries and on the coast. Coastal dwelling populations use shallow, inshore marine areas for feeding. Fresh water is used for bathing, and terrestrial areas for resting and breeding. Foraging is limited to coastal areas (Ref 103); the range is dependent on the quality of its habitat and food. Otters feed on fish such as trout, salmon and eels in freshwater, they are largely nocturnal and occupy very large home ranges (around 32km for males and 20km for females). Coastal dwelling otters are different however, only travelling 4-5km from home to forage, and are more active during the day due to more productive inshore waters (Ref 103). Most feeding is done in waters no less than 3m deep, but otters are capable of hunting in waters 10m deep. Seaward they can forage 80m into and beyond the intertidal zone (Ref 23). They can be sighted all year round but observations tend to peak in May, June, September and October.

22.6.57 Otter were once a common sight in UK waterways before suffering a rapid decline in numbers in the 1970s due to chemical pollutants. Due to recent conservation efforts, their numbers have been rising, and they are now known to be widespread within Suffolk.

22.6.58 Historically, otters may have used small rivers to the south and north of the Landfall (e.g., Dunwich River) but the data is low resolution, and records have not been updated since 2014 (Ref 108).

22.6.59 There are still numerous sightings surrounding the proposed Landfall. Otters' use the river Blyth for foraging, the Suffolk Naturalists society have collected numerous videos of otter in the area. In the 10 months from March to the end of January 2021, 750 videos of otter were recorded from 14 sites (Ref 110).

Future baseline

22.6.60 The future baseline considers changes which may affect the future environment in the absence of the Proposed Offshore Scheme. The existing conditions of the study area are relatively stable. Marine mammal populations naturally change over spatial and temporal scales and therefore fluctuations are likely to occur over the lifetime of the Proposed Scheme. The abundance and distribution of prey is typically what influences the movement of marine mammal populations. Many species can adapt to gradual changes in environment, as their areas of feeding cover large distances, so changes from climate change can be adapted to. However not all species are as adaptational, and anthropogenic activities can alter global trends. For example, grey and harbour seal may be less resilient to long term changes due to them having more restrictive foraging grounds.

22.6.61 The main impacts of anthropogenic climate changes so far have been identified as decreasing ocean productivity, altered food web dynamics, reduced abundance of habitat-forming species, shifting species distributions and a greater incidence of disease. The North Sea has seen one of the greatest increases in sea surface temperature in the past 25 years, a rate of increase of between 0.6°C and 0.8°C (Ref 112).

22.6.62 A shift in distribution could occur in species vulnerable to temperature changes, such as white-beak dolphin. There is a lot of uncertainty however about the details in timescale and location, but there is a clear alteration in ocean systems. White-beaked dolphin is endemic to cold temperatures of the North Sea, increasing water temperature reduces the areas suitable for foraging and habitat loss (Ref 111). Analysis of strandings data has suggested a potential change in their distribution along the North Sea coastline, particularly in southern regions where fewer animals are present. Due to their widespread abundance, white-beaked dolphin was evaluated as a least concern, despite their range expecting to shrink due to rising sea temperature (Ref 113).

22.6.63 Grey seal populations have been increasing in the North Sea since the 1960s. Between 2010 and 2016, pup production has increased by 12% per year due to the rapid expansion of newer colonies in Lincolnshire, the population is stable and increasing (Ref 114). The data suggests there may have been some immigration to colonies further south, since the rate of increase in the southern North Sea has been lower in recent years, suggesting populations around the east coast of England may be reaching carrying capacity (Ref 115). An analysis of Persistent Organic Pollutants (POPs) in blubber from grey seal pubs revealed that there were concentrations that could cause a severe toxic effect (Ref 116). Other threats include entanglement in marine and plastic debris, particularly

ghost fishing gear. Grey seals are not directly linked to a designated site so cannot be classified as favourable or unfavourable.

22.6.64 Harbour seal numbers similarly have gradually increased since the 2000s. For the East coast seal counts are stable, however the 2017 count was 3.9% lower than 2016. This is potentially indicating that the population is reaching carrying capacity earlier than anticipated. In 2002, there was an epidemic called the phocine distemper virus (PDV), the southeast population of harbour seals have recovered from this. There is a high chance that climate change will cause a subtle shift in distribution but based on current trends and epidemics it will be difficult to record the impacts across the marine mammal's study area. Due to the declines recorded, the current UK harbour seal population estimate has been considered as unfavourable and inadequate.

22.6.65 In the North Sea, harbour porpoise is considered vulnerable to bycatch in gillnets used in commercial fishing. Another driver is that harbour porpoise has a high metabolic rate and need to feed regularly, the distribution in porpoise reflects the availability and energy density of prey species (Ref 118). IAMMWG et al (2015) (Ref 119) has reported that necropsies of harbour porpoise strandings have revealed that due to the discharge of POPs, there is an increased susceptibility to parasitic infections. The impact of climate change remains poorly understood, there populations for now remain stable, as there appears to be no change in harbour porpoise range since 1994 (Ref 120, Ref 121). The feature status of harbour porpoise in the Southern North Sea SAC is favourable (Ref 76).

22.6.66 The populations of bottlenose dolphin off the east coast England have increased (Ref 122, Ref 123). The group sizes of bottlenose dolphin are directly related to abundance in fish prey but can also be related to social bonds within the population. The overall assessment of populations, and conservation status for bottlenose dolphin is unknown (Ref 124). The pressures affecting their available habitat are not thought to be increasing, and there are no threats identified likely to impact in the next 12 years. Bottlenose dolphin currently have a conservation status range of favourable, and future prospects are considered good (Ref 124).

22.6.67 In UK waters, minke whale's major threats are the direct and indirect interactions with fisheries. In Scotland, examination of minke whale strandings between 1990 and 2010 noted that 50% were due to entanglement in static fishing gear (Ref 125). Other threats include boat strikes, exposure to anthropogenic noise, ingestion of contaminants and the loss of critical habitat (Ref 126,Ref 127). Whale abundance in the greater North Sea is stable (Ref 128, Ref 129) and there is no evidence to support that the range of minke whale has changed since 2013 (Ref 129). Minke whale currently have a conservation status range of favourable, and future prospects are considered good (Ref 130).

22.7 Embedded design mitigation and control measures

Design and embedded mitigation measures

22.7.1 As described in **Chapter 2 Description of the Proposed Scheme** of this PEIR, a range of measures have been embedded into the Proposed Offshore Scheme design to avoid or reduce environmental effects. These mitigation measures form part of the design that has been assessed, which for marine mammals are listed in **Table 22.19**.

Table 22.19: Design and embedded mitigation measures for marine mammals

Commitment Reference Code	Measure	Compliance Mechanism
OD01	All cables will be installed in one trench	CEMP secured by DML
OD02	High Voltage Direct Current (HVDC) cables will be bundled together to minimise the EMF profile.	CEMP secured by DML
OD04	The intention is to bury the cables in the seabed, except in areas where trenching is not possible e.g. where ground conditions do not allow burial or at infrastructure crossings.	CEMP secured by DML
OD05	External cable protection shall only be used where it can be demonstrated that adequate burial depth cannot be achieved (e.g., where ground conditions do not allow burial or at infrastructure crossings); the footprint of any external protection shall be the minimum required to ensure adequate cable protection and stability.	CEMP secured by DML
OD06	In sites designated for benthic features, cable protection materials will be selected to match the environment (e.g. rock of similar grade as the receiving environment) where feasible.	CEMP secured by DML
OD08	Micro-routeing within the Order Limits to avoid sensitive environmental constraints and minimise the risk of exposure by seabed mobility	CEMP secured by DML

Control measures

22.7.2 Control measures are set out in the **Appendix 2.2 Outline Offshore Construction Environmental Management Plan** of this PEIR which would manage the effects of construction. The measures of particular relevance to marine mammals are listed in **Table 22.20.**

22.7.3 Several management plans would be provided as Outline Management Plans with the application for development consent to support the DML. These will include an Outline Construction Environmental Management Plan (CEMP) (including biosecurity plan details), Outline Marine Pollution Contingency Plan (MPCP), and Outline Marine Mammal Mitigation Plan (MMMP). These documents will outline control measures to be implemented to comply with legislation (e.g., in relation to the prevention of oil and chemical spills) and best industry practice (e.g., implementation of JNCC guidance to reduce impacts on marine mammals from underwater noise during geophysical surveys) during all phases of the Proposed Offshore Scheme. Final management plans would be submitted in accordance with the DML to discharge the licence conditions.

22.7.4 The Applicant would ensure that all work that is undertaken during construction, operation and maintenance and decommissioning complies with the requirements of relevant national and international legislation.

Table 22.20: Control measures relevant to marine mammal assessment

Commitment Reference Code	Measure	Compliance Mechanism
OC01	An offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan (ESRP), Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Marine Mammal Mitigation Plan (MMMP) and a dropped objects procedure will be produced prior to installation.	DML secured through DCO
OC02	All project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972) (IMO, 2019a), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 2019e) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974).	CEMP secured by DML

Commitment Reference Code	Measure	Compliance Mechanism
OC03	An installation machine failure contingency plan will be produced prior to installation	CEMP secured by DML
OC04	All oil, fuel and chemical spills will be reported to the MMO Marine Pollution response team	DML secured through DCO
OC13	Sub-bottom profiling shall comply with the JNCC guidelines for minimising the risk of injury and disturbance to marine mammals.	MMMP secured by DML
OC14	All vessels (exceeding 20m) shall not exceed 14knots during construction operations within the proposed Offshore Scheme to protect marine mammals from ship strikes.	CEMP secured by DML
OC38	The Applicant would apply for a separate Marine Licence and Wildlife Licence for UXO clearance.	CEMP secured by DML
OC39	In accordance with the UK Government (2025) guidance "Supporting minimising environmental impacts from unexploded ordnance clearance" the UXO mitigation hierarchy would be followed for any targets identified during the UXO survey and confirmed as UXO, namely: i. Avoid the UXO by micro-routeing the cables a safe distance away. ii. Safely remove UXO to an alternative seabed position. iii. Safely remove UXO to surface for onshore disposal. iv. If no alternatives exist, in-situ disposal using the most appropriate low noise method. v. If in-situ disposal using the most appropriate low noise method fails after a minimum of three attempts, all best practice has been demonstrably applied, there are no alternatives, there is prior agreement with the MMO, and the relevant consent and mitigation is in place, undertake disposal using high order method.	Secured via a Separate Marine Licence

22.8 Assessment of effects

22.8.1 This section presents the preliminary assessment of likely significant effects on marine mammals resulting from the construction, operation, maintenance and decommissioning of the Proposed Offshore Scheme. The likely significant effects of the Proposed Offshore Scheme are identified considering the embedded design mitigation and control measures.

22.8.2 Following assessment secondary mitigation is proposed as required which is presented in **Section 22.8.**

Construction

Visual disturbance to otter in intertidal zone

22.8.3 Otters are sensitive to visual and noise disturbance. They are intolerant of areas subject to intense human activity (Ref 131). This assessment focuses on disturbance in the intertidal zone from MHWS to 80m seaward (the predicted extent of the use by otters of the Proposed Offshore Scheme). Potential impacts on otter have also been considered by the Proposed Offshore Scheme in **Chapter 8 Ecology and Biodiversity** of this PEIR.

22.8.4 The Broads SAC (which lists otter as a designated feature) is approximately 40km away from the proposed Landfall Site. This is beyond the outer limit of otter foraging range (the largest of which is 32km), so has been included to be precautionary. The HRA Screening (provided with this PEIR) concluded no likely significant effects for this site. Otters are widespread within Suffolk and are known to have used the waterways around Walberswick (public shared photographs during non-statutory consultation events) and there is therefore the potential that they could use the intertidal zone for foraging activity. The proposed Landfall is already used for recreational activity, including sailing, bathing and dog walking. There is sufficient alternative foraging areas for otter in the region, and the proposed Landfall is not a prime area for otter. The sensitivity of otter to the impact has therefore been assessed as negligible as otter would be able to adapt their behaviour so that survival and distribution would not be affected.

22.8.5 Physical activity in the intertidal zone and immediate nearshore would be largely avoided by the use of a trenchless technique (such as horizontal directional drilling) to engineer the HVDC Submarine Cable proposed landfall. Vessels will present within the Proposed Offshore Scheme for discrete periods of time undertaking landfall enabling works, seabed preparation and cable pull-ins. Vessels will be stationary or slow moving (<14knots) during works. Vessels will not be present within 80m of the shore for extended periods of time. The magnitude of the impact has therefore been assessed as negligible.

22.8.6 The preliminary assessment concluded that based on the sensitivity and magnitude, the significance of the effect on otter is **Negligible** and **Not Significant.**

Underwater noise changes – geophysical survey

22.8.7 Cetaceans and pinniped have evolved to use sound as an important aid in navigation, communication and hunting. It is generally accepted that exposure at close range to high noise levels can cause permanent or temporary hearing damage, while in extreme circumstances and at a very close range gross physical trauma is possible. At wider ranges, the introduction of any additional noise could potentially cause short term behavioural changes, for example the ability of a species to communicate and to determine the presence of predators, food, underwater features and obstructions. A change in behaviour although typically a short-term effect can have long term consequence. The animal will likely move a distance from the zone of disturbance until the activity has passed, which prevents the regular foraging and breeding and migratory patterns of the species.

22.8.8 Sound is readily transmitted within the underwater environment and there is potential for the noise emissions from construction of the Proposed Offshore Scheme to affect marine mammals. The preliminary environmental assessment therefore considers the potential for lethal/physical injury, auditory injury and behavioural disturbance.

22.8.9 Noise can be categorised into impulsive sources or continuous sources. Impulsive noises are typically brief, transient (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (Ref 133, Ref 134). This category includes noise sources such as seismic surveys and underwater explosions. Continuous (non-impulsive) noises can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive noises do (Ref 135).This category includes noise sources such as continuous running machinery, sonar, and vessels.

22.8.10 Underwater noise propagation modelling has been undertaken for the Proposed Offshore Scheme to inform the environmental impact assessment. **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR provides a summary of acoustic concepts and terminology, acoustic assessment criteria, estimated source noise levels and provides the approach taken and results of the underwater noise propagation modelling. The report uses sound propagation models to calculate the impact ranges to marine mammals from each phase of the Proposed Offshore Scheme for three key modelled sources:

a. Geophysical Surveys- non-impulsive sound sources;
b. Vessels and equipment - non-impulsive sound sources; and
c. Clearance of UXO – an impulsive sound source.

22.8.11 This section provides the preliminary environmental assessment for geophysical surveys, with subsequent sections providing the preliminary assessments for the other sources, noting that UXO clearance is not being applied for as a consented activity under the Deemed Marine Licence. Activities associated with the lift and shift of any confirmed UXO are to be included in the application for development consent.

22.8.12 Marine mammals are not equally sensitive to noise at all frequencies and have different hearing sensitivity thresholds. The underwater noise propagation modelling calculates the received noise level at different distanced from the source. To determine the potential consequences of these received levels on any marine mammals, it is necessary to relate the levels to known or estimated potential impact thresholds. Thresholds for the onset of a permanent threshold shift (PTS) and a temporary threshold shift (TTS) in hearing are used to determine whether injury could occur. The injury and disturbance thresholds proposed by Southall et al (2019) (Ref 136) and NMFS (2024) (Ref 137) are the latest peer reviewed criteria and have been used in this assessment. These are described and explained in **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR. The approaches separate marine mammals into five groups based on their functional hearing i.e. the frequency characteristics (bandwidth and noise level) within which acoustic signals can be perceived and therefore are assumed to have auditory effects. The categories relevant to this assessment are:

a. Low Frequency (LF) cetaceans: marine mammal species such as baleen whales (e.g. minke whale);
b. High Frequency (HF) cetaceans: marine mammal species such as dolphins, toothed whales, beaked whales and bottlenose whales (e.g. bottlenose dolphin and white-beaked dolphin);
c. Very High Frequency (VHF) cetaceans: marine mammal species such as true porpoises, river dolphins and pygmy/dwarf sperm whales and some oceanic dolphins, generally with auditory centre frequencies above 100kHz) (e.g. harbour porpoise); and
d. Phocid Carnivores in Water (PCW): true seals (e.g. harbour seal and grey seal); hearing in air is considered separately in the group Phocid Carnivores in Air (PCA).

22.8.13 During construction several sonar-like pieces of survey equipment would be used e.g. multi-beam echosounder (MBES), side scan sonar (SSS), sub-bottom profiler (SBP) and USBL (ultra short baseline). These are classed as non-impulsive noise because they generally comprise a single (or multiple discrete) frequency as opposed to a broadband signal. The equipment can typically work at a range of signal frequencies, depending on the distance to the bottom and the required resolution. The signal is highly directional and acts as a beam, with the energy narrowly concentrated within a few degrees of the direction in which it is aimed. This effectively means that there is only the potential for injury if the animal is directly beneath the equipment.

22.8.14 For geophysical survey it is best practice to follow the JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from geophysical surveys (Ref 47) (Commitment Reference Code OC13). Adherence to the guidelines constitutes best practice and would in most cases, reduce the risk of deliberate injury to marine mammals to negligible levels. Implementation of the guidance would be secured through the Offshore Construction Environmental Management Plan.

22.8.15 The JNCC guidelines state that MBES surveys in shallow waters (<200m) use higher frequencies that typically fall outside the hearing frequencies of cetaceans and that the sounds produced are likely to attenuate more quickly than the lower frequencies used in deeper waters. JNCC do not, therefore, advise that mitigation is required for MBES surveys in shallow waters. SSS equipment is similar, and mitigation is not required for these surveys. This preliminary environmental assessment therefore focuses on the use of SBP and USBL. It should be noted that new draft guidance was issued for consultation by JNCC in February 2025. The draft 2025 guidelines do not differ from the 2017 guidance on this point.

Cetaceans and Pinnipeds – injury

22.8.16 Of the species present, the most sensitive to SBP are VHF cetaceans such as harbour porpoise. The Southern North Sea SAC is designated for harbour porpoise, therefore this assessment is also applicable to the designated site. The Draft Order Limits cross the SAC for approximately 138.6km; and of this 87.9km is within the summer grounds and 85.9km is within the winter grounds (see **Figure 22.4** of this PEIR)- the summer and winter grounds overlap for approximately 36.5km.

22.8.17 This functional hearing category has therefore been assessed as having a sensitivity of high. This assessment is based on the potential impact ranges predicted for the VHF cetaceans. **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR, **Table 6-1** indicates that a permanent threshold shift (PTS) in hearing could be experienced within 470m of the source, whilst a temporary threshold shift (TTS) could be experienced within 3,780m of the source. For context, it should be noted that the directionality of the beam significantly reduces the potential for injury and temporary threshold shifts in hearing. However, it does indicate that mitigation would be required to ensure animals are not within 500m of the source on switch on. For other functional groups (including pinnipeds) the impact distances are <150m, noting that for pinnipeds the NMFS (2024) (Ref 137) threshold gives an impact distance of 590m compared to 120m when using the Southall et al. (2019) (Ref 136) threshold.

22.8.18 The magnitude of the impact has been assessed as low. There is no direct evidence to link physical injury in cetaceans and geophysical surveys. The most likely response of a marine mammal to noise levels that could induce auditory injury is to flee from the ensonified area (Ref 139). There is evidence that cetaceans exhibit short-term behavioural responses to geophysical survey (Ref

40, Ref 140). Subsequently the onset of TTS can be referred to as the fleeing response. This is therefore a behavioural response that overlaps with disturbance ranges and animals exposed to these noise levels are likely to actively avoid hearing damage by moving away from the area.

22.8.19 JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from geophysical surveys (2017 or subsequent updates) would be applied to reduce the risk of injury occurring from the SBP systems to negligible. It should be noted that new draft guidance was issued for consultation by JNCC in February 2025. This has been reviewed and any differences noted below in italics, although it should be noted that this guidance has not come into effect and may still change prior to formal publication.

22.8.20 The survey equipment and activities proposed are well within the envelope of those for which the guidelines were designed. The 2025 draft guidance state that if parametric sub-bottom profilers are used, the system is in a fixed position (e.g., hull or pole mounted and not towed), the beam width is <5˚ and no other systems are used at the same time, then mitigation is not required. If none of the above applies, then mitigation should be implemented.

22.8.21 The Proposed Offshore Scheme lies in waters <200m deep. The mitigation as defined by Commitment Reference Code OC13, would include the following:

a. A marine mammal observer would conduct a pre-shooting search for a minimum of 30 minutes prior to commencement of start of SBP systems. If a marine mammal is observed within a 500m mitigation zone around the acoustic source, survey commencement would be delayed until 20 minutes after the marine mammal has left the mitigation zone or was last observed;
b. Soft-start: The JNCC guidelines require that if possible, the operating power of the equipment would be ramped up gradually, in a uniform manner from a low-energy start-up, over a minimum period of 20 minutes. As acknowledged in the guidelines, this would not be possible with most SBP systems as they are either off or on. If a soft-start can be used it would be implemented. *The draft 2025 guidance also states a maximum of 25 minutes from the start of the soft-start to the start of the survey line*;
c. Line change: If line changes (or other pauses) are expected to be longer than 40 minutes, equipment operation would be stopped at the end of the survey line and the pre-shooting search and soft-start (as per items a and b) would be completed prior to resuming survey at full power. Where practical, equipment operation would also be stopped or operated at a reduced power or pulse rate during line changes/pauses expected to be less than 40 minutes;
d. Unplanned breaks: Where there is a gap in data acquisition of greater than 10 minutes, a pre-shooting start and soft-start (as per items a and b) would be completed prior to resuming survey at full power; and
e. Nearshore survey lines and the offshore survey lines would start at the shore end and progress offshore to minimise risk of flushing animals towards the beach.

22.8.22 Following the JNCC et al., (2010) (Ref 141) guidance on whether activities constitute an offence under the Habitats Regulations it can be concluded that with implementation of standard industry control measures, the impact of noise produced by operation of equipment used during the geophysical survey is unlikely to be detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range. There is no potential for an offence to occur because of the proposed survey alone and therefore the assessment has concluded that the effect is **Not Significant.**

Cetaceans and Pinnipeds – disturbance

22.8.23 For geophysical surveys, an effective deterrence range (EDR) of 5km may be assumed based on JNCC et al. (2020) (Ref 141). Although this EDR is provided for harbour porpoise, as the species represents the most sensitive functional hearing group, it is used as a worst-case proxy for other species. This indicates that disturbance effects may be observed in a 5km radius from the source. The geophysical surveys would be transient in any one location, moving in a linear nature through the Proposed Offshore Scheme. Approximately 78.5km^2 of sea would experience underwater noise changes sufficient to cause disturbance effects at any one time. This zone of influence would move as the survey progresses. As outlined above, there is evidence that cetaceans exhibit short-term behavioural responses to geophysical survey. However, the geophysical surveys are temporary and transient, and animals can return to the Proposed Offshore Scheme as soon as the vessel passes through; as evidenced by observations following a 2D seismic survey in the Moray Firth, where harbour porpoise returned to the area within 19 hours of survey stopping (Ref 142). Although other studies note it can take up to three days for harbour porpoise to return to their disturbed habitat following cessation of the noise producing activity (Ref 141, Ref 142). Disturbance will therefore fit under the JNCC et al. (2010) (Ref 141) classification of trivial as it will only lead to “sporadic disturbances without any likely negative impact on the species”.

22.8.24 The sensitivity of cetaceans and pinnipeds to disturbance has been assessed as low and the magnitude of the impact has been assessed as negligible. The significance of the effect has been assessed as **Negligible** and **Not Significant.**

Southern North Sea SAC - disturbance

22.8.25 Guidance from JNCC (Ref 46) considers noise disturbance to harbour porpoise to be significant if it results in the exclusion of harbour porpoises from more than:

a. 20% of the relevant area of the site in any given day, or; and
b. an average of 10% of the relevant area of the site over the season.

22.8.26 The Proposed Offshore Scheme crosses both the summer and winter grounds for the SAC. **Table 22.21** presents the calculated areas of the grounds that would be affected by disturbance level noise changes assuming a 5km EDR either side of the Draft Order Limits. This is representative of one geophysical survey. The

calculations indicate that the thresholds for a significant disturbance effect for a day or season would not be exceeded by the Proposed Offshore Scheme alone. Therefore, in line with the JNCC guidance it can be concluded that the significance of the effect is **Not Significant**. However, it should be noted that implementation of the JNCC 2017 guidance (or as superseded) would still be followed as a matter of best industry practice (as outlined in **Paragraph 22.8.19)**

Table 22.21: Calculation of geophysical survey disturbance effects within Southern North Sea SAC

SAC Grounds	Winter Area	Summer Area
Total Area of ground (km^2)	12,696	27,028
Distance of Proposed Offshore Scheme within Ground (km)	86.1	50.9
Total Area Affected by noise (km^2)	860	509
% of ground affected (km^2)	6.8%	1.9%

Underwater noise changes – vessels and equipment

22.8.27 Underwater noise propagation modelling has been undertaken for the Proposed Offshore Scheme to inform the environmental impact assessment. **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR provides a summary of acoustic concepts and terminology, acoustic assessment criteria, estimated source noise levels and provides the approach taken and results of the underwater noise propagation modelling. Please also refer to the discussion in **paragraphs 22.8.7** to **22.8.15** for the background context relevant to the effects of underwater noise changes on marine mammals and information on the marine mammal functional hearing groups used in this assessment.

Cetaceans, Pinnipeds and Southern North Sea SAC – injury and disturbance

22.8.28 Of the species present, the most sensitive to non-impulsive noise from project vessels and equipment are VHF cetaceans. This assessment is based on the potential impact ranges predicted for the VHF cetaceans. **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR, **Table 6.14**, **Table 6.15, 6.17** and **6.18** indicate that:

a. Most of the equipment proposed to be used e.g. cable ploughs and trenchers, controlled flow excavator, would not cause noise levels sufficient to cause injury (PTS) to cetaceans or pinnipeds. The exception is the trailing suction

hopper dredger where PTS could be experienced within 68m of the equipment for VHF cetaceans and within 7m for HF cetaceans; and

b. TTS is predicted for all equipment types for VHF cetaceans within 20m.

22.8.29 TTS is predicted for several types of vessels for VHF cetaceans. The largest impact range is 517m associated with trailing suction hopper dredger and rock placement vessels. For other vessel types, HF cetaceans and pinnipeds the impact range is <100m.

22.8.30 The values presented above use the Southall et al (2019) (Ref 136) thresholds. The NMFS (2024) (Ref 137) thresholds provide similar results although the impact ranges are generally lower.

22.8.31 TTS is predicted for several types of vessel for VHF cetaceans. The largest impact range is 517m associated with trailing suction hopper dredger and rock placement vessels. For other vessel types, HF cetaceans and pinnipeds the impact range is <100m.

22.8.32 Harbour porpoise, a VHF cetacean, is the designated feature of the Southern North Sea SAC. The sensitivity of this species and HF cetaceans to vessel noise has been assessed as medium, given that the modelling has indicated that they could experience a TTS if present in proximity to a trailing suction hopper dredger. For all other species the sensitivity has been assessed as low.

22.8.33 There is no direct evidence to link physical injury in cetaceans with the use of trailing suction hopper dredgers, but VHF and HF cetaceans are likely to exhibit short-term behaviour responses if exposed to underwater noise that causes discomfort. Subsequently the onset of TTS can be referred to as the fleeing response. This is therefore a behavioural response that overlaps with disturbance ranges and animals exposed to these noise levels are likely to actively avoid hearing damage by moving away from the area.

22.8.34 There is a considerable degree of uncertainty and variability in the onset of disturbance and therefore any disturbance ranges should be treated as potentially over precautionary. Another important consideration is that vessels and construction noise will be temporary and transitory, as opposed to permanent and fixed. In this respect, construction noise is unlikely to differ significantly from vessel traffic already in the area. Animals within the Southern North Sea are subject to high levels of shipping traffic and are habituated to vessel movements.

22.8.35 Disturbance would therefore fit under the JNCC et al., 2010 (Ref 40) classification of trivial as it would only lead to “sporadic disturbances without any likely negative impact on the species”. Based on the discussion above, the magnitude of the impact has been assessed as low.

22.8.36 Of the species present, the most sensitive to non-impulsive noise from project vessels and equipment are very high frequency cetaceans. This functional

hearing category has therefore been assessed as having a sensitivity of medium. The magnitude of the effect has been assessed as low.

22.8.37 The overall significance of the effect has been assessed as **Minor** and **Not Significant.**

Underwater noise – UXO clearance

UXO clearance is not being consented under the DCO; a separate Marine Licence would be applied for. Activities associated with the lift and shift of any confirmed UXO are to be included in the application for development consent.

The below high-level assessment is provided at the request of the Statutory Nature Conservation Bodies for information only and to provide a holistic overview of all impacts associated with the Proposed Offshore Scheme.

22.8.38 UXO clearance is a term used to describe finding, removing and safely disposing of unexploded ordnance (e.g., bombs, shells and landmines). It follows a systematic process and mitigation hierarchy, whereby avoidance is the first option, moving through options such as removal to another seabed location, removal to surface, in-situ clearance via low noise method, with in-situ controlled detonation of the UXO using a high-order method as the last option; only undertaken if all other options have failed or if there is an exceptional circumstance.

22.8.39 A high-order detonation is a traditional method used, whereby a donor charge is placed next to the UXO and detonated, causing a chain reaction that detonates the UXO. High order detonations are characterised by a rapid, strong shock wave.

22.8.40 Low-order clearance methods like deflagration are designed to render UXO harmless by burning out the explosive content so that the UXO does not detonate in a high-order manner. A single charge of 30g to 80g Net Explosive Quantity is placed proximal to the UXO. When detonated, a shaped charge penetrates the casing of the UXO to introduce a small, clinical plasma jet into the main explosive filling. The intention is to excite the explosive molecules within the main filling to generate enough pressure to burst the UXO casing, producing a deflagration of the main filling and neutralising the UXO. It is possible that some residual explosive material remains on the seabed following deflagration. In this case, recovery will be performed which may require a small (500g) 'clearing shot'.

22.8.41 In January 2025, guidance from the UK Government was published - "*Supporting minimising environmental impacts from unexploded ordnance clearance".* This sets out that when applying for a marine licence if no alternatives in the UXO mitigation hierarchy exist the default method of clearance should be low noise methods in the first instance e.g., low order detonation/deflagration as opposed to high order clearance, though high order may be considered on exception if

allow noise methods have been attempted and failed, all best practice has been demonstrably applied, and there are no alternatives as per Defra guidance.

22.8.42 The precise details and locations of potential UXOs is unknown at this time. A UXO survey and identification campaign would be completed as part of the seabed preparation works during pre-construction activities. Any confirmed UXO would be marked and the below UXO mitigation hierarchy (as outlined in Commitment Reference OC39) would be followed.

a. Avoid the UXO by micro-routeing the cables a safe distance away;
b. Safely remove UXO to an alternative seabed position;
c. Safely remove UXO to surface for onshore disposal; and
d. If no alternative exists, in-situ disposal using the most appropriate low noise method.

22.8.43 If in-situ disposal using the most appropriate low noise method fails after a minimum of three attempts, all best practice has been demonstrably applied, there are no alternatives, there is prior agreement with the MMO, and the relevant consent and mitigation is in place, undertake disposal using high order method. For the purposes of this assessment, it has been assumed that the worst case UXO size would be 697kg. 697kg represents the largest charge known to have been historically used in the study area.

22.8.44 Underwater noise propagation modelling has been undertaken for various scenarios to establish predict injury and disturbance ranges for marine mammals. **Appendix 22.1 Underwater Noise Modelling Report** of this PEIR (**Table 6.2, Table 6.3, Table 6.5** and **Table 6.6**) presents the approach, results and predicted injury and disturbance ranges for the following scenarios:

a. Low order disposal using an 80g charge;
b. Clearing shot using a 500g charge; and
c. High order disposal of a 697kg UXO.

Low order disposal – Cetaceans, Pinnipeds and Southern North Sea SAC

22.8.45 All species present are sensitive to underwater explosions and therefore the sensitivity has been assessed as high. Harbour porpoise, the designated feature of the Southern North Sea SAC, is a VHF cetacean, and therefore one of the most sensitive species to underwater noise changes.

22.8.46 For low order disposal (80g charge), the greatest PTS range occurs for VHF cetaceans at 685m according to Southall et al., (2019) (Ref 136) criteria. An impact range for behavioural disturbance for VHF cetaceans of 2,455m has been predicted for multiple disposals in a 24-hour period or 1,480m for a single clearance according to the NMFS (2024) (Ref 137) criteria.

22.8.47 For the use of a clearing shot (500g), the greatest PTS range occurs for VHF cetaceans at 1,265m according to Southall et al., 2019 criteria (Ref 136). An impact range for behavioural disturbance of 3,735m has been predicted for multiple detonations in a 24-hour period or 2,475m for a single clearance, for VHF

cetaceans according to the NMFS 2024 criteria (Ref 137), but noting that the disturbance range is higher at 4,010m for multiple detonations in a 24-hr period of LF cetaceans.

22.8.48 The modelling indicates that even with low order disposal (considered to be the mitigated approach) there is still a relatively large release of impulsive sound. At close range there would be risk of mortality as relatively small quantities of explosive can result in significant sound pressure levels. The magnitude of the impact has therefore been assessed as high because injury is still possible with low-order disposal without additional mitigation.

22.8.49 Mitigation would need to be agreed with JNCC/NE once the details of the UXO is known but, but in accordance with the "JNCC guidelines for minimising the risk of injury to marine mammals from unexploded ordnance (UXO) clearance in the marine environment" (Ref 48) would likely include some or all of the following:

a. An agreed Marine Mammal Mitigation Plan would be in place for the activity;
b. Works would only take place during day light hours with visibility greater than 1 nautical mile;
c. Pre-clearance searches (at least 60 minutes in length) would be carried using at least two dedicated marine mammal observers and passive acoustic monitoring to ensure the mitigation zone is clear of marine mammals before clearance commences. The mitigation zone would be agreed with the MMO but would be a minimum of 1km radii;
d. The use of a noise abatement system (such as bubble curtains) would be discussed with the MMO and JNCC/NE. The effectiveness of bubble curtains often depends on the water depth and current speed and may not always be appropriate. In addition, they may not be required if the size of the charge is lower than has been modelled;
e. The use of acoustic deterrent devices would be considered if the mitigation zone is greater than 1km;
f. A Wildlife Licence would be applied for in addition to the Marine Licence; and
g. Timing restrictions e.g., restricting clearance work to one disposal per day, restricting disposal activity to a particular day, week, month or season. This is particularly pertinent to disposal activity within the Southern North Sea SAC where there is the potential for cumulative effects with other marine developments.

22.8.50 Following the JNCC et al., (2010) (Ref 139) guidance on whether activities constitute an offence under the Habitats Regulations it can be concluded that with mitigation, the impact of noise produced by UXO low order clearance is unlikely to be detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range. The implementation of mitigation (a low order clearance) reduces the magnitude of the impact to cetaceans. Therefore, the assessment has concluded that the effect is **Not Significant.**

22.8.51 Using the impact range of 2,455m for behavioural responses in VHF cetaceans an area of 18.93km^2 would be affected within the Southern North Sea SAC for

each low-order clearance. This represents 0.07% of the summer grounds and 0.15% of the winter grounds. According to the guidance from JNCC, (2020) these values are below the thresholds for significant noise disturbance.

22.8.52 Therefore, the assessment has concluded for low order clearance the effect is **Not Significant**.

High order disposal – Cetaceans, Pinnipeds and Southern North Sea SAC

22.8.53 Whilst high order disposal would only be considered in exceptional circumstances an assessment has been provided at the request of the Statutory Nature Conservation Bodies.

22.8.54 All species present are sensitive to underwater explosions and therefore the sensitivity has been assessed as high.

22.8.55 For high order clearance the greatest PTS range occurs for VHF cetaceans at 14.08km according to Southall et al., (2019) criteria. An impact range for behavioural disturbance of 38.8km has been predicted for multiple disposals in a 24-hour period or 25.9km for a single clearance, for VHF cetaceans according to the NMFS (2024) criteria. It should be noted that the impact range for behavioural disturbance for LF cetaceans is substantially higher at 64km, but this is thought to be highly precautionary. The magnitude of the impact has therefore been assessed as high as injurious effects could occur over wide areas without appropriate mitigation.

22.8.56 For high order clearance, an effective deterrence range (EDR) of 26km may be assumed based on JNCC et al. (2020) (Ref 132). This is in line with predicted impact ranges for VHF cetaceans for a single clearance. Using the EDR an area of 2,238km^2 in summer and 4444.17km^2 in winter would be affected within the SAC. This represents 13.1% of the summer grounds and 34.3% of the winter grounds. According to the guidance from JNCC (Ref 132) the value for the summer ground and winter ground is above the thresholds for significant noise disturbance and would be considered Significant disturbance.

22.8.57 As discussed above, high order disposal would not occur without appropriate mitigation. Activities would be conducted in accordance with JNCC guidelines for minimising the risk of injury to marine mammals from unexploded ordnance (UXO) clearance in the marine environment (2025). Mitigation would need to be agreed with JNCC/NE once the details of the UXO is known but would likely include some or all of the points listed under mitigation for low order disposal. In addition, temporal restrictions would also be considered to ensure densities of animals are as low as possible, especially in relation to disposal activities within the Southern North Sea SAC. Given that the size and location of the UXO is unknown and the assessment is based on theoretical worst case scenarios, it is highly precautionary. Mitigation would need to be discussed with the SNCBs for the Marine Licence and Wildlife Licence, but given that consent would only be granted if it could be demonstrated by the Applicant that there would not be a

significant adverse effect the assessment concludes that effects would be **Not Significant**.

Collision with vessels

22.8.58 Vessels would be used throughout the lifecycle of Proposed Offshore Scheme. The greatest requirements would be during construction and decommissioning when multiple vessels may be working within the Draft Order Limit at any one time. During operation, the use of vessels would be reduced significantly to periodic inspection surveys (potentially every other year), sporadic maintenance or repair works on an 'as needed' basis.

22.8.59 Although shipping collision is a recognised cause of marine mammal mortality worldwide, the key factor influencing the injury or mortality caused by collisions is ship size and speed. Laist et al. (2001) (Ref 146) stated that the most severe injuries occur when vessels are travelling at over 14knots. As outlined in **Table 22.20** the Applicant has committed to ensuring that all vessels (exceeding 20m) shall not exceed 14knots during operation and maintenance within the Proposed Offshore Scheme to protect marine mammals from ship strikes. This control measure would be secured through the Offshore Construction Environmental Management Plan.

22.8.60 Marine mammal species are well equipped to move away from oncoming vessels before a collision, although avoidance behaviour around vessels depends on the species. Minke whale and white beaked dolphin are more accustomed to vessel noise, so may not immediately change behaviour to move away. A socialising white beaked dolphin is known to approach vessels, though if foraging or resting it will ignore them. Richardson et al (2005) (Ref 148) has reported curious behaviours in harbour seals, as they are avoidant when vessels are within 100m of a haul out but regularly swim up to tourist boats.

22.8.61 The sensitivity of the receptors has been assessed as medium. Although vessel collisions often lead to mortality in marine mammal and it is likely that deaths from collisions are underreported, there have been reports of non-lethal collisions of large whales by Van Waerebeek et al (2007) (Ref 147). There is already a high level of shipping activity in the region and lower densities of marine mammals than in other areas of the North Sea.

22.8.62 The magnitude of the impact has been assessed as low. Avoidance behaviour may be exhibited by a small number of individuals, but due to the temporary and transient nature of the project vessels, the risk of collision is very low, and the survival rates and reproduction rates for the various cetacean and pinniped populations will not be impacted.

22.8.63 Overall, the significance of the effect has been assessed as **Minor** and **Not Significant.**

Changes in prey availability

Cetaceans, pinnipeds and Southern North Sea SAC

22.8.64 Marine mammals have various prey species they feed on and can travel great distances to forage. The four most common species to the Proposed Offshore Scheme (harbour porpoise, bottlenose dolphin, white-beaked dolphin and minke whale) are all opportunistic hunters, feeding on a variety of fish (haddock, hake, cod, herring, whiting, sandeel, mackerel, salmon and flatfish), cephalopod species, (squid and octopi), and crustaceans (shrimp and crabs) but herring, mackerel and sandeel are often preferred prey.

22.8.65 Activities that lead to temporary habitat loss (e.g., seabed preparation, UXO identification, pre-sweeping of sandwaves, cable burial) or permanent habitat loss (e.g., deposit of cable protection where sufficient cable burial is not possible) affect seabed habitats which in turn could affect the availability of prey.

22.8.66 Most construction activities that penetrate the seabed would present a temporary impact i.e., would only be undertaken once and the seabed will be able to recover after the activity. Some activities will occur in the same footprint and will be separated by several months e.g., PLGR followed by trenching. Certain habitats and species may be more sensitive to the impact than others due to their ability to recover.

22.8.67 External cable protection would be used in the construction of infrastructure crossings and for burial remediation where full cable burial into sediment has not been achieved. Whilst most external cable protection would be installed during construction, it would also be required during the operation phase, either for the maintenance of infrastructure crossings or for remedial burial e.g., associated with a cable repair, or if the cables become exposed. The deposition of external cable protection would result in a permanent change of habitat type within the footprint of the activity. The change in substrate would make it less suitable for certain species of fish as spawning grounds.

22.8.68 Disturbance of the seabed during the spawning season for species with a demersal life stage (such as sandeel and herring) could have a direct impact on the spawning biomass for a specific year group, leading to a shortage of prey species for marine mammals in subsequent years.

22.8.69 Other impacts on prey species such as underwater noise, temporary increase and deposition of suspended sediments and sediment heat changes could also combine with temporary and permanent habitat loss to lead to a change in prey availability. However, the **Appendix 2.4: Offshore Thermal Emissions Technical Note** concluded that a depth of cover of at least 1m can mitigate the sediment heat changes.

22.8.70 If fish species are avoiding an area, then marine mammals could potentially travel greater distances to locate prey, leading to an energetic cost. For example, loss of a preferred prey close to a haul-out site during pupping season would increase

the amount of time animals are at sea or lead to lower food availability for pup inhibiting survival. Harbour porpoises are considered to have higher metabolic rates than land mammals of a similar size and are therefore highly dependent on year-round proximity to reliable food sources (Ref 149). The maintenance of supporting habitats and processes to ensure the provision of prey species for marine mammals is therefore a key consideration in maintaining the favourable conservation status of the individual species.

22.8.71 The sensitivity of the receptor for all marine mammal species present (including European Otter) within the Proposed Offshore Scheme has been assessed as low. Animals hunt over wider areas of the North Sea for prey species and are therefore tolerant of small-scale changes to prey availability such as that caused by a localised disturbance. Whilst harbour porpoise (the designated feature of the Southern North Sea SAC) are highly dependent on year-round proximity to reliable food sources, the Southern North Sea SAC covers a large expanse (36,951km^2). Harbour porpoise move freely throughout the site in their search for prey. Density data illustrated in **Figure 22.4** of this PEIR shows that expected abundance of animals within the Draft Order Limits is 0.75 – 1.25 animals per km^2 during the summer months and during the winter months. The Proposed Offshore Scheme avoids the higher density areas within the SAC, located further offshore around the Dogger Bank, demonstrating that whilst harbour porpoise are present, there are other areas within the SAC (and outside i.e. offshore of Flamborough Head) which act as preferred foraging areas.

22.8.72 The magnitude of the impact for all marine mammal's species presents within the Proposed Offshore Scheme has been assessed as low. The worst-case footprint for temporary and permanent habitat loss is predicted to be 5.46km^2 during construction for the entirety of UK waters. **Table 22.22** presents calculations for the area of seabed disturbed by the Proposed Offshore Scheme within the Southern North Sea SAC.

Table 22.22: Calculation of seabed disturbance effects in Southern North Sea SAC

SAC Grounds	Winter Area	Summer Area
Total Area of ground (km^2)	12,969	27,028
Distance of Proposed Offshore Scheme within Ground (km)	86.1	50.9
Total Area Affected by seabed disturbance (km^2)	2.6	1.5
% of ground affected	0.02%	0.005%

22.8.73 **Chapter 20 Fish and Shellfish** of this PEIR assessed several impacts on fish and shellfish including temporary and permanent habitat loss, temporary increases and deposition of suspended sediments, underwater noise changes, temperature increases and electromagnetic changes. The preliminary assessment concluded that the Proposed Offshore Scheme would not have a significant adverse effect on fish and shellfish ecology. No impact on stock recruitment is predicted and therefore there is no effects predicted on the availability or distribution of prey species.

22.8.74 Intermittent and temporary behavioural impacts may be observed in a small portion of the population if animals avoid the Proposed Offshore Scheme during construction activity, but as they already use wide foraging areas, survival of individuals and reproduction rates would not be affected.

22.8.75 The assessment concluded that the significance of the effect was **Negligible** and **Not Significant.**

Transboundary effects: changes in prey availability

22.8.76 Transboundary effects are defined as any impacts from construction of the Proposed Scheme occurring beyond the European Economic Area. This assessment considers two scenarios. Firstly, that mobile animals from other European Economic Areas that routinely use UK waters for feeding, may be displaced due to a decrease in prey in UK waters. Secondly, animals from UK waters may be displaced to European Economic Areas because of a decrease in prey in UK waters. The displacement of cetaceans to transboundary sites can influence the amount of prey and competition. This can lead to mortality in harbour porpoises due to their high metabolism and need to forage constantly.

22.8.77 **Chapter 20 Fish and Shellfish** of this PEIR assessed several impacts on fish and shellfish including temporary and permanent habitat loss, temporary increases and deposition of suspended sediments, underwater noise changes, temperature increases and electromagnetic changes. The preliminary assessment concluded that the Proposed Offshore Scheme would not have a significant adverse effect on fish and shellfish ecology. No impact on stock recruitment is predicted and therefore there is no effect predicted on the availability or distribution of prey species.

22.8.78 As there is no impact predicted on prey species, the overall significance of the effect has been assessed as **Negligible** and **Not significant.**

Operation

Electromagnetic changes

22.8.79 During the operation of a HVDC Submarine cable electromagnetic fields (EMFs) are generated. To inform the assessment, calculations were undertaken to predict the EMF emissions. The calculations are presented in **Appendix 2.3 Electromagnetic Field Assessment** of this PEIR. They show that for bundled

HVDC poles the magnetic field generated by the cables dissipates to below background geomagnetic levels (49μT) within 20m, when cables are buried at 1m below the seabed. The magnetic field directly above the cables at the seabed is 99.3μT (or 51.9μT without the earth's magnetic field).

22.8.80 The effects of EMF to marine mammals are not fully understood, and there is not enough research into this subject matter. It is acknowledged that cetaceans use magnetic cues, such as the earth's geomagnetic field, to navigate. The mechanism for how this is achieved is still unknown (Ref 143). Gillet et al., (Ref 144) reports that there have been no impacts to the migration of cetaceans over existing interconnector cables and Walker et al., (Ref 145) notes that harbour porpoise migration across the Basslink has been observed unhindered despite several crossings of operating subsea HVDC Submarine cables. Given the rapid attenuation of the magnetic field, the lack of evidence of effects on cetaceans, and the predominantly pelagic existence resulting in separation with the change in field, cetaceans have a low likelihood of being affected by EMF.

22.8.81 The sensitivity of cetaceans and pinnipeds has been assessed as negligible since there is an overall lack of evidence that EMF affects cetaceans at all, there is currently no evidence of pinnipeds using Earth's magnetic field for navigation, so there is no expected impact on seal species.

22.8.82 The magnitude of EMF is negligible as bundled, buried cables result in the lowest electromagnetic change possible for the Proposed Offshore Scheme. The significance of the effect on all receptors has been assessed as **Negligible** and **Not Significant.**

Underwater noise changes (UK and transboundary)

22.8.83 During operation there will be periodic geophysical surveys and the potential for use of vessels and equipment for cable repairs or remediation work. The assessments provided above for construction are relevant and directly applicable for the operation phase, albeit with a slightly lower magnitude of impact given the lower frequency of marine activities during construction. The significance of underwater noise effects during operation are assessed as **Minor** and **Not Significant** with the implementation of Commitment Reference OC13.

Change in prey availability (UK and transboundary)

22.8.84 During operation, there will be periodic geophysical surveys, and the potential for cable maintenance activities such as deposit of additional cable protection where sufficient burial is not possible. As described in **paragraphs 22.8.64** to **22.8.75** activities that lead to temporary habitat loss or permanent habitat loss affect seabed habitats which in turn could affect the availability of prey. Other impacts on prey species such as underwater noise, temporary increase and deposition of suspended sediments and sediment heat changes could also combine with temporary and permanent habitat loss to lead to a change in prey availability.

22.8.85 **Chapter 20 Fish and Shellfish** of this PEIR assessed several impacts on fish and shellfish including temporary and permanent habitat loss, temporary increases and deposition of suspended sediments, underwater noise changes, temperature increases and electromagnetic changes. The preliminary assessment concluded that the Proposed Offshore Scheme would not have a significant adverse effect on fish and shellfish ecology. No impact on stock recruitment is predicted and therefore there is no effects predicted on the availability or distribution of prey species.

22.8.86 Intermittent and temporary behavioural impacts may be observed in a small portion of the population if animals avoid the Proposed Offshore Scheme during marine works in the operational phase, but as they already use wide foraging areas, survival of individuals and reproduction rates would not be affected. There would be no displacement of animals to other European Economic Areas and mobile animals from other states would not be affected in UK waters.

22.8.87 The assessment concluded that the significance of the effect was **Negligible** and **Not Significant.**

Collision with project vessels

22.8.88 Vessels would be used throughout the lifecycle of Proposed Offshore Scheme. During operation, the use of vessels would be reduced significantly to periodic inspection surveys, sporadic maintenance or repair works on an 'as needed' basis.

22.8.89 Whilst marine mammals have a sensitivity of medium, noting that sensitivity is species dependent with some species more likely to approach vessels than others. The magnitude of the impact would be reduced relative to during construction, due to the lower level of vessel use and the sporadic nature of the activities. Commitment measure reference OC14 would still apply during operation and as such the magnitude of the impact during operation has been assessed as negligible.

22.8.90 Avoidance behaviour may be exhibited by a small number of individuals, but due to the temporary and transient nature of the project vessels, the risk of collision is very minor, and the survival rates and reproduction rates for the various cetacean and pinniped populations will not be impacted.

22.8.91 Overall, the significance of the effect during construction has been assessed as **Negligible** and **Not Significant.**

Decommissioning

22.8.92 The Proposed Scheme is expected to have a life span of 40 years. If decommissioning requires cessation of operation and removal of visible infrastructure at this point, then activities and effects associated with the decommissioning phase are expected to be no worse than during construction; and with the removal of visible infrastructure, effects would reduce over the

course of that period. The Proposed Scheme could also remain operational for a period after the 40 years or be taken out of service and left within the Draft Order Limits after 40 years. Acknowledging the complexities of completing a detailed assessment for decommissioning works up to 40 years in the future, based on the information available, the project has concluded that impacts from decommissioning would be no greater than those during the construction phase. The following conclusions reached for construction are therefore applicable:

a. Underwater noise changes from geophysical survey: **Not Significant**.
b. Underwater noise changes from vessels and equipment (UK and transboundary): **Minor** and **Not Significant**.
c. Changes in prey availability (UK and transboundary): **Negligible** and **Not Significant**.
d. Collision with vessels: **Negligible** and **Not Significant**.

22.9 Mitigation and monitoring

22.9.1 Mitigation measures are defined in **Chapter 5 EIA Approach and Methodology** of this PEIR, with embedded control measures for marine mammals being presented in **Section 22.7** of this chapter.

Additional mitigation

22.9.2 The preliminary environmental assessment has concluded that the Proposed Offshore Scheme will not have any significant effects that would require additional mitigation. However, it is acknowledged that there is the potential that underwater noise changes from geophysical survey, specifically the use of a SBP, has the potential for a cumulative effect with other marine developments.

22.9.3 With respect to UXO clearance, a separate Marine Licence would be applied for once locations and details of confirmed UXO are known. Activities associated with the lift and shift of any confirmed UXO are to be included in the application for development consent. The Marine Licence application would be accompanied by specific environmental assessments. Mitigation in line with the 2025 UK Guidance "*Supporting minimising environmental impacts from unexploded ordnance clearance"* would be agreed with the relevant SNCB and the MMO prior to application submission.

Cumulative assessment

22.9.4 A cumulative assessment has not been undertaken at this stage. However, **Chapter 28 Cumulative Effects** of this PEIR presents the long and short lists of 'other developments' which will be considered at the ES stage, and the methodology which allowed for the identification of these other developments, to allow consultation bodies to form a view and provide comment on the other developments included. The long-list will be reviewed and if necessary, updated, in the lead up to the ES, as the Proposed Scheme design further evolves and in response to any comments raised at statutory consultation.

22.9.5 If the cumulative assessment identifies the need for further mitigation this may take the form of coordination of activities with other developers e.g., through the Southern North Sea Noise Forum, or timing restrictions on SBP activities.

Monitoring

22.9.6 The significant adverse effects identified by the preliminary assessment relate to underwater noise changes from UXO clearance. This assessment has been provided for information only, at the request of the Statutory Nature Conservation Bodies, and is not an activity to be consented through the application for development consent. It is possible that monitoring may be required for this activity, but this would be agreed with the MMO, JNCC and NE through a separate Marine Licence.

22.9.7 There are no likely significant adverse effects related to the marine mammal assessment identified either during construction, operation and maintenance, or decommissioning stages of the Proposed Offshore Scheme that require monitoring.

22.10 Summary of residual effects

22.10.1 The preliminary assessment has concluded that no significant effects on marine mammals are expected from the Proposed Offshore Scheme to be consented under the Development Consent Order alone during construction, operation, maintenance and decommissioning, provided design and control measures are implemented. No additional mitigation has been proposed at this stage.

Topic Abbreviations

Term	Definition
CEMP	Construction Environmental Management Plan
CGNS	Celtic and Greater North Sea
CODA	Cetaceans Offshore Distribution and Abundance in the European Atlantic
DCO	Development Consent Order
DML	Deemed Marine Licence
EDR	Effective deterrence range
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EPS	European Protected Species
ES	Environmental Statement
ESRP	Emergency Spill Response Plan
HF	High Frequency
HRA	Habitats Regulations Assessment
HVDC	High Voltage Direct Current
ICES	International Council for the Exploration of the Seas
IUCN	International Union for Conservation of Nature and Natural Resources
JNCC	Joint Nature Conservation Committee
Kg	Kilogram
kHz	Kilo Hertz
Km	Kilometre
LF	Low Frequency
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-beam echosounder
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
MMMP	Marine Mammal Mitigation Plan
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
MU	Management Unit
NE	Natural England
NERC	Natural Environment and Rural Communities

Term	Definition
NM	Nautical Mile
NPS	National Policy Statement
NSMU	Greater North Sea MU
OSPAR	Convention for the Protection of the Marine Environment of the Northeast Atlantic
PCA	Phocid Carnivores in Air
PCW	Phocid Carnivores in Water
PEIR	Preliminary Environmental Information Report
PLGR	Pre-Lay grapnel run
POPs	Persistent Organic Pollutants
PTS	Permanent threshold shift
SAC	Special Area of Conservation
SBP	Sub-bottom profiler
SCANS	Small Cetacean Abundance in the North Sea and Adjacent Waters surveys
SMU	Seal Management Unit
SNCB	Statutory Nature Conservation Bodies
SNS	Southern North Sea
SSS	Side scan sonar
TTS	Temporary threshold shift
VHF	Very High Frequency
UK	United Kingdom
USBL	Ultra short baseline
UXO	Unexploded Ordnance

References

Ref 1 Gov.uk (1981) Wildlife and Countryside Act 1981. (Online) Available at: https://www.legislation.gov.uk/ukpga/1981/69 (Accessed November 2024)

Ref 2 Gov.uk (2017) The Conservation of Habitats and Species Regulations 2017. (Online) Available at: https://www.legislation.gov.uk/uksi/2017/1012 (Accessed November 2024)

Ref 3 Gov.uk (2017) The Conservation of Offshore Marine Habitats and Species Regulations 2017. (Online) Available at: https://www.legislation.gov.uk/uksi/2017/1013/contents (Accessed November 2024)

Ref 4 Gov.uk (1970) Conservation of Seals Act 1970. (Online) Available at: https://www.legislation.gov.uk/ukpga/1970/30 (Accessed November 2024)

Ref 5 NERC Act (2006), Natural Environment and Rural Communities Act 2006, (Online) Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents (Accessed March 2025)

Ref 6 Gov.uk (2008) Planning Act 2008. (Online) Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents (Accessed March 2025)

Ref 7 Gov.UK (2017) The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. (Online) Available at: https://www.legislation.gov.uk/uksi/2017/572/contents https://www.legislation.gov.uk/uksi/2017/572/contents (Accessed March 2025)

Ref 8 Gov.uk (2009) Marine and Coastal Access Act 2009. (Online) Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents (Accessed March 2025)

Ref 9 Gov.UK (2007) The Marine Works (Environmental Impact Assessment) Regulations 2007. (Online) Available at: https://www.legislation.gov.uk/uksi/2007/1518/contents/made (Accessed March 2025)

Ref 10 National Grid (2024) LionLink Environmental Impact Assessment Scoping Report Volume 1 Main Text. (Online) Available at: https://national-infrastructure-consenting.planninginspectorate.gov.uk/projects/EN020033/documents (Accessed 28 May 2025)

Ref 11 Proposed LionLink Multi-purpose Interconnector (Online) Available at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020033-000103-LION%20-%20Scoping%20Opinion.pdf (Accessed 11 August 2025)

Ref 12 National Infrastructure consenting planning inspectorate (2024) LionLink Interconnector Documents. (Online) Available at: https://national-infrastructure-

consenting.planninginspectorate.gov.uk/projects/EN020033/documents (Accessed 11 August 2025)

Ref 13 LionLink Multi-Purpose Interconnector (August 2023) Interim Non-Statutory Consultation Feedback Summary Report. (Online) Available at: https://www.nationalgrid.com/national-grid-ventures/lionlink/library#230548828-3684997351 (Accessed 1st July 2025)

Ref 14 LionLink (March 2024) Supplementary Non-Statutory Consultation Summary Report. Available at: https://www.nationalgrid.com/national-grid-ventures/lionlink/library#230548828-3684997351 (Accessed 1st July 2025)

Ref 15 DESNZ (2013) Overarching National Policy Statement for Energy (EN-1). (Online) Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf (Accessed 17 September 2024)

Ref 16 DESNZ (2023), National Policy Statement for Renewable Energy Infrastructure (EN-3). (Online) Available at: https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf (Accessed 17 September 2024)

Ref 17 Gov.UK (2011) UK Marine policy Statement. (Online) Available at: https://www.gov.uk/government/publications/uk-marine-policy-statement (Accessed January 2025)

Ref 18 Carter, M.I.D., Boehme, L., Cronin, M.A., Duck, C.D., Grecian, W.J., Hastie, G.D. et al., (2022). Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management. Frontiers in Marine Science, 9

Ref 19 SCOS (2022) Scientific Advice on Matters Related to the Management of Seal Populations: 2022. (Online) Available at: http://www.smru.st-andrews.ac.uk/files/2023/09/SCOS-2022.pdf

Ref 20 DECC (2022), UK Offshore Energy Strategic Environmental Assessment 4 (OESEA4), (Online) Available at: https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-4-oesea4 (Accessed March 2025)

Ref 21 The Environment Agency Crawford (2010), Otter Survey: (Online) Available at: https://ptes.org/wp-content/uploads/2015/06/National-Otter-Survey.pdf (Accessed May 2025)

Ref 22 NatureScot (2023) Guidance Notes: Guidance to support Offshore Wind Applications: Marine Ornithology (Online) Available at. https://www.nature.scot/professional-advice/planning-and-development/planning-anddevelopment-advice/renewable-energy/marine-renewables/advice-marine-renewables-development . (Accessed March 2023.)

Ref 23 NPWS (2015) National Parks & Wildlife Service, Otter (Lutra lutra), (Online) Available at: https://www.npws.ie/research-projects/animal-species/mammals. (Accessed July 2025)

Ref 24 OAP (2022) Seal Abundance and Distribution. (Online) Available at: https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-mammals/seal-abundance-and-distribution/. (Accessed July 2025)

Ref 25 IAMMWG. (2023). Review of Management Unit boundaries for cetaceans in UK waters (2023). JNCC Report 734, JNCC, Peterborough, ISSN 0963-8091. (Online) Available at: https://hub.jncc.gov.uk/assets/b48b8332-349f-4358-b080-b4506384f4f7 (Accessed January 2025)

Ref 26 JNCC (2019) Marine Protected Area Advice. (Online) Available at: https://jncc.gov.uk/our-work/southern-north-sea-mpa/#activities-and-management (Accessed January 2025)

Ref 27 NBN Atlas (2025) National Biodiversity Network (NBN) Atlas records. (Online) Available at: NBN Atlas - UK's largest collection of biodiversity information (Accessed December 2024)

Ref 28 Reid et al. (2003) 2003 Atlas of Cetacean Distribution in North-West European Waters. Joint Nature Conservation Committee. Marine Mammal Monthly Distribution Maps. Available at: Sea Watch Foundation » Species Distribution Maps (Accessed December 2024)

Ref 29 Hammond et al. (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. (Online) Available at: https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf (Accessed January 2025)

Ref 30 Gilles et al. (2023) Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023. 64 pp. (Online) Available at: https://tinyurl.com/3ynt6swa (Accessed January 2025)

Ref 31 Scottish Power Renewables (2015). East Anglia THREE Offshore Wind Farm Environmental Statement: Chapter 12 Marine Mammals, Volume 3, Appendices 12.1 – 12.4 (Online) Available at: https://www.scottishpowerrenewables.com/pages/east_anglia_three_document_library.aspx (Accessed July 2025)

Ref 32 ICES (2022) ICES Data, (Online) available at: https://cetaceans.ices.dk/dashboard (Accessed July 2025)

Ref 33 Waggitt et al. (2019) Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57:253-269.

Ref 34 Heinänen and Skov (2015) The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No. 544, JNCC, Peterborough, ISSN 0963-809. (Online) Available at: https://hub.jncc.gov.uk/assets/f7450390-9a89-4986-8389-9bff5ea1978a (Accessed January 2025)

Ref 35 Carter et al. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78. (Online) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf (Accessed January 2025)

Ref 36 National Marine Fisheries Service (2018) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) Underwater Thresholds for Onset of permanent and Temporary Threshold Shifts. (Online) Available at: 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Accessed January 2025)

Ref 37 NMFS. (2024) 2024 Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0). NOAA Technical Memorandum NMFS-OPR-71. (Online) Available at: 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Accessed January 2025)

Ref 38 Southall et al (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals. (Online) Available at: Southall-et-al_2019_MM-Noise-critieria-update-with-errata_Aq-Mammals.pdf (Accessed January 2025)

Ref 39 Southall et al (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise. Available at: (PDF) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioral Responses to Human Noise (Accessed January 2025)

Ref 40 JNCC (2010) JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys, August 2010, available at: JNCC Seismic Guidelines

Ref 41 MarLIN (2022), Short-beaked common dolphin (*Delphinus delphis*), (Online) Available at: https://www.marlin.ac.uk/species/detail/2082 (Accessed 7 July 2025)

Ref 42 Kessler (2021), Stomach contents of common dolphins (Delphinus delphis) and striped dolphins (Stenella coeruleoalba) in Scottish waters between 1992 and 2011, CSIC, (Online) Available at: https://www.researchgate.net/profile/Lucie-

Kessler/publication/350811297_Stomach_contents_of_common_dolphins_Delphinus_delphis_and_striped_dolphins_Stenella_coeruleoalba_in_Scottish_waters_between_1992_and_2011/links/60742c06a6fdcc5f779d0765/Stomach-contents-of-common-dolphins-Delphinus-delphis-and-striped-dolphins-Stenella-coeruleoalba-in-Scottish-waters-between-1992-and-2011.pdf (Accessed July 2025)

Ref 43 Murphy, S., Pinn, E.H. and Jepson, P.D. (2013). The short-beaked common dolphin (Delphinus delphis) in the North-East Atlantic: Distribution, ecology, management and conservation status. Oceanography and Marine Biology: An Annual Review, 51: 193-280.

Ref 44 Neumann, D.R. (2001). Seasonal movements of short-beaked common dolphins (*Delphinus delphis*) in the north-western Bay of Plenty, New Zealand: Influence of sea surface temperature and El Niño/La Niña. *New Zealand Journal of Marine and Freshwater Research*, 35(2): 371-374.

Ref 45 MacLeod C.D., Weir C.R., Santos M.B. and Dunn T.E. (2008) Temperature-based summer habitat partitioning between white-beaked and common dolphins around the United Kingdom and Republic of Ireland. Journal of the Marine Biological Association of the United Kingdom 88, 1193– 1198

Ref 46 JNCC (2020) Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). (Online) Available at: https://assets.publishing.service.gov.uk/media/5ed7ba3c86650c76ab17fcc5/SACNoiseGuidanceJune2020.pdf (Accessed January 2025)

Ref 47 JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf [Accessed January 2025]

Ref 48 JNCC (2025) JNCC, January 2025, (Online) Available at: https://hub.jncc.gov.uk/assets/cbd480f1-47ea-4d78-b94c-04e0f9389daa (Accessed January 2025)

Ref 49 Gov.UK (2025), 3.1.1, Injury to Marine mammals, Available at: Supporting minimising environmental impacts from unexploded ordnance clearance - GOV.UK

Ref 50 JNCC (2019) Harbour Porpoise (Phocoena phocoena) Special Area of Conservation: Southern North Sea Conservation Objectives and Advice on Operations. Available at: Southern North Sea MPA: Conservation Objectives And Advice On Operations [Accessed January 2025]

Ref 51 IAMMWG (2022) Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680 (Revised March 2022), JNCC Peterborough, ISSN 0963- 8091. (Online) Available at: Updated abundance estimates for

cetacean Management Units in UK waters (Revised 2022) [Accessed January 2025]

Ref 52 Williamson et al. (2017) Echolocation detections and digital video surveys provide reliable estimates of the relative density of harbour porpoises. DRYAD. Available at: https://datadryad.org/dataset/doi:10.5061/dryad.cf04g (Accessed August 2024)

Ref 53 JNCC (2015) A Conservation Literature Review for the Harbour Porpoise (Phocoena phocoena), JNCC Report No: 566, December 2015, IAMMWG, Camphuysen, C.J. & Siemensma, M.L, Available at: A Conservation Literature Review for the Harbour Porpoise (Phocoena phocoena)

Ref 54 Kastelein, R.A., Hardman, J. and Boer, H. (1997). Food consumption and body weight of harbour porpoises (*Phocoena phocoena*). In: The Biology of the Harbour Porpoise (Read, A.J., Wiepkema, P.R. and Nachtigall, P.E. Eds.). De Spil Publishers, pp. 217-233.

Ref 55 Lockyer, C.H., Desportes, G., Hansen, K., Labberté, S. and Siebert, U. (2003). Monitoring growth and energy utilisation of the harbour porpoise (*Phocoena phocoena*) in human care. NAMMCO Scientific Publications 5, 107-120.

Ref 56 Mahfouz, C., Meziane, T., Henry, F., Abi-Ghanem, C., Spitz, J., Jauniaux, T., Bouveroux, T., Khalaf, G. and Amara, R. (2017). Multi-approach analysis to assess diet of harbour porpoises *Phocoena phocoena* in the southern North Sea. *Marine Ecology Progress Series*, 563: 249-259.

Ref 57 Jennifer, A., Learmonth, S., Murphy, P., Lastra, L., Robert, J.R (2014) Life history of harbour porpoises (Phocoena phocoena) in Scottish (UK) waters, April 2014 Marine Mammal Science, (Online) Available at: (PDF) Life history of harbor porpoises (Phocoena phocoena) in Scottish (UK) waters

Ref 58 Weir, C.R., Stockin, K.A. and Pierce, G.J. (2007). Spatial and temporal trends in the distribution of harbour porpoises, white-beaked dolphins and minke whales off Aberdeenshire (UK), north-western North Sea. *Journal of the Marine Biological Association of the United Kingdom*, 87: 327-338.

Ref 59 Isojunno, S., Matthiopoulos, J. and Evans, P.G.H. (2012). Harbour porpoise habitat preferences: robust spatio-temporal inferences from opportunistic data. *Marine Ecology Progress Series*, 448: 155-170.

Ref 60 Booth, C.G., Embling, C., Gordon, J., Calderan, S.V. and Hammond, P.S. (2013). Habitat preferences and distribution of harbour porpoise (*Phocoena phocoena*) west of Scotland. *Marine Ecology Progress Series*, 478: 273-285.

Ref 61 East Anglia ONE North Windfarm (2019) East Anglia ONE North Windfarm Chapter 11 Marine Mammals: Preliminary Environmental Information Report Volume 1.

Ref 62 Norfolk Vanguard Limited (2018). Norfolk Vanguard Offshore Wind Farm Chapter 12 Marine Mammals: Environmental Statement Volume 1.

Ref 63 Norfolk Boreas Limited (2018) Norfolk Boreas Offshore Wind Farm Chapter 12 Marine Mammals: Preliminary Environmental Information Report Volume 1.

Ref 64 Five Estuaries Offshore Wind Farm Ltd (2024). Five Estuaries Offshore Wind Farm Environmental Statement Volume 6, Part 5, Annex 4.12: Digital Video Aerial Surveys of Seabirds and Marine Mammals at VE Annual Report March 2019 to February 2021. (Online) Available at: EN010115-000276-6.5.4.12 Digital Video Aerial Surveys of Seabirds and Marine mammals at VE Annual Report March 2019 to February 2021.pdf [Accessed November 2024]

Ref 65 Sea Watch (2025) Recent sightings Eastern England. Available at: https://www.seawatchfoundation.org.uk/recentsightings/?region_id=10-14%5b(Accessed January 2025)

Ref 66 Hammond et al. (2013). Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. Biological Conservation (164). Pages 107 – 122. St Andrews, UK. (Online) Available at: https://doi.org/10.1016/j.biocon.2013.04.010 (Accessed July 2025)

Ref 67 MarLIN (2022). Species list Bottle-nosed dolphin (Tursiops truncatus). (Online) Available at: https://www.marlin.ac.uk/species/detail/1674 (Accessed July 2025)

Ref 68 New et al. (2013). Modelling the biological significance of behavioural change in coastal bottlenose dolphins in response to disturbance. Functional Ecology 27(2). Pages 314-322. (Online) Available at: https://doi.org/10.1111/1365-2435.12052 (Accessed July 2025)

Ref 69 Robinson et al. (2007). The summer distribution and occurrence of cetaceans in the coastal waters of the outer southern Moray Firth in northeast Scotland (UK). Available at: Lutra 50(1)_Robinson et al_2007.pdf [Accessed January 2025]

Ref 70 Weir and Stockin (2001). The occurrence and distribution of bottlenose dolphins (Tursiops truncatus) and other cetacean species in the coastal waters of Aberdeenshire, Scotland. Available at: Proposal for a study into the distribution and occurrence of the bottlenose dolphin Tursiops truncatus in the coastal waters of Aberdeenshire [Accessed January 2025]

Ref 71 Pinn. E, Mitchell. I and Hawkridge. J (2018). Abundance and distribution of coastal bottlenose dolphins. UK Marine Online Assessment Tool, (Online) available at: https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/cetaceans/abundance-and-distribution-of-coastal-bottlenose-dolphins/ (Accessed July 2025)

Ref 72 Reid. J.B, Evans. P.G.H and Northridge. S.P (2003). Atlas of Cetacean distribution in north-west European waters. Joint Nature Conservation Committee,

Peterborough. (Online) Available at: Atlas of Cetacean distribution in north-west European waters (Accessed January 2025)

Ref 73 IAMMWG. (2023). Review of Management Unit boundaries for cetaceans in UK waters (2023). JNCC Report 734, JNCC, Peterborough, ISSN 0963-8091. (Online) Available at: https://hub.jncc.gov.uk/assets/b48b8332-349f-4358-b080-b4506384f4f7 (Accessed July 2025)

Ref 74 Canning et al (2008), Seasonal distribution of white-beaked dolphins (Lagenorhynchus albirostris) in UK waters with new information on diet and habitat use, (Online) available at: Seasonal distribution of white-beaked dolphins (Lagenorhynchus albirostris) in UK waters with new information on diet and habitat use (Accessed July 2025)

Ref 75 Ijsseldijk, L., Brownlow, A., Davison, N., Deaville, R., Haelters, J., Keijl, G., Siebert, U. & ten Doeschate, M. 2018. Spatiotemporal trends in white-beaked dolphin strandings along the North Sea coast from 1991–2017. Lutra, 61(1), 153–163.

Ref 76 JNCC (2023) Southern North Sea MPA. (Online) Available at: https://jncc.gov.uk/our-work/southern-north-sea-mpa/#:~:text=The%20Southern%20North%20Sea%20SAC%20lies%20along%20the%20east%20coast,of%20harbour%20porpoise%20Phocoena%20phocoena (Accessed July 2025)

Ref 77 Risch, D., Castellote, M., Clark, C.W., Davis, G.E., Dugan, P.J., Hodge, L.E.W., Kumar, A., Lucke, K., Mellinger, D.K., Nieukirk, S.L., Popescu, C.M., Ramp, C., Read, A.J., Rice, A.N., Silva, M.A., Siebert, U., Stafford, K.M., Verdaat, H. and Van Parijs, S.M. (2014). Seasonal migrations of North Atlantic minke whales: novel insights from large-scale passive acoustic monitoring networks. Movement Ecology, 2: 24

Ref 78 Robinson, K.P., Eisfeld, S.M., Costa, M. and Simmonds, M.P. (2010). Short-beaked common dolphin (*Delphinus delphis*) occurrence in the Moray Firth, North East Scotland. *Marine Biodiversity Records*, 3: e55.

Ref 79 Stone, C.J. (2015). Marine mammal observations during seismic surveys from 1994-2010. JNCC Report 463a. JNCC, Peterborough.

Ref 80 Hackett, K. (2022). Movement and ecology of bottlenose dolphins (*Tursiops truncutus*) along the North-East coast of the UK. A dissertation submitted in partial fulfilment of the requirements for the degree of Master of Science (MSc) in Marine Biology. Bangor University, Gwynedd, UK.

Ref 81 Sea Watch Foundation. (2012). Cetaceans of Eastern England. The Sea Watch Foundation, Oxford, England.

Ref 82 Fleming, A. and Jackson, J. (2011). Global review of humpback whales (*Megaptera novaeangliae*). NOAA Technical Memorandum NMFS. NOAA-TM-NMFS-SWFSC-474.

Ref 83 Snell, M., Baillie, A., Berrow, S., Deaville, R., Penrose, R., Perkins, M., Williams, R. and Simmonds, M.P. (2023). An investigation into the effects of climate change on baleen whale distribution in the British Isles. *Marine Pollution Bulletin*, 187: 114565.

Ref 84 Leopold, M.F., Rotshuizen, E. and Evans, P.G.H. (2018). From nought to 100 in no time: how humpback whales (*Megaptera novaeangliae*) came into the southern North Sea. *Lutra*, 61(1): 165-188.

Ref 85 Berrow, S. and Whooley, P. (2022). Managing a dynamic North Sea in light of its ecological dynamics: Increasing occurrence of large baleen whales in the southern North Sea. *Journal of Sea Research*, 182: 102186.

Ref 86 Sea Watch Foundation. (2012). Cetaceans of Eastern England. The Sea Watch Foundation, Oxford, England.

Ref 87 Jourdain *et al*., (2019), North Atlantic killer whale *Orcinus orca* populations: a review of current knowledge and threats to conservation, Mammal Review, 12 September 2019, (Online) Available at: https://doi.org/10.1111/mam.12168 (Accessed July 2025)

Ref 88 Sea Watch Foundation (2012), Killer whale sightings Sea Watch Foundation » Recent sightings

Ref 89 Rowley, S.J. (2005). *Grampus griseus* Risso's dolphin. In Tyler-Walters H. and Hiscock K. *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 28-05-2025]. (Online) Available from: https://www.marlin.ac.uk/species/detail/2134 (Accessed July 2025)

Ref 90 Barnes, M.K.S. (2008). *Lagenorhynchus acutus* Atlantic white-sided dolphin. In Tyler-Walters H. and Hiscock K. *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 28-05-2025]. (Online) Available from: https://www.marlin.ac.uk/species/detail/116 (Accessed July 2025)

Ref 91 Rogan, E., Cañadas, A., Macleod, K., Santos, M.B., Mikkelsen, B., Uriate, A., Van Canneyt, O., Vázquez, J.A. and Hammond, P.S. (2017). Distribution, abundance and habitat use of deep diving cetaceans in the North-East Atlantic. *Deep Sea Research Part II: Tropical Studies in Oceanography,* 141: 8-19.

Ref 92 JNCC (2024). The Wash and North Norfolk Coast Designated Special Area of Conservation. (Online) Available at: https://sac.jncc.gov.uk/site/UK0017075 (Accessed January 2025)

Ref 93 JNCC (2024). 1364 Grey Seal *Halichoerus grypus*. (Online) Available at: https://sac.jncc.gov.uk/species/S1364/ (Accessed January 2025)

Ref 94 JNCC (2015). Natura 2000 – Standard Data Form The Wash and North Norfolk Coast (UK0017075). Available at: UK0017075.pdf [Accessed January 2025]

Ref 95 HM Government (2012). Marine online assessment tool. Changes in the abundance and distribution of seals. (Online) Available at: Seal abundance and distribution - Marine online assessment tool [Accessed January 2025].

Ref 96 SMRU (2022). Scientific Advice on Matters Related to the Management of Seal Populations: 2022 Natural Environment Research Council Special Committee on Seals. Available at: Scientific Advice on Matters Related to the Management of Seal Populations: 2022 [Accessed January 2025]

Ref 97 Morris, C.D., Duck, C.D., and Thompson, D. (2021). Aerial surveys of seals in Scotland during the harbour seal moult, 2016-2019. NatureScot Research Report 1256.

Ref 98 Scientific Advice on Matters Related to the Management of Seal Populations: (2021). Natural Environment Research Council Special Committee on Seals. Available at: http://www.smru.st-andrews.ac.uk/scos (Accessed 14 April 2023)

Ref 99 Sharples, R.J., Moss, S.E., Patterson, T.A. and Hammond, P.S. (2012). Spatial variation in foraging behaviour of a marine top predator (*Phoca vitulina*) determined by a large scale satellite tagging program. *PLoS One*, 7(5): e37216.

Ref 100 Royal HaskoningDHV (2019). East Anglia TWO Offshore Windfarm Appendix 11.2 Marine Mammal Information and Survey Report Environmental Statement Volume 3. Available at: Title [Accessed January 2025]

Ref 101 Royal HaskoningDHV (2019) East Anglia ONE North Offshore Windfarm Appendix 11.2 Marine Mammal Information and Survey Report Environmental Statement Volume 3. (Online) Available at: Title [Accessed January 2025]

Ref 102 Royal HaskoningDHV (2018) Norfolk Vanguard Offshore Wind Farm Appendix 12.1 Marine Mammal Survey Report Environmental Statement Volume 3 – Appendices. (Online) Available at: EN010079-001541-Appendix 12.01 Marine Mammal Survey Data.pdf [Accessed January 2025]

Ref 103 JNCC (2022b) Distribution of SACs/SCIs/cSACs containing species 1355 Lutra lutra. Available at: https://sac.jncc.gov.uk/species/S1355/map

Ref 104 NatureScot, 2024, Otter, Scotland is a European stronghold for the otter, a species of the land, river and sea, 16/08/2024 (Online) Available at: https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otter (Accessed July 2025)

Ref 105JNCC (2018). European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1364 - Grey seal (Halichoerus grypus). (Online) Available at: UK conservation status assessment for S1364 - Grey seal (Halichoerus grypus) as part of the Fourth

Report by the United Kingdom under Article 17 of the EU Habitats Directive [Accessed January 2025]

Ref 106 European Mammal Assessment team (2007). *Halichoerus grypus (Europe assessment). The IUCN Red List of Threatened Species* 2007: e.T9660A13006007. [Accessed January 2025]

Ref 107 Suffolk Coast Otter Project (2016). Suffolk Coast Otter Project Report June 2014 to March 2016 on work in progress. (Online) Available at: scop-report-2015-16.pdf [Accessed January 2025]

Ref 108 NBN Atlas (2025). Occurrence records *Lutra lutra*. (Online) Available at: Search: SPECIES: Lutra lutra - within user defined polygon | Occurrence records | NBN Atlas [Accessed January 2025]

Ref 109 NBN Atlas 2025, (Online) Available at: https://species.nbnatlas.org/species/NBNSYS0000005133 (Accessed July 2025)

Ref 110 Richard Woolnough, July 2016, Suffolk Coast Otter Project June 2014 to March 2016, Available at: scop-report-2015-16.pdf

Ref 111 IJsseldijk, L., Brownlow, A., Davison, N., Deaville, R., Haelters, J., Keijl, G., Siebert, U. and Ten Doeschate, M. (2018). Spatiotemporal trends in white-beaked dolphin strandings along the North Sea coast from 1991–2017. 61: 153-163.

Ref 112 Hughes S.L., N.P. Holliday, J. Kennedy, D.I. Berry, E.C. Kent, T. Sherwin, S. Dye, M. Inall, T. Shammon, and T. Smyth (2010) Temperature (Air and Sea) in MCCIP Annual Report Card 2010-11, MCCIP Science Review, (Online) Available at: www.mccip.org.uk/arc (Accessed 1st July)

Ref 113 MacLeod, C.D., Weir, C.R., Santos, M.B. and Dunn, T.E. (2008). Temperature-based summer habitat partitioning between white-beaked and common dolphins around the United Kingdom and Republic of Ireland. Journal of the Marine Biological Association of the United Kingdom 88(6): 1193-1198.

Ref 114 SCOS 2019, Scientific Advice on Matters Related to the Management of Seal Populations: 2019. Natural Environment Research Council Special Committee on Seals. (Online) Available at: https://www.smru.st-andrews.ac.uk/files/2020/08/SCOS-2019.pdf (Accessed 1st July)

Ref 115 SCOS. 2021. Scientific Advice on Matters Related to the Management of Seal Populations: (2021). Natural Environment Research Council Special Committee on Seals. (Online) Available at: http://www.smru.st-andrews.ac.uk/scos/ (Accessed July 2025)

Ref 116 Robinson, K.J., Hall, A.J., Scholl, G., Debier, C., Thome, J., Eppe, G., Adam, C. and Bennet, K.A. (2019) Investigating decadal changes in persistent organic pollutants in Scottish grey seal pups. Aquatic Conserv: Mar Freshw Ecosyst. 29(S1): 86– 100.

Ref 117 Northridge, S., Kingston, A. and Thomas, L. (2019). Annual report on the implementation of Council Regulation (EC) No 812/2004 during 2018.

Ref 118 Santos, M.B., and Pierce, G.J. (2003). The diet of harbour porpoise (Phocoena phocoena) in the Northeast Atlantic. Oceanography and Marine Biology: an Annual Review 2003, 41, 355–390.

Ref 119 IAMMWG. (2015). Management Units for cetaceans in UK waters. JNCC Report 547, ISSN 0963-8091.

Ref 120 Paxton, C.G.M., Scott-Hayward, L., Mackenzie, M., Rexstad, E. and Thomas L. (2016). Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resource. JNCC Report No.517

Ref 121 JNCC. (2019a). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. Conservation status assessment for the species: S1351 - Harbour porpoise (Phocoena phocoena).

Ref 122 Arso Civil, M., Quick, N. J., Cheney, B., Pirotta, E., Thompson, P. M. and Hammond, P. S. (2019). *Changing distribution of the east coast of Scotland bottlenose dolphin population and the challenges of area-based management.* Aquatic Conservation: Marine and Freshwater Ecosystems, 29(S1), 178–196. (Online) Available at: https://doi.org/10.1002/aqc.3102 (Accessed July 2025)

Ref 123 Arso Civil, M., Quick, N., Mews, S., Hague, E. Cheney, B.J., Thompson, P.M. and Hammond, P.S. (2021). Improving understanding of bottlenose dolphin movements along the east coast of Scotland. Final report. Report number SMRUC-VAT-2020-10 provided to European Offshore Wind Deployment Centre (EOWDC), March 2021 (unpublished).

Ref 124 JNCC. (2019b). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. Conservation status assessment for the species: S1349 - Bottlenose dolphin (Tursiops truncatus). Available at: https://jncc.gov.uk/jncc-assets/Art17/S1349-UK-Habitats-Directive-Art17-2019.pdf (Accessed 8th July 2025)

Ref 125 Northridge, S., Cargill, A., and Coram, A. (2010). Entanglement of Minke Whales in Scottish Waters; An Investigation into Occurrence, Causes and Mitigation. Final Report to Scottish Government, CR/2007/49. St Andrews: University of St Andrews, 57

Ref 126 Gill, A., Reid, R.J. and Fairburns, B.R. (2000). Photographic and strandings data highlighting the problem of marine debris and creel rope entanglement to minke whales (Balaenoptera acutorostrata). Eur Res Cetaceans 14:173–178.

Ref 127 Robinson, K.P., Tetley, M.J. & Mitchelson-Jacob, E.G. The distribution and habitat preference of coastally occurring minke whales (Balaenoptera acutorostrata) in the outer southern Moray Firth, northeast Scotland. J Coast Conserv 13, 39–48

(2009). (Online) Available at: https://doi.org/10.1007/s11852-009-0050-2 (Accessed July 2025)

Ref 128 OSPAR IA 2017, OSPAR Intermediate Assessment, JNCC, OSPAR Contracting Parties, 2012-2017, available at: intermediate-assessment-project-summary_edited.pdf

Ref 129 JNCC (2019d) Natura 2000 – Standard data form, Southern North Sea SAC. Joint Nature Conservation

Ref 130 JNCC (2019e). Article 17 Habitats Directive Report: Species Conservation Status Assessment 2019. Conservation status for the species: S2618 – Minke whale (Balaenoptera acutorostrata), Available at: https://jncc.gov.uk/jncc-assets/Art17/S2618-UK-Habitats-Directive-Art17-2019.pdf (Accessed 8th July 2025)

Ref 131 Marine Directorate 2019, Offshore wind energy – draft sectoral marine plan: habitat regulations appraisal, Scottish Government, Available at: 9 Potential for Adverse Effects on the Otter Feature - Offshore wind energy - draft sectoral marine plan: habitat regulations appraisal - gov.scot

Ref 132 JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). JNCC Report No. 654, JNCC, Peterborough, ISSN 0963-8091

Ref 133 ANSI 1986 and 2005, S12.7 (R2020) (Online) Available at: https://webstore.ansi.org/standards/asa/ansiasas121986r2020#:~:text=Its%20scope%20applies%20to%20all,standards%20based%20on%20the%20general (Accessed July 2025)

Ref 134 NIOSH 1998, Criteria for a recommended standard: Occupational Noise Exposure: Revised Criteria 1998, NIOS Numbered Publications, available at: Criteria for a Recommended Standard: Occupational Noise Exposure: Revised Criteria 1998

Ref 135 ANSI 1995, S12.2 (R1999), Criteria for Evaluating Room Noise, Acoustical Society of America, available at: ANSI S12.2-1995 (R1999) - Criteria for Evaluating Room Noise

Ref 136 Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P and Tyack, P.L. (2019). Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects. Aquatic Mammals 2019, 45(2) 125-232.

Ref 137 NMFS 2024, Updated Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing-Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts (Version 3.0), National Marine Fisheries Service, Available at: Federal Register :: 2024 Updated Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing-

Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts (Version 3.0)

Ref 138 Gordon et al 2004, A Review of the Effects of Seismic Surveys on Marine Mammals, Marine Technology Society Journal, Volume 37, Number 4, Winter 2003, pp. 16-34(19), (Online) Available at: https://doi.org/10.4031/002533203787536998

Ref 139 Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene Jr, C.R., Kastak, Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals, 33: Number 4. [online] (Online) Available at: http://seainc.net/assets/pdf/mmnoise_aquaticmammals.pdf (Accessed Feb 2020

Ref 140 Thompson et al 2013, Short-term disturbance by a commercial two-dimensional seismic survey does not lead to long-term displacement of harbour porpoises, (Online) available at: https://doi.org/10.1098/rspb.2013.2001 (Accessed July 2025)

Ref 141 JNCC 2020, Guidance on noise management in harbour porpoise SACs 2020, available at: Guidance on noise management in harbour porpoise SACs | JNCC Resource Hub

Ref 142 BEIS 2018, OFFSHORE OIL & GAS LICENSING 31ST SEAWARD ROUND Habitats Regulations Assessment Appropriate Assessment: Moray Firth, available at: 31st Round AA: Moray Firth

Ref 143 BOEMER 2011, EFFECTS OF EMFS FROM UNDERSEA POWER CABLES ON ELASMOBRANCHS AND OTHER MARINE SPECIES, Final Report, U.S. Department of the Interior Bureau of Ocean Energy Management, Regulation and Enforcement Pacific OCS Region, (Online) Available at: 2011-09-EMF-Effects.pdf

Ref 144 Gillet et al 2005, N Gillet, L Huder, J Aubert, A reduced stochastic model of core surface dynamics based on geodynamo simulations, *Geophysical Journal International*, Volume 219, Issue 1, October 2019, Pages 522–539, Available at: reduced stochastic model of core surface dynamics based on geodynamo simulations | Geophysical Journal International | Oxford Academic (Accessed July 2025)

Ref 145 Walker, W.A., M.B. Hanson, R.W. Baird and T.J. Guenther. 1998. Food habits of the harbor porpoise, Phocoena phocoena, and Dall's porpoise, Phocoenoides dalli, in the inland waters of British Columbia and Washington. Pages 63-75 in Marine Mammal Protection Act and Endangered Species Act Implementation Program 1997. AFSC Processed Report 98-10. National Marine Fisheries Service, Seattle, WA.

Ref 146 Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. (2001). Collisions between ships and whales. Marine Mammal Science 17: 35-75.

Ref 147 Van Waerbeck K., Baker, A.N., Félix, F., Gedamke, J., Iñiguez, M., Sanino, G.P., Secchi, E., Sutaria, D., van Helden, A. and Wang, Y. (2007). Vessel collisions with small cetaceans worldwide and with large whales in the southern hemisphere, and initial assessment. LAJAM 6: 43-69.

Ref 148 Richardson et al (2005), RPS, 2017, Hornsea Project Three Offshore Wind Farm, Preliminary Environmental Report, Volume 2 Chapter 4- Marine Mammals, 4.11.1.172, 17th June 2017, Available at how03_peir_volume-2-section-4_marine-mammals.pdf

Ref 149 JNCC (2019) Harbour Porpoise (Phocoena phocoena) Special Area of Conservation: Southern North Sea Conservation Objectives and Advice on Operations. Available at: Southern North Sea MPA: Conservation Objectives And Advice On Operations (jncc.gov.uk)

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