Addendum to the Environmental Impact Assessment Report

NISA

North Irish Sea Array

Volume 3 - Offshore Chapters

Chapter 14
Marine Mammal Ecology

Statkraft

CIP
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14. Marine Mammal Ecology

North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as 'the Developer') has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála's behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Amendments are therefore required to Chapter 14 Marine Mammal Ecology of the 2024 Environmental Impact Assessment Report (EIAR). Full details of consultation undertaken can be found in Appendix A.1.2: Consultation Report.

For the purposes of clarity, this document shall be read in conjunction with Chapter 14 submitted as part of the 2024 EIAR.

Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within the Addendum to the EIAR unless explicitly stated otherwise. Any cross reference to anything included in the 2024 EIAR will be clearly labelled as such.

Text in bold is only used throughout this document to indicate where changes are required, and what is subsequently driving them. Text in italics is text from a section of the 2024 EIAR which is deleted, or quotations from other documents (as explicitly stated). Replacement text is in normal font.

Tables which have been updated from the 2024 EIAR, or entirely new tables, have been included in the Addendum to the EIAR. These can be identified by the "A" prefix in the caption. Any changes within an updated table, in comparison to tables within the 2024 EIAR, are indicated by grey shading in the relevant cell, column or row, as necessary.

The sections relevant to Chapter 14 in the RFI are included below.

RFI Section	RFI	Relevance to Chapter 14
1 (b)	The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required.	The timeframes associated with the RFI have necessitated a review of the datasets previously used in the 2024 EIAR to ensure any necessary updates to the baseline environment are captured. Therefore, a review of the baseline environment has been undertaken to comply with RFI Section 1 (b).
4	The documentation submitted does not provide specific detail, assessment, or review of the range of ecosystem functions and services which could be impacted by the proposed development. The National Marine Planning Framework (NMPF) states that proposals to protect, maintain, restore, and enhance coastal habitats for ecosystem functioning and provision of ecosystem services will be supported, subject to the outcome of statutory environmental assessment processes. Seafloor and Water Column Integrity Policy 3 of the NMPF also requires proposals to take account of the space required for coastal habitats, for ecosystem functioning and the provision of ecosystem services and to demonstrate that they will, in order of preference, avoid, minimise or mitigate for net loss of coastal habitats. The applicant is requested to update the EIAR to include an assessment of impacts (both positive and negative) on relevant ecosystem functions and services and include mitigation measures, as appropriate. The	The Developer has not revised assessments in the respective Chapters of the EIAR as the conclusions of the EIAR are already directly linked to the assessment of ecosystem functions and services. This includes assessment of decommissioning impacts, the need for adaptive management, ongoing monitoring and/or other mitigations. A synopsis report of ecosystem functions and services has been provided in Appendix A3.3: Ecosystem Functions and Services Assessment. The outcome of individual receptor assessments, concluded no material impact on ecosystem services, and no impediment to the ability of normal ecosystem functions and services to function, resulting from the proposed development.

RFI Section	RFI	Relevance to Chapter 14
	applicant is also requested to submit a synopsis report of the relevant impacts on ecosystem functions and services. In identifying the relevant ecosystem services for assessment, including those services classified as provisioning, regulation and maintenance, and cultural services, the applicant is advised to consider the full range of ecosystem services set out in the report 'Valuing Ireland's Blue Ecosystem Services' (SEMRU of NUI Galway, 2018), as referenced in the NMPF. The report should also consider the need for an adaptive management framework for ongoing assessment and should include provision for appropriate monitoring of any mitigation measures and operational management strategies, as well as provision for decommissioning.	
5	The Board notes that cumulative assessment was addressed under each topic specific chapter in the EIAR and addressed within Chapter 38 Cumulative and Interrelated Effects Assessment (CEA) (and associated Appendices 38.1 and 38.2). The Marine Institute in their observation raises concerns in relation to the methodology applied in the submitted cumulative effects assessment and the manner in which the information is presented, noting the lack of a standard Irish methodology in relation to CEA. The applicant is advised that guidance exists in the UK, namely Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK, September 2024 (NSIP, 2024). The applicant is requested to revise the submitted cumulative assessment in line with NSIP (2024) and submit a standalone document to clearly demonstrate the CEA conclusions. In the interests of consistency and transparency, the applicant is requested to complete the assessment in accordance with the templates provided in the NSIP (2024), namely "Appendix 1: Matrix 1 – Identification of 'other development' for CEA" and "Appendix 2: Matrix 1 – Assessment matrix" (see attached Appendix B). This assessment should include each of the Irish Sea Phase 1 ORE Projects, namely (Oriel WF (ABP-319799-24), Arklow WF (ABP-319864-24), Codling Wind Park (ABP-320768-24), and Dublin Array WF (ABP-321992-25), and all other relevant projects in the International Council for the Exploration of the Sea (ICES) Celtic Sea and Greater North Sea ecoregions, regardless of project type. It is further requested that the applicant confirm that the now published documentation pertaining to the Irish Sea Phase 1 ORE projects, which have all been submitted to the Board for planning consent since this application was submitted, have been fully incorporated into the cumulative effects assessment. In accordance with NSIP (2024) tiered approach, it is requested that the subject proposal and each of the Irish Sea Phase 1 ORE projects be classified under Tier 1 ("Other existing and, or approved development submitted applications under the Planning Acts or other regimes but not yet determined"). The applicant is requested to update the application documentation, where relevant.	The cumulative effects assessment has been revised in line with NSIP (2024) and relevant sections of Chapter 14 Marine Mammal Ecology have been updated.

RFI Section	RFI	Relevance to Chapter 14
	In the interests of comprehensiveness and for ease of reference, the applicant is strongly encouraged to liaise with the other Irish Sea Phase 1 ORE Project applicants in the preparation of the above assessment and drafting of the tables attached in Appendix B.	
10 (a)	The details that have been submitted in relation to underwater noise arising from the proposed development acknowledges the potential for impacts to arise on marine fauna from both Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) over significant areas. The Wildlife Act 1976, as amended, lists marine mammals, including all dolphin, porpoise, seal and whale species as protected, (with subsequent regulations also applying protections to all species of marine turtles and basking sharks) stating that it is an offence to hunt, injure, or wilfully interfere with/destroy the resting or breeding place of such species. The January 2014 'Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources' published by the Department of Arts, Heritage and the Gaeltacht (NPWS (2014)), notes that sound sources with the potential to induce TTS in a receiving marine mammal has the potential to cause both disturbance and injury. This guidance has a statutory basis under Regulation 71 of SI No. 477 of 2011, and refers to the "offence to injure" under the Wildlife Act, 1976, noting that TTS "may constitute such an injury". Having regard to information submitted in the EIAR, the NPWS underwater noise guidelines (NPWS, 2014), the strict protections afforded to marine mammals under the Wildlife Act 1976, as amended, in addition to observations from prescribed bodies and observers, the Board requires a comprehensive suite of noise abatement measures to be proposed and assessed in addition to the existing mitigation measures referenced in the planning application documentation. The applicant is therefore requested to submit: i. A comprehensive review of relevant mitigation, in addition to what is currently contained in the submitted documentation, specifically appropriate noise abatement measures, which could be applied to the proposed development to reduce/restrict the propagation of noise through the marine environment and provide realistic values for the reduction in sound level possible from these technologies. The review must consider the range of suitable abatement measures available, including consideration of, at a minimum, bubble curtains, casings, resonators, and alternative hammer/piling technologies to reduce noise emissions, and set out in detail the suitability of such measures for the construction of the proposed development at this location, including restrictions in relation to their suitability, where relevant. ii. The applicant must also consider and draw on the best available technology and thresholds, including as applied in other EU jurisdictions (e.g. Germany; Belgium; Netherlands; Denmark), to identify and provide for suitable noise abatement to reduce the level and extent of potential noise	As detailed in Appendix A5.1 Design Refinements, the refinement of WTG foundations installation methodology to jackets with suction buckets significantly reduces underwater noise during installation when compared to monopiles and jackets with pin piles. The assessment in this chapter has been updated to reflect the design refinements and the change in potential underwater noise impacts, which removes piling from the construction strategy. In response to the point on TTS having the potential to cause both disturbance and injury, the Developer does not consider TTS to be auditory injury as stated in Section 14.2.10 Auditory Injury of Chapter 14, and further detail justifying this position is provided in Appendix A14.4: Temporary Threshold Shift Position Statement. In response to points a) i – ii on noise abatement: In proposing this design embedded mitigation measure (of WTG jackets with a suction bucket construction methodology) it negates the need for additional noise abatement or Noise Abatement Systems (NAS) as a mitigation measure for underwater noise generation in relation to WTG foundation installation. The Developer has provided further assessment and rationale for this in Chapter 14: Marine Mammal Ecology. The Developer has committed to the use of NAS (e.g. bubble curtains or similar) in the event that low order clearance of UXO is not possible, and high order UXO clearance may be required. Further information is provided in Section 7.5 of Appendix A14.5 Marine Mammal Mitigation Protocol. Pre-clearance ADD deployment is not necessary for low-order clearance but will be used for high-order clearance (with NAS also employed). Information about the evidence base behind the effectiveness of the ADDs is provided in Appendix E to the Appendix A14.5: Marine Mammal Mitigation Protocol. In response to point iii. on noise modelling and mapping: As the Developer will not be undertaking piling, and noise abatement will not be required for the installation of foundations, there is no requirement for revised modelling and mapping.

RFI Section	RFI	Relevance to Chapter 14
	impacts arising from the proposed development. Examples include the German 160 dB re 1 µPa²s SELss and 190 dB re 1 µPa SPLpeak thresholds that must not be exceeded at a distance of 750m from a piling site; or the frequency weighted SELcum PTS thresholds (e.g. harbour porpoise 155 dB re 1µPa2s) that must not be exceeded for a fleeing animal with a starting distance of 200m in Denmark. iii. Revised noise modelling and mapping which provides detailed consideration of the noise abatement strategy selected in response to (i) above and include: 1. The modelled SPL_{peak} and SEL_{cum} PTS and TTS contours, for each functional hearing group potentially present, emanating from the existing locations proposed in the application, which are at the periphery of the proposed development, to demonstrate the full potential spatial extent of underwater noise propagation. Modelling must also show the noise level (SPL_{peak}, SEL_{ss}) at 750m from the locations of each of the piling activities selection. 2. The modelled SEL_{ss} contours for 120-180 dB re 1µPa2s at 5 dB increments at the locations in the point above. Mapping provided must show the relevant noise contours in the context of implementing the abatement technologies/ measures identified at (1) above, and should be displayed alongside the noise contours in the absence of any such noise abatement measures being implemented. 3. Revised details showing the change in total impacted individuals of each species before and after consideration of noise abatement technologies. 4. Modelling must be performed for monopiles and pin piles, as both are under consideration within the project design envelope. 5. Any additional abatement and / or mitigation measures should also be considered in the context of their potential for reduction of cumulative effects with other projects in terms of underwater noise.	
10 (b)	The applicant is invited to submit any details of monitoring/reporting available from previous experience of offshore development in other EU jurisdictions which demonstrates the efficacy of mitigation measures adopted in relation to underwater noise.	The Developer has included summary outcomes of monitoring of SBJs to demonstrate the efficacy of the foundation type in relation to underwater noise in this chapter and Appendix A14.1 Underwater Noise. The Developer has no current projects that have SBJ installed therefore no relevant monitoring from the Developers portfolio available.

RFI Section	RFI	Relevance to Chapter 14
10 (c)	Further to point a) above, there is a lack of clarity and certainty in the submitted documentation as to whether Acoustic Deterrent Devices and Noise Abatement Systems (NAS) will be used, with wording varying across the documentation between 'may' be used and 'will' be used. There is also uncertainty in terms of the efficacy of the mitigation measures that are proposed given proposed future re-modelling based on unknown factors which may or may not have an impact in terms of noise ranges and frequencies (Chapter 14, table 14.45).	Based on the design refinements, the Developer in proposing the design mitigation measure of WTG jackets with a suction bucket construction methodology negates the need for noise abatement as a mitigation measure for underwater noise generation in relation to WTG foundation installation and has provided further assessment and rationale for this in this chapter.
10 (d)	With reference to the Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects Part 2, April 2018 by the Department of Communications Climate Action and Environment (DCCAE) (DCCAE (2018) Guidance), the applicant is requested to justify: i. The selection of a 4km buffer area extending around the array area. The DCCAE (2018) Guidance recommends a minimum buffer of 10 km for cetaceans and seals, with monthly haul-out site surveys. ii. The lack of empirical acoustic data, noting the Department of Housing, Local Government and Heritage, Development Application Unit (DAU) observation which states the omission of acoustic monitoring does not allow the site to be fully characterised for all Annex IV species. iii. The lack of vantage point surveys at the cable landfall location.	Additional survey information has been included in Appendix 14.2 Marine Mammal Baseline and is summarised in this chapter. i) the survey area has been extended to cover the proposed development survey site and broader North-West Irish Sea Special Protection Area (September 2024 to August 2025) which extends beyond the minimum buffer of 10km. A monthly haul-out survey has been undertaken from June 2025 – May 2026 and this is provided in Appendix A14.3. ii) The industry standard, e.g. what is usually included in the baseline EIA reports, are digital aerial surveys (project-specific across the proposed development area plus appropriate buffer) and desktop reviews of existing datasets (e.g. SCANS surveys, SMRU data, telemetry and others) and these have been used to robustly characterise the baseline. iii) the proposed development has conducted seal counts at three land-based vantage points close to the proposed development landfall area in September 2024 and from June 2025 to May 2026, the results of which are considered within Section 14.3 Baseline Environment in this chapter.
10 (e)	The applicant is requested to confirm whether any on-going or additional surveying has been carried out on the site in relation to mobile species since the application was lodged. If so, the applicant is invited to submit any further survey data results and incorporate these into the assessments within the application documentation as appropriate.	Additional survey information has been included in Appendix A14.2 Marine Mammal Baseline and is summarised in this chapter.
10 (f)	The applicant is requested to more clearly define the methodology for the dose-response assessment. The studies on which the dose-response assessment is based (Graham, 2017a; 2019) are explained in detail, however the process of applying the dose-response curve to density maps to determine number of individuals disturbed is not clearly elaborated upon (e.g. description of density calculation within each isopleth and summing). The applicant is requested to address this issue.	The use of the dose-response curve is for estimating a behavioural response (disturbance) as a result of pile driving. Following further design refinement in response to the RFI 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets. Impacts relating to piling have been removed.
10 (g)	The Board notes the use of NOAA Level B Harassment Threshold (National Marine Fisheries Service, USA) for the assessment of behavioural disturbance rather than more recently defined thresholds in European jurisdictions (e.g. Danish threshold of 143 dB re 1µPa (or 103 dB re 1µPa VHF-weighted) single strike sound exposure level (SELss) (Tougaard, 2021).	Following further design refinement in response to the RFI 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets. Impacts relating to piling have been removed. Updated thresholds have been used for other impact pathways:

RFI Section	RFI	Relevance to Chapter 14
		• The new guidance from National Marine Fisheries Service (NMFS, 2024) replaces the PTS and TTS thresholds from Southall et al (2019) • 10 km EDR for mitigated high-order clearance (JNCC, 2025c) replaces 26 km EDR • 3 km EDR for geophysical surveys has been used (JNCC, 2025c)
10 (h)	The applicant is requested to fully assess disturbance from operational turbines.	An assessment of disturbance from operational noise has been added to this chapter.
10 (i)	The applicant is requested to clarify whether Ultra-short Baseline (USBL) positioning systems will be used during pre-construction surveys. If so, the applicant is requestedto include these systems in the assessment.	USBLs have been added to the assessment of pre-construction noise within this chapter.
10 (j)	The EIAR includes an analysis of the likely effect of PTS on minke whale, having regard to their estimated hearing range. The applicant is requested to supplement the analysis with additional literature on the hearing range of minke whale or impact of underwater noise on this species.	An assessment of impacts from UXO clearance and other construction activities (cable laying, trenching, rock placement, drilling) is provided in this chapter. Minke whale sensitivity to auditory injury (PTS) from piling is no longer relevant as pile driving has been removed from the construction strategy due to design refinements.
10 (k)	The applicant is requested to provide supporting reference/s for the statement in Chapter 14 that minke whales can 'tolerate temporary displacement from foraging areas due to their large size and capacity for energy storage	This text from Chapter 14: Marine Mammal Ecology of the 2024 EIAR referred to an assessment under sensitivity to disturbance from piling. This section is no longer relevant as pile driving has been removed from the design and construction strategy, and the text has been removed in Chapter 14.
10 (l)	The worst-case number of piling events does not account for contingency of having to move and re-pile if substrate does not accept the pile. The applicant is requested to add in this consideration or provide justification for its exclusion from the worst-case scenario.	Following further design refinement in response to the RFI 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets. Impacts relating to piling have been removed.
10 (m)	The DAU state in their observation that when assessing the risk of collisions between marine mammals and vessels, the applicant must include all data relevant to Irish waters and not solely rely on reports from UK monitoring programmes, e.g. those reported in Irish Whale and Dolphin Group Cetacean Stranding Schemes and Irish Whale & Dolphin Group Deep Diving and Rare Species Investigation Programme (both supported by NPWS funding). The applicant is requested to address this issue and incorporate the findings of these data sources in the submitted documentation.	The Developer requested further strandings data from IWDG. The request was declined by IWDG as the data is not relevant to the application as it does not include any information on the cause of death given that detailed necropsies have not been consistently carried out; and as they have not previously shared data with other Phase 1 projects. It is noted that while strandings are reported to IWDG by the public, there is no "regular, standardized post-mortem examinations of suitable carcasses to establish the cause of death" (McGovern et al, 2018), and therefore there is unlikely to be sufficient data available on the risk of vessel collision mortality in Irish waters to provide any further context to the assessment.
10 (n)	The DAU notes that monitoring for pinniped species at the location where the proposed development interacts with the shore was not carried out by the applicant and therefore there is no information on whether harbour and grey seals use this site. The applicant is requested	The Developer has undertaken monthly haul-out surveys which has been included as Appendix A14.3 Seal Vantage Point Survey Report. Surveys were undertaken in accordance with DCCAE (2018) guidance at the landfall site at Balbriggan, County

RFI Section	RFI	Relevance to Chapter 14
	to submit further information by means of specific surveys of the site for pinnipeds and that this should also be set in the context of seasonal changes in distribution of these species.	(Co.) Dublin in November 2024 and between June 2025 and May 2026, using VPs within the landfall site and a surrounding 500 metre (m) survey buffer Additional survey information has been included in Appendix A14.2 Marine Mammal Baseline Characterisation and is summarised in this chapter.
10 (o)	The applicant is requested to update the Marine Mammal Mitigation Protocol (MMMP) (Appendix 14.4 of EIAR and Appendix 10 of NIS) to include reference to TTS, as this may constitute injury under Irish legislation and guidance.	A TTS Position Statement is provided in Appendix A14.4, which details why the Developer does not consider TTS using the current TTS-onset threshold to be auditory injury.
10 (p)	As per DAHG (2014) Guidance, PAM may be used as a supplementary mitigation tool to optimise marine mammal detection, but not as a primary mitigation tool. The applicant is requested to clarify the relevant mitigation measures to be utilised.	The MMMP has been updated (Appendix A14.5) and is compliant with the DAHG (2014) guidance. This includes the primary mitigation method used for geophysical surveys or UXO clearances will be through the use of MMOs, visually monitoring the mitigation zone prior to operations commencing. PAM may be used to supplement MMO observations; however, it will not be used as the primary mitigation tool. This is because PAM cannot replace an MMO during periods of low visibility conditions or at night, but it can be used alongside an MMO in good visibility conditions. This is reflected in the mitigation measures applied in the impact assessment in this chapter.
10 (q)	The applicant is requested to address the possibility for temporal mitigation, for example limiting piling to periods that do not overlap with the harbour or grey seal pupping season or the harbour porpoise calving season, to further limit effects on nearby SACs.	Following design refinements to the proposed development, impact piled monopiles are no longer included as a foundation option for either Project Option 1 or Project Option 2, meaning that impact piling is no longer required for either WTG or OSP installation. Therefore, temporal mitigation does not need to be considered for piling. The proposed development Natura Impact Statement (NIS) contains an assessment of impacts on designated sites. It has identified no adverse effects on the integrity of SACs that need to be addressed with temporal mitigation.
10 (r)	The applicant is requested to provide further information regarding the piling schedule outlined in Chapter 14 of the EIAR and Appendix 14.6 to provide a more comprehensive assessment of potential adverse effects of cumulative noise (airborne and underwater) from concurrent pile driving across the Irish Sea Phase ORE 1 projects in the Irish Sea.	The Developer confirms that following further design refinement in response to the RFI 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets, therefore there is no piling required for the proposed development. All impacts assessed within Chapter 14 of EIAR that relate to piling have been removed in the updated Chapter 14, including within the cumulative effects assessment.
10 (s)	The applicant is requested to map maximum masking and behaviour impacts in the cumulative noise impact assessment on marine mammals, and fish and behavioural impacts for shellfish. The cumulative assessment should model impacts based on concurrent construction with and without noise abatement with at least one other windfarm in the Irish Sea. Critical periods of breeding and spawning should be identified and if these are associated with any known vocalisation	There are currently no industry standard marine mammal masking thresholds established in either the Ireland, the EU or the UK. A quantitative assessment for masking, such evaluation cannot be carried out currently. Although masking may have more far-reaching effects compared to behavioural disturbance, it is a more subtle interference of acoustic perception compared to behavioural disturbance, with studies indicating anti-masking strategies in a few species (Erbe et al, 2016). It is therefore considered that the effect concluded for

RFI Section	RFI	Relevance to Chapter 14
		masking would not be of greater magnitude and significance compared to behavioural disturbance and therefore there would be no change to the conclusions of the cumulative assessment presented in this chapter.
10 (t)	Notwithstanding the rationale provided in relation to the assessment of impacts of operational underwater noise on marine megafauna (Chapter 14, pg 14-42, of the EIAR), the applicant is requested to assess potential impacts from operational underwater noise on marine mammals in terms of the cumulative assessment with other Irish Sea Phase 1 ORE projects.	The Developer has included an assessment of operational underwater noise within Section 14.9 of this Chapter. This includes consideration of other Irish Sea Phase 1 ORE projects.

14.1 Introduction

The key change to this section is an update to the linked EIAR chapters that should be read in conjunction with Chapter 14.

The assessment should be read in conjunction with the following linked EIAR chapters:

- Chapter 13: Fish and Shellfish Ecology; and
- Chapter 10: Marine Geology, Oceanography and Physical Processes.

The assessment should be read in conjunction with the following appendices:

- Appendix A14.1: North Irish Sea Array: Underwater Noise Assessment;
- Appendix A14.2: Marine Mammal Baseline Characterisation;
- Appendix A14.3: Seal Vantage Point Survey Report 2025-2026;
- Appendix A14.4: Temporary Threshold Shift Position Statement;
- Appendix A14.5: Marine Mammal Mitigation Protocol; and
- Appendix 14.5: Environmental Vessel Management Plan of the 2024 EIAR.

The following Appendices from the 2024 EIAR have been removed;

- Appendix 14.3 of the 2024 EIAR; Marine Mammal Certainties and Limitations; and
- Appendix 14.6 of the 2024 EIAR; East Coast Phase One Irish Offshore Windfarms; Cumulative iPCoD Modelling

There are no other changes to this section. Refer to Section 14.1 of Chapter 14 of the 2024 EIAR.

14.2 Methodology

14.2.1 Introduction

There are no changes to this section. Refer to Section 14.2.1 of Chapter 14 of the 2024 EIAR.

14.2.2 Study Area

There are no changes to this section. Refer to Section 14.2.2 of Chapter 14 of the 2024 EIAR.

14.2.3 Relevant Guidance, Policy and Legislation

The key change to this section is the addition of new policy and guidance documents, in response to RFI Section 1 (b). In addition to the sources referenced in Section 14.2.3 of Chapter 14 of the 2024 EIAR, the following sources should be added:

- NMFS (2024): Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts;
- JNCC (2025a): DRAFT JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys;
- JNCC (2025b): JNCC guidelines for minimising the risk of injury to marine mammals from unexploded ordnance (UXO) clearance in the marine environment; and
- JNCC (2025c): Updated Effective Deterrent Ranges (EDRs) for assessing the significance of noise disturbance in harbour porpoise Special Areas of Conservation (SACs).

In Section 4 of the RFI, An Bord Pleanála requested the Developer to update the EIAR to include an assessment of impacts (both positive and negative) on ecosystem functions and services. The following text should be added to this section:

Marine ecosystem functions and services are considered within this chapter. The NMPF (2024) sets out the framework and proposed approach to managing Ireland's maritime activities to ensure the sustainable use of marine resources up to 2040. Environment policies in the NMPF have been split into nine categories largely aligned to the Marine Strategy Framework Directive (MSFD) Good Environmental Status (GES) descriptors as well as addressing air quality and climate change.

In particular, the Seafloor and Water Column Integrity Policy 3 of the NMPF also requires proposals to take account of the space required for coastal habitats, for ecosystem functioning and the provision of ecosystem services and to demonstrate that they will, in order of preference, avoid, minimise or mitigate for net loss of coastal habitats.

The conclusions of this chapter EIAR are directly linked to the assessment of ecosystem functions and services. Refer to Ecosystem Functions and Services Assessment (Appendix A3.3) which provides the link between MSFD, the Overarching Marine Planning Policy (OMPP) and EIAR topics.

There are no other changes to this section. Refer to Section 14.2.3 of Chapter 14 of the 2024 EIAR.

14.2.3.1 Habitats Directive 92/43/EEC

There are no changes to this section. Refer to Section 14.2.3.1 of Chapter 14 of the 2024 EIAR.

14.2.3.2 Wildlife Acts 1976 to 2021

There are no changes to this section. Refer to Section 14.2.3.2 of Chapter 14 of the 2024 EIAR.

14.2.3.3 Bonn Convention

There are no changes to this section. Refer to Section 14.2.3.3 of Chapter 14 of the 2024 EIAR.

14.2.3.4 Bern Convention

There are no changes to this section. Refer to Section 14.2.3.4 of Chapter 14 of the 2024 EIAR.

14.2.3.5 Whale Fisheries Act, 1937

There are no changes to this section. Refer to Section 14.2.3.5 of Chapter 14 of the 2024 EIAR.

14.2.3.6 National Marine Planning Framework

There are no changes to this section. Refer to Section 14.2.3.6 of Chapter 14 of the 2024 EIAR.

14.2.4 Data Collection and Collation

The key change required in this section is the inclusion of additional site-specific surveys to validate the earlier studies used to characterise the baseline (in response to RFI Sections 10 (e) and 9 (n)) and the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Table 14.2 in Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.1. For clarity, all changes are highlighted in grey.

Table A14.1 Data sources examined to inform the baseline characterisation for marine mammals (Replaces Table 14.2 in Chapter 14 of the 2024 EIAR).

Data source	Type of data	Temporal and spatial coverage
Updated 2024-2025 NWIS DAS (Sep 2024 – Aug 2025)	Digital aerial surveys	September 2024 to August 2025, the proposed development survey site and broader North-West Irish Sea(NWIS) candidate Special Protection Area (cSPA).
ObSERVE 2 (Giralt Paradell et al, 2024)	Visual aerial surveys	3 surveys: summer 2021, summer 2022 and the winter of 2022-2023. Offshore waters around Ireland, within and beyond Ireland's continental shelf. The offshore development area is entirely located within ObSERVE survey Stratum 5.
Gilles *et al* (2025) SCANS IV density surface	Predictive habitat-based models of cetaceans in European Atlantic waters in the summer of 2022 based on SCANS IV survey data	Modelled density surfaces cover the entire SCANS IV survey area. The proposed development is located within SCANS IV block CS-D.
Seal landfall surveys	Visual landfall surveys	Seal vantage point (VP) surveys have been undertaken at the landfall site at Balbriggan, County (Co.) Dublin in November 2024 and between June 2025 and May 2026, using VPs within the landfall site and a surrounding 500 metre (m) survey buffer, and following guidance from the following source: NPWS and Department of Communications Climate Action and Environment (NPWS, 2010; DCCAE, 2018) (refer to Appendix A14.3).These counts include counts of seals within the landfall area, both at-sea and hauled-out on land.
Irish seal haul-out surveys (Morris et al, 2025)	Aerial thermal-imaging	August 2024, surveys covered the whole Irish coastline.
Site-specific surveys	Combination of visual boat-based surveys and digital aerial surveys	The original site specific DAS survey extent mirrored the array area within the foreshore licence plus a 4km buffer. The DAS survey extent was updated in November 2020 to include the entire MAC boundary (which included the small area beyond 12nm that was not within the original DAS survey extent. Surveys conducted between November 2019 and October 2022.
ObSERVE (Rogan et al 2018)	Visual aerial surveys	4 surveys: summer 2015, winter 2015, summer 2016 and winter 2016. Offshore waters around Ireland, within and beyond Ireland's continental shelf. The offshore development area is entirely located within ObSERVE survey Stratum 5.
SCANS III & IV (Hammond et al, 2017, Hammond et al, 2021, Lacey et al, 2022, Gilles et al, 2023)	Aerial and vessel visual surveys	All European Atlantic waters. The offshore development area is located in block E (western Irish Sea) for SCANS III surveys. This block was renamed to block CS-D for SCANS IV.
SCANS II (Hammond et al 2013)	Aerial and vessel visual surveys	June & July 2005. All European Atlantic waters. Proposed development located in block O (entire Irish Sea).
Distribution and abundance of cetaceans Wales and its adjacent waters (Evans and	Maps of sighting rates and indicative density surface maps from aerial and vessel survey data	1990 – 2020. Wales and adjacent seas, including the whole Irish Sea.

Data source	Type of data	Temporal and spatial coverage
Waggitt 2023)		
Irish marine mammal atlas (Wall et al 2013)	Collation of data from IWDG, the ISCOPE I and II projects, ferry survey programme and the PReCAST surveys.	2005-2011. Irish EEZ.
IWDG Irish Sea surveys (Berrow et al 2011)	Visual and acoustic survey	2 surveys in August 2011. Inshore surveys in 2 blocks: Block A (northern Irish Sea – including the proposed development) and Block B (southern Irish Sea).
IWDG SAC surveys (Berrow and O'Brien 2013, O'Brien and Berrow 2016, Berrow et al 2021)	Visual and acoustic line transect surveys	1 survey in 2013. 4 surveys in 2016. 6 surveys in 2021. Rockabill to Dalkey Island SAC.
IWDG Irish coastal water surveys (Berrow et al 2008)	Vessel based visual line transect surveys and T-POD acoustic monitoring	6 survey days between July-September 2008. 5 sites (North County Dublin, Dublin Bay, Cork coast, Roaringwater Bay SAC and Galway Bay).
IWDG Greater Dublin Drainage Project surveys (Meade et al 2017)	Land based observations, vessel-based surveys and CPOD acoustic monitoring	24 surveys: March 2015-March 2017. Land: North-eastern cliffs of Howth Head. Vessel: waters off Loughshinny and Portmarnock area. CPODs: 3 sites: East of Loughshinny, North of Lambay Island and off Portmarnock.
MERP maps (Waggitt et al 2020)	Collation of data from JCP (aerial and vessel)	1980 and 2018. European Atlantic waters.
Seal counts 2017-2018 (Morris and Duck 2019)	Aerial survey	August 2017 and 2018. Entire coastline of Ireland.
Seal at-sea density (Carter et al 2020)(Carter et al, 2022)	Seal habitat-use derived from telemetry data	2005 – 2019 UK and Ireland
Seal telemetry (Cronin et al 2016)	Telemetry tags	Strangford Lough: 33x harbour seals (2006, 2008 & 2010). Raven Point (Co Wexford): 19x grey seals 2013 & 2014. Great Blasket Island: 8x grey seals 2009.
Seal counts 2005 (Ó Cadhla et al 2007)	Aerial survey	Spring & summer 2005. Entire coastline of the Republic of Ireland.
Seal counts 2017-18 (Morris and Duck 2019)	Aerial survey	August 2017 and 2018. Entire coastline of Ireland.
Seal telemetry (Cronin et al 2016)	Telemetry tags	Strangford Lough: 33x harbour seals (2006, 2008 & 2010). Raven Point (Co Wexford): 19x grey seals 2013 & 2014. Great Blasket Island: 8x grey seals 2009.
Codling surveys (Codling Wind Park Limited 2020)	Visual vessel surveys	April 2013 – March 2014 and again in Oct 2018 – Oct 2019. Codling Wind Park array area.
Arklow surveys (RPS 2020)	Visual vessel surveys Digital aerial surveys	Monthly vessel surveys: July 1996 and March 1997, and June 2000 and June 2009. Arklow Bank wind farm array area plus a 5km buffer. Monthly aerial surveys between March 2018 and February 2020. Lease Area plus a 4km buffer.

14.2.5 Site-specific Surveys

The key change for this section is the addition of NWIS DAS surveys undertaken in 2024 and 2025 in response to RFI Section 10 (e). The following paragraph shall be added to Section 14.2.5 of Chapter 14 of the 2024 EIAR:

Following submission of the 2024 EIAR, APEM were contracted by the Developer to conduct a 12 month DAS programme from September 2024 to August 2025 of the proposed development survey site and broader North-West Irish Sea (NWIS) candidate Special Protection Area (cSPA), collectively referred to as the Survey Area, covering a maximum area of 2,396km². See Appendix A14.2 for full details regarding the NWIS DAS.

There are no other changes required to this section. Refer to Section 14.2.5 of Chapter 14 of the EIAR.

14.2.6 Desk-Based Review

There are no changes to this section. Refer to Section 14.2.7 of Chapter 14 of the 2024 EIAR.

14.2.7 Data Limitations

There are no changes to this section. Refer to Section 14.2.7 of Chapter 14 of the 2024 EIAR.

14.2.8 Methodology for Assessment of Effects

There are no changes to this section. Refer to Section 14.2.8 of Chapter 14 of the 2024 EIAR.

14.2.8.1 Sensitivity criteria

There are no changes to this section. Refer to Section 14.2.8.1 of Chapter 14 of the 2024 EIAR.

14.2.8.2 Magnitude of Impact criteria

There are no changes to this section. Refer to Section 14.2.8.2 of Chapter 14 of the 2024 EIAR.

14.2.8.3 Defining the significance of effect

There are no changes to this section. Refer to Section 14.2.8.3 of Chapter 14 of the 2024 EIAR.

14.2.9 Auditory Injury

The key change for this section is the replacement of the Southall et al (2019) auditory injury thresholds used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds, in accordance with RFI Section 10 (g). In response to RFI Section 10 (a), the Developer does not consider TTS to be auditory injury, please refer to Appendix A1.4:4 TTS Position Statement which details this position.

The following paragraph of the Section 14.2.9 of Chapter 14 of the 2024 EIAR shall be deleted:

The PTS-onset thresholds used in this assessment are those presented in Southall et al (2019) (Table 14.6) and are weighted based upon the functional hearing groups and estimated functional hearing ranges of different marine mammal taxa (i.e, the varying frequencies they hear and communicate at) (Southall et al 2007, Southall et al 2019).

And be replaced with:

The PTS-onset thresholds used in this assessment are those presented in NMFS (2024) (Table A14.2) and are weighted based upon the functional hearing groups and estimated functional hearing ranges of different marine mammal taxa (i.e, the varying frequencies they hear and communicate at) (Southall et al, 2007, Southall et al, 2019, NMFS, 2024).

Table 14.6 in Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.2. For clarity, all changes are highlighted in grey.

Table A14.2 PTS-onset thresholds for impulsive noise (Source: NMFS, 2024) (Replaces Table 14.6 in Chapter 14 of the 2024 EIAR).

Hearing group	Species	Cumulative PTS (SEL_{cum} dB re 1 μPa^2s weighted)	Instantaneous PTS (SPL_{peak} dB re 1 µPa unweighted)
Very High Frequency (VHF) Cetacean	Harbour porpoise	159	202

Hearing group	Species	Cumulative PTS (SEL_{cum} dB re 1 μPa^2s weighted)	Instantaneous PTS (SPL_{peak} dB re 1 µPa unweighted)
High Frequency (HF) Cetacean	Dolphin species	193	230
Low Frequency (LF) Cetacean	Minke whale	183	222
Phocid (in water)	Grey and harbour seal	183	223

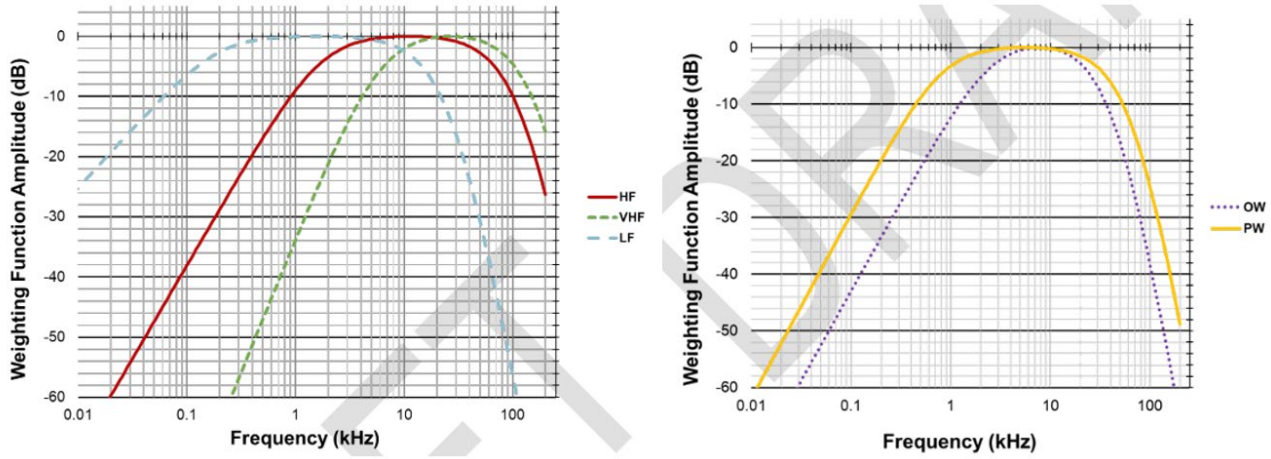
The following paragraph of the Section 14.2.9 of Chapter 14 of the 2024 EIAR shall be deleted:

Therefore, for the cumulative sound exposure level (SEL_{cum}), sound has been weighted based on species group specific weighting curves given in Southall et al (2019) (Graph 14.1).

And be replaced with:

Therefore, for the cumulative sound exposure level (SEL_{cum}), sound has been weighted based on species group specific weighting curves given in NMFS (2024) (Graph A14.1).

Graph 14.1 in Chapter 14 of the 2024 EIAR shall be deleted and replaced with Graph A14.1:



Graph A14.1: Auditory weighting functions for low frequency (LF), high frequency (HF) and very high frequency (VHF) cetaceans as well as phocid (PCW) pinnipeds in water Source: NMFS, 2024 (Replaces Graph 14.1 in Chapter 14 of the 2024 EIAR).

There are no other changes to this section. Refer to Section 14.2.9 of Chapter 14 of the 2024 EIAR.

14.2.9.1 PTS – pile driving

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2. In the 2024 EIAR, WTG monopile foundations and OSP monopile and jacket foundations with pin piles were considered. Following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with suction bucket jacket (SBJ) foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets. Therefore, PTS from pile driving is no longer assessed. Subsequently, the Section 14.2.9.1 of Chapter 14 of the 2024 EIAR shall be deleted.

14.2.9.2 PTS – UXO clearance

The key change for this section is the replacement of the Southall et al (2019) auditory injury thresholds used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds (in response to RFI Section 10 (g)). Following further design refinement in response to the RFI Section 10 (a), high order UXO clearance is now proposed with the commitment to at-source noise reduction (e.g. bubble curtain or similar).

The following paragraph of the Section 14.2.9.2 of Chapter 14 of the 2024 EIAR shall be deleted:

Current practice is that the PTS-onset thresholds in Southall et al (2019) should be used for assessing the impacts from UXO detonation on marine mammals. The Southall et al (2019) PTS-onset threshold metrics which are currently used for assessing impacts from UXO are believed to be potentially over-conservative, namely due to the fact there is a lack of empirical evidence from the action of UXO detonation to confirm that current propagation models for UXO detonation accurately predict the range at which PTS-onset thresholds are exceeded.

And be replaced with:

Current practice is that the PTS-onset thresholds in NMFS (2024) should be used for assessing the impacts from UXO detonation on marine mammals. The NMFS (2024) PTS-onset threshold metrics which are currently used for assessing impacts from UXO are believed to be potentially over-conservative, namely due to the fact there is a lack of empirical evidence from the action of UXO detonation to confirm that current propagation models for UXO detonation accurately predict the range at which PTS-onset thresholds are exceeded.

There are no other changes to this section. Refer to Section 14.2.9.2 of Chapter 14 of the 2024 EIAR.

14.2.9.3 PTS – Other construction activities

The key change to this section is the removal of dredging activities following updated bathymetry from the geophysical survey campaign, and a change to the use of drilling from potential use for some WTG piles to potential drilling of OSP foundations only (refer to Appendix A5.1: Design Refinements).

There are no other changes to this section. Refer to Section 14.2.9.3 of Chapter 14 of the 2024 EIAR.

14.2.10 Assessment of Disturbance (behavioural response)

There are no changes to this introductory section. Refer to Section 14.2.10 of Chapter 14 of the 2024 EIAR.

14.2.10.1 Disturbance from piling

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, disturbance from pile driving is no longer assessed. Subsequently, the Section 14.2.10.1 of Chapter 14 of the 2024 EIAR shall be deleted.

14.2.10.2 Disturbance (behavioural response) from UXO clearance

The key change required in this section is the publication of updated guidance, the new Effective Deterrent Ranges (EDRs) advised by JNCC (2025c) have replaced the EDRs in JNCC (2020) in the 2024 EIAR and the replacement of the Southall et al (2019) auditory injury thresholds used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds, in accordance with RFI Section 10 (g).

Section *EDR – 26km for high order UXO clearance* in the 2024 EIAR shall be deleted in its entirety and replaced with the following:

EDR – 10km for high order UXO clearance with at-source noise reduction

The Developer has committed to at-source noise reduction (e.g. bubble curtain or similar) for mitigation purposes if high-order clearance is required. The latest guidance provided in JNCC (2025c) is that for high-order UXO clearance with a bubble curtain, an EDR of 10km should be used to assess the significance of noise disturbance against Conservation Objectives of harbour porpoise Special Areas of Conservation (SACs) in England, Wales and Northern Ireland. In the absence of recommended EDRs for other species, the same 10km EDR is assumed for all marine mammals.

EDR – 5km for low order UXO clearance

There are no empirical data upon which to set a threshold for disturbance from low-order UXO clearance. However, updated guidance concluded that the 5km EDR is well-supported by evidence from sound measurement studies (JNCC, 2025c). Data have shown that low-order deflagration detonations produce underwater noise that is over 20dB lower than high-order detonation of charges of 5-10kg (Robinson et al 2020) which highlights that the EDR for low-order UXO clearance should be significantly lower than that assumed for high-order clearance methods. For low-order deflagration the sound levels correlate to the donor charge weight and not the UXO itself, as the explosive material within the UXO is not expected to undergo detonation (JNCC, 2025c). The number of animals expected within the 5km EDR range has been calculated and presented as a proportion of the relevant (estimated) population size.

Fixed noise threshold – TTS-onset

The key change required in this section is the replacement of the Southall et al (2019) auditory injury thresholds used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds, in accordance with RFI Section 10 (g).

An estimation of the extent of behavioural disturbance from UXO clearance is presented based on the sound levels at which the onset of TTS is predicted to occur. It is acknowledged that TTS-onset criteria are not empirically derived behavioural response thresholds. However, they are widely used and accepted in the UK by regulators and their advisors as a proxy for behavioural response thresholds to single impulses (i.e. explosions), with the assumption that they correspond to the noise level at which a fleeing response may be expected to occur in marine mammals. This is a result of discussion in Southall et al (2007) which states that in the absence of empirical data on behavioural responses, the use of the TTS-onset threshold may be appropriate for single pulses (like UXO clearance). It should be however noted that "*although TTS is not a behavioral effect per se, this approach is used because any compromise, even temporarily, to hearing functions has the potential to affect vital rates by interfering with essential communication and/or detection capabilities. This approach is expected to be precautionary because TTS at onset levels is unlikely to last a full diel cycle or to have serious biological consequences during the time TTS persists*." (Southall et al, 2007).

TTS-onset thresholds are taken as those proposed for different functional hearing groups by NMFS (2024). TTS-onset as a proxy for disturbance, following the application of bubble curtain (10dB attenuation), has been presented alongside the 10km EDR approach in acknowledgement that there is no empirically based threshold to assess disturbance from high-order UXO clearance currently available. The number of animals expected within the TTS-onset impact ranges were presented for both low-order and mitigated high-order (10dB attenuation) UXO clearance.

There are no other changes to this section. Refer to Section 14.2.10.2 of Chapter 14 of the 2024 EIAR.

14.2.10.3 Disturbance from other construction activities

The key change to this section is the removal of dredging activities from pre-construction activities.

14.2.10.4 Population modelling

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, population modelling for pile driving disturbance is no longer required. Subsequently, the Section 14.2.10.4 of Chapter 14 of the 2024 EIAR shall be deleted.

14.2.10.5 Assessment of other impact pathways

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, a new impact pathway has been added to the assessment; disturbance from SBJ installation.

Disturbance from SBJ installation

There is currently no guidance on the thresholds to be used to assess the behavioural response (disturbance) of marine mammals from SBJ installation. Therefore, this impact assessment provides a qualitative assessment for these impacts. The assessment is based on the limited evidence that is available in the existing literature for that impact pathway.

There are no other changes to this section. Refer to Section 14.2.10.5 of Chapter 14 of the 2024 EIAR.

14.2.11 Uncertainties and limitations

There are no changes to this section. Refer to Section 14.2.11 of Chapter 14 of the 2024 EIAR.

14.3 Baseline Environment

14.3.1 Introduction

The key change required in this section is the inclusion of additional site-specific surveys to validate the earlier studies used to characterise the baseline (in response to RFI Section 1 (c) and 10 (d)) and the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR.

The following paragraph of the Section 14.3.1 of Chapter 14 of the 2024 EIAR shall be deleted:

The baseline environment for marine mammals is detailed in the Marine Mammal Baseline Characterisation, with a summary provided here. This chapter should therefore be read alongside the detailed Marine Mammal Baseline Characterisation which identifies the range of species and the abundance and density of marine mammals that could potentially be impacted by the proposed development, informed by data collected across previous surveys in the MU and site specific surveys.

And be replaced with:

The baseline environment for marine mammals is detailed in the Appendix 14.2: Marine Mammal Baseline Characterisation of the 2024 EIAR as well as Appendix A14.2: Marine Mammal Baseline Characterisation (hereafter referred to as 'Appendix A14.2'). This chapter should therefore be read alongside both documents which identify the range of species and the abundance and density of marine mammals that could potentially be impacted by the proposed development, informed by data collected across previous surveys in the MU and site specific surveys.

There are no other changes to this section. Refer to Section 14.3.1 of Chapter 14 of the 2024 EIAR

14.3.2 Receiving Environment

14.3.2.1 Harbour porpoise

The key change required in this section is the inclusion of the additional 2024-2025 NWIS DAS to validate the earlier studies used to characterise the baseline in addition to the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Section 14.3.2.1 of Chapter 14 of the 2024 EIAR shall be deleted in its entirety and replaced with the following text:

Harbour porpoise within the Celtic and Irish Seas MU have an estimated abundance of 62,517 (95% CI: 48,324–80,877, CV: 0.13) (estimated using data from SCANS III and ObSERVE) (IAMMWG, 2023). Data from the sources analysed indicate the potential for harbour porpoise presence all year round, although several studies found density and abundance to be highest during the summer months (e.g. Berrow et al 2008, Rogan et al 2018). Harbour porpoise densities in the Irish Sea are much lower than in the southern North Sea and in the Celtic Sea (Lacey and Hammond, 2020).

During the 2024-2025 NWIS DAS, a total of 998 harbour porpoise (54.8% of all marine mammal sightings) were sighted. The average absolute density estimate across the 12 surveys was 0.21 porpoise/km^2 (0.11 – 0.39 porpoise/km^2). However, the density varied seasonally, with density estimates in the autumn, winter and spring months being very similar (0.22-0.23 porpoise/km^2) compared to the summer months (0.15

porpoise/km^2). For the ObSERVE2 surveys the harbour porpoise density estimate from stratum 5 (east coast Ireland) was highest in summer 2021, where corrected estimates reached 0.4158 animals/km^2 (Giralt Paradell et al, 2024). The SCANS IV density surface shows that the predicted harbour porpoise distribution across the Irish Sea is not uniform. The densities of harbour porpoise in the vicinity of the ECC and array area are relatively low, with average values of 0.0945 harbour porpoise/km^2 for the ECC (0.0487 – 0.1446) and 0.1540 harbour porpoise/km^2 for the proposed development array area (0.1357 – 0.1688) (Gilles et al, 2025).

Given that the NWIS DAS provides the most recent and fine scale density estimates relevant to the proposed development, the quantitative impact assessment in the EIAR will present impacts using the maximum and average densities across the 12 months. This approach is precautionary since the maximum density from the NWIS DAS aligns with the higher density estimates from ObSERVE2 and are higher than the density estimates using SCANS IV block or density surface estimates.

14.3.2.2 Bottlenose dolphin

The key change required in this section is the inclusion of the 2024-2025 NWIS DAS to validate the earlier studies used to characterise the baseline in addition to the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Section 14.3.2.2 of Chapter 14 of the 2024 EIAR shall be deleted in its entirety and replaced with the following text:

Bottlenose dolphins have been sighted off all Irish coasts, with evidence that an offshore ecotype of bottlenose dolphins exists in Irish waters (Mirimin et al, 2011). Bottlenose dolphins within the Irish Sea MU have an estimated abundance of 293 dolphins (95% CI: 108–793, CV: 0.54) (estimated using data from SCANS III in 2016 and ObSERVE in 2015/2016) (IAMMWG, 2023). The predicted density of bottlenose dolphins within the Irish Sea and other UK coastal waters is generally low, with highest predicted densities in the Celtic Sea and the Bay of Biscay (Lacey and Hammond, 2020).

During the 2024-2025 NWIS DAS, only one bottlenose dolphin was identified resulting in a density estimate of 0.0 dolphins/km^2 (95% CIs: 0.0 – 0.1). The ObSERVE2 surveys recorded only sporadic bottlenose dolphin sightings within stratum 5 (east coast Ireland). Within survey stratum 5 a bottlenose dolphin (corrected) density estimate was only available for Summer 2022 only (0.111 dolphins/km^2) (Giralt Paradell et al, 2024). The SCANS IV density surface shows that the predicted bottlenose dolphin distribution across the Irish Sea is not uniform. The densities of bottlenose dolphins in the vicinity of the ECC and array area are relatively low, with average values of 0.1669 bottlenose dolphin/km^2 for the ECC (0.1577 – 0.1787) and 0.1587 bottlenose dolphin/km^2 for the array area (0.1444 – 0.1712) (Gilles et al, 2025).

The Gilles et al (2025) SCANS IV density surface is considered the best representation of bottlenose dolphin density for use in the EIAR. It is noted that the SCANS IV density surface for the Irish Sea are incompatible with the current MU abundance estimate in IAMMWG (2023) as there are significantly more dolphins in the density surface than in the current MU estimate. Thus, when using the SCANS IV density estimates, the Irish Sea MU is estimated to be 8,225 dolphins.

14.3.2.3 Common dolphin

The key change required in this section is the inclusion of the 2024-2025 NWIS DAS to validate the earlier studies used to characterise the baseline in addition to the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Section 14.3.2.3 of Chapter 14 of the 2024 EIAR shall be deleted in its entirety and replaced with the following text:

Common dolphins are the most frequently recorded dolphin species in Irish waters, occurring in group sizes ranging from a few individuals to over a thousand individuals in the open sea (NPWS, 2019). The species has been assessed as having an overall Favourable conservation status in Irish waters (NPWS, 2019). A single MU is implemented for common dolphin: Celtic and Greater North Seas. It is estimated that the MU comprises 102,656 common dolphin (95% CI: 58,932 – 178,822, CV: 0.29) (estimated using data from SCANS III and ObSERVE) (IAMMWG, 2023).

Common dolphins have been reported in Irish waters year-round with the higher densities of these animals from late spring to autumn (specifically July – September (Evans and Waggitt, 2023)), and this species becoming largely absent during the winter (Wall et al, 2013), contradicting the site-specific survey data. An increased density in the late spring to autumn would coincide with common dolphin breeding periods, where calves are typically born during the summer months, typically from May to August (Robinson et al, 2010).

Common dolphin predicted densities around most of the UK and the Irish Sea MU is low, with highest densities predicted to occur in shelf waters and along the shelf edge in the northern Bay of Biscay and Celtic Sea and around the coasts of Spain and Portugal (Lacey and Hammond, 2020).

During the 2024-2025 NWIS DAS, a total of 487 common dolphins were identified (26.8% of all marine mammal sightings). The average absolute density estimate across the 12 surveys was 0.10 common dolphins/km^2. Seasonal variation occurred, with the highest density in the autumn months (0.19 common dolphins/km^2) and the lowest in the winter months (0.05 common dolphins/km^2). The ObSERVE2 surveys recorded infrequent sightings of common dolphins within stratum 5 (east coast Ireland). The common dolphin density estimate within survey stratum 5 was estimated as 0.411 animals/km^2 in Summer 2022, and 0.762 animals/km^2 in Winter 2022-23 (Giralt Paradell et al, 2024). The SCANS IV density surface shows that the predicted common dolphin distribution across the Irish Sea is not uniform, with the highest densities predicted in the western Irish Sea closest to shore. The densities of common dolphins in the vicinity of the ECC and array area are relatively low, with average values of 0.1669 common dolphin/km^2 for the ECC (0.1577 – 0.1787) and 0.1587 common dolphin/km^2 for the array area (0.1444 – 0.1712) (Gilles et al, 2025).

The updated NWIS DAS provides the most recent, fine scale density estimates relevant to impacts from the proposed development. The quantitative impact assessment in the EIAR will, therefore, present impacts using the maximum and average densities across the 12 months.

14.3.2.4 Minke whale

The key change required in this section is the inclusion of 2024-2025 NWIS DAS to validate the earlier studies used to characterise the baseline in addition to the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Section 14.3.2.4 of Chapter 14 of the 2024 EIAR shall be deleted in its entirety and replaced with the following text:

Minke whales are observed throughout Ireland's coastal and offshore waters, and both the continental slope and shelf. The species has been assessed as having an overall Favourable conservation status in Irish waters (NPWS, 2019). Minke whale abundance is also analysed within the Celtic and Greater North Seas MU and is estimated at 20,118 (95% CI: 14,061 – 28,786, CV: 0.18) (estimated using data from SCANS III and ObSERVE) (IAMMWG, 2023).

During the 2024-2025 NWIS DAS, a total of 3 minke whale sightings were identified (0.2% of all marine mammal sightings). One sighting occurred in each of June, July and August 2025. This resulted in an average density estimate of 0.0 minke whales/km^2 (95% CIs: 0.0 – 0.1 minke whales/km^2).

The ObSERVE2 surveys within survey stratum 5 (east coast Ireland) estimated corrected density estimates were 0.018 animals/km^2 in Summer 2021 and Summer 2022 and 0.004 animals/km^2 in Winter 2022-23 (Giralt Paradell et al, 2024). The SCANS IV density surface shows that the predicted minke whale distribution across the Irish Sea is not uniform, with the highest densities predicted in the central Irish Sea closest to shore. The densities of minke whales in the vicinity of the ECC and array area are relatively low, with average values of 0.0059 whales/km^2 for the ECC (0.0055 – 0.0062) and 0.0066 whales/km^2 for the array area (0.0059 – 0.0073) (Gilles et al, 2025).

The SCANS IV density surface provides the most up to date spatially explicit density surface, while the ObSERVE2 summer estimate for 2021 and 2022 provides the highest density estimate. The quantitative impact assessment in the EIAR will present impacts based on both the SCANS IV density surface and the ObSERVE summer density estimate (noting that both are summer only densities). To account for reduced densities of minke whale in the winter, the ObSERVE2 winter survey density estimate will also be presented.

14.3.2.5 Harbour seals

The key change required in this section is the inclusion of 2024-2025 NWIS DAS and landfall surveys to validate the earlier studies used to characterise the baseline in addition to the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Section 14.3.2.5 of Chapter 14 of the 2024 EIAR shall be deleted in its entirety and replaced with the following text:

Harbour seals occur throughout Irish waters in estuarine, coastal, and fully marine areas. For this impact assessment, harbour seals have been assessed within the East region of Ireland and the Northern Ireland MU.

MU size has been estimated as a proportion of the haul out count for the region and the total August counts for the East region (247), South-east region (69) and the Northern Ireland MU (818) can be scaled by the estimated proportion of animals hauled-out at the time of the survey (0.72, 95% CI 0.54–0.88) (Lonergan et al 2013). The combined harbour seal count totals 1,134 harbour seals with a resulting population estimate of 1,575 harbour seals in the reference population (95% CI: 1,289–2,100).

During the 2024-2025 NWIS DAS, one harbour seal was sighted resulting in a density estimate of 0.0 seals/km^2 (95% CIs: 0.0 – 0.1). Across the dedicated surveys conducted in November 2024 and then monthly between June 2025 and May 2026, harbour seals were recorded in four of the 13 surveys, both hauled out and in the water, with peak counts reaching 6 individuals hauled out (June 2025). None of these sightings were within the seal survey area, with sightings primarily associated with Cardy Rocks, located approximately 650 m offshore. No seals were observed hauled out on the shore or along the proposed development landfall site. Furthermore, no pups were observed across any of the months, indicating that the area is not used as a pupping or breeding site.

. In addition, the Lambay Island SAC is within 20km of the offshore development area, which is within the typical foraging range of harbour seals (40-50km from their haul-out sites; SCOS 2019). Given the proximity of the proposed development to the Lambay Island SAC, densities in the vicinity of the proposed development are higher compared to the Irish Sea in general, with density estimates for the cells adjacent to the Lambay Island SAC reaching up to 0.25 harbour seals/km^2 (extracted from Carter et al 2022). The average harbour seal density across grid cells within the array area and ECC is 0.115 harbour seals/km^2 (extracted from Carter et al 2022).

Given that there is no suitable alternative, it is recommended that the at-sea density estimates obtained from the habitat preference maps (Carter et al 2022) are used in the impact assessment for the proposed development.

14.3.2.6 Grey seals

The key change required in this section is the inclusion of the 2024-2025 NWIS DAS and landfall surveys to validate the earlier studies used to characterise the baseline in addition to the inclusion of additional desk-based reports on marine mammals, published following the submission of the 2024 EIAR. Section 14.3.2.6 of Chapter 14 of the 2024 EIAR shall be deleted in its entirety and replaced with the following text:

Grey seals are known to be present off all Irish coasts year-round. The East and South-east regions of Ireland MUs and the Northern Ireland MU have been combined to provide the most appropriate MU for grey seals. The total August counts for the East region (331), South-east region (671) and the Northern Ireland MU (549) can be scaled by the estimated proportion of animals hauled-out at the time of the survey (25.15%, 95% CI 21.45% - 29.07%) (SCOS, 2022) to provide an estimate of the total population (hauled-out and at-sea at the time of the count). The combined count totals 1,551 grey seals with a resulting population estimate of 6,167 grey seals in the reference population (95% CI: 5,335 – 7,231).

During the 2024-2025 NWIS DAS, 113 grey seals were sighted (6.2% of all marine mammal sightings). Grey seals were sighted almost all year-round during t the NWIS DAS (except for August 2025), with an average density of 0.03 grey seals/km^2. The greatest density occurred during summer months (0.06 grey seals/km^2) and was lowest in autumn months (0.01 grey seals/km^2).

Across the dedicated surveys conducted in November 2024 and then monthly between June 2025 and May 2026, grey seals were recorded in all surveys except January and March 2026. Within the seal survey area, grey seals were observed swimming but not hauled out. The majority of sightings were recorded on or around Cardy Rocks, outside of the seal survey area. Grey seals were sighted hauled out at Cardy Rocks on 8 surveys, with a peak count of nine grey seals hauled out at Cardy Rocks in October 2025.

No seals were observed hauled out on the shore or along the proposed development landfall site. Furthermore, no pups were observed across any of the months, indicating that the area is not used as a pupping or breeding site. Whilst there have been several studies on grey seal abundance and distribution at haul-outs around Ireland, there is a lack of at-sea density estimates due to a lack of telemetry data in Irish waters. However, telemetry data for grey seals tagged in UK waters have shown connectivity between the east coast of the Ireland, Northern Ireland, Wales, Southwest England and the southwest coast of Scotland

(Carter et al 2022). The average grey seal density across grid cells within the array area and ECC is 0.421 grey seals/km^2 (extracted from Carter et al 2022).

Although grey seals were sighted almost all year-round during the NWIS DAS, with an average density of 0.03 seals/km^2, it is recommended that the at-sea density estimates obtained from the habitat preference maps are used in the impact assessment for the proposed development rather than a site-specific density estimate. This is precautionary since the site-specific density estimates were lower than those obtained from habitat preference maps.

14.3.2.7 Risso's dolphin

Risso's dolphins were not screened into the assessment of the 2024 EIAR due to a lack of relevant density data for the area. Section 14.3.2.7 is a new section that has been added given the availability of a Risso's dolphin density estimate from the ObSERVE2 study published after the 2024 EIAR, thus enabling this species to be screened into assessment.

Risso's dolphin occurrence is described as "wide and frequent… throughout Irish waters", sighted in both the continental shelf and slope as well as the margins of deeper ocean basins (NPWS, 2019). The species has been assessed as having a Favourable overall conservation status in Irish waters (NPWS, 2019). The IAMMWG recommend a single Celtic and Greater North Seas MU for Risso's dolphin where the estimate of abundance is 12,262 (CV: 0.46, 95% CI: 5,227 – 28,764) (IAMMWG, 2023) based on data collected during SCANS III and the ObSERVE surveys.

No Risso's dolphins were sighted in the 2024-2025 NWIS DAS. The ObSERVE2 surveys within survey stratum 5 (east coast Ireland) estimated corrected density estimates were 0.027 dolphins/km^2 in Summer 2022 (Giralt Paradell et al, 2024). The ObSERVE2 density estimate represents the most up-to-date, and largest density estimate for Risso's dolphins in the Irish Sea and is considered appropriate for use in the EIAR assessment.

14.3.3 Designated Sites

The key change required in this section is the addition of the Isle of Man Marine Nature Reserves, in accordance with RFI Section 18. Therefore, the following text shall be added to Section 14.3.3 of Chapter 14 of the 2024 EIAR.

In addition to the marine mammal SACs listed in Table 14.8 of the 2024 EIAR, which have been assessed in the NIS; there are also ten Marine Nature Reserves (MNRs) designated by the Isle of Man for marine mammals under the Wildlife Act 1990 (section 32 (1)) (Table A14.3). The MNRs were designated to provide areas that are protected from some damaging activities and impacts, and within the MNRs, there should be no damage to protected species. Given the limited impact ranges predicted for the proposed development during construction (due to a lack of pile driving), operation and maintenance and decommissioning, there is expected to be no impact to marine mammals within the Isle of Man MNRs, therefore they have been screened out of further assessment.

Table A14.3 Isle of Man Marine Nature Reserves with marine mammal designation features.

Marine Nature Reserve	Distance to Nearest WTG, km	Harbour seal	Grey seal	Harbour porpoise	Bottlenose dolphin	Risso's dolphin	Minke whale
Calf and Wart Bank	72.7	x	x	x		x	
Baie ny Carrickey	79.4			x	x	x	
Douglas Bay	101.3				x	x	
Langness	84.7	x	x	x			
Laxey Bay	108.5			x	x		x
Little Ness	97.8			x		x	

Marine Nature Reserve	Distance to Nearest WTG, km	Harbour seal	Grey seal	Harbour porpoise	Bottlenose dolphin	Risso's dolphin	Minke whale
Niarbyl Bay	82.6		x	x			
Port Erin Bay	78.3			x			
Ramsey Bay	116.5	x	x				
West Coast	85.0	x	x	x			

14.3.4 Summary

The key changes in this section are required as a result of the new marine mammal baseline data.

The following paragraph of the Section 14.3.4 of Chapter 14 of the 2024 EIAR shall be deleted:

The data available have confirmed the likely presence of harbour porpoise, bottlenose dolphin, common dolphin, minke whale, harbour seal and grey seal in the offshore development area and the wider study area and, therefore, these species should be considered within the quantitative impact assessment. The most robust and relevant density estimates within each MU were determined for each receptor (Table 14.9). Where possible, density estimates derived from site- DAS have been used, however it is important to note that the site-specific density estimates are not representative of animals densities across the wider scale for large scale impacts such as disturbance from UXO clearance or piling.

The table below presents the MUs and density estimates selected as the most appropriate to be used in the quantitative assessment for each marine mammal species, with consideration of the spatial scale of potential impacts. It should be noted that for bottlenose dolphins, differing MU population estimates are used in the impact assessment (to assess for the proportion (%) of the MU impacted) depending on the density estimate used, as there is some incompatibility between the density estimates and the current Irish Sea MU population size (IAMMWG, 2023) (see Table 14.9).

And be replaced with:

The data available have confirmed the likely presence of harbour porpoise, bottlenose dolphin, common dolphin, Risso's dolphin, minke whale, harbour seal and grey seal in the offshore development area and the wider study area and, therefore, these species should be considered within the quantitative impact assessment. The most robust and relevant density estimates within each MU were determined for each receptor (Table A14.4).

Table 14.9 within Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.4.

Table A14.4 Marine mammal MU and density estimates (# animals/km^2) utilised for quantitative impact assessment (Replaces Table 14.9 in Chapter 14 of the 2024 EIAR).

Species	MU	MU size	MU source	Density (animals/km^2)	Density source
Harbour porpoise	Celtic and Irish Sea	62,517	IAMMWG (2023)	0.21 (0.11 – 0.39)	Proposed development site-specific surveys Average (min – max)
Bottlenose dolphin	Irish Sea	8,225[1]	IAMMWG (2023)	Grid cell specific ECC 0.1669 (0.1577 – 0.1787) Array area 0.1587 (0.1444 – 0.1712)	SCANS IV density surface (Gilles et al, 2025) Average (min – max)

[1] Given the high density estimates for bottlenose dolphins in the Irish Sea using the Gilles et al (2025) density surface, they are incompatible with the current Irish Sea MU population size of 293 dolphins (IAMMWG, 2023)

Species	MU	MU size	MU source	Density (animals/km^2)	Density source
Common dolphin	Celtic and Greater North Sea	102,656	IAMMWG (2023)	0.10 (0.02 – 0.33)	Proposed development site-specific surveys Average (min – max)
Risso's dolphin	Celtic and Greater North Sea	12,262	IAMMWG (2023)	0.027	ObSERVE2 strata 5 summer 2022
Minke whale	Celtic and Greater North Sea	20,118	IAMMWG (2023)	Grid cell specific: ECC 0.0059 (0.0055 – 0.0062) Array area 0.0066 (0.0059 – 0.0073)	SCANS IV density surface (Gilles et al, 2025) Average (min – max)
				0.018	ObSERVE2 strata 5 summer (July – September) 2021 & 2022 (Giralt Paradell et al, 2024)
				0.004	ObSERVE2 strata 5 winter (November – February) 2022-2023 (Giralt Paradell et al, 2024)
Harbour seal	East regions of Ireland & Northern Ireland MU	1,575	Scaled count from Morris et al (2025) and SCOS (2023)	0.040 (0.022 – 0.056)	Habitat preference map ECC (Carter et al, 2022) Average (min – max)
				0.026 (0.015 – 0.044)	Habitat preference map array area (Carter et al, 2022) Average (min – max)
Grey seal	East regions of Ireland & Northern Ireland MU	6,167	Scaled count from Morris et al (2025) and SCOS (2023)	0.525 (0.034 – 0.939)	Habitat preference map ECC (Carter et al, 2022) Average (min – max)
				0.329 (0.223 – 0.439)	Habitat preference map array area (Carter et al, 2022) Average (min – max)

There are no other changes to this section. Refer to Section 14.3.4 of Chapter 14 of the 2024 EIAR.

14.4 Characteristics of the Proposed Development

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2. Following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets, as indicated by the grey shading in Table A14.5 below. Table 14.10 of Chapter 14 of the 2024 EIAR shall be replaced with Table A14.5.

Table A14.5 Key characteristics of Project Option 1 and Project Option 2 (Replaces Table 14.10 in Chapter 14 of the 2024 EIAR)

Key Offshore Characteristics	Project Option 1	Project Option 2
Array area	88.5km^2	88.5km^2
ECC	36.45km^2	36.45km^2
Landfall	One landfall site, immediately south of Bremore Point, which includes two subtidal exit pits within the ECC	One landfall site, immediately south of Bremore Point, which includes two subtidal exit pits within the ECC
Wind Turbine Generator (WTG)	49 WTGs with 250m rotor diameter	35 WTGs with 276m rotor diameter
WTG Foundations	49 SBJs of 18m diameter requiring seabed preparation	35 SBJs of 18m diameter requiring seabed preparation
Offshore Substation Platform (OSP) Foundations (array area)	One OSP, supported on a multi-leg jacket foundation (four leg configuration) founded on suction buckets or drilled pin piles	One OSP, supported on a multi-leg jacket foundation (four leg configuration) founded on suction buckets or drilled pin piles
Cables	Installation of 111km of inter-array cables within the array area and installation of two 18km subsea export cables within the ECC	Installation of 91km of inter-array cables within the array area and installation of two 18km subsea export cables within the ECC

There are no other changes required to this section. Refer to Section 14.4 of Chapter 14 of the EIAR.

14.4.1 Parameters for Assessment

There are no changes to this section. Refer to Section 14.4.1 of Chapter 14 of the 2024 EIAR.

14.4.2 Construction

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets).

The following paragraph of the Section 14.4.2 of Chapter 14 of the 2024 EIAR shall be deleted:

During construction the following activities and infrastructure have the potential to impact on marine mammal ecology:

- *Pre-construction surveys (noise impacts)*
- *UXO clearance (noise impacts)*
- *Piling activities (noise impacts)*
- *Other construction activities, including dredging, cable laying, rock placement, drilling of foundations, HDD and trenching (noise impacts); and*
- *Vessel movements (collision and noise impacts).*

And be replaced with:

During construction the following activities and infrastructure have the potential to impact on marine mammal ecology:

- Pre-construction surveys (noise impacts);
- UXO clearance (noise impacts);
- SBJ installation (noise impacts);

- Other construction activities, including cable laying, rock placement, HDD and trenching (noise impacts); and
- Vessel movements (collision and noise impacts).

There are no other changes to this section. Refer to Section 14.4.2 of Chapter 14 of the 2024 EIAR.

14.4.2.1 Piling parameters

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, pile driving parameters are no longer required. Subsequently, the Section 14.4.2.1 of Chapter 14 of the 2024 EIAR shall be deleted.

14.4.3 Operational Phase

There are no changes to this section. Refer to Section 14.4.3 of Chapter 14 of the 2024 EIAR.

14.4.4 Decommissioning

There are no changes to this section. Refer to Section 14.4.4 of Chapter 14 of the 2024 EIAR.

14.4.5 Embedded Mitigation Measures

Following further design refinement in response to the RFI Section 10 (a), the key changes required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (refer to Appendix A5.1: Design Refinements). WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets, as well as at-source noise reduction (e.g. bubble curtain or similar) for high-order UXO clearance. Section 14.4.4 in Chapter 14 of the 2024 EIAR should be deleted and replaced in its entirety with the following:

The following embedded mitigation measures in Table A14.6 have been identified through the design and consultation process and are assumed to be incorporated as part of the proposed development. The embedded mitigation measures will not be considered again at the residual impact stage.

A MMMP (Appendix A14.5) and Offshore Environmental Management Plan (EMP) (Appendix A6.1) have been prepared and will be implemented for all phases of the proposed development.

Table A14.6 Embedded mitigation measures relating to marine mammal ecology (Replaces Table 14.14 in Chapter 14 of the 2024 EIAR)

Measure	Mitigation detail
Construction	
Marine Pollution Contingency Procedure (MPCP)	An offshore Environment Management Plan (EMP) is provided in Appendix 6.1 and will be implemented to cover the construction, operational and decommissioning phase of the proposed development. The Offshore EMP includes a MPCP to cover accidental spills, potential contaminant release and include key emergency contact details. Key measures in the MPCP include: • Compliance with MARPOL; • Spill kits on board all vessels; • Fuel and chemical storage according to relevant storage regulations; • Handling of waste in accordance with relevant waste regulations; and • Vessel refuelling to take place in port. The measures included in the MPCP would reduce the likelihood of potentially harmful pollutants to be released into the marine environment which may then impact on marine mammal receptors. Further information is provided in Appendix 6.1.
Collision avoidance	The Department of Communications, Marine and Natural Resources released a Marine Notice (No 15 of 2005) for the correct procedures when encountering whales and dolphins in Irish coastal waters (DCMNR, 2005). Alongside this Marine Notice, the Irish Whale and Dolphin Group provided a Code of Conduct for all watercraft encountering whales and dolphins (IWDG, 2005). These guidelines were drafted specifically for the interactions between small vessels and marine mammals (e.g. whale

Measure	Mitigation detail
	watching passenger vessels), however the key principals will be followed by all project vessels where practicable to minimise the risk of vessel collisions with marine mammals and disturbance to marine mammals from vessels. These measures are captured within Appendix 14.5 Environmental Vessel Management Plan (EVMP). Other key measures to mitigate collision risk, as described in the EVMP include: • When an animal(s) is first sighted, vessels should maintain a steady course (speed and direction) to allow marine mammals to predict the vessel's path; • Where practicable, when an animal(s) is in close proximity (for example 100 – 200 m), vessel speed should be gradually reduced and maintained below 7 knots (in accordance with DCMNR, 2005). The exception to this is when behaviour such as bow riding is experienced, where speed should be maintained on a steady course; • If animals are moving in a consistent direction, maintain a parallel course; • Do not cut off individuals by moving across their path; • Avoid deliberately approaching marine mammals when sighted; • Avoid abrupt changes to course or speed should marine mammals approach the vessel, be on course to cross the path of a vessel or bow-ride; • Transit vessels should maintain a minimum distance of 150m or more from the coast, particularly when near to known seal haul-out sites during sensitive periods (i.e. moulting and breeding seasons). Vessels should remain in the vicinity of seals for no more than 15 minutes; and • Further information is provided in Appendix 6.1.
Auditory injury and disturbance from high order UXO clearance	The Developer has committed to at-source noise reduction (e.g. bubble curtain or similar) if high order UXO clearance is required. Additionally, to reduce in-combination impacts on the Rockabill and Dalkey Island SAC, the Developer has committed not to carry out any high-order detonations at the Proposed Development at the same time that Codling undertakes high-order detonations within its ECC.
Operation	
Marine Pollution Contingency Procedure (MPCP)	The Offshore EMP includes a MPCP to cover accidental spills, potential contaminant release and include key emergency contact details. Key measures in the MPCP include: • Compliance with MARPOL; • Spill kits on board all vessels; • Fuel and chemical storage according to relevant storage regulations; • Handling of waste in accordance with relevant waste regulations; and • Vessel refuelling to take place in port. The MPCP would reduce the likelihood of potentially harmful pollutants to be released into the marine environment which may then impact on marine mammal receptors.
Collision avoidance	The Department of Communications, Marine and Natural Resources released a Marine Notice (No 15 of 2005) for the correct procedures when encountering whales and dolphins in Irish coastal waters (DCMNR, 2005). Alongside this Marine Notice, the Irish Whale and Dolphin Group provided a Code of Conduct for all watercraft encountering whales and dolphins (IWDG, 2005). These guidelines were drafted specifically for the interactions between small vessels and marine mammals (e.g. whale watching passenger vessels), however the key principals will be followed by all proposed development vessels where practicable to minimise the risk of vessel collisions with marine mammals and disturbance to marine mammals from vessels. These measures are captured within Appendix 14.5 EVMP. Other key measures from the EVMP are the same as those listed in the construction collision avoidance mitigations section of this table.
Decommissioning	
Collision avoidance	The Department of Communications, Marine and Natural Resources released a Marine Notice (No 15 of 2005) for the correct procedures when encountering whales and dolphins in Irish coastal waters (DCMNR, 2005). Alongside this Marine Notice, the Irish Whale and Dolphin Group provided a Code of Conduct for all watercraft encountering whales and dolphins (IWDG, 2005). These guidelines were drafted specifically for the interactions between small vessels and marine mammals (e.g. whale watching passenger vessels), however the key principals will be followed by all Project vessels where practicable to minimise the risk of vessel collisions with marine mammals and disturbance to marine mammals from vessels. These measures are captured within the EVMP. Other key measures from the EVMP are the same as those listed in the construction collision avoidance mitigations section of this table.
Assessment of impacts and best practice	Prior to decommissioning a study of the potential environmental impacts to marine mammal receptors from the proposed decommissioning activities will be undertaken, considering the baseline

Measure	Mitigation detail
environmental management	environment at the pre-decommissioning stage. All mitigation measures to be delivered will be captured within the Rehabilitation Schedule and Offshore EMP. Any licences or authorisations that might be required will be identified and obtained prior to decommissioning, including any validation, updating or new submission of an EIAR, as required.

There are no other changes to this section. Refer to Section 14.4.5 of Chapter 14 of the 2024 EIAR.

14.4.6 Potential Impacts

The key change required in this section is the design refinement and the removal of Impacts 5 -7 relating to pile driving, and the addition of 'Impact 23 Disturbance from SBJ installation' and 'Impact 24 Disturbance of operational noise', in response to RFI Section 10 (h).

Other changes include: addition of USBL to pre-construction geophysical surveys (Impacts 1 and 2) in response to RFI Section 10 (i); change of characteristics for other construction activities (Impacts 8 and 9) due to the design refinements to SBJ foundation installation (refer to Appendix A5.1: Design Refinements); and the change to vessel numbers and transits (Impacts 10, 11, 14, 15) due to the design refinements to SBJ foundation installation (refer to Appendix A5.1: Design Refinements). Therefore, Table 14.15 within Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.7. All changes are highlighted in grey.

Table A14.7 Potential impacts and magnitude of impact per project option. The project option that has the greatest magnitude of impact is identified in blue (Replaces Table 14.15 in Chapter 14 of the 2024 EIAR)

Impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
Construction Phase			
1. Auditory injury (PTS) from pre-construction surveys	A series of pre-construction surveys will be undertaken in the array area and along the ECC. Geophysical surveys will utilize towed equipment such as side scan sonar, sub bottom profiler, multibeam echosounder, USBL and magnetometer.	A series of pre-construction surveys will be undertaken in the array area and along the ECC. Geophysical surveys will utilize towed equipment such as side scan sonar, sub bottom profiler, multibeam echosounder, USBL and magnetometer.	**The magnitude of impact is considered to be the same for both Project Option 1 and Project Option 2**.
2. Disturbance from pre-construction surveys	A series of pre-construction surveys will be undertaken in the array area and along the ECC. Geophysical surveys will utilize towed equipment such as side scan sonar, sub bottom profiler, multibeam echosounder, USBL and magnetometer.	A series of pre-construction surveys will be undertaken in the array area and along the ECC. Geophysical surveys will utilize towed equipment such as side scan sonar, sub bottom profiler, multibeam echosounder, USBL and magnetometer.	**The magnitude of impact is considered to be the same for both Project Option 1 and Project Option 2**.
3. Auditory injury (PTS) from UXO clearance	A detailed UXO survey will be completed prior to construction. The type, size (net explosive quantities (NEQ) and number of possible detonations and duration of UXO clearance operations is not known at this stage. Therefore, an illustrative assessment is presented here, using a range of UXO charge sizes from 25kg to 525kg.	A detailed UXO survey will be completed prior to construction. The type, size (NEQ) and number of possible detonations and duration of UXO clearance operations is not known at this stage. Therefore, an illustrative assessment is presented here, using a range of UXO charge sizes from 25kg to 525kg.	**The magnitude of impact is considered to be the same for both Project Option 1 and Project Option 2**.
4. Disturbance from UXO clearance	A detailed UXO survey will be completed prior to construction. The type, size (net explosive quantities (NEQ) and number of possible detonations and duration of UXO clearance operations is not known at this stage. Therefore, an illustrative assessment is presented here, using a range of UXO charge sizes from 25kg to 525kg. NAS will be employed for the clearance of high order UXO.	A detailed UXO survey will be completed prior to construction. The type, size (net explosive quantities (NEQ) and number of possible detonations and duration of UXO clearance operations is not known at this stage. Therefore, an illustrative assessment is presented here, using a range of UXO charge sizes from 25kg to 525kg. NAS will be employed for the clearance of high order UXO.	**The magnitude of impact is considered to be the same for both Project Option 1 and Project Option 2**.
23. Disturbance from SBJ installation	**WTGs:** 49 multi-leg SBJ WTG foundations Max 4 legs per jacket 2 days per foundation = 98 installation days **OSP:** 1 multi-leg SBJ OSP foundation Max 4 legs	**WTGs:** 35 multi-leg SBJ WTG foundations Max 4 legs per jacket 2 days per foundation = 70 installation days **OSP:** 1 multi-leg SBJ OSP foundation Max 4 legs	**Project Option 1 represents the greatest magnitude of impact in relation to disturbance from SBJ installation.** The magnitude of the impact is defined by the extent of construction activity which will generate noise.

Impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
	Timeline: WTG & OSP foundation installation Q1 2029-Q3 2030	**Timeline:** WTG & OSP foundation installation Q1 2029-Q3 2030	
8. Auditory injury (PTS) from other construction activities	**Inter-array cables:** Installation of 111km of array cables Installation method: jetting, ploughing, trenching Protection: burial, mattressing and/or loose rock Cable installation timeframe (PLGR, trenching, laying, protection): 240 days **Export cables:** Installation of 18km of export cables Installation: jetting, ploughing, trenching Protection: mattressing and/or loose rock Duration: 180 days **OSP pin piles:** Drilled pin piles	**Inter-array cables:** Installation of 91km of array cables Installation method: jetting, ploughing, trenching Protection: burial, mattressing and/or loose rock Cable installation timeframe (PLGR, trenching, laying, protection): 240 days **Export cables:** Installation of 18km of export cables Installation: jetting, ploughing, trenching Protection: mattressing and/or loose rock Duration: 180 days **OSP pin piles:** Drilled pin piles	**Project Option 1 represents the greatest magnitude of impact in relation to PTS from other construction noise.** The magnitude of the impact is defined by the extent of construction activity which will generate noise.
9. Disturbance from other construction noise	**Inter-array cables:** Installation of 111km of array cables Installation method: jetting, ploughing, trenching Protection: burial, mattressing and/or loose rock Cable installation timeframe (PLGR, trenching, laying, protection): 240 days **Export cables:** Installation of 18km of export cables Installation: jetting, ploughing, trenching Protection: mattressing and/or loose rock Duration: 180 days **OSP pin piles:** Drilled pin piles	**Inter-array cables:** Installation of 91km of array cables Installation method: jetting, ploughing, trenching Protection: burial, mattressing and/or loose rock Cable installation timeframe (PLGR, trenching, laying, protection): 240 days **Export cables:** Installation of 18km of export cables Installation: jetting, ploughing, trenching Protection: mattressing and/or loose rock Duration: 180 days **OSP pin piles:** Drilled pin piles	**Project Option 1 represents the greatest magnitude of impact in relation to PTS from other construction noise.** The magnitude of the impact is defined by the extent of construction activity which will generate noise.
10. Collision with vessels	**Summary for construction:** Total construction vessels: 70 Total number of return trips during construction: 3032	**Summary for construction:** Total construction vessels: 70 Total number of return trips during construction: 2504	**Project Option 1 represents the greatest magnitude of impact in relation to collision with vessels as the number of return vessel trips is higher.**

Impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
	Maximum vessels simultaneously onsite during construction: 50 Types: guard vessel, observation vessel, transport vessel, installation vessel (SSCV, HLV), support vessel, scour protection vessel, SOV, CTV, cable laying vessel, cable burial vessel, JUV, workboats/RIB	Maximum vessels simultaneously onsite during construction: 47 Types: guard vessel, observation vessel, transport vessel, installation vessel (SSCV, HLV), support vessel, scour protection vessel, SOV, CTV, cable laying vessel, cable burial vessel, JUV, workboats/RIBs	The magnitude of the impact is defined by the number of vessels associated with construction activities.
11. Disturbance from vessels	**Summary for construction:** Total construction vessels: 70 Total number of return trips during construction: 3032 Maximum vessels simultaneously onsite during construction: 50 Types: guard vessel, observation vessel, transport vessel, installation vessel (SSCV, HLV), support vessel, scour protection vessel, SOV, CTV, cable laying vessel, cable burial vessel, JUV, workboats/RIBs	**Summary for construction:** Total construction vessels: 70 Total number of return trips during construction: 2504 Maximum vessels simultaneously onsite during construction: 47 Types: guard vessel, observation vessel, transport vessel, installation vessel (SSCV, HLV), support vessel, scour protection vessel, SOV, CTV, cable laying vessel, cable burial vessel, JUV, workboats/RIBs	**Project Option 1 represents the greatest magnitude of impact in relation to disturbance from vessels as the number of return vessel trips is higher.** The magnitude of the impact is defined by the number of vessels associated with construction activities.
12. Prey availability and distribution	See the Potential Impacts table in Chapter 13 Fish and Shellfish Ecology	See the Potential Impacts table in Chapter 13 Fish and Shellfish Ecology	Project Option with the greatest magnitude varies across different impact types on fish and shellfish
13. Increased concentration of suspended sediments	See the Potential Impacts table in Chapter 10 Marine Physical Processes	See the Potential Impacts table in Chapter 10 Marine Physical Processes	Impact dependent on the result of the Marine Physical Processes assessment.
Operational Phase			
14. Collisions with vessels	**Summary for O&M:** Total O&M vessels: 12 Total number of annual return trips during O&M: 1261 Maximum vessels simultaneously onsite during O&M: 12 Types: JUV, SOV, CTV, lift vessel, cable vessel, aux vessel	**Summary for O&M:** Total O&M vessels: 12 Total number of annual return trips during O&M: 1055 Maximum vessels simultaneously onsite during O&M: 12 Types: JUV, SOV, CTV, lift vessel, cable vessel, aux vessel	**Project Option 1 represents the greatest magnitude of impact in relation to collision with vessels as the number of return vessel trips is higher.** The magnitude of the impact is defined by the number of vessels associated with operation activities.
15. Disturbance from vessels	**Summary for O&M:** Total O&M vessels: 12	**Summary for O&M:** Total O&M vessels: 12	**Project Option 1 represents the greatest magnitude of impact in relation to**

Impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
	Total number of annual return trips during O&M: 1261 Maximum vessels simultaneously onsite during O&M: 12 Types: JUV, SOV, CTV, lift vessel, cable vessel, aux vessel	Total number of annual return trips during O&M: 1055 Maximum vessels simultaneously onsite during O&M: 12 Types: JUV, SOV, CTV, lift vessel, cable vessel, aux vessel	**disturbance from vessels as the number of return vessel trips is higher.** The magnitude of the impact is defined by the number of vessels associated with operation activities.
16. Prey availability and distribution	See the Potential Impacts table in Chapter 13 Fish and Shellfish Ecology	See the Potential Impacts table in Chapter 13 Fish and Shellfish Ecology	Project Option with the greatest magnitude varies across different impact types on fish and shellfish.
17. Increased concentration of suspended sediments	See the Potential Impacts table in Chapter 10 Marine Physical Processes	See the Potential Impacts table in Chapter 10 Marine Physical Processes	Impact dependent on the result of the Marine Physical Processes assessment.
24. Disturbance from operational noise	49 WTGs	35 WTGs	**Project Option 1 represents the greatest magnitude of impact in relation to disturbance from operational noise as more infrastructure will be required for Project Option 1.**
Decommissioning			
18. PTS and disturbance from decommissioning	The greatest potential for a likely significant effect is identical to (or less than) that of the construction phase	The greatest potential for a likely significant effect is identical to (or less than) that of the construction phase	**Project Option 1 represents the greatest magnitude of impact in relation to PTS and disturbance from decommissioning.** More infrastructure will require decommissioning for Project Option 1, with a similar indicative methodology for both project options. As such, Project Option 1 has the greatest magnitude of impact for PTS and disturbance from decommissioning.
19. Collisions with vessels	The greatest potential for a likely significant effect is identical to (or less than) that of the construction phase	The greatest potential for a likely significant effect is identical to (or less than) that of the construction phase	**Project Option 1 represents the greatest magnitude of impact in relation to collisions with vessels.** The number of vessels required during decommissioning is dependent upon the technologies available at the time of decommissioning, and the methodology likely to be used.

Impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
			More infrastructure will require decommissioning for Project Option 1. As such, Project Option 1 has the greatest magnitude of impact for collisions with vessels.
20. Disturbance from vessels	The greatest potential for a likely significant effect is identical to (or less than) that of the construction phase	The greatest potential for a likely significant effect is identical to (or less than) that of the construction phase	**Project Option 1 represents the greatest magnitude of impact in relation to disturbance from vessels.** The number of vessels required during decommissioning is dependent upon the technologies available at the time of decommissioning, and the methodology likely to be used. More infrastructure will require decommissioning for Project Option 1. As such, Project Option 1 has the greatest magnitude of impact for collisions with vessels.
21. Prey availability and distribution	See the Potential Impacts table in Chapter 13 Fish and Shellfish Ecology	See the Potential Impacts table in Chapter 13 Fish and Shellfish Ecology	Project Option with the greatest magnitude varies across different impact types on fish and shellfish.
22. Increased concentration of suspended sediments	See the Potential Impacts table in Chapter 10 Marine Physical Processes	See the Potential Impacts table in Chapter 10 Marine Physical Processes	Impact dependent on the result of the Marine Physical Processes assessment.

14.4.6.1 Impacts scoped out

The change required in this section is the revision of the foundation types for Project Option 1 and Project Option 2(refer to Appendix A5.1: Design Refinements). In the 2024 EIAR, WTG monopile foundations and OSP monopile and jacket foundations with pin piles were considered. Following further design refinement in response to the RFI, WTGs are now proposed and assessed as SBJ foundations, and OSPs as jacket foundations with either pin piles or suction buckets.

Therefore, piling is not required and the following paragraph of the Section 14.4.6.1 of Chapter 14 of the 2024 EIAR shall be deleted:

Auditory injury and disturbance from drilling of WTGs

Impact pile driving is considered to be more impactful than drilling for marine mammals. Therefore, the assessment is based on impact pile driving of foundations only.

Additionally, RFI Section 10 (t) requested that operational noise be assessed, therefore the operational noise paragraph in section 14.4.6.1 shall be deleted:

Operational Noise

Existing evidence suggests that operational noise associated with fixed-bottom offshore wind farms is likely to be considerably less than that of construction noise. Recent advances in technology mean that newer WTGs use direct drive technology rather than gears, which are expected to generate lower operational underwater noise levels (sound reduction of around 10dB compared to the same size geared turbine) (Stöber and Thomsen, 2021). While underwater sound is expected to increase with increasing turbine size, new direct drive technology means that new WTG will produce considerably less underwater noise compared to the older geared WTG. Additionally, as WTG increase in size fewer are required to be installed to meet a projects capacity.

It is acknowledged that there is still a lack of data on operational noise generated by larger size WTG; however, given the presence of marine mammals (both porpoise and seals) within operational windfarms (e.g. Brandt et al, 2018, Russell et al, 2016, Benhemma-Le Gall et al, 2020), it is unlikely that operational noise is expected to be of a level that would result in any disturbance effects. In addition, reviews have concluded that operational, fixed-bottom wind farm noise will have negligible effects on marine mammals (Madsen et al, 2006, Teilmann et al, 2006a, Teilmann et al, 2006b, CEFAS, 2010, Brasseur et al, 2012)."

There are no other changes to this section. Refer to Section 14.4.6.1 of Chapter 14 of the 2024 EIAR.

14.5 Potential Effects

There are no changes to this section. Refer to Section 14.5 of Chapter 14 of the 2024 EIAR.

14.5.1 Do-Nothing Scenario

There are no changes to this section. Refer to Section 14.5.1 of Chapter 14 of the 2024 EIAR**.**

14.5.2 Construction Phase

There are no changes to this section. Refer to Section 14.5.2 of Chapter 14 of the 2024 EIAR.

14.5.2.1 Impact 1 - Auditory injury (PTS) from pre-construction surveys

The key changes for this section are the replacement of the Southall et al (2019) auditory injury thresholds and hearing ranges used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds and hearing ranges (in response to RFI Section 10 (g)) as well as addition of the USBL (in response to RFI Section 10 (i)). Section 14.5.2.1 in Chapter 14 of the 2024 EIAR should be deleted and replaced in its entirety with the following.

A series of pre-construction surveys will be undertaken in the array area and along the ECC. The purpose of these surveys will be to further characterise the seabed conditions and morphology, determine soil design parameters and identify any potential obstructions or hazards to the construction works as well as furthering understanding of baseline metocean conditions.

Geophysical surveys are non-intrusive and will utilise towed equipment such as side scan sonar, sub bottom profiler, multibeam echosounder and magnetometer to gather detailed information on the bathymetry, seabed sediments, geology, and anthropogenic features (e.g. existing seabed infrastructure, unexploded ordnance (UXO)) that exist across the offshore development area. Remotely Operated Vehicles (ROV) may also be used for further identification of findings from the geophysical surveys. Details on each of the aforementioned geophysical survey equipment are outlined below:

- Multi-Beam Echo Sounder (MBES): MBES is used to acquire detailed seabed topography and water depth by emitting a fan shaped swath of acoustic energy (sound waves) along a survey transect. The sound waves are reflected from the seabed to enable high resolution seafloor mapping. The MBES can be either hull- or ROV-mounted.
- Side Scan Sonar (SSS): SSS utilises conical or fan-shaped pulses of sounds directed at the seafloor to provide information on the surface of the seabed through analysis of reflected sound.
- Sub Bottom Profiler (SBP): The SBP is a type of geophysical survey tool that uses low-frequency or high frequency sounds (pings) to identify acoustic impedance of the sub-surface geology and to identify transitions from one stratigraphic sequence to another2. Sound sources that produce lower frequency pulses can penetrate through and be reflected by subsurface sediments (low-resolution data), whilst higher frequency pulses achieve higher resolution images but do not penetrate the subsurface sediments3.
- Magnetometer: A magnetometer is used to measure the variation in the earth's total magnetic field to detect and map ferromagnetic objects on or near the sea floor along the survey's vessel tracks. Often, two magnetometers are mounted in a gradiometer format to measure the magnetic gradient between the two sensors. The magnetometer is a passive system and, therefore, does not emit any noise, it is therefore scoped out of assessment.
- USBL: USBL acoustic positioning systems operate by emitting acoustic signals from a transceiver mounted on a surface vessel, which are then received by a transponder located on a subsea target, such as a remotely operated vehicle. The transponder responds by sending an acoustic signal back to the transceiver. The system measures the time delay between transmission and reception to calculate the range, and the angle of arrival to determine the bearing, thereby computing the target's position relative to the vessel

An essential step in assessing the potential for effects on relevant species is a consideration of their auditory sensitivities. Marine mammal hearing groups and auditory injury criteria from NMFS (2024) and corresponding species of relevance to this assessment, are summarised in Table A14.8.

Table A14.8 Marine mammal hearing groups (NMFS, 2024) (Replaces Table 14.16 in Chapter 14 of the 2024 EIAR)

Hearing Group	Species	Estimated hearing range	Estimated region of greatest sensitivity†
Low-frequency (LF) cetaceans*	Minke whale	7Hz –36kHz (45-90kHz*)	168Hz–26.6kHz
High-frequency (HF) cetaceans	Bottlenose dolphin Common dolphin	150Hz–160kHz	1.73–129kHz
Very high-frequency (VHF) cetacean	Harbour porpoise	200Hz–165kHz	5.93–140kHz
Phocid carnivores in water (PCW)	Harbour seal Grey seal	40Hz–90kHz	0.81–68.3kHz

†Region of greatest sensitivity represents low-frequency (F1) and high-frequency (F2) inflection points

(Southall et al, 2019).* It should be noted that the NMFS (2024) did not include the data collected by the National Marine Mammal Foundation on two minke whales during field season in 2023 in Norway. Houser et al (2024) show that minke whales are sensitive to sound frequencies as high as 45 to 90 kilohertz.

[2] https://www.aspectsurveys.com/survey-services/geophysical/sub-bottom-profiling/

[3] https://www.ixblue.com/maritime/subsea-imagery/sub-bottom-profilers/

Prior to an evaluation in relation to each item of equipment, the overlap between typical survey equipment operating characteristics and marine mammal functional hearing capability is considered in Table A14.9. Table A14.9 presents typical values for geophysical surveys for large offshore wind farms, but equipment specific values will vary between different survey contractors. Where there is no overlap between hearing capability and functional hearing, there is no potential for disturbance effects to occur. High magnitude pressure waves may result in physiological damage to organs regardless of hearing range overlap, i.e. blast trauma from underwater explosions; however, the acoustic signals from high frequency geophysical sources (e.g. MBES, SSS) which are above the hearing range of marine mammals are not impulsive enough to have the potential to result in hearing injury or other harm through such a mechanism.

Table A14.9 Comparison of typical noise emitting survey equipment operating characteristics and overlap with the estimated hearing range of different marine mammal functional hearing groups (Replaces Table 14.17 in Chapter 14 the 2024 EIAR)

Equipment	Estimated source pressure level (dB re 1µPa)	Expected Sound Frequency	LF	HF	VHF	PCW
MBES	210–240dB re 1µPa (SPLpeak) for multiple beams* (Lurton and Deruiter, 2011) 197dB re 1µPa (SPL_{peak}) for a single beam at an operational frequency of 200 kHz (Risch et al, 2017)	200–400kHz (Hartley Anderson Ltd, 2020)	Above all hearing ranges			
SSS	210dB re 1µPa (SPL_{peak}) (Crocker and Fratantonio, 2016, Crocker et al, 2019)	300 & 900kHz (Crocker and Fratantonio, 2016, Crocker et al, 2019)	Above all hearing ranges			
SBP	210–220dB re 1µPa (SPL_{peak}) (Hartley Anderson Ltd, 2020)	Frequency selectable. Typically 2–15kHz with a peak frequency of 3.5kHz (Hartley Anderson Ltd, 2020)	Yes	Yes	Yes	Yes
USBL	204dB re 1µPa (SPL_{peak})	12 – 32 kHz	Yes	Yes	Yes	Yes

**The higher the frequency of operation, the lower the source level tends to be.*

Sensitivity of the receptor

MBES and SSS: While the indicative source levels for MBES and SSS exceed the unweighted injury threshold for harbour porpoise and seals, the operational frequency of each sound source (MBES: 200 – 400kHz; SSS: 300 & 900kHz) is far above that of greatest hearing sensitivity for both porpoise (275Hz–160kHz (peak sensitivity: 105kHz)) and seals (50Hz–86kHz (peak sensitivity: 13kHz)). As there is no overlap between the hearing ranges of these species and the expected sound frequency of equipment, there is expected to be no reduction in the hearing abilities of either species.

For dolphin species and minke whales, the indicative source levels for SSS (210dB re 1µPa (SPL_{peak})) are unlikely to exceed the unweighted injury thresholds for PTS (dolphins: 230dB re 1µPa (SPL_{peak}); minke whale: 222dB re 1µPa (SPL_{peak})). As such, there is no risk of auditory injury to these species from the use of SSS. For MBES the indicative source levels (210–240dB re 1µPa (SPL_{peak})) could exceed unweighted injury thresholds for PTS for both dolphin species and minke whale depending on the source level used during surveys. In the event that the PTS thresholds are exceeded for both species during use of MBES equipment, the operational frequency (200 – 400kHz) is far above that of the hearing range for dolphins (150Hz–160kHz) and minke whales (7Hz –36kHz). As such, the expected sound frequency does not overlap with the functional hearing range of these species and hence there is no potential to affect the hearing abilities of dolphins and minke whale. The sensitivity of all marine mammals to PTS-onset from use of MBES and SSS equipment is assessed as negligible.

SBP: The indicative source levels for SBP exceed the unweighted injury threshold for harbour porpoise. While harbour porpoise hearing ranges are between 200Hz – 165kHz, the SBP (2 – 15kHz (peak: 3.5kHz)) typically operate in the bottom region of greatest hearing sensitivity of harbour porpoise. Therefore, whilst there is a risk of auditory injury, this risk is expected to be minimal. The sensitivity of porpoise and seals to PTS-onset from use of SBP is therefore assessed as low. The source levels of SBP are below the SPL_{pk} PTS-onset thresholds for minke whale, dolphins and seals.

Therefore, it is concluded that there would be no risk of PTS onset to minke whale and any of dolphin or seal species from the use of SBP equipment and their sensitivity is assessed as negligible.

USBL: The indicative source levels for USBL exceed the unweighted injury threshold for harbour porpoise by 2dB. While harbour porpoise hearing ranges are between 200Hz – 165kHz, the USBL (12 – 32kHz) shall typically operate in the bottom region of greatest hearing sensitivity of harbour porpoise. Therefore, whilst there is a risk of auditory injury, this risk is expected to be minimal. The sensitivity of porpoise and seals to PTS-onset from use of USBL is therefore assessed as low. The source levels of USBL are below the SPL_{pk} PTS-onset thresholds for minke whale, dolphins and seals. Therefore, it is concluded that there would be no risk of PTS onset to minke whale and any of dolphin or seal species from the use of USBL equipment and their sensitivity is assessed as negligible.

Magnitude of impact

MBES and SSS: JNCC (2025a) do not advise that mitigation to avoid injury from use of MBES is necessary in shallow (<200m) waters where the MBES used are of high frequencies (as they are planned to be here). EPS Guidance (JNCC et al, 2010) for use of SSS states that *"this type of survey is of a short-term nature and results in a negligible risk of an injury or disturbance offence (under the Regulations)."* An equivalent conclusion was reached by DECC (2011). Furthermore, a recent comprehensive assessment of the characteristics of acoustic survey sources proposed that MBES and SSS should be considered *de minimis* in terms of being unlikely to result in PTS to marine mammals or behavioural disturbance under the 160dB re 1µPa (rms) threshold adopted in the United States (Ruppel et al, 2022). Therefore, the risk of injury from MBES and SSS to all marine mammals is concluded to be of negligible magnitude.

SBP: For minke whale, seals and dolphins, the source levels of SBP equipment are below the PTS-onset thresholds (see Table A14.8). As such, there is no risk of PTS onset to minke whale and any dolphin or seal species from the use of this equipment and the magnitude of impact is assessed as negligible.

For harbour porpoise, the predicted SBP source levels exceed the PTS-onset threshold and as such, the use of this equipment has the potential to cause PTS. However, results for SBPs have indicated that PTS onset is likely to arise between 17–23m from the use of this equipment at source levels of 267dB re 1 µPa (SPL_{peak}) (BEIS, 2020). This source level is considerably louder than those likely to be used within the offshore development area and as such, impacts which could adapt behaviour so that individual survival and reproduction rates may be affected are unlikely. It is also suggested that SBPs used in high-resolution geophysical surveys have a very low potential for injury of sensitive marine fauna (BEIS, 2019), especially that harbour porpoises are likely to be deterred from such small injury zone by the presence of the vessel. While the likelihood of an animal experiencing PTS-onset from SBP is very low, PTS is a permanent effect on the hearing sensitivity of the animal, and thus the magnitude is considered medium.

USBL: For minke whale, seals and dolphins, the source level of USBL equipment is below the PTS-onset thresholds (see Table A14.8). As such, there is no risk of PTS onset to minke whale and any dolphin or seal species from the use of this equipment and the magnitude of impact is assessed as negligible.

For harbour porpoise, the predicted USBL source levels exceed the PTS-onset threshold and as such, the use of this equipment has the potential to cause PTS. A recent sound source verification exercise in the Danish North Sea reported measured noise levels from several active acoustic sources at sampling stations with closest points of approach of 0m, 100m and between 500m and 2km (Pace et al, 2021). In the study, Pace et al (2021) reported noise levels for a USBL operating at 25-40kHz attached to a SSS operating at a dual 300/600kHz frequency, the latter being above the recording capabilities of the noise loggers used. The effective source level was estimated as 184dB re 1µPa^2 @1m (SPL_{rms}). At 100m distance, broadband received levels in the 20-30kHz band were 147.9dB re 1µPa^2 (SPL_{rms}). The USBL appeared fairly omnidirectional with an estimated transmission loss of c.15logR. When the USBL was active, the combined source was detectable above background noise at the maximum recording distance of 2km; however, at a distance of c. 1km from the source, broadband received levels were ⩽140dB re 1µPa^2 (SPL_{peak}), ⩽130dB re 1µPa^2 (SPL_{peak}), and application of VHF cetacean (harbour porpoise) frequency weighting indicated noise levels of <120dB re 1µPa^2 (SPL_{peak}, VHF frequency-weighted). These results illustrate no potential for instantaneous PTS-onset from the USBL source tested. While there is potential for USBL to be operated at a theoretical source level which exceeds the minimum threshold for instantaneous injury in a relevant marine mammal species (harbour porpoise; 202dB) by up to 2dB, such noise levels are unlikely to be realised.

The noise levels from the USBL are expected to rapidly attenuate with distance from the source, even when assuming an omnidirectional source. While the likelihood of an animal experiencing PTS-onset from USBL is very low, PTS is a permanent effect on the hearing sensitivity of the animal, and thus the magnitude is considered medium.

Significance of the effect

As the sensitivity of all marine mammals to PTS onset from MBES and SSS equipment has been assessed as negligible, and the magnitude of impact has been assessed as negligible, the significance of the effect for Project Option 1 and Project Option 2 is assessed as imperceptible, which is not significant in EIA terms.

The sensitivity of minke whale, dolphin and seal species have been assessed as negligible, and the magnitude of impact from the use of SBPs has been assessed as negligible. As such, the significance of the effect for Project Option 1 and Project Option 2 is assessed as imperceptible, which is not significant in EIA terms. For harbour porpoise, the sensitivity has been assessed as low, and the magnitude of impact from the use of SBP has been assessed as medium. As such, the significance of the effect for Project Option 1 and Project Option 2 is assessed as slight, which is not significant in EIA terms, for these species.

USBL: The sensitivity of minke whale, dolphin and seal species have been assessed as negligible, and the magnitude of impact from the use of USBL has been assessed as negligible. As such, the significance of the effect for Project Option 1 and Project Option 2 is assessed as imperceptible, which is not significant in EIA terms. For harbour porpoise, the sensitivity has been assessed as low, and the magnitude of impact from the use of USBL has been assessed as medium. As such, the significance of the effect for Project Option 1 and Project Option 2 is assessed as slight, which is not significant in EIA terms, for these species.

For clarity, the significance of effect remains unchanged for MBES and SSS and all marine mammal species. The significance of effect changed for SBP for minke whale and seal species from slight negative to imperceptible negative. There was no change in the significance of effect for SBP for harbour porpoise and dolphin species. The significance of effect for all species remains not significant in EIA terms.

14.5.2.2 Impact 2 - Disturbance from pre-construction surveys

The key changes for this section are the replacement of the Southall et al (2019) auditory injury thresholds and hearing ranges used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds (in response to RFI Section 10 (g)) and hearing ranges as well as addition of the USBL (in response to RFI Section 10 (i). Section 14.5.2.2 in Chapter 14 of the 2024 EIAR should be deleted and replaced in its entirety with the following.

Sensitivity of the receptor

MBES or SSS: As indicated in Table A14.9 there is no potential for disturbance effects to occur through use of MBES or SSS, as the sound levels emitted are above 200kHz and therefore above the hearing frequency range of the marine mammals likely to be present in the region. The sensitivity of all marine mammals to disturbance from MBES and /or SSS is therefore assessed as negligible.

SBP: As indicated in Table A14.8, the expected sound frequency for SBPs falls within the functional hearing range for all relevant marine mammal species and, therefore, has the potential to result in disturbance effects. The operational frequencies of SBP (2–15kHz) shall typically operate in the bottom region of greatest sensitivity of harbour porpoise, dolphins and seals. It should be noted that when the equipment is emitting higher frequency sounds, the source level tends to be lower (Lurton and Deruiter, 2011) and thus, the probability of a disturbance response is anticipated to be reduced at lower source levels (Tougaard, 2021). Marine mammals may experience behavioural disturbance from underwater noise due to SBPs, however, since the SBP is a mobile source and operates in a given area for only a few days, animals are likely to return shortly after survey activities have ceased (Thompson et al, 2013). It is expected that marine mammals can tolerate these temporary effects without impacts on survival or reproduction and will resume normal behaviour once the survey has ceased. As such, the sensitivity of all marine mammals to disturbance from SBP is assessed as low.

USBL: As indicated in Table A14.8, the expected sound frequency for USBL falls within the functional hearing range for all relevant marine mammal species and, therefore, has the potential to result in disturbance effects. The operational frequencies of USBL (12 – 32kHz) shall typically operate in the bottom region of greatest sensitivity of harbour porpoise, dolphins and seals. There are currently no empirical data available on the behavioural responses of marine mammals to USBL usage specifically. However, this is likely to be short-term, temporary and of a spatial extent unlikely to exceed a few hundred metres of the source. It is expected that marine mammals can tolerate these temporary effects without impacts on survival or reproduction and will resume normal behaviour once the survey has ceased. As such, the sensitivity of all marine mammals to disturbance from USBL is assessed as low.

Magnitude of impact

MBES and SSS: As the sound levels emitted from MBES and SSS are above 200kHz and therefore above the hearing frequency range of all marine mammals likely to be present in the region, the magnitude of impact is assessed as negligible.

SBP: Stone (2024) summarised the results of opportunistic accounts of marine mammal responses to SBPs and noted that that detection rates were reduced when pingers were active and animals remained further from the source when chirps were active, which suggests some degree of displacement. Furthermore, a study on harbour porpoise distribution off Holy Island, Wales, coincided with a five-day SBP survey and a notable decrease in porpoise detections was reported corresponding to the survey period (Veneruso, 2024). A recent review of literature found that different types of SBPs, reported distances to behavioural response thresholds (160dB re 1µPa SPL_{rms}) were small, e.g. <1km based on noise measurement data and ≤1.69km based on modelling studies (Majewska et al, 2025). When including the limited empirical response results from Stone (2024) for chirp SBPs, the reported effects range increases to 2km (Majewska et al, 2025).

USBL: There are no empirical evidence on marine mammal responses to USBL. However, a recent review of literature reported small distances to behavioural response thresholds (160dB re 1µPa SPL_{rms}), e.g. >0.1km based on noise measurement data and ≤1.0km based on modelling studies (Majewska et al, 2025).

The updated JNCC guidance recommended a precautionary EDR of 3km for SBPs and USBL (JNCC, 2025c). In line with that guidance, Table A14.10 presents the number of marine mammals at risk of being disturbed during the pre-construction surveys. However, it should be noted that SBPs are highly directional, with noise levels outside of the main beam considerably lower and therefore with limited horizontal propagation of noise levels. Considering that the number of animals expected to experience disturbance will be low, representing temporary behavioural effects in a small proportion of the population, it is very unlikely to result in changes to the population trajectory. The magnitude of impact for SBP and USBL is assessed as low.

Table A14.10 Number of animals predicted to be disturbed by pre-construction surveys (SBP and USBL, 3km EDR).

Species	Density (#/km²)		Animals impacted	MU size	% MU
Harbour porpoise	0.21 (0.11 – 0.39)	Proposed development NWIS DAS average (min – max)	6 (3 – 11)	62,517	0.01% (0.00 – 0.02)
Bottlenose dolphin	0.1669 (0.1577 – 0.1787)	SCANS IV surface ECC average (min – max)	5 (4 – 5)	8,225	0.06% (0.05 – 0.06)
	0.1587 (0.1444 – 0.1712)	SCANS IV surface array area average (min – max)	4 (4 – 5)		0.05% (0.05 – 0.06)
Risso's dolphin	0.027	ObSERVE2 strata 5 summer 2022	<1	12,262	<0.01%
Common dolphin	0.10 (0.02 – 0.33)	Proposed development NWIS DAS average (min – max)	3 (<1 – 9)	102,656	0.00% (0.00 – 0.01%)
Minke whale	0.0059 (0.0055 – 0.0062)	SCANS IV surface ECC average (min – max)	<1 (<1 – <1)	20,118	0.00% (0.00 – 0.00)

Species	Density (#/km^2)		Animals impacted	MU size	% MU
	0.0066 (0.0059 – 0.0073)	SCANS IV surface array area average (min – max)	<1 (<1 – <1)		0.00% (0.00 – 0.00)
	0.018	ObSERVE2 strata 5 summer 2022	<1		0.00%
	0.004	ObSERVE2 strata 5 winter 2022-2023	<1		0.00%
Harbour seal	0.040 (0.022 – 0.056)	Habitat preference map ECC Average (min – max)	1 (<1 – 2)	1,365	0.06% (<0.06 – 0.13)
	0.026 (0.015 – 0.044)	Habitat preference map array area Average (min – max)	<1 (<1 – 1)		0.06% (<0.06 – 0.06)
Grey seal	0.525 (0.034 – 0.939)	Habitat preference map ECC Average (min – max)	15 (<1 – 27)	6,056	0.24% (<0.02 – 0.44)
	0.329 (0.223 – 0.439)	Habitat preference map array area Average (min – max)	9 (6 – 12)		0.15% (0.10 – 0.19)

Significance of the effect

As the sensitivity of all marine mammals to disturbance from MBES and SSS equipment has been assessed as negligible, and the magnitude of impact has been assessed as negligible, the significance of the effect for Project Option 1 and Project Option 2 is assessed as imperceptible, which is not significant in EIA terms.

As the sensitivity of all marine mammals to disturbance from SBP and USBL equipment has been assessed as low, and the magnitude of impact has been assessed as low, the significance of the effect for Project Option 1 and Project Option 2 is assessed as slight, which is not significant in EIA terms.

For clarity, the significance of effect remains unchanged and is imperceptible negative for MBES and SSS and slight negative for SBP which is not significant in EIA terms.

14.5.2.3 Impact 3 - Auditory injury (PTS) from UXO clearance

The key changes for this section are the replacement of the Southall et al (2019) auditory injury thresholds and hearing ranges used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds and hearing ranges (in response to RFI Section 10 (g)). Additionally, following further design refinement in response to the RFI Section 10 (a), the Developer has commitment to at-source noise reduction (e.g. bubble curtain or similar) for any high order of UXO clearance event. Section 14.5.2.3 in Chapter 14 of the 2024 EIAR should be deleted and replaced in its entirety with the following.

Studies to date indicate the array area to be low risk and one area within the ECC near the coast in the southwest is considered medium risk of encountering UXOs (6 Alpha Associates, 2021). If found, a risk assessment will be undertaken and items of UXO will either be avoided, removed, or detonated in situ. Recent advancements in the available methods for UXO clearance mean that high-order detonation may be avoided. The methods of UXO clearance considered for the proposed development may include the primary methods of removal/ relocation or low-order deflagration. If this is not possible, then high-order detonation will be a last resort method. If high-order clearance is required, at-source noise reduction (e.g. bubble curtain **or similar**) will be used. As the detailed pre-construction surveys have not yet been completed, it is not possible at this time to determine how many items of UXO will require clearance.

The preferred clearance method is to remove or deflagrate the UXO. Low order deflagration has been modelled assuming a donor of 0.25kg. The maximum equivalent charge weight for the potential UXO devices that could be present within the offshore development area has been estimated as 525kg (TNT equivalent). This has been modelled for high-order detonation alongside a range of smaller devices, at charge weights of 25, 55, 120, and 240kg. In each case, an additional donor weight of 0.5kg has been included to initiate detonation, see Appendix A14.1 for detailed modelling results.

For the purposes of the assessment in this chapter, only low order clearance with 0.25kg donor as well as the high order detonation of 525kg UXO with at-source noise reduction (e.g. bubble curtain or similar) will be presented in this section. The unweighted UXO clearance source levels are presented in Table A14.11.

Table A14.11 Summary of the unweighted SPL_{peak} and weighted SEL_{ss} source levels used for UXO clearance modelling (Replaces Table 14.18 in Chapter 14 of the 2024 EIAR).

Charge weight (TNT equivalent)	Unweighted SPL_{peak} source level	Weighted SEL_{ss} source level
Low order (0.25kg)	269.8dB re 1µPa @ 1m	215.2dB re 1µPa^{2}s @ 1m
525kg + 0.5kg donor + at-source noise reduction (e.g. bubble curtain or similar)	284.8dB re 1µPa @ 1m	226.4dB re 1µPa^{2}s @ 1m

Sensitivity of the receptor

Most of the acoustic energy produced by a high-order detonation is below a few hundred Hz, decreasing on average by about SEL 10dB per decade above 100Hz, and there is a pronounced drop-off in energy levels above ~5-10kHz (von Benda-Beckmann et al, 2015, Salomons et al, 2021). Therefore, the primary acoustic energy from a high-order UXO detonation is either outside or in the bottom region of greatest hearing sensitivity of harbour porpoise, dolphins and seals (NMFS, 2024). If PTS were to occur within this low frequency range, it would be unlikely to result in any significant impact to vital rates of porpoise, dolphins, and seals. Therefore, porpoise, dolphins, and seals have been assessed as having a low sensitivity to auditory injury (PTS-onset) from UXO clearance.

Recent acoustic characterisation of UXO clearance noise has shown that there is more energy at lower frequencies (<100Hz) then previously assumed (Robinson et al, 2022). Given the lower frequency components of the sound produced by UXO clearance, it is more precautionary to assess minke whales as having a medium sensitivity to auditory injury (PTS-onset) from UXO clearance.

Magnitude of impact

As UXO detonation is defined as a single pulse and thus the impulsive weighted SEL_{ss} criteria and the impulsive unweighted SPL_{peak} criteria from NMFS (2024) have been used in calculating injury ranges (Table A14.12). Given that the Developer has committed to use of at-source noise reduction (e.g. bubble curtain **or similar**) in case high-order clearance is required, results of the high-order detonation are only presented with at-source noise reduction (e.g. bubble curtain **or similar**) providing -10dB attenuation.

Low-order deflagration

The auditory injury (PTS-onset) range for low-order deflagration is small across all species, with a greatest impact range of <1km (Table A14.12). For all species, this equates to 1 or <1 individual impacted. Therefore, for low-order deflagration the magnitude is assessed as negligible.

High-order with at-source noise reduction (e.g. bubble curtain or similar)

For high-order detonation using at-source noise reduction (e.g. bubble curtain), HF cetaceans (dolphins) and seals have the smallest predicted instantaneous injury range of up to 260m and 540m, respectively (SPL_{peak}). LF cetaceans (minke whale) are predicted to have a slightly larger instantaneous impact range of 600m (SPL_{peak}). For VHF cetaceans (harbour porpoises), the predicted instantaneous PTS-onset impact range is considerably larger, reaching up to 4.6km (SPL_{peak}) for the maximum high-order charge size with at-source noise reduction (e.g. bubble curtain).

Table A14.12 Summary of the auditory injury (PTS-onset) impact ranges for low-order deflagration and high-order detonation with at-source noise reduction (e.g. bubble curtain or similar) using the impulsive, weighted SEL_{ss} and unweighted SPL_{peak} noise criteria from NMFS (2024) for marine mammals (Replaces Table 14.19 in Chapter 14 of the 2024 EIAR).

NMFS (2024)	PTS (weighted SEL_{ss})				PTS (unweighted SPL_{peak})			
	LF 183dB	HF 193dB	VHF 159dB	PCW 183dB	LF 222dB	HF 230dB	VHF 202dB	PCW 223dB
Low order (0.25kg)	130 m	< 50 m	170 m	< 50 m	130 m	60 m	990 m	110 m
525kg + donor + at-source noise reduction (e.g. bubble curtain **or similar**)	950 m	< 50 m	820 m	190 m	600 m	260 m	4.6 km	540 m

Bottlenose dolphins, Risso's dolphins, common dolphins, minke whales, harbour seals and grey seals are all predicted to have ⩽1 individual experience auditory injury (PTS-onset) from UXO clearance activities (Table A14.13). If <1 individual is predicted to be impacted, then the magnitude is assessed as negligible.

For harbour porpoise, 3 individuals (range: 2 – 6) are predicted to experience auditory injury (PTS-onset) from high order UXO clearance at the greatest charge weight, which is 0.005% of the MU. For harbour porpoise, where the number of animals predicted to be impacted is 3, the impact magnitude has been assessed as low. This is due to the fact that while only a very small number of animals are predicted to be impacted, auditory injury (PTS) is a permanent impact. Therefore, auditory injury from UXO clearance is expected to have a permanent effect on individuals that may influence individual survival but not at a level that would alter population trajectory over a generational scale.

Significance of the effect

Low-order deflagration

The sensitivity of harbour porpoise, dolphins and seals has been assessed as low, and the magnitude of auditory injury (PTS-onset) impacts from low-order deflagration UXO clearance have been assessed as negligible, this effect has been assessed as imperceptible, which is not significant in EIA terms, for Project Option 1 and Project Option 2.

The sensitivity of minke whales has been assessed as medium, and the magnitude of auditory injury (PTS-onset) impacts from low-order deflagration UXO clearance have been assessed as negligible, the significance of effect has been assessed as slight, which is not significant in EIA terms, for Project Option 1 and Project Option 2.

High-order clearance with at-source noise reduction (e.g. bubble curtain or similar)

The sensitivity of dolphins and seals has been assessed as low, and the magnitude of auditory injury (PTS-onset) impacts from high-order UXO clearance with at-source noise reduction (e.g. bubble curtain or similar) have been assessed as negligible, this impact has been assessed as imperceptible, which is not significant in EIA terms, for Project Option 1 and Project Option 2.

The sensitivity of porpoise has been assessed as low, and the magnitude of auditory injury (PTS-onset) impacts from high-order UXO clearance with at-source noise reduction (e.g. bubble curtain or similar) have been assessed as low, this impact has been assessed as slight, which is not significant in EIA terms, for Project Option 1 and Project Option 2.

The sensitivity of minke whales has been assessed as medium, and the magnitude of auditory injury (PTS-onset) impacts from high-order UXO clearance at-source noise reduction (e.g. bubble curtain or similar) have been assessed as negligible, this impact has been assessed as slight, which is not significant in EIA terms, for Project Option 1 and Project Option 2.

For clarity, the significance of effect remains unchanged for low-order deflagration and all marine mammal species. The significance of effect changed for high order detonation due to inclusion of at-source noise reduction (e.g. bubble curtain or similar) from medium negative to slight negative. The significance of effect for all species remains not significant in EIA terms.

Table A14.13 Estimated number of marine mammals potentially at risk of PTS during UXO clearance (Replaces Table 14.20 in Chapter 14 of the 2024 EIAR).

			PTS weighted SEL_{ss}		PTS unweighted SPL_{peak}	
Species	**Density (#/km²)**	**Impact**	**Low order (0.25 kg)**	**525kg + donor + at-source noise reduction (e.g. bubble curtain or similar)**	**Low order (0.25 kg)**	**525kg + donor + at-source noise reduction (e.g. bubble curtain or similar)**
Harbour porpoise: Proposed development NWIS DAS; average (min – max)	0.21 (0.11- 0.39)	# animals	<1	<1	<1	3 (2-6)
Bottlenose dolphin: SCANS IV surface ECC; average (min – max)	0.1669 (0.1577-0.1787)	# animals	<1	<1	<1	<1
Bottlenose dolphin: SCANS IV surface array area; average (min – max)	0.1587(0.1444-0.1712)	# animals	<1	<1	<1	<1
Risso's dolphin: ObSERVE2 strata 5 summer 2022	0.027	# animals	<1	<1	<1	<1
Common dolphin: Proposed development NWIS DAS; average (min – max)	0.10 (0.02-0.33)	# animals	<1	<1	<1	<1
Minke whale: SCANS IV surface ECC; average (min – max)	0.0059 (0.0055-0.0062)	# animals	<1	<1	<1	<1
Minke whale: SCANS IV surface array area; average (min – max)	0.0066 (0.0059-0.0073)	# animals	<1	<1	<1	<1
Minke whale: ObSERVE2 strata 5 summer 2022	0.018	# animals	<1	<1	<1	<1
Minke whale: ObSERVE2 strata 5 winter 2022-2023	0.0059	# animals	<1	<1	<1	<1
Harbour seal: Habitat preference map ECC; average (min – max)	0.040 (0.022- 0.056)	# animals	<1	<1	<1	<1
Harbour seal: Habitat preference map array area; average (min – max)	0.026 (0.015 0.044)	# animals	<1	<1	<1	<1
Grey seal: Habitat preference map ECC; average (min – max)	0.525 (0.034-0.939)	# animals	<1	<1	<1	<1
Grey seal: Habitat preference map array area; average (min – max)	0.329 (0.223-0.439)	# animals	<1	<1	<1	<1

14.5.2.4 Impact 4 - Disturbance from UXO clearance

The key changes for this section are revised baseline, the publication of new JNCC EDR guidance (JNCC, 2025c) and commitment from the Developer to at-source noise reduction (e.g. bubble curtain or similar) during the high-order clearance. Section 14.5.2.4 in Chapter 14 of the 2024 EIAR should be deleted and replaced in its entirety with the following.

Studies to date indicate the array area to be low risk and one area within the ECC near the coast in the southwest is considered medium risk of encountering UXOs. (6 Alpha Associates, 2021). Therefore, UXO clearance activities are expected to occur very infrequently (likely over a few days at most, given the low risk of UXO presence in the area).

This assessment presents results for each of the following behavioural disturbance thresholds:

- 5km EDR for low-order deflagration;
- 10km EDR for high-order detonations with at-source noise reduction (e.g. bubble curtain or similar); and
- TTS-onset thresholds for both high-order detonations with at-source noise reduction (e.g. bubble curtain or similar) and low-order deflagration.

Sensitivity of the receptor

It is noted in the JNCC (2020) guidance that, although UXO detonation is considered a loud underwater noise source, *"...a one-off explosion would probably only elicit a startle response and would not cause widespread and prolonged displacement..."* Whilst detonations will usually be undertaken as part of a campaign and, therefore, there may result in multiple detonations over several days (JNCC 2020), each detonation will be of a short-term duration. Therefore, it is not expected that disturbance from UXO detonation would result in any significant impacts, and that disturbance would not be sufficient to result in any changes to the vital rates of individuals. Therefore, the sensitivity of marine mammals for disturbance from UXO clearance is expected to be low.

5km EDR

Low-order deflagration clearance is expected to be the primary method used to clear any UXOs present. This will result in substantially lower impact than high-order detonation clearance.

Magnitude of impact

The greatest estimated disturbance occurs for grey seals, harbour porpoise and bottlenose dolphins, where 41 grey seals (0.68% MU), 16 harbour porpoises (0.03% MU) and 13 bottlenose dolphins (0.16% MU) are predicted to be disturbed (Table A14.14). The consequence of the impact is short-term and intermittent with temporary behavioural effects that are very unlikely to alter survival and reproductive rates to the extent that the population trajectory would be altered. Therefore, disturbance impacts associated with low-order deflagration on all marine mammals are assessed as low in magnitude.

Table A14.14 Estimated number of marine mammals potentially at risk of disturbance during UXO clearance (assuming an EDR of 5km, resulting in a 78.54km^2 impact area) (Replaces Table 14.22 in Chapter 14 of the 2024 EIAR)

Species	Density (#/km^2)		Animals impacted	MU size	% MU
Harbour porpoise	0.21 (0.11 – 0.39)	Proposed development NWIS DAS average (min – max)	16 (9 - 31)	62,517	0.03% (0.01 – 0.05)
Bottlenose dolphin	0.1669 (0.1577 – 0.1787)	SCANS IV surface ECC average (min – max)	13 (12 - 14)	8,225	0.16% (0.15 – 0.17)
	0.1587 (0.1444 – 0.1712)	SCANS IV surface array area average (min – max)	12 (11 - 13)		0.15% (0.13 – 0.16)
Risso's dolphin	0.027	ObSERVE2 strata 5 summer 2022	2	12,262	0.02%

Species	Density (#/km^2)		Animals impacted	MU size	% MU
Common dolphin	0.10 (0.02 – 0.33)	Proposed development NWIS DAS average (min – max)	8 (2 – 26)	102,656	0.01% (0.00 – 0.0.03)
Minke whale	0.0059 (0.0055 – 0.0062)	SCANS IV surface ECC average (min – max)	<1	20,118	0.00%
	0.0066 (0.0059 – 0.0073)	SCANS IV surface array area average (min – max)	<1		0.00%
	0.018	ObSERVE2 strata 5 summer 2022	<1		0.00%
	0.004	ObSERVE2 strata 5 winter 2022-2023	<1		0.00%
Harbour seal	0.040 (0.022 – 0.056)	Habitat preference map ECC Average (min – max)	3 (2 – 4)	1,365	0.22% (0.15 – 0.29)
	0.026 (0.015 – 0.044)	Habitat preference map array area Average (min – max)	2 (1 – 3)		0.15% (0.07 – 0.22)
Grey seal	0.525 (0.034 – 0.939)	Habitat preference map ECC Average (min – max)	41 (3 – 74)	6,056	0.68% (0.05 – 1.22)
	0.329 (0.223 – 0.439)	Habitat preference map array area Average (min – max)	26 (18 – 34)		0.43% (0.30 – 0.56)

Significance of the effect

Given that the sensitivity of all marine mammals to disturbance from low-order UXO clearance has been assessed as low and the magnitude of the impact (assuming a 5km EDR) to all marine mammals has also been assessed as low, the significance of effect of disturbance from low-order UXO clearance to all marine mammals for Project Option 1 and Project Option 2 is assessed as being slight, which is not significant in EIA terms.

For clarity, the significance of effect remains unchanged for 5km EDR and all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

10km EDR

The Developer has committed to at-source noise reduction (e.g. bubble curtain or similar) if high-order clearance is required. The latest guidance provided in JNCC (2025c) is that for high-order UXO clearance with a bubble curtain, an EDR of 10km should be used to assess the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs in England, Wales and Northern Ireland. Within this 10km EDR, all animals are assumed to be disturbed. While the advice acknowledges that there is no empirical evidence of harbour porpoise avoidance from UXO clearance, this is the only guidance available and so it is used in this assessment. In the absence of agreed metrics for the use of other marine mammal species for disturbance and given a lack of empirical data on the likelihood of response to explosives, this 10km radius (area of 314km^2) has been applied for all species for high order detonations.

Magnitude of impact

The greatest estimated disturbance occurs for grey seals, harbour porpoise and bottlenose dolphins, where up to 165 grey seals (2.72 % MU), 66 harbour porpoise (0.11 % MU) and 52 bottlenose dolphins (0.63% MU) are predicted to be disturbed per detonation (Table A14.15). While the number of animals and the proportion of the MU this represents is non-negligible, the duration of disturbance is expected to negligible (disturbance lasting less than a day per detonation event) and the frequency of the impact is expected to be negligible (likely over a few days at most, given the low risk of UXO presence in the area).

The consequence of the impact is therefore short-term and intermittent with temporary behavioural effects that are very unlikely to alter survival and reproductive rates to the extent that the population trajectory would be altered. Therefore, disturbance impacts associated with high-order UXO clearance with at-source noise reduction (e.g. bubble curtain or similar) on all marine mammals are assessed as low in magnitude.

Table A14.15 Number of animals predicted to be disturbed by high order UXO clearance with at-source noise reduction (e.g. bubble curtain or similar) (10 km EDR) (Replaces Table 14.21 in Chapter 14 of the 2024 EIAR)

Species	Density (#/km^2)		Animals impacted	MU size	% MU
Harbour porpoise	0.21 (0.11 – 0.39)	Proposed development NWIS DAS average (min – max)	66 (35 – 123)	62,517	0.11% (0.06 – 0.20)
Bottlenose dolphin	0.1669 (0.1577 – 0.1787)	SCANS IV surface ECC average (min – max)	52 (50 – 56)	8,225	0.63% (0.61 – 0.68)
	0.1587 (0.1444 – 0.1712)	SCANS IV surface array area average (min – max)	50 (45 – 54)		0.61% (0.55 – 0.66)
Risso's dolphin	0.027	ObSERVE2 strata 5 summer 2022	8	12,262	0.07%
Common dolphin	0.10 (0.02 – 0.33)	Proposed development NWIS DAS average (min – max)	31 (6 – 104)	102,656	0.03% (0.01 – 0.10)
Minke whale	0.0059 (0.0055 – 0.0062)	SCANS IV surface ECC average (min – max)	2 (2 – 2)	20,118	0.01% (0.01 – 0.01)
	0.0066 (0.0059 – 0.0073)	SCANS IV surface array area average (min – max)	2 (2 – 2)		0.01% (0.01 – 0.01)
	0.018	ObSERVE2 strata 5 summer 2022	6		0.03%
	0.004	ObSERVE2 strata 5 winter 2022-2023	1		0.00%
Harbour seal	0.040 (0.022 – 0.056)	Habitat preference map ECC Average (min – max)	13 (7 – 18)	1,365	0.95% (0.51 – 1.32)
	0.026 (0.015 – 0.044)	Habitat preference map array area Average (min – max)	8 (5 – 14)		0.59% (0.37 – 1.03)
Grey seal	0.525 (0.034 – 0.939)	Habitat preference map ECC Average (min – max)	165 (11 - 295)	6,056	2.72% (0.18 – 4.87)
	0.329 (0.223 – 0.439)	Habitat preference map array area Average (min – max)	103 (70 - 138)		1.70% (1.16 – 2.28)

Significance of the effect

The sensitivity of all marine mammals to disturbance from high-order UXO clearance with at-source noise reduction (e.g. bubble curtain or similar) has been assessed as low and the magnitude of the impact (assuming a 10km EDR) has been assessed as low. Therefore, for all marine mammals for Project Option 1 and Project Option 2 the significance of effect is assessed as slight, which is not significant in EIA terms.

It is important to note that while high-order detonation represents the scenario with the greatest magnitude of impact for UXO clearance, it is regarded as the "last resort method", with a preference for removal/relocation or low-order deflagration methods to be used.

For clarity, the significance of effect remains unchanged between 26km and 10km EDR all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

TTS-onset as a proxy for disturbance

While the number of animals and the proportion of the MU this represents is non-negligible, the duration of disturbance is expected to negligible (disturbance lasting less than a day per detonation event) and the frequency of the impact is expected to be negligible (likely over a few days at most, given the low risk of UXO presence in the area). The consequence of the impact is therefore short-term and intermittent with temporary behavioural effects that are very unlikely to alter survival and reproductive rates to the extent that the population trajectory would be altered. Therefore, disturbance impacts associated with UXO clearance on all marine mammals are assessed as low in magnitude.

Table A14.16 presents the TTS as a proxy for disturbance impact ranges for UXO detonation considering various charge weights and impact criteria. Full details of the underwater noise modelling and the resulting TTS-onset impact areas and ranges are detailed in the Underwater Noise Modelling Report.

Magnitude of impact

For low-order deflagration, the greatest estimated disturbance (using TTS-onset as a proxy) range is 1.8km for both minke whales and harbour porpoise (Table A14.16). This equates to <1 individual for each species (Table A14.17).

For the high-order clearance of a 525kg UXO + donor with at-source noise reduction (e.g. bubble curtain or similar), the greatest estimated disturbance (using TTS-onset as a proxy) range is 13km for minke whales, 8.4km for harbour porpoise and 2.7km for seals (Table A14.16). This equates to disturbance to 12 harbour porpoise, <1 minke whale and 3 grey seals (Table A14.17).

Southall et al (2007) states that the use of TTS as a proxy for disturbance is *"expected to be precautionary because TTS at onset levels is unlikely to last a full diel cycle or to have serious biological consequences during the time TTS persists"*. TTS-onset thresholds are therefore likely to over-estimate the true behavioural response of any number of individuals predicted to be impacted. In addition, it is expected that the detonation of a UXO would elicit a startle response and potentially very short duration behavioural responses and would therefore not be expected to cause widespread and prolonged displacement (JNCC, 2020).

While the number of animals and the proportion of the MU this represents is non-negligible, the duration of disturbance is expected to negligible (disturbance lasting less than a day per detonation event) and the frequency of the impact is expected to be negligible (likely over a few days at most, given the low risk of UXO presence in the area). The consequence of the impact is therefore short-term and intermittent with temporary behavioural effects that are very unlikely to alter survival and reproductive rates to the extent that the population trajectory would be altered. Therefore, disturbance impacts associated with UXO clearance on all marine mammals are assessed as low in magnitude.

Table A14.16 Summary of the TTS impact ranges (as a proxy for disturbance) for UXO detonation using the impulsive, noise criteria from NMFS (2024) for marine mammals (Replaces Table 14.23 in Chapter 14 of the 2024 EIAR)

NMFS (2024)	TTS (weighted SEL_{ss})				TTS (unweighted SPL_{peak})			
	LF 168dB	HF 178dB	VHF 144dB	PCW 168dB	LF 216dB	HF 224dB	VHF 196dB	PCW 21dB
Low order (0.25kg)	1.8 km	< 50 m	1.2 km	380 m	230 m	100 m	1.8 km	210 m
525kg + donor + at-source noise reduction (e.g. bubble curtain or similar)	13 km	80 m	2.9 km	2.7 km	1.1 km	490 m	8.4 km	1.0 km

Significance of the effect

Given that the sensitivity of all marine mammals to disturbance from UXO clearance has been assessed as low and the magnitude of the impact (assuming TTS as a proxy for disturbance) to all marine mammals has also been assessed as low, the impact of TTS as a proxy for disturbance from UXO clearance to all marine mammals for Project Option 1 and Project Option 2 is assessed as being a slight effect, which is not significant in EIA terms.

For clarity, the significance of effect remains unchanged for TTS-onset as a proxy for disturbance following the inclusion of at-source noise reduction (e.g. bubble curtain or similar) for all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

Table A14.17 Estimated number of marine mammals potentially at risk of disturbance (using TTS as a proxy) during UXO clearance (Replaces Table 14.24 in Chapter 14 of the 2024 EIAR)

			TTS weighted SEL_{ss}		TTS unweighted SPL_{peak}	
Species	**Density (#/km²)**	**Impact**	**Low order (0.25 kg)**	**525kg + donor + at-source noise reduction (e.g. bubble curtain or similar)**	**Low order (0.25 kg)**	**525kg + donor + at-source noise reduction (e.g. bubble curtain or similar)**
Harbour porpoise: Proposed development NWIS DAS; average (min – max)	0.21 (0.11- 0.39)	# animals	<1	1 (1 – 3)	<1	12 (6 – 22)
Bottlenose dolphin: SCANS IV surface ECC; average (min – max)	0.1669 (0.1577-0.1787)	# animals	<1	<1	<1	<1
Bottlenose dolphin: SCANS IV surface array area; average (min – max)	0.1587 (0.1444-0.1712)	# animals	<1	<1	<1	<1
Risso's dolphin: ObSERVE2 strata 5 summer 2022	0.027	# animals	<1	<1	<1	<1
Common dolphin: Proposed development NWIS DAS; average (min – max)	0.10 (0.02-0.33)	# animals	<1	<1	<1	<1
Minke whale: SCANS IV surface ECC; average (min – max)	0.0059 (0.0055-0.0062)	# animals	<1	1	<1	<1
Minke whale: SCANS IV surface array area; average (min – max)	0.0066 (0.0059-0.0073)	# animals	<1	1	<1	<1
Minke whale: ObSERVE2 strata 5 summer 2022	0.018	# animals	<1	2	<1	<1
Minke whale: ObSERVE2 strata 5 winter 2022-2023	0.0059	# animals	<1	1	<1	<1
Harbour seal: Habitat preference map ECC; average (min – max)	0.040 (0.022- 0.056)	# animals	<1	<1	<1	<1
Harbour seal: Habitat preference map array area; average (min – max)	0.026 (0.015 0.044)	# animals	<1	<1	<1	<1
Grey seal: Habitat preference map ECC; average (min – max)	0.525 (0.034-0.939)	# animals	<1	3 (0 – 5)	<1	<1
Grey seal: Habitat preference map array area; average (min – max)	0.329 (0.223-0.439)	# animals	<1	2 (1 – 3)	<1	<1

14.5.2.5 Impact 5 - Auditory Injury (PTS) from pile driving

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, Section 14.5.2.5 in Chapter 14 of the 2024 EIAR should be deleted.

14.5.2.6 Impact 6 - Auditory Injury (TTS) from pile driving

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, Section 14.5.2.6 in Chapter 14 of the 2024 EIAR should be deleted.

14.5.2.7 Impact 7 - Disturbance from pile driving

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, 14.5.2.7 in Chapter 14 of the 2024 EIAR should be deleted and replaced in its entirety with the following:

14.5.2.8 Impact 23 - Disturbance from SBJs

Magnitude of impact

There are very little empirical data on the underwater noise levels produced during the installation of SBJs. Koschinski and Ludemann (2020) provide a review of noise mitigation methods to comply with noise limits when constructing offshore wind turbines. The first SBJ offshore wind turbine was installed by Orsted at Borkum Riffgrund 1 in 2014 (n=1), and they have since been installed at Borkum Riffgrund 2 in 2018 (n=20) and Aberdeen Bay in 2018 (n=11). Measurements at Borkum Riffgrund 2 showed that the noise from the suction pumps could not be detected more than 500m from the source, and that the average sound pressure level at 750m did not differ from the background noise, though it was noted that the background noise levels at the time included construction related noise including the installation vessel.

More recently, 114 WTGs were installed on three-legged steel jackets using suction bucket caissons at Seagreen between 2021 and 2023. It should be noted that the aim of this study was to look at regional scale changes and therefore smaller scale impacts may not have been recorded. Underwater noise monitoring showed that PAM sites within the Seagreen array area detected a 3-5 dB median increase the 0.1 – 1 kHz frequency band during hours of suction compared to baseline (Chudzinska et al, 2026). However, the data also showed that when comparing suction and non-suction hours within a construction day, the differences were relatively minor suggesting that vessel traffic, mobilisation, and ancillary operations contribute substantially to the overall increase in underwater noise on construction days. There was no evidence of a change in dolphin or porpoise detections as a result of SBJ construction activities.

Weilgart (2023) provides a review of best available technologies and environmental practices for mitigating the noise from pile driving. This includes a section on SBJs which states that SBJ installation noise "*barely exceeds background levels*".

Given the minimal underwater noise produced by SBJ installation, it is expected that any potential disturbance impacts to marine mammals will be minimal, and most likely restricted to disturbance within the array area boundary. The magnitude of impact is therefore considered to be negligible.

Sensitivity of receptor

The sensitivity of marine mammals to SBJ installation is unknown. To be precautionary, the sensitivity is assumed to be Low (the same as for other construction activities such as drilling, etc. – see Impact 9).

Significance of the effect

The sensitivity of marine mammal species has been assessed as low and the magnitude of disturbance from SBJs installation has been assessed as negligible. Therefore, the significance of effect for is assessed as imperceptible, which is not significant in EIA terms.

14.5.2.9 Impact 8 - Auditory injury (PTS) from other construction activities

The key changes for this section are revised baseline, the replacement of the Southall et al (2019) auditory injury thresholds and hearing ranges used in the 2024 EIAR with the more up to date NMFS (2024) auditory thresholds and hearing ranges (in response to RFI Section 10 (g)) and the revision of the foundation installation method for Project Option 1 and Project Option 2 (following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets) Additionally, there will be no dredging at the proposed development. Section 14.5.2.9 in Chapter 14 of the 2024 EIAR should be deleted in its entirety and replaced with the following:

During the construction of the proposed development, there will be several activities that will produce underwater noise. These include:

- Cable laying (if not trenched): Noise from the cable laying vessel and any other associated noise during the offshore cable laying activities;
- Trenching: Plough trenching and/or jet trenching may be required during offshore cable installation;
- Rock placement: Potentially required on site for installation of offshore cables (cable crossings and cable protection) and scour protection around foundation structures; and
- Drilling: Potential for OSP pin pile foundations to be drilled.

Sensitivity of the receptor

Cable laying (if not trenched) is generally considered to have a low potential for impacts to marine mammals due to the non-impulsive nature of the noise generated and the fact that any generated noise is likely to be dominated by the vessel from which cable installation is taking place (Genesis 2011). Therefore, the sensitivity of marine mammals from cable laying activities will be the same as for vessel noise. Vessel noise is continuous, and is dominated by sounds from propellers, thrusters, and various rotating machinery (e.g. power generation, pumps). In general, support and supply vessels (50-100m in length) are expected to have broadband source levels in the range 165-180dB re 1µPa, with the majority of energy below 1kHz (OSPAR 2009). Large commercial vessels (>100m in length) produce relatively loud and predominately low frequency sounds, with the strongest energy concentrated below several hundred Hz. For porpoise, dolphins and seals, the hearing sensitivity below 1kHz is relatively poor and thus it is expected that a PTS at these low frequency ranges would result in little impact to vital rates. Therefore, the sensitivity of porpoise, dolphins, and seals to PTS from cable laying is assessed as low. The low frequency noise produced during cable laying may be more likely to overlap with the hearing range of low frequency cetacean species such as minke whales. Therefore, the sensitivity of minke whales to PTS from cable laying is assessed as medium.

Trenching during cable installation is highly variable underwater noise generation and dependent on the physical properties of the seabed that is being cut. At the North Hoyle OWF, trenching activities had a peak energy between 100Hz–1kHz and in general the sound levels were generally only 10–15dB above background levels (Nedwell et al 2003). For porpoise, dolphins and seals, the hearing sensitivity below 1kHz is relatively poor and thus it is expected that a PTS at these low frequency ranges would result in little impact to vital rates. Therefore, the sensitivity of porpoise, dolphins, and seals to PTS from trenching is assessed as low. The low frequency noise produced during trenching may be more likely to overlap with the hearing range of low frequency cetacean species such as minke whales. Therefore, the sensitivity of minke whale to PTS from trenching is precautionarily assessed as medium.

Drilling noise has been likened to that produced by potential dredging activity; low frequency noise caused by rotating machinery (Greene, 1987). Recordings of drilling at the North Hoyle offshore windfarm suggest that the sound produced is concentrated at 125Hz (Nedwell et al, 2003).

For harbour porpoise, dolphins and seals, the hearing sensitivity below 1kHz is relatively poor and thus it is expected that a PTS at these low frequency ranges would result in little impact to vital rates. Therefore, the sensitivity of harbour porpoise, dolphins and seals to PTS from drilling noise is assessed as low. The low frequency noise produced during drilling may be more likely to overlap with the hearing range of low frequency cetacean species such as minke whales. Therefore, the sensitivity of minke whales to PTS from drilling is precautionarily assessed as medium.

Rock placement noise generation is largely unknown. One study of rock placement activities in the Yell Sound in Shetland found that rock placement noise produced low frequency tonal noise from the machinery, but that measured noise levels were within background levels (Nedwell and Howell 2004). Therefore, it is highly likely that any generated noise is likely to be dominated by the vessel from which activities taking place. Therefore, the sensitivity of harbour porpoise, dolphins and seals to PTS from rock placement is expected to be low. The low frequency noise produced during rock placement may be more likely to overlap with the hearing range of low frequency cetacean species such as minke whales. Therefore, the sensitivity of minke whale to PTS from rock placement is precautionarily assessed as medium.

MMO (2015) provide information on the acoustic properties of anthropogenic continuous noise sources; this includes noise sources such as drilling and shipping. For both activities, the main energy is listed as being <1kHz. For porpoise, dolphins and seals species considered here, the hearing sensitivity below 1kHz is relatively poor and thus it is expected that a PTS at these low frequency ranges would result in little impact to vital rates and, therefore, their sensitivity is assessed as low. As minke whales have a greater hearing sensitivity below 1kHz, meaning their hearing range is more likely to overlap with other construction, activities their sensitivity has precautionarily been assessed as medium.

Magnitude of impact

Using the non-impulsive weighted SEL_{cum} PTS-onset thresholds resulted in estimated PTS impact ranges of <50m for all marine mammal species for all non-piling construction noise (Table A14.18). Given the *de minimis* extent of the impact range, <1 individual of each species is predicted to be impacted by each of these activities. Therefore, the impact of these sources will have a negligible magnitude.

Table A14.18 Summary of the source level (SPL_{rms} dB re 1µPa @ 1m) and PTS-onset impact ranges for the different construction noise sources using the non-impulsive SEL_{cum} criteria from NMFS (2024) and fleeing animal (Replaces Table 14.42 in Chapter 14 of the 2024 EIAR)

Source	VHF (Harbour porpoise)	HF (Dolphins)	LF (Minke whale)	PCW (Grey & harbour seal)
Cable laying	<50m	<50m	<50m	<50m
Trenching	<50m	<50m	<50m	<50m
Rock placement	<50m	<50m	<50m	<50m
Drilling	<50m	<50m	<50m	<50m

Significance of the effect

The sensitivity of porpoise, dolphins and seals to auditory injury (PTS) from other construction activities has been assessed as low. The sensitivity of minke whales to auditory injury (PTS) from other construction activities has been assessed as medium. The magnitude of auditory injury (PTS) from other construction activities has been assessed as negligible for all species. Therefore, the significance of effect is imperceptible, which is not significant in EIA terms, for porpoise, dolphins and seals, and slight, which is not significant in EIA terms, for minke whales.

For clarity, the significance of effect remains unchanged for auditory injury (PTS) from other construction activities and all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

14.5.2.10 Impact 9 - Disturbance from other construction activities

The key change for this section is the removal of dredging at the proposed development.

For clarity, the significance of effect remains unchanged for disturbance from other construction activities and all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

14.5.2.11 Impact 10 - Collision with vessels

The key change to this section is a very slight increase in the total number of construction vessels (was 67, now 70), a very slight increase in the total number of return trips during construction (was 3,008, now 3,032) and a very slight increase in the maximum number of vessels simultaneously onsite during construction (was 49, now 50) compared to the 2024 EIAR. The reason for changes in vessel number is due to the design refinements to SBJ foundation installation (refer to Appendix A5.1: Design Refinements). This change in vessel numbers and vessel trips makes no change to the resulting magnitude or significance assessment, and thus the significance of effect remains unchanged.

14.5.2.12 Impact 11 - Disturbance from vessels

The key change to this section is a very slight increase in the total number of construction vessels, total number of return trips during construction and the maximum number of vessels simultaneously onsite during construction (as previously outlined in section 14.5.2.11) compared to the 2024 EIAR. The reason for changes in vessel number is due to the design refinements to SBJ foundation installation (refer to Appendix A5.1: Design Refinements). This change in vessel numbers and vessel trips makes no change to the resulting magnitude or significance assessment, and thus the significance of effect remains unchanged.

14.5.2.13 Impact 12 - Prey availability and distribution

The key change to this section is the updated impact assessment for fish species in Chapter 13 Fish and Shellfish Ecology.

Magnitude

The assessment provided in Chapter 13: Fish and Shellfish Ecology indicates that the overall adverse impacts to fish species from the construction of the proposed development will be not significant to slight (not significant):

- Impact 1: Temporary increase in SSC and sediment deposition arising during the construction phase = Slight
- Impact 2: Temporary damage and disturbance of the seabed during construction activities = Slight
- Impact 3: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination = Not significant
- Impact 4: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/or behavioural effects during construction = Slight.

Given that there is expected to be no significant impacts to any of their prey species, the predicted impact on marine mammals is of negligible magnitude.

Significance of the effect

The sensitivity of receptors as low and the magnitude of the impact has been assessed as negligible. Therefore, the significance of the effect of changes in fish abundance/distribution, in relation to impacts on marine mammals during construction is concluded to be imperceptible, which is not significant in EIA terms.

There are no other changes to this section. Refer to Section 14.5.2.13 of Chapter 14 of the 2024 EIAR.

14.5.2.14 Impact 13 - Increased concentrations of suspended sediments

There are no changes to this section. Refer to Section 14.5.2 of Chapter 14 of the 2024 EIAR.

For clarity, the significance of effect remains unchanged for increased concentration of suspended sediments effecting marine mammal species. The significance of effect for all species remains not significant in EIA terms.

14.5.3 Operational Phase

There are no changes to this section. Refer to Section 14.5.3 of Chapter 14 of the 2024 EIAR.

14.5.3.1 Impact 14 - Collision with vessels

There are no changes to this section. Refer to Section 14.5.3 of Chapter 14 of the 2024 EIAR.

For clarity, the significance of effect remains unchanged for collision with vessels and all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

14.5.3.2 Impact 15 - Disturbance from vessels

There are no changes to this section. Refer to Section 14.5.3 of Chapter 14 of the 2024 EIAR.

For clarity, the significance of effect remains unchanged for disturbance from vessels and all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

14.5.3.3 Impact 16 - Prey availability and distribution

The key change to this section is the updated impact assessment for fish species in Chapter 13 Fish and Shellfish Ecology.

Magnitude

The assessment provided in Chapter 13: Fish and Shellfish Ecology indicates that the overall adverse impacts to fish species from the operation of the proposed development will be not significant to slight (not significant):

- Impact 5: Temporary increase in SSC and sediment deposition arising during maintenance activities = Slight
- Impact 6: Temporary damage and disturbance of the seabed during maintenance activities = Slight
- Impact 7: Long-term/permanent loss of benthic habitat due to the placement of subsea infrastructure = Slight
- Impact 8: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination = Not significant
- Impact 9: Increase in hard substrate and structural complexity due to the placement of subsea infrastructure = Slight
- Impact 10: Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables = Slight
- Impact 15: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/ or behavioural effects during the operational phase = Slight

Given that there is expected to be no significant impacts to any of their prey species, the predicted impact on marine mammals is of negligible magnitude.

Significance of the effect

The sensitivity of receptors as low and the magnitude of the impact has been assessed as negligible. Therefore, the significance of the effect of changes in fish abundance/distribution, in relation to impacts on marine mammals during operation is concluded to be imperceptible, which is not significant in EIA terms.

There are no other changes to this section. Refer to Section 14.5.3.3 of Chapter 14 of the 2024 EIAR.

14.5.3.4 Impact 17 - Increased concentrations of suspended sediments

There are no changes to this section. Refer to Section 14.5.3.4 of Chapter 14 of the 2024 EIAR.

For clarity, the significance of effect remains unchanged for increased concentrations of suspended sediments and all marine mammal species. The significance of effect for all species remains not significant in EIA terms.

14.5.3.5 Impact 24 – Disturbance from Operational Noise

An assessment of disturbance from operational noise of the turbines has been added to the EIAR in response to RFI Section 10 (h).

Sensitivity of the receptor

Operational noise is primarily low frequency. For bottom-fixed OWFs it was reported to be well below 1kHz (Thomsen et al, 2006, Stöber and Thomsen, 2021, Bellmann et al, 2023). Therefore, the primary acoustic energy from operational bottom-fixed WTGs is likely to be below the region of greatest sensitivity for most marine mammal species considered here. In terms of potential ecological effects, Bellmann et al (2023) highlighted the low-frequency nature of WTG noise and corroborated that such noise cannot be perceived by harbour porpoises, even at distances of 100m from the WTG. Other species with more sensitive hearing at lower frequencies, such as seals and minke whales, would be able to perceive such noise.

As such, it is expected that a disturbance at this frequency would result in limited impact to animals' vital rates. Therefore, the sensitivity of harbour porpoise and dolphin species to disturbance from operational noise is assessed as negligible.

The low frequency noise produced during operations may be more likely to overlap with the hearing range of seals and low frequency cetacean species such as minke whales. Minke whale communication signals have been demonstrated to be below 2kHz (Edds-Walton, 2000, Mellinger et al, 2000, Gedamke et al, 2001, Risch et al, 2013, Risch et al, 2014). Tubelli et al (2012) estimated the most sensitive hearing range (the region with thresholds within 40dB of best sensitivity) to extend from 30 to 100Hz up to 7.5 to 25kHz, depending on the specific model used. Therefore, it has been precautionarily assumed that both species of seals, and minke whales have a low sensitivity to disturbance from operational noise.

Magnitude of impact

Most studies conducted on operational noise from bottom-fixed OWFs to date were conducted at wind farms with relatively small-sized, geared WTGs (Tougaard et al, 2020). Using data from bottom-fixed foundation WTGs of <1 to 6 MW capacity, Tougaard et al (2020) showed that as WTG size increases, the underwater sound pressure level also increases. Stöber and Thomsen (2021) also noted a difference in underwater noise levels generated by geared vs direct-drive WTGs, with one example of the latter being 10dB quieter than the average geared WTG of equivalent capacity. Tougaard et al (2020) present a formula, based on the published data for the operational wind farms, that allows broadband noise level to be estimated based on the application of wind speed, WTG size (by nominal power output) and distance from the WTG. As presented in the underwater noise modelling report (Appendix A14.1), this formula suggests that marine mammals may experience behavioural disturbance (using the precautionary level B harassment 120dB SPL_{rms} threshold) within 150m from an operational geared-drive WTG. This formula is largely derived from data from geared WTGs, and therefore it can be anticipated that the operation of the direct drive WTG will result in even smaller disturbance ranges.

A recent study of wind farms in German waters provides the most comprehensive assessment to date of operational noise from bottom-fixed foundation WTGs (Bellmann et al, 2023). Results draw upon noise measurements from 24 operational wind farms with WTGs of 2.3 to 8MW capacity and including multiple foundation types. Background noise measurements were also collected. The authors noted the low-frequency dominance of noise emitted from operational WTGs, with tonal elements in the 25 – 160 Hz range and, in some case, harmonics up to a few hundred Hz.

These low frequency sounds were only dominating the broadband sound pressure level in the immediate vicinity of the WTGs (approx. 100m) and when the WTGs were operating close to their nominal power. Mean sound pressure levels at nominal power varied between 112 and 131dB (mean across study of 120dB).

Bellmann et al (2023) did not find a strong correlation between WTG capacity and noise levels. Contrary to previous studies (Tougaard et al, 2020), there was a tendency for lower noise emissions from WTGs with higher nominal capacity. The authors suggested that this observation may be explained by larger, newer WTG designs generally featuring direct-drive instead of a gearbox, with direct-drive tending to be 'quieter' and with the frequency of noise emissions lower (≤80Hz) than that of geared WTGs.

From a broader spatial perspective, Bellmann et al (2023) reported that tonal, low-frequency components of WTG noise could usually be measured up to a few kilometres outside of wind farm arrays, albeit mixing with general background noise which was mostly dominated by non OWF related shipping traffic.

Considering the above, the underwater noise associated with the operational phase of the proposed development has a potential to alter the acoustic soundscape within the immediate vicinity of the WTGs. Depending on the design of the WTG (direct drive or geared) and species-specific hearing capabilities of marine mammals, the underwater noise may be audible to marine mammals at distances varying from a few metres to a few kilometres. The presence of species such as harbour porpoise, grey seal and harbour seal around bottom-fixed foundations has been widely documented (Scheidat et al, 2011, Delefosse et al, 2020, Fernandez-Betelu et al, 2024, Russell et al, 2014).

The impact of underwater noise during the operational phase is considered to be localised to the very immediate vicinity of the WTGs. It is unlikely to lead to the exclusion of animals within the array area, and therefore, at most, affecting a small proportion of receptor population and without an alteration to population trajectories. This aligns with a low magnitude score.

Significance of the effect

Project Option 1

The sensitivity of porpoise and dolphins to disturbance from operational noise has been assessed as negligible. The sensitivity of minke whales and seals to disturbance from operational noise has been assessed as low. The magnitude of disturbance from operational noise has been assessed as low for all species. Therefore, the significance of effect for Project Option 1 is imperceptible, which is not significant in EIA terms, for porpoise and dolphins, and slight, which is not significant in EIA terms, for minke whales and seals.

Project Option 2

Overall, it is predicted that the sensitivity of receptors, and magnitude of impact for Project Option 2, will be equal to or less than those predicted for Project Option 1. As such, it is predicted that the sensitivity of porpoise and dolphins to disturbance from operational noise has been assessed as negligible. The sensitivity of minke whales and seals to disturbance from operational noise has been assessed as low. The magnitude of disturbance from operational noise has been assessed as low for all species. Therefore, the significance of effect for Project Option 2 is imperceptible, which is not significant in EIA terms, for porpoise and dolphins, and slight, which is not significant in EIA terms, for minke whales and seals.

14.5.4 Decommissioning

Following further design refinement in response to the RFI Section 10 (a), WTGs are now proposed with suction bucket jacket (SBJ) foundations, and OSPs with jacket foundations installed with either drilled pin piles or SBJs. Therefore, the description of decommissioning activities requires a change. Therefore, Section 14.5.4 of Chapter 14 of the 2024 EIAR shall be disregarded and replaced in its entirety with the following.

After decommissioning of the transition piece, positive pressure is applied within the suction bucket to break the seal between the bucket and the seabed, effectively reversing the original installation process. The foundation is carefully lifted and transported to shore for recycling, reuse, or disposal in accordance with waste management protocols.

To break the seal between a suction bucket and the seabed during decommissioning, water is pumped into the sealed chamber at the top of the bucket to create positive internal pressure. This pressure counteracts the external hydrostatic pressure and the frictional resistance of the surrounding soil, gradually lifting the bucket and releasing it from the seabed. The process is carefully controlled to avoid sudden movements or sediment disturbance, allowing the bucket to be extracted safely and with minimal environmental impact.

Due to the high recyclability of steel (the dominant substructure material) the jacket and bucket will be recycled. The jacket and bucket will be removed to a dismantling yard, and recycling and waste facilities, which will be fully licensed for the relevant activities.

14.5.4.1 Impact 18 - PTS and disturbance from decommissioning

Due to the change of foundation installation method for Project Option 1 and Project Option 2, the description of decommissioning activities requires a change. Therefore, Impact 18 – PTS and disturbance from decommissioning of Chapter 14 of the 2024 EIAR shall be deleted and replaced in its entirety with the following.

The impacts of decommissioning activities will likely be similar or of a lesser extent than during the construction phase.

Significance of the effect

Project Option 1

The impacts of decommissioning activities for Project Option 1 will likely be similar or of a lesser extent than during the construction phase. Therefore, the significance of effect will be slight, which is not significant in EIA terms.

Project Option 2

Overall, it is predicted that the sensitivity of receptors, and magnitude of impact for Project Option 2, will be equal to or less than those predicted for Project Option 1. Therefore, the significance of effect for Project Option 2 is assessed as slight, which is not significant in EIA terms.

14.5.4.2 Impact 19 - Collision with vessels

There are no changes to this section. Refer to Section 14.5.4.2 of Chapter 14 of the 2024 EIAR.

For clarity, the significance of effect remains unchanged for collision with vessels and all marine mammal species. The significance of effect for all species remains not significant in EIA terms

14.5.4.3 Impact 20 - Disturbance from vessels

There are no changes to this section. Refer to Section 14.5.4.3 of Chapter 14 of the 2024 EIAR.

For clarity, the significance of effect remains unchanged for disturbance from vessels and all marine mammal species. The significance of effect for all species remains not significant in EIA terms

14.5.4.4 Impact 21 - Prey availability and distribution

The key change to this section is the updated impact assessment for fish species in Chapter 13 Fish and Shellfish Ecology.

Magnitude

The assessment provided in Chapter 13: Fish and Shellfish Ecology indicates that the overall adverse impacts to fish species from the decommissioning of the proposed development will be not significant to slight (not significant):

- Impact 11: Temporary increase in SSC and sediment deposition arising during the decommissioning phase = Slight
- Impact 12: Temporary damage and disturbance of the seabed during decommissioning activities = Slight

- Impact 13: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination = Not significant
- Impact 14: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/or behavioural effects = Slight

Given that there is expected to be no significant impacts to any of their prey species, the predicted impact on marine mammals is of negligible magnitude.

Significance of the effect

The sensitivity of receptors as low and the magnitude of the impact has been assessed as negligible. Therefore, the significance of the effect of changes in fish abundance/distribution, in relation to impacts on marine mammals during decommissioning is concluded to be imperceptible, which is not significant in EIA terms.

There are no other changes to this section. Refer to Section 14.5.4.4 of Chapter 14 of the 2024 EIAR.

14.5.4.5 Impact 22 - Increased concentrations of suspended sediments

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2.

The following paragraph of the Section 14.5.2.1 of Chapter 14 of the 2024 EIAR shall be deleted:

During decommissioning, SSC could potentially be increased and an associated deposition of material within the array area may occur from activities conducted in reverse of the construction process to remove foundation structure, cables and monopile and multi leg foundation legs.

And be replaced with:

During decommissioning, SSC could potentially be increased and an associated deposition of material within the array area may occur from activities conducted in reverse of the construction process to remove foundation structures and cables.

There are no other changes required to this section. Refer to Section 14.5.4.5 of Chapter 14 of the EIAR. For clarity, the significance of effect remains unchanged and is imperceptible negative which is not significant in EIA terms.

There are no other changes to this section. Refer to Section 14. of Chapter 14 of the 2024 EIAR.

14.6 Mitigation and Monitoring Measures

Following further design refinement in response to the RFI Section 10 (a), the key changes required in this section are the revision of the foundation installation method for Project Option 1 and Project Option 2 (WTGs are now proposed with suction bucket jacket (SBJ) foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets) and the commitment to at-source noise reduction (e.g. bubble curtain or similar). Therefore, pile driving impacts and associated mitigation and monitoring are no longer considered and deleted from Table 14.45 and at-source noise reduction (e.g. bubble curtain or similar) for high order clearance is now considered embedded (see Table A14.6).

To clarify, Table 14.45 within Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.19. All changes are highlighted in grey.

Table A14.19 Mitigation relating to marine mammal ecology (Replaces Table 14.45 in Chapter 14 of the 2024 EIAR)

Measure	Mitigation detail
Construction	
Geophysical survey monitoring	• Geophysical survey equipment sources with a greater than negligible magnitude of impact will be covered by 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' (DAHG, 2014), which outlines measures to reduce the potential impacts (PTS and disturbance) to negligible levels. Only the

Measure	Mitigation detail
	SBP is predicted to overlap with the estimated hearing range of relevant marine mammal species. Measures proposed are: – A mitigation zone (an area within which mitigation must be applied to prevent instantaneous injury) of 500m radial distance from the SBP source; – A qualified and experienced marine mammal observer (MMO) will be appointed to monitor for marine mammals and to log all relevant events using standardised data forms in accordance with licensing and regulatory requirements; – Survey equipment with a source SPL above 170dB re 1µPa shall commence from a lower energy start-up and increase gradually over a period of 40 minutes; – The start of the acoustic equipment will be delayed if marine mammals are detected within the mitigation zone during the pre-watch, allowing the animals time to move away from the acoustic source. The start of the source will be delayed for at least 30 minutes following the last sighting within the mitigation zone; – For any breaks in operation of the equipment of 10 minutes the MMO will undertake dedicated monitoring to check no marine mammals are present within the mitigation zone prior to the source restarting; and – For line changes taking longer than 40 minutes, the source will be stopped, then a pre-watch of 30 minutes followed by a soft-start will be required to resume operations. Further details on these measures are included in the MMMP (Appendix A14.5).
UXO clearance mitigation measures, including: • MMO; • ADD (if required); and • At-source noise reduction (bubble curtain or similar).	The implementation of a MMMP (Appendix A14.5) with specific measures should UXO clearance be required, to ensure the risk of PTS to marine mammals is imperceptible (not significant levels). The list of measures and procedures can be modified in accordance with advice received from the regulator and their specialist UXO advisors as appropriate prior to UXO clearance activities commencing. Measures will include: • If detonation is deemed necessary, a mitigation zone of 1,000m from the detonation location will be established, within which it will be ensured, through visual observations (trained and experienced MMOs) that no marine mammals are present prior to the detonation event. • Where a UXO disposal method has a risk of PTS impact range that may exceed the 1,000m mitigation zone there is a residual risk of auditory injury to marine mammals at a greater range than can be mitigated by monitoring of the 1,000m mitigation zone alone. Therefore, an ADD will be operated for a pre-determined length of time, concurrent to the pre-detonation search, to deter marine mammals to a greater distance prior to any detonation.
Operation	
Nil	No mitigation measures are anticipated to be required specifically during the operational phase.
Decommissioning	
Nil	No additional mitigation measures are anticipated to be required specifically during the decommissioning phase. All relevant embedded mitigation measures will still apply.

There are no other changes to this section. Refer to Section 14.6 of Chapter 14 of the 2024 EIAR

14.7 Residual Effects

Following further design refinement in response to the RFI Section 10 (a), the key changes required in this section are the revision of the foundation installation method for Project Option 1 and Project Option 2 (WTGs are now proposed with suction bucket jacket (SBJ) foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets) and the commitment to at-source noise reduction (e.g. bubble curtain or similar) for high order of UXO clearance.

Table 14.46 within Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.20. All changes are highlighted in grey.

There are no other changes to this section. Refer to Section 14.7 of Chapter 14 of the 2024 EIAR

Table A14.20 Residual effects relating to marine mammals (Replaces Table 14.46 in Chapter 14 of the 2024 EIAR).

Potential impact	Species	Embedded mitigation	Sensitivity	Magnitude	Likely significant effect (pre-mitigation) for Project Option 1 and Project Option 2	Additional Mitigation	Magnitude after Additional Mitigation	Residual effect (post-mitigation) for Project Option 1 and Project Option 2
CONSTRUCTION PHASE								
1 Auditory injury (PTS) from pre-construction surveys	Harbour porpoise		Negligible - Low	Negligible - Medium	Slight (not significant)	Geophysical survey MMMP: MMO watch and 500m mitigation zone	Negligible	Imperceptible (not significant)
	Dolphin species		Negligible	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
	Minke whale		Negligible - Low	Negligible - Medium	Slight (not significant)		Negligible	Imperceptible (not significant)
	Seal species		Negligible - Low	Negligible - Medium	Slight (not significant)		Negligible	Imperceptible (not significant)
2 Disturbance from pre-construction surveys	All		Negligible - Low	Negligible - Low	Slight (not significant)	None required	Negligible - Low	Slight (not significant)
3 Auditory injury (PTS) from UXO clearance	Harbour porpoise	At-source noise reduction (e.g. bubble curtain or similar) for high-order clearance	Low	Low order: Negligible High-order: Low	Slight (not significant)	UXO MMMP: MMO watch and 1km mitigation zone Pre-clearance ADD use if PTS impact range exceeds the 1km mitigation zone	Negligible	Imperceptible (not significant)
	Dolphin species		Low	Low order: Negligible High-order: Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
	Minke whale		Medium	Low order: Negligible High-order: Negligible	Slight (not significant)		Negligible	Slight (not significant)
	Seal species		Low	Low order: Negligible High-order: Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
4 Disturbance from UXO clearance	All	At-source noise reduction (e.g. bubble curtain or similar) for high-order clearance	Low	Low	Slight (not significant)	None required	Low	Slight (not significant)

Potential impact	Species	Embedded mitigation	Sensitivity	Magnitude	Likely significant effect (pre-mitigation) for Project Option 1 and Project Option 2	Additional Mitigation	Magnitude after Additional Mitigation	Residual effect (post-mitigation) for Project Option 1 and Project Option 2
23 Disturbance from SBJ installation	All		Low	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
8 Auditory injury (PTS) from other construction activities	Harbour porpoise		Low	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
	Dolphin species		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
	Minke whale		Medium	Negligible	Slight (not significant)		Negligible	Slight (not significant)
	Seal species		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
9 Disturbance from other construction noise	All		Low	Low	Slight (not significant)	None required	Low	Slight (not significant)
10 Collision with vessels	All	Vessel codes of conduct	High	Negligible	Slight (not significant)	None required	Low	Slight (not significant)
11 Disturbance from vessels	Harbour porpoise	Vessel codes of conduct	Medium	Negligible	Slight (not significant)	None required	Negligible	Slight (not significant)
	Dolphin species		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
	Minke whale		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
	Seal species		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
12 Prey availability and distribution	All		Low	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
13 Increased concentration of suspended sediments	All		Negligible	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
OPERATIONAL PHASE								
14 Collisions with vessels	All	Vessel codes of conduct	High	Negligible	Slight (not significant)	None required	Low	Slight (not significant)

Potential impact	Species	Embedded mitigation	Sensitivity	Magnitude	Likely significant effect (pre-mitigation) for Project Option 1 and Project Option 2	Additional Mitigation	Magnitude after Additional Mitigation	Residual effect (post-mitigation) for Project Option 1 and Project Option 2
15 Disturbance from vessels	Harbour porpoise	Vessel codes of conduct	Medium	Low	Slight (not significant)	None required	Low	Slight (not significant)
	Dolphin species		Low	Low	Slight (not significant)		Low	Slight (not significant)
	Minke whale		Low	Low	Slight (not significant)		Low	Slight (not significant)
	Seal species		Low	Low	Slight (not significant)		Low	Slight (not significant)
16 Prey availability and distribution	All		Low	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
17 Increased concentration of suspended sediments	All		Negligible	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
24 Disturbance from operational noise	Harbour porpoise & dolphin species		Negligible	Low	Imperceptible (not significant)	None required	Low	Imperceptible (not significant)
	Minke whale & seal species		Low	Low	Slight (not significant)		Low	Slight (not significant)
DECOMMISSIONING PHASE								
18 PTS and disturbance from decommissioning	All	Offshore EMP and Rehabilitation Strategy	Low	Low	Slight (not significant)	None required	Low	Slight (not significant)
19 Collisions with vessels	All	Vessel codes of conduct	High	Negligible	Slight (not significant)	None required	Low	Slight (not significant)
20 Disturbance from vessels	Harbour porpoise	Vessel codes of conduct	Medium	Negligible	Slight (not significant)	None required	Negligible	Slight (not significant)
	Dolphin species		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
	Minke whale		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)

Potential impact	Species	Embedded mitigation	Sensitivity	Magnitude	Likely significant effect (pre-mitigation) for Project Option 1 and Project Option 2	Additional Mitigation	Magnitude after Additional Mitigation	Residual effect (post-mitigation) for Project Option 1 and Project Option 2
	Seal species		Low	Negligible	Imperceptible (not significant)		Negligible	Imperceptible (not significant)
21 Prey availability and distribution	All		Low	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)
22 Increased concentration of suspended sediments	All		Negligible	Negligible	Imperceptible (not significant)	None required	Negligible	Imperceptible (not significant)

14.8 Transboundary Effects

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2 (WTGs are now proposed with suction bucket jacket (SBJ) foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets). Therefore, pile driving impacts are no longer considered.

As detailed in Section 14.3.3 Designated Sites, there is expected to be no impact to marine mammals within the Isle of Man MNRs, therefore they have been screened out of further assessment.

Table 14.47 within Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.21.

Table A14.21 Potential transboundary effects on marine mammal receptors (Replaces Table 14.47 in Chapter 14 of the 2024 EIAR)

Potential effect	Project Phase	Effect description	Effect significance
Auditory injury (PTS) from geophysical surveys, UXO clearance, other activities (e.g. trenching) and decommissioning activities	Construction, Decommissioning	Likely significant effects resulting from auditory injury (PTS) to marine mammals sustained from various OWF construction and decommissioning associated activities. Highly localised impacts such as PTS however, are not considered to be transboundary impacts as impact ranges do not extend into other EEA states, whether from the proposed development alone or cumulatively with other projects in the wider area. The magnitude of impact for the proposed development alone was assessed as negligible to medium and the sensitivity of receptors assessed as negligible. Given that the risk of auditory injury to marine mammals as a result of non-piling construction activities and decommissioning has been assessed as negligible for the proposed development alone, these impacts were not considered further cumulatively with other projects.	Not significant in EIA terms for all species assessed.
Disturbance from UXO clearance	Construction	Likely significant effects resulting from disturbance as a result of UXO removal. The proposed development is located in close proximity to other states (e.g. Northern Irish waters, Welsh waters, Manx waters, Scottish waters and English waters) and, depending on the locality of where UXO are removed, could cause disturbance in these areas. The magnitude of impact for the proposed development alone was assessed as low and the sensitivity of receptors assessed as low. However, it is expected that going forward, most, if not all, UXO clearance will be conducted using low-order deflagration techniques, and therefore disturbance impacts will be minimal, highly localised and over an extremely short duration. Thus, this impact was not considered further cumulatively with other projects.	Not significant in EIA terms for all species assessed.
Disturbance from vessel activity and other construction activities (e.g. geophysical surveys)	Construction, Operations, Decommissioning	Likely significant effects resulting from disturbance and displacement due to vessel activity and the presence of offshore infrastructure across the construction, operational and decommissioning phases. When considering the impact of disturbance from other development activities, this is predicted to be of local spatial extent, short-term and reversible. The magnitude of impact for the proposed development alone was assessed as negligible and the sensitivity of receptors assessed as negligible to medium. The potential for disturbance from vessel activity during construction, operation and decommissioning of offshore energy developments (i.e., geophysical surveys) cumulatively with other projects is assessed in Section 14.9. In addition, the impacts of overall vessel disturbance cumulatively with other projects Northern Irish, Welsh, Manx, Scottish, English and EU waters is assessed in Section 14.9 but was not significant in EIA terms for all species.	Not significant in EIA terms for all species assessed.
Disturbance to prey species	Construction, Operations, Decommissioning	Likely significant effects resulting from disturbance to prey species from loss of fish spawning and nursery habitat and suspended sediments and deposition. The effects of reduction in prey availability are predicted to be limited in extent to a number of kilometres from the proposed development and are therefore not predicted to extend into the waters of other states. The magnitude of impact for the proposed development alone was assessed as negligible and the sensitivity of receptors assessed as low. As the effects on prey availability is anticipated to be highly localised and therefore the potential for cumulative effects is considered to be negligible. As such, this impact was not considered further cumulatively with other projects (Section 14.9).	Not significant in EIA terms for all species assessed.

Potential effect	Project Phase	Effect description	Effect significance
Collision risk	Construction, Operations, Decommissioning	Likely significant effects due to marine mammal species colliding with vessels during the construction, operational and decommissioning phases. The magnitude of impact for the proposed development alone was assessed as negligible and the sensitivity of receptors assessed as high. As it is expected that all offshore energy projects will employ a vessel management plan/ vessel codes of conduct or follow best practice guidance to reduce the already low risk of collisions with marine mammals, this impact was not considered further cumulatively with other projects.	Not significant in EIA terms for all species assessed.
Increased concentrations of suspended sediments	Construction, Operations, Decommissioning	Likely significance effects due to reductions in water quality as a result of construction, operational and decommissioning activities. These can have both direct and indirect impacts on marine mammals. Indirect impacts include effects on prey species. Direct impacts include the impairment of visibility and therefore foraging ability which might be expected to reduce foraging success. During each phase of the proposed development, sediment will be disturbed and released into the water column. This will give rise to suspended sediment plumes and highly localised changes in bed levels as material settles out of suspension. However, marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. The magnitude of impact for the proposed development alone was assessed as negligible and the sensitivity of receptors assessed as negligible. As this impact shall be highly localised, this impact was not considered further cumulatively with other projects.	Not significant in EIA terms for all species assessed.

14.9 Cumulative Effects

The key changes to this section are the updating of text to reflect the minor change in cumulative assessment methodology to follow the Nationally Significant Infrastructure Projects (NSIP) (2024) guidance, following the request by An Bord Pleanála in RFI Section 5.

The second paragraph shall be deleted;

The Cumulative and Inter-Related Effects Chapter contains the outcome of Stage 1 Establishing the list of 'Other Existing and/or Approved Projects'; and Stage 2 'Screening of 'Other Existing and/or Approved Projects'. This section presents Stage 3, an assessment of whether the proposed development in combination with other projects, grouped in tiers, would be likely to have significant cumulative effects.

And replaced with:

Chapter 38 contains the outcome of Stage 1 Establishing the list of 'Other Existing and/or Approved Projects'; Stage 2 'Screening of 'Other Existing and/or Approved Projects'; and provides the CEA conclusions in the NSIP Appendix 2: Matrix 1 – Assessment matrix. This section presents the full Stage 3 assessment, which steps through whether the proposed development in combination with other projects, grouped in tiers, would be likely to have significant cumulative effects.

The fifth paragraph should be deleted;

Given the location and nature of the proposed development, a tiered approach to establishing the list of other existing and/or approved projects has been undertaken in Stage 1 of the cumulative effects assessment. The tiering of projects is based on project relevance to the proposed development and it is not a hierarchical approach nor based on weighting. Further information on the tiers is provided in Section 11.10 and in the Cumulative and Inter-Related Effects Chapter.

And replaced with:

Given the location and nature of the proposed development, a tiered approach to establishing the list of other existing and/or approved projects has been undertaken in Stage 1 of the cumulative effects assessment. The tiering of projects is based on the NSIP 2024 guidance. Further information on the tiers is provided in Section 11.10 and in the Chapter 38.

There are no other changes required to this section. Refer to Section 14.9 of Chapter 14 of the 2024 EIAR.

14.9.1 Marine mammal ecology cumulative screening exercise

The key changes required in this section are the change to the construction timeframe and the revision of the foundation installation method for Project Option 1 and Project Option 2. In the 2024 EIAR, WTG monopile foundations and OSP monopile and jacket foundations with pin piles were considered. Following further design refinement in response to the RFI, WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets.

The following paragraph of the Section 14.9.1 of Chapter 14 of the 2024 EIAR shall be deleted:

"*The time period considered in the cumulative effects assessment for marine mammals is 2023 to 2031 inclusive. This allows for the quantification of impacts to the MUs both prior to the construction of the proposed development (since the baseline was collated) and during the period when piling at the proposed development is anticipated in 2028. The cumulative impact window has been extended to include 2031 as this is the timeframe used in the cumulative Phase One population modelling scenario (see Section 14.9.4.4). In the assessment of magnitude, the complete cumulative effects assessment time period of 2023 to 2031 is considered, with particular importance placed on the proportion of the population potentially impacted by piling at the proposed development cumulatively with Tier 1, Tier 2 and Tier 3 projects in 2028".*

And be replaced with:

The time period considered in the cumulative effects assessment for marine mammals is 2026 to 2031 inclusive. This allows for the quantification of impacts to the MUs both prior to, during and after the construction of the proposed development (2028-2030 inclusive). For the purpose of this CEA, the following timeline is assumed:

- Pre-construction activities (UXO clearance & geophysical surveys): Q1 – Q4 2028
- WTG & OSP foundation installation (SBJ installation): Q1 2029 – Q3 2030
- Overall construction period (vessel impacts): 2028-2030

There are no other changes required to this section. **Refer to Section 14.9.1 of Chapter 14 of the EIAR.**

14.9.2 Projects considered within the cumulative effects assessment

The key changes to this section are the updating of text to reflect the minor change in cumulative assessment methodology to follow the NSIP 2024 guidance, as per RFI Section 5.

The entire section shall be deleted and replaced with:

The planned, existing and/or approved projects selected through the screening exercise as potentially relevant to the assessment of impacts to marine processes are presented in Table 14.22.

The tiers for the assessment are:

- Tier 1 is all existing submitted and approved projects (not yet in operation/part of baseline), including. the OMF option being considered which involves the adaption and leasing part of an existing port facility at Greenore (further detail is provided in Chapter 6) and the East Coast Phase One Projects.
- Tier 2 is all projects that have scoping reports or have a MAC.
- Tier 3 is all other projects that have been identified in the relevant Development Plans and other plans and programmes as appropriate.

The tiering structure is intended to provide an understanding of the potential for likely significant effects of the proposed development with the construction of all existing and submitted projects (tier one); followed by a cumulative assessment of the likely significant effect of that scenario combined with all projects that have a scoping report or Maritime Area Consent (MAC) (tier two); and lastly the combination of tier one and tier two with tier three, which is all other projects that have been identified in the relevant Development Plans and other plans and programmes which have been screened in.

Table A14.22 Projects and plans considered within the cumulative impact assessment

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
Tier 1						
Offshore Wind	North Irish Sea Array (NISA)	Planning application submitted	High	0.00	0.00	Within ZoI and overlap in construction/operational period.
	Oriel	Planning application submitted	High	16.94	21.61	
	Dublin Array	Planning application submitted	High	32.92	37.58	
	Codling Wind Park	Planning application submitted	High	50.99	56.99	
	Arklow Bank Wind Park (ABWP) 2	Planning application submitted	High	76.36	80.13	
	Mona	Consented	High	117.53	124.82	
	Mooir Vannin (Isle of Man)	Planning application submitted	High	118.33	126.84	
	Awel y Môr	Consented	High	131.64	139.54	
	Morecambe	Consented	High	142.57	150.01	
	Llyr 1	Planning application submitted	High	248.83	254.29	
	Llyr 2	Pre-planning application	Medium	251.05	257.55	
	Erebus Floating Wind Demo	Consented	High	235.08	239.82	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Machair	Pre-planning application	Medium	235.23	239.92	
	White Cross	Consented	High	274.75	280.77	
	Forthwind	Consented	High	324.03	331.95	
	Neart Na Gaoithe	Consented	High	357.92	365.99	
	TwinHub	Operational	High	358.51	362.66	
	Inch Cape	Under construction	High	377.38	385.41	
	Berwick Bank	Consented	High	377.57	385.68	
	Seagreen Phase 1A	Consented	High	397.71	405.75	
	Morven	Pre-planning application	Medium	444.07	452.22	
	Outer Dowsing	Consented	High	452.34	459.68	
	Sheringham Shoal Extension	Consented	High	459.17	466.78	
	Ossian	Planning application submitted	High	464.46	472.61	
	Dudgeon Extension	Consented	High	465.67	473.13	
	Dogger Bank South (West)	Planning application submitted	High	478.68	486.99	
	Rampion 2	Consented	High	485.74	495.78	
	Moray West	Under construction	High	501.70	508.86	
	Dogger Bank South (East)	Planning application submitted	High	504.42	512.69	
	Salamander	Consented	High	517.09	524.99	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Caledonia	Planning application submitted	High	519.36	526.83	
	Muir Mhòr	Planning application submitted	High	519.74	527.77	
	Dogger Bank - Teesside B (Sofia)	Under construction	High	526.02	534.45	
	Hornsea Project Three	Under construction	High	529.44	537.14	
	Centre-Manche 1	Planning application submitted	High	533.62	543.66	
	East Anglia ONE North	Consented	High	560.46	568.83	
	Dogger Bank C - Teeside A	Under construction	High	563.96	572.36	
	Five Estuaries	Planning application submitted	High	564.56	573.39	
	West of Orkney	Consented	High	566.67	573.04	
	Norfolk Vanguard West	Consented	High	548.26	556.02	
	East Anglia TWO	Consented	High	554.68	563.18	
	Aspen	Planning application submitted	High	555.67	563.70	
	Green Volt	Consented	High	556.72	564.64	
	Pentland Floating	Consented	High	557.74	564.44	
	North Falls	Planning application submitted	High	558.30	567.36	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	MarramWind	Planning application submitted	High	570.58	578.45	
	Norfolk Vanguard East	Consented	High	578.58	586.25	
	East Anglia THREE	Under construction	High	582.18	590.09	
	Courseulles-sur-mer	Under construction	High	582.56	592.59	
	Cenos	Planning application submitted	High	582.72	590.88	
	Fécamp	Under construction	High	583.07	593.12	
	Dieppe Le Tréport	Under construction	High	609.08	619.05	
	IJmuiden Ver	Planning application submitted	High	613.68	621.65	
	Culzean Floating Demo	Consented	High	620.45	628.60	
	HKW Kavel VII	Approved	High	640.19	648.13	
	HKW Kavel VI	Construction	High	647.21	655.01	
	EnBW He Dreiht	Consented	High	787.18	795.23	
	Thor	Consented	High	889.88	898.38	
Subsea Cables	Oriel ECC	Proposed	High	18.06	22.60	Within ZoI and overlap in construction/operational period.
	Codling Wind Park ECC	Proposed	High	35.71	31.14	
	Dublin Array ECC	Proposed	High	41.92	42.15	
	Arklow Bank Wind Park 2 ECC	Proposed	High	75.47	79.21	
	Greenlink Interconnector	Proposed	High	172.45	166.98	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Celtic Interconnector	Proposed	High	229.28	219.71	
	ALTNAHARRIE	Construction	High	462.76	468.87	
Other Offshore Energy	Fair Head Phase 1	Planning application submitted	High	199.68	204.86	Within ZoI and overlap in construction/operational period.
Tier 2						
Coastal Assets	Development at Howth Fishery Harbour Centre	Approved	High	38.29	37.82	Within ZoI and overlap in construction period.
Offshore Wind	North Channel Wind 2	Pre-planning application	Medium	112.88	120.01	Within ZoI and overlap in construction/operational period.
	North Channel Wind 1	Pre-planning application	Medium	135.36	141.72	
	Bellrock	Pre-planning application	Medium	494.92	503.07	
	Spiorad na Mara	Pre-planning application	Medium	513.34	518.23	
	Havbredey	Pre-planning application	Medium	560.74	566.31	
	Stromar	Pre-planning application	Medium	566.39	573.83	
	Buchan	Pre-planning application	Medium	576.85	584.57	
	Ayre	Pre-planning application	Medium	601.65	608.90	
Shipping & Ports	Port of Waterford - Offshore Renewable Energy Capable Terminal (Belview)	Construction	High	167.39	160.21	Within ZoI and overlap in construction period.
Subsea Cables	Mares Connect	Proposed	Medium	6.02	12.26	Within ZoI and overlap in construction/operational period.
	LirlC Interconnector	Proposed	Medium	111.99	118.22	
	Erebus Floating Offshore Wind Potential Cable Route	Proposed	Medium	217.98	225.77	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Western Isles Link	Proposed	Medium	457.42	463.50	
	Orkney-Caithness Interconnector	Construction	High	551.42	558.18	
Survey	Site investigation activities to inform the development of the North Irish Sea Array (NISA) offshore windfarm (OWF) and export cable.	Approved	High	0.00	0.00	Within ZoI and overlap in construction period.
	North Irish Sea Array (NISA) Site Investigations	Approved	High	0.00	5.23	
	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Portmarnock, County Dublin.	Approved	High	10.33	19.16	
	MaresConnect Electricity Interconnector Site Investigation	Approved	High	10.35	17.99	
	Geophysical survey and site investigations for a proposed subsea fibre optic cable having landfall in Dublin Port, County Dublin	Approved	High	16.81	26.67	
	CWPL intends to undertake survey mobilisations at the proposed Licence Area to inform the location and detailed design of the proposed CWP OWF SITE A	Approved	High	34.68	31.61	
	Site Investigation - Dublin Array at Kish and Bray Banks	Approved	High	35.17	31.31	
	Foreshore licence application for a gas pipeline trenchless crossing of River Tolka, Dublin	Approved / Ended	High	35.76	29.49	
	CWPL intends to undertake survey mobilisations at the proposed Licence Area to inform the location and detailed design of the proposed CWP OWF. SITE B	Approved	High	35.99	31.12	
	Environmental survey and ground investigation works in order to inform the design of proposed Point Bridge and Tom Clarke Widening Project	Approved	High	36.64	30.75	
	Surveys for the East Coast Rail Infrastructure Protection Projects (ECRIPP) SITE A	Approved	High	37.95	33.73	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Surveys for the East Coast Rail Infrastructure Protection Projects (ECRIPP) SITE B	Approved	High	40.59	39.60	
	Surveys for the East Coast Rail Infrastructure Protection Projects (ECRIPP) SITE C	Approved	High	47.64	47.49	
	Surveys for the East Coast Rail Infrastructure Protection Projects (ECRIPP) SITE D	Approved	High	52.35	53.35	
	CWPL intends to undertake survey mobilisations at the proposed Licence Area to inform the location and detailed design of the proposed CWP OWF. SITE C	Approved	High	70.04	71.76	
	Wicklow Sea Wind Ltd - Cable Route Site Investigations (Celtic Sea to Wicklow)	Consultation	High	70.78	75.65	
	Sure Partners Arklow Bank Wind Park Phase 2 Site Investigations	Approved	High	76.59	81.04	
	Arklow Bank Wind Park off coast of County Wicklow	Approved	High	76.66	81.25	
	Energia Site Investigation off Wexford Coast	Approved	High	91.22	97.42	
	CETUS research project. (Wicklow Coast -Site A)	Approved	High	91.65	95.33	
	Marine site investigation (SI) works for two offshore substations (OSS) in the Tonn Nua Area A	Approved	High	160.66	155.35	
	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Kilmore Quay, County Wexford.	Approved	High	166.53	163.07	
	East Celtic Offshore Wind Park - RWE Renewables (Wexford & Waterford)	Application submitted	High	184.15	179.92	
	Marine Survey and Site Investigations for a cable route for the PISCES subsea cable	Approved	High	207.38	191.93	
	Inis Ealga Marine Energy Park - Site Investigations (SW Ireland)	Approved	High	220.14	212.80	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Maintenance dredging at four sites around the Aughinish Alumina Ltd (AAL) jetty (Site A)	Approved	High	234.95	220.26	
	Maintenance dredging at four sites around the Aughinish Alumina Ltd (AAL) jetty (Site B)	Approved	High	234.99	220.30	
	Marine environmental surveys for site selection for the Strategic Gas Emergency Reserve (SITE B)	Approved	High	235.36	220.63	
	Maintenance dredging at four sites around the Aughinish Alumina Ltd (AAL) jetty (Site C)	Approved	High	235.37	220.68	
	Maintenance dredging at four sites around the Aughinish Alumina Ltd (AAL) jetty (Site D)	Approved	High	235.47	220.80	
	Marine environmental surveys for the purposes of site investigation within Shannan Estuary (Cahiracon/Foynes, Co. Limerick)	Approved	High	236.86	222.13	
	Site investigation for the deep water terminal development on Foynes Island, Limerick (Site A)	Approved	High	238.98	224.33	
	Site investigation for the deep water terminal development on Foynes Island, Limerick (Site B)	Approved	High	239.74	225.04	
	Maintenance dredging at four sites around the Aughinish Alumina Ltd (AAL) jetty (Site E)	Approved	High	241.14	226.43	
	Marine survey within Cork Harbour for site selection for the Strategic Gas Emergency Reserve.	Approved	High	252.65	242.15	
	To carry out a strategic modelling study of water currents within Cork Harbour and its environs.	Approved	High	252.89	242.05	
	To carry out marine site survey work and site investigations (Dognose Bank, Corkbeg, Whitegate, Co. Cork)	Approved	High	254.00	243.55	
	Marine environmental surveys within two areas of the Shannon Estuary for the Strategic Gas Emergency Reserve (SITE A)	Approved	High	254.39	239.56	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Electricity Supply Board (ESB) intends to undertake a survey campaign at the Moneypoint Generating Station site (County Clare)	Approved	High	255.69	240.80	
	White Cross Floating Offshore Wind - Site Investigations	Application submitted	High	280.70	286.84	
	CETUS research project. (Cork Coast - Site E)	Approved	High	292.19	281.57	
	Geophysical survey and site investigations for a proposed transatlantic subsea fibre optic cable having a landfall at Castlefreke, County Cork	Approved	High	308.29	296.94	
	2Africa Submarine Cable System (Site A)	Approved	High	362.53	357.38	
	2Africa Submarine Cable System (Site B)	Approved	High	430.52	423.42	
	2Africa Submarine Cable System (Site C)	Approved	High	444.19	436.93	
Coastal Assets	Development at Howth Fishery Harbour Centre	Approved	High	38.29	37.82	
Offshore Wind	North Channel Wind 2	Pre-planning application	Medium	112.88	120.01	
	North Channel Wind 1	Pre-planning application	Medium	135.36	141.72	
Tier 3						
Carbon Capture & Storage	HyNet North West Industrial Cluster & Liverpool Bay CO2 Storage	In Development	High	148.34	155.89	Within ZoI and overlap in construction/operational period.
	Hamilton North Carbon Storage Licence	In Development	High	153.96	161.28	
	Lennox Carbon Storage Licence	Licenced - apprasial stage	High	170.20	177.54	
Offshore Wind	Bowdun	Pre-planning application	Medium	449.58	457.61	Within ZoI and overlap in construction/operational period.
	Parc eolien pose au large de la Normadie (AO4)	Pre-planning application	Medium	530.53	540.56	
	Centre-Manche 2	Pre-planning application	Medium	539.60	549.66	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Hollandse Kust F	Under construction	High	630.44	638.93	
	Kattegat II	Pre-planning application	Medium	1122.07	1130.55	

14.9.3 Screening impact pathways

The key change required in this section is the revision of the foundation installation method for Project Option 1 and Project Option 2. In the 2024 EIAR, WTG monopile foundations and OSP monopile and jacket foundations with pin piles were considered. Following further design refinement in response to the RFI, WTGs are now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets.

Table 14.48 within Chapter 14 of the 2024 EIAR shall be deleted and replaced with Table A14.23.

Table A14.23 Impacts scoped out from further consideration in the cumulative impact assessment (Replaces Table 14.48 in Chapter 14 of the 2024 EIAR)

Impact	Justification
Auditory injury (PTS)	Where PTS may result from activities such as SBP surveys and UXO clearance, as a requirement of European Protected Species legislation, suitable mitigation must be put in place to reduce injury risk to marine mammals to negligible levels across all projects considered in the cumulative assessment (JNCC, 2010a, JNCC, 2010b). Similarly, any risk of PTS during decommissioning will be determined via appropriate decommissioning plans and if required, mitigated. As such, assuming application of appropriate mitigation measures, any risk of injury it is considered highly unlikely and potential for cumulative effects on marine mammals due to PTS as a result of SBP survey activities, UXO and decommissioning was not considered further. The risk of auditory injury to marine mammals as a result of non-piling construction activities has been assessed as very localised (less than 50m, see Section 14.5.2.1) and it is anticipated that underwater noise associated with vessel activity will deter animals from the injury zone. As such any risk of injury it is considered highly unlikely and potential for cumulative effects on marine mammals due to PTS as a result of non-piling construction activities was not considered further.
Disturbance from UXOs	It is expected that, across all projects, UXO clearance campaigns will be conducted using low-order deflagration techniques or using a Noise Abatement System (NAS) (e.g. bubble curtain or similar) for mitigation in the event of high-order clearance. The Developer has committed to deploying NAS similar for mitigation purposes if high-order clearance is required. It is expected that the detonation of a UXO would elicit a startle response and potentially very short-duration behavioural responses and would therefore not be expected to cause widespread and prolonged displacement (JNCC, 2020). Given that behavioural disturbance is considered negligible in the context of UXO clearance as the duration of the impact (underwater noise) is extremely short, the potential for cumulative effects is considered unlikely and this impact was not considered further.
Disturbance from SBJs	The magnitude of disturbance from SBJ installation is expected to be negligible (see assessment in Section 14.5.2.8). Given that other OWF projects screened into the CEA are considering pile driving installation methods, the construction of the proposed development will be *de minimis* in comparison. None of the OWF projects screened into the CEA will perform the same foundation installation.
Disturbance from other construction activities	Disturbance from other (non-piling) construction activities is anticipated to be highly localised (see Section 14.5.2.10) and is closely associated with the disturbance from vessel presence required for the activity. As such, cumulative effects have been assessed under “disturbance from vessels” impact and potential for cumulative effects due to other (non-piling) construction activities was not considered further.
Collision with vessels	It is expected that across all project’s vessel movements will be managed through the implementation of vessel codes of conduct that will mitigate the negative impacts to marine mammals (e.g. limited vessel speeds, adherence to vessel transit routes), following relevant guidance to minimise the risks of injury to marine mammals. As such, the potential for cumulative effects is negligible and this impact was not considered further.
Increased concentration of suspended sediments	The risk of increased concentrations of suspended sediment is expected to be highly localised. As such, the potential for cumulative effects is considered to be negligible and therefore this impact was not considered further.
Prey availability and distribution	The effects on prey availability is anticipated to be highly localised and therefore the potential for cumulative effects is considered to be negligible. As such, this impact was not considered further.

The following paragraph of the Section 14.9.3 of Chapter 14 of the 2024 EIAR shall be deleted;

"*Therefore, the impacts that are considered in the marine mammal cumulative effects assessment are as follows:*

• The potential for disturbance from underwater noise from piling during construction of offshore wind farms (where data are available) and the construction of coastal and offshore developments; and

• The potential for disturbance from vessel activity during construction, operation and decommissioning of coastal and offshore developments".

And be replaced with:

Therefore, the impacts that are considered in the marine mammal cumulative effects assessment are as follows:

- The potential for disturbance from vessel activity during construction, operation and decommissioning of coastal and offshore developments;
- The potential for disturbance from geophysical surveys; and
- The potential for disturbance from operational noise.

For each impact, the project option with the greatest potential for a likely significant effect has been determined based on the comparison and justification provided in Table 16.8. The impacts considered in the cumulative assessment are presented in Table A14.24. As the residual effects for Project Option 1 and Project Option 2 are the same (as identified in Section 14.7), the cumulative effects assessment presented in this section applies to both options.

Table A14.24 Potential cumulative impacts and tiers for assessment

Potential cumulative impact	Phase	Tiers and Projects	Justification for inclusion in cumulative effects assessment
Impact 7 – Disturbance from vessel activity during construction, operation and decommissioning of coastal and offshore developments	Construction, operation and decommissioning	Tier 1 – Offshore Wind, Subsea Cables, Other Offshore Energy Tier 2 – Coastal Assets, Shipping & Ports, Subsea Cables, Survey Tier 3 – Carbon Capture & Storage, Offshore Wind	Potential for activities to temporally overlap with the construction and operation phases and therefore cause cumulative vessel disturbance impacts to occur within the Irish Sea
Impact 8 - Disturbance from pre-construction geophysical surveys	Construction	Tier 2 – Survey Tier 1 – Offshore Wind	Potential for noise emitted from geophysical survey equipment to have cumulative behavioural disturbance impacts
Impact 9 - Disturbance from operational noise	Operation	Tier 1 – Offshore Wind	Potential for noise emitted by operational wind turbine generators to have cumulative behavioural disturbance impacts

There are no other changes required to this section. Refer to Section 14.9.3 of Chapter 14 of the EIAR.

14.9.4 Disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.4 in Chapter 14 of the 2024 EIAR shall be deleted.

14.9.5 Cumulative Impact 1 - Harbour porpoise – disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.3 in Chapter 14 of the 2024 EIAR shall be deleted.

14.9.6 Cumulative Impact 2 - Bottlenose Dolphin – disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.6 in Chapter 14 of the 2024 EIAR shall be deleted.

14.9.7 Cumulative Impact 3 - Common Dolphin – disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.7 in Chapter 14 of the 2024 EIAR shall be deleted.

14.9.8 Cumulative Impact 4 - Minke whale – disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.8 in Chapter 14 of the 2024 EIAR shall be deleted.

14.9.9 Cumulative Impact 5 - Harbour seal – disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.9 in Chapter 14 of the 2024 EIAR shall be deleted.

14.9.10 Cumulative Impact 6 - Grey seal – disturbance from underwater noise

Following refinements to the project design (see Appendix A5.1: Design Refinements, Chapter 6 Description of the Proposed Development Offshore and Chapter 8 Construction Strategy - Offshore of the EIAR), piling is no longer included within the construction strategy, therefore will be no contribution to cumulative disturbance from piling and thus this impact is not considered in the CEA. The entire Section 14.9.10 in Chapter 14 of the 2024 EIAR shall be deleted

14.9.11 Cumulative Impact 7 - Disturbance from vessels

14.9.11.1 Tier 1

The key changes to this section are the updating of text to reflect the minor change in cumulative assessment methodology to follow the NSIP 2024 guidance, as per RFI Section 5. The entire Section 14.9.11.1 text should be deleted and replaced with:

Tier 1 projects screened into the cumulative effects assessment for disturbance impacts from vessels include OWFs, subsea cables and offshore energy tidal and wave projects in the Irish Sea.

Although some OWF vessels (such as crew transport and supply vessels) may transit the wind farm at higher speeds, they often travel in repeated / predictable routes within the site. Many other vessels (e.g. jack-up vessels and pilot or attending vessels) travel more slowly within the wind farm site or spend long periods of time jacked-up, at anchor (minimising movement and acoustic signature from engines) or using dynamic positioning systems (minimising movement, although still generating noise). Unfortunately, there are very few species-specific studies covering these vessel types that capture vessel movement patterns as well as their acoustic signatures and the corresponding response of marine mammals.

Vessel routes to and from offshore windfarms and other offshore projects will, for the majority, use existing vessel routes for pre-existing vessel traffic which marine mammals will be accustomed to. They may also have become habituated to the volume of regular vessel movements and therefore the additional risk is predominantly confined to construction sites. The vessel movements for offshore wind farms are likely to be limited and slow, resulting in less risk of disturbance to marine mammal receptors. In addition, as in case of the proposed development, most projects are likely to adopt Vessel Management Plans (VMPs, or comply with exiting Marine Wildlife Watching Codes) to minimise any potential effects on marine mammals, as this is considered standard mitigation across the offshore wind industry and complies directly with the relevant Irish guidance for managing vessel interactions with marine mammals.

Vessel movements for the proposed and under construction subsea cables and the Fair Head Phase 1 offshore energy project are also likely to involve vessels travelling slowly and using dynamic positioning and, given the relatively sporadic nature of these activities, are unlikely to contribute to a significant cumulative disturbance impact from vessel activity.

The sensitivity of marine mammals to vessel disturbance is the same as the project alone scenario: medium to low depending on the species. The magnitude of impact to marine mammals from disturbance from vessels is assessed as low. Therefore, the significance of the cumulative effect of disturbance with Tier 1 projects is assessed as being slight, which is not significant in EIA terms.

14.9.11.2 Tier 1 and 2

The key changes to this section are the updating of text to reflect the minor change in cumulative assessment methodology to follow the NSIP 2024 guidance, as per RFI Section 5. The entire Section 14.9.11.2 text should be deleted and replaced with:

Tier 2 projects screened into the cumulative effects assessment for disturbance impacts from vessels include coastal assets, shipping & ports, subsea cables and surveys in the Irish Sea.

Vessel movements for the development of Howth Fishery Harbour and the Port of Waterford are likely to be sporadic in nature as well as extremely limited in terms of spatial extent, and are therefore unlikely to contribute to a significant cumulative disturbance impact from vessel activity.

Vessel movements for the proposed and under construction subsea cables are likely to involve vessels travelling slowly and using dynamic positioning and, given the relatively sporadic nature of these activities, are unlikely to contribute to a significant cumulative disturbance impact from vessel activity.

Geophysical surveys do not use existing vessel routes, so may risk adding vessel presence to novel areas; however, these are slow-moving and operate their own mitigation measures to protect marine mammals (while mitigating for PTS the mitigation measures will also reduce disturbance impacts). Therefore, increases in disturbance from vessels from offshore survey projects are likely to be small in relation to current and ongoing levels of shipping.

The sensitivity of marine mammals to vessel disturbance is assessed as low. The magnitude of impact to marine mammals from disturbance from vessels is assessed as low. Therefore, the significance of the cumulative effect of disturbance with Tier 1 and Tier 2 projects is assessed as being slight, which is not significant in EIA terms.

14.9.11.3 Tier 1 and 2 and 3 (all tiers)

The key changes to this section are the updating of text to reflect the minor change in cumulative assessment methodology to follow the NSIP 2024 guidance, as per RFI Section 5. The entire Section 14.9.11.3 text should be deleted and replaced with:

Tier 3 projects screened into the cumulative effects assessment for disturbance impacts from vessels include carbon capture and storage and OWF projects.

Vessel activities for the carbon capture and storage projects are likely to be low-moderate in density, with a relatively limited duration. These vessels are also likely to be slow moving and are likely to use existing vessel routes for pre-existing vessel traffic which marine mammals will be accustomed to. They will also spend a large percentage of time stationary on dynamic positioning and the spatial extent of on-site activity will be limited to the immediate area around the platforms and pipelines being repurposed. Therefore, these activities are unlikely to contribute to a significant cumulative disturbance impact from vessel activity.

As discussed in Tier 1 above regarding OWFs, there are a number of OWF vessel types that will operate in the Irish Sea and there is limited data covering these vessel types and the corresponding response from marine mammals. The proposed development, along with the other OWFs will implement a VMP in order to minimise any potential effects on marine mammals.

In summary, it is extremely difficult to reliably quantify the level of increased disturbance to marine mammals resulting from increased vessel activity on a cumulative basis, given the large degree of temporal and spatial variation in vessel movements between projects and regions, coupled with the spatial and temporal variation in marine mammal movements across the region.

Although vessels will be moving across the Irish Sea, the impact is considered to be localised to the vicinity of the moving vessel (up to approximately 4km for harbour porpoise). The impact will be temporary (only when vessel is moving or stationary with the engine running) and will occur throughout the long-term. It is likely that the effect may occur at moderate frequency. The effect will be reversible, as the disturbance effects are temporary. Therefore, the magnitude of vessel disturbance is considered to be low, indicating that the potential is for short-term and / or intermittent behavioural effects, with survival and reproductive rates very unlikely to be impacted to the extent that the population trajectory would be altered. It is anticipated that any animals displaced from the area will return once vessels leave.

The sensitivity of all marine mammals to disturbance from vessel activity was assessed as low.

Therefore, the significance of the cumulative effect of Project Option 1 or Project Option 2 with Tier 1, 2 and 3 projects (all tiers) is assessed as slight, which is not significant in EIA terms.

There are no other changes required to this section. **Refer to Section 14.9.11 of Chapter 14 of the EIAR.**

14.9.12 Cumulative Impact 8 - Disturbance from pre-construction geophysical surveys

The following Section 14.9.12 is to be inserted into Chapter 14 and is provided in response to RFI Section 10 (g) which requests new disturbance thresholds are used including for geophysical surveys, and in response to RFI Section 10 (i) which requests an assessment of the use of USBLs.

14.9.12.1 Tier 1

No Tier 1 projects have been screened into the assessment of Cumulative Impact 8.

14.9.12.2 Tier 1 and 2

The Tier 2 projects screened into the cumulative effects assessment for disturbance impacts from pre-construction geophysical surveys are surveys.

Given the small impact ranges associated with geophysical surveys (3 km EDR), only projects located within the Irish Sea that are conducting geophysical surveys at the same time as the proposed development (in 2028) are included in this quantitative assessment. Using the SCANS IV block CS-D density (0.2803 porpoise/km^2), the number of harbour porpoise predicted to be impacted is 8 individuals per project (0.01% Celtic and Irish Sea MU). Similar numbers are expected to be impacted at other geophysical surveys in the Irish Sea (Table A14.25).

It is anticipated that the noise emitted from geophysical survey equipment will be rapidly attenuated with distance from source such that noise levels at which behavioural disturbance would be anticipated to occur will be of small spatial extent. In particular, it is noted that those sources with higher source levels (SBP, UHRS) are highly directional, with noise levels outside of the main beam considerably lower and therefore with limited horizontal propagation of noise levels. The consequence of the impact is short-term, intermittent over the course of a geophysical survey campaigns, with temporary behavioural effects. It is predicted that any disturbance arising from the geophysical survey works will be of localised spatial extent but could occur intermittently across 2028. The effect is likely to occur but at low frequency. Although the effect could affect a very small proportion of the receptor populations, population trajectories are unlikely to be altered. Therefore, the magnitude of behavioural disturbance due to geophysical surveys has been assessed as low.

The sensitivity of all marine mammals to disturbance from geophysical surveys was assessed as negligible - low. Therefore, significance of the cumulative effect with Tier 1 and Tier 2 projects is assessed as imperceptible - slight, which is not significant in EIA terms.

Table A14.25: 3 km EDR for geophysical surveys (for surveys within the Irish Sea that are surveying in 2028).

Offshore Development	Developer / Applicant	Tier	# porpoise impacted (SCANS IV 0.2803 porpoise/km^2)
NISA pre-construction geophysical surveys	North Irish Sea Array (NISA) Windfarm Limited; Statkraft	-	8
Codling pre-construction geophysical surveys	Codling Wind Park Limited (CWPL)	1	8
Dublin Array pre-construction geophysical surveys	RWE Renewables Ireland	1	8
Oriel pre-construction geophysical surveys	Oriel Windfarm Ltd	1	8
Mona offshore wind farm	EnBW and BP	1	8
Mooir Vannin	Ørsted	1	8
Foreshore licence application for a gas pipeline trenchless crossing of River Tolka, Dublin	Bord Gais Network	2	8
East Coast Rail Infrastructure Protection Projects (ECRIPP) geophysical site investigation	Iarnród Éireann	1	8

14.9.12.3 Tier 1 and 2 and 3 (all tiers)

No Tier 3 projects have been screened into the assessment of Cumulative Impact 8.

The magnitude of behavioural disturbance due to geophysical surveys has been assessed as low.

The sensitivity of all marine mammals to disturbance from geophysical surveys was assessed as negligible - low. Therefore, significance of the cumulative effect of Project Option 1 or Project Option 2 with Tier 1, 2 and 3 projects (all tiers) is assessed as imperceptible - slight, which is not significant in EIA terms.

There are no other changes required to this section. Refer to Section 14.9.12 of Chapter 14 of the EIAR.

14.9.13 Cumulative Impact 9 - Disturbance from operational noise

The following Section 14.9.13 is to be inserted into Chapter 14 and is provided in as an assessment of disturbance from operational noise in response to RFI Section 10 (h) and 10 (t). Section 14.9.3 and Section 14.9.4

14.9.13.1 Tier 1

The Tier 1 projects screened into the cumulative effects assessment for disturbance impacts from operational noise are OWFs.

Given the small impact ranges associated with operational noise, only projects located within the Irish Sea are included in this quantitative assessment. All OWF projects that are currently operational are considered to be part of the existing baseline and will have continued impacts in the future at the same level as they did in the baseline. All OWF constructing from 2026 onwards will have future operational noise impacts that were not considered as part of the baseline (Table A14.26).

As presented in the underwater noise modelling report (Appendix A14.1), marine mammals may experience behavioural disturbance (using the precautionary level B harassment 120 dB SPL_{rms} threshold) within 150 m from an operational WTG at the proposed development. Similar disturbance impact ranges of <200 m have been predicted for Oriel, Mona and Morecambe (Table A14.26), and most offshore OWFs scope operational noise out of assessment as they are unlikely to result in significant effects on marine mammals.

Table A14.26 Predicted disturbance ranges for operational noise at other OWF in the Irish Sea

OWF	Estimated disturbance range	Reference
NISA	150 m (level B)	This EIA
Oriel	170 m (level B)	Oriel Wind Farm Project. Environmental Impact Assessment Report – Addendum. Chapter 10 Addendum: Marine Mammals and Megafauna (December 2025)
Codling	Operational noise impacts scoped out of assessment	Codling Wind Park Environmental Impact Assessment Report Volume 3 Chapter 11 Marine Mammals (2024)
Arklow Bank Phase 2	Operational noise impacts scoped out of assessment	Arklow Bank Wind Park 2 Environmental Impact Assessment Report Volume II, Chapter 11: Marine Mammals (2024)
Dublin Array	Operational noise impacts scoped out of assessment	Dublin Array Offshore Wind Farm. Environmental Impact Assessment Report. Volume 3, Chapter 5: Marine Mammals (2025)
Mona	160 m (level B)	Mona Offshore Wind Project: Environmental Statement Volume 2, Chapter 4: Marine mammals (2024)
Awel y Mor	Operational noise impacts scoped out of assessment	Awel y Môr Offshore Wind Farm. Category 6: Environmental Statement Volume 2, Chapter 7: Marine Mammals (2022)
Morecambe	100 m (TTS)	Morecambe Offshore Windfarm: Generation Assets Environmental Statement Volume 5 Chapter 11 Marine Mammals (2024)
Isle of Man (Mooir Vannin)	Impact ranges not modelled. Qualitative assessment only.	Mooir Vannin Generation Project Environmental Impact Statement Volume 2, Chapter 5: Marine Mammals (2025)

The presence of species such as harbour porpoise, grey seal and harbour seal around bottom-fixed foundations has been widely documented (Scheidat et al, 2011, Delefosse et al, 2018, Fernandez-Betelu et al, 2024, Russell et al, 2014), which suggests that operational noise is unlikely to result in significant disturbance to these species. There are no data currently available on the presence of dolphin species or minke whales within operational OWFs.

The impact of underwater noise during the operational phase of all OWFs is considered to be temporary and localised to the very immediate vicinity of the WTGs. The effect of disturbance is expected to last less than a day, though the disturbance impact could occur across many years. It is unlikely to lead to the exclusion of animals within the OWF array areas, and therefore, at most, affecting a very small proportion of receptor population and without an alteration to population trajectories. This aligns with a low magnitude score.

The sensitivity of harbour porpoise and dolphin species to disturbance from operational noise was assessed as negligible. Therefore, the significance of the cumulative effect with Tier 1 projects is assessed as imperceptible, which is not significant in EIA terms. The sensitivity of minke whales and seals to disturbance from operational noise was assessed as low. Therefore, significance of the impact is assessed as slight, which is not significant in EIA terms.

14.9.13.2 Tier 1 and 2

No Tier 2 projects have been screened into the assessment of Cumulative Impact 9.

14.9.13.3 Tier 1 and 2 and 3 (all tiers)

No Tier 3 projects have been screened into the assessment of Cumulative Impact 9.

The sensitivity of harbour porpoise and dolphin species to disturbance from operational noise was assessed as negligible. Therefore, the significance of the cumulative effect of either Project Option 1 or Project Option 2 with Tier 1, 2 and 3 projects (all tiers) is assessed as imperceptible, which is not significant in EIA terms. The sensitivity of minke whales and seals to disturbance from operational noise was assessed as low. Therefore, significance of the cumulative effect of Project Option 1 with Project Option 2 with Tier 1, 2 and 3 projects (all tiers) is assessed as slight, which is not significant in EIA terms.

There are no other changes required to this section. Refer to Section 14.9 in Chapter 14 of the 2024 EIAR.

14.10 References

As a result of new information, the following references are added:

6 Alpha Associates Ltd (2021) Unexploded ordnance threat and risk assessment with risk mitigation strategy. Project: North Irish Sea array windfarm.

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Giralt Paradell, O., Ca-Adas, A., Bennison, A., Todd, N., Jessopp, M. & Rogan, E. 2024. Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2021-2023. Ireland: Department of the Environment, Climate & Communications and Department of Housing, Local Government & Heritage.

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JNCC 2025a. DRAFT JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys.

JNCC 2025b. JNCC guidelines for minimising the risk of injury to marine mammals from unexploded ordnance (UXO) clearance in the marine environment.

JNCC 2025c. Updated Effective Deterrent Ranges (EDRs) for assessing the significance of noise disturbance in harbour porpoise Special Areas of Conservation (SACs). England, Wales & Northern Ireland. Peterborough: JNCC.

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There are no other changes to this section. Refer to Section 14.10 of Chapter 14 of the 2024 EIAR.