Addendum to the Environmental Impact Assessment Report

NISA
North Irish Sea Array

Volume 3 - Offshore Chapters

Chapter 13
Fish and Shellfish Ecology

Statkraft

CIP Copenhagen Infrastructure Partners

GoBe APEM Group

ARUP

Contents

Tables

13. Fish and Shellfish 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: 13 Fish and Shellfish Ecology of the 2024 Environmental Impact Assessment Report (EIAR). Full details of consultation undertaken can be found in Appendix A1.2 Consultation Report.

For the purposes of clarity, this document shall be read in conjunction with the Chapter 13 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 why they are required. 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.

Only tables and figures which have been updated from the 2024 EIAR, or entirely new tables and figures, 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 exception to this is when a table has changed in its entirety.

The sections relevant to Chapter 13 in the RFI are included below.

RFI Section	RFI	Relevance to Chapter
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. These are reflected in this Chapter and Appendix A13.1: Fish and Shellfish Ecology Baseline Characterisation.
1 (c)	The applicant is requested to confirm whether any on-going or additional surveying has been carried out since the application was lodged and, if so, the applicant is invited to submit any further survey data results and analysis and update the planning application documentation, as appropriate.	The results of a benthic subtidal ecology survey covering the array area and ECC corridor to validate the baseline assumptions (Appendix A12.1: Benthic Ecology Survey Report 2025) were incorporated into this Chapter.
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.	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.

RFI Section	RFI	Relevance to Chapter
	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 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.	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.
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 cumulative effects assessment has been revised in line with NSIP (2024) and Section 13.9 of this Chapter has been updated.

RFI Section	RFI	Relevance to Chapter
	The applicant is requested to update the application documentation, where relevant. 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.	
8 (c) vii	Impacts to Prey Species: The DAU in their observation states that the documentation submitted does not appear to include any consideration of potential indirect effects of the proposed development on the likely prey-base (i.e. Atlantic salmon Salmo salar) for resident Common Kingfisher Alcedo atthis, an Annex I species and a SCI for the River Boyne and Blackwater SPA. The DAU also state that there does not appear to be any consideration of the potential effects with respect to either the associated construction works and/or operation of the development on the Conservation Objectives of the River Boyne and River Blackwater SPA; which is connected to the River Boyne SAC, Boyne Coast and Estuary SAC, and the offshore marine waters of the Irish Sea. The applicant is requested to address the issues raised. The applicant is requested to fully assess the potential impacts on Atlantic herring Clupea harengus potential spawning habitat. The applicant is requested to review the application in this regard and clarify potential effects on seabird prey populations.	The Developer confirms that Section 3.4, of Appendix A13.1: Fish and Shellfish Ecology Baseline Characterisation has been updated to provide further detail on forage fish and other important prey species. This chapter has also been updated to include further references to potential impacts on forage species. Furthermore, Section 13.3.9 has been updated to include further reference to the River Boyne and River Blackwater SAC, which is designated for Atlantic salmon and river lamprey. Lastly, the potential for impact to Atlantic herring spawning habitat, and in result indirect impacts on seabirds due to impacts on prey, have has been further assessed through reference to Particle Size Analysis data collected along the ECC and within the array area in 2025 (Appendix A12.1), and heatmapping in accordance with the Kyle-Henney, (2024) methodology. The revised assessment is detailed in Section 3.4 of this chapter. The assessments concluded no significant adverse effects on herring spawning habitat, and by extension no significant effects on seabirds through indirect impacts on prey.
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 vocalisations.	The Developer confirms that the potential for masking and behaviour impacts on all sensitive fish and shellfish receptors is assessed in Impact 4: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/or behavioural effects) however, this does not include mapping or modelling. The assessment was based on the qualitative underwater noise thresholds as defined by Popper et al., (2014), and informed by a review of peer reviewed literature. Notwithstanding this, as a result of the design refinements no impact piling operations will be undertaken during the construction phase of the development, and subsequently the impact ranges from underwater noise have been significantly reduced for the project alone. The cumulative impact assessment has been revised in accordingly within cumulative Impact 3, Section 13.9.6 of Chapter 13 which confirms that there will be no likely cumulative significant effects.
11 (a)	The assessments relating to Atlantic herring omit the potential spawning habitat in Dundalk Bay (MPA Advisory Group, 2023, Ecological sensitivity analysis of the western Irish Sea to inform future designation of Marine Protected Areas (MPAs, 2023), focusing instead on the known Mourne spawning ground (Dickey-Collas et al., 2001, The location of spawning of Irish Sea herring (Clupea harengus). Journal of the Marine Biological Association of the United Kingdom, 81(4): pp. 713-714) to the northeast of Dundalk Bay (including the potential spawning grounds). The two areas are defined within Chapter 13, Figure 13.5. The Dundalk Bay potential spawning habitat and Mourne spawning grounds are located outside of the ZoI for seabed disturbance effects (12 km).	Reference to both the Mourne and Dundalk Bay herring spawning grounds have now been incorporated into this Chapter and Appendix A13.1.

RFI Section	RFI	Relevance to Chapter
	However, Figure 13.13 and Figure 13.14 in Chapter 13 clearly show areas being located within the ZoI for underwater noise effects (70 km) and subsequently within the modelled impact ranges for Temporary Threshold Shift (TTS) effects (186 dB re 1µPa² / 186 dB SELcum). If it is the case that both spawning grounds are included in the assessment and collectively termed 'the Mourne spawning ground' as a result of their close proximity, the applicant is requested to clarify this in the text so the assessment of both spawning grounds is clear. Otherwise, the applicant is requested to review their assessment of underwater noise for Atlantic herring to include both areas.	
11 (b)	The applicant is requested to consider the inclusion of additional data pertaining to potential spawning grounds in their assessments. Data aggregate sites including those provided by the Marine Institute (Marine Data Centre | Marine Institute) may provide further evidence to aid in increasing confidence relating to the population distribution of these species, specifically where spring spawning season data is available in addition to autumn spawning season data. These may be beneficial in developing understanding and assessment of the Mourne herring spawning grounds extent, and whether the Dundalk Bay grounds should be considered as a separate ground, or as a component of the extensive Mourne spawning grounds.	Additional site specific and regional survey data pertaining to potential herring spawning grounds have been considered further in this chapter and Appendix A13.1.
11 (c)	Within the review arising from a) above, the applicant is requested to consider the updates by Kyle-Henney et al. (2024) and Reach et al. (2024) to the Reach et al. (2013) and Latto et al. (2013) methodologies to identify potential spawning habitats for Atlantic herring and potential supporting habitats for sandeel Ammodytidae. The applicant is requested to update the Fish and Shellfish Ecology chapter to take account of these methodologies.	Heatmapping has now been undertaken in accordance with the methodologies by Kyle-Henney et al. (2024) and Reach et al. (2024) to inform the assessment in this chapter.
11 (d)	Given the extensive distance of Temporary Threshold Shift (TTS) on fish with a swim bladder used in hearing (69 km), the location of sensitive Atlantic herring spawning grounds, and the limited spatial extent of potential spawning habitat available in the region, as referenced above under the heading of marine mammals, the applicant is requested to assess the possibility for the use of Noise Abatement Systems (NAS) to reduce the spatial impact of underwater noise associated with impact piling beyond soft start procedures so that TTS extent would not overlap with the spawning grounds. Reference to NAS should contain appropriate links with and inform other relevant chapters (e.g Chapter 14 Marine Mammal Ecology), in which NAS may be applicable.	Following design refinements in response to the RFI, the proposed development now excludes monopiles as a foundation option and includes for jacket foundations with suction buckets for the Wind Turbine Generators (WTGs) and jacket foundations with either suction buckets or drilled pin piles for the Offshore Substation Platform (OSP). Consequently, impact piling is no longer included in the construction strategy, resulting in a significant reduction in predicted underwater noise exposure. This chapter has been updated to remove piling operations. The Developer has committed to the use of a Noise Abatement System (NAS) (e.g. bubble curtains or similar) as noise abatement if high order UXO clearance is required. Reference to NAS has been included within this chapter.
11 (e)	Given the concerns raised in observations regarding potential impacts to Norway lobster (Nephrops norvegicus) fisheries, the applicant is requested to present a figure / figures for both inshore and offshore fishing grounds relative to the development area, rather than focussing on inshore fisheries (Figure 13.11). Offshore fishing grounds and distribution boundaries are requested to be added to Figure 13.11 as an addition to inshore fisheries information and subsequently referred to in text.	An additional Figure (Figure A13.6) has been added to show inshore and offshore Nephrops VMS based landings value across the North Irish Sea.
11 (f)	The applicant is requested to strengthen relevant cross references to commercial fisheries (Chapter 16) within Chapter 13 Fish and Shellfish Ecology, to support assessment conclusions as appropriate.	Cross references to the appropriate information in the commercial fisheries chapter have been added to this chapter.

RFI Section	RFI	Relevance to Chapter
11 (g)	The applicant is requested to consider disturbance to fish, basking shark and sea turtles from underwater noise generated by wind turbines during the operational phase of the proposed development.	Disturbance to these species have been considered further within this chapter in Section 13.5, Impact 15.
18	The Board notes that the observation received by the Territorial Sea Committee on behalf of the Isle of Man, raises, inter alia, concerns in relation to the lack of consideration of designated Manx sites, with potential for transboundary impacts in particular in relation to birds, fish/shellfish, and marine mammals. The applicant is requested to address the Isle of Man observation.	Further consideration to Isle of Man protected sites have been included within this chapter, with the potential for transboundary impacts considered in Section 13.8.

13.1 Introduction

The key change to this section is the addition of the 2025 benthic survey data (AQUAFACT, 2025), in response to RFI Section 1 (b). Therefore, the following is to be added to Section 13.1 of the 2024 EIAR:

- Appendix A12.1: Benthic Ecology Survey Report 2025.

There are no further changes to this section. Refer to Section 13.1 of Chapter 13 of the 2024 EIAR.

13.2 Methodology

13.2.1 Introduction

There are no changes to this section. Refer to Section 13.2.1 of Chapter 13 of the 2024 EIAR.

13.2.2 Study Area

Following refinements to the proposed development 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. Although the removal of piling will reduce the area affected by underwater noise, the previously defined underwater noise (UWN) ZoI has been retained. Consequently, the defined fish and shellfish ecology study area still encapsulates the potential extent of direct and indirect effects on fish and shellfish receptors. Therefore, there are no changes to this section. Refer to Section 13.2.2 of Chapter 13 of the 2024 EIAR.

13.2.3 Relevant Guidance, Legislation and Policy

Following design refinements in response to the RFI, the proposed development now excludes monopiles and includes for jacket foundations with suction bucket jackets (hereafter referred to as 'SBJs') for the WTGs and jacket foundations with either suction buckets or drilled pin piles for the Offshore Substation Platforms (OSPs). Consequently, piling is no longer included in the construction strategy. In addition, in Section 11 (g) of the RFI, An Bord Pleanála requested the Developer to update the EIAR to consider disturbance to fish, basking shark and sea turtles from underwater noise generated by wind turbines during the operational phase of the proposed development. Therefore, Table 13.1 of Chapter 13 of the 2024 EIAR requires amendments and is replaced with Table A13.1 below. Amendments are indicated by the grey shading in Table A13.1.

Table A13.1 Key NMPF policies relevant to the assessment of fish and shellfish ecology (replaces Table 13.1 of Chapter 13 of the 2024 EIAR)

Policy Name	Policy Description	Where addressed
• National Marine Planning Framework (NMPF) (Government of Ireland, 2024)	Biodiversity Policy 1 • Proposals incorporating features that enhance or facilitate species adaptation or migration, or natural native habitat connectivity will be supported, subject to the outcome of statutory environmental assessment processes and subsequent decision by the competent authority, and where they contribute to the policies and objectives of this NMPF. Proposals that may have significant adverse impacts on species adaptation or migration, or on natural native habitat connectivity must demonstrate that they will, in order of preference and in accordance with legal requirements: a. avoid, b. minimise, or c. mitigate • significant adverse impacts on species adaptation or migration, or on natural native habitat connectivity.	The significance of effects relevant to Biodiversity Policy 1 is addressed in: • Section 13.5.2.1 Impact 1, Section 13.5.3.1 Impact 5, and Section 13.5.4.1 Impact 12: Temporary increase in Suspended Sediment Concentrations (SSC) and sediment deposition during construction, maintenance and decommissioning activities, respectively; • Section 13.5.3.3 Impact 7: Long-term and permanent loss of benthic habitat due to the placement of subsea infrastructure; • Section 13.5.2.4 Impact 4, Section 13.5.3.7 Impact 11 and Section 13.5.4.4 Impact 15: Introduction of underwater noise and vibration leading to mortality, injury, Temporary Thresholds Shift (TTS) and/ or behavioural impacts; and • Section 13.5.3.6 Impact 10: Potential barriers to movement through the presence of turbines and Electro-Magnetic Fields (EMF) from inter-array and export cables. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5 and include the adoption of an Unexploded Ordinance (UXO) specific management plan, the implementation of marine pollution prevention and contingency measures, and cable burial and cable protection measures.
	Biodiversity Policy 2 • Proposals that protect, maintain, restore and enhance the distribution and net extent of important habitats and distribution of important species will be supported, subject to the outcome of statutory environmental assessment processes and subsequent decision by the competent authority, and where they contribute to the policies and objectives of this NMPF. Proposals must avoid significant reduction in the distribution and net extent of important habitats and other habitats that important species depend on, including avoidance of activity that may result in disturbance or displacement of habitats.	The significance of effects relevant to Biodiversity Policy 2 is addressed in: • Section 13.5.2.1 Impact 1, Section 13.5.3.1 Impact 5, and Section 13.5.4.1 Impact 12: Temporary increase in SSC and sediment deposition during construction, maintenance and decommissioning activities, respectively; • Section 13.5.2.2 Impact 2, Section 13.5.3.2 Impact 6, and Section 13.5.4.2 Impact 13: Temporary habitat damage and disturbance of the seabed during construction, maintenance and decommissioning activities, respectively; and • Section 13.5.3.3 Impact 7: Long-term and permanent loss of benthic habitat due to the placement of subsea infrastructure. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5 and include the implementation of marine pollution prevention and contingency measures.
	Biodiversity Policy 4 • Proposals must demonstrate that they will, in order of preference and in accordance with legal requirements: a. avoid, b. minimise, or c. mitigate	The significance of effects relevant to Biodiversity Policy 4 is addressed in: • Section 13.5.2.4 Impact 4, Section 13.5.3.7 Impact 11, and Section 13.5.4.4 Impact 15: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/ or behavioural impacts; and

Policy Name	Policy Description	Where addressed
	• significant disturbance to, or displacement of, highly mobile species.	• Section 13.5.3.6 Impact 10: Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5 and include soft-start procedures during piling, the adoption of a UXO specific management plan, and the use of cable burial and cable protection measures.
	Protected Marine Sites Policy 1 • Proposals must demonstrate that they can be implemented without adverse effects on the integrity of Special Areas of Conservation (SACs) or Special Protection Areas (SPAs). Where adverse effects from proposals remain following mitigation, in line with Habitats Directive Article 6(3), consent for the proposals cannot be granted unless the prerequisites set by Article 6(4) are met.	The significance of effects relevant to Protected Marine Sites Policy 1 is addressed in: • Table 13.8, which identifies the designated Natura sites relevant to fish and shellfish receptors that may be impacted by the Proposed Development. • The Natura Impact Statement (NIS).
	Protected Marine Sites Policy 4 • Until the ecological coherence of the network of protected marine sites is examined and understood, proposals should identify, by review of best available evidence (including consultation with the competent authority with responsibility for designating such areas as required), the features, under consideration at the time the application is made, that may be required to develop and further establish the network. Based upon identified features that may be required to develop and further establish the network, proposals should demonstrate that they will, in order of preference, and in accordance with legal requirements: a. avoid, b. minimise, or c. mitigate significant impacts on features that may be required to develop and further establish the network, or d. If it is not possible to mitigate significant impacts, proposals should set out the reasons for proceeding.	The determination of which fish and shellfish species to take forward to the impact assessment stage has considered the advice provided by Ireland's Marine Protected Area (MPA) Advisory Group with respect to species that could be recommended for spatial protection in the western Irish Sea (MPA Advisory Group, 2023). The significance of effects relevant to Protected Marine Sites Policy 4 is addressed in Section 13.5.2 Construction Phase, Section 13.5.3 Operational Phase, and Section 13.5.4 Decommissioning Phase. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5.
	Non-indigenous Species Policy 1 • Reducing the risk of the introduction and / or spread of non-indigenous species is a requirement of all proposals. Proposals must demonstrate a risk management approach to prevent the introduction of and / or spread of non-indigenous species, particularly when: a. moving equipment, boats or livestock (for example fish or shellfish) from one water body to another, b. introducing structures suitable for settlement of non-indigenous species, or the spread of non-indigenous species known to exist in the area of the proposal.	The significance of effects relevant to Non-indigenous Species Policy 1 is addressed in Chapter 12: Benthic Subtidal and Intertidal Ecology.

Policy Name	Policy Description	Where addressed
	Water Quality Policy 1 • Proposals that may have significant adverse impacts upon water quality, including upon habitats and species beneficial to water quality, must demonstrate that they will, in order of preference and in accordance with legal requirements: a. avoid, b. minimise, or c. mitigate significant adverse impacts	The significance of effects relevant to Water Quality Policy 1 is addressed in: • Section 13.5.2.1 Impact 1, Section 13.5.3.1 Impact 5, and Section 13.5.4.1 Impact 12: Temporary increase in SSC and sediment deposition during construction, maintenance and decommissioning activities, respectively; and • Section 13.5.2.3 Impact 3, Section 13.5.3.4 Impact 8, and Section 13.5.4.3 Impact 14: Reduction in water and sediment quality through the release of contaminated sediments and/ or accidental pollution during construction, maintenance and decommissioning activities, respectively. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5 and include the implementation of marine pollution prevention and contingency measures.
	Sea Floor and Water Column Integrity Policy 2 • Proposals, including those that increase access to the maritime area, must demonstrate that they will, in order of preference and in accordance with legal requirements: a. avoid, b. minimise, or c. mitigate adverse impacts on important habitats and species.	The significance of effects relevant to Sea Floor and Water Column Integrity Policy 2 is addressed in: • Section 13.5.2.1 Impact 1, Section 13.5.3.1 Impact 5, and Section 13.5.4.1 Impact 12: Temporary increase in SSC and sediment deposition during construction, maintenance and decommissioning activities, respectively; • Section 13.5.2.2 Impact 2, Section 13.5.3.2 Impact 6, and Section 13.5.4.2 Impact 13: Temporary habitat damage and disturbance of the seabed during construction, maintenance and decommissioning activities, respectively; • Section 13.5.2.4 Impact 4, Section 13.5.3.7 Impact 11, and Section 13.5.4.4 Impact 15: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/or behavioural effects during construction and decommissioning; • Section 13.5.3.3 Impact 7: Long-term and permanent loss of benthic habitat due to the placement of subsea infrastructure; and • Section 13.5.3.6 Impact 10: Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5 and include the adoption of a UXO specific management plan, and the use of cable burial and cable protection measures.
	Fisheries Policy 5 • Proposals, regardless of the type of activity they relate to, enhancing essential fish habitat,	The significance of effects relevant to Fisheries Policy 5 is addressed in:

Policy Name	Policy Description	Where addressed
	including spawning, nursery and feeding grounds, and migratory routes should be supported. If proposals cannot enhance essential fish habitat, they must demonstrate that they will, in order of preference: a. avoid, b. minimise, c. mitigate significant adverse impact on essential fish habitat, including spawning, nursery and feeding grounds, and migration routes. d. if it is not possible to mitigate significant adverse impact on essential fish habitat, proposals must set out the reasons for proceeding.	• Section 13.5.2.1 Impact 1, Section 13.5.3.1 Impact 5, and Section 13.5.4.1 Impact 12: Temporary increase in SSC and sediment deposition during construction, maintenance and decommissioning activities, respectively; • Section 13.5.2.2 Impact 2, Section 13.5.3.2 Impact 6, and Section 13.5.4.2 Impact 13: Temporary habitat damage and disturbance of the seabed during construction, maintenance and decommissioning activities, respectively; • Section 13.5.2.3 Impact 3, Section 13.5.3.4 Impact 8, and Section 13.5.4.3 Impact 14: Reduction in water and sediment quality through the release of contaminated sediments and/ or accidental pollution during construction, maintenance and decommissioning activities, respectively; • Section 13.5.3.3 Impact 7: Long-term and permanent loss of benthic habitat due to the placement of subsea infrastructure; and • Section 13.5.3.5 Impact 9: Increase in hard substrate and structural complexity due to the placement of subsea infrastructure. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5 and include the implementation of marine pollution prevention and contingency measures.
	Underwater Noise Policy 1 • Proposals must take account of spatial distribution, temporal extent, and levels of impulsive and / or continuous sound (underwater noise) that may be generated and the potential for significant adverse impacts on marine fauna. • Where the potential for significant impact on marine fauna from underwater noise is identified, a Noise Assessment Statement must be prepared by the proposer of development. The findings of the Noise Assessment Statement should demonstrably inform determination(s) related to the activity proposed and the carrying out of the activity itself. • The content of the Noise Assessment Statement should be relevant to the particular circumstances and must include: – Demonstration of compliance with applicable legal requirements, such as necessary assessment of proposals likely to have underwater noise implications, including but not limited to: – Appropriate Assessment (AA); – Environmental Impact Assessment (EIA); – Strategic Environmental Assessment (SEA); – Specific response to 'strict protection' requirements of Article 12 of the Habitats	The significance of effects relevant to Underwater Noise Policy 1 is addressed in: • Section 13.5.2.4 Impact 4, Section 13.5.3.7 Impact 11, and Section 13.5.4.4 Impact 15: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/ or behavioural effects during construction and decommissioning. The assessments describe the noise sources associated with construction, operation and maintenance, and decommissioning activities. A detailed assessment of underwater noise effects on potentially sensitive fish and shellfish species is provided. No significant adverse residual effects on fish and shellfish receptors are predicted as a result of underwater noise. Embedded mitigation measures in respect to likely effects from underwater noise are detailed in Section 13.4.5 and include the adoption of a UXO specific management plan.

Policy Name	Policy Description	Where addressed
	Directive in relation to certain species listed in Annex IV of the Directive; and – Species protected under the Wildlife Acts. – An assessment of the potential impact of the development or use on the affected species in terms of environmental sustainability; – Demonstration that significant adverse impacts on marine fauna resulting from underwater noise will, in order of preference and in accordance with legal requirements be: a. avoided, b. minimised, or c. mitigated, or d. if it is not possible to mitigate significant adverse impacts on marine fauna, the reasons for proceeding must be set out. This policy should be included as part of statutory environmental assessments where such assessments require consideration of underwater noise.	
	Transboundary Policy 1 • Proposals that have transboundary impacts beyond the maritime area, on either the terrestrial environment or neighbouring international jurisdictions, must show evidence of consultation with the relevant public authorities, including terrestrial planning authorities and other country authorities. Proposals should consider transboundary impacts throughout the lifetime of the proposed activity.	The significance of effects relevant to Transboundary Policy 1 is addressed in: • Section 13.8 Transboundary Effects. No significant adverse residual transboundary effects on fish and shellfish receptors are predicted as a result of the assessed impacts. Embedded mitigation measures in respect to likely effects are detailed in Section 13.4.5.

There are no further changes to this section. Refer to Section 13.2.3 of Chapter 13 of the 2024 EIAR.

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 further changes to this section. Refer to 13.2.3 of Chapter 13 of the 2024 EIAR.

13.2.4 Data Collection and Collation

The key change to this section is the update to Table 13.2 in the 2024 EIAR, which lists additional and more recent data and reports that have become available since submission of the 2024 EIAR. New and updated information is indicated by the grey shading in Table A13.2. The new information has been reviewed and included to ensure the impact assessment is informed by the most current and up-to-date data, satisfying RFI Section 11 (b). In addition, the following paragraph within Section 13.2.4 of Chapter 13 of the 2024 EIAR shall be deleted:

"Key data and information sources used to inform the fish and shellfish ecology baseline characterisation are listed in Table 13.2. Full details on these data sources and the utilisation of each are provided in the Fish and Shellfish Technical Baseline."

And be replaced with:

Key data and information sources used to inform the fish and shellfish ecology baseline characterisation are listed in Table A13.2. Full details on these data sources and the utilisation of each are provided in the Fish and Shellfish Technical Baseline.

There are no other changes required to this section. Refer to Section 13.2.4 of Chapter 13 of the 2024 EIAR.

Table A13.2 Data sources used to inform the fish and shellfish ecology baseline characterisation and assessment (replaces Table 13.2 of Chapter 13 of the 2024 EIAR).

Data source	Data utilisation
Site-specific Surveys	
• 2022 site-specific benthic ecology baseline surveys across the array area (Appendix 12.1: Array Area Benthic Survey Report, Natural Power (2022)) and Export Cable Corridor (ECC) (Appendix 12.2: Cable Route Benthic Survey Report, Natural Power (2023)); and • 2025 site-specific benthic ecology survey across the array area and ECC (Appendix A12.1: Benthic Ecology Survey Report 2025, AQUAFACT, 2025).	• Site-specific survey data inclusive of benthic grabs, Drop Down Video (DDV), Particle Size Analysis (PSA), sediment total carbon content and contaminant analysis. DDV data used to inform the fish and shellfish baseline; PSA data used to determine potential for herring and sandeel spawning grounds.
Existing Data Sources	
• Coull et al. (1998) Fisheries Sensitivity Maps in British Waters.	• Used to provide information on likely spawning grounds or nursery areas for commercially important species.
• Ellis et al. (2010) Mapping spawning and nursery areas of species to be considered in Marine Protected Areas (MPAs).	• Provided information on spawning and nursery grounds for elasmobranchs and commercially important fish species.
• Ellis et al. (2012) Spawning and nursery grounds of selected fish species in UK waters.	
• Marine Institute (2016) Species spawning and nursery areas – Ireland's Marine Atlas.	• Provided information on spawning and nursery grounds, and observations of common commercially important fish species in Ireland.
• Marine Institute (2009) Irish Sea Marine Assessment (ISMA) (2009) Survey CV0926.	• Irish Sea marine habitat data presented to provide an indication on the location of suitable habitat and spawning grounds for herring and sandeel.
• Integrated Mapping for the Sustainable Development of Ireland's Marine Resources (INFOMAR) (2023) Marine broadscale habitat data.	• Broadscale marine habitat data presented to provide an indication on the location of suitable habitat and spawning grounds for herring and sandeel.
• Broad-scale seabed habitat map of Europe (EUSeaMap) (2021). European Marine Observation and Data Network (EMODnet)	• Broadscale seabed habitat map presented to characterise the seabed environment.
• Cefas (2000) Irish Sea Annual Egg Production Method (AEPM) Plankton Survey.	• Used to provide information on numbers of fish eggs, larvae and zooplankton.

Data source	Data utilisation
• Agri-Food and Biosciences Institute (AFBI) (2024). Northern Irish Northeastern Larvae Survey (NINEL) data (2016-2023).	• Used to indicate the distribution of Atlantic herring spawning grounds within the fish and shellfish study area.
• International Council for the Exploration of the Sea (ICES) (2025a) Northern Irish Ground Fish Survey (NIGFS) (2014-2024).	• Provided distribution data on ground fish in the western Irish Sea (ICES statistical rectangles 36E3, 36E4, 35E3, 35E4, 37E3, and 37E4)
• ICES (2025b) Offshore Beam Trawl Survey (BTS) (2014-2024).	• Provided distribution data on ground fish in the western Irish Sea (ICES statistical rectangles 36E3, 36E4, 35E3, 35E4, 37E3, and 37E4)
• Marine Institute (2025) The Stock Book 2025: Annual Review of Fish Stocks in 2025 with Management Advice for 2026.	• Commercial fisheries data used to provide data related to fisheries landings and fishing effort within the study area.
• Gerritsen (2024) Atlas of Commercial Fisheries around Ireland.	
• Marine Institute and Bord Iascaigh Mhara (2023, 2024) Shellfish Stocks and Fisheries - Review 2023 and 2024.	• Commercial fisheries data used to provide data related to shellfish fisheries within the study area.
• Tully (2017) Atlas of Commercial Fisheries for Shellfish around Ireland.	
• Celtic Sea Trout Project (CSTP) (2016)	• Used to provide information on the status, distribution, and ecology of sea trout populations.
• ICES (2024) ICES Ecosystem Overviews. Celtic Seas ecoregion – Ecosystem Overview	• Overview of the state of the ecosystem in the region.
• ICES (2025c) ICES Fisheries Overviews. Celtic Seas ecoregion – fisheries overview.	• Overview of all common commercially important fish and shellfish species in the region.
• O'Sullivan et al. (2013) An Inventory of Irish Spawning Herring Grounds	• Inventory of key herring spawning and fishing grounds around the coast of Ireland based on data from the fishing industry and seabed surveys.
• King et al. (2011) Ireland Red List No. 5: Amphibians, Reptiles and Freshwater Fish	• Details most up-to-date list of amphibians, reptiles and freshwater fish native and non-native to Ireland, listed from least concern to extinct.
• Clarke et al. (2016) Ireland Red List No. 11: Cartilaginous fish (sharks, skates, rays and chimaeras)	• Details most up-to-date list of cartilaginous fish native and non-native to Ireland, listed from least concern to extinct.
• Inland Fisheries Ireland (IFI) publications on the status of migrating fish populations (2018-2023).	• Findings of a monitoring programme designed to assess the status of salmon populations in river catchments throughout Ireland.
• Marine Institute (2013) Article 6 Assessment of Fisheries, including a Fishery Natura Plan for Seed Mussel (2013-2017), in the Irish Sea.	• Assessment of the potential ecological impact of fishing activity on Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the Irish Sea.
• Aquatic Services Unit (2020) Dublin Port Maintenance Dredging 2022 – 2029 Benthic and Fisheries Assessment	• Trawl survey data from Dublin Bay used to support the fish and shellfish baseline characterisation.
• Saorgus Energy Limited, 2013. Dublin Array An Offshore Wind Farm on the Kish and Bray Banks. Environmental Impact Statement.	• Environmental and ecological data collected from the Kish and Bray banks and along the ECC of the proposed Dublin Array wind farm development. Data used to support the fish and shellfish baseline characterisation.
• Department of Communications, Energy and Natural Resources (DCENR), 2010. Strategic Environmental Assessment (SEA) of the Offshore Renewable Energy Development Plan (OREDP) in the Republic of Ireland: Environmental Report Volume 2: Main Report and Appendix F – Commercial Fisheries in Environmental Report Volume 4: Appendices.	• Includes data on common commercially important fish and shellfish species in Irish waters.
• Department of the Environment, Climate and Communications, 2023. Draft OREDP II: Draft SEA Report and Appendix 3 – Updated Baseline Summary Report.	

13.2.5 Methodology for Assessment of Effects

There are no changes to this section. Refer to Section 13.2.5 of Chapter 13 of the 2024 EIAR.

13.3 Baseline Environment

13.3.1 Introduction

There are no changes to this section. Refer to Section 13.3.1 of Chapter 13 of the 2024 EIAR.

13.3.2 Receiving Environment

The key change required to this section is the inclusion of additional site-specific and regional survey data and information that have become available since submission of the 2024 EIAR.

The new information has been reviewed to validate the earlier studies used to characterise the baseline conditions for fish and shellfish ecology, ensuring the impact assessment is informed by the most current and up-to-date data and satisfying RFI Section 11 (b).

13.3.3 Marine Fishes and Elasmobranchs

This section has been updated to include reference to the most recent data collected during regional and site-specific surveys, satisfying RFI Section 1 (b) which requested that the scientific information remains relevant and appropriate at the point of submitting. In addition, information on forage fish and other important prey species for marine mammals and seabirds has been added, as requested in RFI Section 8 (c) vii, which requested consideration of the potential for indirect effects on the likely prey base on marine predators. Therefore, Section 13.3.3 in the 2024 EIAR shall be removed from the 2024 EIAR in its entirety and replaced with the text herein:

Data collected during the Northern Irish Ground Fish Surveys (NIGFS) (ICES, 2025a) and Offshore Beam Trawl Surveys (BTS) (ICES, 2025b) between 2014 and 2024 suggest that the ground fish assemblages within the study area are dominated by whiting *Merlangius merlangus*, haddock *Melanogrammus aeglefinus*, common dab *Limanda limanda*, and plaice *Pleuronectes platessa*. Other species caught in high numbers were Norway pout *Trisopterus esmarkii*, grey gurnard *Eutrigla gurnardus*, common dragonet *Callionymus lyra*, poor cod *Trisopterus minutus*, red gurnard *Chelidonichthys cuculus*, American plaice *Hippoglossoides platessoides*, and thickback sole *Microchirus variegatus*. Many other species were typically caught albeit in lower numbers, such as Atlantic cod *Gadus morhua*, blue whiting *Micromesistius poutassou*, tub gurnard *Chelidonichthys lucerna*, Mediterranean scaldfish *Arnoglossus laterna*, spotted dragonet *Callionymus maculatus*, witch flounder *Glyptocephalus cynoglossus*, the white anglerfish *Lophius piscatorius,* and various flatfish species.

The most abundant pelagic fish species caught during the NIGFS were Atlantic herring *Clupea harengus* and European sprat *Sprattus sprattus* followed by Atlantic mackerel *Scomber scombrus* and Atlantic horse mackerel *Trachurus trachurus*.

Among the elasmobranch species recorded within the study area, small-spotted catshark *Scyliorhinus canicula* was typically the most abundant (ICES, 2025a,b). Other elasmobranch species regularly recorded in these surveys included nursehound *Scyliorhinus stellaris*, spiny dogfish *Squalus acanthias*, starry smooth-hound *Mustelus asterias*, tope *Galeorhinus galeus*, thornback ray *Raja clavata*, spotted ray *Raja montagui*, blonde ray *Raja brachyura*, and cuckoo ray *Leucoraja naevus*. Notable demersal elasmobranch species recorded on the Kish and Bray banks in the southern part of the study area (Saorgus Energy Limited, 2013) and across Dublin Bay (Aquatic Services Unit, 2020) included small-spotted catshark and thornback ray. Moreover, basking shark *Cetorhinus maximus* are known to migrate through the Irish Sea (e.g. Berrow and Heardman, 1994). Opportunistic public sightings and satellite tracking indicate that basking shark hotspots are located across the central Irish Sea, around the Isle of Man; however, there are also records of basking sharks across the western Irish Sea, including the study area (e.g., Dolton *et al.*, 2020; Irish Whale and Dolphin Group, 2023). Monthly site-specific digital aerial surveys (DAS)[1] conducted across the array area

[1] DAS surveys were conducted by APEM Ltd. on a monthly basis between May 2020 and October 2022 to inform the assessment of marine mammal and ornithology receptors. A total of 16 transects per month were surveyed with 2.3km spacing totalling 15% coverage of the survey area. Further

(plus a 4km buffer area) between May 2020 and October 2022 recorded one basking shark each in September and November 2020. Five sightings were recorded in October 2022, though it is unclear if these records captured different individuals or constitute repeat sightings.

DDVs taken across the array area and the ECC during the site-specific benthic ecology baseline surveys (Appendix 12.1, Appendix 12.2, and Appendix A12.1) recorded flatfishes (Pleuronectiformes), dragonets (*Callionymidae*), cod fishes (*Gadidae*), gurnards (*Triglidae*), and unidentified fish species.

Beam trawl samples from Kish and Bray banks located in the southern part of the underwater noise ZoI (Saorgus Energy Limited, 2013) also included flatfishes (e.g., plaice, dab, witch flounder and lemon sole *Microstomus kitt*) and cod fishes (e.g., haddock, whiting, cod, and poor cod *Trisopterus minutus*) as well as gurnards, lesser weaver *Echiichthys vipera*, butterfish *Pholis gunnellus*, herring, two-spotted clingfish *Diplecogaster bimaculata*, lesser sandeel *Ammodytes tobianus*, and greater sandeel *Hyperoplus lanceolatus*.

Flatfishes (e.g., dab, plaice, and flounder *Plathichtys flesus*) have also been frequently caught in beam trawls taken across Dublin Bay and the Dublin shipping channel (Aquatic Services Unit, 2020).

Other groundfish species recorded were cod, whiting as well as butterfish, dragonet, sand gobies, short-spined sea scorpion *Myxocephalus scorpius*, sandeel (*Ammodytes* spp.) and thornback ray.

Several of the fish and shellfish species present in the study area are important prey items for top marine predators including elasmobranchs, piscivorous fish, seabirds, and marine mammals (e.g., Cummins *et al.*, 2019; Hernandez-Milian *et al.*, 2015). Sandeels, for example, constitute an important food source for sea birds, such as terns, puffins, kittiwakes, European shag, common guillemots and razorbills (Cummins *et al.*, 2019; Furness, 2002; Green, 2017; Wanless *et al.*, 1998), and are also preyed upon by marine mammals, such as harbour seals (Sharples *et al.*, 2009), grey seals (Hammond *et al.*, 1994) and harbour porpoise (Jansen *et al.*, 2013). Besides sandeel, marine mammals prey on a wide range of other species, such as whiting, cod fishes, mackerel, gobies, salmon, herring, sprat, flatfish and cephalopods, depending on species and prey availability (e.g., Hernandez-Milian *et al.*, 2015; Jansen *et al.*, 2013; Sharples *et al.*, 2009). Other fish species important in the diet of seabirds are sprat and herring (Cummins *et al.*, 2019; Rindorf *et al.*, 2000).

13.3.4 Shellfish Ecology

This section has been updated to include reference to the most recent data collected during regional and site-specific surveys to ensure the fish and shellfish information remains relevant and up to date, as requested in RFI Section 1 (b). Therefore, Section 13.3.4 of the 2024 EIAR shall be removed from the 2024 EIAR in its entirety and replaced with the text herein.

Site-specific DDVs identified the presence of Norway lobster *Nephrops norvegicus* burrows in the fish and shellfish study area, particularly in the finer sediments within the northern section of the array area (Appendix 12.1 (Natural Power, 2022) and Appendix A12.1 (AQUAFACT, 2025)) and along the ECC (Appendix 12.2 (Natural Power, 2023) and Appendix A12.1 (AQUAFACT, 2025)). *Nephrops* inhabiting these burrows are part of the western Irish Sea *Nephrops* population, which is found in the fine sediments of the Western Irish Sea Mud Belt from about 54.5°N in the north to 53.5°N in the south (Figure 13.2). The western Irish Sea stock supports one of the most productive *Nephrops* fisheries in Irish waters, with fishing effort concentrated in ICES rectangle 36E4 (Appendix A16.1 Commercial Fisheries Technical Baseline), which overlaps the array area and the deeper areas of the ZoIs (Figure 13.2).

Other shellfish recorded during the 2022 site-specific DDV surveys (Natural Power, 2022, 2023) were limited to sporadic sightings of bivalves (*Pectinidae*) and bivalve siphons, sea snails (*Buccinidae*) and decapod crustaceans (e.g., hermit crabs *Paguridae*, and Brachyura including brown crab *Cancer pagurus*), with higher numbers of both Brachyura and bivalve siphons recorded at the stations sampled furthest inshore. In 2025 (AQUAFACT, 2025), macroinvertebrate species observed in the nearshore sections of the ECC included crabs and shells of razor clams, while further offshore, auger shells *Turritellinealla tricarinata* were recorded. The areas surrounding the proposed development boundary are known to host several

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information about the DAS programme including transect lines and data collection methods is provided in Appendix 15.1: Offshore Ornithology Baseline Characterisation.

shellfish species. Beam trawl surveys undertaken across the Dublin shipping channel and inner Dublin Bay recorded common whelk *Buccinum undatum*, shrimp spp. and several species of crab, including hermit crab *Pagurus bernhardus*, green crab, brown crab, velvet crab *Necora puber*, harbour crab *Liocarcinus* sp. and spider crabs *Majidae* (Aquatic Services Unit, 2020). The substrates on Kish and Bray banks supports crabs, common whelk and blue mussel *Mytilus edulis* (Saorgus Energy Limited, 2013).

Decapod crustaceans and epibenthic molluscs commonly recorded during the regional ICES surveys within the study area (ICES, 2025a,b) also included *Nephrops*, queen scallop, King scallop, hermit crabs, brown crab, velvet crabs, king scallop *Pecten maxiumus*, and spider crabs *Inachus* spp.

13.3.5 Marine Turtles

There are no changes to this section. Refer to Section 13.3.5 of the 2024 EIAR.

13.3.6 Spawning and Nursery Grounds

This section has been updated to include reference to the inclusion of the NINEL herring larval data, and heatmaps of the larval densities recorded in the surveys, used as a proxy to determine the location of active spawning grounds for Atlantic herring. This update has been made in response to RFI Section 11 (b). Therefore, the following paragraph of Section 13.3.6 of the 2024 EIAR shall be deleted:

"The locations of spawning and nursery grounds of fish and elasmobranch receptors were identified using information from Coull et al. (1998), Ellis et al. (2010, 2012) and Ireland's Marine Atlas (Marine Institute, 2016) and data from the Irish Sea AEPM plankton surveys (Cefas, 2000). The Coull et al. (1998) dataset shows spawning and nursery grounds for commercially important fish species in waters surrounding the UK and Ireland. Ellis et al. (2010, 2012) provides an update to these maps and extends the identification of spawning and nursery locations to ecologically important species, including elasmobranchs."

And be replaced with:

The locations of spawning and nursery grounds of fish and elasmobranch receptors were identified using information from Coull *et al.* (1998), Ellis *et al.* (2010, 2012) and Ireland's Marine Atlas (Marine Institute, 2016). The Coull *et al.* (1998) dataset shows spawning and nursery grounds for commercially important fish species in waters surrounding the UK and Ireland. Ellis *et al.* (2010, 2012) provides an update to these maps and extends the identification of spawning and nursery locations to ecologically important species, including elasmobranchs. Additional data sourced from the Irish Sea Annual Egg Production Method (AEPM) Plankton Survey (Cefas, 2000) were used to ground-truth the Coull *et al.* (1998) and Ellis *et al.* (2010, 2012) datasets. Herring larvae data from the annual NINEL survey (AFBI, 2024) were reviewed and used as a proxy to determine the location of active spawning grounds for herring (see Section 13.3.6.2).

There are no further changes to this section. Refer to Section 13.3.6 of Chapter 13 of the 2024 EIAR.

13.3.6.1 Sandeel

In this Section, Figure 13.9 of Chapter 13 of the 2024 EIAR has been updated to include the new benthic ecology survey PSA data (AQUAFACT, 2025), which have been categorised in accordance with the Latto *et al.* (2013) spawning habitat categories for sandeel. In addition, PSA data from the British Geological Survey (BGS) collected within UK waters and categorised in accordance with the Latto *et al.* (2013) spawning habitat categories for sandeel have been added to Figure 13.9 of Appendix 13.1 of the 2024 EIAR to supplement the habitat suitability analysis for sandeel. Therefore, Figure 13.9 of Chapter 13 of the 2024 EIAR shall be deleted and replaced with Figure A13.1.

In Section 11 (c) of the RFI, An Bord Pleanála requests that the EIAR be updated to take account of the revised heatmapping methodologies by Reach *et al.* (2024) to identify potential supporting habitats for sandeel *Ammodytidae*. The output of the confidence mapping exercise following Reach *et al.* (2024) is presented in Figure A13.2. This figure is additional and does not replace any figures of Chapter 13 of the 2024 EIAR.

The text of Section 13.3.6.1 in the 2024 EIAR has been updated to describe the new outputs. Therefore, Section 13.3.6.1 in the 2024 EIAR shall be removed from the 2024 EIAR and replaced with the text herein:

Sandeel show a high degree of site fidelity, and the settled distribution of adult sandeel is largely reflective of preferred spawning sediments (Jensen *et al.*, 2011). Therefore, the distribution of potential sandeel habitats discussed below equally refers to suitable spawning habitats.

Data analysed by Ellis *et al.* (2010) suggest that the study area overlaps with 'low intensity' sandeel spawning grounds (Figure 13.5). Sandeels are demersal spawners with a preference for sandy and gravelly sandy sediments with low mud content (Holland *et al*., 2005; Wright *et al.*, 2000). Broadscale sediment maps (EUSeaMap, 2021) indicate mainly homogenous substrates across the array area and ECC with sediments predominantly composed of Sandy muds to Muddy sands and Sands (Figure A13.1). Sediments across the ZoI also contain large areas of Mud to muddy sand and Mixed sediments. To further refine the understanding of potential sandeel spawning grounds within the study area, site-specific PSA data collected across the array area (Appendix 12.1 (Natural Power, 2022) and Appendix A12.1 (AQUAFACT, 2025), ECC (Appendix 12.2 (Natural Power, 2023) and Appendix A12.1 (AQUAFACT, 2025) and ZoI (INFOMAR, 2023 and BGS (2015) were classified according to the methodology described in Latto *et al.* (2013).

The Latto *et al.* (2013) approach classes sediments as either 'Unsuitable', 'Suitable' or 'Sub-Prime' for sandeel spawning based on the proportions of mud, sands and gravels within the sediments.

The site-specific sediment data from the 2022 and 2023 benthic ecology surveys (Natural Power, 2022, 2023) showed a seabed characterised by sandy Muds and muddy Sands within the array area, indicating 'Unsuitable' conditions for sandeel spawning (Figure A13.1). 'Unsuitable' sediments for sandeel were also located in the north-eastern corner of the ECC where muddy Sands and Mixed sediments with mud concentrations greater than 10% were recorded. Sediments within the remaining ECC sampling area were categorised as mainly 'Suitable' Sands for sandeel with some locations classed as 'Sub-Prime' sandeel substrate (Figure A13.1). Sampling undertaken in 2025 along the ECC (AQUAFACT, 2025) recorded a comparatively higher concentration of fines, with >10% of mud recorded in all the samples. Due to the higher percentage of fines recorded, the stations sampled along the ECC in 2025 are classified as 'Unsuitable' for sandeel. These findings are considered representative of relatively high seabed mobility in the area, with observed changes in the proportion of sand/muds likely to be related to natural mobility in the shallow waters of the ECC that are more susceptible to local climatic conditions.

Within the sedimentary ZoI, INFOMAR (2023) seabed substrate data indicate localised 'Suitable' areas for sandeel spawning to the north and south of the ECC between the proposed windfarm array and the coastline. PSA data from INFOMAR (2023) and BGS (2015) indicate the presence of 'Preferred' ('Prime' and 'Sub-Prime') and 'Marginal' ('Suitable') sandeel habitats within the wider region across the sandy substrates to the south and east of the offshore development area (Figure A13.1).

The supplementary heatmapping of spawning potential for sandeel (Figure A13.2) indicates that the array area lies within an area unsuitable for sandeel, due to the presence of muddy substrates across the array. The offshore ECC transits areas assigned as low-medium spawning potential (normalised confidence score of 0.2-0.3), due to the presence of slightly coarser substrates (as informed by the EUSeaMap (2021) broadscale marine habitat mapping).

13.3.6.2 Herring

The key change to this section is the inclusion of herring larvae data, used as a proxy to determine the location of active spawning grounds for herring. The data sources and results of the analysis are fully described within Appendix A13.1: Fish and Shellfish Ecology Baseline Characterisations, with a summary provided in this chapter, including a heatmap of herring larvae densities in Figure A13.4. In addition, in Section 11 (c) of the RFI, An Bord Pleanála requested the Developer to update the EIAR to take account of updates by Kyle-Henney *et al.* (2024) to the Reach *et al.* (2013) methodology to identify potential spawning habitats for Atlantic herring. The output of the confidence mapping exercise for Atlantic herring following Kyle-Henney *et al.* (2024) is presented in Figure A13.5. Figures A13.4 and A13.5 are additional and do not replace any figures of Chapter 13 of the 2024 EIAR.

Figure 13.10 of Chapter 13 of the 2024 EIAR has also been updated to include the new benthic ecology survey PSA data (AQUAFACT, 2025), which have been categorised in accordance with the Reach *et al.* (2013) spawning habitat categories for herring. Therefore, Figure 13.10 of Chapter 13 of the 2024 EIAR shall be deleted and replaced with Figure A13.3.

The text of Section 13.3.6.2 in the 2024 EIAR has been updated to describe the new outputs. Therefore, Section 13.3.6.2 in the 2024 EIAR shall be removed from the 2024 EIAR and replaced with the text herein:

Herring were recorded in relatively high abundances across the study area and western Irish Sea in the NIGFS (ICES, 2023a). Herring nursery grounds are located inshore, overlapping the array area, ECC and the northern sections of the ZoI (Figure 13.7).

Cumulative larval densities for herring, as recorded in the NINEL surveys (2016-2023) (AFBI, 2024), are presented as a heatmap in Figure A13.4. These data indicate the presence of ongoing herring spawning to the north of the proposed development across the Dundalk Bay spawning ground and across the historic Mourne spawning ground located off County Down and the northern sections of County Louth (Dickey-Collas *et al.*, 2001). In the eastern Irish Sea, herring spawning grounds are located to the east, south and north of the Isle of Man.

The highest larval densities are typically found in the coastal waters to the south and south-east of the Isle of Man Island, and low intensity spawning does occur within the Mourne and Dundalk Bay spawning grounds (Figure A13.4), although spawning intensity appears to show interannual variability.

Potential suitable substrate for herring spawning was also defined using site-specific and publicly available PSA data, following the classifications described by Reach *et al.* (2013). The results of this analysis suggest that sediments within the array area and ECC are unsuitable for herring spawning, based on the analysis of substrate type, being dominated by Sands and Muds (Figure A13.3). To the north of the ECC, 'Preferred' spawning substrates for herring are present within the Mourne and Dundalk Bay herring spawning grounds (Figure A13.3), outside the sedimentary ZoI. Whether such areas are ultimately used by herring for spawning depends on additional factors, including small-scale seabed geomorphology and local wind and flow conditions (Frost and Diele, 2022).

The heatmapping of spawning potential for herring (Figure A13.5), in accordance with the Kyle-Henney (2024) methodology, also suggests that neither the array area nor the ECC lie within an area of importance for herring, as indicated by areas of no spawning potential value across the array and ECC due to an absence of data indicative of spawning activity available and low spawning potential areas present along the eastern border of the array area (normalised score of 0.75-0.5). As evident in Figure A13.5, areas of higher spawning potential for herring are present to the north of the array area, within the identified Mourne and Dundalk spawning grounds (score of 0.2-0.03), and to the south, southeast and northeast of the Isle of Man, within the Manx herring spawning grounds (score of 0.05-0.021).

13.3.7 Species of Commercial importance

The key change to this section is the addition of Figure A13.6 to show inshore and offshore Nephrops VMS based landings value across the North Irish Sea, to satisfy RFI Section 11 (e). In addition, Figure 13.11 in Chapter 13 of the 2024 EIAR has been updated to include more recent data on the location of razor clam fishing grounds. Figure 13.11 in Chapter 13 shall therefore be deleted and replaced with Figure A13.7. Lastly, the text in Section 13.3.7 of Chapter 13 of the 2024 EIAR has been updated with the latest fishing activity information to ensure the fish and shellfish baseline characterisation remains relevant and up to date, as requested in RFI Section 1 (b).

These updates have been provided and further cross reference to Chapter 16 has been included to satisfy RFI Section 11 (f).

Section 13.3.7 of Chapter 13 of the 2024 EIAR shall be removed from the 2024 EIAR and replaced with the text herein:

As described in the Commercial Fisheries Technical Baseline, the study area supports a variety of commercial fisheries for fish and shellfish. The array area and its surrounding areas to the north and east are dominated by landings of Nephrops caught with demersal otter trawls (Figure A13.6). Demersal fish and elasmobranch species caught in conjunction with the Nephrops fishery include haddock, plaice, monkfish, cod, lesser spotted dogfish, thornback ray, and other demersal species. A low intensity beam trawl fishery mainly targeting sole, plaice and thornback ray also occurs within the study area, with notable grounds located approximately 50km south-east of the array area. Pelagic species commercially targeted within the study area are Atlantic herring and European sprat, with fishing grounds mainly located inshore in Dublin Bay and off Howth.

The inshore areas overlapping the ECC are dominated by landings of shellfish including sword razorshell *Ensis siliqua*, brown crab, and European lobster *Hommarus gammarus* (Figure A13.7). Fishing grounds for razor clams are located close to the coast from Howth to Dundalk Bay in water depths of about 4-14m (Figure A13.7) (Marine Institute and Bord Iascaigh Mhara, 2023, 2024), while brown crab are currently targeted across the ECC right up to the array area (Commercial Fisheries Technical Baseline). Other shellfish commercially fished within the study area are king scallop, common whelk and common cockle *Cerastoderma edule*. King scallop are commercially fished from several scallop beds around the coastline (Commercial Fisheries Technical Baseline), and cockles are currently commercially harvested across the inshore areas in Dundalk Bay (Marine Institute and Bord Iascaigh Mhara, 2024). Potting activity for whelk is understood to have changed since publication of the most recent activity maps (Figure A13.7) with potting extending further north towards the array area boundary.

13.3.8 Diadromous Species

There are no changes to this Section. Refer to Section 13.3.8 of Chapter 13 of the 2024 EIAR.

13.3.9 Species of Conservation Importance and Designated Sites

The key change to this section is inclusion of the Isle of Man Marine Nature Reserves (MNRs) to Figure 13.12, in response to RFI Section 18. Therefore, Figure 13.12 of Chapter 13 of the 2024 EIAR shall be deleted and replaced with Figure A13.8. Furthermore, an erratum to Table 13.8 of Chapter 13 of the 2024 EIAR has been provided which includes corrected distances of the proposed development to the Slaney River Valley SAC and the River Barrow and River Nore SAC. Table 13.8 of Chapter 13 of the 2024 EIAR incorrectly lists the shortest distances between the proposed development and the two SACs instead of the distance to the respective river mouths. Therefore, Table 13.8 of Chapter 13 of the 2024 EIAR shall be deleted and replaced with Table A13.3.

Table A13.3 Natura 2000 sites relevant to fish and shellfish receptors (replaces Table 13.8 of Chapter 13 of the 2024 EIAR)

Site code	Site name	Relative location to the proposed development	Qualifying/supporting fish and shellfish features	Relevance for fish and shellfish receptors
SACs				
002299	River Boyne and River Blackwater SAC[2]	Located 20.9km from the array area and 13.0km from the ECC	River lamprey and Atlantic salmon	COs provide protection of features.
000781	Slaney River Valley SAC[2]	Located 149km from the array area and 152km from the ECC	Twaite shad, river lamprey, Brook lamprey, sea lamprey, Atlantic salmon, freshwater pearl mussel	COs provide protection of features.
002162	River Barrow and River Nore SAC[2]	Located 213km from the array area and 216km from the ECC	Twaite shad, river lamprey, Brook lamprey, sea lamprey, Atlantic salmon, freshwater pearl mussel	COs provide protection of features.
003000	Rockabill to Dalkey Island SAC	Located 2.4km from the array area and 2.9km from the ECC	Harbour porpoise	COs provide for the protection against activities that have the potential to adversely affect the harbour porpoise community at the site, which includes activities that may affect key prey resources.
SPAs				
004014	Rockabill SPA	Located 0.2km from the array area and	Designated for ornithology features, including roseate tern Sterna	COs provide for the protection of prey biomass, with key prey items

[2] For protected migratory fish species, distances to designated freshwater sites are provided to the respective river mouth, as the point of access.

Site code	Site name	Relative location to the proposed development	Qualifying/supporting fish and shellfish features	Relevance for fish and shellfish receptors
		0.1km from the ECC	dougallii, common tern S. hirundo, and Arctic tern S. paradisaea	including crustaceans and small fish, mainly clupeids, sandeel and gadoids.
004236	North-west Irish Sea cSPA	Overlapping with the array area and ECC	Designated for ornithology features	COs provide for the protection of foraging grounds and forage biomass of species the protected bird species rely on as prey, which include fish and crustaceans.

There are no further changes to this section. Refer to Section 13.3.9 of Chapter 13 of the 2024 EIAR.

13.3.10 Valued Ecological Receptors

The key change to this section is the addition of the common skate complex and European seabass to the list of Valued Ecological Receptors (VER) given their protection status within Isle of Man MNRs and their highly mobile nature. Considering this, Table 13.9 of Chapter 13 of the 2024 EIAR shall be deleted and replaced with Table A13.4. The assessment of potential effects on fish and shellfish receptors within Section 13.3.10 has subsequently been updated to include reference to these additional VERs.

Table A13.4. Valued Ecological Receptors included in the impact assessment (replaces Table 13.9 of Chapter 13 in the 2024 EIAR)

VER Group	VERs
• Demersal VERs	• Atlantic cod, plaice, lemon sole, common sole, common dab, whiting, American plaice, witch flounder, common haddock, anglerfish, European seabass
• Pelagic VERs	• Atlantic mackerel, sprat, Atlantic horse mackerel
• Substrate-spawning VERs	• Atlantic herring, sandeel
• Diadromous VERs	• Sea trout, European eel, Atlantic salmon, sea lamprey, river lamprey, twaite shad
• Shellfish VERs	• Nephrops, European lobster, brown crab, razor clam, common cockle, king scallop, common whelk, blue mussel
• Elasmobranch VERs	• Thornback ray, blonde ray, spotted ray, cuckoo ray, small-eyed ray, common skate complex, tope, nursehound, small-spotted catshark, spiny dogfish, starry smooth-hound, basking shark
• Marine turtle VERs	• Leatherback turtle, loggerhead turtle, Kemp's Ridley turtle, hawksbill turtle, green turtle

There are no further changes to this section. Refer to Section 13.3.10 of Chapter 13 of the 2024 EIAR.

13.4 Characteristics of the Proposed Development

The change required in this section is in response to the refinement of the foundation types 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 design refinement in response to the RFI, monopiles have been removed and 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 A13.5 below. Therefore, Table 13.10 of Chapter 13 in the 2024 EIAR shall be deleted and replaced with Table A13.5.

Table A13.5 Key characteristics of Project Option 1 and Project Option 2 (replaces Table 13.10 of Chapter 13 of the 2024 EIAR)

Key Offshore Characteristics	Project Option 1	Project Option 2
• Array area	• 88.5km2	• 88.5km2

Key Offshore Characteristics	Project Option 1	Project Option 2
• ECC	• 36.45km2	• 36.45km2
• 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 (three or four leg configuration) requiring seabed preparation	• 35 SBJs (three or four leg configuration) requiring seabed preparation
• Offshore Substation Platform (OSP) Foundations (array area)	• One OSP, installed on a multi-leg jacket foundation (four leg configuration) with either suction buckets or drilled pin piles	• One OSP, installed on a multi-leg jacket foundation (four leg configuration) with either suction buckets or drilled pin piles
• Cables	• Installation of 111km of array cables within the array area and installation of two 18km export cables within the ECC	• Installation of 91km of array cables within the array area and installation of two 18km export cables within the ECC

There are no further changes to this section. Refer to Section 13.4 of Chapter 13 of the 2024 EIAR.

13.4.1 Parameters for Assessment

There are no changes to this Section. Refer to Section 13.4.1 of Chapter 13 of the 2024 EIAR.

13.4.2 Construction

The change required in this section is in response to the potential need to extract seawater within the array area to prepare grout for the installation of the suction bucket foundations. Low strength grout (or similar material) may be required to complete the suction bucket installation to ensure full contact between the foundation and the seabed. Updates have been made to account for seawater extraction and assess its potential to cause likely significant effects to fish and shellfish receptors. Therefore, the text in Section 13.4.2 of Chapter 13 of the 2024 EIAR shall be deleted and be replaced with:

During construction the following activities and infrastructure have the potential to impact on fish and shellfish ecology:

- Pre-construction geotechnical and geophysical surveys
- Seabed preparation in advance of foundation installation and cable laying
- WTG foundation installation and OSP foundation installation
- Installation of WTGs and OSP topside
- Installation of scour protection
- Installation of inter-array cables and cable protection
- Installation of export cables and cable protection; and
- Landfall Horizontal Directional Drilling (HDD) for export cables.

In addition to the activities listed above, construction will involve sea water extraction for use in grout preparation. Low strength grout (or similar material) may be required to complete the suction bucket installation to ensure full contact between the foundation and the seabed. Any seawater extraction will be carried out within the array area via an intake system on the installation or support vessel. The intakes are submersible or deck-mounted pumps which pull seawater through specialized filtration systems which prevent the intake of marine macrofauna, silt and debris. The extracted seawater will be entirely used for grout mixing with no release of excess water or water mixed with grout back into the marine environment.

The process of pumping in water has the potential to cause physical injuries to pelagic receptors, particularly to pelagic fish and shellfish eggs and larvae, which have limited or no swimming capacity and are therefore highly susceptible to impingement and entrainment during water intake. It is estimated that a total of up to 60,000m^3 of seawater may need to be extracted under Project Option 1 over the entire construction phase. Under Project Option 2, less SBJ foundations will be installed and as a result the maximum volume of seawater to be extracted will be lower.

The installation of SBJ foundations will be sequenced and as a result, seawater extraction will constitute discreet, intermittent, and temporary events. Taking into account the limited volumes of water being removed from the open sea in combination with the intermittent and temporary nature of seawater extraction and the distribution and spatial extent of fish and shellfish spawning grounds, it is concluded that seawater extraction in the array area during the installation of SBJ foundations will not be on a scale that may result in significant effects on fish and shellfish receptors. Therefore, this pathway has not been considered further in the impact assessment for fish and shellfish receptors.

13.4.3 Operational Phase

In Section 11 (g) of the RFI, An Bord Pleanála requested the Developer to update the EIAR to consider disturbance to fish, basking shark and sea turtles from underwater noise generated by wind turbines during the operational phase of the proposed development. Therefore, Section 13.4.3 of Chapter 13 of the 2024 EIAR shall be deleted and be replaced with:

During operation, the following activities and infrastructure have the potential to impact on fish and shellfish ecology:

- Presence of WTG and OSP foundations, scour and cable protection material;
- Operation of WTGs;
- Repair and replacement of WTG and OSP components; and
- Repair and replacement of inter-array and export cables.

13.4.4 Decommissioning

There are no changes to this section. Refer to Section 13.4.4 of Chapter 13 of the 2024 EIAR.

13.4.5 Embedded Mitigation Measures

As noted in Section 13.4, the refined design parameters of the proposed development include no option for driven piles, therefore removing the need for mitigation measures relating to pile driving activities. Moreover, the Developer has committed to the use of a Noise Abatement System (NAS) e.g. bubble curtains or similar if high order UXO clearance is required. Therefore, Table 13.11 of Chapter 13 of the 2024 shall be replaced with Table A13.6 below.

Table A13.6 Embedded mitigation measures relating to fish and shellfish ecology (replaces Table 13.11 of Chapter 13 of the 2024 EIAR)

Measure	Mitigation detail
Construction	
Marine Pollution Contingency Procedure (MPCP)	• Marine pollution prevention and contingency measures will be implemented as part of Appendix A6.1: Offshore Environmental Management Plan (EMP; hereafter the Offshore EMP) to manage the risk of accidental pollution from offshore operations relating to the proposed development (Appendix 2A and 2B in Offshore EMP). The MPCP will include the following control measures and procedures: – A chemical risk review with information regarding how and when chemicals (including vessel fuels) are to be used, stored and transported in accordance with recognised best practice guidance and national and international regulations and commitments. – Navigational safety measures (e.g., guard vessels, safety buoys, lighting of active working zones) to reduce the likelihood of collision events; and – Emergency response methods and procedures to deal with any spills and collision incidents. • Implementation of these measures would reduce the likelihood of potentially harmful pollutants to be released into the marine environment, thereby reducing the likelihood of pollution impacts on sensitive fish and shellfish receptors.

Measure	Mitigation detail
Offshore Waste Management Procedure	• An Offshore Waste Management Procedure setting out waste management and disposal procedures will be implemented as part of the Offshore EMP (Appendix 6 in Offshore EMP, Appendix A6.1). The Waste Management Procedure will include the following measures: – Application of the waste hierarchy (prevention, re-use, recycle, recovery, and disposal) to minimise the amount of waste produced, and reduce, as far as possible, the amount of waste that is disposed of in landfill; – Waste disposal procedures, ensuring all waste that cannot be reused, recycled or recovered will be kept onboard vessels and safely disposed of onshore in a suitable licensed waste facility; and – Code of conduct for vessel operators with respect to the discharge of wastewater and handling and storing of hazardous materials. • Implementation of these measures will reduce the likelihood of potentially harmful pollutants to be released into the marine environment, thereby reducing the likelihood of pollution impacts on potentially sensitive migratory fish species.
Environmental Vessel Management Plan (EVMP)	An EVMP will be implemented to minimise the risk of collision, injury and disturbance to marine wildlife during construction activities, which will include a code of conduct for vessel operators when encountering marine species (Appendix 14.5). In addition, vessel movements to and from construction sites and ports will, where feasible, follow existing routes. While the measures are targeted towards marine mammals and birds at sea, they would equally reduce the risk of injury and disturbance to marine turtles and larger mobile receptors, such as basking sharks.
UXO Management Measures	• The clearance of UXO will follow a mitigation hierarchy, with micro-siting of subsea infrastructure around UXO where practicable. Where avoidance is not possible, relocating the UXO to a safe place and leaving in situ will be considered. Where clearance of UXO is required (i.e. avoidance or relocation is not practicable), removal of the UXO from the site or low order clearance at the UXO location will be adopted where feasible. However, removal of the UXO or low order deflagration of the UXO are not always possible and are dependent upon the individual situations surrounding each UXO. Therefore, a high order detonation of the UXO may be required. • A case-by-case risk assessment will be undertaken following dedicated geophysical and ROV surveys during the construction phase (Appendix A14.5: Marine Mammal Mitigation Protocol (MMMP), and Appendix A6.1: Offshore EMP). • Where there may be clusters of UXO requiring detonation, these UXO will not be detonated at the same time (Offshore EMP). In addition, to reduce in-combination impacts to harbour porpoise protected within the Rockabill to Dalkey Island SAC, the Developer has committed to not undertake any high order UXO detonations at the proposed development at the same time Codling undertakes high order clearance within its Offshore Export Cable Corridor (OECC) (Chapter 14: Marine Mammal Ecology).
Noise Abatement System (NAS) during high order UXO clearance	The Developer has committed to the use of NAS (e.g. bubble curtain or similar) if high order UXO clearance is required (Appendix A14.5: MMMP). This would reduce the impact of UXO clearance noise on sensitive fish and shellfish species.
Pre-construction profile survey	Where necessary, before works commence and following reinstatement, a topographical survey of the nearshore subtidal area will be carried out to identify and map the contours of the subtidal HDD exit pit to ensure a profile similar in nature to the profile recorded during the pre-construction survey is reinstated, as far as practicable.
Operation	
Cable burial and cable protection measures	Export and inter-array cables will be buried where practicable to ensure they are not exposed by sediment movements (Section 8.3.10 in the Offshore Construction Strategy). Where cables cannot be buried, additional cable protection measures such as rock placement or mattressing will be applied to achieve adequate cable protection. Up to 20% of cable length is expected to need protection either during initial installation, or throughout the operational phase of the proposed development (Chapter 8). Cable burial or cable protection increases the distance between the cables and electro- and magneto-sensitive receptors, thereby reducing the received EMF (from attenuation of the EMF).
MPCP, Offshore Waste Management Procedure, EVMP	Marine pollution and waste management control measures and vessel operating procedures will be implemented throughout the operational phase of the proposed development, following the same measures and procedures that were implemented during the construction phase.
Decommissioning	
Assessment of impacts and best practice	Prior to decommissioning a study of the potential environmental impacts to fish and shellfish receptors from the proposed decommissioning activities will be undertaken, considering the baseline environment at the pre-decommissioning stage. All mitigation measures to be captured will be

Measure	Mitigation detail
environmental management	captured within the Rehabilitation Schedule and decommissioning strategy within the 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 further changes to this section. Refer to Section 13.4.5 of Chapter 13 of the 2024 EIAR.

13.4.6 Potential Impacts

As a result of design refinements in response to the RFI, WTGs are now proposed to be installed on SBJ foundations, while the OSP will be mounted on jacket foundations with either drilled pin piles or suction bucket foundations. These changes have also affected other design parameters, leading to a change in the relevant characteristics of Project Option 1 and Project Option 2 for several impacts relevant to fish and shellfish ecology. These design refinements remove the previously proposed monopile foundations, the piling of which is a major source of underwater noise during construction, resulting in a significant reduction in predicted underwater noise levels. In addition, the removal of dredging activities across the site further reduces the potential for disturbance to fish, shellfish and other sensitive marine receptors, as well as associated fish and shellfish habitats.

In addition, in Section 11 (g) of the RFI, An Bord Pleanála requested the Developer to update the EIAR to consider disturbance to fish, basking shark and sea turtles from underwater noise generated by wind turbines during the operational phase of the proposed development. Therefore, Table 13.12 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.7 below. New and updated information considered in this assessment is indicated by the grey shading in Table A13.7.

Table A13.7: 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 13.12 of Chapter 13 of the 2024 EIAR)

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
Construction			
Impact 1: Temporary increase in SSC and sediment deposition arising during the construction phase	**Total volume of suspended sediment and sediment deposition 455,139m^3** Drilling of OSP foundation Drill cuttings released during drilling of pin piles = 10,179m^3. **Cable trenching:** Installation of 111km of array cables = 333,000m^3. Installation of two export cables = 108,000m^3 (excluding the part of the export cable within the array area). **Subtidal HDD:** Exit pits total volume = 3,960m^3. Release of drilling muds (i.e. bentonite) during exit pit punch-out = 30 tonnes.	**Total volume of suspended sediment and sediment deposition 395,139m^3** Drilling of OSP foundation Drill cuttings released during drilling of pin piles = 10,179m^3. **Cable trenching:** Installation of 91km of array cables = 273,000m^3. Installation of two export cables = 108,000m^3 (excluding the part of the export cable within the array). **Subtidal HDD:** Exit pits total volume = 3,960m^3. Release of drilling muds (i.e. bentonite) during exit pit punch-out = 30 tonnes.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest volume of sediments released during construction activities including cable installation and drilling of OSP foundations. The greatest magnitude of impact for foundation installation results from the largest volume suspended relating to the drilling of pin piles during the installation of the OSP jacket foundations. One OSP will be constructed within the order limits. For cable installation, the greatest magnitude of impact results from the greatest volume installation using energetic means (CFE). This also assumes the largest number of cables and the greatest burial depth. Project Option 1 has a higher total volume than Project Option 2 (60,000m^3 more volume of materials) and presents the greatest magnitude of impact.
Impact 2: Temporary habitat damage and disturbance of the seabed during construction activities	**Temporary habitat disturbance of 6,216,745m^2.** **Array area** Repeat attempts - Caisson footprint -Allowance for relocation / micrositing due to failure to achieve penetration upon initial suction installation attempt (20% of locations = >10no.) = 7,069 m^2. Wet storage allowance – Caisson footprint - Temporary placement of SBJ on seabed prior to ultimate placement at micro-sited location =– 7,069 m^2. 2x Jack-up deployments at 49 WTGs and 1 OSP and 20% allowance for relocation with individual footprint of 1,885m^2 = 226,195m^2. Cable seabed preparation and installation in the array area trench area affected: 111km length, 40m width (including preparatory seabed measures) = 4,440,000m^2.	**Temporary habitat disturbance of 5,334,050m^2.** **Array area** Repeat attempts - Caisson footprint -Allowance for relocation / micrositing due to failure to achieve penetration upon initial suction installation attempt (20% of locations = >10no.) = 5,655 m^2. Wet storage allowance – Caisson footprint - Temporary placement of SBJ on seabed prior to ultimate placement at micro-sited location =– 5,655 m^2. 2x Jack-up deployments footprint for 35 WTGs and 1 OSP and 20% allowance for relocation with individual footprint of 1,885m^2 = 165,876m^2. Cable seabed preparation and installation in the array trench area affected: 91km length, 40m width (including preparatory seabed measures) = 3,640,000m^2.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the total area of seabed temporarily disturbed or damaged during the construction phase. It includes areas affected by foundation installation, jack-up and anchoring operations and cable installation including boulder clearance and Pre-Lay Grapnel Runs (PLGR). Note that the loss of benthic habitat due to the presence of subsea infrastructure (e.g., WTG foundations, scour and cable protection) is considered an operational impact and has been assessed under Impact 7. Project Option 1 has a higher total area of temporary habitat disturbance than Project Option 2 (889,685m^2 greater area) and presents the greatest magnitude of impact.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
	Boulders required to be cleared across array area (490 boulders) = 9,621m² Footprint under anchors and buoys in array area = 75,960m² **ECC** Cable seabed preparation and installation in the ECC trench area affected: 18km length, 40m width (including preparatory seabed measures) = 1,440,000m². Boulders required to be cleared across ECC (10 boulders) = 196m² Footprint under anchors and buoys in ECC = 6,480m² **Subtidal HDD:** Total footprint of disturbance (exit pits, transition zone, temporary sidecast/ deposited material & JUV footprint) = 4,156m².	Boulders required to be cleared across array area (350 boulders) = 6,872m² Footprint under anchors and buoys in array area = 59,160m² **ECC** Cable seabed preparation and installation in the ECC trench area affected: 18km length, 40m width (including preparatory seabed measures) = 1,440,000m². Boulders required to be cleared across ECC (10 boulders) = 196m² Footprint under anchors and buoys in ECC = 6,480m² **Subtidal HDD:** Total footprint of disturbance (exit pits, transition zone, temporary sidecast/ deposited material & JUV footprint) = 4,156m².	
Impact 3: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination	The magnitude of the impact represents the largest volume of sediments released during the construction phase, as listed under Impact 1 (Temporary increase in SSC and sediment deposition arising during the construction phase). **Total volume of sediment released 455,139m³**. Dry grout mix for foundation installation: Grout will be cementitious in nature, typically based on ordinary Portland cement (OPC) or equivalent formulations; Maximum quantity carried per vessel at any one time: 1,000 tonnes; and Total quantity required during construction: 100,000 tonnes.	The magnitude of the impact represents the largest volume of sediments released during the construction phase, as listed under Impact 1 (Temporary increase in SSC and sediment deposition arising during the construction phase). **Total volume of sediment released 395,139m³.** Dry grout mix for foundation installation: Grout will be cementitious in nature, typically based on ordinary Portland cement (OPC) or equivalent formulations; Maximum quantity carried per vessel at any one time: 1,000 tonnes; and Total quantity required during construction: 100,000 tonnes.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest volume of sediments that may be released into the water column during construction activities. The risk of accidental contamination as a result of spillages or collisions will be managed through the implementation of an Offshore EMP, and therefore no design scenarios are presented for accidental contamination.
Impact 4: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/or behavioural effects during construction	**UXO clearance** Pre-construction surveys have not yet been completed; therefore, it is not possible at this time to determine how many items of UXO will require clearance.	**UXO clearance** Pre-construction surveys have not yet been completed; therefore, it is not possible at this time to determine how many items of UXO will require clearance.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by spatial and temporal extents of noise propagation resulting from pre-construction surveys, UXO clearance operations and construction activities including the installation of foundations and cables.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
	Pre-construction surveys A series of pre-construction surveys will be undertaken in the array area and along the ECC. Geophysical surveys will utilise towed equipment such as side scan sonar, sub bottom profiler, multibeam echosounder, USBL and magnetometer. Installation of WTG and OSP foundations Two days per foundation = 100 installation days. WTG and OSP foundation installation Q1-Q4 2028. **Other construction noise** Noise emitted from construction vessels and arising during construction activities (e.g., seabed preparation, cable installation, and placement of scour and cable protection). IAC cable installation duration = 240 days. Export cable installation duration = 180 days. Total construction vessels = 70. Total number of return trips during construction = 3,032. Maximum vessels simultaneously onsite during construction = 50.	**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. Installation of WTG and OSP foundations Two days per foundation = 72 installation days. WTG and OSP foundation installation Q1-Q4 2028. **Other construction noise** Noise emitted from construction vessels and arising during construction activities (e.g., seabed preparation, cable installation, and placement of scour and cable protection). IAC cable installation duration = 240 days. Export cable installation duration = 180 days. Total construction vessels = 70. Total number of return trips during construction = 2,504. Maximum vessels simultaneously onsite during construction = 47.	Project Option 1 is considered to have the greatest temporal extent as more infrastructure will be installed. Note the construction programme is indicative at this stage as it is dependent on the contractor selected at construction stage.
Operational Phase			
Impact 5: Temporary increase in SSC and sediment deposition arising during maintenance activities	The volume of sediment released during the operational phase and associated bed level changes would be less to those experienced during the construction phase (as listed under Impact 1). **Repair and maintenance of WTG and OSP components** Once every 5 years per turbine **Repair and maintenance of scour protection for WTG and OSP foundations** Once every 10 years **Inter-array cable replacement, repair and reburial**	The volume of sediment released during the operational phase and associated bed level changes would be less to those experienced during the construction phase (as listed under Impact 1). **Repair and maintenance of WTG and OSP components** Once every 5 years per turbine **Repair and maintenance of scour protection for WTG and OSP foundations** Once every 10 years **Inter-array cable replacement, repair and reburial**	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest volume of sediments released into the water column during maintenance activities. The volume of sediment that could be suspended has not been calculated but will be of much smaller quantity compared with that generated by construction and decommissioning activities. There is more infrastructure to maintain in Project Option 1; therefore, the increase of SSC from operational activities will be greater from Project Option 1.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
	Once every 5 years **Export cable repair and reburial** Once every 5 years	Once every 5 years Export cable repair and reburial Once every 5 years	
Impact 6: Temporary damage and disturbance of the seabed during maintenance activities	**Total temporary habitat disturbance: 675,134m^2.** **Array area:** Major WTG component repair/replacement = 646,540m^2. Major OSP component repair/replacement = 13,195m^2. Inter array cable repair and/or replacement of cabling = 7,000m^2. Inter array cable reburial of any section of the offshore export cable which has become exposed = 700m^2. **ECC** Export Cable - Repair and/or replacement of cabling = 7,000m^2. Export Cable - Reburial of any section of the offshore export cable which has become exposed = 700m^2.	**Total temporary habitat disturbance: 490,409m^2.** **Array area:** Major WTG component repair/replacement = 461,814m^2. Major OSP component repair/replacement = 13,195m^2. Inter array cable repair and/or replacement of cabling = 7,000m^2. Inter array cable reburial of any section of the offshore export cable which has become exposed = 700m^2. **ECC** Export Cable - Repair and/or replacement of cabling = 7,000m^2. Export Cable - Reburial of any section of the offshore export cable which has become exposed = 700m^2.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the area of seabed temporarily disturbed or damaged during maintenance activities. It includes areas affected by cable maintenance activities and jack-up vessel operations during the maintenance of WTG and OSP foundations. Project Option 1 has a higher total area of seabed potentially affected during maintenance activities than Project Option 2 (184,725m^2 more seabed area) and presents the greatest magnitude of impact. Note that the loss of benthic habitat due to the potential placement of cable protection material during the operational phase is included under Impact 7.
Impact 7: Long-term/permanent loss of benthic habitat due to the placement of subsea infrastructure	**Habitat change of 526,898m^2.** **Array area:** WTG footprint with scour protection, based on 49 WTGs = 369,605m^2. One OSP foundation footprint with scour protection = 7,543m^2. Pre- and post-lay rock berm area within array area (5 cable crossings) = 2,750m^2. Inter array cable protection assuming 20% of cable will require additional cable protection = 111,000m^2. **ECC:** Cable protection assuming 20% of cable will require additional cable protection = 36,000m^2.	**Habitat change of 401,297m^2.** **Array area:** WTG footprint with scour protection, based on 35 WTGs = 264,004m^2. One OSP foundation footprint with scour protection = 7,543m^2. Pre- and post-lay rock berm area within array area (5 cable crossings) = 2,750m^2. Inter array cable protection assuming 20% of cable will require additional cable protection = 91,000m^2. **ECC:** Cable protection assuming 20% of cable will require additional cable protection = 36,000m^2.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest area of seabed lost or changed as a result of the installation of offshore infrastructure and associated protection measures. Project Option 1 has a higher total area of long-term or permanent habitat loss than Project Option 1 (125,601m^2 more seabed area) and presents the greatest magnitude of impact.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
Impact 8: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination	The magnitude of the impact represents the largest volume of sediments released during the operational phase, as listed under Impact 5 (Temporary increase in SSC and sediment deposition arising during maintenance activities). Temporary increases in SSC will result from periodic jack-up vessel deployment, and cable repair, replacement and reburial activities (activities listed under Impact 5).	The magnitude of the impact represents the largest volume of sediments released during the operational phase, as listed under Impact 5 (Temporary increase in SSC and sediment deposition arising during maintenance activities). Temporary increases in SSC will result from periodic jack-up vessel deployment, and cable repair, replacement and reburial activities (activities listed under Impact 5).	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest volume of sediment that are predicted to be released into the water column during the operational phase. There is more infrastructure to maintain in Project Option 1; therefore, the increase of SSC from operational activities will be greater from Project Option 1. The risk of accidental contamination as a result of spillages or collisions will be managed through the implementation of an Offshore EMP, and therefore no design scenarios are presented for accidental contamination.
Impact 9: Increase in hard substrate and structural complexity due to the placement of subsea infrastructure	**Total surface area of introduced hard substrate in the water column: 899,964m^2.** Scour protection 49 WTGs, 1 OSP = 377,148m^2. Cable protection = 196,980m^2. Post-lay rock berm = 4,125m^2. Total surface area of subsea portions of WTG foundation piles in contact with the water column (based on average water depth of 46.5 m across the array area) = 315,315m^2. Total surface area of subsea portions of OSP foundation piles in contact with the water column = 6,396m^2.	**Total surface area of introduced hard substrate in the water column: 672,468m^2.** Scour protection 35 WTGs, 1 OSP = 271,547m^2. Cable protection = 170,180m^2. Post-lay rock berm = 4,125m^2. Total surface area of subsea portions of WTG foundations in contact with the water column (based on average water depth of 46.5 m across the array area) = 220,220m^2. Total surface area of subsea portions of OSP foundation piles in contact with the water column = 6,396m^2.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The project option with the greatest magnitude of impact is defined by the greatest area of structures, scour protection, cable protection and cable crossings introduced to the water column, including surface area of vertical structures. The greatest magnitude of impact in relation to introduction of hard substrate for colonisation is the surface of the WTG piles within the water column. Project Option 1 has a higher total area of introduced surface than Project Option 2 (227,496m2 more available area) and presents the greatest magnitude of impact.
Impact 10: Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables	**Inter-array cables** Total length = 111km Nominal operating voltage 66kV or 132kV **Export cables** Two export cables, each with a length of 18km Nominal voltage of 220kV with High Voltage Alternating Current (HVAC) Target burial depth of all cables = 1m-3m	**Inter-array cables** Total length = 91km Nominal operating voltage 66kV or 132kV **Export cables** Two export cables, each with a length of 18km Nominal voltage of 220kV with High Voltage Alternating Current (HVAC) Target burial depth of all cables = 1m-3m.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the number and largest length of cables and the type and strength of currents to be applied.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
Impact 15: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/or behavioural effects during the operational phase	**Operation of wind turbines** Noise generated by 49 WTGs. **Geophysical surveys to monitor the condition of WTGs and the OSP** Twice yearly for 1st year then annually for remaining lifetime. **Geophysical surveys to monitor the condition of IACs and export cables** Annually for first 3 years then every 3 years. **Maintenance activities** Noise generated during maintenance activities including noise from vessels. Total O&M vessels = 12. Total number of annual return trips during O&M = 1,261. Maximum vessels simultaneously onsite during O&M = 12.	**Operation of wind turbines** Noise generated by 35 WTGs. **Geophysical surveys to monitor the condition of WTGs and the OSP** Twice yearly for 1st year then annually for remaining lifetime. **Geophysical surveys to monitor the condition of IACs and export cables** Annually for first 3 years then every 3 years. **Maintenance activities** Noise generated during maintenance activities including noise from vessels. Total O&M vessels = 12. Total number of annual return trips during O&M = 1,055. Maximum vessels simultaneously onsite during O&M = 12.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by spatial and temporal extents of noise propagation resulting from O&M activities. Project Option 1 is considered to have the greatest temporal extent as more infrastructure will need to be maintained and the number of return vessel trips is higher resulting in a longer period of noise exposure. In addition, Project Option 1 is considered to have the greatest spatial extent of noise propagation from operational turbines as more WTGs will be installed.
Decommissioning			
Impact 11: Temporary increase in SSC and sediment deposition arising during decommissioning activities	It is anticipated that the activities resulting in the impact will be similar to the construction phase (Impact 1) apart from seabed preparation works and excluding the removal of structures that may remain. Therefore, it is expected that the volume of sediments released during decommissioning activities and associated bed level changes would be comparable or less to the amounts released during the construction phase.	It is anticipated that the activities resulting in the impact will be similar to the construction phase (Impact 1) apart from seabed preparation works and excluding the removal of structures that may remain. Therefore, it is expected that the volume of sediments released during decommissioning activities and associated bed level changes would be comparable or less to the amounts released during the construction phase.	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest volume of sediments released into the water column during the removal of offshore infrastructure including foundations, cables, and scour and cable protection. The project option with the greatest magnitude of impact is assumed to be as per the construction phase, with all infrastructure removed in reverse-construction order.
Impact 12: Temporary habitat damage or disturbance of the seabed during decommissioning activities	Removal of all foundations, cables and rock protection leading to a temporary damage or disturbance of the seabed equivalent to Impact 2 (Temporary habitat damage or disturbance of the seabed during decommissioning activities).	Removal of all foundations, cables and rock protection leading to a temporary damage or disturbance of the seabed equivalent to Impact 2 (Temporary habitat damage or disturbance of the seabed during decommissioning activities).	**Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the area of seabed temporarily disturbed or damaged during the removal of foundations, cables, and scour and cable protection material. The largest area to be disturbed is assumed to be similar to the construction phase (Impact 2), with all infrastructure removed in reverse construction order.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
			The greatest magnitude of impacts considers the removal of cables and rock protection; however, the necessity to remove cables and rock protection will be reviewed at the time of decommissioning.
Impact 13: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination	The magnitude of the impact represents the largest volume of sediments released during the decommissioning phase, as listed under Impact 12 (Temporary increase in SSC and sediment deposition arising during decommissioning activities).	The magnitude of the impact represents the largest volume of sediments released during the decommissioning phase, as listed under Impact 12 (Temporary increase in SSC and sediment deposition arising during decommissioning activities).	**Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by the largest volume of contaminated sediments that may be released into the water column during the decommissioning phase. The risk of accidental contamination as a result of spillages or collisions will be managed through the implementation of an Offshore EMP, and therefore no design scenarios are presented for accidental contamination.
Impact 14: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/or behavioural effects during decommissioning	It is anticipated that the activities resulting in the impact will be similar to the construction phase (Impact 4) excluding the removal of UXO. Therefore, it is expected that the magnitude of the impact would be no greater or less than that during construction (Impact 4).	It is anticipated that the activities resulting in the impact will be similar to the construction phase (Impact 4) and excluding the removal of UXO. Therefore, it is expected that the magnitude of the impact would be no greater or less than that during construction (Impact 4).	**Project Option 1 represents the greatest magnitude of impact in relation to this impact.** The magnitude of the impact is defined by spatial and temporal extents of noise propagation resulting from the decommissioning of infrastructure. Under Project Option 1, more infrastructure will require decommissioning, with a similar indicative methodology for both project options. Therefore, Project Option 1 has the greatest magnitude of impact.

13.5 Potential Effects

There are no changes to this the introductory text in this section. Refer to Section 13.5 of Chapter 13 of the 2024 EIAR.

13.5.1 Do-Nothing Scenario

There are no changes to this section. Refer to Section 13.5.1 of Chapter 13 of the 2024 EIAR.

13.5.2 Construction Phase

There are no changes to the introductory text in this section. Refer to Section 13.5.2 of Chapter 13 of the 2024 EIAR.

13.5.2.1 Impact 1: Temporary increase in SSC and sediment deposition arising during the construction phase

Design refinements in response to the RFI, have necessitated changes to this section; notable refinements of relevance to this impact include the removal of monopiles, with WTGs now proposed with SBJ foundations, and OSPs with jacket foundations installed with either drilled pin piles or suction buckets. Furthermore, dredging activities across the site have also been removed from the proposed development. Therefore, for the purpose of clarity, the following text from Section 13.5.2.1 of Chapter 13 of the 2024 EIAR shall be deleted:

"The numerical plume modelling study predicts increases to SSC and sediment deposition during the construction phase of the development to arise from the following activities:

- *Seabed levelling prior to the installation of foundations via trailer suction hopper dredger (TSHD) and associated release of dredged material*
- *Drilling during the installation of piled foundations, which will release drill cuttings*
- *Cable installation using trenching, jetting and/or ploughing*
- *Excavation of HDD exit pits nearshore via mass flow excavator (MFE); and*
- *Release of drilling muds (with bentonite) following HDD."*

And be replaced with:

The numerical plume modelling study predicts increases to SSC and sediment deposition during the construction phase of the development to arise from the following activities:

- Drilling during the installation of pin piles for the OSP foundations, which will release drill cuttings;
- Cable installation using trenching, jetting or ploughing;
- Excavation of HDD exit pits nearshore via mass flow excavator (MFE); and
- Release of drilling muds (with bentonite) following HDD.
- The process of pumping out water during the installation of the suction buckets has the potential to draw out fine sediments from the seabed, although this effect is generally most pronounced in highly permeable coarser-grained deposits. In the case of low permeability finer-grained sediments, (which are evident in the shallow soil layers that underlie the proposed development site), the consequence of seepage flow is anticipated to be minimal. Accordingly, the installation of SBJ across the offshore array area is not expected to lead to any locally elevated levels of turbidity (Appendix A10.1: Marine Processes. Review of Project Options). Therefore, this pathway has not been considered further in the assessment.

There are no further changes to the introductory text of this section. Refer to Section 13.5.2.1 of Chapter 13 of the 2024 EIAR.

Sensitivity of receptors

The key change to this section is the addition of the common skate complex and European seabass to the VER list, reflecting their protection status within Isle of Man MNRs and their highly mobile nature. These receptors fall within the 'elasmobranch' and 'demersal VERs' sensitivity groups respectively. Due to the biological similarities between these species and the existing receptors within their respective groups, the sensitivities assigned in Table 13.13 of Chapter 13 of the 2024 EIAR therefore remain unchanged. Subsequently, no changes have been made to Table 13.13.

Magnitude of impact

The key changes to this Section, reflect the refinement in the foundation types and removal of dredging, necessitated revised sediment plume modelling to determine the resulting effects on SSC and deposition. The revised modelling is detailed in Appendix A10.2: Marine Processes Modelling Report. Table 13.15 of the 2024 EIAR has also been updated, to include reference to the outputs of the 2025 benthic characterisation survey (AQUAFACT, 2025), and additional information on the Mourne and Dundalk Bay herring spawning grounds; these amendments are reflected in Table A13.9 below, which replaces Table 13.15 of the 2024 EIAR, satisfying RFI Sections 11 (a) and (b). New and updated information is indicated by the grey shading in Table A13.10.

To reflect these updates, the *Magnitude of impact* in Section 13.5.2.1 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the following:

For clarity, these refinements do not alter the overall conclusions of the assessment: the significance of effects for all fish and shellfish receptors remains slight (adverse) and therefore not significant in EIA terms.

Ambient levels of Suspended Particulate Matter (SPM) within the study area vary seasonally in response to annual wave dynamics, with highest concentrations typically found in January and lowest levels occurring during summer in June and July. Long-term data of SPM derived from satellite data (Cefas, 2016) show that concentrations are highest within the nearshore zone of the study area, peaking in Dundalk Bay around 25km north-west of the array area. Here, monthly mean sea surface SPM concentrations vary from 4.0mg/l in June to 14.0mg/l in January (± 2.0mg/l standard deviation). For the nearshore part of the ECC, the monthly mean sea surface SPM concentrations vary from 2.9mg/l in July to 8.3mg/l in December (± 1.3mg/l standard deviation). For the array area, the monthly mean sea surface SPM concentrations vary from 0.6mg/l in June/July to 4.8mg/l in January (± 0.5mg/l standard deviation). Site-specific water samples taken to the north-east and south of the array area in January 2023 indicate total suspended solid concentrations between 13 to 38mg/l for a range of water depths, noting these samples were taken following a period of strong winds (Figure 1 of Partrac, 2023). Overall, all concentrations are considered to be relatively low (Chapter 10).

The extent and magnitude of sediment plumes and associated bed level changes predicted for the different construction activities are detailed in Table A13.8, and the impact magnitude for all fish, marine turtle and shellfish VERs has been assessed in Table A13.9, based on the methodology outlined in Section 13.2.5. No specific embedded mitigation measures relevant to the impact have been defined (see Table A13.6)

The results of the site-specific modelling show that construction activities would create discrete sediment plumes that would spread over several tidal cycles prior to completely settling out. Based on typical flows during a spring tide, the longest tidal excursion from the middle of the ECC extends up to 6.4km to the north-west for the flood phase and 6.3km to the south-east during the ebb phase. For the array area, the equivalent distances are estimated to be 7.2km in a north-north-west (flood) direction and 6.7km in a south-south-east (ebb) direction. Tidal excursions during neap tides are around 50% of those occurring during springs.

For the array area, sediment mobilisation is predicted only during peak flood and ebb flows on spring tides, which have the potential to mobilise surficial sediments (fine sands to silts). For the central area of the ECC, only peak flood flows during spring tides have the capacity to mobilise sediments up to fine sands, while spring peak ebb flows are limited to mobilising very fine sands and smaller particles into suspension. In contrast, flow conditions during neap tides are too weak to mobilise sediment and instead provide extended periods favourable for sediment deposition (see the Chapter 10).

Table A13.8 Modelled increases in SSC and sediment deposition during construction activities (replaces Table 13.14 of Chapter 13 of the 2024 EIAR)

Construction impact	Location	Details of increase in SSC and deposition
Drilling for foundation installation	Array area	• Plume modelling shows that sediment plumes produced from drill cuttings initially remain within the tidal excursion buffer with a steadily reduced concentration in suspended solids eventually spreading further afield over several tidal cycles. Notably, the spring release shows a distinctive net plume dispersion to the north with the flood dominant flows, with a total excursion of around 40km from the point of release, which has the potential to cross into UK territorial waters. During neap tides, plumes show a reduced net northly excursion and remain fully within Irish territorial waters. • Sediment plumes reaching UK waters are predicted to be imperceptible against natural background levels with SSC of ⩽1mg/l (trace levels; see Chapter 10). Suspended sediments at concentrations above natural background levels (i.e., greater than 10mg/l) are predicted to remain within the tidal excursion buffer, and highest concentrations above 500mg/l remain close to the point of discharge. Outside the tidal excursion buffer suspended sediment concentrations are typically <10mg/l and equivalent to background levels. • Maximum initial deposition depths of settled drill cuttings in the range of 20 to 50mm remain close to the drilling location which reduces to between 5 to 10mm up to the adjacent WTG location. Only trace levels (<1mm) exceed the northern boundary of the tidal excursion buffer.
Cable installation	Array area	• Highest SSC in the range 100 to 500mg/l are limited along the trenching line and only occur during the period of jetting, rapidly reducing thereafter. Only low concentrations below 2mg/l (equivalent to normal variations in turbidity) are predicted to exceed the tidal excursion buffer, which for all release scenarios tend to favour a northerly distribution due to the flood dominant tide. • For the northerly high flow scenario (flood spring tide release), tidal advection has the potential to extend the plume to just reach UK territorial waters for a short period, but with a very low concentration equivalent to around 1mg/l (trace level). This pattern is only likely to be repeated for trenching activities occurring in the north-eastern part of the array area under a similar set of spring tide conditions. • Highest levels of initial settlement between 20 to 100mm occur along the trenching line (i.e., material falling back into the trench in the near-field). Levels above 10mm spread up to 500maround the trenching line in the direction of the general north-south tidal axis. Levels above 5mm spread further by around 2km in the direction of the tidal axis. Only trace levels (<1mm) exceed the northern boundary of the tidal excursion buffer with a small amount of settlement potentially reaching UK territorial Waters for a flood release on a spring tide... • Where there is an adjacent cable line upstream or downstream on the tidal axis then there is potential for subsequent overlapping deposition (i.e. the extent of settlement from one cable line has the chance of reaching the adjacent trench line in the direction of the tidal axis). In such cases, the net level of overall deposition across the array area is expected to vary from around 10 to 50mm between trenching lines and 50 to 100mm closer to each trenching line.
	ECC	• Highest SSC in the range 200 to 1,800mg/l are limited along the trenching line and only occur for the period of trenching, advecting away thereafter. • Highest levels of deposition between 10 to 50mm occur along the trenching line (i.e., material falling back into the trench). All levels above 1mm remain within the ECC boundary with only trace levels (<1mm) spreading further afield
Excavation of HDD exit pits	ECC	• Spring tide releases indicate a maximum excursion distance of the sediment plume along the coast of around 2.2km to the north-west (flood) and to the south-east (ebb) for concentrations >1mg/l, equivalent to trace levels. Neap releases travel a shorter distance along the coast of around 1.3km on flood and ebb. • All releases cross in front of Balbriggan Bay (around 1.5km south of the exit pits) but with concentrations that remain low at all times (<10mg/l) and for a short duration (<4 hours). The highest elevated concentrations remain close to the exit pits within the ECC boundary with levels up to 1,120mg/l. • The maximum spread of fine sediment deposition is around 2.5km to the north-north-west and south-south-east of the exit pit trench. The greatest depth of deposition remains close to the pits with maximum levels of between 68 to 193mm.
Bentonite release	ECC	• Spring tide releases indicate a maximum excursion distance of around 1.1km to the north-west (flood) and 0.8km to the south-east (ebb) for concentrations >1mg/l. Neap tide releases travel a shorter distance along the coast.

Construction impact	Location	Details of increase in SSC and deposition
		• The highest elevated concentrations remain close to the HDD exit pits with levels up to 29mg/l for each release, or 58 mg/l if both punch-outs were to occur simultaneously. • The maximum spread of bentonite deposition is around 1.7km to the north-north-west and 1.4km to the south-south-east of the exit pit trench, with greatest depths of deposition remaining closest to the pits with levels between 0.3 to 0.7mm (trace levels). This level of deposition is considered to be the same if the two releases were to occur simultaneously given that consecutive or simultaneous releases involve the same overall mass of bentonite.

In summary, the results of the plume modelling indicate that any increases in SSC above background levels during the construction phase would be restricted to within the sedimentary ZoI. The highest SSCs (>500mg/l) would remain close to the points of discharge within the near-field (e.g., around WTG locations and cable trench line) and increases to SSC above natural background levels (i.e., greater than 10mg/l) are predicted to remain within the tidal excursion buffer. Sediment deposition would consist of coarser material deposited close to the source (i.e., around the area of disturbance), with the deposition of finer material decreasing from the point of release.

Sediment plumes are expected to quickly dissipate after cessation of the construction activities due to settling and wider dispersion, with SSCs reducing within a couple of tidal cycles to background levels. Consequently, the impact will be restricted to the construction phase of the proposed development and will therefore be short-term (i.e., one to seven years as defined in the assessment methodology in Table 13.5), although works in any given discrete location within the proposed offshore development area will be temporary (less than one year). In addition, construction activities are largely expected to be carried out on a sequential basis, which limits the opportunity for successive periods of sediment disturbance to develop overlapping sediment plumes (i.e., sediment plumes from one activity are expected to fully disperse with material settling out of suspension prior to the occurrence of a subsequent sediment disturbance event due to a different activity).

The impact will occur frequently during the construction phase, originating from discrete locations throughout the array area and along the ECC.

Table A13.9 Determination of impact magnitude of increased SSC and sediment deposition during construction activities (replaces Table 13.15 of Chapter 13 of the 2024 EIAR)

Receptor	Impact magnitude
Pelagic VERs (Atlantic mackerel, Atlantic horse mackerel, sprat)	It has been determined that the impact may affect pelagic VERs predominantly through the effects of high levels SSCs on planktonic eggs and larvae. All pelagic VERs including their known spawning locations are widely distributed throughout the study area and wider region, and therefore the degree of overlap between these receptors and those areas subject to increases in SSCs is predicted to be small in the context of available spawning habitat. Moreover, the potential for adverse effects on eggs and larvae would be confined to areas experiencing high levels of SSC and as such would be restricted to the near-field close to the point of release. Based on this together with the short-term, intermittent and localised nature of the impact, any effects upon pelagic VERs are assessed to be either not discernible or barely discernible from baseline conditions. Consequently, the magnitude of the impact is deemed to be low (adverse).
Demersal VERs (Atlantic cod, plaice, lemon sole, common sole, common dab, American plaice, witch flounder, whiting, haddock, anglerfish, and European seabass)	Cod, plaice, lemon sole, common sole, whiting, and haddock all have spawning grounds within the fish and shellfish study area (Coull et al., 1998; Ellis et al., 2010; Marine Institute, 2016). As for the pelagic VERs, it has been determined that the impact may affect demersal VERs predominantly through the effects of increased levels SSCs on planktonic eggs and larvae. Spawning grounds of these receptors are widely distributed across the study area and within the Irish Sea. Therefore, the degree of overlap between sediment plumes and the receptors, including early life stages sensitive to high SSCs, is anticipated to be small in the context of available spawning habitat and the areas likely to be affected by elevated SSCs and sediment deposition. Similarly, later life stages of the receptors are highly mobile and widely distributed within the wider region, and therefore the interaction between the receptors and the impact is assessed to be low. Considering the wide distribution of the receptors and their spawning locations within the study area and Irish Sea, and the short-term, intermittent and localised nature of the impact arising during construction, any effects on demersal VERs are assessed to be either not discernible or barely discernible from

Receptor	Impact magnitude
	baseline conditions, and consequently the magnitude of the impact is deemed to be low (adverse).
Small-spotted catshark, nursehound and skate species (thornback ray, spotted ray, blonde ray, cuckoo ray, small-eyed ray, common skate complex)	It has been determined that the impact may predominantly affect these receptors through the potential smothering of egg cases deposited on the seabed. Areas affected by high SSC and sediment deposition will be highly localised. In addition, the receptors are widely distributed within the study area, and therefore the interaction between the receptors and the impact is predicted to be small in the context of available habitat. Based on this together with the intermittent and short-term nature of the impact, any effects upon the receptors are assessed to be barely discernible from baseline conditions. Consequently, the magnitude of the impact is deemed to be low (adverse).
Sandeels	Site-specific sediment data from the 2022, 2023 and 2025 benthic ecology surveys (Natural Power, 2022, 2023 and AQUAFACT, 2025) showed a seabed characterised by fine sediment habitats, primarily sandy mud, muddy sand and slightly gravelly muddy sands within the array area, indicating 'Unsuitable' conditions for sandeel spawning (Figure A13.1). 'Unsuitable' sediments for sandeel spawning are also located in the north-eastern corner of the ECC, where muddy Sands and Mixed sediments with mud concentrations greater than 10% were recorded. Sediments within the remaining ECC sampling area were categorised as Sands that are either 'Suitable' or 'Sub-Prime' for sandeel spawning in the 2023 survey (Figure A13.1). Sampling undertaken in 2025 along the ECC recorded a comparatively higher concentration of fines, with >10% of mud recorded in all the samples. On account of the higher percentage of fines recorded, the stations sampled along the ECC in 2025 are therefore classified as 'unsuitable' for sandeel. On account of these findings, and assuming a maximum magnitude of impact scenario that suitable spawning substrates are still present along the ECC (as identified in the 2023 survey), it is therefore assumed that there is the potential for some proportion of suitable spawning grounds for sandeel to be subject to increased SSCs and smothering from sediment deposition during construction activities within the ECC. The deposition of coarser sediments resulting from construction activities would be restricted to areas close to the points of release, and close to the HDD exit pits for activities within the ECC. Plumes of finer sediments will disperse more widely. Low intensity sandeel spawning grounds are predicted to be distributed across large parts of the Irish Sea (Ellis et al., 2010; Figure A13.5). In addition, PSA data collected through INFOMAR (2023) confirm the presence of suitable sandeel habitats within the study area (outside of the array area and ECC) and wider region, with areas classed as 'Suitable' and 'Sub-Prime' for sandeel spawning being located to the south of the array area (Figure A13.1). Taking this into consideration, any effects on sandeel spawning grounds from increased SSCs and sediment deposition are assessed to be relatively small in the context of available suitable substrate in the study area and wider region. Based on this together with the short-term and intermittent nature of the impact, any effects upon sandeel populations and their spawning grounds are considered to be barely discernible from baseline conditions, and therefore the magnitude of the impact is deemed to be low (adverse).
Herring	The closest known spawning ground for herring is located within Dundalk Bay, approximately 20 km north of the study area (Dundalk Bay spawning ground) (Figure A13.3). This spawning ground lies outside of the Sedimentary ZoI and does not overlap with the proposed areas for the disposal of spoil material, or any areas potentially affected by the deposition of coarser material. Plumes of finer sediments may disperse into Dundalk Bay; however, the levels of SSCs in plumes reaching Dundalk Bay would be well within natural background concentrations (Table A13.8). In addition, any deposited sediment would be rapidly re-distributed by tidal currents. Therefore, no discernible changes are anticipated on spawning herring grounds from the impact during the construction phase, and consequently the magnitude of the impact is deemed to be negligible.
Nephrops	The site-specific DDV surveys (Natural Power, 2022, 2023) indicated the presence of Nephrops burrows along most of the ECC and within the northern section of the array area. Similar findings were observed in DDV from the 2025 survey (AQUAFACT, 2025), which identified evidence of Nephrops burrowing at all sampled sites across the array area. Nephrops within the study area are part of the western Irish Sea Nephrops population, which inhabits the fine sediments of the Western Irish Sea Mud Belt from about 54.5°N in the north to 53.5°N in the south. Therefore, the degree of overlap between sediment plumes and associated sediment deposition is considered to be small in the context of the distribution of the western Irish Sea Nephrops population.

Receptor	Impact magnitude
	Taking into consideration the wide distribution of the receptor throughout the fish and shellfish study area and wider western Irish Sea together with the short-term, intermittent and localised nature of the impact, any effects on Nephrops from increases in SSCs and sediment deposition are assessed to be barely discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be low (adverse).
Brown crab, European lobster, common whelk, common cockle, King scallop, razor clams	Taking into account the distribution of the shellfish receptors within the study area and the short-term and localised nature of the impact, any effects on the shellfish receptors are assessed to be barely discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be low (adverse).
Common cockle	It has been determined that the impact may affect common cockles directly through high levels of sediment deposition. Common cockles typically occur in intertidal areas and sometimes may also be found within the shallow subtidal (Tyler-Walters, 2007). A temporary increase in nearshore sediment deposition would occur during the excavation of the two subtidal HDD exit pits, with the greatest depths of deposition remaining closest to the exit pits within the ECC with levels between 68 to 193 mm (Table A13.8). Highest levels of sediment deposition during cable installation would occur along the trenching line, reaching levels between 10 to 50mm (Table A13.8). Fishing activity data indicate that the main cockle beds within the fish and shellfish study area are located in Dundalk Bay outside the area affected by this sediment deposition. In addition, none of the benthic assemblages recorded within the intertidal landfall area and adjacent shallow subtidal are characterised by common cockles (Chapter 12). Therefore, the number of cockles affected by heavy sediment deposition is likely to be very small when compared to the extent of large commercial beds and available intertidal and shallow subtidal soft sediment habitats within the wider region. Based on this together with the short-term nature of the impact, any effects on common cockles from the impact are expected to be not discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be negligible.
Blue mussel	The site-specific benthic baseline surveys did not record blue mussels within the offshore development area (Appendix 12.1 and 12.2). In addition, fishing activity data (Marine Institute, 2016) indicate that seed mussel beds are located to the south of the offshore development area outside the sedimentary ZoI (Figure 13.11). Therefore, the number of blue mussels affected by the impact is likely to be very small, in particular when compared to the extent of large seed mussel beds within the wider region. Based on this together with the short-term and intermittent nature of the impact, any effects on blue mussels from the impact are expected to be not discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be negligible.

In summary, elevated levels of suspended sediments above background levels and associated sediment deposition during construction activities are expected to be localised within the near-field and adjacent far-field. Furthermore, these changes are expected to be temporary to short-term, intermittent, and reversible, with any changes to the baseline of sensitive receptors assessed as being not discernible for herring, blue mussel, and common cockle and at most barely discernible for the remaining receptors. The magnitude of this impact for these receptors has therefore been assessed as being negligible and low (adverse), respectively. Marine turtles, diadromous VERs and viviparous and ovoviviparous elasmobranchs (including basking sharks) were assessed as not being sensitive to the impact and were therefore screened out of the magnitude assessment

There are no further changes required to this section. Refer to Section 13.5.2.1 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.2.2 Impact 2: Temporary habitat damage and disturbance of the seabed during construction activities

The key change to this section is the addition of the common skate complex and European seabass to the VER list, reflecting their protection status within Isle of Man MNRs and their highly mobile nature. These receptors fall within the 'elasmobranch' and 'demersal VERs' sensitivity groups respectively.

Due to the biological similarities between these species and the existing receptors within their respective groups, the sensitivities assigned in Table 13.16 of Chapter 13 of the 2024 EIAR therefore remain unchanged. Subsequently no changes are reflected in Table 13.16.

Magnitude of impact

The key change to this section is an increase in the area of habitat disturbance across both Project Option 1 and Project Option 2 due to the increased footprint of SBJ foundations. To reflect the change in habitat disturbance, within Section 13.5.2.2 of Chapter 13 of the 2024 EIAR, the *Magnitude of Impact* shall be deleted and replaced with the following:

Up to about 6.2km^2 of seabed is predicted to be directly impacted within the array area and ECC during the construction phase of the proposed development for Project Option 1 and 5.3km^2 for Project Option 2 (Table A13.7). Within the array area, an area of approximately 4.8km^2 for Project Option 1 and 3.9km^2 for Project Option 2 is predicted to be temporarily lost or disturbed because of jack-up barge and anchoring operations, boulder clearance, and the installation of infrastructure foundations and inter-array cables. This equates to approximately 5.4% of the total seabed area within the array area for Project Option 1 and 4.4% for Project Option 2. Within the areas of the ECC, an area of approximately 1.5km^2 will be temporarily disturbed during installation of export cables including burial and jointing for Project Option 1 and Project Option 2. This equates to approximately 4.0% of the total seabed area within the ECC.

With regard to the scale of the impact, disturbances to the seabed will be spatially restricted to within the immediate footprint of the infrastructure and associated installation activity. Consequently, the maximum extent of the impact will be restricted to the near-field.

Any seabed disturbances during construction activities will be restricted to the construction phase of the proposed development, which is anticipated to last up to three years. The impact will therefore be short-term (one to seven years), as defined in Table 13.5, although works in any given discrete location within the offshore development area will often be temporary (less than one year). The impact will occur frequently in discrete locations within the offshore development area during the construction phase of the development.

In response to RFI Section 11 (b) issued by An Bord Pleanála to assess the potential for impacts to herring in Dundalk Bay as two separate spawning components (the Dundalk Bay spawning component and the Mourne stock spawning component), Table 13.17 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.10 below. Updates have also been made to reflect the outputs of the 2025 site-specific benthic ecology survey (in response to RFI Section 1 (c) across the array area and ECC (Appendix A12.1: Benthic Ecology Survey Report 2025). New and updated information considered is indicated by the grey shading in Table A13.10.

Table A13.10 Determination of impact magnitude of temporary habitat disturbance and loss (replaces Table 13.17 of Chapter 13 of the 2024 EIAR)

Receptor	Impact magnitude
Sandeel	As described previously, site-specific PSA data suggest that the array area is largely composed of sediments unsuitable for sandeel (Natural Power, 2022, and AQUAFACT, 2025). The ECC was identified as having sub-prime and suitable sandeel spawning habitats, as identified in the 2023 site specific surveys (Natural Power, 2023). Although, surveys in 2025 indicated the ECC was largely dominated in sediment classified as ‘unsuitable’ for spawning. These findings are reflective of the relatively high seabed mobility in the area. In addition, sandeel spawning grounds are predicted to be distributed across the Irish Sea (Ellis et al., 2010), and PSA data collected through INFOMAR (2023) indicate the presence of suitable sandeel habitats within the study area (outside of the array area and ECC) and wider region. Taking this into consideration, any temporary damage or disturbance to the seabed during construction activities is considered to be small (<4% of the ECC) in the context of available suitable sandeel habitat throughout the study area and wider region. Based on this together with the short-term nature of the impact, any effects upon sandeel populations and their spawning grounds are assessed to be barely discernible from baseline conditions, and therefore the magnitude of the impact is deemed to be low (adverse).
Herring	The closest known active spawning beds for herring are located to the north of the study area (the Dundalk Bay spawning ground, and the Mourne spawning ground), and outside the area to be affected by construction activities. Therefore, no direct damage or disturbance to herring spawning grounds are predicted from physical impacts to the seabed, and the magnitude of the impact is consequently assessed as being negligible.

Receptor	Impact magnitude
Nephrops	Physical impacts to the seabed during the construction phase may damage or remove Nephrops or displace individuals to nearby undisturbed sediments, which may lead to small-scale changes in the distribution and abundance of Nephrops within the study area (i.e., within the near-field). The degree and extent of these changes are expected to be small in the context of the known distribution of Nephrops throughout the fish and shellfish study area and western Irish Sea Mud Belt (Figure 13.2). Based on this and considering the short-term and intermittent nature of the impact, any effects on Nephrops from the impact are considered unlikely to result in noticeable adverse changes to the western Irish Sea Nephrops population. Consequently, the magnitude of the impact is deemed to be low (adverse).
Brown crab, European lobster, common whelk, King scallop, razor clams	Taking into account the distribution of the shellfish receptors within the study area and the short-term and localised nature of the impact, any effects on the shellfish receptors are assessed to be barely discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be low (adverse).
Common cockle	As described previously (Table A13.9 A13.9), the number of cockles directly affected by physical impacts to the seabed is likely to be very small, in particular when compared to the extent of large commercial beds in Dundalk Bay and available intertidal and shallow subtidal soft sediment habitats within the wider region. Based on this together with the short-term nature of the impact, no discernible changes in common cockle distribution and abundance are anticipated to result from temporary damage and disturbance to the seabed during construction activities, and consequently the magnitude of the impact is deemed to be negligible.
Blue mussel	As described previously (Table A13.9), the number of blue mussels directly affected by physical impacts to the seabed is likely to be very small, in particular when compared to the extent of commercial seed mussel beds in the south of the study area. Based on this together with the short-term nature of the impact, no discernible changes in blue mussel distribution and abundance are anticipated to result from temporary damage and disturbance to the seabed during construction activities, and consequently the magnitude of the impact is deemed to be negligible.

In summary, the temporary damage and disturbance of the seabed during construction activities would be localised and restricted to the near-field. Furthermore, these changes are expected to be temporary to short-term, intermittent, and reversible, with any changes to the baseline of sensitive receptors assessed as being not discernible for herring, blue mussel and common cockle or barely discernible for the remaining receptors. The magnitude of this impact for these receptors has therefore been assessed as being negligible and low (adverse), respectively. Marine turtles, viviparous and ovoviviparous elasmobranchs (including basking sharks), and all demersal and diadromous VERs were assessed as not being sensitive to the impact and were therefore screened out of the magnitude assessment.

There are no further changes to this section. Refer to Section 13.5.2.2 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.2.3 Impact 3: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination

The key change required to this section is the inclusion of new site-specific survey data. Updates have been made to reflect the outputs of the 2025 site-specific benthic ecology survey across the array area and ECC (Appendix A12.1), which included contaminants sampling. Therefore, the following paragraphs within Section 13.5.2.3 '*Magnitude of impact*' of Chapter 13 of the 2024 EIAR shall be deleted:

"The site-specific contaminants sampling indicate that levels of sediment-bound contaminants are low in both the array area and ECC. None of the samples taken in the array area exceeded the Irish Lower Action Levels. In the ECC, the Lower Irish Action Levels were exceeded for cadmium in two samples and for zinc in one sample. Levels of Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) were below the Irish Lower Action Levels for all sampling sites.

Likewise, levels of PCBs and organochlorine pesticides (Dibutyl Tin and Tributyl Tin) were below the Irish Sediment Quality Lower Level (Marine Water and Sediment Quality chapter)."

And be replaced with:

The site-specific contaminants sampling undertaken in 2022, 2023 (Natural Power, 2022, 2023) and 2025 (AQUAFACT, 2025) indicate that levels of sediment-bound contaminants are low in both the array area and ECC. None of the samples taken in the array area exceeded the Irish Lower Action Levels in all surveys. In the ECC, in the 2023 survey, the Lower Irish Action Levels were exceeded for cadmium in two samples and for zinc in one sample. Levels of Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) were below the Irish Lower Action Levels for all sampling sites. No exceedances were recorded at any stations along the ECC in the 2025 survey. Accordingly, the 2025 benthic sediment contamination results do not identify any new or elevated contaminant concentrations relative to the baseline described in Chapter 13 of the 2024 EIAR.

Updates have also been made to Table 13.18, to reflect the outputs of the 2025 site-specific benthic ecology survey (Appendix A12.1). Table 13.18 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.11 below. New and updated information considered is indicated by the grey shading in Table A13.11.

Table A13.11 Determination of impact magnitude of reduction in water and sediment quality (replaces Table 13.18 of Chapter 13 of the 2024 EIAR)

Criteria	Impact magnitude
Extent	As outlined previously, the majority of sediments re-suspended during construction activities would be dispersed and deposited in the immediate vicinity of the works within the near-field and adjacent far-field of the study area, with locations beyond the tidal excursion distance unlikely to experience any measurable change in SSCs from background levels. Sediment bound contaminants are likely to quickly dissipate due to settling and wider dispersion by the prevailing tidal currents.
Duration	The impact would be restricted to the construction phase of the proposed development and would therefore be short-term (one to seven years), although works in any given discrete location within the proposed development area would be temporary (less than one year). Sediment plumes are expected to quickly dissipate after cessation of individual construction activities due to settling and wider dispersion with concentrations reducing within a couple of tidal cycles to background levels. In addition, construction activities are largely expected to be carried out on a sequential basis with minimal opportunity for successive periods of sediment disturbance to develop overlapping sediments plumes.
Frequency	The impact would occur frequently in discrete areas throughout the construction phase of the development.
Consequence	Sediment sampling within the array area and ECC during the 2023 site-specific benthic ecology baseline surveys showed low contaminant levels in surficial sediments, with only the lower Irish Action Levels exceeded for cadmium (two sites) and zinc (one site) in the ECC (Natural Power, 2022, 2023). All sediment contamination samples collected along the ECC and in the array area during the 2025 site-specific survey were below the applicable Lower Upper Irish Action Levels (Appendix A12.1: Benthic Ecology Survey Report 2025). Sediment-bound contaminants are likely to be rapidly diluted by tidal currents, and increased bio-availability that could potentially result in adverse eco-toxicological effects to fish and shellfish and their prey is therefore not expected. In addition, under normal circumstances, very small concentrations of contaminants enter the dissolved phase, with the majority adhering to sediment particles when temporarily entering suspension in the water column. Partition coefficients may be applied to estimate the concentration of the contaminants entering the dissolved phase, which will result in a reduction of several orders of magnitude than the concentrations associated with suspended sediments. As such, it is considered highly unlikely that the Maximum Allowable Concentration Environmental Quality Standards threshold, as prescribed by the Irish Action Levels, will be exceeded for any of the substances as a result of disturbing sediments during the construction phase (Chapter 11). Given the fates of the plumes, the low concentrations of sediment-bound contaminants, and the very low likelihood of increased bio-availability of contaminants in the water column, the impact is not considered to result in any discernible changes to fish and shellfish receptors from baseline conditions. The magnitude of this impact has therefore been assessed as negligible.

For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is not significant, which is not significant in EIA terms.

13.5.2.4 Impact 4: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/or behavioural effects during construction

The key changes to this section reflect the design refinements, made in response to the RFI. These design refinements remove the previously proposed monopile foundations, the piling of which is a major source of underwater noise during construction, resulting in a significant reduction in predicted underwater noise levels.

For clarity, these refinements do not alter the overall conclusions of the assessment: the significance of effects for all fish and shellfish receptors remains slight (adverse) and therefore not significant in EIA terms.

Potential noise sources

As a result of the design refinements in response to the RFI, *Potential noise sources* of Section 13.5.2.4 in Chapter 13 of the 2024 EIAR will be removed and replaced with the following:

During construction, the following noise producing activities have the potential to affect fish and shellfish receptors:

- Drilling during the installation of OSP foundations;
- Installation of SBJ for WTG foundations;
- Unexploded ordnance (UXO) clearance;
- General construction noise from vessels and marine works such as cable laying and the installation of foundations and scour protection; and
- Geophysical and geotechnical pre-construction surveys.

The largest impact ranges would likely result from UXO clearance activities, which would generate impulse sounds, characterised by high acoustic energy levels with a rapid rise time followed by a rapid decay (Popper and Hawkins, 2019), although any detonation would represent a short-term (i.e., seconds) increase in underwater noise. General construction noise arising from the installation of suction bucket foundations (underwater noise would be generated from the vacuum pumps used to extract water from within the bucket), the drilling of WTG or OSP platform foundations and vessel movements would generate low levels of continuous sounds throughout the construction phase. In addition, non-impulse sounds would also be generated during geophysical and geotechnical surveys, which would take place during the construction phase.

To inform the assessment of potential impacts associated with underwater noise, approximate subsea noise levels have been predicted using a simple modelling approach, scaled to relevant parameters for the site and to the specific noise sources to be used, this is supplemented by available peer reviewed literature and existing analyses undertaken for comparable offshore developments. A detailed description of the noise modelling approach is provided in Appendix A14.1: North Irish Sea Array: Underwater Noise Assessment.

Functional hearing groups

The key change to this section is the addition of the common skate complex and European seabass to the VER list, reflecting their protection status within Isle of Man MNRs and their highly mobile nature. The common skate complex and European seabass fall within the Group 1 and Group 3 receptor hearing groups respectively (as defined by Popper *et al.*, 2014), reflecting auditory characteristics consistent with the receptors already assigned to these groups. Accordingly, Table A13.12 remains unchanged, as it simply identifies which receptors fall within each Popper-defined hearing category. The existing classifications continue to apply and no updates to the table are necessary. There are no further changes to this section. Refer to '*Functional hearing groups*' in Section 13.5.2.4 of Chapter 13 of the 2024 EIAR.

Likely significant effects and noise impact thresholds

As a result of design refinements in response to the RFI, piling is no longer included in the construction strategy for the WTG and OSP foundations. Therefore, *Likely significant effects and noise impact thresholds* in Section 13.5.2.4 of Chapter 13 of the 2024 EIAR shall be removed from the 2024 EIAR and replaced with the text herein.

The range of effects from underwater sound on sensitive receptors, includes immediate death, permanent or temporary tissue damage, temporary shifts in hearing, and behavioural changes and masking effects (Popper *et al.*, 2014). Tissue damage can result in eventual death or may make the fish less fit until healing occurs, resulting in lower survival rates. Hearing loss can also lower fitness until hearing recovers.

The extent to which underwater sound might cause an adverse environmental impact in a particular fish species is dependent upon the level of sound pressure or particle motion, its frequency, duration and/or repetition (Hastings and Popper, 2005). In general, physical injuries as a result of underwater noise are either related to a sudden, large pressure change (barotrauma) or to the total quantity of sound energy received by a receptor over a period of time. Barotrauma injury can result from exposure to a high intensity sound even if the sound is of short duration. However, when considering injury occurring due to the energy of an exposure, the time of the exposure becomes important.

To assess the significance of effects from underwater sounds on fish, shellfish and marine turtle receptors, impacts can be grouped into the following categories (Popper *et al.*, 2014):

- Mortality and potential mortal injury
  - Exposure to sound may result in instantaneous or delayed mortality. The potential for mortality or mortal injury is likely to only occur in extreme proximity to intense sounds, such as those emitted during UXO detonation.
- Recoverable injury
  - Recoverable injury is a survivable injury with full recovery occurring after exposure, although decreased fitness during the recovery period may result in increased susceptibility to predation or disease (Popper *et al*., 2014).
- Temporary threshold shift (TTS)
  - TTS is a temporary reduction in hearing sensitivity caused by exposure to intense sound or sounds of long duration (e.g., tens of minutes to hours). TTS has been demonstrated in some fishes, resulting from the loss or damage of sensory hair cells of the inner ear and/or damage to auditory nerves. However, sensory hair cells are constantly added to fishes and are replaced when damaged, and therefore the extent of TTS is of variable duration and magnitude. Normal hearing ability returns following cessation of the noise causing TTS, though this period is variable between species, lasting between a few hours to several days. When experiencing TTS, fish may have decreased fitness due to a reduced ability to communicate, detect predators or prey, and/or assess their environment (Popper and Hawkins, 2019).
- Behavioural effects
  - Behavioural effects as a result of construction related underwater noise include a wide variety of responses including startle responses (C-turn), strong avoidance behaviour, changes in swimming or schooling behaviour, or changes of position in the water column (e.g., Hawkins *et al.*, 2014). Depending on the intensity, timing and duration of exposure there is the potential for some of these responses to lead to significant effects at an individual level (e.g., reduced fitness, increased susceptibility to predation) or at a population level (e.g., interference with foraging, avoidance or delayed migration to key spawning grounds) (e.g., Popper and Hawkins, 2019). Some behavioural responses may only be short-term with no wider effects for the individual or population, particularly once acclimatisation to the sound has taken place (Popper and Hawkins, 2019). There is also evidence that behavioural responses can vary depending on the activity in which the receptors are engaged during sound emission (Skaret *et al.*, 2005). For example, Wardle *et al.* (2001) have shown that the interaction between hearing and vision can alter the response to a noise source, with fish responses to a seismic airgun being greater when the airgun was visible. Even when disturbed by a noise source, fish rapidly returned to the swimming track they were on prior to the noise source within seconds or minutes following exposure (Wardle *et al.*, 2001). As such, the context in which a fish is exposed to underwater noise is as important if not more so than the received sound level.

Quantitative and qualitative noise thresholds for the onset of mortality, recoverable injury and TTS in fish have been recommended by Popper *et al.* (2014) for a range of noise sources. Table 2.5 and Table 2.6 of the Underwater Noise Modelling Report list the respective thresholds for continuous noise (emitted during activities such as drilling, foundation installation, cable laying and vessel operation) and explosions (UXO clearance). These thresholds represent current best practice sound exposure criteria for fish and have consequently been applied in the impact assessment.

For single impulse sound events, such as triggered explosions during the clearance of UXO, Popper *et al.* (2014) recommend the use of unweighted peak Sound Pressure Levels (SPL_{peak}) impact thresholds. SPL_{peak} represents the maximum sound energy level of individual impulse sounds measured as differential pressure from positive to zero. Thresholds for continuous sounds (e.g., from shipping) are presented as root-mean-square sound pressure levels (SPL_{rms}) measured over a specific time interval.

It is important to note that all impact thresholds in the Popper *et al.* (2014) guidelines are based on received sound pressure levels. However, as discussed previously, many species of fish and marine invertebrates detect particle motion rather than acoustic pressure (e.g., Popper and Hawkins, 2019). Research into the effects of particle motion on fish and shellfish species is scarce, with no criteria for assessment currently available. Research on particle motion is continuing, with recent publications calling for updated criteria and guidelines on how to assess the risk of effects from changes in particle motion. In the absence of this, the Popper *et al.* (2014) guidance is still recommended as the most suitable reference source for assessing impacts of underwater noise including particle motion on fish and marine invertebrates (Popper and Hawkins, 2019). In this respect, it should also be noted that particle motion dominates the acoustic information within the area close to the sound source, while at larger distances from the sound source the majority of the acoustic information is dominated by the propagating pressure wave (Radford *et al.*, 2012). This indicates that particle motion effects are contained within the sound pressure impact ranges, and therefore the lack of quantitative thresholds for particle motion is not expected to alter the conclusions of the assessment.

It should also be acknowledged that, where insufficient data exist (explosions, or continuous noise sources), Popper *et al.* (2014) recommend the use of qualitative thresholds. These categorise the risks of effects in relative terms as ‘high’, ‘moderate’ or ‘low’ at three distances from the sound source: near (10s of metres), intermediate (100s of metres), and far (1000s of metres), respectively.

Information on the impact of underwater noise on marine invertebrates is also scarce, and no attempt has been made to set exposure criteria (Hawkins and Popper, 2014). Therefore, the impact assessment has been based on a review of peer-reviewed literature on the current understanding of the likely significant effects of underwater noise on shellfish species. Studies have shown sensitivity of marine invertebrates to substrate borne vibration (Roberts *et al.*, 2015). It is generally their hairs that provide the sensitivity, although these animals also have other sensory systems that could be capable of detecting vibration.

Predicted impact ranges

As a result of design refinements in response to the RFI, piling is no longer included in the construction strategy for the WTG and OSP foundations. Therefore, *Predicted impact ranges* of Section 13.5.2.4 in Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein.

As aforementioned, for the purposes of identifying the greatest noise levels, and impact ranges, approximate subsea noise levels have been predicted using a simple modelling approach based on UWN measurement data, scaled to relevant parameters for the site and to the specific noise sources (e.g. foundation installation, or cable laying). These outputs are also supplemented by available peer reviewed literature and existing analyses undertaken for comparable offshore developments. The modelling approach, and modelling results are detailed in full in Appendix A14.1.

The following sections present the assessment of likely significant effects on noise sensitive receptors for the installation of WTG and OSP foundations, UXO clearance and other noise generating activities during the construction phase. Consideration is given to the sensitivity of the VERs within each hearing group listed in Table 13.20, before characterising the scale and magnitude of the impact and providing the overall conclusion with regard to the predicted significance of effects.

Likely significant effects from impact piling

As a result of design refinements in response to the RFI, piling is no longer included in the construction strategy for the WTG and OSP foundations. Therefore, this section of Chapter 13 of the 2024 EIAR shall be removed from the 2024 EIAR.

Likely significant effects from UXO clearance on fish, shellfish and marine turtle VERs

Magnitude of impacts

The key changes required to this section are the commitments from the Developer to use a NAS (e.g. bubble curtains or similar) as noise abatement if high-order UXO clearance is required and an amendment of an erratum regarding the range of impacts for TTS, behavioural effects and masking, as cited from Popper *et al.* (2014). The following text within '*Magnitude of impacts*' in *'Likely significant effects from UXO clearance on fish, shellfish and marine turtle VERs'* of Section 13.5.2.4 of Chapter 13 of the 2024 EIAR shall therefore be deleted:

"The maximum impact range for the onset of mortality and potential mortal injury from the highest charge weight using the unweighted SPLpeak explosion noise criteria from Popper et al. (2014) is estimated to be 810m from the detonation. The maximum extent of the impact would therefore be restricted to the near-field, which would represent a localised impact. The impact is anticipated to occur infrequently and would be momentary (i.e., lasting seconds to minutes).

Given the high intensity nature of sounds generated during UXO detonation and their potential for adverse effects on marine species, mitigation is included by implementation of specific measures should UXO clearance be required (see Table 13.11). The clearance of UXO will follow a mitigation hierarchy with high order detonation of UXO only taken place where avoidance, relocation, removal or low order deflagration is not possible. To minimise the area affected by underwater noise and the sound levels received by marine species at any one time, UXO detonations will not occur within the same 24-hour window as piling operations, and where there may be clusters of UXO requiring detonation, these UXO would not be detonated at the same time. In addition, where auditory injury impact ranges for marine mammals from the use of high order detonations are greater than what can be mitigated using MMO/PAM watch and ADD (e.g., 120kg UXO charge weight plus donor weight), NAS in the form of bubble curtains will be used to attenuate the sound emitted during the detonation.

While the primary driver for the use of NAS is to mitigate effects on marine mammals, their use will also reduce the likelihood of mortality and potential mortal injury in sensitive receptors.

Recoverable injury, TTS and disturbance effects will occur over a larger area, with TTS and disturbance effects potentially reaching 10's of kilometres from the UXO location (Popper et al., 2014). It is possible that UXO operations will be planned to take place year-round during the UXO clearance campaign pre-construction, and therefore they have the potential to interact with key spawning or nursery periods for different fish and shellfish species. However, each UXO clearance is a discrete event and while this may result in some temporary disturbance to fish and shellfish receptors, it is less likely to result in the displacement of receptors from specific spawning, nursery or feeding grounds, compared to longer-term activities such as piling."

And be replaced with:

The maximum impact range for the onset of mortality and potential mortal injury from the highest charge weight using the unweighted SPL_{peak} explosion noise criteria from Popper *et al.* (2014) is estimated to be 810m from the detonation. The maximum extent of the impact would therefore be restricted to the intermediate field. The impact is anticipated to occur infrequently and would be momentary (i.e., lasting seconds to minutes).

Given the high intensity nature of sounds generated during UXO detonation and their potential for adverse effects on marine species, mitigation is included by implementation of specific measures should UXO clearance be required (see Table A13.6). The clearance of UXO will follow a mitigation hierarchy with high order detonation of UXO only taken place where avoidance, relocation, removal or low order deflagration is not possible. To minimise the area affected by underwater noise and the sound levels received by marine species at any one time, where there may be clusters of UXO requiring detonation, these UXO would not be detonated at the same time. In addition, a NAS (e.g., a bubble curtain or similar) will be used during high-order UXO clearance.

While the primary driver for the use of NAS is to mitigate effects on marine mammals, their use will also reduce the likelihood of mortality and potential mortal injury in sensitive fish and shellfish receptors.

Recoverable injury, TTS and disturbance effects will occur over a larger area, with high risk of TTS and disturbance effects potentially reaching 100's of metres (within the intermediate field) from the UXO location for the most sensitive fish receptors (Popper *et al.*, 2014). It is possible that UXO operations will be planned to take place year-round during the UXO clearance campaign pre-construction, and therefore they have the potential to interact with key spawning or nursery periods for different fish and shellfish species. However, each UXO clearance is a discrete event and while this may result in some temporary disturbance to fish and shellfish receptors, it is unlikely to result in the displacement of receptors from specific spawning, nursery or feeding grounds. Moreover, the Developer has committed to the use of NAS (e.g. bubble curtains or similar) in case of high-order clearance, providing -10dB noise attenuation and consequently a reduction in the noise propagated through the water column during detonations (Table A13.6).

Factoring in the mitigation measures above and considering the infrequent and momentary nature of the impact together with the highly localised nature of potential lethal or sublethal injuries and the temporary nature of potential TTS or behavioural changes, any effects upon the fish and shellfish VERs from high-order UXO clearance are assessed to be barely discernible from baseline conditions and would not impact the survival or condition of the receptors to the extent that could alter population trajectories. Therefore, the magnitude of the impact for all receptors is assessed as being low (adverse).

There are no further changes to this section. Refer to '*Magnitude of Impacts'* in Section 13.5.2.4 of Chapter 13 of the 2024 EIAR.

Significance of effects

There are no changes to this section. Refer to '*Significance of effects'* in '*Likely significant effects from UXO clearance on fish, shellfish and marine turtle VERs'* in Section 13.5.2.4 of Chapter 13 of the 2024 EIAR. For clarity, the Developer can confirm the significance of underwater noise effects from UXO clearance remains unchanged for all fish and shellfish receptors and is slight (adverse), which is not significant in EIA terms.

Likely significant effects from other noise sources on fish, shellfish and marine turtle VERs

As a result of design refinements in response to the RFI, piling is no longer included in the construction strategy for the WTG and OSP foundations. Therefore, the following text in '*Likely significant effects from other noise sources on fish, shellfish and marine turtle VERs'* in Section 13.5.2.4 of Chapter 13 of the 2024 EIAR shall be removed.

"Besides piling and the detonation of UXO, there will be several other construction activities that will produce underwater noise, namely dredging, drilling, cable laying, rock placement, geophysical and geotechnical surveys, and vessel noise. These activities may occur either alongside piling and UXO clearance or separately. In addition, there might be the potential that turbine foundations will be installed using drilling rather than piling. All these activities will produce non-impulse sounds.

Sound levels associated with construction activities have received considerably less attention and very little monitoring data is available. Among the construction activities, suction dredging is predicted to generate the largest sound levels of 186dB re 1µPa at 1m SELRMS (Underwater Noise Modelling Report). Rock placement is generally considered to be the nosiest external protection method, since the rocks fall down a fall pipe from the rock placement vessel, which may result in underwater noise. Other external protection measures such as mattresses and grout bags are typically placed onto the seabed using an ROV or crane, and as such these are unlikely to result in any significant underwater noise. Nedwell and Edwards (2004) found that the noise of rock placement was not detectable over the vessel noise, since there was no determinable difference between measurements taken when rock placement was ongoing, and when the vessel was holding station without placing rock. The estimated source levels of underwater noise from rock placement at the proposed development is 172dB re 1µPa at 1m, and the noise emitted from large vessels is estimated at 168dB re 1µPa at 1m (Underwater Noise Modelling Report). Vessel noise would occur from jack-up vessels during the piling of foundations and WTG installations and from other large and medium sized vessels that carry out other construction tasks and anchor handling. Additional small vessels will be required for crew transport and maintenance on site."

And be replaced with:

Besides the detonation of UXO, there will be several other construction activities that will produce underwater noise, namely, the installation of suction bucket foundations, drilling of foundations, cable laying, rock placement, geophysical and geotechnical surveys, and vessel noise. These activities may occur either alongside UXO clearance or separately. All these activities will produce non-impulse sounds.

Sound levels associated with these construction activities have received considerably less attention and very little monitoring data is available. Among the construction activities of the proposed development, trenching and rock placement (for cable or scour protection) are considered to generate the largest sound levels of 172dB re 1µPa at 1m SEL_{RMS} (Appendix A14.1). Rock placement is generally considered to be the nosiest external protection method, since the rocks fall down a fall pipe from the rock placement vessel, which may result in underwater noise. Other external protection measures such as mattresses and grout bags are typically placed onto the seabed using an ROV or crane, and as such these are unlikely to result in any significant underwater noise. Nedwell and Edwards (2004) found that the noise of rock placement was not detectable over the vessel noise, since there was no determinable difference between measurements taken when rock placement was ongoing, and when the vessel was holding station without placing rock. The estimated source levels of underwater noise from rock placement at the proposed development is 172dB re 1µPa at 1m, and the noise emitted from large vessels is estimated at 168dB re 1µPa at 1m (Appendix A14.1).

As detailed in Table A13.7, following design refinements in response to the RFI, WTG foundations will now be installed with multi-leg SBJs, and the OSP will be installed on jacket foundations with either pin piles (using drilling) or suction buckets. These design refinements remove the previously proposed monopile foundations, the piling of which is a major source of underwater noise during construction, resulting in a significant reduction in predicted underwater noise levels.

Underwater noise of a continuous nature will be generated from the installation of SBJ through the use of vacuum pumps or drilling of pin piles using rotating equipment such as the drill string, pumps and generators. The use of vacuum pumps to install SBJ foundations extracts water from within the buckets, which creates a pressure to force the foundations into the seabed. As detailed in Appendix A14.1, there is limited empirical evidence on the underwater noise generated during the installation of SBJ foundations. Koschinsky and Lüdemann (2020) provided monitoring data for the installation of SBJs at the Borkum Riffgrund 2 Offshore Wind Farm (OWF) in Germany. The study reported that the average sound pressure level at 750m from the vacuum pumps did not differ from the background noise level of 137dB $L_{eq,50}$ (equivalent to $L_{p,RMS}$); however, it was noted that background noise recorded during the installation was influenced by other construction activities.

More recently, 114 WTGs were installed on three-legged steel jackets using suction bucket caissons at Seagreen between 2021 and 2023. Underwater noise monitoring showed that PAM sites within the Seagreen array area detected a 3-5 dB median increase in 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. 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”. Based on the above, it is concluded that the noise produced by the suction bucket pumps is not considered a significant UWN source during SBJ installation, with vessel operations considered the main contributor (Appendix A14.1).

Vessel noise would occur from jack-up vessels during WTG installations and from other large and medium sized vessels that carry out other construction tasks and anchor handling. Additional small vessels will be required for crew transport and maintenance on site. Sound levels from vessel noise are anticipated to range from 161dB re 1µPa @ 1m(RMS) to 168dB re 1µPa @ 1m ($_{RMS}$) (Appendix A14.1).

As aforementioned, the drilling of piles for the OSP will also produce continuous underwater noise; with sound levels during these activities potentially reaching up to 169dB re 1µPa @ 1 m (RMS) (Appendix A14.1).

There are no further changes to this section. Refer to ‘*Likely significant effects from other noise sources on fish, shellfish and marine turtle VERs’* in Section 13.5.2.4 of Chapter 13 of the 2024 EIAR.

For clarity, the Developer can confirm the significance of underwater noise effects from other noise sources remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

Likely significant effects from all noise sources

As a result of design refinements in response to the RFI, piling is no longer included in the construction strategy for the WTG and OSP foundations. Therefore, '*Likely significant effects from all noise sources*' of Chapter 13 of the 2024 EIAR shall be removed from the 2024 EIAR and replaced with the text herein.

As outlined previously there is the potential for construction activities to occur concurrently with UXO clearance. As discussed in the previous section, continuous UWN emitted during these construction activities may potentially cause temporary TTS in the most sensitive VERs (i.e., Group 3 and Group 4 species) as well as behavioural reactions but are not thought to cause mortal injuries. Any TTS are predicted to be restricted to the near-field (< 50m from the noise source) while behavioural reactions will be confined to within the areas over which behavioural changes might occur as a result of UXO clearance. It is therefore concluded that any underwater noise effects on fish and shellfish receptors during simultaneous construction activities (e.g., foundation installation and UXO clearance) will be no greater in magnitude than those predicted from UXO clearance alone. This would result in a slight (adverse) effect, which is not significant in EIA terms.

13.5.3 Operational Phase

There are no changes to the introductory text in this section. Refer to Section 13.5.3 of Chapter 13 of the 2024 EIAR.

13.5.3.1 Impact 5: Temporary increase in SSC and sediment deposition arising during the maintenance activities

There are no changes to this section. Refer to Section 13.5.3.1 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.3.2 Impact 6: Temporary damage and disturbance of the seabed during maintenance activities

There are no changes to this section. Refer to Section 13.5.3.2 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.3.3 Impact 7: Long-term/permanent loss of benthic habitat due to the placement of subsea infrastructure

The key change required to this section is the inclusion of new site-specific survey data as per RFI Section 1 (b). Updates have been made to reflect the outputs of the 2025 site-specific benthic ecology survey across the array area and ECC (Appendix A12.1). Additionally, common skate complex and European seabass have been added to the VER list given their protection status within Isle of Man MNRs and their highly mobile nature. Table 13.26 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.12 below. New and updated information considered is indicated by the grey shading in Table A13.12.

Table A13.12 Determination of sensitivities or receptors to long-term/permanent loss of habitat (replaces Table 13.26 of Chapter 13 of the 2024 EIAR)

Receptor	Sensitivity
Marine turtles, basking shark, pelagic VERs (Atlantic mackerel, Atlantic horse mackerel, sprat)	Marine turtles, basking sharks and all pelagic VERs do not depend upon the seabed for part or all of their life cycle and therefore are not considered susceptible to the long-term loss of subtidal sediments that would arise during the operational phase of the proposed development. Consequently, the sensitivity of these species to the impact is deemed to be **negligible**. Irrespective of the magnitude of the impact, the significance of the impact for these VERs is **imperceptible** as defined in the significance matrix (Table 13.6), and the impact is therefore not considered further for these receptors.
Demersal VERs, diadromous VERs, tope, starry smooth-hound, spiny dogfish	As detailed in Table 13.16, these receptors are considered to have a high adaptability and tolerance to seabed disturbance events (including seabed loss) given that they are mobile and would therefore be able avoid the impact. Recoverability is also assessed as high. In addition, these receptors are pelagic spawners (demersal fish VERs), do not spawn within the study area (diadromous VERs) or bear live young (tope, starry smooth-hound and spiny dogfish), and therefore the physical loss of benthic habitats within the study area would not result in any loss of available spawning locations. Based on this and considering the regional importance of the receptors, the sensitivity of all demersal and diadromous VERs and tope, starry smooth-hound and spiny dogfish to long-term habitat loss is deemed to be **negligible.** Irrespective of the magnitude of the impact, the significance of the impact for these VERs is **imperceptible** as defined in the significance matrix (Table13.6), and the impact is therefore not considered further for these receptors.
Small-spotted catshark, nursehound and skate species (thornback ray, spotted ray, blonde ray, cuckoo ray, small-eyed ray, common skate complex)	Small-spotted catshark, nursehound and skates are oviparous that attach egg cases onto the seabed. In addition, these receptors depend to some degree on the seabed for feeding. All receptors are highly mobile and would be able to relocate to nearby suitable feeding and egg-deposition grounds. Therefore, they are assessed as having a high adaptability and tolerance to the impact. Based on this and considering the regional importance of the receptors, the sensitivity of small-spotted catshark, nursehound and skate species to long-term habitat loss is deemed to be **negligible**. Irrespective of the magnitude of the impact, the significance of the impact for these VERs is **imperceptible** as defined in the significance matrix (Table 13.6), and the impact is therefore not considered further for these receptors.
Sandeel	As discussed previously, sandeel are susceptible to the long-term loss of sedimentary habitats as they exhibit strong site fidelity and have specific substrate requirements throughout their juvenile and adult life history. Therefore, they have been assessed as having a low tolerance to the impact. As described previously, site-specific PSA data suggest that the array area is largely composed of sediments unsuitable for sandeel (Natural Power, 2022, and AQUAFACT, 2025). The ECC was identified as having sub-prime and suitable sandeel spawning habitats, as identified in the 2023 site specific surveys (Natural Power, 2023). Although, surveys in 2025 indicated the ECC was largely dominated in sediment classified as 'unsuitable' for spawning. These findings are reflective of the relatively high seabed mobility in the area. In addition, sandeel spawning grounds are predicted to be distributed across the Irish Sea (Ellis et al., 2010), and PSA data collected through INFOMAR (2023) indicate the presence of suitable sandeel habitats within the study area (outside of the array area and ECC) and wider region. In light of this, it is considered that sandeel may be able to relocate to nearby unimpacted areas (if they are indeed spawning in the ECC). Taking this into consideration together with their regional importance, the sensitivity of sandeel to long-term habitat loss is deemed to be **medium.**
Herring	Herring rely upon specific substrates on which to deposit their eggs, which makes them susceptible to long-term changes in substratum type within spawning grounds. As discussed in Section 13.3.6, the closest known active spawning beds for herring are located in the Dundalk Bay (Dundalk Bay spawning ground), approximately 20km north of the array area, outside the areas to be affected by the placement of infrastructure. Therefore, no loss to herring spawning grounds is predicted from the proposed development, and therefore for the purpose of this assessment the sensitivity of herring to the impact has been assessed as **negligible.** Irrespective of the magnitude of the impact, the significance of the impact for these VERs is **imperceptible** as defined in the significance matrix (Table 13.6), and the impact is therefore not considered further for this receptor.
Nephrops	Berried female Nephrops are considered largely sedentary, remaining in their burrows during the overwintering period. Furthermore, Nephrops are confided to particular substrate types and exhibit some site fidelity.

Receptor	Sensitivity
	Therefore, they are considered to have a low adaptability and very low tolerance to the permanent loss of sedimentary habitat. Although the loss of habitat will persist over the long-term, Nephrops may be able to recover by resettling in nearby unaffected areas. Recovery from any localised decline in population numbers or reproductive success is anticipated to occur within the short-term to medium-term through larval dispersal and recruitment into surrounding unaffected areas (medium to low recoverability). Taking into consideration the regional importance of Nephrops together with their low adaptability, very low tolerance and low to medium recoverability, the sensitivity of Nephrops to long-term habitat loss is deemed to be **medium.**
Brown crab, European lobster, common whelk, common cockle, King scallop, razor clams	These species are of commercial importance to the region. They are substrate dependent and are therefore susceptible to the long-term loss of sedimentary habitats. Whelk typically remain stationary when not actively searching for food, either resting on the seafloor or being to some degree buried within in the sediment. Cockles are found in surface sediments, and King scallop typically prefer clean firm sand, fine or sandy gravel substrates. Brown crab occur on a range of substrate types, including boulders, mixed coarse grounds, and offshore sands, and berried females overwinter in pits dug in the sediment or under rocks. Adult European lobster typically inhabit rocky substrata, living in holes and excavated tunnels, while juvenile lobsters are known to spend large amounts of time within their burrows. Based on their dependence on sedimentary habitats, either for all or part of their life cycle, these receptors are considered to have a very low tolerance to the permanent loss of habitat during the operational phase. Although the loss of habitat will persist over the long-term, the receptors would be able to recover by resettling in nearby unaffected areas. Recovery from any localised decline in population numbers or reproductive success is anticipated to occur within the short-term to medium-term through larval dispersal and recruitment into surrounding unaffected areas (medium to low recoverability. Taking into consideration the regional importance of the receptors together with their low adaptability, very low tolerance and low to medium recoverability, the sensitivity of the remaining shellfish VERs to the long-term loss of benthic habitats is deemed to be **medium.**
Blue mussel	Blue mussels occur on a wide variety of substrata including sedimentary and rock substrata and artificial structures (Tillin et al., 2023). Offshore wind farm structures including turbine foundations and scour protection are known to provided suitable substrates for blue mussel settlement and growth (e.g., Degraer et al., 2020; Maar et al., 2009). A change in substratum type due to the placement of infrastructure may therefore not change the ability of blue mussels to colonise the offshore development area, and therefore the sensitivity of blue mussels to the impact is deemed to be **negligible.** Irrespective of the magnitude of the impact, the significance of the impact for these VERs is **imperceptible** as defined in the significance matrix (Table 13.6), and the impact is therefore not considered further for this receptor.

There are no further changes to this section. Refer to '*Sensitivity of receptors'* of Section 13.5.3.3 of Chapter 13 of the 2024 EIAR.

Magnitude of impact

This change involves an increase in the area of long-term habitat loss for both Project Option 1 and Project Option 2 due to the use of SBJ foundations, and the associated scour protection. Furthermore, Table 13.27 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.13 below. The key change required to this table is the inclusion of new site-specific survey data. Updates have been made to reflect the outputs of the 2025 site-specific benthic ecology survey across the array area and ECC (Appendix A12.1). New and updated information is indicated by the grey shading in Table A13.13.

To reflect the change in habitat loss, '*Magnitude of impact'* in Section 13.5.3.3 of the 2024 EIAR shall be deleted and replaced with the following text:

The predicted long-term loss of sedimentary benthic habitats during the operational phase of the proposed development would occur from the placement of WTG and OSP foundations and the associated scour protection, along with the cable protection measures used at cable crossings and areas where cable burial is not possible would lead to a permanent change in seabed conditions throughout the 35-year operational phase of the windfarm development.

Table A13.7 identifies the project option that has the greatest magnitude of impact for foundation, scour and cable protection footprint. For Project Option 1 the total habitat loss from these components equates to approximately 0.53km^2 of the array area and ECC representing approximately 0.42% of the combined areas, while for Project Option 2 the figures are 0.4km^2 and 0.32% respectively.

The loss of sedimentary habitat would be restricted to the footprint of the installed infrastructure and associated protection material. Consequently, the maximum extent of the impact would be restricted to the immediate vicinity of infrastructure. The predicted footprint of habitat loss during the operational phase would fall within the area of direct damage and disturbance during the construction phase.

As a minimum, the impact would occur throughout the operational period (35 years) and therefore would be long-term (15-60 years), as defined in the assessment methodology (Section 13.2.5, Table 13.5). Seabed infrastructure left in place following the decommissioning of the proposed development would result in a permanent change in substratum type.

Table A13.13 Determination of impact magnitude of long-term and permanent loss of habitat (replaces Table 13.27 of Chapter 13 of the 2024 EIAR)

Receptor	Impact magnitude
Sandeel	As described previously, site-specific PSA data suggest that the array area is largely composed of sediments unsuitable for sandeel (Natural Power, 2022, and AQUAFACT, 2025). The ECC was identified as having sub-prime and suitable sandeel spawning habitats, as identified in the 2023 site specific surveys (Natural Power, 2023). Although, surveys in 2025 indicated the ECC was largely dominated in sediment classified as 'unsuitable' for spawning. These findings are reflective of the relatively high seabed mobility in the area. In addition, sandeel spawning grounds are predicted to be distributed across the Irish Sea (Ellis et al., 2010, 2012), and PSA data collected through INFOMAR (2023) indicate the presence of suitable sandeel habitats within the study area (outside of the array area and ECC) and wider region. Taking this into consideration, any long-term or permanent loss of soft substratum is considered to be small in the context of available suitable sandeel habitat throughout the study area and wider region. Therefore, any effects upon sandeel populations and their spawning grounds are considered to be barely discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be **low (adverse).**
Nephrops	As described previously, site-specific survey data suggest the presence of Nephrops along the ECC and within the array area. Nephrops within the study area are part of the western Irish Sea Nephrops population, which inhabits the fine sediments of the Western Irish Sea Mud Belt from about 54.5°N in the north to 53.5°N in the south. Considering the localised nature of the impact (up to approximately 0.64 km^2 of seabed), the areas affected by long-term or permanent habitat loss are considered to be small in the context of the distribution of the western Irish Sea Nephrops population, and the total extent of the Western Irish Sea Mud Belt (approximately 0.01%). Suitable habitat for Nephrops will remain extensive and contiguous in the surrounding area, with a localised impact, with no reduction in habitat connectivity, larval dispersal, or population viability anticipated. Therefore, taking into consideration the wide distribution of the receptor together with the localised nature of the impact, any effects on Nephrops from the impact are considered to be barely discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be **low (adverse).**
Brown crab, European lobster, common whelk, common cockle, King scallop razor clams,	It is predicted that the impact may affect the receptors through the long-term or permanent loss of sedimentary habitats, including potential overwintering grounds. The subtidal benthic substrates that would be affected are common and widespread within the study area and throughout the wider region. Therefore, any long-term or permanent loss of soft sedimentary habitats is considered small in the context of their overall extent. Based on the highly localised nature of the impact, no to barely discernible changes to the receptors are anticipated, and consequently the magnitude of the impact for these receptors is assessed as being at most **low (adverse).**

In summary, the loss of benthic habitats during the operational phase of the proposed development would be localised and restricted to the immediate vicinity of subsea infrastructure, with effects on sensitive fish and shellfish receptors assessed as being not discernible or barely discernible from baseline conditions. The maximum magnitude of this impact has therefore been assessed as low (adverse). Whilst the area of long-term habitat loss has increased due to the use of SBJ foundations and associated scour protection, this increase remains small in the context of the extensive availability of suitable soft substratum within the array area, ECC and wider region, and therefore does not alter the assessed magnitude of impact.

Marine turtles, herring, blue mussel and all elasmobranch, demersal, pelagic and diadromous VERs were assessed as not being sensitive to the impact and were therefore screened out of the magnitude assessment.

There are no further changes to Section 13.5.3.3. Refer to Section 13.5.3.3 of Chapter 13 of the 2024 EIAR. For clarity, whilst the maximum area of long-term habitat loss has increased from approximately 0.3km² to 0.53km² due to the use of SBJ foundations and associated scour protection, this increase remains small in the context of the extensive availability of suitable soft substratum within the array area, ECC and wider region. The significance of effects therefore remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.3.4 Impact 8: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination

There are no changes to this section. Refer to Section 13.5.3.4 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is not significant, which is not significant in EIA terms.

13.5.3.5 Impact 9: Increase in hard substrate and structural complexity due to the placement of subsea infrastructure

Chapter 13 of the 2024 Magnitude of impact

The key change to '*Magnitude of impact*' in Section 13.5.3.5 of Chapter 13 of the 2024 EIAR involves an increase in the area of hard substrate introduced, for both Project Option 1 and Project Option 2 due to the installation of SBJ foundations which represents the maximum design scenario for this impact. Furthermore, Table 13.29 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.14 below. The key change required to this table is the inclusion of new site-specific survey data as per RFI Section 1 (b). Updates have been made to reflect the outputs of the 2025 site-specific benthic ecology survey across the array area and ECC (Appendix A12.1). New and updated information is indicated by the grey shading in Table A13.14.

To reflect this change, this section of the 2024 EIAR shall be deleted and replaced with the following text:

Any introduction of hard substrates due to the placement of WTG and OSP foundations and the associated scour protection, along with the cable protection measures used at cable crossings and areas where cable burial is not possible would lead to a permanent change in seabed conditions throughout the 35-year operational phase of the windfarm development. The impact may be reversible if the infrastructure is removed; however not all introduced hard substrate is likely to be removed, with scour protection and cable protection assumed to be remaining in-situ.

While the impact will be locally significant and comprise a permanent change in seabed habitat within the footprint of the structures and scour, and cable protection, the footprint of the area affected is highly localised. The seabed footprint of introduced hard substratum within the array area and ECC would equate to approximately 0.6km² for Project Option 1 and 0.4km² for Project Option 2, which equates to approximately 0.4% of the array area and ECC for Project Option 1 and 0.3% for Project Option 2 (Table A13.7). An additional 0.3km² would be introduced as lateral surfaces through the placement of WTG and OSP foundations for Project Option 2 and 0.2km² for Project Option 1.

The impact will be for the duration of the 35-year operational period and therefore will be long-term (15-60 years).

Table A13.14 Determination of magnitude of increased hard substrate and structural complexity as the result of the introduction of infrastructure (replaces Table 13.29 of Chapter 13 of the 2024 EIAR)

Receptor	Impact magnitude
Sandeel	As described previously, site-specific PSA data suggest that the array area is largely composed of sediments unsuitable for sandeel (Natural Power, 2022, and AQUAFACT, 2025). The ECC was identified as having sub-prime and suitable sandeel spawning habitats, as identified in the 2023 site specific surveys (Natural Power, 2023). Although, surveys in 2025 indicated the ECC was largely dominated in sediment classified as ‘unsuitable’ for spawning. These findings are reflective of the relatively high seabed mobility in the area. In addition, sandeel spawning grounds are predicted to be distributed across the Irish Sea (Ellis et al., 2010, 2012), and PSA data collected through INFOMAR (2023) indicate the presence of suitable sandeel habitats within the study area and wider region. Therefore, any long-term loss of soft substratum (and associated increase in hard substratum) is considered to be small in the context of available suitable sandeel habitat throughout the study area and wider region. Therefore, any effects upon sandeel populations and their spawning grounds as a result of an increase in hard substrate are considered at most to be barely discernible from baseline conditions, and consequently the magnitude of the impact is deemed to be **low (adverse).**
Herring	As discussed previously, no known herring spawning grounds, or suitable spawning substrates are located within the array area and ECC (Natural Power, 2022, and AQUAFACT, 2025). Therefore, no loss of herring spawning grounds are predicted from the introduction of hard substrate, and the magnitude of the impact has consequently been assessed as being **negligible.**
Nephrops, King scallop, common cockle, common whelk, razor clams	As discussed in Table A13.13, given the localised spatial extent of the impact and the wide distribution of supporting benthic habitats (including the broadscale nature of the Western Irish Sea Mud Belt and suitable sediments for Nephrops) any increase in hard substrate (and the associated loss of soft sediments) is considered to result in no or barely discernible changes from baseline conditions. The magnitude of the impact is therefore deemed to be at most **low (adverse).**

In summary, the increase in hard substrate and structural complexity during the operational phase of the proposed development would be highly localised and restricted to the immediate vicinity of subsea infrastructure, with effects on sensitive fish and shellfish receptors being not discernible or barely discernible from baseline conditions. The maximum magnitude of this impact has therefore been assessed as low (adverse). Whilst the area of hard substrate has increased due to the use of SBJ foundations and associated scour protection, this increase remains small in the context of the extensive availability of suitable soft substratum within the array area, ECC and wider region, and therefore does not alter the assessed magnitude of impact.

Marine turtles and all elasmobranch, demersal, pelagic and diadromous VERs were assessed as not being sensitive to the impact and were therefore screened out of the magnitude assessment.

There are no further changes to this section. Refer to Section 13.5.3.5 of Chapter 13 of the 2024 EIAR. For clarity, whilst the maximum area of hard substrate has increased from approximately 0.4km^2 to 0.9km^2 due to the use of SBJ foundations and associated scour protection, this increase remains small in the context of the extensive availability of suitable soft substratum within the array area, ECC and wider region. The significance of effects therefore remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.3.6 Impact 10: Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables

There are no changes to this section. Refer to Section 13.5.3.6 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.3.7 Impact 15: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/ or behavioural effects during the operational phase

In Section 11 (g) of the RFI, An Bord Pleanála requested the Developer to update the EIAR to consider disturbance to fish, basking shark and sea turtles from underwater noise generated by wind turbines during the operational phase of the proposed development. Therefore, Impact 15 has been added to the assessment and does not replace any text from Chapter 13 of the 2024 EIAR.

Underwater noise generated by WTG operation has the potential to cause both direct and indirect impacts on fish and shellfish receptors.

Sensitivity of receptors

The main source of underwater noise from operational WTGs will be mechanically generated vibration from rotating turbine machinery, such as the rotor blade, the gearbox and the generator, which will be transmitted through the tower and foundation into the water column (Bellman *et al.*, 2023). For bottom-fixed OWFs, the produced continuous sounds are low frequency, with harmonics mostly below 1kHz (Bellmann *et al.*, 2023; Stöber and Thomsen, 2021; Wahlberg and Westerman, 2005), and as such are likely to be audible to fish and shellfish receptors. As discussed in Section 13.5.2.4, fish and shellfish receptors were assessed as having a low sensitivity to continuous underwater sounds. Therefore, the sensitivity of all fish and shellfish species to disturbance from operational noise is assessed as low.

Magnitude of impact

Most studies conducted on turbine 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 versus direct-drive WTGs, with one example of the latter being 10dB quieter than the average geared WTG of equivalent capacity.

Modelling of a generic 6MW operational WTG installed on jacket, monopile and gravity foundations demonstrated strong tonal peaks close to the structures, associated with gearbox and generator components. These tonal components are strongly localised and dissipate rapidly beyond tens of metres, although this is influenced by wind speed and sea state (Marmo *et al.*, 2013).

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.*, 2024). Results draw upon noise measurements from 24 operational wind farms with WTGs of 2.3 to 8.4MW 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.* (2024) 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. Estimates of operational noise levels from larger WTGs were provided for the Rampion 2 OWF project (located in UK waters) by extrapolating existing in situ data (Rampion 2 Wind Farm, 2024). For representative WTGs of 10 and 18 MW, this resulted in estimated source noise levels of 151.6 and 162.7 dB re 1 µPa (SPL_{RMS}) at 1 m, respectively. The maximum rotor diameter proposed for Rampion 2 (295m) is comparable to the maximum rotor diameter proposed for the proposed development at 250m for Project Option 1 and 276m for Project Option 2; however, it should be noted that the extrapolated fit is speculative and does not take account of potential noise reductions when using larger, direct-drive (gearbox-less) designs noted above. From a broader spatial perspective, Bellmann *et al.* (2024) 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), environmental conditions (e.g., wind speed, water depth) and species-specific hearing capabilities of fish, the generated underwater noise may be audible to fish at distances varying from a few metres to a few kilometres (e.g., Bergström *et al.*, 2013; Marmo *et al.*, 2013; Wahlberg and Westerberg, 2005).

The potential responses of fish to operational turbine noise are poorly documented. The sound levels generated by WTGs during operation are below levels known to cause physical injury to fish (Bergström *et al.*, 2013; Mooney *et al.*, 2020; Wahlberg and Westerberg, 2005) but lie within the range that may cause TTS in some species (Mooney *et al.*, 2020). 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. Application of this formula against the Popper *et al.* (2014) sound exposure criteria for continuous noise suggest that the threshold for the onset of TTS in the most hearing-sensitive fish (hearing group 3 and 4) would only be reached at distances less than 50m from the noise source (Appendix A14.1). However, for TTS to occur, an animal would have to stay within the immediate vicinity of the turbine for 12 hours continuously. Moreover, the formula by Tougaard *et al.* (2020) is largely derived from data from geared WTGs, and therefore it can be anticipated that the operation of a direct drive WTG will result in even smaller disturbance ranges. Whilst limited, the available data provide an indicator that operational WTGs have the potential to disturb fish within very close proximity of the WTG structures, as postulated by Wahlberg and Westerberg (2005). However, the available measurement data is mostly for smaller WTGs (up to 6MW), and it would be expected that larger wind WTGs would result in different acoustic characteristics, with foundation type also having an influence on the acoustic characteristics of the noise radiated from the structure.

In situ studies on behavioural effects in fish and shellfish from operational turbine sounds remain limited, and the few available studies indicate that responses vary between species and individuals within a species (reviewed in Mooney *et al.*, 2020). For example, Bergström *et al.* (2013) examined fish distribution patterns in relation to the local acoustic environment at the Lillgrund wind farm in Swedish waters. The authors found a lower degree of aggregation close to the wind turbines at higher noise levels for eelpout *Zoarces viviparus* and European eel but not for cod. The study also concluded that noise levels within some 100m from the turbine were high enough to cause direct escape behaviour or possible masking of communication. A study by Westerberg (1994, reviewed in Mooney *et al.*, 2020) recorded decreased catch rates of Atlantic cod and roach *Rutilis rutilus* within 100m of an operating wind turbine compared to when the turbine was stopped. In contrast, cod tagged within a Dutch OWF did not display significant changes in behaviour or avoidance during the operation of turbines when compared to periods when turbines were out of order (Winter *et al.*, 2010). Long-term *in situ* measurements at ~10m from an operational turbine in Taiwan (from 2017-2018) found no detectable influence on seasonal fish chorusing patterns, indicating no observed alteration of seasonal vocalisation behaviour at close range (Siddagangaiah *et al.*, 2024), although it should be acknowledged that these findings were based on the operation of a single turbine. Moreover, the attraction of several shellfish and demersal fish species such as brown crab and cod, to the foundations of operational wind turbines has been widely documented (e.g., Bergström *et al.*, 2013; Krone *et al.*, 2017; Langhamer and Wilhelmsson, 2009; see also Section 13.5.3.5 Impact 9: Increase in hard substrate and structural complexity due to the placement of subsea infrastructure), indicating that the noise levels radiated from the turbines are generally insufficient to initiate significant avoidance behaviour in these species.

The impact of underwear noise from operational turbines is predicted to be continuous and of long-term duration (during the lifetime of the proposed development) and will affect the fish and shellfish receptors indirectly. Considering the information presented above, it is concluded that there is potential for operational turbine noise to affect a small proportion of some receptor populations within the vicinity of the WTGs, predominantly through disturbance; however, any disturbance effects will unlikely result in a significant re-distribution or exclusion of fish and shellfish receptors within the array area. Based on this, it is concluded that effects from operational turbine noise will at most be barely discernible from baseline conditions for the most hearing-sensitive fish species, and the magnitude is therefore, on a pre-cautionary basis, considered to be low.

Significance of effects

Overall, it is predicted that in relation to Project Option 1 and Project Option 2 the maximum sensitivity of the fish and shellfish receptors to the impact is low, and the maximum magnitude of the impact is low (adverse). The maximum medium sensitivity and maximum low magnitude of the impact on fish and shellfish receptors would at most result in a slight (adverse) effect, which is not significant in EIA terms.

13.5.4 Decommissioning Phase

There are no changes to the introductory text in this section. Refer to Section 13.5.4 of Chapter 13 of the 2024 EIAR.

13.5.4.1 Impact 11: Temporary increase in SSC and sediment deposition arising during the decommissioning phase

There are no changes to this section. Refer to Section 13.5.4.1 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.4.2 Impact 12: Temporary habitat damage or disturbance of the seabed during decommissioning activities

There are no changes to this section. Refer to Section 13.5.4.2 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.5.4.3 Impact 13: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination

There are no changes to this section. Refer to Section 13.5.4.3 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is Not significant, which is not significant in EIA terms.

13.5.4.4 Impact 14: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/or behavioural effects during decommissioning

There are no further changes to this section. Refer to Section 13.5.4.4 of Chapter 13 of the 2024 EIAR. For clarity, the significance of effects remains unchanged for all fish and shellfish receptors and is at most slight (adverse), which is not significant in EIA terms.

13.6 Mitigation and Monitoring Measures

There are no further changes to this section. Refer to Section 13.6 of Chapter 13 of the 2024 EIAR.

13.7 Residual Effects

As noted in Section 13.5.3.7, the disturbance of fish and shellfish receptors from underwater noise generated by wind turbines during the operational phase has been added to the assessment in response to RFI Section 11 (g). Therefore, Table 13.31 of Chapter 13 of the 2024 EIAR shall be updated and replaced with Table A13.15 below.

Table A13.15 Residual effects relating to fish and shellfish ecology (replaces Table 13.31 of Chapter 13 of the 2024 EIAR)

Potential Impact	Likely significant effect– Project Option 1	Likely significant effect– Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
Construction				
Impact 1: Temporary increase in SSC and sediment deposition arising during the construction phase	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	

Potential Impact	Likely significant effect– Project Option 1	Likely significant effect– Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
Impact 2: Temporary damage and disturbance of the seabed during construction activities	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 3: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination	Not significant	Not significant	Not significant	Not significant
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 4: Introduction of underwater noise and vibration leading to mortality, injury, TTS and/or behavioural effects during construction	UXO clearance Slight Other noise sources Slight	UXO clearance Slight Other noise sources Slight	UXO clearance Slight Other noise sources Slight	UXO clearance - Slight Other noise sources - Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Operations and Maintenance				
Impact 5: Temporary increase in SSC and sediment deposition arising during maintenance activities	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 6: Temporary damage and disturbance of the seabed during maintenance activities	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 7: Long-term/permanent loss of benthic habitat due to the placement of subsea infrastructure	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 8: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination	Not significant	Not significant	Not significant	Not significant
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	

Potential Impact	Likely significant effect– Project Option 1	Likely significant effect– Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
Impact 9: Increase in hard substrate and structural complexity due to the placement of subsea infrastructure	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 10: Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 15: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/ or behavioural effects during the operational phase	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Decommissioning				
Impact 11: Temporary increase in SSC and sediment deposition arising during the decommissioning phase	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 12: Temporary damage and disturbance of the seabed during decommissioning activities	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 13: Reduction in water and sediment quality through the release of contaminated sediments and/or accidental contamination	Not significant	Not significant	Not significant	Not significant
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	
Impact 14: Introduction of underwater noise and vibration leading to mortality, recoverable injury, TTS and/or behavioural effects	Slight	Slight	Slight	Slight
			No further mitigation (in addition to that already identified in Table A13.6) is considered necessary. No ecologically significant adverse residual effects on fish and shellfish ecology receptors have therefore been predicted.	

There are no further changes to this section. Refer to Section 13.7 of Chapter 13 of the 2024 EIAR.

13.8 Transboundary Effects

In Section 18 of the RFI, An Bord Pleanála requested the Developer to update the EIAR to consider the potential for transboundary impacts on marine features found in Isle of Man territorial waters, including features protected within Manx MNRs. Figure A13.8 shows the location of the Manx MNRs in relation to the fish and shellfish study area.

Therefore, Section 13.8 of Chapter 13 of the 2024 EIAR shall be deleted in its entirety from the 2024 EIAR and replaced with the text herein:

Transboundary effects are defined as those effects upon the receiving environment of other states, whether occurring from the proposed development alone, or cumulatively with other projects in the wider area.

This assessment considers the potential for transboundary effects arising from the residual effects of the proposed development (i.e., after any additional mitigation measures have been applied).

Among the impacts assessed in Section 13.5, the following impacts would be restricted to the offshore development area and have therefore been screened out of the assessment of transboundary effects: Temporary habitat damage and disturbance of the seabed during construction, maintenance and decommissioning activities (Impacts 2, 6 and 12), Long-term and permanent loss of benthic habitats due to the placement of subsea infrastructure (Impact 7), Increase in hard substrate and structural complexity due to the placement of subsea infrastructure (Impact 9), and Potential barriers to movement through the presence of turbines and EMF from inter-array and export cables (Impact 10).

Project-specific plume modelling indicates that there is potential for sediment plumes generated in the northern part of the array area to disperse over several tidal cycles in a net northerly direction into UK waters during periods of spring tides. Suspended sediments at concentrations above natural background levels will be displaced up to about 12km from the point of release, while any sediment plumes reaching UK waters are predicted to be imperceptible against natural background levels (≤1mg/l, trace; Chapter 10). Given the predicted plume dispersal pathways, sediment plumes are not expected to reach Manx territorial waters. Therefore, sediment plumes and any associated sediment deposition are not anticipated to affect fish and shellfish receptors outside of Irish waters. The impact of temporary increases in SSC and associated sediment deposition was assessed as not being significant in EIA terms for all fish and shellfish species, including any mobile and migrating species protected in Manx MNRs that may pass through the fish and shellfish study area. Any effects resulting from the potential release of sediment-bound contaminants during construction (Impact 3), maintenance (Impact 8) and decommissioning (Impact 13) activities have been assessed to be of negligible magnitude, and as such it is concluded that these impacts will not result in significant transboundary effects.

Potential mortality or recoverable injury to fish and shellfish receptors due to underwater noise from construction activities and UXO clearance are predicted to be restricted to areas within Irish waters. Any potential effects were assessed as not being significant in EIA terms for all fish and shellfish species, including any mobile and migrating species protected in Manx MNRs that may pass through the fish and shellfish study area. TTS and/ or behavioural reactions as a result of UXO clearance and construction activities could occur over larger ranges, with high risk of TTS and disturbance effects following UXO detonation potentially reaching 100’s of metres (within the intermediate field) from the UXO location for the most sensitive fish receptors (Popper *et al.*, 2014). UXO will only be cleared within the order limits of the proposed development, which is located >13km from UK waters and >50km from Isle of Man waters. At these distances, the risk of TTS and/ or behavioural effects as a result of UXO clearance is assessed as low for all receptors (Popper *et al.*, 2014). Moreover, the Developer has committed to the use of a NAS (e.g. a bubble curtain or similar) in case of high-order clearance, providing -10dB noise attenuation and consequently a reduction in the noise propagated through the water column during detonations. Any TTS and/ or behavioural reactions would be temporary and reversible and were assessed as not being significant in EIA terms for all fish and shellfish species, including any mobile and migrating species such as basking sharks, tope, and spiny dogfish. Likewise, any effects arising from other noise sources during the construction, operation and maintenance, and decommissioning phases were assessed as not being significant in EIA terms for all fish and shellfish species, including any mobile and migrating species protected within Manx MNRs.

Based on this, it is concluded that any transboundary effects on fish and shellfish receptors that may result from underwater noise generated during construction, operation and maintenance, and decommissioning of the proposed development will not be significant in EIA terms.

13.9 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, as per RFI Section 5.

The second paragraph should 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 be replaced with:

Chapter 38: Cumulative and Inter-Related Effects 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 and Stage 4 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 13.9.2 and in the Cumulative and Inter-Related Effects Chapter."

And be 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 'Advice on Cumulative Effects Assessment' (Planning Inspectorate, 2024). Further information on the tiers is provided in Section 13.9.2 and in Chapter 38.

There are no other changes required to this section. Refer to Section 13.9 of Chapter 13 of the 2024 EIAR.

13.9.1 Fish and shellfish cumulative screening exercise

As detailed previously, following design refinements in response to the RFI, piling is no longer included in the construction strategy and seabed preparation activities have been restricted to boulder clearance and UXO clearance activities only, with no dredging activities now required. These changes have altered several design parameters, resulting in updates to the relevant characteristics of Project Option 1 and Project Option 2 for several impacts relevant to fish and shellfish receptors.

Although the removal of piling will reduce the area affected by underwater noise from the proposed development alone, the previously defined screening range of 100km buffering the offshore development area has been retained to assess impacts from underwater noise in combination with other consented or proposed OWFs, particularly those that include piling operations. For projects that do not include piling operations or the detonation of UXO, but which may have other noise generating activities associated with them, a screening range of 10km has been adopted during the screening stage. Furthermore, in response to RFI Section 11(g), underwater noise arising from operational WTGs has been screened into the cumulative impact assessment for fish, shellfish and marine turtles adopting a screening range of 100km from the boundary of the offshore development area to assess the potential for cumulative effects during the operation of the proposed Phase One Projects.

The screening distance to assess potential cumulative impacts associated with seabed-disturbance events, including temporary damage to the seabed, increases to SSC and changes in sediment deposition, has been reduced from 100km to 24km on account of the changes to the project design (i.e., removal of dredging) and predicted sediment dispersal patterns associated with the proposed development alone. As indicated by the project-specific plume modelling, including the revised plume modelling results presented in Chapter 10: Marine Geology, Oceanography and Physical Processes, increases to SSC above background levels would be confined to the tidal excursion buffer, with the total tidal excursion distance extending approximately 12.7km in the central area of the ECC and 13.9km in the array area. A reduction of the screening range for sedimentary impacts to 24km (twice the sedimentary ZoI adopted for the proposed development alone impact assessment) is considered to be more proportionate to the scale of predicted impacts from the proposed development alone and cumulatively with other plans and projects compared to the 100km screening range adopted in the 2024 EIAR. The screening range to assess potential cumulative impacts from EMF has also been reduced from 100km to 24km based on the localised nature of any potential EMF effects from operational and proposed power transmission cables.

As an erratum to the 2024 EIAR, existing telecommunication cables have been removed from the cumulative effects assessment for fish and shellfish for cumulative effects from EMF on the basis that the EMFs generated by these cables are negligible and have therefore no potential to give rise to likely significant cumulative effects on electro- and magneto-sensitive species. Following the approach adopted in Chapter 13 of the 2024 EIAR, all projects and activities that have ongoing impacts which are not part of the fish and shellfish ecology baseline have been retained in the cumulative impact assessment. This now also includes existing subsea cables and oil and gas pipelines within the 24km screening range to account for potential maintenance activities which may result in temporary seabed disturbance and associated changes to SSC and sediment deposition.

To reflect the amendments listed above, Section 13.9.1 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein:

The existing and/or approved projects selected as relevant to the cumulative effects assessment of impacts to fish and shellfish ecology are based on an initial screening exercise undertaken on a long list (see Chapter 38) based on spatial distance to the proposed development. Consideration of effect-receptor pathways, data confidence and temporal and spatial scales has then allowed the selection of the relevant projects for the fish and shellfish ecology cumulative short-list.

To assess potential cumulatively impacts from underwater noise, a screening range of 100km around the offshore development area was applied. As outlined in Section 13.5.2.4, the greatest underwater noise impact ranges are anticipated to arise from the controlled detonation of UXO. As detailed in Section 13.5.2.4, the maximum predicted range for the onset of mortality or potential mortal injury in sensitive fish receptors from underwater noise from high order UXO clearance from the proposed development alone, based on the highest charge weight and the unweighted SPL_{peak} criteria from Popper *et al.* (2014), is approximately 810 m from the detonation site. Recoverable injury, TTS and disturbance effects will occur over a larger area, with high risk of TTS and disturbance effects potentially within 100's of metres (within the intermediate field) from the UXO location for the most sensitive fish receptors (Popper *et al.*, 2014). While underwater noise impact ranges for the most severe effects (mortality and potential mortal injury) from the proposed development alone are predicted to occur within the intermediate field, extending up to hundreds of metres from the source, when considering the potential for impacts to fish and shellfish receptors from underwater noise cumulatively with other consented or proposed projects that generate high intensity impulsive sounds, particularly those that include piling operations, the overall spatial extent within which effects may occur is expected to increase. On this basis, a screening range of 100km for projects that generate high intensity impulsive UWN is considered suitably precautionary to encompass the area within which potential significant cumulative effects on fish and shellfish may arise, particularly given the mobile nature of many receptors.

For the operational noise impact from offshore wind turbines, the same 100km buffer has been applied, reflecting the scale of the NSIPs and the wide-ranging movement of the receptors; therefore, all East Coast Phase One projects have been screened into the assessment of this impact.

Regarding more discrete works, such as site investigation surveys and projects that generate continuous noise only (e.g., dredging and rock placement and associated vessel operations), a 10km screening buffer around the offshore development area has been applied. Popper *et al.* (2014) indicate that behavioural effects in fish from continuous underwater noise are most likely to occur at ranges up to hundreds of metres from the noise source. During the exposure to high intensity seismic sounds, the risk of behavioural effects in the far field (1000s of metres) is likely to be moderate for the most noise sensitive fish species (group 3 and group 4 species) and low for the remaining receptors (Popper *et al.*, 2014). For the purposes of this cumulative assessment, site investigation surveys and projects that generate continuous noise only are therefore screened using a smaller spatial range than that applied to impulsive noise sources, such as piling. The adopted 10km screening buffer fully encompasses any potential range of impacts from continuous noise sources and high-resolution geophysical survey equipment, and provides additional allowance for uncertainty in propagation, species-specific sensitivity, and the potential overlap of multiple continuous noise sources.

To assess potential cumulative impacts associated with seabed disturbance events, including increases in SSC and sediment deposition, a screening range of 24km around the array area and offshore ECC has been applied. This distance is informed by project specific sediment plume modelling (Chapter 10: Marine Geology, Oceanography and Physical Processes and Appendix A10.2: Marine Physical Processed Numerical Modelling), which indicates that increases in SSC above natural background levels (i.e., greater than10 mg/l) remain within the spring tidal excursion buffer, which based on typical flows during a spring tide extends over a total distance of approximately 12.7km in the central area of the ECC and 13.9km in the array area. A precautionary distance of 24km (twice the sedimentary ZoI of 12km) has been selected to encompass the combined extent of impacts to fish and shellfish receptors from the proposed development alone and similar impacts arising from other projects in the vicinity of the proposed development under the assumption that sedimentary plumes generated by nearby projects disperse in a similar pattern than those arising from the proposed development. A screening range of 24km has also been applied to assess potential cumulative effects from EMF, based on the localised nature of any potential EMF effects.

For the full list of projects considered, including those screened out, see Chapter 38 and Appendix A38.2.

13.9.2 Projects considered within the cumulative effects assessment

The key changes to this section reflect changes to the cumulative assessment methodology, as per RFI Section 5, and the timing of the proposed development construction phase. Published project design parameters of the Phase One Projects have been fully incorporated into the cumulative effects assessment, as requested in RFI Section 5.

In addition, Table 13.32 in Chapter 13 of the 2024 EIAR has been updated to include the revised topic-specific short-list of projects screened into the cumulative effects assessment for fish and shellfish receptors, in accordance with the revised screening ranges detailed in Section 13.9.1. The list of projects and plans screened into the cumulative effects assessment has been reviewed and updated to ensure the cumulative effects assessment is informed by the most current and up-to-date data, satisfying RFI Section 1 (b). Therefore, Table 13.32 of Chapter 13 of the 2024 EIAR should be deleted and replaced with Table A13.16 below.

To reflect the changes, Section 13.9.2 of Chapter 13 of the 2024 EIAR should be deleted and replaced with the text herein:

The planned, existing and/or approved projects selected through the screening exercise as potentially relevant to the assessment of impacts to fish and shellfish ecology are presented in Table A13.16. 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 a scoping report or have a MAC.
- Tier 3 is all other projects including existing and/or approved development 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 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 all other projects including existing and/or approved development that have been identified in the relevant Development Plans and other plans and programmes as appropriate (tier three).

Offshore construction of the proposed development is anticipated to occur between 2028 to 2030, with operation commencing in 2031. After construction, the proposed development would be operational for 35 years.

Table A13.16 Projects and plans screened into the cumulative effects assessment (replaces Table 13.32 of Chapter 13 of the 2024 EIAR)

Development Type	Project	Status	Data Confidence	Distance to array area	Distance to ECC	Justification for screening into the assessment
Tier 1						
Coastal Assets	Operations and Maintenance Facility (OMF) at Greenore Port	MAC received and planning consented	High	34.12km	38.77km	Construction of an OMF at Greenore Port for future OWF projects on the East Coast of Ireland, including the proposed development. Piling may be required to construct a new pontoon, which will generate underwater noise. The proposed construction of the OMF is limited to the onshore expansion of facilities and is therefore not considered to have the potential to contribute to changes in SSC, sediment deposition or cumulative temporary or long-term damages or disturbances of the seabed. Therefore, underwater noise in the only impact screened into the cumulative effects assessment.
	Drogheda Port Company (dredging)	Consented Licence FS007028	High	19.84km	12.71km	Maintenance dredging between the period 2021 and 2029 within the commercial estuary of the River Boyne and seaward approaches. Within screening range for cumulative sedimentary impacts and potential for temporal overlap with proposed development construction period.
	Dublin Port Masterplan - MP2 Project	Consented Licence FS006893	High	31.88km	33.03km	Phased development work within Dublin Port scheduled to take place 2022-2032 (part of Dublin Port's Masterplan 2040). Proposed works include piling during the installation of quay walls and jetties, which will generate underwater noise. Within screening range for cumulative underwater noise impacts from impulsive noise sources and potential for temporal overlap with proposed development construction period.
	Dublin Port Masterplan - 3FM Plan	Planning application	High	35.77km	31.38km	Phased development work within Dublin Port (part of Dublin Port's Masterplan 2040). Proposed works include piling to strengthen quay walls and construction of other infrastructure. Within screening range for cumulative underwater noise impacts from impulsive noise sources and potential for temporal overlap with proposed development construction period.
East Coast Phase One OWFs	Oriel Wind Park	Planning application	High	16.94km	21.61km	Installation of up to 25 WTGs, one OSP, and one export cable. Offshore construction is anticipated to commence in Q4 of 2028 and will take approximately 15 months. Operation is anticipated to commence in Q2 2030 (Oriel Windfarm, 2025a). Within screening range for cumulative sedimentary impacts and underwater noise impacts from impulsive noise sources and operational turbine noise. Potential for temporal overlap with proposed development construction and operation and maintenance period.
	Dublin Array	Planning application	High	32.92km	37.58km	Installation of up to 50 WTGs, two export cables, and one OSP with offshore construction anticipated to take place between 2029-2032 (Kish Offshore Wind Ltd., 2025). Within screening range for cumulative underwater noise impacts from impulsive noise sources and operational turbine noise.

Development Type	Project	Status	Data Confidence	Distance to array area	Distance to ECC	Justification for screening into the assessment
						Potential for temporal overlap with proposed development construction and operation and maintenance period.
	Codling Wind Park	Planning application	High	50.99km	56.99km	Installation of up to 75 WTGs, three export cables, and three OSPs. Construction is anticipated to take place 2026-2029. Within screening range for cumulative underwater noise impacts from impulsive noise sources and operational turbine noise. Potential for temporal overlap with proposed development construction and operation and maintenance period.
	Arklow Bank Wind Park Phase 2	Planning application	High	76.36km	80.13km	Installation of up to 53 WTGs, two OSPs, and two export cables (SSE Renewables, 2026). Construction is anticipated to take place 2027-2030. Within screening range for cumulative underwater noise impacts from impulsive noise sources and operational turbine noise. Potential for temporal overlap with proposed development construction and operation and maintenance period.
	Arklow Bank Wind Park Phase 1	Operational	High	88.27km	91.54km	Within screening range for operational turbine noise. Temporal overlap with proposed development operation and maintenance period.
Dumping at Sea	Drogheda Port Company - Dumping Site A1	Consented	High	11.7km	10.25km	Release of dredged material from vessels at predefined dumping site approximately 4km northeast (Dumping site A1) from the Drogheda port entrance. Within screening range for cumulative sedimentary impacts and potential for temporal overlap with proposed development construction period.
Dumping at Sea	Drogheda Port Company - Dumping Site A2	Consented	High	15.33km	14.28km	Release of dredged material from vessels at predefined dumping site approximately 4km north (Dumping site A2) from the Drogheda port entrance. Within screening range for cumulative sedimentary impacts and potential for temporal overlap with proposed development construction period.
Disposal	Warrenpoint B	Consented	High	23.75km	28.88km	Sea disposal of dredging material from Warrenpoint Harbour at Warrenpoint B. Within screening range for cumulative sedimentary impacts and potential for temporal overlap with proposed development construction period.
Subsea cables	HAVHINGSTEN SEG 1 Telecommunication Cable	Active	High	0.68km	9.73km	Operational subsea cables may require maintenance activities which may result in short-term, temporary seabed disturbance. In addition, active and proposed power transmission cables will generate EMFs. Within screening range for cumulative EMF and sedimentary impacts. Some cables within screening range for cumulative impacts from continuous noise sources. Potential for temporal overlap with proposed development construction and operation and maintenance period.
Subsea cables	ROCKABILL Telecommunication Cable	Active	High	4.87km	12.85km	
Subsea cables	EAST WEST INTERCONNECTOR Power Cable	Active	High	5.15km	11.57km	

Development Type	Project	Status	Data Confidence	Distance to array area	Distance to ECC	Justification for screening into the assessment
Subsea cables	HIBERNIA ATLANTIC SEG C Telecommunication Cable	Active	High	7.79km	17.09km	
Subsea cables	SIRIUS SOUTH Telecommunication Cable	Active	High	9.41km	18.75km	
Subsea cables	CelticConnect Telecommunication Cable	Active	High	11.29km	20.07km	
Subsea cables	ZAYO EMERALD BRIDGE ONE Telecommunication Cable	Active	High	12.09km	20.23km	
Subsea cables	ESAT 2 Telecommunication Cable	Active	High	14.41km	24.19km	
Subsea cables	Oriel ECC Power Cable	Planning application	High	18.06km	22.60km	
Oil and Gas Pipelines	Interconnector 2 Scotland to Ireland	Active	High	0.52km	2.68km	Pipelines may require maintenance activities which may result in short-term, temporary seabed disturbance. Within screening range for cumulative sedimentary impacts and impacts from continuous noise sources. Potential for temporal overlap with proposed development construction and operation and maintenance period.
Oil and Gas Pipelines	Interconnector 1 Scotland to Ireland	Active	High	4.24km	10.60km	
Tier 2						
Subsea cables	MaresConnect Electricity Interconnector Power Cable	Pre-consent	Medium	6.02km	12.26km	Proposed subsea power cable with construction anticipated to take place from 2026 to 2028. Within screening range for cumulative sedimentary impacts and impacts from continuous noise sources. Potential for temporal overlap with proposed development construction and operation and maintenance period.

13.9.3 Project impacts included in the assessment

The key changes to this section are the updates to the cumulative assessment tiering system and the topic-specific short-list of projects screened into the cumulative effects assessment for fish and shellfish receptors. Table 13.33 of Chapter 13 of the 2024 EIAR should be deleted and replaced with Table A13.17 below. New and updated information is indicated by the grey shading in Table A13.17. Published project design parameters of the Phase One Projects have been fully incorporated into the cumulative effects assessment, as requested in RFI Section 5.

Therefore, Section 13.9.3 of Chapter 13 of the 2024 EIAR should be deleted and replaced with the text herein:

The identification of potential cumulative impacts has been undertaken by considering the outcome of the residual effects assessment (Section 13.7) and the potential for a pathway for those impacts to have direct and/or indirect effects on known receptors (as identified in Section 13.3) when combined with potential impacts from other projects. Each identified impact relevant to the cumulative assessment of fish and shellfish ecology is presented in Table A13.17. As the residual effects for Project Option 1 and Project Option 2 are the same (as identified in Section 13.7), the cumulative effects assessment presented in this section applies to both options.

13.9.3.1 Tier 1

Most projects screened into the cumulative effects assessment for fish and shellfish receptors are Tier 1 projects (Table A13.6) which are under construction or permitted under the Planning Act and other regimes but not yet implemented. In addition, Tier 1 also includes the East Coast Phase One ORE projects, the OMF proposed at Greenore Port, and construction activities associated with the proposed third phase of the Dublin Port Masterplan (3FM Plan).

The OMF proposed at Greenore Port will be required to service the offshore wind farm throughout the operational phase of the proposed development. Since the OMF will be subject to separate planning/permitting consents, it is considered within the cumulative impact assessment for fish and shellfish. The OMF will be located onshore as a part of an existing port facility at Greenore. The port will need to be adapted to provide, amongst others, berthing facilities to support the crew transfer vessels. In addition, it is expected that a new pontoon would need to be constructed, and therefore it is anticipated that piling will take place during the construction of the OMF.

All East Coast Phase One OWFs in Ireland have been awarded a MAC and have formally submitted applications for planning consent; however, none of the projects were awarded consent within the timescales for delivery described in the 2024 EIAR for the proposed development and the further information submitted by the Applicant in 2026. Notwithstanding this, due to the similar development timelines of the East Coast Phase One projects (Table A13.16) and the resultant risk associated with cumulative effects, East Coast Phase One OWF projects were assessed under Tier 1.

Other Tier 1 projects that may contribute to cumulative effects through simultaneous activities with the proposed development include maintenance dredging within the River Boyne and associated offshore sediment disposal, sea disposal of dredged material at Warrenpoint B, construction activities associated with the Dublin Port Masterplan (MP2 project and 3FM Plan), and maintenance activities associated with existing subsea cables and operational oil and gas pipelines (Table A13.17). In addition, active power transmission cables and cables associated with the proposed East Coast Phase One projects are considered for their potential to give rise to effects in-combination with EMFs emitted from cables installed at the proposed development.

Tier 2 projects that may contribute to cumulative effects through simultaneous activities during the construction phase of the proposed development include the construction of the proposed MaresConnect electricity interconnector. In line with the tier hierarchy (for more details see Chapter 38), the assessment for Tier 2 also includes Tier 1 projects.

13.9.3.2 Tier 3

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

Table A13.17 Potential cumulative impacts and tiers for assessment (replaces Table 13.33 of Chapter 13 of the 2024 EIAR)

Potential cumulative impact	Phase	Tiers and Projects	Justification for inclusion in cumulative effects assessment
Cumulative Impact 1: Cumulative increase in SSC and sediment deposition	Construction, Operation, Decommissioning	**Tier 1** Oriel Wind Park Oriel ECC Power Cable Drogheda Port Company (Dredging, Dumping Site A1 and Dumping Site A2) Warrenpoint B HAVHINGSTEN SEG 1 Telecommunication Cable ROCKABILL Telecommunication Cable EAST WEST INTERCONNECTOR Power Cable HIBERNIA ATLANTIC SEG C Telecommunication Cable SIRIUS SOUTH Telecommunication Cable CelticConnect Telecommunication Cable ZAYO EMERALD BRIDGE ONE Telecommunication Cable ESAT 2 Telecommunication Cable Interconnector 2 Scotland to Ireland Oil and Gas Pipeline Interconnector 1 Scotland to Ireland Oil and Gas Pipeline **Tier 2** MaresConnect Power Cable	Dredging and sediment disposal, cable and pipeline maintenance works, seabed preparation activities, and foundation and cable installation works can cause temporary increases in SSC and sediment deposition. If these activities overlap temporally with either construction, decommissioning or operational activities at the proposed development, there is potential for cumulative increases to SSC and sediment deposition to occur, which may affect sensitive fish and shellfish receptors.
Cumulative Impact 2: Cumulative temporary damage and disturbance of the seabed	Construction, Operation, Decommissioning	**Tier 1** Oriel Wind Park Oriel ECC Power Cable Drogheda Port Company (Dredging) Warrenpoint B HAVHINGSTEN SEG 1 Telecommunication Cable ROCKABILL Telecommunication Cable EAST WEST INTERCONNECTOR Power Cable HIBERNIA ATLANTIC SEG C Telecommunication Cable SIRIUS SOUTH Telecommunication Cable CelticConnect Telecommunication Cable ZAYO EMERALD BRIDGE ONE Telecommunication Cable ESAT 2 Telecommunication Cable Interconnector 2 Scotland to Ireland Oil and Gas Pipeline	Dredging, cable and pipeline maintenance works, seabed preparation activities, and foundation and cable installation works would result in temporary disturbance and damage of the seabed. If these activities overlap temporally with either construction, decommissioning or operational activities at the proposed development, there is potential for cumulative effects on fish and shellfish receptors that fully or partly depend on the seabed throughout their life cycle.

Potential cumulative impact	Phase	Tiers and Projects	Justification for inclusion in cumulative effects assessment
		Interconnector 1 Scotland to Ireland Oil and Gas Pipeline MaresConnect Electricity Interconnector Site Investigation **Tier 2** MaresConnect Power Cable	
Cumulative Impact 3: Cumulative underwater noise and vibration during the construction phase of the proposed development	Construction	**Tier 1** OMF at Greenore Port Oriel Wind Park Dublin Array Codling Wind Park Arklow Bank Wind Park Phase 1 Dublin Port Masterplan (MP2 Project) HAVHINGSTEN SEG 1 Telecommunication Cable ROCKABILL Telecommunication Cable EAST WEST INTERCONNECTOR Power Cable HIBERNIA ATLANTIC SEG C Telecommunication Cable SIRIUS SOUTH Telecommunication Cable Interconnector 2 Scotland to Ireland Oil and Gas Pipeline Interconnector 1 Scotland to Ireland Oil and Gas Pipeline **Tier 2** MaresConnect Power cable	Concurrent construction activities or the long-term exposure to sounds due to sequential operations over prolonged periods of time could adversely affect sensitive fish, shellfish, and marine turtle receptors. Cumulative effects may also arise from non-impulse sounds associated with geophysical and geotechnical surveys and vessel and/or construction and maintenance activities from other projects within the region.
Cumulative Impact 4: Cumulative long-term loss of benthic habitats due to the placement of subsea infrastructure	Operation	**Tier 1** Oriel Wind Park Oriel ECC Power Cable **Tier 2** MaresConnect Power Cable	The presence of proposed marine infrastructure on the seabed, such as WTG foundations and scour and cable protection material will alter the extent and distribution of sedimentary habitats on which fish and shellfish rely upon.
Cumulative Impact 5: Cumulative barriers to movement through the presence of EMF from cables	Operation	**Tier 1** Oriel Wind Park Oriel ECC Power Cable EAST WEST INTERCONNECTOR Power Cable **Tier 2** MaresConnect Power Cable	The presence of existing and proposed power transmission cables result in the emission of EMFs, which could affect electro- and magneto-sensitive receptors.

Potential cumulative impact	Phase	Tiers and Projects	Justification for inclusion in cumulative effects assessment
Cumulative Impact 6: Cumulative underwater noise and vibration from operational wind turbines	Operation	**Tier 1** Oriel Wind Park Dublin Array Codling Wind Park Arklow Bank Wind Park Phase 1 Arklow Bank Wind Park Phase 2	Operational wind turbines generate underwater noise which could affect sensitive fish and shellfish receptors. Temporal overlap with proposed development operation and maintenance period.

13.9.4 Cumulative Impact 1: Cumulative increase in SSC and sediment deposition

The key changes to this section reflect changes to the topic-specific short-list of projects screened into the cumulative effects assessment for fish and shellfish receptors and amendments to the cumulative assessment methodology including the tiering system to follow the NSIP 2024 guidance, as per RFI Section 5. To reflect the changes, Section 13.9.4 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein:

Dredging and sediment disposal, repair and maintenance of existing subsea cables and pipelines, seabed preparation works, and the installation of new infrastructure will result in temporary increases in SSC and associated sediment deposition, which may give rise to additive effects on sensitive receptors. This impact is associated primarily with activities that take place during the construction and decommissioning phases. The potential for significant cumulative effects on fish, shellfish, and marine turtle receptors because of cumulative increases in SSC and sediment deposition is assessed in the following sections.

13.9.4.1 Tier 1

Tier 1 projects screened into the cumulative effects assessment for impacts from increases to SSC and sediment deposition include the proposed Oriel Wind Park and Oriel ECC Power Cable, the Drogheda Port Company maintenance dredging and associated spoil disposal at Dumping Sites A1 and A2, sediment disposal at Warrenpoint B, active telecommunications and power transmission cables, and active oil and gas pipelines.

The potential maximum magnitude of effects arising from the impact at the proposed development alone has been assessed as low (adverse) based on the short-term duration of construction, maintenance and decommissioning activities, and the intermittent, localised and temporary nature of changes in SSC and sediment deposition.

Increases to SSC and associated sediment deposition at Oriel Wind Park will arise during site preparation activities (sandwave clearance), the drilling of foundations, and during the installation and maintenance of inter-array and export cables. Peak SSC of around 2,000 mg/l are predicted to arise during the installation of inter-array cables within the immediate vicinity of operations, and the largest spatial extent of sediment plumes is predicted during the drilling of foundations and cable trenching within the ECC (Oriel Windfarm, 2025b,c). Sediment plumes generated during the construction of Oriel Wind Park are, like those arising during the construction of the proposed development, predicted to return to background levels within a couple of tidal cycles (Oriel Windfarm, 2025b).

Project-specific sediment plume modelling undertaken for Oriel Wind Park (Oriel Windfarm, 2025c) and the proposed development (Chapter 10: Marine Geology, Oceanography and Physical Processes) suggests that there is potential for sediment plumes generated during concurrent construction activities at the Oriel OWF and the proposed development to overlap. However, the potential increases in SSC, when considered cumulatively, would still to be temporary and intermittent, with SSC across overlapping plumes likely to be within natural background levels. Any potential simultaneous disturbance effects on sensitive fish and shellfish receptors due to concurrent activities at Oriel Wind Park and the proposed development are expected to be localised, temporary and intermittent as sediment plumes would quickly dissipate following cessation of activities. Similarly, any areas likely to be exposed to heavy sediment deposition would be localised and small in the context of available suitable habitats of sensitive fish and shellfish receptors in the study area and wider region.

A small number of dredging and dredge disposal sites are located within the screening range, which have the potential to contribute to cumulative effects with the proposed offshore construction works through sediment plume or deposition effects. Those projects include ongoing maintenance dredging activities at Drogheda Port and the disposal of dredged material offshore at designated disposal sites (Drogheda Port Company project Dumping Sites A1 and A2, and Warrenpoint B disposal site). It is not known what volumes of sediment will be dredged and/or released at the disposal sites at any one time. However, given the distance between the projects and the offshore development area (the nearest licensed sea disposal site is located >10km from the array area), the potential for sediment plumes to interact is considered to be low.

Simultaneous increases in SSC and sediment deposition may also arise during construction and operation of the proposed development and planned and unplanned maintenance of operational subsea cables and pipelines. Exact details and maintenance schedules are unknown; however, the lengths of cable and/ or pipelines to be replaced or reburied would likely be similar in scale to potential maintenance activities associated with the proposed development, and the potential impacts would be highly localised and occur over a short duration. Moreover, maintenance activities are expected to be infrequent over the lifetime of the assets, reducing the likelihood of concurrent activities with the proposed development.

While there is potential for simultaneous disturbance effects within the screening range, any increases to SSC associated with the Tier 1 projects are expected to be temporary and intermittent, with sediment plumes expected to quickly dissipate following cessation of activities. Any areas likely to be exposed to heavy sediment deposition (e.g., at dredge disposal sites and areas near construction activities) are expected to be small in the context of available suitable habitats of sensitive receptors in the study area and wider region. Therefore, any potential cumulative effects on fish and shellfish receptors resulting from the simultaneous increase in SSC and sediment deposition at the proposed development cumulatively with Tier 1 projects are anticipated to be at most barely discernible from baseline conditions. Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 projects is assessed as being low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.4.2 Tier 1 and Tier 2

Tier 2 projects screened into the cumulative effects assessment for impacts from increases to SSC and sediment deposition include the proposed MaresConnect interconnector power cable.

Owing to the proximity of the proposed MaresConnect cable route to the offshore development area and the potential for temporal overlap during construction and O&M activities with the proposed development, there is potential for the effects of increases in SSC and sediment deposition to act cumulatively. Installation methodologies, location and the construction programme for the MaresConnect interconnector are unknown at the time of writing. However, sediment released during the construction of MaresConnect are anticipated to behave in a similar pattern as the sediments being disturbed by the proposed development due to expected similarities in activities combined with a similar environmental setting. Any potential simultaneous disturbance effects on sensitive fish and shellfish receptors due to concurrent activities are expected to be localised, temporary and intermittent as sediment plumes would quickly dissipate following cessation of activities. Similarly, any areas likely to be exposed to heavy sediment deposition would be localised and small in the context of available suitable habitats of sensitive fish and shellfish receptors in the study area and wider region. Therefore, any potential cumulative effects on fish and shellfish receptors resulting from the simultaneous increase in SSC and sediment deposition from the proposed development in-combination with Tier 1 and Tier 2 projects are anticipated to be at most barely discernible from baseline conditions. Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 and Tier 2 projects is assessed as being low (adverse).

As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.4.3 Tier 1 and Tier 2 and Tier 3 (all tiers)

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

In summary, sediment plumes and deposition generated by Tier 1 and Tier 2 projects are anticipated to behave in a similar pattern as the sediments being disturbed by the proposed development due to expected similarities in activities combined with a similar environmental setting. Any plumes associated with the identified projects will be intermittent and disperse rapidly within a couple of tidal cycles. Any heavy sediment deposition will be highly localised and small in the context of available suitable habitats of fish and shellfish receptors that depend on the seabed. Therefore, it is concluded that the maximum magnitude of potential cumulative effects on fish and shellfish receptors from the proposed development in-combination with Tier 1 and Tier 2 projects will be comparable to the project alone, i.e. low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

Therefore, no additional mitigation to that already identified in Table A13.6 is considered necessary, and no significant adverse residual cumulative effects on fish and shellfish receptors have been predicted in respect to this impact.

13.9.5 Cumulative Impact 2: Cumulative temporary damage and disturbance of the seabed

The key changes to this section reflect changes to the topic-specific short-list of projects screened into the cumulative effects assessment for fish and shellfish receptors and amendments to the cumulative assessment methodology including the tiering system to follow the NSIP 2024 guidance, as per RFI Section 5. To reflect the changes, Section 13.9.5 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein:

Dredging, repair and maintenance of existing subsea cables and pipelines, seabed preparation works, and the installation of new infrastructure can temporarily damage and disturb the seabed, which may give rise to additive effects on sensitive fish and shellfish receptors. This impact is associated primarily with activities that take place during the construction and decommissioning phases. The potential for significant cumulative effects on fish, shellfish, and marine turtle receptors because of cumulative temporary disturbances to the seabed is assessed in the following sections.

13.9.5.1 Tier 1

Tier 1 projects screened into the cumulative effects assessment for impacts from temporary damage and disturbance of the seabed include the proposed Oriel Wind Park and Oriel ECC Power Cable, maintenance dredging within the River Boyne (Drogheda Port Company - Dredging), sediment disposal at Warrenpoint B, and maintenance activities associated with active telecommunications and power transmission cables and active oil and gas pipelines,

As detailed in Section 13.5.2.2 it is predicted that up to 6.2km^2 of seabed would be temporarily damaged or disturbed during the construction phase of the proposed development (Table A13.7). The loss of sedimentary habitats resulting from the construction of the Oriel Wind Park is predicted to be smaller compared to that assessed for the proposed development, with approximately 0.7km^2 of seabed predicted to be temporarily damaged during the offshore construction phase (Oriel Windfarm, 2024b). Maintenance activities would temporarily damage and disturb up to 0.7km^2 of seabed at the proposed development (Table A13.7) and 0.4km^2 at Oriel Wind Park (Oriel Windfarm, 2024b). Any changes to the seabed and effects on sensitive fish and shellfish receptors resulting during the construction of the proposed development and Oriel Wind Park are expected to be restricted to discrete areas within the array areas and ECCs, and as such these would be of local spatial extent. Cumulative impacts would be of short-term duration, intermittent and reversible.

Physical impacts to the seabed associated with remaining shortlisted Tier 1 projects are also expected to be of local extent, temporary and reversible, with the cumulative duration of activities expected to be at most short-term.

Broadscale habitat maps (INFOMAR, 2023) show that the subtidal benthic substrates that would be affected are common and widespread within the study area and wider region. Furthermore, the fish and shellfish receptors, including their spawning and nursery grounds, are widely distributed within the cumulative assessment area. Therefore, any cumulative effects on fish and shellfish receptors resulting from potential simultaneous disturbances to the seabed from the proposed development in-combination with Tier 1 projects are anticipated to be at most barely discernible from baseline conditions. Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 projects is assessed as being low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.5.2 Tier 1 and Tier 2

Tier 2 projects screened into the cumulative effects assessment for impacts from temporary damage and disturbance of the seabed include the proposed MaresConnect interconnector power cable.

Cumulative effects may arise during simultaneous offshore construction activities associated with the installation of the proposed MaresConnect electricity interconnector.

Installation methodologies, location and the construction programme for the MaresConnect interconnector are unknown at the time of writing. However, physical impacts to the seabed associated with this project are expected to be of local extent, temporary and reversible, with the cumulative duration of activities expected to be at most short-term.

Broadscale habitat maps (INFOMAR, 2023) show that the subtidal benthic substrates that would be affected are common and widespread within the wider region. Furthermore, the fish and shellfish receptors are widely distributed within the study area and wider western Irish Sea have comparatively large spawning and nursery areas (see Section 13.3). Therefore, any cumulative effects on fish and shellfish receptors resulting from potential simultaneous disturbances to the seabed from the proposed development in-combination with Tier 1 and Tier 2 projects are anticipated to be at most barely discernible from baseline conditions. Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 and Tier 2 projects is assessed as being low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.5.3 Tier 1, Tier 2 and Tier 3 (all tiers)

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

In summary, temporary damage or disturbance to the seabed resulting from the Tier 1 and Tier 2 projects will be localised, intermittent and reversible. Any cumulative changes to the distribution and abundance of sensitive fish and shellfish receptors resulting from Tier 1 and Tier 2 projects are assessed to be barely discernible from baseline conditions given the localised nature of the impact and the wide distribution of available supporting seabed habitats including spawning and nursery grounds. Therefore, it is concluded that the maximum magnitude of potential cumulative effects on fish and shellfish receptors from the proposed development in-combination with Tier 1 and Tier 2 projects will be comparable to the project alone, i.e. low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table A13.6 is considered necessary, and no significant adverse residual cumulative effects on fish and shellfish receptors have been predicted in respect to this impact.

13.9.6 Cumulative Impact 3: Cumulative underwater noise and vibration during the construction phase of the proposed development

The key changes to this section reflect the design refinements, made in response to the RFI. These design refinements remove the previously proposed monopile foundations, the piling of which is a major source of underwater noise during construction, resulting in a significant reduction in predicted UWN noise levels arising from the proposed development. To reflect these changes, Section 13.9.6 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein:

13.9.6.1 Tier 1

As detailed in Table A13.7, no piling operations are proposed as part of the proposed development project design, with WTGs proposed to be installed on SBJs and the OSP mounted on jacket foundations with either drilled pin piles or SBJs. Given this installation approach, the greatest underwater noise impact range during construction at the proposed development would arise from UXO clearance activities, with underwater noise also generated from geophysical surveys and non-impulsive sounds generated from vessel operations and construction activities.

As described in Section 13.91, and presented in Table A13.17, all proposed East Coast Phase One Projects within 100km from the proposed development have been taken forward to assess cumulative impacts from underwater noise on the basis of these projects generating impulsive sounds, the overlap in construction periods with the proposed development, and the mobile nature of many receptors. In addition, the OMF at Greenore Port and construction activities associated with the Dublin Port Masterplan (MP2 Project and 3FM Plan) have also been screened into the assessment as the proposed activities for these projects include piling which will generate high intensity impulsive underwater noise.

For projects that generate continuous sounds only (e.g., cable and pipeline maintenance activities and associated vessel operations) a precautionary 10km screening buffer has been applied, resulting in the screening in of potential maintenance activities associated with existing subsea cables and oil and gas pipelines (Table A13.17).

The following sections assess the potential for significant cumulative effects on fish and shellfish receptors from different noise sources, specifically for UXO clearance operations at the proposed development cumulatively with UXO clearance operations at other East Coast Phase One projects, UXO clearance operations associated with the proposed development cumulatively with UXO clearance and piling operations associated with the screened in Tier 1 projects, and UXO clearance operations at the proposed development cumulatively with activities that generate continuous underwater noise.

Cumulative underwater noise from UXO clearance

Tier 1 projects screened into the cumulative effects assessment for impacts from UXO clearance operations include Oriel Wind Park, Dublin Array, Codling Wind Park, and Arklow Bank Wind Park Phase 2.

As detailed in Table A13.7, no piling operations are proposed as part of the proposed development project design, with WTGs proposed to be installed on SBJs and the OSP mounted on jacket foundations with either drilled pin piles or SBJs. Given this installation approach, the greatest underwater noise impact range during construction at the proposed development would arise from UXO clearance activities.

As assessed in Section 13.5.2.4 (Impact 4), UXO clearance has the potential to result in mortality, mortal injury, recoverable injury, TTS and disturbance to fish and shellfish species, depending on the proximity of the individuals to the UXO location and the size of the UXO. Mortality and potential mortal injury in fish, marine turtles and eggs and larvae during unmitigated high order UXO clearance at the proposed development is predicted to occur up to 810m from the detonation site, based on the maximum UXO charge size of 525kg and an additional donor weight of 0.5kg to initiate detonation (Appendix A14.1).

Site investigations at the proposed Oriel Wind Park indicated a low risk of encountering UXO within the development area and as such, UXO clearance is not anticipated to be required for this project (Oriel Windfarm, 2025b). At the proposed Codling Wind Park, up to ten UXO may require clearance (Codling Wind Park, 2025), while at Dublin Array up to four high order UXO detonations may take place (Kish Offshore Wind Ltd., 2025). For both projects, mortality and potential mortal injury during high-order UXO clearance is predicted to occur up to 810m from the detonation site, based on a maximum charge weight of 525kg. At Arklow Bank Wind Park Phase 2, the maximum charge weight required for high order UXO removal has been estimated at 800kg (plus a charge weight of 0.5kg), which is predicted to result in mortality and potential mortal injury in sensitive receptors up to 930m from the detonation site (SSE Renewables, 2026). The risk of recoverable injuries resulting from high-order UXO clearance is assessed to be low at far distances (1000s of metres) from the detonation site (Popper *et al.*, 2014), and as such this is expected to be a small-scale impact.

Considering the distance between the proposed development and other East Coast Phase One projects together with the predicted impact ranges for UXO clearance operations presented above the maximum impact zones for the onset of mortality and recoverable injuries during UXO clearance at the identified East Coast Phase One projects are unlikely to overlap with those predicted for the proposed development. Moreover, UXO clearance operations at the Phase One OWF sites will follow a UXO mitigation hierarchy similar to that adopted for the proposed development, with high order UXO detonation only used when other clearance options (e.g., avoidance, removal and low order deflagration) are not possible. In addition, high order UXO clearance at the proposed development and Dublin Array will be undertaken using a NAS (e.g., a bubble curtain or similar), which will further reduce the likelihood of cumulative mortal and/ or recoverable injuries due to UXO clearance operations.

As discussed in Section 13.5.2.4, any potential TTS and disturbance effects arising from UXO detonations would be reversible and temporary, and sensitive receptors are anticipated to resume normal behaviour and distribution shortly after the clearance event. Moreover, each UXO detonation within the respective East Coast Phase One development areas would be a discrete and brief event (lasting less than one day), with impulsive sounds anticipated to be momentary (i.e., seconds to minutes). Therefore, it is concluded that the likelihood of concurrent clearance events between East Coast Phase One projects is low, thereby reducing the likelihood of cumulative effects.

Moreover, while these events may result in some temporary disturbance and re-distribution to fish and shellfish receptors, given the brief nature of the impact, they are unlikely to result in widespread and long-term displacement of individuals from migration routes or specific spawning or nursery grounds.

Based on the considerations set out above, it is concluded that any cumulative effects upon fish and shellfish receptors from UXO clearance would at most result in barely discernible changes from baseline conditions. Consequently, the magnitude of the cumulative impact with respect to UXO clearance activities associated with Tier 1 projects is concluded to be low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

Cumulative underwater noise from UXO clearance and piling

While piling is no longer included in the construction strategy for the proposed development, when considering the potential for impacts to fish, shellfish and marine turtle receptors from underwater noise in combination with other projects, particularly those that include piling operations, the overall spatial extent within which cumulative effects may occur is expected to increase. Therefore, the cumulative impact assessment considers the potential for cumulative impacts from UXO clearance operations at the proposed development in-combination with projects that may generate impulsive noise during piling and/ or underwater explosions associated with UXO clearance.

Tier 1 projects screened into the cumulative effects assessment for impacts from piling and UXO clearance operations include Oriel Wind Park, Dublin Array, Codling Wind Park, Arklow Bank Wind Park Phase 1, OMF at Greenore Port, and the Dublin Port MP2 Project.

The proposed construction periods of the East Coast Phase One ORE projects (i.e., Oriel Wind Park, Dublin Array, Codling Wind Park, and Arklow Bank Wind Park Phase 2) indicate the potential for construction to occur concurrently with offshore construction activities at the proposed development (2028-2030). Piling operations at these offshore wind farm sites would result in the largest spatial and temporal extents of underwater noise impacts and are therefore assessed for their potential to contribute to cumulative impacts on sensitive fish and shellfish receptors. The project parameters (with respect to piling) and the proposed construction periods of the screened in Phase One projects are summarised below together with the outputs of predicted underwater noise modelling undertaken to inform the EIARs of these developments:

- Oriel Wind Park is proposed to be located approximately 17km from the proposed development at its nearest point (Table A13.16). The project would comprise up to 25 WTGs and one OSS, installed on monopile foundations of 9.6m diameter using piling followed by drilling (Oriel Windfarm, 2024a). Offshore construction is anticipated to commence in Q4 of 2028 and will take approximately 15 months, and operation is anticipated to commence in Q2 2030 (Oriel Windfarm, 2025a). Piling of foundations is expected to occur over a total of 26 days during the construction period using a maximum hammer energy of 3,500kJ (Oriel Windfarm, 2024b). Impact ranges for the onset of TTS during piling are predicted up to 9.6km for stationary receptors and 5.5km for fleeing receptors (Oriel Windfarm, 2025b).
- Dublin Array is proposed to be located approximately 33km from the proposed development at its nearest point (Table A13.16). The project would comprise up to 50 WTGs and one OSP, installed on either monopile or multi-leg foundations on pin piles using piling. Dates for offshore construction have been identified as 2029-2032, with piling operations anticipated to range from 18 to 30 months. Piling of foundations is expected to occur over a maximum of 125 days during the construction period using a maximum hammer energy of 6,372kJ during the piling of monopiles and 4,695kJ during the piling of pin piles. Impact ranges for the onset of TTS during piling are predicted up to 29km for stationary receptors and 9.3km for fleeing receptors (Kish Offshore Wind Ltd., 2025).
- Codling Wind Park is proposed to be located approximately 51km from the proposed development at its nearest point. The project would comprise up to 75 WTGs and three OSPs on monopile foundations, installed using piling, drilling or vibropiling. Indicative dates for offshore construction activities at Codling Wind Park have been identified as 2026-2029. Piling of foundations is expected to occur over a total of 75 days during the construction period using a maximum hammer energy of 4,400kJ. Impact ranges for the onset of TTS are predicted up to 34km for stationary receptors and 24km for fleeing receptors (Codling Wind Park, 2025).

- Arklow Bank Wind Park Phase 2 is proposed to be located approximately 76km from the proposed development at its nearest point. The project would comprise up to 53 WTGs installed on monopiles with a pile diameter between 7 to 11m and a maximum of two OSPs installed on monopiles with a pile diameter between 7 and 14m (SSE Renewables, 2026). Indicative dates for construction have been identified as 2027 to 2030. Piling of foundations is expected to occur over a total of 75 days during the construction period using a maximum hammer energy of 3,500kJ. Impact ranges for the onset of TTS during piling are predicted up to 39km for stationary receptors and 28km for fleeing receptors (SSE Renewables, 2026).

As detailed above, mortality and potential mortal injury during unmitigated high-order UXO clearance at the proposed development is predicted to occur up to 810m from the detonation site, based on the maximum UXO charge size of 525kg and an additional donor weight of 0.5kg to initiate detonation. The relative risk of recoverable injury, TTS and behavioural changes in the most hearing sensitive fish species (hearing group 3 and 4) is considered to be high at near (10s of meters) and intermediate (100s of meters) distances from the sound source and low at far (1000s of meters) distances from the detonation site (Popper *et al.*, 2014). Given the distance between the proposed development and other East Coast Phase One projects and considering the predicted maximum impact range associated with piling operations at those projects, the risk of cumulative mortality, recoverable injury, TTS and behavioural effects from overlapping noise contours during concurrent UXO clearance at the proposed development and UXO clearance and piling at other East Coast Phase One projects is concluded to be low. Moreover, as outlined previously, a NAS (e.g., a bubble curtain or similar) will be used during high-order UXO clearance at the proposed development, reducing the maximum sound levels produced and the area over which effects on sensitive receptors may occur.

Piling activities are also proposed for projects located at Greenore Port and within Dublin Port. Construction of an OMF at Greenore port will involve piling during the construction of a quay wall and new pontoons (Greenore Port Unlimited Company, 2024), and construction activities within Dublin Port as part of the Dublin Port Masterplan MP2 Project include the piling for new quay walls and mooring dolphins (RPS, 2020). Piling operations are also proposed for the third project of the Dublin Port Masterplan (3FM Plan) for the construction of a new jetty amongst other marine infrastructure (RPS, 2022). Noise modelling undertaken on behalf of the Dublin Port Company predict that the underwater noise impact zone for piling associated with the MP2 Project will be limited to the navigational channel of Dublin Harbour and the River Liffey (RPS, 2020). Underwater noise modelling for piling associated with the 3FM Dublin Port project predict that, under piling parameters with the greatest magnitude of impact for a static receptor, fish may experience TTS within a maximum range of 300m during the longest continuous piling durations (1,200 blows or one hour) (RPS, 2022). Site-specific information relating to the duration and specifications of piling operations at Greenore Port are currently not available, but the project predicts similar impact ranges to those modelled for piling operations within Dublin Port for the Alexandra Basin Redevelopment, which constituted the first project of the Dublin Port Masterplan (Greenore Port Unlimited Company, 2024). As detailed in the Alexandra Basin Re-development EIAR (RPS, 2014), injurious effects in Group 2 fish were predicted to occur up to 295m from the piling source (based on 5,000 pile strikes). These estimates, however, were derived using the Carlson *et al.* (2007) method, which is based on a theoretical model, and should therefore be interpreted with caution. Drawing on the qualitative Popper *et al.* (2014) criteria for pile driving, the risk of TTS and disturbance to the most sensitive receptors (group 3 and group 4 fish) from piling activities at each of the projects described above is predicted to be high up to hundreds of meters away, and low up to thousands of meters away.

Given the distance between the proposed development and Dublin Port (> 31km) and the OMF at Greenore Port (> 34km), it is concluded that there is unlikely to be any spatial overlap between the maximum impact ranges for the onset of mortality and recoverable injury associated with piling at the OMF and Dublin Port and the respective impact ranges associated with UXO clearance at the proposed development. Moreover, piling for the OMF and new infrastructure in Dublin Harbour is anticipated to occur at most infrequently and would be temporary, making the occurrence of concurrent noise-generating events unlikely. Any potential TTS or behavioural responses would be temporary and reversible, and it is therefore expected that sensitive receptors would resume to normal behaviour and distribution shortly after operations have ceased.

Based on the considerations set out above, it is concluded that the potential of the proposed development to contribute to cumulative effects on fish and shellfish receptors from impulsive underwater noise sources is low and will result in at most barely discernible changes to baseline conditions. Therefore, the overall magnitude of the cumulative impact is deemed to be low (adverse).

As per the project alone assessment, the maximum sensitivity of the receptors to underwater noise from UXO clearance is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

Cumulative underwater noise from other noise sources

Tier 1 projects screened into the cumulative effects assessment for impacts from other noise sources include maintenance activities associated with existing subsea cables and oil and gas pipelines. These activities would generate non-impulsive sounds similar to those generated during the construction of the proposed development (e.g., vessel noise, trenching). It is anticipated that, following standard practises, vessel moving to and from construction sites will, for the majority, use existing vessel routes for pre-existing vessel traffic (Table A13.6), which fish and shellfish receptors will be accustomed to. They may also have become habituated to the noise generated by regular vessel movements, and therefore it is considered that potential cumulative effects may predominantly result at the construction sites.

As assessed in Section 13.5.2.4 (Impact 4), the sound levels emitted from non-impulsive sources are unlikely to result in mortality and mortal injury in fish and shellfish receptors but may cause recoverable injury and TTS, particularly in species with enhanced sensitivities to sound pressure. Current evidence suggests that these effects would be restricted to the immediate vicinity of operations (within 10s of metres) and only occur if individuals stay near the sound source for several hours continuously (Popper *et al.*, 2014). Similarly, the risk of adverse cumulative behavioural reactions from overlapping noise contours or because of sequential disturbances is considered to be low, given the reversibility of the effects and the intermittent and temporary to short-term nature of the activities. Therefore, as for the project alone assessment, the magnitude of the impact for Group 3 and Group 4 fish VERs is deemed at most low (adverse). Given their lower hearing capabilities and the lower risk of recoverable injuries and TTS, the magnitude of the impact for the remaining receptors (Group 1 and Group 2 fish, shellfish, eggs and larvae, and marine turtles) is deemed to be negligible.

As per the project assessment alone, the maximum sensitivity of all fish and shellfish VERs to non-impulsive sounds is deemed to be low. This together with the maximum low (adverse) magnitude of the impact would at most result in slight (adverse) cumulative effects, which is not significant in EIA terms.

13.9.6.2 Tier 1 and Tier 2

Tier 2 projects screened into the cumulative effects assessment for impacts from underwater noise during the construction phase of the proposed development include the proposed MaresConnect interconnector power cable.

Construction of the proposed MaresConnect interconnector will generate non-impulsive sounds similar to those generated during the construction of the proposed development. No information on the construction schedule of the interconnector and installation activities is currently available. However, any potential disturbance effects during construction operations will be temporary, with affected individuals expected to resume to normal behaviours shortly after activities have ceased. Any potential recoverable injuries or TSS as a result of non-impulsive construction sounds are anticipated to be highly localised (i.e., within 10s of metres, see Section 13.5.2.4), and therefore the potential for cumulative effects is limited. Based on the above, it is concluded that any simultaneous or sequential effects resulting from underwater noise generated during the construction of the MaresConnect interconnector and the proposed development would be no greater in magnitude than those predicted for the project alone (i.e., low (adverse), Impact 4). Furthermore, given the likely intermittent and temporary nature of construction activities of the MaresConnect power cable combined with the reversibility of any potential TTS and behavioural effects, it is concluded that when considered across Tier 1 and Tier 2 projects, effects on sensitive fish and shellfish receptors would be no greater in magnitude than those predicted for the proposed development in-combination with Tier 1 projects (i.e., low (adverse), see previous section). Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 and Tier 2 projects is assessed as being low (adverse).

As per the project assessment alone, the maximum sensitivity of all fish and shellfish VERs to non-impulsive sounds is deemed to be low. This together with the maximum low (adverse) magnitude of the impact would at most result in slight (adverse) cumulative effects, which is not significant in EIA terms.

13.9.6.3 Tiers 1, Tier 2 and Tier 3 (all tiers)

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

In summary, the above assessments concluded that when considered across all tiers (i.e., Tier 1, Tier 2 and Tier 3 projects), underwater noise would result in at most barely discernible changes to baseline conditions of the most sensitive receptors, and as such the overall magnitude of the cumulative impact from underwater noise is deemed to be low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table A13.6 is considered necessary, and no significant adverse residual cumulative effects on fish and shellfish receptors have been predicted in respect to this impact.

13.9.7 Cumulative Impact 4: Cumulative long-term or permanent loss of benthic habitats due to the placement of subsea infrastructure

The key changes to this section reflect changes to the topic-specific short-list of projects screened into the cumulative effects assessment for fish and shellfish receptors, amendments to the cumulative assessment methodology including the tiering system to follow the NSIP 2024 guidance, as per RFI Section 5, and changes to the proposed development design, which has resulted in an increase in the area of long-term habitat loss for both Project Option 1 and Project Option 2. To reflect the changes, Section 13.9.7 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein:

The presence of infrastructure on the seabed, including turbine foundations, scour protection and cable protection, will cause long-term changes in the extent and distribution of benthic habitats, which may affect the distribution and abundance of sensitive fish and shellfish receptors that depend on the seabed. Also, any infrastructure left in situ following decommissioning will represent a permanent loss of habitat. The potential for significant cumulative effects on fish and shellfish receptors because of simultaneous long-term or permanent loss of benthic habitats is assessed in the following sections.

13.9.7.1 Tier 1

Tier 1 projects screened into the cumulative effects assessment for impacts from long-term loss of benthic habitats include the proposed Oriel Wind Park and Oriel ECC Power Cable.

As detailed in 13.5.3.3, it is predicted that up to 0.53km^2 of seabed would be permanently lost due to the installation of foundations, scour protection and cable protection associated with the proposed development alone (Table A13.7). The loss of sedimentary habitats resulting from the construction of the Oriel Wind Park is predicted to be slightly smaller compared to that assessed for the proposed development, with approximately 0.3km^2 of seabed predicted to be lost due to the placement of foundations, scour protection and cable protection (Oriel Windfarm, 2024b). Any long-term or permanent loss of seabed habitats will be highly localised and restricted to discrete areas within the array areas and ECC, resulting in a cumulative loss of sedimentary habitats with the proposed development of approximately 0.83km^2. While the impact will be locally significant and comprise a permanent change in seabed habitat within the footprint of the structures and scour and cable protection, the footprint of the area affected is highly localised.

Broadscale habitat maps (INFOMAR, 2023) show that the subtidal benthic substrates that would be lost are common and widespread within the study area and wider region. Furthermore, the fish and shellfish receptors that rely on these substrates are widely distributed within the cumulative assessment area. Therefore, any effects on fish and shellfish receptors due to the cumulative loss of benthic habitats from the proposed development in-combination with the identified Tier 1 projects are anticipated to be at most barely discernible from baseline conditions. Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 projects is assessed as being low (adverse).

As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.7.2 Tier 1 and Tier 2

Tier 2 projects screened into the cumulative effects assessment for impacts from long-term loss of benthic habitats include the proposed MaresConnect interconnector power cable.

The proposed MaresConnect interconnector may contribute to the cumulative long-term loss of benthic fish and shellfish habitats through the placement of cable protection measures. No information relating to the use of cable protection by the proposed development is currently available. However, any loss of seabed habitats predicted from the proposed development would be highly localised in the context of habitats available to fish and shellfish receptors within the screening range and wider region. Therefore, cumulatively with the proposed development and the Tier 1 and Tier 2 projects, at most barely discernible changes to fish and shellfish receptors are expected. Consequently, the maximum magnitude of the cumulative impact with respect to Tier 1 and Tier 2 projects is assessed as being low (adverse).

As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.7.3 Tier1, Tier 2 and Tier 3 (all tiers)

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

Cumulatively with the proposed development and the identified Tier 1 and Tier 2 projects, at most barely discernible changes to fish and shellfish receptors are expected. Consequently, the maximum magnitude of cumulative losses of the seabed with respect to Tier 1 and Tier 2 projects is assessed as being low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be medium. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table A13.6 is considered necessary, and no significant adverse residual cumulative effects on fish and shellfish receptors have been predicted in respect to this impact.

13.9.8 Cumulative Impact 5: Cumulative barriers to movement through the presence of EMF from cables

The key changes to this section reflect changes to the topic-specific short-list of projects screened into the cumulative effects assessment for fish and shellfish receptors and amendments to the cumulative assessment methodology including the tiering system to follow the NSIP 2024 guidance, as per RFI Section 5. This includes the removal of operational telecommunication cables from the in-combination assessment for EMF effects on fish and shellfish receptors as the EMFs generated by these cables are negligible. To reflect the changes, Section 13.9.8 of Chapter 13 of the 2024 EIAR shall be removed and replaced with the text herein:

13.9.8.1 Tier 1

Tier 1 projects screened into the cumulative effects assessment for impacts from EMF include the proposed Oriel Wind Park and Oriel ECC Power Cable and the active East West Interconnector Power Cable.

The potential maximum magnitude of the impact during the operation of the proposed development has been assessed as low (adverse), based on the rapid attenuation of EMFs away from the cables and the localised nature of potential behavioural changes in sensitive receptors. Based on similar technology and project designs (use of 66 kV AC inter-array cables and 220 kV AC offshore export cables; Oriel Windfarm, 2024b), the extent of EMF emissions from power transmission cables associated with the proposed Oriel Wind Park is also expected to be highly localised and restricted to areas within the immediate proximity of the cable lines. Based on the same rationale, behavioural changes in sensitive receptors resulting from EMFs produced by existing power cables are expected to be restricted to the immediate proximity of the cable lines. The fish and shellfish receptors are widely distributed within the study area and use comparatively large feeding, spawning and nursery areas. Therefore, cumulative increases in the spatial extent of areas affected by artificial EMFs emitted from active power cables are considered to be small in relation to the extent of habitats used by fish and shellfish species within the study area and wider West Irish Sea region. As per the project alone assessment, any cumulative behavioural responses of sensitive fish and shellfish receptors are therefore assessed as being at most barely discernible from baseline conditions. Consequently, the maximum magnitude of cumulative emissions of EMF with respect to Tier 1 projects is assessed as being low (adverse).

As per the project alone assessment, the maximum sensitivity of the receptors to EMFs generated from subsea power transmission cables is deemed to be low. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.8.2 Tier 1 and Tier 2

Tier 2 projects screened into the cumulative effects assessment for impacts from EMF include the proposed MaresConnect interconnector power cable.

There is potential for the MaresConnect electricity interconnector to contribute to ongoing EMF emissions within the cumulative assessment area for EMF effects (24km screening range). Based on the same rationale as presented above for EMFs generated by Tier 1 projects, any behavioural responses of sensitive fish and shellfish receptors are expected to be restricted to the immediate proximity of the cable lines. Any cumulative behavioural changes with the proposed development and Tier 1 projects are concluded to be at most barely discernible from baseline conditions. Consequently, the maximum magnitude of cumulative emissions of EMF with respect to Tier 1 and Tier 2 projects is assessed as being low (adverse). As per the project alone assessment, the maximum sensitivity of the receptors to the impact is deemed to be low. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.8.3 Tier 1, Tier 2 and Tier 3 (all tiers)

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

In summary, EMFs emitted from the proposed development and all Tier 1 and Tier projects screened into the assessment are predicted to result in highly localised behavioural responses in electro- and magneto-sensitive receptors. Given the wide distribution of the receptors within the cumulative assessment area and the distances between the assessed projects (10s of kilometres), any potential cumulative changes in the distribution of individuals are assessed to result in at most barely discernible changes to baseline conditions, and as such the overall magnitude of the cumulative impact when assessed across all tiers is deemed to be low (adverse). This together with the maximum low sensitivity of the receptors would result in a slight (adverse) cumulative effect, which is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table A13.6 is considered necessary, and no significant adverse residual cumulative effects on fish and shellfish receptors have been predicted in respect to this impact.

13.9.9 Cumulative Impact 6: Cumulative underwater noise and vibration from operational wind turbines

Underwater noise arising from operational WTGs has been screened into the cumulative impact assessment in response to RFI Section 11 (g). Therefore, Cumulative Impact 6 has been added to the assessment and does not replace any text from Chapter 13 of the 2024 EIAR.

13.9.9.1 Tier 1

Tier 1 projects screened into the cumulative effects assessment for impacts from operational turbine noise include Arklow Bank Wind Park Phase 1 and all East Coast Phase one projects (i.e., Oriel Wind Park, Dublin Array, Codling Wind Park, and Arklow Bank Wind Park Phase 2).

As discussed in Section 13.5.3.7, underwater noise arising from operational offshore wind turbines has the potential to alter the acoustic soundscape around WTGs. Whilst it is likely that some species present within the areas around the WTGs will be able to detect the operational turbine sounds, the emitted sound levels are below levels known to cause physical injury in fish and shellfish receptors. There is potential for higher capacity WTGs to induce TTS in the most sensitive fish species (hearing group 3 and 4); however modelling of the predicted source levels against the Popper *et al.* (2014) thresholds for continuous noise indicate that the threshold for the onset of TTS from continuous turbine sounds would only be reached at a distance below the limit of detection of standard noise propagation models (< 50 m). Moreover, for TTS to occur, an animal would have to stay within the immediate vicinity of the turbine for several hours continuously (Popper *et al.*, 2014). Any behavioural changes would, if occurring, affect a small proportion of receptor populations within the vicinity of the WTGs and are unlikely to lead to a significant distribution of fish and shellfish within the array areas of the respective OWF projects.

Given the distance between the proposed development and the operational and proposed OWF projects screened into the cumulative effects assessment, the impact ranges of any potential TTS and/ or behavioural changes in sensitive fish and shellfish receptors will not overlap. Based on this and considering the highly localised nature of any potential disturbance effects, it is concluded that cumulative effects from operational turbine noise will at most be barely discernible from baseline conditions for the most hearing-sensitive fish species. The magnitude of the cumulative impact is therefore, on a pre-cautionary basis, considered to be low (adverse).

As per the project alone assessment, the sensitivity of fish and shellfish receptors to continuous noise arising from operational turbines is deemed to be low. At most, this would result in a slight (adverse) cumulative effect, which is not significant in EIA terms.

13.9.9.2 Tier 1 and Tier 2

No Tier 3 projects were screened into the cumulative effects assessment for Cumulative Impact 6.

13.9.9.3 Tier 1, Tier 2 and Tier 3 (all tiers)

No Tier 3 projects were screened into the cumulative effects assessment for Fish and Shellfish Ecology.

In summary, underwater noise generated by operational turbines of the proposed development in-combination with operational turbine noise emitted from existing and proposed OWF projects within the cumulative assessment area (100km screening range) is assessed to result in at most barely discernible changes to baseline conditions, and as such the overall magnitude of the cumulative impact when assessed across all tiers is deemed to be low (adverse). This together with the low sensitivity of the receptors to continuous noise would result in a slight (adverse) cumulative effect, which is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table A13.6 is considered necessary, and no significant adverse residual cumulative effects on fish and shellfish receptors have been predicted in respect to this impact.

13.10 References

The following references are added to the reference list in Section 13.10 of Chapter 13 of the 2024 EIAR.

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