NORTH FALLS

Offshore Wind Farm

ENVIRONMENTAL STATEMENT

Appendix 12.1 Marine Mammal Consultation

Document Reference:	3.3.6
Volume:	3.3
APFP Regulation:	5(2)(a)
Date:	July 2024
Revision:	0

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Project	North Falls Offshore Wind Farm
Document Title	Environmental Statement: Appendix 12.1 Marine Mammal Consultation
Document Reference	3.3.6
APFP Regulation	5(2)(a)
Supplier	Royal HaskoningDHV
Supplier Document ID	PB9244-RHD-ES-OF-RP-OF-0223

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
0	July 2024	Submission	RHDHV	NFOW	NFOW

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Glossary of Acronyms

CEA	Cumulative Effects Assessment
EDR	Effective Deterrent Radius
EMF	Electro Magnetic Fields
EPP	Evidence Plan Process
EPS	European Protected Species
ES	Environmental Statement
ETG	Expert Topic Group
IAMMWG	Inter-Agency Marine Mammal Working Group
JNCC	Joint Nature Conservation Committee
kg	Kilogram
kJ	Kilojoule
km	Kilometre
LF	Low frequency
m	Metre
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MMObs	Marine Mammal Observers
m/s	Metre per second
MU	Management Unit
MW	Megawatt
OWF	Offshore Wind Farm
PAM	Passive Acoustic Monitoring
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Management Plan
PTS	Permanent Threshold Shift
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SCOS	Special Committee on Seals
SEL	Sound Exposure Level
SLs	Sound Levels
SMUs	Seal Management Units
SPL	Sound Pressure Level
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMP	Vessel Management Plan
WCS	Worst-Case Scenario

ZSL	Zoological Society London

Glossary of Terminology

Array area	The offshore wind farm area, within which the wind turbine generators, array cables, platform interconnector cable, offshore substation platform(s) and / or offshore converter platform will be located.
Array cables	Cables which link the wind turbine generators with each other, the offshore substation platform(s) and / or the offshore converter platform.
Landfall	The location where the offshore cables come ashore at Kirby Brook.
Offshore cable corridor	The corridor of seabed from array area to the landfall within which the offshore export cables will be located.
Offshore converter platform	Should an offshore connection to a third party HVDC cable be selected, an offshore converter platform would be required. This is a fixed structure located within the array area, containing HVAC and HVDC electrical equipment to aggregate the power from the wind turbine generators, increase the voltage to a more suitable level for export and convert the HVAC power generated by the wind turbine generators into HVDC power for export to shore via a third party HVDC interconnector cable.
Offshore export cables	The cables which bring electricity from the offshore substation platform(s) to the landfall, as well as auxiliary cables.
Offshore project area	The overall area of the array area and the offshore cable corridor.
Offshore substation platform(s)	Fixed structure(s) located within the array area, containing HVAC electrical equipment to aggregate the power from the wind turbine generators and increase the voltage to a more suitable level for export to shore via offshore export cables.
Platform interconnector cable	Cable connecting the offshore substation platforms (OSP); or the OSP and offshore converter platform (OCP).
The Applicant	North Falls Offshore Wind Farm Limited (NFOW).
The Project Or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Wind turbine generator (WTG)	Power generating device that is driven by the kinetic energy of the wind.

1 Marine mammal consultation

1. This appendix includes the consultation comments and responses relevant to marine mammals for the Environmental Statement (ES) Chapter 12 Marine Mammals (Document Reference: 3.1.14).
2. References included in this appendix are listed in full in the reference list in the ES Chapter 12 Marine Mammals (Section 12.13) (Document Reference: 3.1.14).

1.1 Consultation

3. Consultation with regard to marine mammals has been undertaken in line with the general process described in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8) and ES Chapter 7 Technical Consultation (Document Reference: 3.1.9).
4. The consultation comments are listed by consultee and document. Responses indicate, where appropriate / relevant, where a particular comment has been addressed in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14).
5. Consultation relating to marine mammal ecology has been undertaken in relation to the Preliminary Environmental Information Report (PEIR). Comments and responses relating to the PEIR have been provided for the following documents:
    - North Falls PEIR Chapter 12 Marine Mammals;
    - North Falls PEIR Appendix 12.1 Marine Mammal Baseline (now ES Appendix 12.2, Document Reference: 3.3.7);
    - North Falls PEIR Appendix 12.2 Underwater Noise Modelling Report (now ES Appendix 12.3, Document Reference: 3.3.8);
    - North Falls PEIR Appendix 12.3 Underwater Noise Technical Assessment (now ES Appendix 12.4, Document Reference: 3.3.9);
    - North Falls PEIR Appendix 12.4 Marine Mammal Unexploded Ordnance Clearance Information and Assessment (now ES Appendix 12.5, Document Reference: 3.3.10); and
    - North Falls PEIR Appendix 12.5 Marine Mammal Cumulative Effect Assessment Screening (now ES Appendix 12.6, Document Reference: 3.3.11).
6. Other key elements to date have included the Scoping Report and the ongoing technical consultation via the marine mammal Expert Topic Group (ETG). The feedback received has been considered in preparing this ES.

1.2 Scoping opinion

1.2.1 Marine Management Organisation (MMO) comments

7. Table 1.1 provides the consultation responses received from the MMO for the Scoping Report, received August 2021.

Table 1.1 MMO Scoping Opinion consultation responses

Consultee	Date / Document	Comment	Response / where addressed in the ES
MMO	Scoping Opinion – 19/07/2021 p. 212, Section 2.5, paragraph 2.5.1	The Applicant has used relevant literature to justify their reasons behind the levels of magnitude, duration, reversibility, and timing (Section 2.5.4 210 of the Scoping Report) applied to each area or species of concern. For example, they will be using the most recent noise thresholds provided by Popper *et al*. (2014) and National Marine Fisheries Services (2018) for fishes and marine mammals, respectively, which are the appropriate criteria for noise assessment. The evidence is also consistent with that submitted for operations of a similar nature.	Noted.
MMO	Scoping Opinion – 19/07/2021 p. 213, Section 2.5, paragraph 2.5.3	The Scoping Report provides high level information which will be expanded upon during a programme of consultation with technical stakeholders throughout the EIA process, as such some technical detail about construction, operation and decommission is missing. For example, the timing and duration of works (including construction hours) is not included within the Scoping Report. The timing and duration of works (such as piling, Unexploded Ordnance (UXO) clearance and service vessel operations) will influence underwater noise exposure levels. Therefore, within the EIA this information should be provided, using a worst-case scenario (WCS) if details are not finalised.	The full project description has been provided in ES Chapter 5 Project Description (Document Reference: 3.1.7), and the WCS assessed for marine mammals has been provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.3.2.
MMO	Scoping Opinion – 19/07/2021 p. 213, Section 2.5, paragraph 2.5.4	The MMO agree with The Applicant's conclusion to scope in the potential impact of underwater noise during construction, operation and decommission for both fishes (Section 2.6.3 of the Scoping Report) and marine mammals (Section 2.7.3 of the Scoping Report).	Noted.
MMO	Scoping Opinion – 19/07/2021 p. 213, Section 2.5, paragraph 2.5.5	The Applicant plans to use modelling to assess auditory injury and behavioural impacts of marine mammals (Section 2.7.3 Table 2.19 of the Scoping Report). At this scoping stage, it is important to emphasise that the potential for both temporary threshold shift (TTS) and permanent threshold shift (PTS) should be included with The Applicant's	An assessment for the potential for PTS and TTS has been provided throughout the marine mammal assessment, where relevant for each noisy activity, for construction, operation and maintenance, and decommissioning phases (see throughout Es Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6).

Consultee	Date / Document	Comment	Response / where addressed in the ES
		investigation/ definition of auditory injury. Furthermore, modelling of auditory injury should be conducted for fishes following guidelines of noise exposure criteria from Popper *et al*. (2014).	
MMO	Scoping Opinion – 19/07/2021 p. 213, Section 2.5, paragraph 2.5.6	In Section 2.6.3.1 of the Scoping Report, UXO clearance was not mentioned as a potential impact on fish species during construction although it was for marine mammals in Section 2.7.3.1. Additionally, in Section 2.6.3.2 of the Scoping Report, underwater noise was not mentioned as a potential impact during operation despite ongoing vessel maintenance. The MMO would expect both the potential impacts of underwater noise arising from UXO clearance and increased presence of vessel traffic to be considered for both fish and marine mammal species.	An indicative assessment of the potential for underwater noise due to UXO clearance has been provided in ES Appendix 12.5 (Document Reference: 3.3.10), and an assessment for the potential for underwater noise effects due to vessel traffic is provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.1.3, 12.6.2.3 and 12.6.3.2 for the construction, operation and maintenance, and decommissioning phases respectively.
MMO	Scoping Opinion – 19/07/2021 p. 214, Section 2.5, paragraph 2.5.9	Both fish and marine mammals were identified as having the potential to be impacted by underwater noise throughout the wind farm's lifetime (Table 2.18 and 2.19 of the Scoping Report respectively). However, as this Scoping Report provides a high-level evaluation of the works to be conducted at North Falls, proposed mitigation were not described in detail in relation to underwater noise so the MMO cannot comment on the mitigation at this stage.	Mitigation measures that will be applied to underwater noise effects are described in and included throughout the relevant underwater noise assessments as presented in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.
MMO	Scoping Opinion – 19/07/2021 p. 214, Section 2.5, paragraph 2.5.10	Within the EIA, the MMO would expect to see mitigation described in detail, including an appropriate Marine Mammal Mitigation Plan / Protocol (MMMP) for piling and UXO clearance. Typical / standard measures may include soft start procedures during piling, marine mammal observation and / or temporal restrictions (i.e., only operating during daylight hours or avoiding construction coinciding with key spawning events).	Mitigation measures that will be applied to underwater noise effects are described in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.3.3 and included throughout the relevant underwater noise assessments as presented in Section 12.6. An Outline (MMMP) has also been provided as part of the DCO Application (document reference 7.7).
MMO	Scoping Opinion – 19/07/2021 p. 214, Section 2.5, paragraph 2.5.11	For both fishes and marine mammals, cumulative and transboundary assessments are planned for the EIA (see Sections 2.6.3.4, 2.6.3.5, 2.7.3.4 and 2.7.3.5 of the Scoping Report). The Applicant has highlighted other human activities in the vicinity of the proposed area, particularly other operational and planned wind farms (Greater Gabbard, Galloper and Five Estuaries Offshore Wind Farm (herein 'Five Estuaries')).	Screening assessments of other human activities and projects have been undertaken and the cumulative effect of activities and projects screened in have been assessed in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.9.

1.2.2 Natural England

Table 1.2 provides the consultation responses received from Natural England for the Scoping Report, received August 2021.

Table 1.2 Natural England Scoping Opinion consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	Scoping Opinion – 16/08/2021 p. 231	Natural England consider that there is insufficient information provided for marine mammals in the Scoping Report to allow for a meaningful scoping exercise to be undertaken. The proposed data and information sources require updating, and a wider exercise of searching for more recent data should be undertaken to inform the assessment. There was no explanation of the EIA methodology or how metrics such as magnitude and sensitivity will be assessed, and there was no information provided regarding the cumulative effect assessment (CEA), the methodology for undertaking it or how the results will be presented. This information is critical to undertaking a thorough and complete assessment of impacts to marine mammals in the EIA.	A full review of the available baseline data sources has been undertaken to inform the baseline environment, as described in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.4.2 and ES Appendix 12.2 (Document Reference: 3.3.7). The assessment methodology for undertaking the marine mammal assessments and for the CEA have been provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Sections 12.4.3 and 12.4.4 respectively.
Natural England	Scoping Opinion – 16/08/2021 p. 242, Section 2.7.1 paragraph 237	The statements in this paragraph should be appropriately referenced. Nevertheless, we agree that sperm whale and long-finned pilot whales can be scoped out. No action needed.	Noted.
Natural England	Scoping Opinion – 16/08/2021 p. 242, Section 2.7.1 paragraph 238	We advise that the applicant also considers the results of Carter *et al*. (2020) with regards to the at sea density of seals, alongside Russell *et al*. (2017). Although Carter *et al*. (2020) updated Russell *et al*. (2017), we acknowledge that Carter *et al*. (2020) provides abundance relative to the current population size and therefore may not be as readily useable as Russell *et al*. (2017) which provides absolute abundance. We advise that the authors of these papers should be contacted as to how the papers should be used and their relative limitations. Contact the authors of Carter *et al*. (2020) and determine how best to	The Carter *et al*. (2022) report, which provides an update to the Carter *et al*. (2020) report, has been used to determine the absolute density estimates for seals at sea, for both grey seal and harbour seal (see ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Sections 12.5.3.3 and 12.5.4.3 respectively). The Carter *et al*. (2022) density estimates have been used to inform the assessments of both seal species.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		use this evidence in relation to Russell *et al.* (2017).	
Natural England	Scoping Opinion – 16/08/2021 p.243. Section 2.7.1, paragraph 240	The applicant states that white-beaked dolphin were observed during the Galloper Wind Farm surveys, however the number and frequency of white-beaked dolphin observations have not been included. These survey data should be presented to Natural England and white-beaked dolphin taken forward to assessment if appropriate. Seek advice from Natural England regarding whether white-beaked dolphin require scoping into the assessment after provision of additional survey data.	A full baseline review of white-beaked dolphin has been undertaken and provided in ES Appendix 12.2 (Document Reference: 3.3.7). White-beaked dolphin have been scoped out of assessment due to very low presence in the vicinity of North Falls.
Natural England	Scoping Opinion – 16/08/2021 p. 243, Section 2.7.1, paragraph 241	Natural England is in agreement with the species scoped in to take forward to assessment. Inclusion of white- beaked dolphin should be considered further, however the data is not presented here for Natural England to advise. Seek advice from Natural England regarding whether white-beaked dolphin require scoping into the assessment once further data has been provided.	A full baseline review of white-beaked dolphin has been undertaken and provided in ES Appendix 12.2 (Document Reference: 3.3.7) White-beaked dolphin have been scoped out of assessment due to very low presence in the vicinity of North Falls.
Natural England	Scoping Opinion – 16/08/2021 p. 243, Section 2.7.2, Table 2.17	The description of the datasets should be clarified so that it explicitly states the project and purpose of the survey. Based on Table 2.17, it appears that there were two datasets collected in relation to the Greater Gabbard project, though the results of only one is referenced in paragraph 240. All relevant datasets should be used going forward. Provide clarity on the data sources in the ES.	Further detail on the existing datasets and other offshore wind farm (OWF) surveys has been provided in ES Appendix 12.2 (Document Reference: 3.3.7).
Natural England	Scoping Opinion – 16/08/2021 p. 243, Section 2.7.2, paragraph 247	The Management Units (MUs) for cetaceans in United Kingdom (UK) waters have recently been updated in terms of their abundance (available on the Joint Nature Conservation Committee (JNCC) website). Use the recommended references in the ES.	The latest Inter-Agency Marine Mammal Working Group (IAMMWG) (2023) report has been used to inform the relevant reference populations.

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	Scoping Opinion – 16/08/2021 p. 243, Section 2.7.2, paragraph 247	The data and information sources listed here should be revisited and updated with reference to the following; Carter *et al*. (2020) should be used to infer the at- sea density of seals, alongside Russell *et al*. (2017) (as per previous comment). A revised Small Cetaceans in the European Atlantic and North Sea (SCANS) III report is now available as of June 2021 and should be used. Zoological Society London (ZSL) should be contacted in order to obtain the most recent information from their seals sightings database. The applicant should also consider the findings of Cox *et al*. (2020) and Cucknell *et al.* (2020) It should be noted that previous Special Committee on Seals (SCOS) reports can be of use as these may contain the results of surveys that are not done annually e.g., pup counts. Check and update data list used in the ES.	A full review of the available baseline data sources has been undertaken to inform the baseline environment, as described in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.4.2 and ES Appendix 12.2 (Document Reference: 3.3.7). The Carter *et al*. (2022) report, which provides an update to the Carter *et al*. (2020) report, has been used to determine the absolute density estimates for seals at sea, for both grey seal and harbour seal (see ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Sections 12.5.3.3 and 12.5.4.3 respectively). The Carter *et al*. (2022) density estimates have been used to inform assessments for both seal species. The revised SCANS-III report (Hammond *et al*., 2021) has been used to inform the baseline assessments (see ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Sections 12.5.1 and 12.5.2). The relevant ZSL reports have been used to inform the baseline assessment (see ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Sections 12.5.3 and 12.5.4).
Natural England	Scoping Opinion – 16/08/2021 p. 244, Section 2.7.3.1, paragraph 248	The potential for auditory injury from underwater noise from UXO clearance (and other construction activities) should also be considered. Assess the potential for auditory injury from underwater noise from UXO clearance (and other construction activities).	An assessment of the potential for underwater noise due to UXO clearance is provided in ES Appendix 12.5 (Document Reference: 3.3.10), and an assessment for the potential for underwater noise effects due to other construction activities is provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.1.2.
Natural England	Scoping Opinion – 16/08/2021 p. 244, Section 2.7.3.1, paragraph 248	We acknowledge and welcome the inclusion of an assessment of barrier effects due to underwater noise during construction. No action needed.	Noted.
Natural England	Scoping Opinion – 16/08/2021 p. 244, Section 2.7.3.1, paragraph 251	We acknowledge that water quality impacts are scoped in at this time and are content with the proposed approach of reviewing this through the Evidence Plan Process (EPP) following site-specific data collection.	Noted.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		No action needed.	
Natural England	Scoping Opinion – 16/08/2021 p. 244, Section 2.7.3.2, paragraph 254	Natural England agrees that impacts from Electro Magnetic Fields (EMF) can be scoped out. However, Natural England consider that insufficient information has been provided to scope out barrier effects during operation. Barrier effects can arise when the project and associated underwater noise producing activities are located in a migratory or known movement route of marine mammals. The applicant has not provided sufficient information to confirm that the project area is not within any migratory / movement routes. The potential for barrier effects is location-specific, therefore the results of the screening exercise for other projects in different locations are not necessarily applicable. Consider information on migratory and movement routes before determining whether barrier effects during operation can be scoped out or not.	An assessment of the potential for barrier effects during operation and maintenance is provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.2.4.
Natural England	Scoping Opinion – 16/08/2021 p. 245, Section 2.7.3.4, paragraph 256	We agree with the consideration of cumulative impacts on prey species. We advise that cumulative disturbance should be considered (not just displacement), and that this should be considered for both animals at sea and for seal haul-outs. They should assess cumulative disturbance, not just displacement, for both animals at sea and seal haul-outs.	The potential for cumulative disturbance has been assessed for both marine mammals at sea (see ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.9.3.1), and for cumulative disturbance to seals at haul-out sites (see Section 12.9.3.4).
Natural England	Scoping Opinion – 16/08/2021 p. 245, Section 2.7.3.4, paragraph 256	The applicant should include cumulative collision risk (or include justification as to why this is can be scoped out). Cumulative collision risk should be scoped into the ES until justification is provided and agreed that it can be scoped out through the EPP.	The potential for cumulative risk of collision has been assessed in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.9.3.3.
Natural England	Scoping Opinion – 16/08/2021 p. 245, Section 2.7.3.4, paragraph 256	No information has been provided on the scale at which the CEA will scope in other plans and projects, how the CEA will be structured (i.e., the use of tiers), what parameters / scenarios will be assessed or which impacts will be	The assessment methodology for undertaking the marine mammal CEA has been provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.4.4, and the full cumulative project screening is

Consultee	Date / Document	Comment	Response / where addressed in the ES
		assessed cumulatively or scoped out of CEA and the justification for those decisions. We also advise that the relevant marine mammal MUs is used here. Use the relevant MUs for screening in projects and plans in the CEA. Information should be provided on the scale at which CEA will be considered.	provided in ES Appendix 12.6 (Document Reference: 3.3.11).
Natural England	Scoping Opinion – 16/08/2021 p. 245, Section 2.7.3.6, Table 2.19	It would be beneficial to separate out the different pathways of underwater noise and state which are being scoped in / out at the different stages, for clarity. Similarly, the different cumulative impacts and their relevant project phase(s) could be delineated further. Provide more clarity on which pathways are being screened in / out at different stages.	Further information on the potential underwater noise sources assessed, with the potential for each effect, has been provided for construction (ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.1), operation and maintenance (Section 12.6.2), and decommissioning (Section 12.6.3).
Natural England	Scoping Opinion – 16/08/2021 p. 245, Section 2.7.3.6, Table 2.19	We advise that barrier effects from underwater noise during decommissioning should not be scoped out at this stage due to uncertainty over the activities that will be undertaken during decommissioning. This is in addition to our previous comment regarding the scoping in of barrier effects during construction. Screen in barrier effects during the decommissioning stage.	An assessment of the potential for barrier effects during decommissioning is provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.3.3.
Natural England	Scoping Opinion – 16/08/2021 p. 245, Section 2.7.4, paragraph 259	Could the applicant please specify which activities will be included in the underwater noise modelling? List what activities will be included in the underwater noise modelling and present to Natural England for consideration.	Further information on the potential underwater noise sources assessed, and the results of the underwater noise modelling, is provided in ES Appendix 12.3 (Document Reference: 3.3.8) and ES Appendix 12.4 (Document Reference: 3.3.9).

1.2.3 Planning Inspectorate comments

8. Table 1.3 provides the consultation responses received from the Planning Inspectorate for the Scoping Report, received August 2021.

Table 1.3 Planning Inspectorate consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Planning Inspectorate	Scoping Opinion – 26/08/2021	Marine mammal species scoped out of assessment.	A full baseline review of white-beaked dolphin has been undertaken and provided in ES

Consultee	Date / Document	Comment	Response / where addressed in the ES
	p. 42, Paragraph 241, Table 2.19	Paragraph 241 lists the marine mammal species that the Applicant proposes to take forward for assessment. Several cetacean species (including sperm whale and various species of dolphin as listed in Paragraphs 235 to 240) that are expected to be absent or infrequent visitors within the offshore project area are proposed to be scoped out of the ES. Natural England has stated that it is in agreement with the species scoped in to take forward to assessment. However, the Inspectorate notes that uncertainty remains regarding white-beaked dolphin and that additional survey data may be required before this species can be scoped out of the assessment. Therefore, the Inspectorate agrees that all species listed in Paragraph 241 may be scoped out with the exception of white-beaked dolphin. The Applicant should seek to agree with Natural England and other relevant consultation bodies regarding whether impacts to white-beaked dolphin should be assessed making use of the additional survey data.	Appendix 12.2 (Document Reference: 3.3.7). White-beaked dolphin have been scoped out of assessment due to very low presence in the vicinity of North Falls. This was agreed with Natural England via a ETG meeting on 9th July 2021.
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 42, Table 2.19	Barrier effects from underwater noise during operation and decommissioning. Barrier effects from underwater noise during the operation and decommissioning phases of the Proposed Development are proposed to be scoped out of the assessment. The Applicant states that this approach is consistent with other recent OWF projects as there is no evidence of any impact. The Inspectorate considers that barrier effects can arise when the Proposed Development and associated underwater noise producing activities are located in a migratory or known movement routes of marine mammals; limited information regarding this matter has been provided in the Scoping Report. The Inspectorate also considers that the potential for barrier effects is location-specific, and therefore the results of the screening exercise for other projects in different locations are not necessarily applicable. On this basis, the Inspectorate does not consider that there is sufficient	An assessment of the potential for barrier effects during operation and maintenance is provided in Section 12.6.2.4 and during decommissioning in Section 12.6.3.3.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		information at this stage to agree to scope this matter out of the assessment.	
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 43, Paragraph 254, Table 2.19	Barrier effects from the physical presence of the wind farm during operation. The potential for impacts from physical barrier effects during operation are proposed to be scoped out of the assessment. The Applicant states that this approach is consistent with other recent OWF projects as there is no evidence of any impact. The Inspectorate agrees that significant effects are unlikely to occur, and this matter can be scoped out of the assessment.	Noted.
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 43, Paragraph 254, Table 2.19	Effects from EMFs during operation. The potential for impacts from EMF during operation are proposed to be scoped out of the assessment. The Applicant states that this approach is consistent with other recent OWF projects as there is no evidence of any impact. The Inspectorate agrees that significant effects are unlikely to occur, and this matter can be scoped out of the assessment.	Noted.
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 43, Section 2.7.1, Table 2.17	Existing environment. The Inspectorate considers that the proposed data and information sources listed in Table 2.17 may require updating, and a wider exercise of searching for more recent data should be undertaken to inform the assessment.	A full review of the available baseline data sources has been undertaken to inform the baseline environment, as described in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.4.2 and ES Appendix 12.2 (Document Reference: 3.3.7).
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 44, Paragraph, Figure 2.1 (Volume II)	Designated sites and study area. The aspect chapter does not reference any designated sites other than the Southern North Sea Special Area of Conservation (SAC) (designated for harbour porpoise), despite several other European designated sites and Marine Protected Areas being present within the vicinity of the Proposed Development (as shown in Figure 2.1, Volume II). Therefore, the extent to which these offshore designated sites and their qualifying / protected features have been	An assessment of the effect on the relevant marine mammal designated sites has been undertaken with the Report to Inform Appropriate Assessment (RIAA). The assessment methodology for undertaking the marine mammal assessments has been provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.4.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		considered within the marine mammal assessment is not clear. No reference is made to a defined study area and / or methodology that will be used to establish the baseline and assess impacts, nor is any criteria presented to identify how significance of effect will be determined. The ES should be clear on how the assessment has been undertaken, taking into relevant guidance and using an aspect specific methodology where this is relevant.	
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 44, Section 2.7.2	Approach to data collection. The ES should set out in full the potential risk to European Protected Species (EPS) and confirm if any EPS licences will be required (e.g., harbour porpoises). The Applicant's attention is drawn to advice from JNCC for the need to acquire EPS license to conduct certain construction activities in the marine environment (e.g., piling and UXO clearance).	A summary of the requirements for an EPS licence application has been provided in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.7.
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 44, Section 2.7.3.1, paragraph 390	Approach to assessment – underwater noise modelling. The Scoping Report states that underwater noise modelling will be undertaken to inform the marine mammal assessment; however, limited information is provided regarding the proposed assessment methodology. It's unclear, for example, which receptors underwater noise modelling will be applied to / undertaken for. The ES should fully describe the methodology applied, including PTS, TTS and disturbance ranges used, as well as the potential for the disturbance impact footprints to overlap with the boundary of offshore designated sites, including the Southern North Sea SAC. If noise modelling indicates an overlap of the disturbance footprint with an offshore designated site, the area and duration of such disturbance will need to be assessed against the conservation objectives of the designated site. The Inspectorate understands that the number, type and size of UXO devices is not known. However, the ES should assess the likely impacts from UXO (including the potential for auditory injury from underwater	The approach to undertaking the underwater noise modelling has been detailed in ES Appendix 12.3 (Document Reference: 3.3.8) and 12.4 (Document Reference: 3.3.9). Further information on the potential underwater noise sources assessed, with the potential for each effect, has been provided for construction ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.1), operation and maintenance (Section 12.6.2), and decommissioning (Section 12.6.3). An assessment of potential disturbance effects to the Southern North Sea SAC has been provided within the RIAA Part 3 Marine Mammals (Document Reference: 7.1.3). An assessment of the potential for underwater noise due to UXO clearance is provided in ES Appendix 12.5 (Document Reference: 3.3.10).

Consultee	Date / Document	Comment	Response / where addressed in the ES
		noise from UXO clearance, as well as other construction activities) and explain the assumptions applied to the assessment as necessary. The ES should also clarify whether UXO are envisaged during the operations and maintenance phased of the Proposed Development.	
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 45, Paragraph 256	Cumulative impacts. Cumulative collision risk should be scoped into the ES until justification is provided and agreed that it can be scoped out through the EPP. The ES should also assess cumulative disturbance, and not just displacement, for both animals at sea and seal haul-outs.	The potential for cumulative risk of collision has been assessed in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.9.3.3.
Planning Inspectorate	Scoping Opinion – 26/08/2021 p. 45	Marine mammal mitigation. The ES should explain the extent to which any proposed marine mammal mitigation has been agreed with relevant consultation bodies, including mitigation to enable the commencement of piling and UXO clearance. Any proposed noise abatement mitigation (where noise modelling estimates PTS impact ranges are large or if the disturbance footprint is anticipated to overlap with an offshore designated site) should be described in the ES.	Mitigation measures that will be applied to underwater noise effects are described in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.2.3, and included throughout the relevant underwater noise assessments as presented in Section 12.6. An Outline MMMP has also been provided as part of the DCO Application (document reference 7.7).

1.3 Response to PEIR Chapter 12 Marine Mammals

1.3.1 Natural England

9. Table 1.4 provides the consultation responses received from Natural England for the PEIR, received July 2023.

Table 1.4 Natural England PEIR consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR – 14/07/2023	We would like to see further justification and rationale for the WCS for use of Acoustic Deterrent Devices. We also note that the MMMP has not yet been drafted, therefore, we would wish to be consulted on this prior to it being included in the ES. In the submitted ES, we also advise that consideration should be given to the total number of days of piling	The ES and HRA has been updated to include the I required ADD duration to cover PTS (cumulative) ranges, based on current underwater noise modelling results. Further information on ADD durations is provided within the Outline MMMP (document reference 7.7). Natural England have been consulted on the Outline MMMP,

Consultee	Date / Document	Comment	Response / where addressed in the ES
		for all OWF projects, not just the number of days piling for North Falls alone.	which is submitted as part of the DCO Application (document reference 7.7). The in-combination assessment for the Southern North Sea SAC have been updated to take account of the total days of activity with the relevant season, rather than just the days that overlap with North Falls (RIAA Section 6.2.3.4.1).
Natural England	PEIR – 01/08/2023	Provide justification to explain why 10 minutes ADD activation is the WCS	The ES and HRA have been updated to include the actual required ADD duration to cover PTS (cumulative) ranges based on the current underwater noise modelling results. Further information on ADD durations is provided within the Outline MMMP (document reference 7.7).
Natural England	PEIR – 01/08/2023	Engage with Natural England on the draft MMMP prior to including in the submitted ES.	Natural England have consulted on the Outline MMMP, which is submitted as part of the DCO Application (document reference 7.7).
Natural England	PEIR – 01/08/2023	Apply a consistent approach for grey seal SMUs in the submitted ES and HRA and provide a clear justification for the approach chosen for the assessment.	Both the South-East England MU reference population (30,592) and the wider reference population (South-East and North-East England MU populations combined, 56,505) of grey seals will be presented in the assessments within the ES Chapter 12 Marine Mammals (Document Reference: 3.1.14). As a worst case it is assumed that all seals are from the nearest MU, the South-East England MU, although the more realistic assessment is based on wider reference population which takes into account the movement of seals. The assessments provided in the RIAA are based on SAC population estimates rather than MU population estimates.
Natural England	PEIR – 01/08/2023	In the submitted ES, take into consideration the total number of days of piling for all OWF projects, not only the number of days piling for North Falls.	The in-combination assessment for the Southern North Sea SAC has been updated to take account of the total days of activity with the relevant season, rather than just the days that overlap with North Falls (RIAA Section 6.2.3.4.1).
Natural England	PEIR – 01/08/2023	Consider all available mitigation tools and techniques to reduce the risk of PTS injury (including bubble curtains) and incorporate the mitigation into the submitted ES.	All potential mitigation measures are being considered, including noise reduction measures (such as bubble curtains); see the Outline MMMP (document reference 7.7) for further information.
Natural England	PEIR – 01/08/2023	The stated duration of the WCS ADD activation time is 10 minutes. Natural England seeks	The ES and HRA have been updated to include the actual required ADD duration to cover PTS

Consultee	Date / Document	Comment	Response / where addressed in the ES
	Table 12.37	justification as to why such a short duration of ADD activation has been chosen as a WCS.	(cumulative) ranges. The worst case ADD activation time is based on the current underwater noise modelling (see the Outline MMMP (document reference 7.7) for further detail).
Natural England	PEIR – 01/08/2023 1.2-9	Natural England agrees with the four key marine mammal receptors identified.	Noted.
Natural England	PEIR – 01/08/2023 1.3-1.9	Natural England agrees with the MUs for the key marine mammal species.	Noted.
Natural England	PEIR – 01/08/2023 1.8.3- 98; 1.8.4-99	The first paragraph indicates a total of 36 partially identified seals and six seal / small cetacean species, while the second states that a total of 23 seal species and 17 seal / small cetacean species were recorded.	This has been corrected; see ES Appendix 12.2 (Document Reference: 3.3.7).
Natural England	PEIR – 01/08/2023 Table 2	Natural England queries whether partially identified species were assigned to any species categories for the purpose of calculating densities and abundance.	A correction factor has been applied to the harbour porpoise data to account for availability bias. No survey data has been apportioned (i.e. no species group data has been used within the density and abundance calculations), although note there were a very low number of 'cetacean species (n=5) and 'seal / cetacean species' (n=17) compared to the total number of harbour porpoise (n=702); therefore, would not significantly alter the densities, see ES Appendix 12.2 (Document Reference: 3.3.7).
Natural England	PEIR – 01/08/2023 Table 8; 114	Table 8 indicates that the total reference population of grey seals is 60,310, while the paragraph below states that the total reference population for the assessment is 34,461. Thus, it is not clear from the text which value will be taken forward to the assessment. Natural England advises that the total population of both Seal Management Units (SMUs) is taken forward.	This has been amended in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.4.3.3. Both the SE MU reference population and the wider reference population will be used within assessments.
Natural England	PEIR – 01/08/2023 1.8.6	The maximum foraging range of grey seals, 448km should be noted here as per Carter *et al*. (2022).	This has been amended in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.5.1.
Natural England	PEIR – 01/08/2023 General Comment	IAMMWG 2022 review has been used for information on MUs. The most up to date IAMMWG report is 2023.	This has been amended throughout ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) and relevant appendices.
Natural England	PEIR – 01/08/2023 Table 12.3	It is in stated Table 12.3 that the ramp up would be minimum 20 minutes, however the soft start duration is not specified. This is	New proposed soft start and ramp up scenarios have been consistently applied throughout the ES Chapter 12 Marine Mammals (Document

Consultee	Date / Document	Comment	Response / where addressed in the ES
		not in line with Table 12.2, where it is stated that soft start would be 10 minutes at 15% with ramp up to 120 minutes. Clarification is needed on the exact soft start procedure that will be implemented as an embedded mitigation measure.	Reference: 3.1.14) and relevant Appendices.
Natural England	PEIR – 01/08/2023 Table 12.3	The Vessel Management Plan (VMP) should be listed as an embedded mitigation in relation to vessel collision risk. We advise that specific best practice documents / guidelines to reduce any risk of collisions are included in the VMP. Furthermore, Natural England advises that the VMP is included within the Project Environmental Management Plan (PEMP), and best practice measures are followed in order to mitigate the impacts of increased vessel presence on marine mammals at all stages of the project (including operation / maintenance stage).	Vessel management measures are included within the Outline PEMP (document reference 7.6). This is listed as mitigation within Section 12.8 of the ES Chapter 12 Marine Mammals (Document Reference: 3.1.14).
Natural England	PEIR – 01/08/2023 Table 12.6	Natural England is satisfied with the key data sources used to inform the assessment. However, the inclusion of survey data from other OWF in the area would add context to the information on the presence, abundance, and densities of marine mammals in the region.	A summary of the available (and relevant) survey data from other nearby OWFs (namely Five Estuaries, Greater Gabbard and Galloper) is provided in ES Appendix 12.2 (Document Reference: 3.3.7).
Natural England	PEIR – 01/08/2023 12.4.4 / 44	Natural England welcomes the application of the Tiered approach as per the Natural England Best Practice Guidelines.	Noted.
Natural England	PEIR – 01/08/2023 Para 93	It is not clear whether the total reference population (SE England and NE England SMU) or the SE England SMU population will be taken forward for the assessment.	Both the South-East England MU reference population (30,592) and the wider reference population (South-East England and North-East England MU populations combined, 56,505) of grey seals are presented in the assessments. As a worst case it is assumed that all seals are from the nearest MU (the South-East England MU), although the more realistic assessment is based on wider reference population which takes into account the movement of seals.
Natural England	PEIR – 01/08/2023 Table 12.16	It is not clear how the figure of 35,583 grey seals is derived, and why the harbour seal population of 4,853 for SE England MU is different from the figure for the wider reference population based in the SE England MU.	Population figures have been updated throughout the ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) and appendices.

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR – 01/08/2023 Table 12.17	Natural England agrees with the chosen density estimates for the four key marine mammal receptors.	Noted.
Natural England	PEIR – 01/08/2023 Table 12.9	It was previously stated that harbour porpoise winter densities obtained from the site-survey will be used for the assessment. Therefore, only that figure should be presented here with the resulting magnitude of low.	Only the winter density estimate for harbour porpoise has been used to inform the magnitude of effects throughout the ES Chapter 12 Marine Mammals (Document Reference: 3.1.14). However, an assessment against all harbour porpoise densities has been provided in ES Appendix 12.4 (Document Reference: 3.3.9) for completeness.
Natural England	PEIR - 01/08/2023 Table 12.9, 12.23	Natural England advises that the number of impacted animals greater than one is presented as a whole number, i.e., 2.6 harbour porpoises should be presented as 3 and this number should be used to calculate the % of the reference population affected. This is to bring an ecological meaning to the assessment as it is not possible to injure / disturb a fraction (0.6) of an animal. It should be noted that this comment also applies to further tables and other species too.	This has been applied to assessments throughout the ES Chapter 12 Marine Mammals (Document Reference: 3.1.14), the RIAA, and all relevant Appendices (ES Appendix 12.4 (Document Reference: 3.3.9) and ES Appendix 12.5 (Document Reference: 3.3.10)).
Natural England	PEIR – 01/08/2023 Table 12.24, 12. 25	Natural England has not yet had sight of the draft Marine Mammal Monitoring Plan (MMMP). Therefore, we cannot agree at this stage that the measures in the MMMP will be sufficient to significantly reduce any potential for PTS injury.	Natural England have consulted on the Outline MMMP, which is submitted as part of the DCO Application (document reference 7.7).
Natural England	PEIR – 01/08/2023 Para 166	It should be acknowledged that, based on the current modelling results with a potential PTS range of 680m and 550m, the standard mitigation zone of 500m has been exceeded. Thus, it is likely that the mitigation zone will need to be extended to account for these modelled ranges. We advise that all available mitigation measures to minimise the risk of injury should be considered including the use of bubble curtains.	An updated mitigation zone has been proposed based on the PTS impact range, as seen in the Outline MMMP (document reference 7.7)
Natural England	PEIR – 01/08/2023 Para 166	A clear definition of soft start and ramp up, as well as the duration and associated energies, should be provided within the MMMP.	This has been included within the Outline MMMP (document reference 7.7)
Natural England	PEIR – 01/08/2023 Para 168	We do not agree that vessel disturbance should be considered as a mitigation measure to reduce the risk of injury from PTS.	Proposed mitigation has been reviewed, and the text has been amended as seen in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14).

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR – 01/08/2023 Table 12.37	The stated duration of the WCS ADD activation time is 10 minutes. Natural England seeks justification as to why such a short duration of ADD activation has been chosen as a WCS.	The ES and HRA have been updated to include the actual required ADD duration to cover PTS (cumulative) ranges based on current underwater noise modelling. Further information on ADD durations is provided within the Outline MMMP (document reference 7.7).
Natural England	PEIR – 01/08/2023 Para 403	This paragraph requires clarification as different durations of ADD activation were mentioned (e.g. 36 minutes and 10 minutes).	The ES and HRA have been updated to include the actual required ADD duration to cover PTS (cumulative) ranges. Further information on ADD durations is provided within the Outline MMMP (document reference 7.7).
Natural England	PEIR – 01/08/2023 Para 633	The statement on TTS from underwater noise being screened out is in contradiction with Table 12.89, where it is stated "…the potential risk of TTS in marine mammals from cumulative effects will be considered alongside that of disturbance from underwater noise, and the highest known potential effect ranges (of either TTS or disturbance) will be used to the inform the CEA. The approach to screening impacts in the CEA should be reviewed, and full and consistent justification should be provided for the screening decisions.	Text has been reviewed and amended to provide further clarification over the effects that have been screened into the CEA, see Section 12.9 in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14)..
Natural England	PEIR – 01/08/2023 Para 633	Justification is needed for the screening-out of all operational effects from the CEA. Given that there will be increased levels of vessel traffic during operation and maintenance phase, vessel disturbance and collision risk should be considered.	Further consideration has been given for the potential cumulative vessel disturbance and vessel collision risk during the operational and maintenance phase of OWFs. See ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.9.3.3.
Natural England	PEIR – 01/08/2023 Para 738	Natural England queries this statement given the close proximity of North Falls to Five Estuaries: "…Taking into account the locations of the OWFs and other noise sources from North Falls, the maximum underwater effect ranges for disturbance at other projects would not overlap with the maximum underwater effect ranges for disturbance at North Falls during piling and construction. Therefore, there is no potential for underwater noise from North Falls, other OWFs and noise sources to result in a barrier of movement to marine mammals". We recommend that a figure is produced mapping the maximum potential disturbance	The disturbance ranges indicate there is the potential for impact ranges between North Falls and Five Estuaries to overlap. Therefore the cumulative barrier effects assessment has been reviewed and amended in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.9.3.2.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		ranges of both OWFs to illustrate no overlap.	

1.3.2 RWS Netherlands

10. Table 1.5 provides the consultation responses received from RWS Netherlands for the PEIR, received July 2023.

Table 1.5 RWS Netherland PEIR consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
RWS Netherlands	PEIR – 14/07/2023 Chapter 12 Marine Mammals (underwater noise)	3) Mitigation measures: including considering options on limiting underwater noise for marine mammals. The Netherlands (and Germany and Belgium) include this kind of information in EIAs including establishing a standard for underwater noise (impacts).	All potential mitigation measures are being considered such as noise reduction measures, and timing of piling, see ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.8 and the Outline MMMP (document reference 7.7).
RWS Netherlands	PEIR – 14/07/2023 Chapter 12 Marine mammals, Chapter 11 Fish and shellfish ecology, Chapter 10 Benthic and Intertidal Ecology	4) (Broader) ecosystem effects (e.g. stratification) in the assessment (those are missing now). In the current report it is not clear on the basis of which information the conclusion was drawn that there are no transboundary ecosystem effects to be expected.	Further information and clarification for the conclusions reached for transboundary effects have been added, see Section 12.10 ES Chapter 12 Marine Mammals (Document Reference: 3.1.14).
RWS Netherlands	PEIR – 14/07/2023 Chapter 12 Marine Mammals	5) Effects on marine mammals, for instance related to underwater noise. More information over which species were included and on which information is available for (a part of) the species.	Text has been reviewed, further information for the inclusion of marine mammal species in assessments have been detailed in ES Appendix 12.2 (Document Reference: 3.3.7).

1.3.3 MMO

11. Table 1.6 provides the consultation responses received from the MMO for the PEIR, received July 2023.

Table 1.6 MMO PEIR consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
MMO	PEIR – 14/07/2023 Chapter 12	All relevant / applicable marine mammal functional hearing groups have been considered in the underwater noise modelling assessment. Furthermore, all fish groups have been considered as per Popper *et al*. (2014). The marine mammal species scoped into the PEIR assessment, which sit within these four hearing groups, are harbour porpoise, minke whale, grey seal and	Noted.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		harbour seal. The MMO defers to Natural England to ensure that all relevant marine mammal species have been scoped in.	
MMO	PEIR – 14/07/2023 Chapter 12	The MMO believes that all relevant impacts have been scoped in for assessment. Specifically, the potential effects of auditory injury (PTS) and TTS and disturbance resulting from the following activities, have been considered: a. Piling (and disturbance to ADD activation, noting that final requirements for mitigation in the MMMP will be determined prior to construction), b. Other construction activities including seabed preparations, rock placements and cable installation, c. Construction vessels, d. Noise from operational wind turbines and O&M activities and vessels.	Noted.
MMO	PEIR – 14/07/2023 Chapter 12	Chapter 12 Marine Mammals confirms that a MMMP will be developed for piling. The MMO supports this approach. The final MMMP will include the standard measures as per the JNCC (2010) guidance, including a monitoring zone of at least 500m (or higher if required to cover the PTS range for a single strike of the hammer), soft start procedures and acoustic deterrent devices (ADDs).	Outline MMMP (document reference 7.7) has been produced and submitted as part of the DCO application, with JNCC guidance included.
MMO	PEIR – 14/07/2023 Chapter 12, Para 138	The MMO notes that Paragraph 138, states: 'The potential for PTS due to a single strike at the starting hammer energy (of 900kJ) will be provided in the ES, and to inform the in-principle MMMP. Underwater noise modelling for a single strike at the starting hammer energy has not been provided at this stage, however it will be required to inform mitigation requirements which will be confirmed at ES stage.' The MMO will provide further comments once this is provided.	Noted. The results of the underwater noise modelling for a single strike of the starting hammer energy are provided in ES Appendix 12.3 (Document Reference: 3.3.8), and an assessment of these effect ranges is provided in ES Appendix 12.4 (Document Reference: 3.3.9).
MMO	PEIR – 14/07/2023 Chapter 12, Para 145	Paragraph 145, states: "It is important to note that assessment for PTS from cumulative exposure is highly precautionary". The results are not necessarily highly precautionary given the variable	The text in this section has been amended to remove reference to the assessment being highly precautionary. Further detail on how results are

Consultee	Date / Document	Comment	Response / where addressed in the ES
		modelling parameters, and uncertainties regarding source levels, please see comments in Section 7 and 9 on modelling.	used within the assessments have been added, see Chapter 12 Section 12.6.1.
MMO	PEIR – 14/07/2023 Chapter 12, Para 308	Paragraph 308 (and comments also applies to paragraphs 355, 366, 499, 538 and elsewhere in this chapter) states: "There is unlikely to be any significant risk of any TTS, as again the modelling indicates that the marine mammal would have to remain <100m for 12 hours in a day, with the exception of harbour porpoise which would have to remain 200m or less during dredging for 12 hours, or for seal species, which would have to remain with 1km or less of rock placement for 12 hours to be at risk of TTS". The MMO believes that this statement is not accurate. The modelling is based on a fleeing receptor, and, therefore, the receptor is simply at risk if they are within 100m of the vessel when they start to move away (fleeing is about the receptor starting position). This should be corrected throughout the report as part of the ES.	This has been corrected throughout the relevant assessments in ES Chapter 12 Marine Mammals (Document Reference: 3.1.14).

1.4 Response to PEIR Appendix 12.1 Marine mammal baseline

12. Table 1.7 provides the consultation responses received from Natural England for the PEIR Appendix 12.1 Marine mammal baseline, received August 2023.

Table 1.7 Natural England PEIR Appendix 12.1 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR Appendix 12.1 MM baseline – 02/08/2023 Appendix 1, 102	When assessing connectivity, the maximum rather than the average foraging range should be considered, thus Natural England recommends that the list of screened in European sites is revised to account for this.	Screening list has been amended to include maximum foraging range rather than average, see the HRA Screening report (Document Reference: 7.1.1.1) for further details.
Natural England	PEIR Appendix 12.1 MM baseline – 02/08/2023 Appendix 1, 97-98	We note that NE England SMU for grey seals is no longer included within the assessment population of grey seals. This is inconsistent with the PEIR document where this SMU is included in the assessment. We advise consistency in the approach.	Both the SE MU reference population (30,592) and the wider reference population (SE and NE England MU populations combined, 56,505) of grey seals are presented in the EIA assessments. As a worst case it is assumed that all seals are from the nearest

Consultee	Date / Document	Comment	Response / where addressed in the ES
			MU, the SE England MU, although the more realistic assessment is based on wider reference population which takes into account the movement of seals, see ES Chapter 12 Marine Mammals (Document Reference: 7.1.14). For assessments in the RIAA, they are based on connectivity with SACs therefore the specific SAC populations are used for seal species, RIAA Part 3, Marine Mammals (Document reference: 7.1.3).

1.5 Response to PEIR Appendix 12.2 Underwater noise modelling

1.5.1 Natural England

13. Table 1.8 provides the consultation responses received from Natural England for the PEIR Appendix 12.2 underwater noise modelling, received August 2023.

Table 1.8 Natural England PEIR Appendix 12.2 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, 3.2.2, Page 14	Here, the Applicant states that up to four pin pile foundations can be installed in a 24-hour period. This applies to both sequential and simultaneous piling. We query how up to four pin piles has been considered in the simultaneous modelling scenarios and seek clarity regarding how this has been assessed. At present only simultaneous piling at North and South locations have been considered. Therefore, Natural England require conformation that simultaneous (pin) piling at more than two locations is not included in the project envelope. If up to four pin piles can be installed at two locations, it follows that two pin piles can be installed at each location (i.e., are installed sequentially). This should be reflected in the modelling.	New piling scenarios have been modelled for. The updated WCS include three sequential monopiles per day- at both south and east locations (6 piles per day in total); for pin piles the worst case is based on six piles per day at both south and east locations (12 piles per day in total), see ES Appendix 12.3 (Document Reference: 3.3.8) for further information.
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, 4.1.1, Page 22	The Applicant has noted that the impact ranges from pin piles are greater than monopiles because of the soft start and ramp up methods used, despite monopiles having a higher source level and maximum hammer energy. The Applicant	The soft-start and ramp-up scenarios have been reviewed and the pin pile scenario amended to reduce impact ranges; see ES Appendix 12.3

Consultee	Date / Document	Comment	Response / where addressed in the ES
		should provide further justification as to why the soft start and ramp up methods have been selected, and whether these can be varied in order to reduce the impact ranges to marine mammals.	(Document Reference: 3.3.8).
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, Table 4-3 Page 23	This table (and others) state in the caption that unweighted cumulative sound exposure levels (SEL_{cum}) are presented, whereas the text in the table states that weighted SEL_{cum} have been used. This should be consistent.	ES Appendix 12.3 (Document Reference: 3.3.8) has been amended to correct to the table headings.
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, Table 4-6 Page 24	Natural England notes that the maximum instantaneous PTS distance is 680m, based on monopiles and very high frequency (VHF) cetaceans. This maximum PTS distance should be considered when determining the appropriate size of the mitigation zone in the MMMP.	Maximum PTS distance has been considered for the MMMP, 700m mitigation zone has been proposed, as seen in the Outline MMMP (document reference 7.7).
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, 4.2 Page 33	The East location comprises the maximum propagation distances. We request that the Applicant demonstrates that inclusion of the East location in the multiple piling scenario would not lead to larger impact areas.	The East location has been included within the latest underwater noise modelling for simultaneous piling locations (ES Appendix 12.3 (Document Reference: 3.3.8)).
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, Table 4-35 Page 36	This table presents an in-combination area for TTS for VHF of 270km^2, which appears anomalous as it is smaller than the areas from North or South alone. This value should be checked	The multiple location modelling has been updated and checked, see Section 4.3.1 of ES Appendix 12.3 (Document Reference: 3.3.8).
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, Table 5-2 Page 40	The assessment assumes that other sources of noise during construction would only occur for 12 hours per day. However, evidence is not presented to justify this approach. We advise that it should be assumed that this noise could occur for 24 hours a day, unless there is evidence to the contrary.	The underwater noise modelling results have been updated to include 24 hours a day of working for all noisy activities; see ES Appendix 12.3 (Document Reference: 3.3.8).
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, Table 5-8 Page 45	Natural England best practice advice is to use 750kg plus an appropriate donor charge size as the maximum UXO size. The Applicant should justify why they have not used this value.	The underwater noise modelling and relevant assessments have been updated to include a UXO of up to 750kg, as seen in ES Appendix 12.5 (Document Reference: 3.3.10).
Natural England	PEIR Appendix 12.2 UWN modelling – 02/08/2023 Appendix 12.2, 6 Page 48	It is stated here that sequential piling causes negligible increases compared to single piling. Whilst it is only minor, we do note that for pin pile installation at the East location (the WCS), sequential piling leads to an impact range of 5.2km for VHF cetacean, compared	Maximum impact ranges have been used throughout the assessments within ES Chapter 12 Marine Mammals (Document Reference: 3.1.14) Section 12.6.1.1. for both single

Consultee	Date / Document	Comment	Response / where addressed in the ES
		to 5.1km for single piling. The maximum impact range should be used in the assessment, and it is noted that this does relate to sequential piling.	strike and cumulative modelling scenarios.

1.5.2 MMO

14. Table 1.7 provides the consultation responses received from the MMO for the PEIR Appendix 12.2 underwater noise modelling, received July 2023.

Table 1.9 MMO PEIR Appendix 12.2 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 2.2	This report appropriately provides details of the underwater noise modelling undertaken to support the PEIR. For the assessment of the cumulative sound exposure, a fleeing animal receptor has been assumed for marine mammals, with 'fleeing' speeds of 3.25m/s for low-frequency cetaceans and 1.5m/s for all other receptors.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 3	The general approach / methodology to the underwater noise modelling is largely appropriate, and effort has been undertaken to produce an informative report, along with details of the input parameters used in the modelling. The assessment refers to appropriate noise exposure criteria for marine receptors. The MMO agrees with the report that at the time of writing, Southall *et al*. (2019) and Popper *et al*. (2014) represent the most up-to date and authoritative criteria for marine mammals and fish respectively.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Figure 3.1	Figure 3-1 (Appendix 12.2 Underwater Noise Modelling Report) shows a comparison between example measured impact piling data and modelled data using INSPIRE version Firstly, the pile sizes used in this comparison are much smaller than the proposed 12 or 17m diameter for North Falls OWF (i.e., 1.8m pile, 9.5m pile, 6.1m pile, and 6m pile). Secondly, providing the hammer energies as well as pile diameter would be helpful (it is very unlikely that the hammer energies will be close to the proposed 6,000Kj hammer energy for North Falls OWF).	The lack of data available for the assessment of the largest foundations and largest hammer energies is acknowledged; this data is not available. INSPIRE uses an extrapolation based on the best available data at the time of modelling and to date this extrapolation has produced results that have been demonstrated to be reasonable when monitoring of the piling has been undertaken on previous developments.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		Thirdly, further evidence is required in terms of the SEL_{ss} and not just the SPL_{peak}. The MMO recommends these points should be addressed in the ES.	In respect of validation for single strike Sound Exposure Level (SEL_{ss}), any future revision of the Underwater Noise Modelling Report will include charts equivalent to those provided for peak Sound Pressure Level (SPL_{peak}).
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 3.1	In section 3.1 the report states: "The current version of INSPIRE (version 5.1) is the product of re-analysing all the impact piling noise measurements in SubAcoustech Environmental measurement database and cross-referencing it with blow energy data from piling logs…. This analysis showed that, based on the most up-to-date measurement data for large piles at high blow energies, the previous iterations of INSPIRE tended to overestimate the predicted noise levels at these blow energies… With this in mind, the current version of INSPIRE attempts to calculate closer to the average fit of the measured noise levels at all ranges". The MMO welcomes this clarification, and acknowledges the drive for reducing unnecessary conservatism in modelling. Allegedly, the current version of INSPIRE should produce more realistic predictions.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 4.1	In Section 4.1 Single location modelling – monopiles the following maximum PTS (SEL_{cum}) injury ranges in marine mammals are predicted: a. 3.2km for very-high frequency (VHF) cetaceans (i.e., harbour porpoise), b. 7.0km for low frequency (LF) cetaceans (i.e., minke whale), and c. < 100m for phocid pinnipeds (i.e., seals) TTS ranges of 24km, 30km and 8.9km were predicted for VHF cetaceans, LF cetaceans and phocids respectively. For fish, a maximum range of 33km (stationary receptor) was predicted for TTS using the Popper *et al*. (2014) criteria, as well as potential mortal injury	Noted.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		(6.0km) and recoverable injury (9.3km).	
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 4.1	The predicted ranges for fish look credible based on the modelling parameters. The MMO has been able to somewhat match the Subacoustech predictions for marine mammals, but it is important to note that predictions will vary greatly, depending on a particular transect and chosen sound propagation parameters (i.e., seabed sediment parameters). This, however, also means that varying certain parameters (e.g., source levels, or the choice of geo-acoustic properties for a generic sandy-type seabed) can lead to sizeable differences in predictions. The salient point to note is that the results are certainly within the plausible range of outcomes but at the same time not necessarily over-precautionary.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 4.1	In relation to pin piles, overall, larger effect ranges are predicted for pin piles, for the reasons explained in the assessment (i.e., the piling profile and fleeing assumptions). The following maximum PTS (SEL_{cum}) injury ranges in marine mammals are predicted: d. 5.1km for VHF cetaceans (i.e., harbour porpoise), e. 10km for LF cetaceans (i.e., minke whale), and f. < 100m for phocid pinnipeds (i.e., seals) TTS ranges of 26km, 35km and 11km were predicted for VHF cetaceans, LF cetaceans and phocids respectively. For fish, a maximum range of 25km (stationary receptor) was predicted for TTS using the Popper *et al*. (2014) criteria, as well as potential mortal injury (3.3km) and recoverable injury (5.5km).	Noted. For pin piles, the soft-start and ramp-up procedure has been amended with the result of lower effect ranges. See ES Appendix 12.3 (Document Reference: 3.3.8) for further information.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 4.1	In relation to Section 4.1 Sequential pile installation, for monopiles it is expected that in a 24-hour period, up to two monopile foundations, or four pin pile foundations can be installed. For marine mammals, and for two monopiles, the predicted ranges are the same as those predicted for a single monopile. The time it	Noted.

Consultee	Date / Document	Comment	Response / where addressed in the ES
		takes to install one monopile is 7.5 hours. Therefore, by the time the subsequent pile is installed, the fleeing receptor (in the case of marine mammals) is at such a distance that the additional exposure is minimum (assuming the animal continues to flee throughout the piling period).	
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 4.1	However, when considering a stationary animal (as in the case of fish), the ranges are increased because the receptor is receiving noise from double the number of strikes. For example, for a single monopile, the predicted TTS (SEL_{cum}) range is 33km, which increases to 39km based on the cumulative exposure of two monopiles.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 4.1	For pin piles, in general, there is no increase in effect from multiple pin piles for marine mammals (due to the fleeing animal assumptions). For fish, there is an increase in the predicted effect zones, as expected. TTS (SEL_{cum} increases from 25km to 36km, for example.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Table 4.35	It is appropriate that simultaneous piling has also been considered, although please double check the TTS prediction for VHF cetaceans in Table 4-35, as this is incorrect.	VHF cetaceans TTS prediction has been updated based on new modelling results; see ES Appendix 12.3 (Document Reference: 3.3.8).
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 5	Small effect ranges (largely <100m, with the exception of suction dredging, rock placement and large vessels) have been predicted for other sources of noise (i.e., cable laying, suction dredging, trenching, rock placement and vessel noise). A fleeing animal receptor has been assumed for all marine mammals, and therefore the predicted effect ranges are minimal. Small effect ranges are predicted for fish receptors.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Figure 5.2	Figure 5-2 (Appendix 12.2. Underwater Noise Modelling Report) presents a level against range plot for the two turbine sizes using the Tougaard *et al*. (2020) calculation, assuming an average 6ms-1 wind speed. This formula represents a statistical model that was used to assess the correlation between SPL and	This is agreed to some extent: the Applicant would not recommend that this formula be used to predict noise levels at 1m from the pile, nor in the far field, e.g. beyond 500m at the closest. However, all estimations of impact are less than 100m, and so no

Consultee	Date / Document	Comment	Response / where addressed in the ES
		various parameters (distance, wind speed, turbine size) for the data in the Tougaard study. However, the MMO considers that this is not suitable for estimation of the sound levels (SLs) @1m in a bespoke model, or as substitute for modelling the propagation loss to the far field. In particular, in terms of estimating propagation, the use of the formula would imply a loss of 23.7 log R, which is unrealistically large, and thus will lead to underestimation of the levels in the far field.	prediction is made at this order of distances. It is worth noting that new research by Holme *et al* (2023) found that Tougaard *et al*. (2020) overestimated the noise measured near (70m) from a 6.3MW and an 8.3MW wind turbine. Data for larger turbines is not yet available.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 5	For UXO clearance the MMO notes that the maximum equivalent charge weight for the potential UXO devices that could be present within the North Falls OWF site boundary has been estimated as 698kg + donor (which equates to 698.5kg). This has been modelled alongside a range of smaller devices. In addition, low-order deflagration has been assessed, which assumes that the donor or shaped-charge (charge weight 0.5kg) detonates fully to initiate a burnout of the explosive but without the follow-up detonation of the UXO.	Noted.
MMO	PEIR, Appendix 12.2 UWN modelling – 14/07/2023 Appendix 12.2, Section 5	To estimate the potential impact from UXO detonation, an attenuation correction has been added to the Soloway and Dahl (2014) equations for the absorption over long ranges (i.e., of the order of thousands of metres), based on measurements of high intensity noise propagation taken in the North Sea and Irish Sea (section 5.3.1 of the report). The maximum PTS range calculated (based on the worst-case UXO) is 13km for VHF cetaceans (SPL_{peak} criteria) (with a TTS range of 25km). For fish, the maximum range is 890m. The MMO has conducted a spot check of the worst-case predictions which look reasonable (a PTS prediction of ~14km for VHF cetaceans assuming the methodology from Soloway and Dahl and no attenuation correction).	Noted.

1.6 Response to PEIR Appendix 12.3 Underwater noise technical assessment

1.6.1 Natural England

15. Table 1.10 provides the consultation responses received from Natural England for the PEIR Appendix 12.3 Underwater noise technical assessment, received August 2023.

Table 1.10 Natural England PEIR Appendix 12.3 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR Appendix 12.3 UWN assessment – 02/08/2023 Appendix 12.3, 1.2.1.3 Pages 14-15	Here the Applicant states that the soft start occurs over the first 30 minutes. However, this does not align with the time increments in Table 1.1, where 30 minutes from the start falls within the second stage of the ramp up. The Applicant should review their position that the soft start is 30 minutes, in relation to the monopile ramp up.	Soft start and ramp up procedures have been reviewed and applied consistently throughout the reports, see ES Appendix 12.3 (Document Reference: 3.3.8) for soft start and ramp up details.
Natural England	PEIR Appendix 12.3 UWN assessment – 02/08/2023 Appendix 12.3, Table 1.1 Page 15	The number of pile strikes for two monopiles is incorrect, it should read 26,600.	This has been updated in ES Appendix 12.4 (Document Reference: 3.3.9).
Natural England	PEIR Appendix 12.3 UWN assessment – 02/08/2023 Appendix 12.3, 1.2.2 Page 23	Natural England supports the use of dose response curves to assess disturbance, where available for the species.	Noted.
Natural England	PEIR Appendix 12.3 UWN assessment – 02/08/2023 Appendix 12.3, Table 1.5 Page 24	The percentage of the population that is impacted based on the harbour porpoise summer density is incorrect. It currently states 0.001%, but it should be lower. This should be changed to demonstrate that the Negligible magnitude is correct.	All assessments have been updated and checked in ES Appendix 12.4 (Document Reference: 3.3.9).
Natural England	PEIR Appendix 12.3 UWN assessment – 02/08/2023 Appendix 12.3, Table 1.5 and others Page 25	There are some magnitudes in this table which appear to be on the threshold of the higher magnitude definition, but have not been assigned that higher magnitude (e.g., 0.01% being Low, 0.001% being Negligible). The magnitudes in this table, and other tables, should be checked.	Magnitude levels have been reviewed and updated throughout assessments in ES Appendix 12.4 (Document Reference: 3.3.9).
Natural England	PEIR Appendix 12.3 UWN assessment – 02/08/2023 Appendix 12.3, Table 1.22 Pages 58 and 60	As per the underwater noise modelling report (Table 5-4), the TTS ranges for rock placement is 1.0km for VHF cetaceans, rather than 0.1km as has been presented here. This value should be corrected and the assessment re-calculated.	Assessments have been updated in ES Appendix 12.4 (Document Reference: 3.3.9).

1.6.2 MMO

16. Table 1.11 provides the consultation responses received from the MMO for the PEIR Appendix 12.3 Underwater noise technical assessment, received July 2023.

Table 1.11 MMO PEIR Appendix 12.3 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
MMO	PEIR, Appendix 12.3 UWN assessment – 14/07/2023 Appendix 12.3	Appendix 12.3 provides a helpful high-level summary of the underwater noise modelling (full details are in Appendix 11.2). An assessment of potential effects (and magnitude) has also been undertaken in this appendix, based on density estimates and reference populations, and the MMO defers to Natural England for comments on the suitability of the data presented for marine mammals.	Noted.
MMO	PEIR, Appendix 12.3 UWN assessment – 14/07/2023 Appendix 12.3, Table 1.14	In relation to Table 1.14, the magnitude of effect for TTS (temporary hearing loss) from the cumulative exposure of one monopile in a 24-hour period, has been assessed as negligible for all marine mammal species. As an example, for harbour porpoise, an estimated 0.63% of the North Sea MU reference population (based on the site-specific worst case aerial annual density estimate) is at risk. However, this equates to 2,168 individual harbour porpoises at risk, so the numbers are far from insignificant. It is vital that appropriate mitigation is put in place to reduce the risk of potential impact on sensitive marine receptors, especially considering the cumulative effect from offshore wind development across UK waters.	All potential mitigation measures are being considered such including noise reduction measures (such as bubble curtains). Further information is provided within the Outline MMMP (document reference 7.7).
MMO	PEIR, Appendix 12.3 UWN assessment – 14/07/2023 Appendix 12.3, Table 1.24	Please could the values in Table 1.24 be double checked for harbour porpoise and seals (the values for minke whale look correct based on an impact range of 0.1km). For harbour porpoise, impact ranges are greater than 0.1km (100m) for some of the activities (i.e., 1.0km for rock placement).	Assessments have been checked and updated in ES Appendix 12.4 (Document Reference: 3.3.9).

1.7 Response to PEIR Appendix 12.4 Marine mammal UXO assessment

1.7.1 Natural England

17. Table 1.12 provides the consultation responses received from the Natural England for the PEIR Appendix 12.4 Marine mammal UXO assessment, received August 2023.

Table 1.12 Natural England Appendix 12.4 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR Appendix 12.4 Marine Mammal UXO – 01/08/2023 Appendix 12.4, 1	Natural England notes that the UXO assessment is provided for information purposes only and that a separate marine licence application will be submitted post-consent once more details become available.	Noted.
Natural England	PEIR Appendix 12.4 Marine Mammal UXO – 01/08/2023 Appendix 12.4, Table 1.2	Natural England recommends that Passive Acoustic Monitoring (PAM) is considered as a potential mitigation measure for UXO clearance alongside Marine Mammal Observers (MMOs).	The potential use of PAM has been considered and has been listed as a potential mitigation measure for UXO clearance. Further information is provided within the Outline MMMP (document reference 7.7).
Natural England	PEIR Appendix 12.4 Marine Mammal UXO – 01/08/2023 Appendix 12.4, 54	Natural England agrees that alternative mitigation measures such as bubble curtains for high order clearance larger than 55kg are required to fully mitigate the PTS impact range and avoid injury to EPS. Nb. If there is any residual effect, i.e., potential for injury, it is a requirement to demonstrate that all mitigation options have been considered (i.e. the second test) in order for EPS licence to be granted.	All mitigation measures will be considered depending on the outcome of EPS risk assessments.

1.7.2 MMO

18. Table 1.13 provides the consultation responses received from the MMO for the PEIR Appendix 12.4 Marine mammal UXO assessment, received July 2023.

Table 1.13 MMO PEIR Appendix 12.4 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
MMO	PEIR, Appendix 12.4 MM UXO – 14/07/2023 Appendix 12.4, Para 57	Paragraph 57 states: "The proposed mitigation measures for consideration in the MMMP for UXO clearance include, the use of low-order clearance techniques, such as deflagration, establishing a monitoring zone and surveying prior to UXO clearance, the use of	Proposed mitigation for UXO clearance has been reviewed and described further in the Outline MMMP (document reference 7.7).

Consultee	Date / Document	Comment	Response / where addressed in the ES
		ADDs if any high-order detonations are required". The MMO recommends that viable noise abatement measures are also considered within the MMMP for UXO clearance. As noted in para 54 of the appendix, "there is the potential for injury to occur for harbour porpoise for a high-order clearance of UXO of higher than 55kg. Alternative mitigation or noise reduction options would be required (e.g. bubble curtains) to avoid injury to this EPS, or, if not possible to wholly mitigate the potential for auditory injury, an EPS licence for injury would be applied for, at the time of the Marine Licence application". For an EPS licence to be issued, there must be no satisfactory alternatives.	
MMO	PEIR, Appendix 12.4 MM UXO – 14/07/2023 Appendix 12.4, Para 65	Para 65 Minor Comment In relation to disturbance for low-order clearance (the preferred clearance method) and Effective Deterrent Radius (EDR) paragraph 65 states: "As a precautionary approach, it has been assumed that there could be an estimated worst case of 5km disturbance range (78.54km^2) including vessels". Evidence to support the 5km EDR must be provided; this this is standard for OWF developments.	Reference to why the 5km EDR has been used has been added to the text in ES Appendix 12.5 (Document Reference: 3.3.10).

1.8 Response to PEIR Appendix 12.5 Cumulative Effect Assessment

19. Table 1.14 provides the consultation responses received from Natural England for the PEIR Appendix 12.5 CEA, received August 2023.

Table 1.14 Natural England PEIR Appendix 12.5 consultation comments

Consultee	Date / Document	Comment	Response / where addressed in the ES
Natural England	PEIR Appendix 12.5 Marine Mammal CEA – 02/08/2023 Appendix 12.5. 1	Natural England notes that the assessment of cumulative effects presented in the PEIR is preliminary and the full CEA will be presented in the ES.	CEA list has been updated for the ES submission, as seen in ES Appendix 12.6 (Document Reference: 3.3.11).

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