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Environmental Impact Assessment Report (EIAR) Addendum

Part 1

(Non-Technical Summary and Chapters 1 to 13 of the EIAR)

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Abbreviations

Abbreviation	Term in full
AAM	Alternative Alignment for the Purposes of Modelling
ABR	Alexandra Basin Redevelopment
AC	Alternating current
ACP	An Coimisiún Pleanála
ADD	Acoustic deterrent device
AEP	Annual exceedance probability
AEZ	Archaeological Exclusion Zone
AIS	Automatic Identification System
AL	Action Level
AP	Acoustic pipeline
ASL	Above sea level
BAI	Bat Activity Index
BIM	Bord Iascaigh Mhara
BO	Band Option
BTO	British Trust for Ornithology
CEA	Cumulative Effects Assessment
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CGR	Counterfactual Growth Rate
CI	Confidence Interval
CLV	Cable laying vessel
CPS	Counterfactual Population Size
CPUE	Catch per unit effort
CRM	Collision Risk Model
cSPA	Candidate Special Protection Are
CWP	Codling Wind Park
DAS	Digital Aerial Survey
DBT	Dibutyltin
DDV	Drop-down video
DRM	Dispute resolution mechanism
eDNA	Environmental deoxyribonucleic acid

Abbreviation	Term in full
EDR	Effective Deterrence Ranges
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic field
EPA	Environmental Protection Agency
ESAS	European Seabirds at Sea
EVMP	Ecological Vessel Management Plan
FIR	Further information request
FLOWW	Fishing liaison with offshore wind and wet renewables group
GB	Great Britian
GIS	Geographic Information System
HF	High Frequency
HRA	Habitats Regulations Assessment
IAA	Irish Aviation Authority
IAC	Inter-array cable
IBTS	International Bottom Trawl Survey
ICES	International Council for the Exploration of the Sea
IEF	Important Ecological Feature
INNS	Invasive Non-Native Species
iPCoD	Interim Population Consequences of Disturbance
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
JUV	Jack-Up Vessel
LF	Low Frequency
LoD	Limit of deviation
LVIA	Landscape and Visual Impact Assessment
MAC	Maritime Area Consent
MAGIC	Multi-Agency Geographic Information for the Countryside MAGIC
MARA	Maritime Area Regulatory Authority
MBT	Monobutyltin
MHWS	Mean High Water Spring
MISE	Mammals in a Sustainable Environment (MISE)
MLWS	Mean Low Water Springs

Abbreviation	Term in full
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Mammal Observer
MNCR	Marine Nature Conservation Review
MP2	Masterplan Phase 2
MSFD	Marine Strategy Framework Directive
MU	Management Unit
N	Nursery
NIGFS	Northern Irish Groundfish Survey
NIS	Natura Impact Statement
NM	Nautical Mile
NMPF	National Marine Planning Framework
NSP	Navigational Safety Plan
OECC	Offshore Export Cable Corridor
ORE	Offshore renewable energy
OREI	Offshore Renewable Energy Installations
OSS	Offshore substation
PA	Preferred Alignment
PAB	Proposed Application Boundary
PAHs	Polycyclic Aromatic Hydrocarbons
PAM	Passive Acoustic Monitoring
PCBs	Polychlorinated Biphenyls
PCW	Phocid Carnivores in Water
PD	Project Description
PSA	Particle Size Analysis
PTS	Permanent threshold shift
ROI	Republic of Ireland
S	Spawning
SAC	Special Area of Conservation
SAR	Search and Rescue
SBP	Sub bottom profilers
SELcum	Cumulative Sound Exposure Level
SF6	Sulphur Hexafluoride
SFPA	Sea Fisheries Protection Authority

Abbreviation	Term in full
SOLAS	International Convention for the Safety of Life at Sea
SPA	Special Protection Area
SPLpeak	Peak Sound Pressure Level
SSC	Suspended sediment concentration
TBT	Tributyltin
TTS	Temporary Threshold Shift
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
USB	Ultra-short baselines
USBL	Ultrasonic Baseline
UWN	Underwater Noise
UWTV	Underwater Television
UXO	Unexploded ordnance
VHF	Very High Frequency
WFD	Water Framework Directive
WTG	Wind turbine generator
ZoI	Zone of influence

PREFACE

1. On Friday 6th September 2024 Codling Wind Park Ltd. (referred to hereafter as the 'Applicant') applied for planning permission to An Bord Pleanála (now An Coimisiún Pleanála (and referred to hereafter as the Commission)) under Section 291 of the Planning and Development Act 2000, as amended, for the construction, operation and decommissioning of the CWP Project. On 1st August 2025, having reviewed the application documentation, including the EIAR, the Commission issued a Further Information Request (FIR) in relation to the CWP Project.

2. The Environmental Impact Assessment Report (EIAR) Addendum has been developed in response to the FIR from the Commission. This document forms **Part 1** of the EIAR Addendum.

3. The topic addendums provided in this document should now be read in conjunction with original topic chapters provided in the EIAR revision and which were included with the CWP Project planning application in September 2024.

4. Not all topic chapters have been amended as a result of the FIR. Where no amendments are made to a topic chapter, this is clearly stated in the EIAR Addendum under the relevant chapter number.

5. The EIAR Addendum is laid out as follows:

- Part 1 (**this document**) contains the following topics:
    - Chapter 1 Introduction
    - Chapter 2 Policy and Legislative Context
    - Chapter 3 Site Selection and Consideration of Alternatives
    - Chapter 4 Project Description
    - Chapter 5 Environmental Impact Assessment Methodology
    - Chapter 6 Marine Geology, Sediments and Coastal Processes
    - Chapter 7 Marine Water Quality
    - Chapter 8 Subtidal and Intertidal Ecology
    - Chapter 9 Fish, Shellfish and Turtle Ecology
    - Chapter 10 Ornithology
    - Chapter 11 Marine Mammals
    - Chapter 12 Commercial Fisheries
    - Chapter 13 Offshore Bats

- Part 2 contains the following topics:
    - Chapter 14 Marine Archaeology and Cultural Heritage
    - Chapter 15 Seascape, Landscape and Visual Impact
    - Chapter 16 Shipping and Navigation
    - Chapter 17 Aviation, Military and Radar
    - Chapter 18 Material Assets – Marine Infrastructure
    - Chapter 19 Land, Soils and Geology
    - Chapter 20 Hydrology and Hydrogeology
    - Chapter 21 Onshore Biodiversity
    - Chapter 22 Onshore Archaeological, Architectural and Cultural Heritage
    - Chapter 23 Landscape and Visual Impact Assessment (LVIA)
    - Chapter 24 Noise and Vibration
    - Chapter 25 Air Quality
    - Chapter 26 Material Assets Built Services
    - Chapter 27 Traffic and Transport

- Chapter 28 Climate
- Chapter 29 Population
- Chapter 30 Human Health
- Chapter 31 Waste and Resource Management
- Chapter 32 Risk of Major Accidents and Disasters
- Chapter 33 Summary of Mitigation and Monitoring
- Chapter 34 Summary of Residual Effects

VOLUME 1 NON-TECHNICAL SUMMARY

EIAR Volume 1 Non-technical Summary is unchanged.

1 INTRODUCTION

1.1 Introduction

Section 1.1 remains unchanged.

1.2 The Applicant

Section 1.2 remains unchanged.

1.3 Project background

Section 1.3 remains unchanged.

1.4 Maritime Area Consent

Section 1.4 remains unchanged.

1.5 Need for the CWP Project

Section 1.5 remains unchanged.

1.6 The EIA process

Section 1.6 remains unchanged.

1.7 Structure and content of the EIAR

Section 1.7 remains unchanged.

1.8 The Applicant's team and contributors to the EIAR

Section 1.8 remains unchanged.

1.9 References

Section 1.9 remains unchanged.

2 POLICY AND LEGISLATIVE CONTEXT

In summary, EIAR **Volume 2**, **Chapter 2 Policy and Legislative Contex**t is unchanged, however to support the Commission's decision-making framework the Applicant has undertaken a legislation and policy review to identify any changes to planning policy and legislative context since the submission of the planning application on 6th September 2024. The outcome of this review is presented in the **Planning Report Addendum**. This document has been prepared to demonstrate that the CWP Project is compliant with the relevant policy and legislative framework.

2.1 Introduction

Section 2.1 remains unchanged.

2.2 International context

Section 2.2 remains unchanged.

2.3 European context

Section 2.3 remains unchanged.

2.4 European Directives

Section 2.4 remains unchanged.

2.5 Irish planning legislation

Section 2.5 remains unchanged.

2.6 Irish policy context

Section 2.6 remains unchanged.

2.7 Regional context

Section 2.7 remains unchanged.

2.8 Local context

Section 2.8 remains unchanged.

2.9 Conclusion

Section 2.9 remains unchanged.

3 SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

3.1 Introduction

Section 3.1 remains unchanged.

3.2 Background

Section 3.2 remains unchanged.

3.3 Legislation, policy and guidance

Section 3.3 remains unchanged.

3.4 Site selection process and consideration of alternatives methodology

Section 3.4 remains unchanged.

3.5 Consultation

Section 3.5 i remains unchanged.

3.6 Do nothing scenario

Section 3.6 remains unchanged.

3.7 Phase 1: Consideration of alternative array sites (and associated infrastructure)

Section 3.7 remains unchanged.

3.8 Array site infrastructure: consideration of alternative designs

Section 3.8 remains unchanged.

3.9 Phase 2: Consideration of alternative grid connection points

Section 3.9 remains unchanged.

3.10 Phase 3: Consideration of alternative landfall sites

Section 3.10 remains unchanged.

3.11 Landfall infrastructure: consideration of alternative designs

Section 3.11 remains unchanged.

3.12 Phase 4: Consideration of alternative offshore export cable corridors

Section 3.12 remains unchanged.

3.13 Offshore export cables: consideration of alternative designs

Section 3.13 remains unchanged.

3.14 Phase 5: Consideration of alternative onshore substation sites

Section 3.14 remains unchanged.

3.15 Onshore substation infrastructure: consideration of alternative designs

Section 3.15 remains unchanged.

3.16 Phase 6: Consideration of alternative onshore export cable routes

Section 3.16 remains unchanged.

3.17 References

Section 3.17 remains unchanged.

4 PROJECT DESCRIPTION

4.1 Introduction

Section 4.1 remains unchanged.

4.2 Site location and characteristics

Section 4.2 remains unchanged.

4.3 Project design approach

Section 4.3 remains unchanged.

4.4 Construction programme

Section 4.4 remains unchanged.

4.5 Offshore pre-installation activities

Section 4.5 remains unchanged.

4.6 Generating station

Section 4.6 remains unchanged.

4.7 Transmission Component 1 - Offshore transmission infrastructure

4.7.1 Offshore substation overview

Section 4.7.1 remains unchanged.

4.7.2 OSS topside

Section 4.7.2 remains unchanged.

4.7.3 OSS monopile foundation

Section 4.7.3 remains unchanged.

4.7.4 OSS scour protection

Section 4.7.4 remains unchanged.

4.7.5 Offshore export cables

Section 4.7.5 is unchanged except for paragraphs 210 to 211 and Table 4-19.

- Paragraphs 210 to 211 are replaced by paragraphs 1 to 2 below. This update has been made in response to FIR Item 18a (see **FIR Response Document**).
- Table 4-19 is replaced by Table 4-A below. This update has been made in response to FIR Item 18a (see **FIR Response Document**).

It should also be noted that an updated version of Appendix 4-2 Preliminary Offshore Cable Crossing Schedule has been provided in response to FIR item 16b. The updated appendix is provided as part of the EIAR Addendum as **Appendix 4-A Preliminary Offshore Cable Crossing Schedule**.

Installation

Installation methods

1. The Applicant will, where practicable, bury all offshore export cables to a minimum depth of cover of 1.4 m, with a trench depth during installation of 2.0 m. This will provide the cables with protection against damage and reduce interference with fishing activities and other sea users. Apart from in the zone of greater burial depth, where, following cable burial, the minimum depth of cover is inadequate due to unforeseeable seabed conditions, cable protection will be implemented as mitigation to avoid risks to other marine operations, as described in **Section 4.7.6**. The Applicant does not propose to install cable protection in the zone of greater burial depth.
2. As highlighted in planning drawing **0007 Offshore Site Layout Master Plan - Option A (75 WTGs)** (WTG Layout Option A) and **planning drawing 0011 Offshore Site Layout Master Plan - Option (60 WTGs)** (WTG Layout Option B), there is a proposed zone of greater burial depth east of Dún Laoghaire harbour. In this area, a minimum depth of cover of 3.0 m has been assumed for the offshore export cables for the purposes of the EIA.

Installation parameters

Table 4-A Offshore export cable installation parameters

Details	Value
Minimum depth of cover (m)[1]	1.4
Trench depth (m)[1]	2
Width of seabed affected by installation	15
Total seabed disturbed (m^2)	1,890,000–2,187,000
Length of cable installed in 24 hours (km)	5–25

Details	Value
No. of days to install each cable circuit[2]	10–21

[1]Except the cable buried within the zone of greater burial depth adjacent to Dún Laoghaire harbour, which will have an increased minimum depth of cover of 3.0m.

[2]Excluding downtime and installation of cable protection.

4.7.6 Offshore export cable protection

Section 4.7.6 is unchanged except for paragraph 225 which is replaced by paragraph 3 below. This update has been made in response to FIR Item 18a (see **FIR Response Document**).

Design

3. Elsewhere, except for in the zone of greater burial depth, the Applicant will, where practicable, bury all cables to a minimum depth of cover of 1.4m. In cases where depth of cover is inadequate, cable protection will be implemented as mitigation to avoid risks to other marine operations.

4.8 Transmission Component 2 – Landfall

Section 4.8 remains unchanged.

4.9 Transmission Component 3 - Onshore transmission infrastructure

Section 4.9 remains unchanged.

4.10 Offshore construction vessel requirements

Section 4.10 remains unchanged.

4.11 Operations and maintenance (O&M)

Section 4.11 remains unchanged.

4.12 Decommissioning

Section 4.12 remains unchanged.

4.13 References

Section 4.13 remains unchanged.

5 EIA METHODOLOGY

5.1 Introduction

Section 5.1 remains unchanged.

5.2 Legislation and guidance

Section 5.2 remains unchanged.

5.3 The EIA Process

Section 5.3 remains unchanged.

5.4 The EIA process

Section 5.4 remains unchanged.

5.5 Consultation

Section 5.5 remains unchanged.

5.6 EIA scoping

Section 5.6 remains unchanged.

5.7 Information to be contained in an EIAR

Section 5.7 remains unchanged.

5.8 Structure of the EIAR

Section 5.8 remains unchanged.

5.9 Characterisation of the existing environment

Section 5.9 remains unchanged.

5.10 Approach to assessment of effects

Section 5.10 is unchanged.

5.11 Approach to addressing design flexibility

Section 5.11 remains unchanged.

5.12 Approach to mitigation and monitoring

Section 5.12 remains unchanged, however it should be noted that an updated version of EIAR Volume 5, Chapter 33 Summary of Mitigation and Monitoring has been provided in response to the Commissions FIR. The updated version is provided in **Section 33** of the **EIAR Addendum (Part 2)**.

5.13 Approach to cumulative, transboundary and inter-related effects

Section 5.13 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report** in response to FIR Item 5. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR. Taking account of the FIR, the CEA Report also provides an update to the CEA methodology and therefore supersedes **EIAR Volume 4, Appendix 5.1 Cumulative Effects Assessment Methodology**.

5.14 References

Section 5.14 remains unchanged.

6 MARINE GEOLOGY, SEDIMENTS AND COASTAL PROCESSES

6.1 Introduction

Section 6.1 remains unchanged.

6.2 Consultation

Section 6.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

6.3 Legislation, policy and guidance

Section 6.3 remains unchanged.

6.4 Impact assessment methodology

Section 6.4 remains unchanged but should now be read in conjunction with the additional text provided in Section 6.4.2 below.

6.4.1 Study area

Section 6.4.1 remains unchanged.

6.4.2 Data and Information Sources

Section 6.4.2 remains unchanged but should now be read in conjunction with the additional text provided in paragraph 1 below. This update has been made in response to FIR Item 6a (see **FIR Response Document**).

1. Following consultation, it was clarified that the 500 m zone surrounding the array site, which was introduced solely as part of the 2024 Maritime Area Consent (MAC) amendment to facilitate the temporary deployment of perimeter demarcation buoys, does not contain any permanent infrastructure and has no potential to influence geology, sediments, or coastal processes. On this basis, the area was appropriately scoped out of the original site-specific geophysical survey campaign. The subsequent MAC extension occurred after survey completion and therefore lies outside the surveyed footprint; however, as no physical works are proposed within this zone, dedicated geophysical acquisition is neither necessary nor proportionate. A desktop review has been included in the EIAR for completeness, drawing on existing regional datasets (e.g., surficial sediment maps) to confirm that conditions within the 500 m MAC extension are consistent with those already characterised within the surveyed area. Given the absence of any potential for impact, and the availability of suitable regional data to contextualise the area, the exclusion of this 500 m buffer from the geophysical campaign is

considered appropriate and does not affect the robustness or defensibility of the baseline or impact assessment.

6.4.3 Impact Assessment

Section 6.4.3 remains unchanged.

6.5 Assumptions and limitations

Section 6.5 remains unchanged.

6.6 Existing environment

Section 6.6 remains unchanged. Additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document.**

6.7 Scope of the assessment

Section 6.7 remains unchanged.

6.8 Assessment parameters

Section 6.8 remains unchanged.

6.9 Primary mitigation measures

Section 6.9 remains unchanged with the exception of Table 6-20, which is replaced in its entirety with Table 6-A. This update has been made in relation to offshore cable burial depths, which is in response to FIR Item 18a.

Table 6-A Primary mitigation measures

Project Element	Description
All offshore infrastructure	Positions of WTGs and OSSs have been informed by a wide range of site specific data, including metocean data (e.g., wind speed and direction), geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation. Designing and optimising the layout of the WTGs has considered multiple constraints identified from analysis of these datasets, alongside the consideration of layout principles taken from relevant guidance on the design of OWFs. A summary of the key actions taken to avoid or otherwise reduce impacts is provided below:

Project Element	Description
	• The WTG layout options include Search and Rescue (SAR) access lanes to allow a search and SAR resource to fly on the same orientation continuously through the array site. This is provided to minimise risks to surface vessels and / or SAR resource transiting through the array site. • Archaeological exclusion zones (AEZs) around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational or decommissioning phases. • The locations of offshore infrastructure have been developed to avoid known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa*, which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micro-siting around sensitive habitats, such as *Sabellaria spinulosa*. • The WTG layout options have been developed to avoid or minimise interaction with known areas of high fishing density, where possible. As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence. • A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided.
Offshore cables	The Applicant will, where practicable, bury all cables within the offshore development area: • IACs and interconnector cables will have a minimum depth of cover of 1.0 m; and • Offshore export cables will have a minimum depth of cover of 1.4 m (except cables buried within the zone of greater burial depth adjacent to DL Harbour, which will have a minimum depth of cover of 3.0 m). Except in the zone of greater burial depth, in cases where burial is inadequate due to unforeseeable seabed conditions, and at cable crossings, cable protection will be implemented as mitigation to avoid risks to other marine operations.
All offshore infrastructure	Bedform clearance operations will be undertaken only where necessary, thereby minimising sediment disturbance and alteration to seabed morphology.
All offshore infrastructure	Disposal of dredged material will occur in suitable locations within the offshore development area, and in accordance with the requirements under a disposal at sea licence which will be sought

Project Element	Description
	separately. This has the benefit of minimising impacts on seabed morphology and the wider sediment regime.
Offshore construction vessels	During WTG installation, equipment such as jack-up vessels (if required) are expected to remain in any one location for a limited period of time (hours to a few days). This will ensure any impacts on the prevailing hydrodynamic, wave and sediment regimes and coastal processes are minimised.
All offshore infrastructure All onshore infrastructure	A Rehabilitation Schedule is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.

6.10 Impact assessment

Section 6.10 remains unchanged except for updates to paragraphs 119, 121,123,125,129,130,137,138,140,148 and 149-158.

6.10.1 Construction phase

Impact 1: Temporary disturbance of the seabed resulting from pre-installation methods and effects, cable and monopile installation leading to increases in suspended sediment concentrations, and associated deposition.

This section remains unchanged except for:

- Paragraph 119, which is replaced by paragraph 2 below;
- Paragraph 121, which is replaced by paragraph 3 below;
- Paragraph 123, which is replaced by paragraph 4 below;

These revisions have been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

Cable Installation Activities

2. Several cable installation methods are proposed: cable burial can be achieved by ploughing, jet or mechanical trenching and it is likely that a combination of these techniques will be employed during

cable installation operations to account for different water depths and seabed conditions along the IAC and OECC. Typically, a 2 m maximum trench depth will be sought, increasing to 6.5 m where the OECC crosses the approaches to Dun Laoghaire harbour (in the zone of greater burial depth), and 3 m where the OECC crosses the RWE cable (see **Appendix 6-A Modelling Report Addendum**). In addition, as part of nearshore cable installation operations, trench excavation will be conducted sub-aerially and a shallow water wheeled jet trenching system will be utilised over a distance of approximately 2 km to the location where the Cable Laying Vessel (CLV) is able to commence conventional cable burial.

3. Assessment was informed by the results of numerical modelling performed for the entire construction campaign, which included the IAC and export cable (see **Appendix 6-A Modelling Report Addendum**). It is of note that the additional characterisation data within the intertidal and more broadly, which *inter alia* provides evidence of limited contaminant presence, with all levels being below that of relevant Irish Levels, CEFAS Action Levels, and indeed detection limits in many places (**Appendix 8-A 2025 Benthic Subtidal Baseline Report 2025**); the potential for contaminated sediments to be released during installation of the landing cable and the construction process through the intertidal area (and more broadly) is therefore negligible. The modelling analyses predict the magnitude (i.e., the size, concentration and spatial extent) of sediment plumes generated during cable installation activities. Based on the analyses, the predicted transport of sediment plumes generated during cable installation activities across the MAC application boundary indicated the finest sediments will potentially be transported up to 6 km. Maximum suspended sediment concentration (SSC) values of up to 140 mg/L were predicted, however these plumes are transient and rapidly decreasing in concentrations as sand sized materials deposit on to the bed and finer sediments are dispersed. Modelling further indicates that the highest SSC concentrations are not expected to occur beyond the MAC boundary. The thickness of the deposit on the seabed away from the trenching activities was predicted to be lower than 1 cm. Deposited sediments would be reworked and rapidly integrated into the prevailing sediment transport regime. Consequently, enhanced SSC and the predicted deposition thickness due to cable installation would not be discernible above the potential natural variation observed during storm events. Elevated SSCs were predicted to reduce to background levels within c. 12 days following trenching operations.

Monopile Installation

4. Based on the Modelling performed (see **Appendix 6-A Modelling Report Addendum**), finer sediments within suspended sediment plumes will potentially be transported up to 4 km in the offshore region from their source within the array site. As the volumes of drill arisings are limited (i.e., 24,516 m^3 across the entire 124.8 km^2 array site), maximum SSC values of c. 30 mg/L are predicted. These plumes are transient, rapidly decreasing in concentration as sand sized sediments deposit to the bed and finer sediments are dispersed. The thickness of the deposit on the seabed away from the monopile location is predicted to be negligible (less than 3 mm). Deposited sediments would be reworked and rapidly integrated into the prevailing sediment transport regime. Consequently, enhanced SSC and the predicted deposition thickness due to monopile installation would not be discernible above the potential natural variation observed during storm events. Elevated SSCs were predicted to reduce to background levels within c. 4 days following monopile installation operations.

Receptor sensitivity

This section (paragraph 125) replaced by paragraph 5 below. This revision has been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

5. The receptors in the Study Area affected by increased SSC and sediment deposition include:

- The wider seabed, its morphology and underlying geology – these receptors are relatively stable over long timescales and have a moderate capacity to accommodate changes. Additionally, these

receptors do not contribute to local distinctiveness, are not of high importance, and are not designated. Based on the assessment criteria provided in **Table 6-4**, the sensitivity of these receptors is assessed as Low;

- The prevailing hydrodynamic and wave regime and the sediment transport regime and coastal processes – these receptors are highly dynamic, naturally varying systems that continuously respond to naturally occurring external forces. Additionally, these receptors do not contribute to local distinctiveness and are not of high importance and are not designated. Based on the assessment criteria provided in **Table 6-4**, the sensitivity of these receptors is assessed as Low;

- South Dublin Bay Special Area of Conservation (SAC) – This SAC is designated to protect key habitat features, including Mudflats and Sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, and Annual Vegetation of Drift Lines. These habitats have a limited capacity to absorb external pressures and exhibit ecological characteristics that contribute to their distinctiveness, rarity, and overall conservation value. Based on the assessment criteria set out in **Table 6-4**, the sensitivity of the South Dublin Bay SAC is assessed as High;

- Rockabill to Dalkey Island SAC – This SAC is designated for Harbour Porpoise and Reefs. Neither of these qualifying features has a functional linkage with coastal processes that could be influenced by the proposed works, and there is no plausible mechanism by which changes in such processes would affect the site's conservation objectives[1]. Accordingly, and in line with the assessment criteria set out in **Table 6-4**, the sensitivity of Rockabill to Dalkey Island SAC is assessed as Low;

- South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) – This SPA is designated for a range of Special Conservation Interest bird species and for Wetlands & Waterbirds as a supporting habitat resource. While the intertidal flats within the SPA depend on the long-term maintenance of sediment availability, they are not sensitive to short-term or very small-scale variations in suspended sediment concentrations or deposition associated with the proposed offshore works. Natural variability in the system (e.g., tides, storms, seasonal cycles) far exceeds the magnitude of any project-related changes, and no alteration to coastal processes, tidal regime, or sediment budgets within the SPA is predicted. . Accordingly, based on the assessment criteria in **Table 6-4**, the sensitivity of the South Dublin Bay and River Tolka Estuary SPA is assessed Low; and,

- Dalkey Islands SPA – This SPA is designated for breeding and wintering seabird species as Special Conservation Interests. These ornithological features do not have a functional connection with coastal processes relevant to the proposed works and there is no pathway through which changes in such processes would influence the conservation objectives of the site. Accordingly, based on the assessment criteria in **Table 6-4**, the sensitivity of the Dalkey Islands SPA is assessed Low.

Magnitude of impact

This section remains unchanged except for paragraph 129, which is replaced by paragraph 6 below. This revision has been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

6. Where liberated sediments are transported towards the coast during operations in the export cable transition zone (rather than in the alongshore or offshore direction), they may be delivered to intertidal regions and incorporated into the dynamic nearshore regime. Predicted sediment plumes in the

[1] Refer to **Section 8.10.1** of **Volume 3, Chapter 8 Subtidal and Intertidal Ecology** and **Section 11.10.1 of Volume 3, Chapter 11 Marine Mammals** for assessments of reef features and Harbour Porpoise sensitivity to SSC.

nearshore area are expected to disperse within 2 km of the OECC, and works will be undertaken during quiescent conditions, meaning that the quantity of sediment mobilised would be comparable to the natural volumes suspended during higher-energy storm events. Accordingly, any temporary elevation in suspended sediment concentrations within the nearshore would be rapidly assimilated into the prevailing coastal sediment transport system. While several designated sites occur within the wider nearshore environment (including South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, and Rockabill to Dalkey Island SAC), only the Mudflats and Sandflats feature of the South Dublin Bay SAC has a functional relationship with coastal processes. However, mudflats / sandflats are naturally subject to ongoing erosion, deposition, and tidal reworking, and are therefore capable of accommodating temporary and short-term variations in sediment delivery without resulting in changes to its structure, extent, or function. Given the limited scale and temporary nature of sediment redistribution associated with the proposed works, the potential effect on coastal processes, including in relation to relevant protected areas, is therefore assessed as being of Low magnitude.

Significance of Effect

This section (paragraph 130) is replaced with paragraphs 7 - 8 below. This revision has been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

7. The sensitivity of the wider seabed, its morphology and underlying geology and the prevailing hydrodynamic and wave regime and the sediment transport regime and coastal processes in the Study Area is considered to be Low, the sensitivity of the South Dublin Bay SAC Mudflat / Sandflat features are considered to be High, and as the other designated sites do not have a functional relationship with coastal processes, they are considered to be Low sensitivity in this context. The magnitude of the impact for all receptors is considered to be Low. Therefore, as per the matrix in **Table 6-6**, a Minor significance of effect is predicted for all marine and coastal physical processes receptors associated with pre-installation methods and effects, cable installation and monopile installation activities. This conclusion reflects the very short duration and highly localised nature of the disturbance, as well as the inherent capability this type of intertidal Sandflat and Mudflat environment to accommodate such transient and localised disturbances. These effects are not significant in EIA terms. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

8. As impacts on these receptors are inherently interlinked (the hydrodynamic and wave regimes act as pathways for sediment transport, which in turn influences coastal processes), they have been grouped under one assessment. However, the significance of effects has been evaluated for each receptor individually.

Additional Mitigation

This section remains unchanged.

Impact 2: Temporary disturbance of the seabed resulting from pre-sweeping / sandwave levelling activities leading to increases in suspended sediment concentrations and associated deposition.

This section remains unchanged except for paragraphs 137 and 138, which are replaced by paragraphs 9 and 10 below. These revisions have been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

9. Pre-sweeping / sandwave levelling, where necessary, will primarily be undertaken through dredge and disposal operations. Suspended sediment plumes created during dredge disposal operations are predicted to enhance SSC levels in the near (i.e., to the point of release) and far field (i.e., up to c. 7 km) from the point of release). The maximum predicted SSC values at any time during the model scenarios were approximately 400 mg/L, however this is highly transient, and the maximum concentrations are restricted to the release point. Though the plume trajectory is dependent on release timings and release locations, the results of the scenarios performed can be considered representative of disposals within the MAC application boundary. The suspended sediment plumes are predicted during the simulation testing to extend Northwards and Southwards from the disposal locations, with a slight plume transport trajectory towards the east quadrant (i.e., offshore) also observed. Enhanced SSCs are transient, and concentrations are predicted to reduce to baseline levels no more than 11 days after the disposal activity. Away from the immediate disposal location, the predicted thickness of the sediment deposited during the simulations was minimal (less than 2 cm), and disposal of sediments within the MAC application boundary ensure that these sediments remain within the local seabed system and it is anticipated they will be rapidly reworked and integrated into the existing sediment regime. Full detail of the modelling completed as part of this assessment is given in **Appendix 6-A Modelling Report Addendum**.

10. The predicted transport of sediment plumes and subsequent deposition during dredge and disposal activities within the MAC application boundary can be summarised as follows:

- Peak SSC of 400 mg/L predicted to occur within 500 m of the release point, but coarser sediment expected to deposit quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location.
- Beyond 1 km from release, the passive plume which is transported beyond this distance is likely to generate SSC in the region of approximately 40 to 60 mg/L, in the direction of the prevailing tidal current flow out to a maximum distance of up to approximately 7 km.
- SSC is predicted to reduce to background levels c. 11 days following cessation of the operations. Beyond this period there is anticipated to be no longer term impact from the dredge activities, the associated sediment transport, deposition, and therefore no longer term impact on seabed morphology.

Receptor sensitivity

This section (paragraph 140) should now be read in conjunction with paragraph 11 below. This revision has been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

11. As no designated sites overlap with the zone of influence associated with the sandwave levelling / pre-sweeping activities, or the disposal of dredge arisings, they are not considered receptors under Impact 2.

Magnitude of impact

This section remains unchanged.

Significance of effect

This section remains unchanged.

Additional mitigation

This section remains unchanged.

Impact 3: Alteration to seabed and intertidal morphology during seabed preparation and cable installation activities.

In this section, paragraph 148 is replaced with paragraph 12 below and paragraphs 149 – 153 should now be read in conjunction with paragraphs 13 to 14 below. These revisions have been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

12. The alteration to seabed morphology relates to impacts to seabed features, bedforms and topography. The potential exists for impacts to occur which affect the local morphology and bedform features during the construction phase, these activities include:

- Bedform clearance
- Dredge disposal operations
- Cable installation activities (cable trenching) within the intertidal zone

Cable Installation Activities within the Intertidal Zone

13. The proposed cable installation activities within the intertidal zone involve installing three landfall cable ducts via open-cut trenching, requiring excavation of approximately 4,224 m³ of material and temporary removal of the coastal revetment. Seaward of the high-water mark, three intertidal ducts will be trenched over a 300 m stretch, with individual trenches up to 18 m wide and 2 m deep, disturbing about 20,400 m² of intertidal area. Further offshore, three export cables will be buried using a combination of open-cut trenching (3 × 1.7 km, 4 m width) and shallow-water trenching tools (3 × 2 km, 4 m width), resulting in an additional disturbed area of approximately 44,400 m² (refer to **Section 1.1** of **Appendix 6-B Intertidal Assessment**).

14. Based on experience from multiple offshore cable installation projects, it is anticipated that natural sediment redistribution and reworking by tides and waves will lead to rapid intertidal/seabed sediment surface recovery. Shallow depressions or minor residual features may persist for longer, particularly in areas of mixed or muddy sediments; however, due to the predominantly sandy composition of the intertidal area in Sandymount, these are anticipated to be highly limited in their spatial extent and depth, and will not represent a significant long-term alteration to intertidal / seabed morphology. Broader reviews of dredging and coastal seabed disturbance in a range of sediment types, from muds to gravels, indicate that recovery in dynamic sandy environments occurs within weeks to months (Newell et al., 2015). Additionally, industry-wide consensus (as informed by impact assessment and monitoring) of subsea cable installation for offshore wind projects considers that impacts from cable burial are typically highly transitory, narrow in their footprint, and readily reversible, especially in unconsolidated / soft-sediment shorelines and seabeds (BOW, 2016; Ørsted, 2019; RWE, 2022). Similarly, regulatory and planning assessments for marine cables and offshore wind developments recognise that construction-phase effects are generally temporary and reversible, provided best-practice installation methods are applied (Scottish Government, 2019). Further detail on the assessment of cable installation activities is provided in **Appendix 6-B Intertidal Assessment**.

Receptor Sensitivity

This section remains unchanged except for paragraph 154 which should be read in conjunction with paragraph 15 below. This revision has been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

15. The receptors in the Study Area affected by the alteration to seabed morphology include:

- The wider seabed, its morphology and underlying geology – these receptors are relatively stable over long timescales and have a moderate capacity to accommodate changes. Additionally, these receptors do not contribute to local distinctiveness, are not of high importance, and are not designated. Based on the assessment criteria provided in **Table 6-4**, the sensitivity of these receptors is assessed as Low;

- South Dublin Bay SAC – This SAC is designated to protect key habitat features, including Mudflats and Sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, and Annual Vegetation of Drift Lines. These habitats have a limited capacity to absorb external pressures and exhibit ecological characteristics that contribute to their distinctiveness, rarity, and overall conservation value. Based on the assessment criteria set out in **Table 6-4**, the sensitivity of the South Dublin Bay SAC is assessed as High;

- The South Dublin Bay and River Tolka Estuary SPA – This SPA is designated due to its importance as an internationally significant wintering bird assemblage, supporting species that rely heavily on intertidal sandflat habitats for feeding, roosting, and staging. Key qualifying species associated with this SPA include Light-bellied Brent Goose, Oystercatcher, Ringed Plover, Sanderling, Dunlin, Bar-tailed Godwit, Redshank and Turnstone, all of which utilise the broader sand-dominated intertidal areas within Dublin Bay. As these qualifying features have a functional linkage with coastal processes that could be influenced by the proposed works considering the seabed and intertidal morphology, and therefore a plausible mechanism by which changes in such processes would affect the site's conservation objectives, based on the assessment criteria set out in **Table 6-4**, the sensitivity of the South Dublin Bay and River Tolka Estuary SPA is assessed as High[2].

Magnitude of impact

This section remains unchanged except for paragraphs 155-156 which should be read in conjunction with paragraph 16 below. This revision has been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

16. Within the intertidal zone, the impacts arising from cable installation activities upon the seabed morphology are expected to cause temporary, localised disturbance to the seabed morphology. Considering the dynamic sedimentary environment of Sandymount Strand, with active tidal and wave energy, and the body of evidence which demonstrates intertidal habitats of this nature recover rapidly, it is evidentially the case that the disturbance footprint will be localised, narrow and only temporary; sediment structure and seabed morphology will tend to naturally re-equilibrate, and benthic infauna and associated communities will recolonise over time. Considering the highly localised extent of the disturbance, both spatially and temporally, and the rapid recovery of dynamic sedimentary environments, the magnitude of impact is deemed to be Low.

[2] Under Construction Impact 1, this SPA was assigned a Low sensitivity rating, whereas under the present impact (Construction Impact 3) it is assigned High sensitivity. This distinction reflects the differing relevance of each impact pathway to the protected features of the SPA; for example, changes in intertidal morphology directly affect the availability of feeding habitat for birds, while elevated suspended sediment concentrations do not result in a comparable direct or tangible effect.

Significance of Effect

This section remains unchanged except for paragraphs 157-158 which should be read in conjunction with paragraph 17 below. This revision has been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

17. The sensitivity of designated sites (South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA) within the intertidal zone is considered to be High. The magnitude of impact for these receptors is considered to be Low, Therefore (as per the matrix in **Table 6-6**), a Minor effect is predicted for marine geology, sediments and coastal processes receptors within the intertidal zone in relation to cable installation activities, which is not significant in EIA terms. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

Additional mitigation

This section remains unchanged.

Impact 4: Localised alteration to the hydrodynamic, wave and sediment regimes and coastal processes

This section remains unchanged.

6.10.2 Operation and maintenance

Section 6.10.2 remains unchanged except for updates to paragraph 175.

Impact 1: Localised alteration of hydrodynamic and wave conditions across the site and effects on the sediment transport regime and coastal processes

This section remains unchanged except for paragraph 175 which is replaced by paragraphs 18 to 20 below. This revision has been made in response to FIR Item 6d (See **FIR Response Document**).

18. The assessment of potential changes to water levels, currents, and waves was performed using spatial and temporal outputs from a coupled hydrodynamic and wave model, comparing scenarios with and without the offshore wind farm (OWF) infrastructure (including WTG/OSS layout and cabling) under extreme high-energy conditions (100- and 500-year return period events, corresponding to 1% and 0.2% AEP, respectively; see the updated **Appendix 6-A Modelling Report Addendum** for details) that were present in the 30-year hindcast that was modelled. Results indicate that the fully installed OWF infrastructure is predicted to have only minor, highly localised effects on prevailing hydrodynamic and wave regimes, confined to areas immediately adjacent to individual structures, with no measurable far-field impacts. For wave parameters (e.g., wave height), the CWP Project is expected to cause less than approximately 6% variation between pre- and post-construction conditions in the near field, with wave conditions returning to background levels within approximately 1 km of the structures. Similarly, tidal currents may experience up to around 7% change in current speed close to individual structures, but these effects diminish rapidly, with negligible differences observed beyond approximately 1 km downstream of the structures. Water level changes across the array are predicted to be less than 6%,

again restricted to the near field, with conditions reverting to natural variability within about 1 km of the infrastructure.

19. These predictions are based on extreme event scenarios supported by site specific hindcast data, and representative of the findings, for comparable locations, in the scientific literature more broadly; under normal operational conditions, variations are expected to be even smaller. Overall, the anticipated changes fall within the natural variability of wave, current, and water level conditions expected over the lifetime of the CWP Project.

20. As effects on wave and hydrodynamic conditions are predicted to be minimal and localised to the array site then it is considered that as these aspects are inherently interlinked, that the impacts to sediment transport regime and morphodynamics / coastal processes will be similarly minimal and localised. These findings indicate that the development will not result in measurable changes at broader / far field spatial scales, or over extended time horizons and support the conclusion that there will be no significant far-field impact on the sediment transport regime or the coastline.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged.

Significance of effect

This section remains unchanged.

Additional mitigation

This section remains unchanged.

Impact 2: Scour around installed structures and associated sediment transportation and deposition leading to changes in seabed composition, structure or morphology

This section remains unchanged.

Impact 3: Operation and maintenance

This section remains unchanged.

6.10.3 Decommissioning phase

Section 6.10.3 remains unchanged except for updates to paragraphs 206 – 208 and paragraphs 218-220 below.

Impact 1: Temporary increases in suspended sediment concentration during removal of foundations and / or cables

This section remains unchanged except for updates to paragraphs 206 – 208 below. These revisions have been made in response to FIR Item 6h (see **FIR Response Document**).

Receptor sensitivity

This section (paragraph 206) is replaced by paragraph 21 below. This revision has been made in response to FIR Item 6h (see **FIR Response Document**).

21. The receptors in the Study Area affected by increased SSC and sediment deposition during the removal of foundations and / or cables include:

- The wider seabed, its morphology and underlying geology – these receptors are relatively stable over long timescales and have a moderate capacity to accommodate changes. Additionally, these receptors do not contribute to local distinctiveness and are not of high importance and are not designated. Based on the assessment criteria provided in **Table 6-4**, the sensitivity of these receptors is assessed as Low;

- The prevailing hydrodynamic and wave regime and the sediment transport regime and coastal processes – these receptors are highly dynamic, naturally varying systems that continuously respond to naturally occurring external forces. Additionally, these receptors do not contribute to local distinctiveness and are not of high importance and are not designated. Based on the assessment criteria provided in **Table 6-4**, the sensitivity of these receptors is assessed as Low;

- South Dublin Bay SAC – This SAC is designated to protect key habitat features, including Mudflats and Sandflats not covered by seawater at low tide, Salicornia and other annuals colonising mud and sand, and Annual Vegetation of Drift Lines. These habitats have a limited capacity to absorb external pressures and exhibit ecological characteristics that contribute to their distinctiveness, rarity, and overall conservation value. Based on the assessment criteria set out in **Table 6-4**, the sensitivity of the South Dublin Bay SAC is assessed as High;

- Rockabill to Dalkey Island SAC – This SAC is designated for Harbour Porpoise and Reefs. Neither of these qualifying features has a functional linkage with coastal processes that could be influenced by the proposed works, and there is no plausible mechanism by which changes in such processes would affect the site's conservation objectives[3]. Accordingly, and in line with the assessment criteria set out in **Table 6-4**, the sensitivity of Rockabill to Dalkey Island SAC is assessed as Low;

- South Dublin Bay and River Tolka Estuary SPA – This SPA is designated for a range of Special Conservation Interest bird species and for Wetlands & Waterbirds as a supporting habitat resource. While the intertidal flats within the SPA depend on the long-term maintenance of sediment availability, they are not sensitive to short-term or very small-scale variations in suspended sediment concentrations or deposition associated with the proposed offshore works. Natural variability in the system (e.g., tides, storms, seasonal cycles) far exceeds the magnitude of any project-related changes, and no alteration to coastal processes, tidal regime, or sediment budgets within the SPA is predicted. Accordingly, based on the assessment criteria in **Table 6-4**, the sensitivity of the South Dublin Bay and River Tolka Estuary SPA is assessed Low; and,

[3] Refer to **Section 8.10.1** of **Volume 3, Chapter 8 Subtidal and Intertidal Ecology** and **Section 11.10.1 of Volume 3, Chapter 11 Marine Mammals** for assessments of reef features and Harbour Porpoise sensitivity to SSC

- Dalkey Islands SPA – This SPA is designated for breeding and wintering seabird species as Special Conservation Interests. These ornithological features do not have a functional connection with coastal processes relevant to the proposed works and there is no pathway through which changes in such processes would influence the conservation objectives of the site. Accordingly, based on the assessment criteria in **Table 6-4**, the sensitivity of the Dalkey Islands SPA is assessed Low.

Magnitude of impact

This section (paragraph 207) is replaced by paragraph 22 below. This revision has been made in response to FIR Item 6h (see **FIR Response Document**).

22. Where liberated sediments are transported towards the coast during decommissioning operations in the export cable transition zone (rather than in the alongshore or offshore direction), they may be delivered to intertidal regions and incorporated into the dynamic nearshore regime. Predicted sediment plumes in the nearshore area are expected to disperse within 2 km of the OECC, and works will be undertaken during quiescent conditions, meaning that the quantity of sediment mobilised would be comparable to the natural volumes suspended during higher-energy storm events. Accordingly, any temporary elevation in suspended sediment concentrations within the nearshore would be rapidly assimilated into the prevailing coastal sediment transport system. While several designated sites occur within the wider nearshore environment (including South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, Dalkey Islands SPA, and Rockabill to Dalkey Island SAC), only the Mudflats and Sandflats feature of the South Dublin Bay SAC has a functional relationship with coastal processes. However, mudflats / sandflats are naturally subject to ongoing erosion, deposition, and tidal reworking, and are therefore capable of accommodating short-term variations in sediment delivery without resulting in changes to its structure, extent, or function. Given the limited scale and temporary nature of sediment redistribution associated with the proposed activities (such as cable removal where required), the potential effect on coastal processes, including in relation to relevant protected areas, is therefore assessed as being of Low magnitude.

Significance of Effect

This section (paragraph 208) is replaced by paragraphs 23-24 below. This revision has been made in response to FIR Item 6h (see **FIR Response Document**).

23. The sensitivity of the wider seabed, its morphology and underlying geology and the prevailing hydrodynamic and wave regime and the sediment transport regime and coastal processes in the Study Area is considered to be Low, the sensitivity of the South Dublin Bay SAC Mudflat / Sandflat features are considered to be High, and as the other designated sites in the area do not have a functional relationship with coastal processes, they are considered to be Low sensitivity. The magnitude of the impact for all receptors is considered to be Low. Therefore, as per the matrix in **Table 6-6**, a Minor significance of effect is predicted for all marine and coastal physical processes receptors associated with cable / foundation removal activities. This conclusion reflects the very short duration and highly localised nature of the disturbance, as well as the inherent capability this type of intertidal Sandflat and Mudflat environment to accommodate such transient and localised disturbances. These effects are not significant in EIA terms. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

24. As impacts on these receptors are inherently interlinked (the hydrodynamic and wave regimes act as the pathways for sediment transport, which in turn influences coastal processes), they have been

grouped under one assessment. However, the significance of effects has been evaluated for each receptor individually.

Additional mitigation

This section remains unchanged.

Impact 2: Localised alteration of hydrodynamic and wave conditions across the site and effects on the sediment transport regime and coastal processes

This section remains unchanged.

Impact 3: Alteration to seabed morphology during decommissioning

This section remains unchanged except for updates to Paragraphs 218-220 below. These revisions have been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

Receptor Sensitivity

This section (paragraph 218) is replaced with paragraph 25 below. This revision been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

25. The receptors in the Study Area affected by the alteration to seabed morphology include:

- The wider seabed, its morphology and underlying geology – these receptors are relatively stable over long timescales and have a moderate capacity to accommodate changes. Additionally, these receptors do not contribute to local distinctiveness, are not of high importance, and are not designated. Based on the assessment criteria provided in **Table 6-4**, the sensitivity of these receptors is assessed as Low;

- South Dublin Bay SAC – This SAC is designated to protect key habitat features, including Mudflats and Sandflats not covered by seawater at low tide, Salicornia and other annuals colonising mud and sand, and Annual Vegetation of Drift Lines. These habitats have a limited capacity to absorb external pressures and exhibit ecological characteristics that contribute to their distinctiveness, rarity, and overall conservation value. Based on the assessment criteria set out in **Table 6-4**, the sensitivity of the South Dublin Bay SAC is assessed as High;

- The South Dublin Bay and River Tolka Estuary SPA – This SPA is designated due to its importance as an internationally significant wintering bird assemblage, supporting species that rely heavily on intertidal sandflat habitats for feeding, roosting, and staging. Key qualifying species associated with this SPA include Light-bellied Brent Goose, Oystercatcher, Ringed Plover, Sanderling, Dunlin, Bar-tailed Godwit, Redshank and Turnstone, all of which utilise the broader sand-dominated intertidal areas within Dublin Bay. As these qualifying features have a functional linkage with coastal processes that could be influenced by the proposed works considering the seabed and intertidal morphology, and therefore a plausible mechanism by which changes in such processes would affect the site's conservation objectives, based on the assessment criteria set out in **Table 6-4**, the sensitivity of the South Dublin Bay SAC is assessed as High.

Magnitude of impact

This section (paragraph 219) is replaced with paragraph 26 below. This revision been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

26. Within the intertidal zone, the impacts arising from cable removal activities upon the seabed morphology are expected to cause temporary, localised disturbance to the seabed morphology. Considering the dynamic sedimentary environment of Sandymount Strand, with active tidal and wave energy, and the body of evidence which demonstrates intertidal habitats of this nature to recover rapidly, it is evidentially the case that the disturbance footprint will be localised, narrow and only temporary; sediment structure and seabed morphology will tend to naturally re-equilibrate, and benthic infauna and associated communities will recolonise over time. Considering the highly localised extent of the disturbance, both spatially and temporally, and the rapid recovery of dynamic sedimentary environments, the magnitude of impact is deemed to be Low.

Significance of Effect

This section (paragraph 220) is replaced with paragraph 27 below. This revision been made in response to FIR Item 6g and 6h (See **FIR Response Document**).

27. The sensitivity of designated sites (South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA) within the intertidal zone is considered to be High. The magnitude of impact for these receptors is considered to be Low. Therefore (as per the matrix in **Table 6-6**), a Minor effect is predicted for marine geology, sediments and coastal processes receptors within the intertidal zone in relation to cable installation activities, which is not significant in EIA terms. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

Additional mitigation

This section remains unchanged.

6.11 Cumulative impacts

Section 6.11 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

6.12 Transboundary impacts

Section 6.12 remains unchanged.

6.13 Inter-relationships

Section 6.13 remains unchanged.

6.14 Potential monitoring requirements

Section 6.14 remains unchanged.

6.15 Impact assessment summary

Section 6.15 remains unchanged except for Table 6-22, which is replaced by Table 6-B below. The revision relates to Impact 1 and Impact 3 for the construction and decommissioning phases only. The revision has been made in response to FIR Items 6h and 6i (See **FIR Response Document**).

Table 6-B: Summary of potential impacts and residual effects

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Construction						
Impact 1: Temporary disturbance of the seabed resulting from pre-installation methods and effects, cable and monopile installation leading to increases in suspended sediment concentrations, and associated deposition.	Wider seabed, its morphology and underlying geology, the prevailing hydrodynamic and wave regime, the sediment transport regime and coastal processes, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA and Dalkey Islands SPA	Low or High	Low	Minor **(not significant)**	No additional mitigation required	Not significant

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 2: Temporary disturbance of the seabed resulting from pre-sweeping / sandwave levelling activities, leading to increases in suspended sediment concentrations and associated deposition.	Wider seabed, its morphology and underlying geology, the prevailing hydrodynamic and wave regime and the sediment transport regime and coastal processes.	Low	Low or Medium	Negligible / Minor or Minor **(Not significant)**	No additional mitigation required	Negligible / Minor or Minor **(Not significant)**
Impact 3: Alteration to seabed and intertidal morphology during seabed preparation and cable installation activities.	Wider seabed, its morphology and underlying geology, South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA	Low or High	Low	Minor **(not significant)**	No additional mitigation required	Not significant

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 4: Localised alteration to the hydrodynamic, wave and sediment regimes and coastal processes.	Wider seabed, its morphology and underlying geology, the prevailing hydrodynamic and wave regime and the sediment transport regime and coastal processes.	Low	Low	Negligible / Minor **(Not significant)**	No additional mitigation required	Negligible / Minor **(Not significant)**
Operation and Maintenance						
Impact 1: Localised alteration of hydrodynamic and wave conditions across the site and effects on the sediment transport regime and coastal processes.	Prevailing hydrodynamic, wave and sediment transport regimes, seabed morphology and coastal processes.	Low	Very low	Negligible **(Not significant)**	No additional mitigation required	Negligible **(Not significant)**

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 2: Scour around installed structures and associated sediment transportation and deposition, leading to changes in seabed composition, structure or morphology.	Wider seabed, its morphology and underlying geology.	Low	Low	Negligible / Minor **(Not significant)**	No additional mitigation required	Negligible / Minor **(Not significant)**
Impact 3: Operation and maintenance	Wider seabed, its morphology and underlying geology.	Low	Low	Negligible / Minor **(Not significant)**	No additional mitigation required	Negligible / Minor **(Not significant)**
Decommissioning						

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 1: Temporary increases in suspended sediment concentration during removal of foundations and / or cables	Wider seabed, its morphology and underlying geology, the prevailing hydrodynamic and wave regime, the sediment transport regime and coastal processes, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA and Dalkey Islands SPA	Low or High	Low	Minor **(not significant)**	No additional mitigation required	Not significant
Impact 2: Localised alteration of hydrodynamic and wave conditions across the site and effects on the sediment transport regime and coastal processes.	Hydrodynamic, wave and sediment regimes and wider seabed, its morphology and underlying geology and coastal processes.	Low	Low	Negligible / Minor **(Not significant)**	No additional mitigation required	Negligible / Minor **(Not significant)**

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 3: Alteration to seabed morphology during decommissioning	Wider seabed, its morphology and underlying geology, South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA	Low or High	Low	Minor **(not significant)**	No additional mitigation required	Not significant

6.16 References

Section 6.16 should now be read in conjunction with the text below. This revision has been made in response to FIR Items 6g and 6h (See **FIR Response Document**).

28. Beatrice Offshore Windfarm (BOW). (2016). 'Alternative landfall cable installation method marine licence application – Environmental Report'. (Doc. No. LF000005-REP-1338). Spey Bay / Moray Firth, Scotland. Retrieved from: https://marine.gov.scot/sites/default/files/00516997.pdf [Accessed 12 January 2026].

29. Ørsted. (2019). Preliminary Environmental Information Report (PEIR), Volume 2: Chapter 1 – Marine Geology, Oceanography and Physical Processes. (Doc. No. A2.1; Version A). London, UK

30. RWE (2022). Awel y Môr Offshore Wind Farm – Category 6 Environmental Statement: Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes. (Revision B). Swindon, UK

7 MARINE WATER QUALITY

7.1 Introduction

This section remains unchanged.

7.2 Consultation

Section 7.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

7.3 Legislation, policy and guidance

Section 7.3 remains unchanged.

7.4 Impact assessment methodology

Section 7.4 remains unchanged except for updates to Paragraphs 19, 23 and 35 and to Table 7-2.

7.4.1 Study area

Section 7.4.1 remains unchanged except for paragraph 19 which has been replaced by paragraph 1 below. This update has been made to include the updated sediment plume modelling in response to RFI Item 6i (see **FIR Response Document)**.

1. The study area for the marine water quality assessment has been informed by the greatest dispersion and greatest tidal excursion in modelling presented in **Appendix 6-A Modelling Report Addendum**. Modelling was undertaken to identify the greatest extent of potential sediment plumes dispersion, level of dispersion above background levels (mg/L) and accumulated level of deposited material. The modelling identified that the greatest direction and distance of dispersion of disturbed material was 4–7 km north – south / slight east, although one scenario showed a north - south dispersion reaching 2–4 km Modelling suggests a maximum transport distance of disturbed material to be 7 km, therefore, with a view to applying the precautionary principle, the study area has been defined as a 10 km radius in all directions around the array site and offshore export cable corridor (OECC) extending up to MHWS (**Figure 7-1, Figure 7-2** and **Figure 7-3**). This area is also deemed suitable for other impacts that may be distributed by hydrodynamic forces, such as pollution events.

7.4.2 Data and information sources

Section 7.4.2 remains unchanged except for:

- Paragraph 23 which has been replaced by paragraph 2 below. This update has been made to include the contaminant analysis results from the 2025 benthic and intertidal site-specific surveys in response to FIR Item 8k and 8i (see **FIR Response Document)**.

- Table 7-2 which has been replaced by Table 7-A below. Table 7-A presents the latest information from the Water Quality in Ireland 2019-2024 Report (EPA, 2025) and the update has been made in response to FIR Item 1b (see **FIR Response Document)**.

2. No dedicated water quality surveys were undertaken, due to the breadth of water quality data available and given that the benthic subtidal and intertidal site-specific surveys provide data on sediment quality. Surveys were conducted in 2021 and 2025 at stations positioned across the array site, offshore export cable corridor (OECC) and near to landfall in the intertidal area and included both particle size analysis (PSA) and chemical contaminant analysis. The 2021 surveys were conducted at 46 stations with chemical contaminant analysis undertaken at eight stations across the OECC. The 2025 surveys were conducted at 69 stations with contaminant analysis undertaken at 10 stations in the intertidal area and 12 stations across the OECC. Full details are provided in **Appendix 8.3 CWP Benthic Baseline Report** and **Appendix 8-A Benthic Subtidal Survey Report 2025**.

Table 7-A Data sources

Data	Source*	Date	Notes
Environmental Protection Agency (EPA) data including WFD catchment maps, water quality	EPA (2022a) Geographic Information Service (GIS) maps online portal Catchments.ie – Water, from source to sea.	2025	All WFD data is provided here and updated by the EPA.
Water Quality in Ireland 2019–2024 Report	EPA (2025)	2025	EPA produces annual reports summarising monitoring within their remit.
3rd Cycle Draft Liffey and Dublin Bay Catchment Report (HA 09)	Environmental Protection Agency Catchment Science and Management Unit (EPA-CSMU) (2021a)	2021	Report specific to the Liffey and Dublin Bay catchment summarising the current status of the waterbodies contained within that catchment.
3rd Cycle Draft Ovoca–Vartry Catchment Report (HA 10)	EPA-CSMU (2021b)	2021	Report specific to the Ovoca–Vartry catchment summarising the current status of the waterbodies contained within that catchment.
Ireland's National Water Framework Directive Monitoring Programme 2019–2021	EPA (2021)	2021	EPA produces reports summarising monitoring within their remit during the reporting period.
Draft River Basin Management Plan for Ireland 2022–2027 (Third Cycle)	DHLGH (2021a; 2021b)	2021	Draft report. Final report is being prepared by DHLGH.
River Basin Management Plan for	DHLGH (2018, 2021c)	2021	

Data	Source*	Date	Notes
Ireland 2018–2021 (Second Cycle)			
Marine Strategy Framework Directive 2008/56/EC Article 17 update to Ireland's Marine Strategy Part 1: Assessment (Article 8), Determination of Good Environmental Status (Article 9) and Environmental Targets	DHLGH (2020)	2020	Initial assessment required under the MSFD. Originally published in 2013 and updated and accepted by the Irish Government in 2020.
Beaches.ie	EPA (2022c)	2022	Bathing water quality of beaches, updated annually in September.
Marine Climatology	Met Éireann (2022)	2022	Ranges of sea temperatures and water levels from Ireland's National Meteorological Service.
OSPAR Intermediate Assessment	OSPAR (2017)	2017	Background environmental quality status in the North Atlantic and North Sea.
Sea Fisheries Protection Authority (SFPA)	SFPA (2022)	2022	Description and current status of designated shellfish areas.

7.4.3 Impact assessment

Section 7.4.3 remains unchanged except for an update to Paragraph 35.

Sensitivity of receptor

This section remains unchanged except for paragraph 35 which has been replaced by paragraph 3. This update has been made to include the latest information from the Water Quality in Ireland 2019-2024 Report (EPA, 2025) and the update has been made in response to FIR Item 1b (see **FIR Response Document)**.

3. WFD status is classified by the EPA and is expressed in terms of five classes (high, good, moderate, poor or bad) (EPA, 2025). These classes are established on the basis of specific criteria and boundaries. For coastal and transitional waters, these are defined as follows:

- Ecological status or ecological potential
    - Biology;
    - Water quality;
    - Hydromorphology; and

- Chemical status (level of harmful chemicals in the water).

Magnitude of impact

This section remains unchanged.

Significance of effect

This section remains unchanged.

7.5 Assumptions and limitations

Section 7.5 remains unchanged.

7.6 Existing environment

Section 7.6 remains unchanged except for updates to paragraphs 67, 70,71,72, 87, Table 7-7 and Table 7-8. Additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document**.

7.6.1 Offshore waters (beyond 1 NM)

Section 7.6.1 remains unchanged.

7.6.2 WFD marine and transitional waterbodies (up to 1 NM)

Section 7.6.2 remains unchanged except for paragraph 67 and Table 7-7 which have been replaced by paragraph 4 and Table 7-B below. This text has been updated to include the latest information from the Water Quality in Ireland 2019-2024 Report (EPA, 2025) and this update has been made in response to FIR Item 1b (see **FIR Response Document)**.

4. In general, the 'Water Quality in Ireland 2019–2024 Report' (EPA, 2025) indicates that the Southwestern Irish Sea–Killiney Bay Dublin Bay and Irish Sea waterbodies have good ecological status, indicating that only minor or slight changes from natural conditions were identified. Liffey Estuary Lower, Liffey Estuary Upper and North Bull Island have moderate WFD status, which appears to be driven in the Tolka Estuary by excess nutrient levels, affecting oxygen and angiosperm / macroalgal production. The Tolka Estuary waterbody itself is at poor ecological status. The risk for meeting WFD targets by 2027 has recently been updated (EPA, 2024); Irish Sea Dublin, Dublin Bay and Southwestern Irish Sea–Killiney Bay are not at risk. North Bull Island and Liffey Estuary Upper are still under review. Tolka Estuary and Liffey River Lower are, however, at risk of failing to meet WFD targets by 2027.

Table 7-B WFD Waterbodies within 10 km of the offshore infrastructure

WFD water body	WB code	Waterbody type	Type	WFD ecological status 2019–2024	Chemical status 2019–2024	Hydromorph-ology or quantitative status 2019–2024	Current risk (Cycle 3)	Minimum distance to onshore infrastructure (km)	Minimum distance to offshore infrastructure (km)
Dublin Bay	EA_090_0000	Coastal	Euhaline, Mesotidal, Moderately Exposed	Good	Not provided	Good Hydromorphology	Not at risk	0	0 (OECC)
Liffey Estuary Lower	EA_090_0300	Transitional	Meso or Polyhaline, Strongly Mesotidal, Sheltered	Moderate	Not provided	Moderate Hydromorphology	At risk	0	0.75* (OECC)
Irish Sea Dublin (HA 09)	EA_070_0000	Coastal	Euhaline, Mesotidal, Moderately Exposed	Good	Not provided	Not provided	Not at risk	9.4	0 (OECC)
Southwestern Irish Sea–Killiney Bay (HA10)	EA_100_0000	Coastal	Euhaline, Mesotidal, Moderately Exposed	Good	Not provided	Good Hydromorphology	Not at risk	11.0	0 (OECC)
Tolka Estuary	EA_090_0200	Transitional	Meso or Polyhaline, Strongly Mesotidal, Sheltered	Poor	Not provided	Good	At risk	0.8	1.2 (2.3 around Great South Wall)

WFD water body	WB code	Waterbody type	Type	WFD ecological status 2019–2024	Chemical status 2019–2024	Hydromorph-ology or quantitative status 2019–2024	Current risk (Cycle 3)	Minimum distance to onshore infrastructure (km)	Minimum distance to offshore infrastructure (km)
Liffey Estuary Upper	EA_090_0400	Transitional	Meso or Polyhaline, Strongly Mesotidal, Sheltered	Moderate	Not provided	Poor Hydromorphology	Review	3.2	2.9 (7.7 around Great South Wall)
North Bull Island	EA_090_0100	Transitional	Transitional lagoons: oligo or Polyhaline, Mesotidal, Sheltered	Moderate	Not provided	Not provided	Review	4.0 (7.3 around Bull Island)	3.9 (6.3 around Dollymount Strand)

7.6.3 Marine sediments

Section 7.6.3 remains unchanged except for paragraph 70 to 72 which have been updated by the paragraphs 5-7 below. These updates have been made to include the contaminant analysis results from the 2025 benthic and intertidal site-specific surveys in response to FIR Item 8k and 8l (see **FIR Response Document**).

5. Chemical analysis was collected and analysed for a range of contaminants at eight stations within the OECC in 2021, and 12 within the OECC in 2025. 10 stations were sampled for contaminants within the intertidal area in 2025. These are presented in full in **Appendix 8.3 Benthic Baseline Report** and **Appendix 8-A Benthic Sutidal Survey Report 2025**. The potential for toxicity was compared to Irish levels published by the Environmental Protection Agency (EPA) (Cronin et al., 2006), and United Kingdom (UK) levels published by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) (MMO, 2015) to determine the likelihood of biological impact. Levels below Irish lower action levels (ALs) or Cefas AL1 are generally of no concern and are unlikely to influence the licensing decision about sea disposal, whereas concentrations above Irish upper ALs or Cefas AL2 are considered unsuitable for sea disposal. The 2021 survey results showed that, when assessed against Irish guidelines, stations 28, 30 and 77 had arsenic levels above the lower AL but below the upper AL. Cadmium levels at Station 59 were also between the lower and upper AL. When assessed against Cefas guidelines, levels of cadmium, chromium and zinc at Station 59 were slightly above AL1 but below AL2. No other contaminants assessed were above Irish lower ALs or Cefas AL1 for the 2021 survey results. The 2025 intertidal survey results showed that, stations 16 and 20 had chromium concentrations slightly above Cefas AL 1 but below AL2, and below Irish lower and upper levels. The 2025 OECC survey results showed that, stations 8, 10,11 and 13 had arsenic levels above Irish lower AL but below the Irish upper AL, and below Cefas AL1 and AL2. No other contaminants assessed were above Irish lower ALs or Cefas AL1 for 2025 survey results.
6. Organotin compounds (tributyl tin (TBT), dibutyl tin (DBT) and monobutyltin (MBT)) were below the limits of detection and there was no exceedance of Irish or Cefas ALs at any of the sampling stations in either the 2021 or 2025 surveys.
7. No Irish or Cefas ALs were exceeded for polychlorinated biphenyls (PCBs) or polyaromatic hydrocarbons (PAHs) in either the 2021 or 2025 surveys.

7.6.4 Suspended sediments

Section 7.6.4 remains unchanged.

7.6.5 Protected areas

Section 7.6.5 remains unchanged except for Table 7-8 which has been replaced by Table 7-C. This update has been made to include the updated boundary to The Murrough SPA and this update has been made in response to FIR Item 1b (see **FIR Response Document)**.

Table 7-C List of protected areas within the water quality study area

Name	Criteria / Description	Current status	Approx. closest distance to the proposed development* (km)
Designated areas (Habitats Directive)			
Rockabill to Dalkey Island SAC (Site code: 003000)	**Qualifying interests** • Reefs [1170] • *Phocoena phocoena* (harbour porpoise) [1351]	Designated	0
South Dublin Bay SAC (Site code: 000210)	**Qualifying interests** Mudflats and sandflats not covered by seawater at low tide [1140]	Designated	0
South Dublin Bay and River Tolka Estuary SPA (Site code: 004024)	**Qualifying interests** • Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Oystercatcher (*Haematopus ostralegus*) [A130] • Ringed plover (*Charadrius hiaticula*) [A137] • Grey plover (*Pluvialis squatarola*) [A141] • Knot (Calidris canutus) [A143] • Sanderling (*Calidris alba*) [A144] • Dunlin (*Calidris alpina*) [A149] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Redshank (*Tringa tetanus*) [A162] • Black-headed gull (*Chroicocephalus ridibundus*) [A179] • Roseate tern (*Sterna dougallii*) [A192] • Common tern (*Sterna hirundo*) [A193]	Designated	0

Name	Criteria / Description	Current status	Approx. closest distance to the proposed development* (km)
	• Arctic tern (*Sterna paradisaea*) [A194] • Wetland and waterbirds [A999]		
Dalkey Islands SPA (Site code: 004172)	**Qualifying interests** • Roseate tern (*Sterna dougallii*) [A192] • Common tern (*Sterna hirundo*) [A193] • Arctic tern (*Sterna paradisaea*) [A194]	Designated	0.5
North Bull Island SPA (Site code: 004006)	**Qualifying interests** • Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054] • Shoveler (*Anas clypeata*) [A056] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden plover (*Pluvialis apricaria*) [A140] • Grey plover (*Pluvialis squatarola*) [A141] • Knot (Calidris canutus) [A143] • Sanderling (*Calidris alba*) [A144] • Dunlin (*Calidris alpina*) [A149] • Black-tailed godwit (*Limosa limosa*) [A156] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Turnstone (*Arenaria interpres*) [A169] • Black-headed gull (*Chroicocephalus ridibundus*) [A179]	Designated	1.3

Name	Criteria / Description	Current status	Approx. closest distance to the proposed development* (km)
	• Wetland and waterbirds [A999]		
North-West Irish Sea cSPA	**Qualifying interests** • Red-throated diver (*Gavia stellata*) [A001] • Great Northern diver (*Gavia immer*) [A003] • Fulmar (*Fulmarus glacialis*) [A009] • Manx shearwater (*Puffinus puffinus*) [A013] • Cormorant (*Phalacrocorax carbo*) [A017] • Shag (Phalacrocorax aristotelis) [A018] • Common scoter (*Melanitta nigra*) [A065] • Little gull (*Larus minutus*) [A177] • Black-headed gull (*Chroicocephalus ridibundus*) [A179] • Common gull (*Larus canus*) [A182] • Lesser black-backed gull (*Larus fuscus*) [A183] • Herring gull (*Larus argentatus*) [A184] • Great black-backed gull (*Larus marinus*) [A187] • Kittiwake (*Rissa tridactyla*) [A188] • Roseate tern (*Sterna dougallii*) [A192] • Common tern (*Sterna hirundo*) [A193] • Arctic tern (*Sterna paradisaea*) [A194] • Little tern (*Sterna albifrons*) [A195] • Guillemot (*Uria aalge*) [A199] • Razorbill (*Alca torda*) [A200] • Puffin (Fratercula arctica) [A204]	Candidate	1.3
Baldoyle Bay SPA	**Qualifying interests**	Designated	7.0

Name	Criteria / Description	Current status	Approx. closest distance to the proposed development* (km)
	• Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Ringed plover (*Charadrius hiaticula*) [A137] • Golden plover (*Pluvialis apricaria*) [A140] • Grey plover (*Pluvialis squatarola*) [A141] • Bar-tailed godwit (*Limosa lapponica*) [A157] • Wetland and waterbirds [A999]		
Howth Head Coast SPA	**Qualifying interests** Kittiwake (*Rissa tridactyla*) [A188]	Designated	8.2
Ireland's Eye SPA	**Qualifying interests** • Cormorant (*Phalacrocorax carbo*) [A017] • Herring gull (*Larus argentatus*) [A184] • Kittiwake (*Rissa tridactyla*) [A188] • Guillemot (*Uria aalge*) [A199] • Razorbill (*Alca torda*) [A200]	Designated	9.0
The Murrough SPA	**Qualifying interests** • Red-throated diver (*Gavia stellata*) [A001] • Greylag goose (*Anser anser*) [A043] • Light-bellied brent goose (*Branta bernicla hrota*) [A046] • Wigeon (*Anas penelope*) [A050] • Teal (*Anas crecca*) [A052] • Black-headed gull (*Chroicocephalus ridibundus*) [A179] • Herring gull (*Larus argentatus*) [A184] • Little tern (*Sterna albifrons*) [A195]	Designated	0

Name	Criteria / Description	Current status	Approx. closest distance to the proposed development* (km)
	• Wetland and waterbirds [A999]		
North Dublin Bay SAC (Site code: 000206)	**Qualifying interests**** Mudflats and sandflats not covered by seawater at low tide [1140]	Designated	1.3
Wicklow Reef SAC (Site code: 002274)	**Qualifying interests** Reefs [1170]	Designated	5.5
Bathing water			
Shelley Banks	Other bathing water	Excellent	0
Half Moon	Other bathing water	Excellent	0.5
Sandymount Strand	Designated bathing water	Excellent (2023)	0.79
Forty Foot Bathing Place	Designated bathing water	Excellent (2021)	0.86
Sandycove Beach	Designated bathing water	Excellent (2021)	0.97
Merrion Strand	Other bathing water	Excellent	1.3
Dun Laoghaire Baths	Other bathing water	Excellent	1.4
North Bull Wall	Other bathing water	Excellent	2.2
Seapoint	Designated bathing water	Excellent (2021) Blue Flag 2022	2.24
White Rock	Designated bathing water		2.5

Name	Criteria / Description	Current status	Approx. closest distance to the proposed development* (km)
White Rock Beach	Designated bathing water	Excellent (2021)	2.51
Killiney	Designated bathing water	Excellent (2021)	3.27
Dollymount Strand	Designated bathing water	Good (2021)	3.49
Nutrient Sensitive Areas			
Liffey Estuary (Upper and Lower), Tolka Estuary and South Bull Lagoon (Ringsend)	Secondary treatment in place	Currently not meeting objectives	0

7.6.6 Identification of receptors

Section 7.6.6 remains unchanged.

7.6.7 Climate change and natural trends

Section 7.6.7 remains unchanged except for paragraph 84 which has been replaced by paragraph 8. This update has been made to include the latest information from the Water Quality in Ireland 2019-2024 Report (EPA, 2025) and this update has been made in response to FIR Item 1b (see **FIR Response Document)**.

8. There has been a 5% decline in transitional waters and a 2.4% improvement in monitored coastal water since the 2016-2021 report (EPA, 2025) Phytoplankton and fish have been identified as key elements for determining overall ecological status of transitional waters, followed by benthic invertebrates (EPA, 2022b). These characteristics are known to be highly sensitive to pollution, specifically organic pollution (e.g. from land runoff), as well as impacts relating to climate change (EPA, 2022b; OSPAR, 2017).

7.6.8 Predicted future baseline

Section 7.6.8 remains unchanged.

7.7 Scope of the assessment

Section 7.7 remains unchanged.

7.8 Assessment parameters

Section 7.8 remains unchanged except for an update to Table 7-11 below.

7.8.1 Background

Section 7.8.1 remains unchanged.

7.8.2 Options and dimensional flexibility

Section 7.8.2 remains unchanged except for Table 7-11 which has been replaced by Table 7-D below. This update has been made to include the updated sediment plume modelling in response to FIR Item 6i (see **FIR Response Document)**.

7.8.3 Limit of deviation (LoD)

Section 7.8.3 remains unchanged.

Table 7-D Representative scenario summary

Impact	Representative scenario details	Value	Notes / Assumptions
Construction			
Impact 1: Direct temporary disturbance resulting in temporary increases in SSC	Array site (including wind turbine generator (WTGs), offshore substation structure (OSSs) and offshore export cables within the Array Site) and OECC (WTG Layout Option A (75 WTGs))		Option A forms the representative scenario as this represents the greatest level of temporary increase in SSC, and therefore Option A forms the basis of the assessment. Option B, or any other scenario resulting in a lower level of temporary increases in SSC, would not introduce new or different impacts and would not result in a materially different effect. Greatest increases in SSC are anticipated to be caused by dredge disposal operations and cable installations, which underwent sediment plume modelling, as presented in **Appendix 6-A Modelling Report Addendum**.
	Boulder clearance: Array site seabed clearance area (m^2)	2,556,000–2,934,000	
	Sand wave clearance: Array site volume of material disturbed by sand wave clearance (m^3)	615,750–777,750	
	Inter-array cable (IAC) and interconnector cable installation: Total volume of sediment disturbed (m^3)	2,866,500–3,321,000	
	Boulder clearance: OECC seabed clearance area (m^2)	2,220,000–2,616,000	
	OECC volume of material disturbed by sand wave clearance (m^3)	471,450–595,650	
	Offshore export cable installation: Total volume of sediment disturbed (m^3)	3,780,000–4,374,000	
	JUV operations total impact area (m^2)	240,000	
	WTGs and OSS anchoring operations total impact volume (m^3)	1,404,000	
	IAC and interconnector cable anchoring operations total seabed impact volume (m^3)	1,857,600	
	Offshore export cable anchoring operations total seabed impact volume (m^3)	3,153,600	

Impact	Representative scenario details	Value	Notes / Assumptions
	Total volume of WTG monopile drill arisings (m^3)	24,516	
	Landfall		
	Total seabed disturbed by cofferdam (m^2)	6,100	
	Total seabed disturbed by intertidal cable duct installation (m^3)	72,000	
	Total area of seabed in transition zone affected by support structures (m^2)	6,900	
	Total volume of seabed in transition zone affected by installation of cables using either open cut trenching or a shallow water trenching tool (m^3)	216,000	
	Onshore substation		
	Onshore substation: length of combi-wall below the High Water Mark (HWM) (requiring marine piling) (m)	150	
	Onshore substation: Total length of new revetments (m)	150	
Impact 2: Direct disturbance resulting in resuspension of contaminated sediments	Representative scenario parameters are the same as those for Impact 1, above. Coastal processes modelling indicates that spring tides, which generate the greatest horizontal displacement, can extend along the tidal axis for up to 7 km. Sediment plume modelling suggests that the greatest direction and distance of dispersion of disturbed material was 4–7 km north – south / slight east, although one scenario showed a north - south dispersion reaching 2–4 km.	As above for array site, OECC, landfall, and onshore substation	Remobilisation of contaminated sediments relates to seabed preparation for foundations and cables, jack-up and anchoring operations, and cable installation. It should be noted that, where boulder clearance overlaps with sand wave clearance, the boulder clearance footprint will be within the sand wave clearance footprint. Remobilisation of contaminated sediments occur as a result of temporary disturbance to the seabed. Offshore, WTG Option A forms the representative scenario as this represents the

Impact	Representative scenario details	Value	Notes / Assumptions
			greatest level of temporary disturbance to the seabed, and therefore Option A forms the presentational basis of the assessment for Impact 2. Option B would result in a lower level of disturbance and would not introduce new impacts or an impact of materially different magnitude.
Impact 3: Accidental pollution events	Total WTG Total construction vessels (round trips)	75 2,409	Accidental pollution events relate to the oils and fluids which may be used during construction activities, including: • Grease; • Hydraulic oil; • Gear oil; • Nitrogen; • Transformer silicon / ester oil; • Diesel fuel; • Sulphur Hexafluoride (SF6); • Glycol / coolants; • Batteries; and • Drill fluid. The requirement for use of oils and fluids during construction will be the same regardless of the WTG option selected. However, offshore, WTG Option A forms the representative scenario, as this represents the greatest number of locations that may require drilling.
	Number of WTG and OSS locations that may require drilling	12	

Impact	Representative scenario details	Value	Notes / Assumptions
Operations and maintenance			
Impact 1: Direct temporary disturbance resulting in temporary increases in SSC	Temporary increases in SSC during operation and maintenance of the CWP Project are anticipated to occur if one of the following is required: • Cable reburial, following movement of seabed sediments resulting in the exposure of the buried cable; • Cable repair, requiring exposure, recovery and reburial of cables; and • Use of JUVs during WTG / OSS maintenance. It is anticipated that the same or similar methodology will be required as described for the construction phase, except over a greatly reduced area. Given this it is anticipated that, for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 2: Direct disturbance resulting in resuspension of contaminated sediments	Resuspension of contaminants sediments is associated with the disturbance of seabed sediments are increases in SSC. Temporary increases in SSC during operation and maintenance of the CWP Project are anticipated to occur if one of the following is required: • Cable reburial, following movement of seabed sediments resulting in the exposure of the buried cable; • Cable repair, requiring exposure, recovery and reburial of cables; and • Use of JUVs during WTG / OSS maintenance. It is anticipated that the same or similar methodology will be required as described for the construction phase, except over a greatly reduced area. Given this it is anticipated that, for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 3: Accidental pollution events	Number of vessels on site x round trips	1,209	Accidental pollution relates to the oils and fluids which may be used during O&M activities, including: • Grease; • Hydraulic oil; • Gear oil; • Nitrogen; • Transformer silicon / ester oil; • Diesel fuel;

Impact	Representative scenario details	Value	Notes / Assumptions
			• SF6; • Glycol / coolants; • Batteries; • Drill fluid. The requirement for use of oils and fluids during O&M will be the same regardless of the WTG option selected. Therefore, there is only one scenario for this potential impact and this represents the representative scenario.
Decommissioning			
Impact 1: Direct temporary disturbance resulting in temporary increases in SSC	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project all offshore infrastructure will be rehabilitated. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • The WTGs and OSS topsides shall be completely removed. Following WTG and OSS topside decommissioning and removal, the monopile foundations will be cut below the seabed level to a depth that will ensure the remaining foundation is unlikely to become exposed. This is likely to be approximately 1 m below seabed, although the exact depth will depend upon the seabed conditions and site characteristics at the time of decommissioning.		

Impact	Representative scenario details	Value	Notes / Assumptions
Impact 2: Direct disturbance resulting in resuspension of contaminated sediments	• All cables and associated cable protection in the offshore environment shall be wholly removed. It is likely that equipment similar to that used to install the cables may be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables is anticipated to be the same as the area impacted during the installation of the cables. • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project, and the assumptions around the number of vessels on site and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above, it is anticipated that, for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 3: Accidental pollution events	For the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project and the assumptions around the number of vessels on site and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above, it is anticipated that, for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		

7.9 Primary mitigation measures

Section 7.9 remains unchanged.

7.10 Impact assessment

Section 7.10 remains unchanged except for updates to paragraphs 153, 161 and 223.

7.10.1 Construction phase

Section 7.10.1 remains unchanged except for paragraph 153 and 161.

Impact 1: Direct temporary disturbance resulting in temporary increases in SSC

This section remains unchanged.

Impact 2: Direct disturbance resulting in resuspension of contaminated sediments

This section remains unchanged except for paragraph 153 which has been replaced by paragraph 9. This update has been made to include the contaminant analysis results from the 2025 benthic subtidal and intertidal site-specific survey in response to FIR Item 8k and 8l (see **FIR Response Document**).

9. Levels of contaminants above Irish lower AL or Cefas AL1 were detected at four stations in the 2021 survey and at six stations in the 2025 survey (two in the intertidal area, and four along the OECC). In the 2021 survey, slight exceedances occurred at stations 28, 30, and 77 for arsenic, and at station 59 for cadmium, chromium, and zinc. In the 2025 survey, slight exceedances were recorded at stations 16 and 20 (chromium) in the intertidal area, and at stations 8, 10, 11, and 13 (arsenic) along the OECC (**Appendix 8.3 Benthic Baseline Report** and **Appendix 8-A Benthic Subtidal Survey Report 2025**). No station from either the 2021 or 2025 surveys exceeded Irish upper AL or Cefas AL2, and no other pollutants exceeded risk levels. In the Pigeon Park area of the River Liffey, contaminated sediment results showed that no contaminants were found at levels above those of Cefas AL1 or above Irish lower ALs.

Receptor sensitivity

This section remains unchanged except for where paragraph 161 has been replaced below.

Offshore waters (beyond 1 NM)

This section remains unchanged.

WFD marine and transitional water bodies (<1 NM from coast)

Paragraph 161 has been replaced by paragraph 10. This update has been made to include the contaminant analysis results from the 2025 benthic subtidal and intertidal site-specific surveys in response to FIR Item 8k and 8l (see **FIR Response Document**).

10. Site-specific chemical analysis was undertaken at eight stations within the offshore development area in 2021, at 10 stations within the landfall area in 2025, and at 12 stations within the offshore development area in 2025. Selected contaminants were recorded at levels above Irish lower Als or Cefas AL1 at four stations in the 2021 survey and at six stations (two intertidal area, four OECC) in the 2025 survey. (**Appendix 8.3 – Benthic Baseline Report** and **Appendix 8-A – 2025 Benthic Baseline Report**). In the 2021 survey, slight exceedances occurred at stations 28, 30, and 77 for arsenic, and at station 59 for cadmium, chromium, and zinc. In the 2025 survey, slight exceedances to CEFAS AL1 were recorded at stations 16 and 20 (chromium) in the intertidal area, and to the Irish lover AL at stations 8, 10, 11, and 13 (arsenic) along the OECC Station 59 from the 2021 survey and Stations 16 and 20 from the 2025 intertidal survey are located within the Dublin Bay coastal waterbody, and as a result there is potential for these sediments to be released into the Dublin Bay coastal waterbody. Based on sediment plume modelling (**Appendix 6-A Modelling Report Addendum**), sediments disturbed at this location are not anticipated to travel into other WFD waterbodies. Stations 28, 30 and 77 in the 2021 survey and stations 8, 10, 11 and 13 in the 2025 OECC survey are located outside of the WFD jurisdiction, but sediments disturbed from these stations may interact with the Irish Sea Dublin (HA 09) coastal waterbody and the Southwestern Irish Sea–Killiney (HA 10).

Magnitude of impact

This section remains unchanged.

Significance of the effect

This section remains unchanged.

Impact 3: Accidental pollution events

This section remains unchanged.

7.10.2 Operation and maintenance

Section 7.10.2 remains unchanged.

7.10.3 Decommissioning phase

Section 7.10.3 remains unchanged except for paragraph 223.

Impact 1: Direct temporary disturbance resulting in temporary increases in SSC

This section remains unchanged.

Impact 2: Direct disturbance resulting in resuspension of contaminated sediments

Paragraph 223 has been updated by the paragraph 11 below. This update has been made to include the contaminant analysis results from the 2025 benthic subtidal and intertidal site-specific surveys in response to FIR Item 8k and 8l (see **FIR Response Document**).

11. In the baseline site-specific surveys, contaminated sediment results showed low levels of chemical contaminants at stations sampled within the offshore development area and intertidal area. The majority of contaminants levels at sampled stations were below the Irish lower AL and Cefas AL1 (**Appendix 8.3 Benthic Baseline Report** and **Appendix 8-A Benthic Subtidal Survey Report 2025**). It is unknown what levels of contaminated sediments will exist in the areas of habitat disturbance at the time of decommissioning, but no sources of significant contamination are predicted to be present within the offshore development area during its lifetime, and as such it is expected that levels of contamination will not increase during this time.

Impact 3: Accidental pollution events

This section remains unchanged.

7.11 Cumulative impacts

Section 7.11 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

7.12 Transboundary impacts

Section 7.12 remains unchanged.

7.13 Inter-relationships

Section 7.13 remains unchanged.

7.14 Potential monitoring requirements

Section 7.14 remains unchanged.

7.15 Impact assessment summary

Section 7.15 remains unchanged.

7.16 References

Section 7.16 should now be read in conjunction with paragraphs 12 to 26 below. This revision has been made in response to FIR Item 1b (See **FIR Response Document**).

12. Department of Housing, Local Government and Heritage (DHLGH) (2021a). Draft River Basin Management Plan for Ireland 2022-2027. Available at: https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027 [Accessed 06/08/24].

13. Department of Housing, Local Government and Heritage (DHLGH) (2021b). Draft River Basin Management Plan for Ireland 2022-2027 – Appendix 2 – Draft List of Proposed Measures. Available at: https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027 [Accessed 06/08/24].

14. Department of Housing, Local Government and Heritage (DHLGH) (2021c). River Basin Management Plan for Ireland 2018-2021. Available at: https://www.gov.ie/en/publication/429a79-river-basin-management-plan-2018-2021 [Accessed 06/08/24].

15. Department of Housing, Local Government and Heritage (DHLGH) (2020). Marine Strategy Framework Directive 2008/56/EC Article 17 update to Ireland's Marine Strategy Part 1: Assessment (Article 8), Determination of Good Environmental Status (Article 9) and Environmental Targets (Article 10) June 2020. Available at: https://www.gov.ie/en/publication/2fe6c-marine-strategy-framework-directive-200856ec-article-17-update-to-irelands-marine-strategy-part-1-assessment-article-8-determination-of-good-environmental-status-article-9-and-environmental-targets-article-10/ [Accessed 06/08/24].

16. Environment Agency (2024). Cycle 3 HA 09 Liffey and Dublin Bay Catchment Report, May 2024.

17. Environmental Protection Agency (EPA) (2021). Ireland's National Water Framework Directive Monitoring Programme 2019-2021. Available at: https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/EPA_WFD_MonitoringProgramme_2019_2021-(1).pdf [Accessed 06/08/24].

18. Environmental Protection Agency (EPA) (2022b). Water Quality in Ireland 2016–2021 Report. ISBN: 978-1-80009-074-3. Available at: https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/Water-Quality-in-Ireland-2016-2021-Report.pdf.

19. Environmental Protection Agency (EPA) (2022c). Beaches. Available at: https://www.beaches.ie/find-a-beach/#/ [Accessed: 17/11/2022].

20. Environmental Protection Agency (EPA) (2025). Water Quality in Ireland 2019–2025 Report. ISBN: 978-1-80009-302-7. Available at: Water Quality in Ireland 2019-2024

21. Environmental Protection Agency Catchment Science & Management Unit (EPA-CSMU) (2021a). 3rd Cycle Draft Liffey and Dublin Bay Catchment Report (HA 09). Available at: https://catchments.ie/wp-content/files/catchmentassessments/09%20Liffey%20and%20Dublin%20Bay%20Catchment%20Summary%20WFD%20Cycle%203.pdf [Accessed 06/08/24].

22. Environmental Protection Agency Catchment Science & Management Unit (EPA-CSMU) (2021b). 3rd Cycle Draft Ovoca-Vartry Catchment Report (HA 10). Available at: https://catchments.ie/wp-content/files/catchmentassessments/10%20Ovoca-Vartry%20Catchment%20Summary%20WFD%20Cycle%203.pdf [Accessed 06/08/24].

23. Met Éireann (2022). Marine Climatology. Available from https://www.met.ie/science/marine-meteorology/marine-climatology [Accessed: 11/11/2022].

24. OSPAR (2017). Intermediate Assessment. [Online] Available at: https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017 [Accessed: 08/11/2022].

25. OSPAR (2017). Intermediate Assessment. [Online] Available at: https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017 [Accessed: 08/11/2022].

26. Sea Fisheries Protection Authority (SFPA) (2022). Classified Areas: 2022/2023 List of Classified Bivalve Mollusc Production Areas in Ireland (26th July 2022) Available at: https://www.sfpa.ie/What-We-Do/Molluscan-Shellfish/Classified-Areas [Accessed: 01/11/2022].

8 SUBTIDAL AND INTERTIDAL ECOLOGY

8.1 Introduction

Section 8.1 remains unchanged.

8.2 Consultation

Section 8.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

8.3 Legislation, policy and guidance

Section 8.3 remains unchanged.

8.4 Impact assessment methodology

Section 8.4 remains unchanged except for changes to paragraph 17 in Section 8.4.2 below.

8.4.1 Study area

Paragraph 17 has been replaced with paragraph 1 below to reflect the additional sediment plume modelling, in response to FIR item 6i (see **FIR Response Document**).

1. The study area for the subtidal and intertidal ecology assessment has been informed by the modelling presented in **Appendix 6-A Modelling Report Addendum**. Modelling was undertaken to identify the greatest extent of potential sediment plumes dispersion, level of dispersion above background levels (mg/L), and accumulated level of deposited material. The modelling identified the greatest direction and distance of dispersion of disturbed material was 7 km to the North-South / slight East, although one scenario showed dispersion North-South reaching up to 4 km. The model underwent calibration and validation and was deemed fit-for-purpose; however it is a predictive model, and with a view to applying the precautionary principle, the study area has been defined as a 10 km radius and a wider study area of a 20 km radius is provided for context in terms of the surrounding benthic habitats.

8.4.2 Data and information sources

Site specific surveys

Section 8.4.2 remains unchanged but should now be read in conjunction with Table 8-A and paragraph 2 below which have been added in response to FIR item 8b (see **FIR Response Document**).

Table 8-A Benthic ecology related surveys undertaken at Codling Wind Park

Survey	Method	Date
Codling Wind Park	118 x Biological Dredge with 10 mm mesh size	2001-2002
Codling Wind Park	Integrated geophysical survey, including side-scan sonar, magnetometer, multi-beam echo-sounder bathymetry and sub-bottom profiling throughout the entire area	2014
Codling Wind Park Extension	40 x 0.1 m^2 Hamon grab samples	2008
Codling Wind Park Benthic Intertidal and Subtidal Ecology Survey	Phase I Intertidal survey at 23 stations and benthic subtidal 0.1m^2 Day grab / 0.1 m^2 Smyth-McIntyre grab (46 stations)	2021
Codling Wind Park Benthic Intertidal and Subtidal Ecology Survey	Phase I Intertidal survey at 23 stations and benthic subtidal 0.1m^2 mini-Hammon grab and drop-down video (DDV) (46 stations)	2025

2. The additional surveys were undertaken in 2025 to validate the characterisation of the benthic and intertidal ecology in the offshore development area, and to ascertain the presence of rocky or biogenic reef in the northern area of the Wicklow Reef SAC, closest to the offshore development area. The findings are summarised in **Section 8.6** and full details are provided in the survey reports (**Appendix 8-A Benthic Subtidal Survey Report 2025, Appendix 8-B Landfall and Intertidal Survey Report 2025** and **Appendix 8-C DDV Wicklow Reef Survey Report 2025**).

8.4.3 Impact assessment

Section 8.4.3 remains unchanged.

8.5 Assumptions and limitations

Section 8.5 remains unchanged except for paragraph 34 which is replaced by paragraph 3 below. This update has been made in response to FIR Item 8a and 8b (see **FIR Response Document**).

3. Site specific data were gathered in 2021 and 2025 and as such survey data remain valid and provide an appropriate characterisation of the receiving environment at the point of application.

8.6 Existing environment

Section 8.6 remains unchanged except for changes from Section 8.6.1 to Section 8.6.7 detailed below. Additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document**.

8.6.1 Subtidal and Intertidal Ecology Study Area

Section 8.6.1 remains unchanged but should now be read in conjunction with paragraph 4 below which has been provided in response to FIR item 8o (see **FIR Response Document)**.

4. Codling Bank is a geomorphological feature in the study area. A benthic survey of Codling Bank conducted in 2012 found the gravelly / cobbly sediments with areas of sand dominate the Greater Codling Bank (Aquafact, 2012). The fauna present was a mixture of both infaunal and epifaunal taxa with all species present are typical of such coarse gravelly and sandy sediments

8.6.2 CWP Array Site

Section 8.6.2 remains unchanged but should now be read in conjunction with paragraphs 5-14 and Table 8-B and Table 8-C below which have been provided in response to FIR item 8b (see **FIR Response Document** and **Appendix 6-A Modelling Report Addendum)**.

5. The additional 2025 benthic subtidal survey broadly concurs with the site specific 2023 survey with sediments in the array site comprising gravelly muddy sand, gravelly sand, and muddy sandy gravel, reflecting a predominantly coarse, mixed-sediment environment. The typical community structure is characterised by a range of species including polychaetes, bivalves, amphiphods, hydroids and bryozoans.

6. DDV footage was collected at each station as well as benthic grabs. Five biotopes were identified from the DDV whilst four were identified form the grabs (**Table 8-B** and **Table 8-C**). Using both methods the predominant biotope in the array site was *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) or Circalittoral coarse sediment (SS.SCS.CCS) where identification to level 5 biotope was not possible. At a few stations where the infaunal biotope *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) was present, the epifaunal biotope *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment was present as an overlay, with the hydroids indicating slightly less scour at these stations.

7. Mixed sediment biotopes Circalittoral mixed sediment (SS.SMx.CMx) and Polychaete-rich deep Venus community in offshore mixed sediments (SS.SMx.OMx.PoVen) are present in the south of the array site with brittle star beds present at one station.

8. It was not possible to obtain a grab sample at two locations; stations 35 and 46. Station 35 was classified as the hard substrate biotope Echinoderms and crustose communities (CR.MCR.EcCr) and Station 46 as was (SS.SCS.CCS.SpiB) *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles from the underwater imagery. The biotope Echinoderms and crustose communities (CR.MCR.EcCr) occurs on wave-exposed, moderately strong to weakly tide-swept, circalittoral bedrock and boulders, and Station 35 was classified as the biotope due to a discrete area of boulders and cobbles.

9. There was a relatively high level of correspondence between the biotopes assigned to the videos and those assigned to the benthic grab samples, with the majority matching at the habitat level and the biotope level. The primary reason that some classifications differed was that a different substrate had been recorded, which is a reflection of the different scales of sampling as well as the local heterogeneity in sediment type. It is considered that discrete areas of low lying boulders exist amongst what it is generally considered to be a coarse sediment habitat.

10. The biotopes identified in the 2025 survey concur with the 2021 site specific survey with the complex Circalittoral coarse sediment present at all station in the array site sampling stations in the 2021 survey and at the majority in the 2025 survey, with the Circalittoral mixed sediment present at two stations

and Echinoderms and crustose communities at one. These results also align with INFOMAR Seabed Substrate (2019) data which suggests the array site is homogenous with coarse sediment throughout and EUSeamap (2021) broad habitat data which classifies the area as consisting of coarse sediments with one small area of mixed sediment (see **Figure 8-4**).

11. As with the previous baseline survey, all the biotopes identified in the array site suggest it is wave exposed and tide swept and subject to seasonally variable levels of scour.

12. Overall, these results validate the baseline characterisation of the array site present in **Section 8.6.**

Table 8-B Biotopes recorded from underwater video in the Array Site in the 2025 subtidal survey.

Biotope code	Biotope name
SS.SCS.CCS.SpiB	*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles
SS.SCS.CCS	Circalittoral Coarse Sediment
SS.SMx.CMx.FluHyd	*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment
SS.SMx.CMx.OphMx	*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment
CR.MCR.EcCr	Echinoderms and crustose communities

Table 8-C Biotopes recorded from benthic grabs in the Array Site in the 2025 subtidal survey.

Biotope code	Biotope name
SS.SCS.CCS.SpiB	*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles
SS.SCS.CCS	Circalittoral Coarse Sediment
SS.SMx.OMx.PoVen	Polychaete-rich deep Venus community in offshore mixed sediments
SS.SMx.CMx	Circalittoral mixed sediment

13. The sediment types present at all stations within the array site were too coarse to allow for sampling for contaminants analysis to be collected. However, contaminants (such as heavy metals and organic pollutants) primarily accumulate in fine-grained sediments (mud, clay, silt) rather than coarse-grained sediments (sand) (Szava-Kovats, 2008). As such it is anticipated that levels of contaminants within the array site are lower than the low levels found in the OECC and intertidal area (see Sections 8.6.3 and 8.6.4 below).

14. The additional data summarised within this section and presented in full in **Appendices 8-A Benthic Subtidal Survey Report 2025** and **Appendix 8-B Landfall and Intertidal Survey Report 2025**, validates and supports the existing baseline characterisation for the CWP array site presented in Section 8.6 of EIAR **Volume 3**, **Chapter 8 Subtidal and Intertidal Ecology**. Analysis of this data has demonstrated no material change to the current baseline for all relevant receptors. It can therefore be concluded that no material change to the existing assessment conclusions would result from the additional data, and therefore a revised impact assessment to account for this data is not required.

8.6.3 CWP Project OECC area

Section 8.6.3 remains unchanged but should now be read in conjunction with paragraphs 15 –20 and Table 8-D and Table 8-Ebelow which have been added in response to FIR item 8b (see **FIR Response Document**).

15. The additional 2025 benthic subtidal survey broadly concurs with the site specific 2021 survey with the majority of sediments in the OECC consisting of muddy sand and stations closest to the array site comprising mixed and coarse sediments.

16. Seven biotopes were identified from the DDV whilst six were identified form the grabs (**Table 8-D** and **Table 8-E**). The biotope *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (SS.SSa.IMuSa.FfabMag) dominated stations closest to the intertidal area with the habitat changing to mostly *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (SS.SSa.CMuSa.AalbNuc) along the OECC as the silt content reduces. Biotopes in the OECC closest to the array site are the same as the main biotopes found in the array site, namely *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) and Circalittoral mixed sediment (SS.SMx.CMx).

17. Two stations were identified as *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock (CR.MCR.EcCr.UrtScr) from the underwater video which were assessed as being Circalittoral mixed sediment (SS.SMx.CMx) from the benthic grab data. This biotope is only occasionally recorded as a separate entity, because its extent is typically restricted to rock features located at the sediment interface and the dominant species is the anemone *Urticina felina* which commonly occurs at the sand-rock interface (JNCC, 2022). This suggests distinct areas of this epifaunal biotope exists where rock is present on top of the main sedimentary biotope of Circalittoral mixed sediment.

18. The biotopes identified in the 2025 survey concur with the 2021 site specific survey with the biotope *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (SS.SSa.IMuSa.FfabMag) present at Stations 1-5, closest to the intertidal area and *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) at stations closet to the array site. Additional biotopes Circalittoral mixed sediment (SS.SMx.CMx), *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (SS.SSa.CMuSa.AalbNuc) and *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (SS.SSa.CFiSa.EpusOborApri) were identified from the grabs in the 2025 survey. This likely reflects the increased sampling effort and more even distribution of sampling stations within the OECC in the 2025 survey.

19. These results also align with INFOMAR Seabed Substrate (2019) data which suggests sediments along the OECC are sand near to landfall, graduating to sandy mud / muddy sand in the infralittoral followed by an area of mixed sediment then sand and coarse sediment on the approach to the array site. And by EUSeamap (2021) broad habitat data which classifies the OECC sediment types as coarse sediment and mixed sediment close to the array site, followed by a large area of sand along the OECC followed by mud nearer to shore and infralittoral sand nearshore (see **Figure 8-4**).

20. Overall, these results validate the baseline characterisation of the OECC present in **Section 8.6** whilst providing additional information to address previous data gaps.

Table 8-D Biotopes recorded from benthic grabs in the OECC in the 2025 subtidal survey.

Biotope code	Biotope name
SS.SSa.IMuSa.FfabMag	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand
SS.SMx.CMx	Circalittoral mixed sediment
SS.SSa.CMuSa.AalbNuc	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment
SS.SSa.CFiSa.EpusOborApri	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand
SS.SCS.CCS.MedLumVen	*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel
SS.SCS.CCS.SpiB	*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles

Table 8-E Biotopes recorded from underwater video in the OECC in the 2025 subtidal survey.

Biotope code	Biotope name
SS.SSa.IMuSa	Infralittoral muddy sand
SS.SMx.CMx	Circalittoral mixed sediment
SS.SSa.CMuSa	Circalittoral muddy sand
SS.SMx.CMx.FluHyd	*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment
SS.SMx.CMx.OphMx	*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment
CR.MCR.EcCr.UrtScr	*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock
SS.SCS.CCS.SpiB	*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles

Paragraphs 56 and 57 of section 8.6.3 (CWP Project OECC area) of the EIAR are replaced by paragraphs 21-23 below which have been added in response to FIR item 8b (see **FIR Response Document**).

21. Chemical analysis was collected and analysed for a range of contaminants at eight stations within the OECC in 2021, and 12 within the OECC in 2025. These are presented in full in **Appendix 8.3** of EIAR **Volume 3, Chapter 8 Subtidal and Intertidal Ecology** and **Appendix 8-A Benthic Subtidal Survey Report 2025**. The potential for toxicity was compared to Irish levels published by the Environmental Protection Agency (EPA) (Cronin et al., 2006), and United Kingdom (UK) levels published by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) (MMO, 2015) to determine the likelihood of biological impact. Levels below Irish lower action levels (ALs) or Cefas AL1 are generally of no concern and are unlikely to influence the licensing decision about sea disposal, whereas concentrations above Irish upper ALs or Cefas AL2 are considered unsuitable for sea disposal. The 2021 survey results showed that, when assessed against Irish guidelines, stations 28, 30 and 77 had

arsenic levels above the lower AL but below the upper AL. Cadmium levels at Station 59 were also between the lower and upper AL. When assessed against Cefas guidelines, levels of cadmium, chromium and zinc at Station 59 were slightly above AL1 but below AL2. No other contaminants assessed were above Irish lower ALs or Cefas AL1 for the 2021 survey results. The 2025 intertidal survey results showed that, stations 16 and 20 had chromium concentrations slightly above Cefas AL 1 but below AL2, and below Irish lower and upper levels. The 2025 OECC survey results showed that, stations 8, 10,11 and 13 had arsenic levels above Irish lower AL but below the Irish upper AL, and below Cefas AL1 and AL2. No other contaminants assessed were above Irish lower ALs or Cefas AL1 for 2025 survey results.

22. Organotin compounds (tributyl tin (TBT), dibutyl tin (DBT) and monobutyltin (MBT)) were below the limits of detection and there was no exceedance of Irish or Cefas ALs at any of the sampling stations and no Irish or Cefas ALs were exceeded for polychlorinated biphenyls (PCBs) or polyaromatic hydrocarbons (PAHs).

23. The additional data summarised within this section and presented in full in **Appendices 8-A** and **8-B** validates and supports the existing baseline characterisation for the CWP Project OECC area, as presented in **Section 8.6 of** EIAR **Volume 3, Chapter 8 Subtidal and Intertidal Ecology**. Analysis of this data has demonstrated no material change to the current baseline for all relevant receptors. It can therefore be concluded that no material change to the existing assessment conclusions would result from the additional data, and therefore a revised impact assessment to account for this data is not required.

8.6.4 CWP Project landfall and intertidal area

Section 8.6.4 remains unchanged but should now be read in conjunction with paragraphs 24-31 below which have been added in response to FIR item 8l (see **FIR Response Document**).

24. The additional 2025 intertidal survey concurs with the 2021 intertidal survey with sediment type across the lower, middle and upper shore being fine sand or muddy sand.

25. Stations closest to landfall contained moderate amounts of green algae species such as *Ulva intestinalis* and *Chaetomorpha* sp. These species may indicate some nutrient enrichment which can occur due to agricultural run-off or other sources of nutrient enrichment.

26. No seagrass beds were recorded within the survey area. However, several small patches of seagrass, ranging in size from approximately 0.5 m² to 2.5 m², were identified approximately 20 m from one of the sampling stations which lies outside of the Proposed Application Boundary (PAB) and as such no works will take place in this area. These small patches of seagrass do not constitute a seagrass bed due to the small patch sizes.

27. Only one biotope was identified in the 2025 intertidal survey, Littoral Sand (LS.LSa) as were the majority of sampling stations in the 2021 survey apart from one station classified as Littoral mixed sediment and one station as Littoral coarse sediment.

28. Overall, these results validate the baseline characterisation of the intertidal area present in **Section 8.6** of EIAR **Volume 3, Chapter 8 Subtidal and Intertidal Ecology** with the predominant biotope being Littoral sand.

29. Samples for contaminants were collected at 10 stations within the intertidal area in 2025, full results are presented in **Appendix 8-B Landfall and Intertidal Survey Report 2025**. The 2025 results showed that, stations 16 and 20 had chromium concentrations slightly above Cefas AL 1 but below AL2, and below Irish lower and upper levels. The 2025 OECC survey results showed that, stations 8, 10,11 and 13 had arsenic levels above Irish lower AL but below the Irish upper AL, and below Cefas

AL1 and AL2. No other contaminants assessed were above Irish lower ALs or Cefas AL1 for 2025 survey results.

30. Organotin compounds (tributyl tin (TBT), dibutyl tin (DBT) and monobutyltin (MBT)) were below the limits of detection and there was no exceedance of Irish or Cefas ALs at any of the sampling stations and no Irish or Cefas ALs were exceeded for polychlorinated biphenyls (PCBs) or polyaromatic hydrocarbons (PAHs).

31. The additional data summarised within this section, and presented in full in **Appendices 8-A** and **8-B**, validates and supports the existing baseline characterisation for the CWP Project landfall and intertidal area, as presented in **Section 8.6 of** EIAR **Volume 3**, **Chapter 8 Subtidal and Intertidal Ecology**. Analysis of this data has demonstrated no material change to the current baseline for all relevant receptors. It can therefore be concluded that no material change to the existing assessment conclusions would result from the additional data, and therefore a revised impact assessment to account for this data is not required.

8.6.5 River Liffey

Section 8.6.5 remains unchanged, however the Dublin Port Company 2022 survey report is now included in the Section 8.16 References, which has been provided in response to FIR item 8k (see **FIR Response Document**).

8.6.6 Identification of receptors

Section 8.8.8 remains unchanged except for Table 8-9 which has been replaced by Table 8-F below to include 2025 survey biotopes in response to FIR item 8b and 8b (see **FIR Response Document**).

Table 8-F Biotopes recorded in the offshore development area, landfall and surrounding intertidal area in the site specific surveys

Broad habitat	Sub habitat type (biotope) description	MNCR code	Locations present	Biotopes present in Offshore Development Area	
				Present in characterisation survey (Y/N)	Present in validation survey (Y/N)
Coarse sediment habitats	Circalittoral coarse sediment	SS.SCS.CCS	Offshore development area, 10 km & 20 km study areas	Y	Y
	Infralittoral coarse sediment	SS.SCS.ICS	10 km & 20 km study areas	N/A	N/A
	Offshore circalittoral coarse sediment	SS.SCS.OCS	10 km & 20 km study areas	N/A	N/A
	Spirobranchus triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	SS.SCS.CCS.SpiB	Offshore development area	Y	Y
	Mediomastus fragilis, Lumbrineris spp. and venerid bivalves in circalittoral coarse sand or gravel	SS.SCS.CCS.MedLumVen	Offshore development area	Y	Y
Sand habitats	Circalittoral sand	SS.SSa.CMuSa	10 km & 20 km study areas	N/A	N/A
	Abra alba and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment	SS.SSa.CMuSa.AalbNuc	Offshore development area	N	Y
	Infralittoral sand	SS.SSa.IMuSa	10 km & 20 km study areas	N/A	N/A
	Fabulina fabula and *Magelona mirabilis* with venerid bivalves and	SSa.IMuSa.FfabMag	Offshore development area	Y	Y

Broad habitat	Sub habitat type (biotope) description	MNCR code	Locations present	Biotopes present in Offshore Development Area	
				Present in characterisation survey (Y/N)	Present in validation survey (Y/N)
	amphipods in infralittoral compacted fine muddy sand				
	Offshore circalittoral sand	SS.SSa.OSa	10 km & 20 km study areas	N/A	N/A
Mixed sediment habitats	Circalittoral mixed sediment	SS.SMx.CMx	10 km & 20 km study areas	N/A	N/A
	Flustra foliacea and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment	SS.SMx.CMx.FluHyd	Offshore development area	N	Y
	Ophiothrix fragilis and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment	SS.SMx.CMx.OphMx	Offshore development area	N	Y
	Infralittoral mixed sediment	SS.SMx.IMx	10 km & 20 km study areas	N/A	N/A
	Offshore circalittoral mixed sediment	SS.SMx.OMx	10 km & 20 km study areas	N/A	N/A
	Polychaete-rich deep *Venus* community in offshore mixed sediments	SS.SMx.OMx.PoVen	Offshore development area	N	Y
Mud habitats	Circalittoral mud	SS.SMu.CSaMu	10 km & 20 km study areas	N/A	N/A
	Infralittoral mud	SS.SMu.ISaMu	10 km & 20 km study areas	N/A	N/A
	Offshore circalittoral mud	SS.SMu.OMu	10 km & 20 km study areas	N/A	N/A
	Infralittoral rock and biogenic reef	IR.HM / IR.MIR	10 km & 20 km study areas	N/A	N/A
	Circalittoral rock and biogenic reef	CR/HCR / CR.MCR	10 km & 20 km study areas	N/A	N/A

Broad habitat	Sub habitat type (biotope) description	MNCR code	Locations present	Biotopes present in Offshore Development Area	
				Present in characterisation survey (Y/N)	Present in validation survey (Y/N)
Rock and biogenic reef habitats	Offshore circalittoral rock and biogenic reef	CR/HCR / CR.MCR	10 km & 20 km study areas	N/A	N/A
	Echinoderms and crustose communities	CR.MCR.EcCr	Offshore development area	N	Y
	Urticina felina and sand-tolerant fauna on sand-scoured or covered circalittoral rock	CR.MCR.EcCr.UrtScr	Offshore development area	N	Y
Intertidal habitats	Littoral sand	LS.LSa	Landfall and intertidal area	Y	Y
	Littoral mixed sediment	LS.LMx	Landfall and intertidal area	Y	N
	Littoral coarse sediment	LS.LCS	Landfall and intertidal area	Y	N
	Littoral sandy mud	LS.LMu	Landfall and intertidal area	N/A	N/A
River Liffey Habitats	*Capitella capitata* and *Tubificoides* spp. in reduced salinity infralittoral muddy sediment habitat	SS.SMu.SMuVS.CapTubi	River Liffey	N/A	N/A

8.6.7 Habitats / Species of Conservation Importance

Section 8.6.7 remains unchanged with the exception of paragraph 68 which has been replaced with paragraphs 32-38 below and **Appendices 8-A Benthic Subtidal Survey Report 2025** and **8-C DDV Wicklow Reef Survey Report 2025**, in response to FIR item 8a, 8b, 8c and 8d (see **FIR Response Document**).

32. No Annex I Reefs are predicted to occur in the offshore development area or the OECC (Gridded distribution map for Annex I sandbanks as reported by EU member states for 2018 Habitats Directive Article 17 reporting).

33. A reefiness assessment of the 2025 subtidal survey data was undertaken and seven stations, located in the array site, were assessed as having attributes that would qualify as low resemblance stony reef. No stations located in the OECC were assessed as having attributes that would qualify as stony reef (low resemblance or otherwise). Six of these seven stations were located on the eastern edge of the array site and the remaining station on the western side of the array site lies just south of the OECC.

34. To qualify as low resemblance stony reef, four criteria have to be met, these criteria are composition, elevation, biota and extent (Irving, 2009. Golding *et. al*. 2020). At these seven stations, analysis of underwater video and still data suggest low resemblance stony reef criteria are met for composition, elevation and biota. It should be noted however, that for assessing stony reef, the attribute of extent and elevation is best assessed using geophysical data (Golding *et*. *al*. 2020). Existing geophysical data for the site classified the entire array site as sedimentary and as such, the small areas of rocky or stony habitat present are unlikely to be considered as having a 'low resemblance' to Annex I stony reef.

35. In addition, INFOMAR Seabed Substrate (2019) data suggests the array site is homogenous with coarse sediment throughout and EUSeamap (2021) broad habitat data classifies the area as consisting of coarse sediments with one small area of mixed sediment.

36. However, whilst not qualifying as rocky reef, as a precaution and in order to provide a robust assessment, subtidal rock habitats have been assessed for direct impacts in **Section 8.10**.

37. A reefiness assessment of the 2025 Wicklow Reef survey data, wherein underwater video transects were undertaken north of, and in the northern area of the SAC that overlapped the Applicant's Foreshore Investigation Licence Area. Eight transects within the SAC and four transects to the north of the SAC were assessed as having attributes that would qualify as low resemblance *Sabellaria spinulosa* reef (Gubbay, 2007). Approximately half of the transects surveyed were assessed as having attributes that would qualify as low resemblance stony reef. However, there was no corresponding geophysical data to inform the reefiness assessment.

38. It should be noted that the Wicklow Reef area does not have the potential to be impacted by the CWP Project due to the distance from the offshore development area and the predicted distances and direction of increases in SCC and sediment deposition (see **Appendix 6-A Modelling Report Addendum**).

8.6.8 Climate change and natural trends

Section 8.6.8 remains unchanged

8.6.9 Predicted future baseline

Section 8.6.9 remains unchanged

8.7 Scope of the assessment

Table 8-11 has been replaced in its entirety with Table 8-G below. The change is only relevant to the operation and maintenance section and Impact 3 Temporary habitat disturbance. This update has been made in response to FIR item 8h (see **FIR Response Document**).

Table 8-G Potential impacts scoped into the assessment

Impact no.	Description of impact	Notes
Construction		
Impact 1	Temporary habitat disturbance	The temporary disturbance relates to seabed preparation for foundations and cables, jack up and anchoring operations, and cable installation. Only habitats within the CWP Project have the potential to be impacted.
Impact 2	Temporary increase in suspended sediment concentration (SSC)	The temporary increase in SSC relates to seabed preparation for foundations and cables, jack up and anchoring operations, and cable installation.
Impact 3	Remobilisation of contaminated sediments	Remobilisation of contaminated sediments to sediments disturbed, mobilised and deposited elsewhere, during seabed preparation for foundations and cables, jack up and anchoring operations, and cable installation potentially containing contaminated sediments.
Impact 4	Introduction of Invasive Non-Native Species (INNS)	There are no known INNS in the Project area; the potential for spreading of existing INNS is negligible. Therefore, the introduction of INNS relates to the potential transference from construction vessels into the offshore development area.
Impact 5	Accidental pollution events	This relates to the potential for accidental pollution such as oil and hydraulic fluids being introduced to the environment from vessels during construction activitie
Operation and Maintenance		
Impact 1	Long-term habitat loss	The long-term habitat loss relates to the footprints of foundations and cable protection installations on the

Impact no.	Description of impact	Notes
		seabed that will remain for the operational lifetime of the CWP Project.
Impact 2	Habitat creation (increased hard substrate)	Habitat creation relates to increased hard substrate due to the introduction of turbine foundation and scour and cable protection which will become colonised by benthic epifaunal species and create hard substrate habitats.
Impact 3	Temporary habitat disturbance	Temporary habitat disturbance relates to maintenance activities such as cable repair, vessel jack-up operations and deployment of scour protection and scour around installed structures.
Impact 4	Presence of EMF and / or temperature changes	The presence of EMF and / or temperature changes relates to the electromagnetic frequency from the OECC and inter-array cables (IACs) during O&M.
Impact 5	Introduction of INNS	There are no known INNS in the Project area; the potential for spreading of existing INNS is negligible. Therefore, the introduction of INNS relates to the potential transference from the O&M activities vessels into the offshore development area.
Impact 6	Accidental pollution events	This relates to the potential for accidental pollution such as oil and hydraulic fluids being introduced to the environment from vessels during O&M activities.
Decommissioning		
Impact 1	Temporary habitat disturbance	Temporary habitat disturbance relates to the anticipated removal of CWP Project infrastructure and the end of the lifetime of the Project. However, no final decision has been made regarding decommissioning as yet.
Impact 2	Temporary habitat disturbance	Temporary increase in SSC relates to the anticipated removal of CWP Project infrastructure and the end of the lifetime of the Project. However, no final decision has been

Impact no.	Description of impact	Notes
		made regarding decommissioning as yet.
Impact 3	Remobilisation of contaminated sediment	Remobilisation of contaminated sediments relates to the anticipated removal of CWP Project infrastructure and the end of the lifetime of the Project. However, no final decision has been made regarding decommissioning as yet.
Impact 4	Long-term habitat loss	Long-term habitat loss relates to the anticipated removal of hard substrate benthic habitats existing on CWP Project infrastructure at the end of the lifetime of the Project.
Impact 5	Introduction of INNS	Introduction of INNS relates to the activities of offshore vessels to decommission and remove CWP Project infrastructure and the end of the lifetime of the Project. However, no final decision has been made regarding decommissioning as yet.
Impact 6	Accidental pollution events	Accidental pollution relates to the activities of offshore vessels to decommission and remove CWP Project infrastructure and the end of the lifetime of the Project. However, no final decision has been made regarding decommissioning as yet.

8.8 Assessment parameters

Section 8.8 remains unchanged except for changes to Section 8.8.3 below.

8.8.1 Background

Section 8.8.1 remains unchanged.

8.8.2 Options and dimensional flexibility

Section 8.8.2 remains unchanged except for Table 8-12 which is replaced by Table 8-H below, in which Impact 2 for the construction phase has been updated to reflect the additional sediment plume modelling conducted by the Applicant in response to FIR Item 6i (see **FIR Response Document**).

8.8.3 Limit of deviation (LoD)

Section 8.8.3 remains unchanged.

Table 8-H Representative scenario summary

Impact	Representative scenario details	Value	Notes / assumptions
Construction			
Impact 1: Temporary habitat disturbance	Installation methods and effects (array site and offshore export cable corridor) (WTG Layout Option A)		Temporary disturbance relates to seabed preparation for foundations and cables, jack up and anchoring operations, cable installation and to geotechnical survey. It should be noted that where boulder clearance overlaps with sand wave clearance, the boulder clearance footprint will be within the sand wave clearance footprint. Offshore, WTG Option A forms the representative scenario as this represents the greatest level of temporary habitat disturbance, and therefore Option A forms the presentational basis of the assessment for Impact 1. Option B would result in a lower level of disturbance and would not introduce new impacts, or an impact of materially different magnitude.
	Boulder clearance: array site seabed clearance area (m^2)	2,556,000–2,934,000	
	Sand wave clearance: array site seabed clearance area (m^2)	205,250–259,250	
	IAC and interconnector cable installation: Total seabed disturbed (m^2)	1,911,000–2,214,000	
	Boulder clearance: OECC seabed clearance area (m^2)	2,220,000–2,616,000	
	Sand wave clearance: OECC seabed clearance area (m^2)	198,550	
	Offshore export cable installation: total seabed disturbed (m^2)	1,890,000–2,187,000	
	JUV operations total impact area (m^2)	240,000	
	WTGs and OSS anchoring operations total impact area (m^2)	280,800	
	IAC and interconnector cable anchoring operations total impact area (m^2)	371,520	
	Offshore export cable anchoring operations total impact area (m^2)	630,720	

Impact	Representative scenario details	Value	Notes / assumptions
	Total area of disturbed sediment for offshore construction activities (m^2)	**11,931,840**	
	Installation methods and effects (Landfall)		
	Total seabed disturbed by cofferdam (m^2)	6,100	There is only one installation method being proposed at Landfall, open cut trenching. Therefore, the open cut method to install the cable ducts forms the presentational basis of this assessment.
	Total seabed disturbed by intertidal cable duct installation (m^2)	36,000	
	Total area of seabed in transition zone affected by support structures (m^2)	6,900	
	Total area of seabed in transition zone affected by installation of cables using either open cut trenching or a shallow water trenching tool (m^2)	108,000	
	Total area of disturbed sediment for landfall construction activities (m^2)	**157,000**	
Impact 2: Temporary increase in suspended sediment concentration (SSC)	Representative scenario parameters are the same as those above for Impact 1 above. Sediment plume modelling suggests that the greatest direction and distance of dispersion of disturbed material was 7 km to the North-South / slight East, although one scenario showed dispersion to the North-South reaching 4 km. Please note this considers both the 'standard' burial of 2 m maximum trench depth, increasing to 6.5 m where the OECC crosses the approaches to Dun	As above	Temporary increase in SSC relates to seabed preparation for foundations and cables, jack up and anchoring operations, and cable installation. It should be noted that where boulder clearance overlaps with sand wave clearance, the boulder clearance footprint will be within the sand wave clearance footprint. Increases in SSC occur as a result of temporary disturbance to the seabed. Offshore, WTG Option A forms the representative scenario as this represents the greatest level of

Impact	Representative scenario details	Value	Notes / assumptions
	Laoghaire harbour (in the zone of greater burial depth), and 3 m where the OECC crosses the RWE cable		temporary increase in SSC, and therefore Option A forms the presentational basis of the assessment for Impact 2. Option B would result in a lower level of disturbance and would not introduce new impacts, or an impact of materially different magnitude.
Impact 3: Remobilisation of contaminated sediments	Representative scenario parameters are the same as those above for Impact 1 above. Sediment plume modelling suggests that the greatest direction and distance of dispersion of disturbed material was 9–10 km to the east, although one scenario showed dispersion to the south-east reaching 6–7 km and to the west reaching 3–4 km.	As above	Remobilisation of contaminated sediments relates to seabed preparation for foundations and cables, jack up and anchoring operations, and cable installation. It should be noted that where boulder clearance overlaps with sand wave clearance, the boulder clearance footprint will be within the sand wave clearance footprint. Remobilisation of contaminated sediments occur as a result of temporary disturbance to the seabed. Offshore, WTG Option A forms the representative scenario as this represents the greatest level of temporary disturbance, and therefore Option A forms the presentational basis of the assessment for Impact 3. Option B would result in a lower level of disturbance and would not introduce new impacts, or an impact of materially different magnitude.

Impact	Representative scenario details	Value	Notes / assumptions
Impact 4: Introduction of INNS	Total construction vessels (round trips)	2,409	There are no known INNS in the offshore development area, therefore this impact relates to the potential transference of INNS from construction vessels or plant into the CWP Project Offshore. WTG Option A forms the representative scenario as this represents the greatest number of vessels required, and therefore Option A forms the presentational basis of the assessment for Impact 4. Option B would result in a lower potential for the introduction of INNS and would not introduce new impacts, or an impact of materially different magnitude.
Impact 5: Accidental pollution	Total construction vessels (round trips)	As above	Accidental pollution relates to the oils and fluids which may be used during construction activities, including: • Grease • Hydraulic oil • Gear oil • Nitrogen • Transformer silicon / ester oil • Diesel fuel • Glycol / coolants • Batteries • Drill fluid The requirement for use of oils and fluids during construction will be the same regardless of the WTG option

Impact	Representative scenario details	Value	Notes / assumptions
			selected. Therefore, there is only one scenario for this potential impact, and this represents the representative scenario.
Operations and maintenance			
Impact 1: Long-term habitat loss	Permanent infrastructure		The long-term habitat loss relates to the footprints of foundations including scour protection and areas of cable protection installations on the seabed that will remain for the operational lifetime of the CWP Project. Option A forms the representative scenario as this represents the greatest level of long-term habitat loss, and therefore Option A forms the presentational basis of the assessment for Impact 1 long-term habitat loss, in this chapter. Option B would result in a lower level of disturbance and would not introduce new impacts, or an impact of materially different magnitude.
	Total WTG monopile seabed area take (with scour protection) across the array site (m^2)	273,000	
	Total OSS monopile seabed area take (with scour protection) across the array site (m^2)	10,920	
	Interconnector and inter-array cabling – total area of seabed covered by cable protection (m^2)	208,600	
	Offshore export cables –total area of seabed covered by cable protection (m^2)	105,000	
	Substation reclamation (m2)	1,800	
	Total area of potential long-term habitat loss (m^2)	**599,320**	

Impact	Representative scenario details	Value	Notes / assumptions
Impact 2: Habitat creation (increased hard substrate).	Permanent infrastructure		Habitat creation relates to increased hard substrate due to the introduction of turbine foundation and scour and cable protection which will become colonised by benthic epifaunal species and create hard substrate habitats during the lifetime of the CWP Project. Option A forms the representative scenario as this represents the greatest level of habitat creation, and therefore Option A forms the presentational basis of the assessment for Impact 2 habitat creation, in this chapter. Option B would result in a lower level of disturbance and would not introduce new impacts, or an impact of materially different magnitude.
	Representative scenario parameters are the same as those for Impact 1 above.	As above for Impact 1.	

Impact	Representative scenario details	Value	Notes / assumptions
Impact 3: Temporary habitat disturbance	Scheduled operation and maintenance activities will not result in any temporary habitat disturbance. Unscheduled maintenance activities of WTGs will be required should a component fail or break. If a component requires replacing this may be done from a JUV and would result in some temporary habitat disturbance, however this is likely to be one location at a time and therefore the potential impact is much less than that of JUV operations during construction. Anticipated JUV requirements during operation and maintenance are for two JUVs making three round trips annually equating to 150 round trips over an anticipated CWP Project lifetime of 25 years. Unscheduled maintenance activities of IAC, interconnector and export cables include cable repair. Should it be required, this may involve a faulty section of cable to be removed from the seabed, repaired, relaid and reburied. Therefore, resulting in an increase in temporary habitat disturbance. As repair is likely to only ever be required for a section of cable at a time the impacts will be less than the construction phase cable lay and burial. As temporary habitat disturbance during O&M activities will arise due to unscheduled maintenance activities the values of these activities are unknown. However, reliability and ease of maintenance have been carefully considered in the CWP Project design to minimise maintenance requirements and although maintenance activities will be carried out over a longer period of time than construction activities. The amount of habitat disturbed during repair activities is likely to be less than those of the installation of the infrastructure, as maintenance activities will be conducted in discrete locations while construction activities cover the whole CWP Project area. Given this, it is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 4: Presence of EMF and / or temperature changes resulting from presence of electrical infrastructure	Permanent infrastructure		The presence of EMF and / or temperature changes relates to the electromagnetic frequency from the OECC, interconnectors and IACs during the operational phase. Option A forms the representative scenario as this represents the greatest length of cable with the potential to emit EMF and / or temperature changes, and therefore
	Interconnector and IAC length (km)	127.4–147.6	
	Interconnector and IAC minimum depth of cover (m)	1	
	Interconnector and IAC voltage (kV)	66	
	OECC length (km)	126–146	
	OECC minimum depth of cover (m)	1.4	
	OECC voltage (kV)	220	

Impact	Representative scenario details	Value	Notes / assumptions
	Total length of cables with the potential to emit EMF and/or Temperature changes	**253.4 – 293.6**	Option A forms the presentational basis of the assessment for Impact 4: EMF and / or potential temperature changes in this chapter. Option B would result in a shorter cable length and therefore smaller area with the potential to be impacted by EMF and / or temperature changes and would not introduce new impacts, or an impact of materially different magnitude.
Impact 5: Introduction of INNS	Number of vessels on site x round trips	1,209	There is the potential that Invasive non-native species (INNS) could be introduced by O&M related activities, through methods such as the release of contaminated ship's ballast. The estimated number of vessels required during operation and maintenance are the same regardless of the WTG option selected. Therefore, there is only one scenario for this potential impact, and this represents the representative scenario.
Impact 6: Accidental pollution	Oils and fluids which may be used during construction activities include: • Grease • Hydraulic oil • Gear oil • Nitrogen • Transformer silicon / ester oil • Diesel fuel	As above	Accidental pollution relates to the oils and fluids which may be used during O&M activities, including: • Grease • Hydraulic oil • Gear oil • Nitrogen • Transformer silicon / ester oil

Impact	Representative scenario details	Value	Notes / assumptions
	• Glycol / coolants • Batteries • Drill fluid		• Diesel fuel • Glycol / coolants • Batteries • Drill fluid The requirement for use of oils and fluids during O&M will be the same regardless of the WTG option selected. Therefore, there is only one scenario for this potential impact, and this represents the representative scenario.
Decommissioning			
Impact 1: Temporary habitat disturbance	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, all offshore infrastructure will be rehabilitated. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • The WTGs and OSS topsides shall be completely removed. Following WTG and OSS topside decommissioning and removal, the monopile foundations will be cut below the seabed level, to a depth that will ensure the remaining foundation is unlikely to become exposed. This is likely to be approximately one metre below seabed, although the exact depth will depend upon the sea-bed conditions and site characteristics at the time of decommissioning. • All cables and associated cable protection in the offshore environment shall be wholly removed. It is likely that equipment similar to that which is used to install the cables may be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables is anticipated to be the same as the area impacted during the installation of the cables. • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project and the assumptions around the number of vessels on site, and vessel round trips is therefore the same as described for the construction phase of the offshore components.		
Impact 2: Temporary increase in Suspended Sediment Concentrations (SSC)			
Impact 3: Remobilisation of contaminated sediments			

Impact	Representative scenario details	Value	Notes / assumptions
Impact 4: Long-term habitat loss	Given the above it is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 5: Introduction of INNS	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, all offshore infrastructure will be rehabilitated. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project and the assumptions around the number of vessels on site, and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above it is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		
Impact 6: Accidental pollution events			

8.9 Primary mitigation measures

Section 8.9 remains unchanged

8.10 Impact assessment

Updates to Sections 8.10.1, 8.10.2 and 8.10.3 are detailed below under the relevant impacts.

8.10.1 Construction phase

The upfront text (paragraph 97) this section remains unchanged.

Impact 1: Temporary habitat disturbance

This section remains unchanged but should now be read in conjunction with the additional text provided in paragraphs 39 - 63 below. This update has been made in response to FIR Items 8a-8e (see **FIR Response Document**).

Subtidal rock habitats

39. While defined subtidal rock habitats are not predicted to occur in the offshore development area by INFOMAR and EUSeamap and JNCC data, small patches of subtidal rock (e.g. cobble or boulder habitats within areas of otherwise coarse or mixed sediments) may be present at discrete locations within the array site (**Appendix 8-A Benthic Subtidal Survey Report 2025**), and this habitat is therefore assessed for the potential impact of temporary habitat disturbance.

Receptor sensitivity

40. The value of subtidal rock habitats is medium as it is an OSPAR habitat, not situated within a designated site and such rock habitats are common in Irish nearshore waters (West *et. al.*, 2024).

41. Tolerance of the *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock (part of the Echinoderms and crustose communities biotope complex) is assessed low as the epifaunal characterising species are soft bodied and relatively unprotected to the impact of habitat disturbance Recoverability depends on the level of disturbance and for this habitat is assessed as medium due to the low recoverability rates of characterising species (Tillen *et. al.*, 2023).

42. Tolerance of the *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles habitat to temporary habitat disturbance, is assessed as low due many of the characterising species occurring on rocks and pebbles and therefore vulnerable to abrasion. However, the characterising species are short lived, fast growing, colonising species and this habitat will likely recover quickly (1–2 years) from any impact of temporary habitat disturbance due to the wide availability of similar habitat, as such recoverability is assessed as high to temporary habitat disturbance (Tyler-Walters& Tillin, 2023; Tillin and Watson, 2023).

43. Given the medium value, medium tolerance and medium to high level of recoverability of the subtidal rock habitats and based on the sensitivity criteria set out in Table 8-3, the sensitivity of these subtidal rock habitats is considered to be medium.

Magnitude of impact

44. Subtidal rock habitats may occur in discrete locations along the eastern extent of the array site and at one location on the western extent of the array site.

45. The duration of this impact is short (no more than three years in duration), however disturbance events will not persist for this entire period, instead acting as discreet events throughout the construction phase.

46. The consequences of temporary habitat disturbance on subtidal rock habitats are considered to be medium as it is anticipated only a minor loss or alteration of key characteristics of the habitats are expected to occur as a result of the impact and recoverability of the habitats ranges from low to high.

47. Primary project mitigation is outlined in **Section 8.9** and states that **t**he locations of offshore infrastructure have been developed to avoid known sensitive ecological habitats. Whilst reefs were not identified during the 2021 and 2025 characterisation surveys, it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micrositing around sensitive habitats.

48. Based on the criteria set out in **Table 8-4** and considering the primary mitigation the potential magnitude of impact from temporary habitat disturbance to the subtidal rock habitats is considered to be low.

Significance of effect

49. The sensitivity of the subtidal rock habitats receptor is considered to be medium and the magnitude of impact is considered to be low. Therefore (as per the matrix in Table 8 5), an effect of Slight which is a **Not Significant** adverse impact is predicted for subtidal rock habitats.

50. Where flexibility in the proposed design exists, as a representative scenario has been adopted, there is no other scenario which would lead to a more significant effect.

51. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 8.9**.

Subtidal mixed sediment habitats

52. Subtidal mixed sediment habitats were recorded in the offshore development area in the 2025 subtidal benthic survey (**Appendix 6-A Modelling Report Addendum**) and this habitat is therefore assessed for the potential impact by temporary habitat disturbance.

Receptor sensitivity

53. Subtidal mixed sediment habitats are found from the extreme low water mark to deep offshore circalittoral habitats often found in moderately exposed areas subject to strong to weak tidal streams.

54. The broad habitat types of circalittoral and infralittoral mixed sediment habitats have no conservation status in Ireland and circalittoral and infralittoral mixed sediment habitats are common in the marine environment around Ireland and the UK, as such the value of mixed sediment habitats is low.

55. These habitats can support a diverse community particularly rich in polychaetes and in coarser variations of these habitats several echinoderms including *Amphipholis squamata*, *Echinocyamus pusillus* are present. Tolerance of the Polychaete-rich deep Venus community in offshore mixed

sediments biotope is to temporary habitat disturbance is assessed as medium as epifaunal characterising species may be damaged by abrasion. However, recoverability is assessed as high as characterising species may recover or recolonise and opportunistic species are likely to recruit rapidly (Tillin & Watson, 2023).

56. Given the negligible value, and high recoverability and medium tolerance of the mixed sediment habitats to the impact of temporary habitat disturbance and based on the sensitivity criteria set out in **Table 8-3**, the sensitivity is considered to be negligible.

Magnitude of impact

57. Subtidal mixed sediment habitats are present in the south of the array site and at a few stations interspersed in the OECC (**Appendix 6-A Modelling Report Addendum**).

58. The duration of this impact is short (no more than three years in duration), however disturbance events will not persist for this entire period, instead acting as discreet events throughout the construction phase.

59. The consequences of temporary habitat disturbance on mixed sediment habitats are considered to be negligible as the impact will only result in slight or imperceptible changes to characteristics of baseline mixed sediment habitats.

60. Based on the criteria set out in **Table 8-4**, the potential magnitude of impact from temporary habitat disturbance to the subtidal mixed sediment habitats is considered to be negligible.

Significance of effect

61. The sensitivity of subtidal mixed sediments habitats receptor is considered to be negligible and the magnitude of impact is considered to be negligible. Therefore (as per the matrix in Table 8 5), an effect of Imperceptible which is a **Not Significant** adverse impact is predicted for mixed sediment habitats.

62. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

63. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 8.9**.

Subtidal coarse sediment habitats

This section remains unchanged.

Subtidal sand habitats

This section remains unchanged.

Intertidal habitats

The upfront text (paragraph 134) under Intertidal habitats remains unchanged.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This magnitude of impact for Intertidal habitats remains unchanged but should now be read in conjunction with the additional text provided in paragraphs 64 - 66 and Table 8-I below. This update has been made in response to FIR Items 8a-8e (see **FIR Response Document**).

64. Additional detail on the intertidal construction operations is provided in **Volume 2 Chapter 4 Project Description** and summarised below, with the total footprint as per the representative scenario table set out in **Table 8-I**.

65. Three landfall cable ducts (each 50 m long) will be installed via open-cut trenching, requiring excavation of approximately 4,224 m³ of material and temporary removal of the existing coastal revetment. A temporary cofferdam (40 m × 75 m footprint) will be constructed to enable dry working conditions below the HWM, and supported by a gravel access ramp (60 m × 10 m) across the foreshore, which will remain in place for up to 24 months.

66. Three intertidal cable ducts will be installed below the existing intertidal sediment surface over a 300 m length, each within individual trenches up to 18 m wide and 2 m deep. Further seaward (350 m to c. 4 km offshore), three non-ducted offshore export cables will be free-laid and buried using a combination of open-cut trenching (3 x 1.7 km, 4 m width) and shallow-water trenching tools (3 x 2 km, 4 m width). Temporary support structures for cable pull-in include a mid-support pontoon (20 m × 50 m), three tensioner platforms (15 m × 10 m each), approximately 400 rollers per cable circuit, and one equipment storage platform (70 m × 25 m), all of which will be removed post-installation. Construction will be phased over 10 - 12 months, with Phase 1 covering site clearance, berm excavation, cofferdam installation, and duct laying, and Phase 2 involving cable pull-in, burial, and reinstatement.

Table 8-I: Footprint of works within intertidal area as per the Representative scenario

Component	Representative scenario footprint
Cable Duct installation	36,000 m^2
Temporary Cofferdam	6,100 m^2
Non-Ducted Export Cables	108,000 m^2
Support Structures	6,900 m^2

Habitats within the River Liffey

This section remains unchanged.

Significance of the effect

This section remains unchanged.

Impact 2: Temporary increase in SSC

This section remains unchanged except for paragraphs 158-167 which are replaced by Paragraphs 67-77 below. This update has been made in response to FIR Items 8e and 6i (see **FIR Response Document**).

67. Whilst construction activities in the intertidal and landfall areas such as open cut trenching will disturb the sediment, the works will be conducted at low tide and as such have reduced potential to lead to increases in SSC.

68. The two activities that will result in the largest levels of SSC and associated deposition are dredging and trenching, as described in **Section 6** and **Appendix 6-A Modelling Report Addendum**.

69. During dredge disposal and trenching activities, SSCs local to the release locations are predicted to be enhanced to up to c. 400 mg \ L local to the release locations.

70. Enhanced SSCs are transient, and concentrations are predicted to reduce to baseline levels no more than 12 days after the release activity.

Dredging and dredge disposal

71. Suspended sediment plumes created during dredge disposal operations are predicted to enhance SSC levels in the near field (i.e. to the point of release) and far field (i.e. up to c. 7 km) from the point of release).

72. The predicted transport of sediment plumes and subsequent deposition during dredge disposal activities within the offshore development area can be summarised as follows:

Modelled representative scenarios of dredge disposal activities within the array site indicated the predominant direction of travel for SSC plumes is North-South / slight East. In one scenario, after the immediate 400 mg/L local to the release locations, a maximum transient increase in SSC of 250 mg/L was predicted to travel a maximum of 7 km over c.11 days resulting in a cumulative sediment deposition thickness of *c*. 3 cm. In another, a maximum increase of 250 mg/L was predicted to travel up to 6 km over c. 11 days resulting in a cumulative sediment deposition thickness of c. 3 cm. Modelled representative scenarios of dredge disposal activities within the OECC predicted: a maximum transient increase in SSC of 400 mg/L, travelling up to 6 km North-South / slight East resulting in a cumulative sediment deposition thickness of *c*. 4 cm, near the disposal location. In a final scenario, a maximum increase in SSC of 125 mg/L, travelling a maximum of 4 km North-South resulting in a cumulative sediment deposition thickness of c. 3 cm, near the disposal location.

Trenching

73. A consequence of cable installation will be the liberation of sediment into suspension within the water column, just above the seabed. Jetting results in greater sediment suspension, introducing the potential for distribution of greater volumes of material over a larger spatial area than other cable laying techniques which may be employed during construction and thus is assessed as the representative scenario. This method involves fluidising the material to form a narrow trench into which the cable is laid.

74. Based upon the representative scenario, the predicted transport of sediment plumes generated during cable installation activities across the array site indicates the finest sediments will potentially be transported North-South / slight East up to 6 km, over *c.* 11 days, at an increase of *c*. 80 mg/L, resulting in a cumulative sediment deposition thickness of *c*. < 1 cm, near the release location. However, these plumes are transient, rapidly decreasing as sand sized sediments deposit to the bed and finer sediments are dispersed.

75. The predicted transport of sediment plumes generated during cable installation activities across the OECC were for a maximum increase in SSC of 140 mg/L being transported for up to 5 km North-South

/ slight East, over *c.* 12 days, resulting in a cumulative sediment deposition thickness of *c*. 1 cm, near the release location.

76. Deposited sediments would be reworked and rapidly integrated into the prevailing sediment transport regime, and thus would have negligible impact on the prevailing environment. Consequently, enhanced SSC and the predicted deposition thickness would not be discernible above natural variation observed during storm events, with SSCs predicted, in the representative scenario, to reduce to baseline levels within *c*. 12 days following trenching operations.

77. In addition to the modelled scenarios above, **Appendix 6-A Modelling Report Addendum** provides aggregated outputs incorporating the maximum, though transient, spatial extent of SSCs generated over the full construction campaign, which represent the disposal of dredge arisings, cable trenching, and WTG foundation installation. Combination A represents the maximum potential footprint and depositional thickness and results in a potential footprint area of 9 km^2 for cumulative deposition levels of 1 cm and above. However, this footprint area assumes all activities considered would take place simultaneously and does not account for the erosion, entrainment, mobilisation and transportation of deposited sediments between activities.

Subtidal coarse sediment habitats

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

The magnitude of impact has not changed for the receptor subtidal coarse sediment habitats, however paragraphs 177 to 181 have been replaced by paragraphs 78 to 82 below to reflect the revised sediment plume modelling in response to FIR Items 8e and 6i (see **FIR Response Document**).

78. Peak levels of SSC from the proposed activities only persist for a very short period of time (hours) and will affect only a very small area around the location of the activity (< 1 km). Beyond this, a discreet plume of elevated SSC, at a maxim enhanced level of 400 mg/L will be present for a maximum of 12 days, though levels will quickly fall to those experienced by the majority of habitats during the normal course of the year, i.e. through storm events or periods of high wave or tidal action. Due to the coarse nature of much of the sediments, out with the area directly below the disposal sites, < 2 - 3 cm of sediment is likely to be deposited, which will quickly be remobilised and integrated into the natural sediment transport regime.

79. In the array site the increased SSC is predicted to be dispersed up to a maximum of 7 km, predominantly in an North-South / slight East direction and therefore further offshore, where the majority of habitats are mixed and coarse sediment habitats.

80. In the OECC the increased SSC is predicted to be dispersed up to a maximum of 6 km from the source with dispersion predominantly in an North-South / slight East direction where the majority of habitats are mixed sediment habitats.

81. The impact has the potential to occur several times over the course of the construction period (three years), with each period of elevated SSC and associated sediment deposition persisting for a maximum of 12 days before returning to background levels.

82. The duration of this impact is short, and levels of predicted sediment deposition are low (maximum of 4 cm). Although the majority of habitats in the areas of potential impact are coarse sediment habitats, given the hydrodynamic regime in the area, low levels of increase in SSC and sediment deposition, any effects of this impact on the coarse sediment habitats are likely to be localised and short term in nature.

Subtidal sand habitats

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

The magnitude of impact has not changed for the receptor subtidal sand habitats, however paragraphs 190 to 193 have been replaced by paragraphs 83 to 86 below. This update is made in response to FIR Items 8e and 6i (see **FIR Response Document**).

83. In the array site the increased SSC is predicted to be dispersed, a maximum of 7 km with dispersion predominantly to the North-South / slight East. There are areas of sand habitats within 10 km, which lie north and south of the predicted sediment plumes from the proposed dredge disposal locations and therefore have the potential to be impacted by increases in SSC or sediment deposition arising from construction activities within the array site or OECC. Sand habitats account for only c.0.003% of the habitats present within the array site and have the potential to be impacted by increases in SSC and sediment deposition arising from construction activities within the offshore development area.

84. In the OECC the increased SSC is predicted to be dispersed, a maximum of 6 km with dispersion predominantly North-South / slight East, where small areas of sand habitats exist and have the potential to be impacted.

85. This impact has the potential to occur several times over the course of the construction period (three years), with each period of elevated SSC and associated sediment deposition persisting for a maximum of 12 days before returning to background levels.

86. The duration of this impact is short, and levels of predicted sediment deposition are low (maximum of 4 cm). Some small areas of sand habitats occur in the areas of potential impact; however, given the hydrodynamic regime in the area and the low levels of predicted increases in SSC and sediment deposition, any effects of this impact on the sand sediment habitats are likely to be localised and short term in nature.

Subtidal mud habitats

Paragraph 196 remains unchanged.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

The magnitude of impact has not changed for the receptor subtidal mud habitats however paragraph 202 has been replaced by paragraph 87 below. This update is made in response to FIR Items 8e and 6i (see **FIR Response Document**).

87. The frequency of this impact will occur several times over the course of c. three years, with each impact resulting in increased SSC and sediment deposition for a maximum of 12 days before returning to background levels.

Subtidal rock habitats

Paragraph 206 has been replaced by paragraph 88 below. This update is made in response to FIR Items 8e and 6i (see **FIR Response Document**).

88. While subtidal rock habitats are not predicted to occur in the offshore development area by INFOMAR and EUSeamap and JNCC Annex I data, they are present at discrete locations within the array site (**Appendix 8-A Benthic Subtidal Survey Report 2025**) and they are present within the 20 km study area and within 10 km (which has the potential to be impacted by increases in SSC and sediment deposition) of the offshore development area.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

The magnitude of impact has not changed for the receptor subtidal rock habitats however paragraphs 212 to 213 have been replaced by paragraphs 89 to 91 below. This update is made in response to FIR Items 8e and 6i (see **FIR Response Document**).

89. With regards subtidal rock habitat that may constitute designated habitats, the closest area of reef habitat within Rockabill to Dalkey Island SAC is 6 km to the north of the offshore development area. Based upon the modelling of sediment transport arising from the CWP Project activities, there is potential for increases in SSC to affect the protected habitats within the Rockabill to Dalkey SAC. Sediment transport is predicted to travel in a predominantly North-South / slight East direction up to 7 km for the array site and up to 6 km from the OECC.

90. Wicklow Reef SAC lies *c.* 5.5 km southwest from the closest point of the array site and *c.* 11.5 km. The sediment plume modelling showed that increases in SSC arising from the array site may travel up to 7 km, and from the OECC up to 6 km, in a North-South / slight East direction with no increases in SSC moving in a westward direction. As can be seen from the modelling outputs in **Appendix 6-A Modelling Report Addendum**, describing the maximum SSC and depositional thickness for the full construction campaign, it is considered that there will be no effects on the features of the Wicklow Reef SAC from increases in SSC or smothering arising from the CWP Project.

91. In addition, the subtidal rock habitat, low resemblance stoney reef, has the potential to be present within the array site, and has the potential to be impacted by SSC or smothering arising from the CWP Project, however the consequence is assessed to be low as the impact only has the potential to result

in a minor loss or alteration to key characteristics or features of baseline habitats that is within natural variation.

Subtidal mixed sediment habitats

Paragraph 217 remains unchanged.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

The magnitude of impact has not changed for the receptor subtidal mixed sediment habitats however paragraph 225 has been replaced by paragraph 92 below. This update is made in response to FIR Items 8e and 6i (see **FIR Response Document**).

92. No increases in SSC or deposition are predicted to travel north west of the offshore development area with dispersion predominantly to the North-South / slight East. Given the modelled distances and directions of sediment plume transportation and the low level of increases in SSC predicted, it is considered unlikely that these mixed sediment habitats will be impacted from increased SSC and sediment deposition arising from construction activities in the offshore development area.

Intertidal habitats

Paragraph 229 remains unchanged.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

The magnitude of impact has not changed for the receptor intertidal habitats, however paragraphs 236-238 have been replaced by paragraphs 93-95 below. This update is made in response to FIR Items 8e and 6i (see **FIR Response Document**).

93. Peak levels of SSC from the proposed activities only persist for a very short period of time (hours) and therefore it is assumed will affect only a very small area around the location of the activity (< 1 km). Increases in SSC and sediment deposition arising from construction activities in both the array site and OECC are mainly predicted to be transported North-South / slight East, away from the intertidal area.

94. The *Zostera* habitat is considered out with the area over which increased SSC and associated deposition will arise from trenching or dredge disposal, and as such will not be affected by these activities. Nevertheless, some minimal increases in SSC may present in this area, through other activities such as intertidal preparatory works. It is considered that such activities will only result in very

occasional and short-term changes in SSC, and will not increase levels of SSC or deposition above that naturally experienced by the habitats in the intertidal area, e.g. increases in SSC arising naturally through storm events. The frequency of this impact will occur several times over the course of construction (c. three years), with each impact resulting in increased SSC and sediment deposition for a maximum of 12 days before returning to background levels.

95. The duration of this impact is short, and levels of predicted sediment deposition are low (maximum of 4 cm). Given the low predicted levels of increase in SSC and sediment deposition, any effects of this impact on the intertidal habitats are likely to be localised and short term in nature.

Impact 3: Remobilisation of contaminated sediments

This section is replaced in its entirety by paragraphs 96 – 106 and Table 8-J below. This revision has been made in response to FIR Item 8l (see **FIR Response Document).**

96. Activities associated with seabed preparation such as deposit of dredged material and cable installation activities have the potential to remobilise sediments which may contain levels of chemical contaminants (**Chapter 6 Marine Geology, Sediments and Coastal Processes**).

97. In the baseline site specific survey, contaminated sediment results showed low levels of chemical contaminants at stations sampled within the offshore development area. The majority of contaminants levels at sampled stations were below the Irish Lower AL and Cefas AL1[4] (**Appendices 8-A and 8-B**). In the River Liffey, testing of contaminants by DPC showed no contaminants were found at levels above those of Cefas AL1 or above Irish Lower Action Levels (**Section 8.6.5**).

98. Remobilisation of contaminated sediments can occur when such sediments are disturbed and enter the water column and are transported and redeposited elsewhere. As such, the area over which this may apply, and the subtidal and intertidal habitat receptors, are considered analogous to that described above for Impact 2: Temporary increase in SSC.

Receptor sensitivity

99. Benthic habitats are not assessed for the impact of remobilisation of contaminant sediments under MarLIN / MarESA due to the current evidence being extremely limited or completely absent for these receptors (Tyler-Walters et al., 2023). Literary evidence however indicates that high levels of contamination can inhibit recovery of benthic habitats through reduced diversity, biomass, and altered community composition in favour of more contaminant resilient species (Coppo et al., 2023, Lynan et al., 2025). Analysis in the Baltic sea indicates that elevated levels of PAH's have the greatest ability to significantly affect community composition, and whist heavy metals were not identified as predictors of changes in benthic community composition, it was noted that certain metals such as zinc and copper may have harmful effects on bivalve species when at elevated levels, and that mercury, cadmium, and lead are particularly toxic to crustaceans (Raymond et al., 2021).

100. Given this, the sensitivity of the subtidal and intertidal benthic habitats to the remobilisation of contaminated sediments are considered to be high.

[4] *The purpose of the lower action levels is to be able to categorise sediment as essentially "clean" and to allow the disposal at sea of such material considered not to pose a risk through contamination to the marine environment. Addendum-to-2006-Guidelines-(Marine-Insitute-2019).pdf*

Magnitude of impact

101. The extent over which over which remobilisation of contaminated sediment has the potential to impact the subtidal and intertidal habitat receptors is considered the same as that described above for Impact 2: Temporary increase in SSC.

102. The frequency of this impact will occur several times over the course of c. three years, with each impact resulting in increased SSC and sediment deposition for a maximum of 10 days before returning to background levels.

103. Considering the low levels of contamination in the sediments within the offshore development area, including very low levels of PAH's, all below Irish Lower AL which indicates the sediment to be "clean", and often below the limits of detection, and metals predominantly below the Irish Lower AL and none above upper AL, and the lack of contaminants recorded within the River Liffey area, it is considered there is negligible potential to lead to any biological effects from the levels of contamination present. Combined with the relatively low predicted levels of sediment deposition and limited dispersal of sediments predicted, the consequences are considered to be negligible, having the potential to cause at most negligible or imperceptible changes to key features of the baseline habitats.

104. Given the above and based upon the criteria set out in **Table 8-4,** the potential magnitude of impact from the remobilisation of contaminated sediments it is considered negligible.

Significance of effect

105. The sensitivity of subtidal and intertidal ecology receptors in the study area is considered to be High for all habitats and the magnitude of the impact for all habitats is assessed as negligible. Therefore (as per the matrix in **Table 8-5**), a significance of effect of **Slight** adverse is predicted for all habitats (**Table 8-J**). Where flexibility in the proposed design exists there is no other scenario which would lead to a more significant effect.

Table 8-J Significance assignment for remobilisation of contaminated sediments

Receptor group	Sensitivity	Magnitude	Significance
Subtidal coarse sediment habitats	High	Negligible	**Slight** (not significant)
Subtidal sand habitats	High	Negligible	**Slight** (not significant)
Subtidal mud habitats	High	Negligible	**Slight** (not significant)
Subtidal rock habitats	High	Negligible	**Slight** (not significant)
Subtidal mixed habitats	High	Negligible	**Slight** (not significant)
Intertidal habitats	High	Negligible	**Slight** (not significant)
River Liffey habitats	High	Negligible	**Slight** (not significant)

106. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 8.9**.

Impact 4: Introduction of INNS

This section remains unchanged.

Impact 5: Accidental pollution events

This section remains unchanged.

8.10.2 Operation and maintenance

The upfront text (paragraph 287) this section remains unchanged.

Impact 1: Long-term habitat loss

This section unchanged except for paragraph 297 which has been replaced with paragraphs 107 and 108 below and the overall impact section should now be read in conjunction with paragraphs 109-133 below, which now assesses Subtidal rock habitats and subtidal mixed sediments.

Subtidal coarse sediment habitats

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraph 297 which has been replaced with paragraphs 107 and 108 below. These updates are made in response to FIR Items 8a-8d (see **FIR Response Document)**.

107. Within the array site, coarse sediment habitats cover c. 99.997% of the habitats present. Based upon the intended locations of the WTGs and OSSs including scour protection and IACs including cable protection, 0.39% of the coarse sediment habitats within the array site have the potential to be impacted by long-term habitat loss. However, considering the LoD for the location of WTGs and OSSs including scour protection and IACs including cable protection, it is considered that 0.40% of the coarse sediment habitats within the array site have the potential to be impacted by long-term habitat loss.

108. Coarse sediment habitats cover c. 80% of the OECC and based on the Project Description (PD) and representative scenario parameters, and assuming cable protection is installed in the representative locations identified, the maximum area of coarse sediment habitats with potential to be impacted by long-term habitat loss during the operational phase accounts for c. 0.25% of the OECC. When considering the LoD for the offshore export cables, as set out in the PD, 0.28% of the coarse sediments in the OECC have the potential to be impacted by long-term habitat loss.

Subtidal sand habitats

This section remains unchanged.

Habitats within the River Liffey

This section remains unchanged.

The Impact 1 text should now be read in conjunction with paragraphs 109-133 below. These paragraphs assess the Subtidal rock habitats and subtidal mixed sediments. The updates are made in response to FIR Items 8a-8d (see **FIR Response Document**).

Subtidal rock habitats

109. While defined subtidal rock habitats are not predicted to occur in the offshore development area by INFOMAR and EUSeamap and JNCC Annex I data, small patches of subtidal rock (e.g. cobble or boulder habitats within areas of otherwise coarse or mixed sediments) may be present at discrete locations within the array site (**Appendix 8-A Benthic Subtidal Survey Report 2025**) and this habitat is therefore assessed for the potential impact of long term habitat loss.

Receptor sensitivity

110. The value of subtidal rock habitats is medium as it represents OSPAR habits, not situated within a designated site and such rock habitats are common in Irish nearshore waters (West *et. al.*, 2024).

111. The majority of the array site consists of mobile cobbles and pebbles with areas of occasional boulders with mixed or coarse sediment in between and below. The eastern extent of the array site and a small area at the western edge of the array site contain small patches of subtidal rock in the form of cobbles and boulders with associated epifaunal communities.

112. Tolerance of the *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock (part of the Echinoderms and crustose communities biotope complex) is assessed low and recoverability is assessed as very low to the impact of long term habitat loss as a change in the substratum would reclassify the habitat (Tillen *et. al.*, 2023)

113. Tolerance of the *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles habitat to long term habitat loss, assessed low and recoverability is assessed as very low to the impact of long term habitat loss as a change in the substratum would reclassify the habitat (Tyler-Walters& Tillin, 2023; Tillin and Watson, 2023).

114. Given the medium value, low tolerance and very low level of recoverability of subtidal rock habitats and based on the sensitivity criteria set out in Table 8 3, the sensitivity of these subtidal rock habitats is considered to be high.

Magnitude of impact

115. Subtidal rock habitats, in the form of cobbles and boulders, may occur in discrete locations along the eastern extent of the array site and at one location on the western extent of the array site.

116. Over the wider study, the impact of long-term habitat loss only has the potential to impact a small proportion of the available rock habitats present.

117. Though this impact is long term, occurring over the full lifetime of the CWP Project, the proportion of this habitat affected across the wider study area is low and may result in a partial change to key characteristics or features of baseline habitats in the offshore development area but does not have the

potential to impact rock habitats in the surrounding areas, therefore the consequences are considered to be medium.

118. Primary project mitigation is outlined in **Section 8.9** and states that the locations of offshore infrastructure have been developed to avoid known sensitive ecological habitats. Whilst reefs were not identified during the 2021 and 2025 characterisation surveys, it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micrositing around sensitive habitats. This will reduce the impact to any areas of rock habitats as far as practicable.

119. Based on the criteria set out in **Table 8-4** and considering the primary mitigation the potential magnitude of impact from long term habitat loss to the subtidal rock habitat group is considered to be low.

Significance of effect

120. The sensitivity of the subtidal rock habitats receptor is considered to be high and the magnitude of impact is considered to be low. Therefore (as per the matrix in Table 8-5), an effect of Moderate/Slight which is a **Not Significant** adverse impact on subtidal rock habitats. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

121. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 8.9**.

Subtidal mixed sediment habitats

122. Subtidal mixed sediment habitats were recorded in the offshore development area in the 2025 subtidal benthic survey (**Appendix 6-A Modelling Report Addendum**) and this habitat is therefore assessed for the potential impact long term habitat loss.

Receptor sensitivity

123. Sublittoral mixed sediments are found from the extreme low water mark to deep offshore circalittoral habitats often found in moderately exposed areas subject to strong to weak tidal streams.

124. The broad habitat types of circalittoral and infralittoral mixed sediment habitats have no conservation status in Ireland and circalittoral and infralittoral mixed sediment habitats are common in the marine environment around Ireland and the UK therefore the value of this receptor is low.

125. These habitats can support a diverse community particularly rich in polychaetes and in coarser variations of these habitats several echinoderms including *Amphipholis squamata*, *Echinocyamus pusillus* are present. Tolerance of the Polychaete-rich deep Venus community in offshore mixed sediments biotope is to long term habitat loss is assessed as low and tolerance assessed as very low as changes to the sediment type may lead to biotope reclassification (Tillin & Watson, 2023).

126. Although the value of this habitat is negligible, given the low levels of tolerance and recoverability of the mixed sediment habitats to the impact of long term habitat loss and based on the sensitivity criteria set out in **Table 8-3**, the sensitivity is considered to be high.

Magnitude of impact

127. Mixed sediment habitats are present in the south of the array site and at a few stations interspersed in the OECC (**Appendix 6-A Modelling Report Addendum).**

128. Although mixed sediment habitats within the offshore development area may be affected by long-term habitat loss from the installation of structures in the seabed such as OSS and WTG monopile foundations, including scour and cable protection, it is unlikely to affect all this habitat within the offshore development area. Over the wider study, the impact of long-term habitat loss only has the potential to impact a very small proportion of the *c.* 10 km^2 available mixed sediment habitats present.

129. Though this impact is long term, occurring over the full lifetime of the CWP Project, the proportion of this habitat affected across the wider study area is low and its loss over this period will not affect in any way any ecosystem functions that are provided due to the abundance of the habitat in the surrounding areas, therefore the consequences are considered to be low.

130. Based on the criteria set out in **Table 8.4** of the EIAR, the potential magnitude of impact from temporary habitat disturbance to the mixed sediment habitats is considered to be low.

Significance of effect

131. The sensitivity of mixed sediments habitats receptor is considered to be high and the magnitude of impact is considered to be low. Therefore (as per the matrix in **Table 8 5**), an effect of Moderate / Slight which is a **Not Significant** adverse impact is predicted for mixed sediment habitats.

132. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

133. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 8.9**.

Impact 2: Habitat creation (increase in hard substrate)

This section remains unchanged.

Impact 3: Temporary habitat disturbance

This section remains unchanged but should now be read in conjunction with paragraphs 134-140 and Table 8-K below. This update is made in response to FIR Items 8a-8d (see **FIR Response Document).**

Subtidal rock habitats and Subtidal mixed sediment habitats

134. While defined subtidal rock habitats are not predicted to occur in the offshore development area by INFOMAR and EUSeamap and JNCC Annex I data, small patches of subtidal rock (e.g. cobble or boulder habitats within areas of otherwise coarse or mixed sediments) may be present at discrete locations within the array site (**Appendix 8-A Benthic Subtidal Survey Report 2025**) and this habitat is therefore assessed for the potential impact of temporary habitat disturbance.

135. Subtidal mixed sediment habitats were recorded in the offshore development area in the 2025 subtidal benthic survey (**Appendix 6-A Modelling Report Addendum**), and this habitat is therefore assessed for the potential impact of temporary habitat disturbance.

136. It is anticipated that the level of temporary habitat disturbance caused by the maintenance and repair activities during operation and maintenance activities will be no greater than that generated by the installation during construction. Given this, the potential effects of this impact on the subtidal rock and mixed sediment habitats during the operation and maintenance phase will be less than, or equal to, those of temporary habitat disturbance during construction which have been assessed as not significant.

137. Therefore, an effect of **Not Significant** adverse impact on subtidal rock and mixed sediment ecology receptors is predicted for all habitats.

Significance of the effect

138. The sensitivity of rock and mixed sediment receptors is considered to be medium and magnitude is considered to be negligible of impact of temporary habit disturbance (**Table 8-K** below). Therefore (as per the matrix in **Table 8-5**), an effect of **Not Significant** adverse impact on subtidal rock and mixed sediment habitats.

Table 8-K Significance assignment for temporary habitat disturbance for subtidal rock and mixed sediment

Receptor group	Sensitivity	Magnitude	Significance
Subtidal rock habitats	Medium	Negligible	**Slight / Not significant** (not significant)
Subtidal mixed sediment habitats	Medium	Negligible	**Slight / Not significant** (not significant)

139. Where flexibility in the proposed design exists there is no other scenario which would lead to a more significant effect.

140. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation measures described in **Section 8.9**.

Impact 4: Presence of EMF and / or temperature changes

This section remains unchanged, however it should now be read in conjunction with Paragraph 141-143 and Plate 8-A to Plate 8-C to below. This update has been made in response to FIR Item 11c (see **FIR Response Document)**.

141. There is a maximum of 146 km of OECC cable, 8.6 km of inter-connector cable and 139 km of inter-array cabling proposed to be installed for the CWP Project. Cables will mostly be protected by burial, although where required, cable protection will be used (for further details, refer to **EIAR Volume 3 Chapter 4 Project Description**). Burial or protection of a marine cable, as proposed by the CWP Project acts as a buffer between the potential source of EMF and the receptor.

142. Based upon the predicted cable arrangements, the magnetic field strength at the sediment surface (assuming a minimum depth of cover of 1 m for the IACs and interconnectors, and 1.4m for the OECC) will be 1.5 µT for a 1400 Cu mild steel cable (**Plate 8-A**), 2.05 µT for a 1800 Cu mild steel cable (**Plate 8-B)** and 4.7 µT for an 1800 Cu stainless steel cable **(Plate 8-C)**. These values fall sharply as distance from the cable increases, with levels back to near zero within 2 m of the cable.

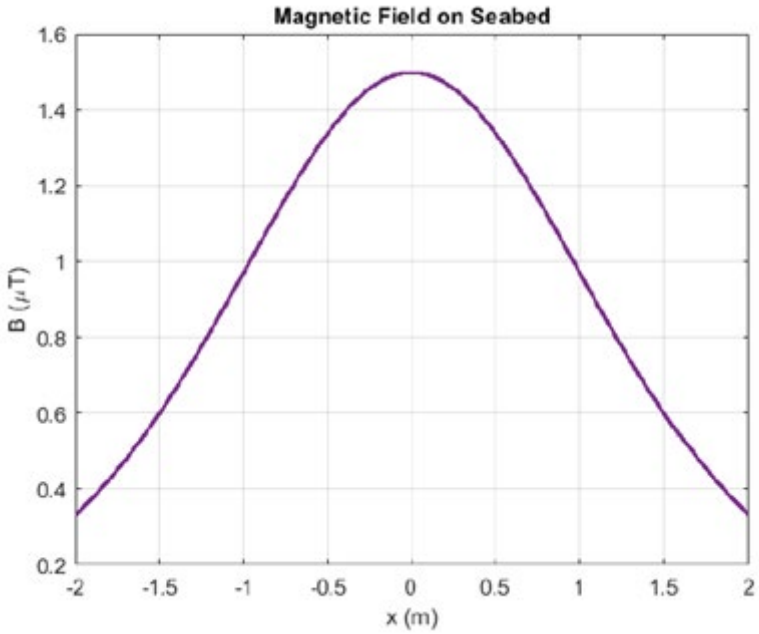


Plate 8-A OECC Magnetic field at seabed surface – 1400 Cu, mild steel – 1064A – 2 m depth of burial

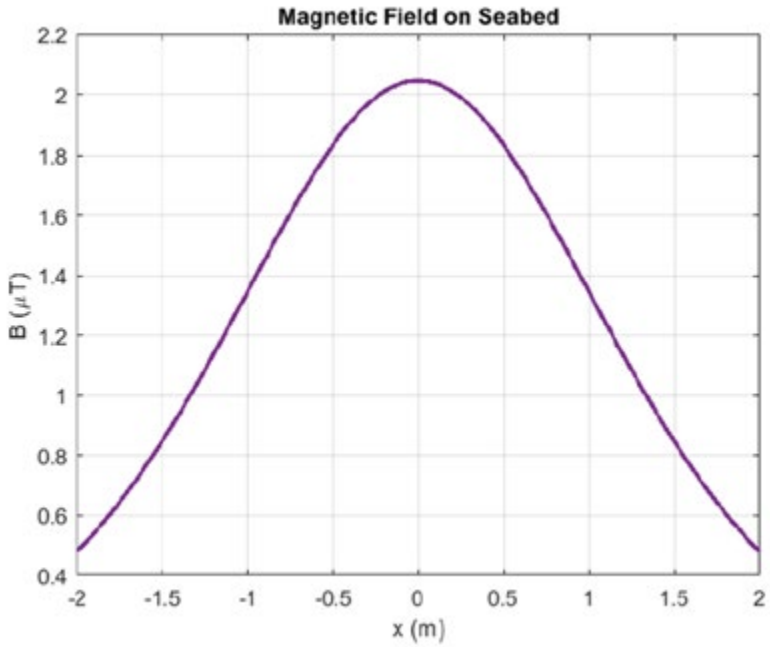


Plate 8-B OECC Magnetic field at seabed surface – 1800 Cu, mild steel – 1083A – 2 m depth of burial

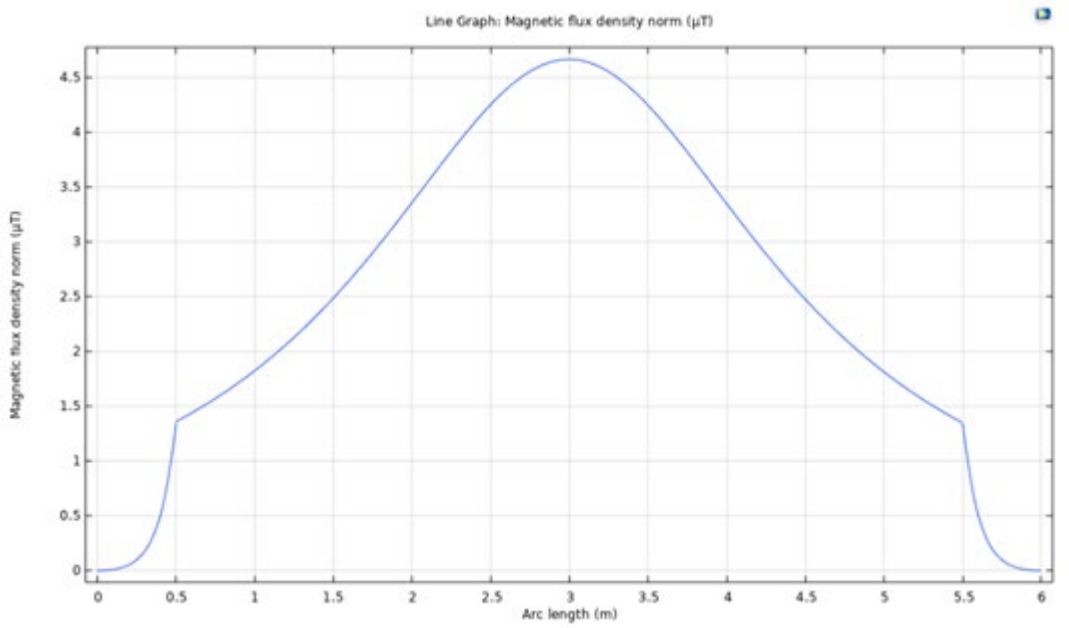


Plate 8-C IAC magnetic field at seabed surface – 1800 Cu, stainless steel – 1083A – 2 m depth of burial

143. The magnetic flux present at the cable surface is considerably higher than on the seabed, however the magnetic field reduces rapidly with distance. Magnetic field density at the cable surface approximately may be as high as 1600 μT, however this is expected to reduce to less than 30 μT at the seabed surface for a buried cable (which is less than the Earth's magnetic field which is approximated at 50 μT in the UK) and further reduce to zero within approximately 6 m (Tripp, 2024). For comparable voltage export cables, EMF for a surface laid cable at 0m above the seabed is predicted to range from 17.97 to 56.54 μT.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged but should now be read in conjunction with paragraph 144 below. This update has been made in response to FIR Item 11c (see **FIR Response Document)**.

144. The earth's magnetic field is typically between 22 μT and 67 μT (British Geological Survey, n. d.). The maximum level predicted to arise from OECC, IAC and interconnector cables (**Figure 8-3**) from the cables is 4.9 μT and is well below the background levels all the receptors experience. Any effects on benthic habitats and communities are anticipated to only occur within the immediate vicinity of the cable, as the maximum magnetic flux density occurring at the cable surface, decreases rapidly with distance (Hutchison et al., 2020; Copping et al., 2016), with EMF at the cable surface typically several orders of magnitude higher than those measured at the sediment surface 1 m above the buried and/or protected cable. The predicted EMF at 0 m above the seabed for a surface laid cable is predicted to range from 17.97 to 56.54 μT. It should however be noted that should cables be surface laid, non-burial cable protection methods will ensure separation between the cable surface and any receptors.

Given the separation from receptors and the cable, which will be buried or otherwise protected, and as predicted EMF levels are likely to be mainly within the range of the natural EMF present from the earth's magnetic field, it is considered that the magnitude of impact from EMF from cables on benthic species are considered negligible.

Significance of effect

This section remains unchanged.

Impact 5: Introduction of INNS

This section remains unchanged.

Impact 6: Accidental pollution events

This section remains unchanged.

8.10.3 Decommissioning phase

The upfront text (paragraphs 374-377) at this section remains unchanged.

Impact 1: Temporary habitat disturbance

This section remains unchanged.

Impact 2: Temporary increase in SSC

This section remains unchanged.

Impact 3: Remobilisation of contaminated sediments

This section remains unchanged except for paragraph 390 which is replaced by paragraph 145 below. This update has been made in response to FIR Item 8l (see **FIR Response Document**).

145. Therefore, a significance of effect of **Sight (not significant)** is predicted for all habitats.

Impact 4: Long-term habitat loss

This section remains unchanged.

Impact 5: Introduction of INNS

This section remains unchanged.

Impact 6: Accidental pollution events

This section remains unchanged.

8.11 Cumulative impacts

Section 8.11 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

8.12 Transboundary impacts

Section 8.12 remain unchanged.

8.13 Inter-relationships

Section 8.13 remain unchanged.

8.14 Potential monitoring requirements

Section 8.14 remains unchanged.

8.15 Impact assessment summary

Section 8.15 remain unchanged.

8.16 References

Section 8.16 remain unchanged but should be read in conjunction with the references in paragraphs 146 – 154 below.

146. Coppo, G. C., Gabriel, F. A., Mazzuco, A. C. A., Queiroz, H. M., Barcellos, D., Ferreira, T. O., & Bernardino, A. F. (2023). Long-term impacts on estuarine benthic assemblages (2015–2020) after a mine tailing spill in SE Brazil. *Marine Pollution Bulletin*, 196, 115616.

147. Gubbay, S. (2007). Defining and managing Sabellaria spinulosa reefs: Report of an inter-agency workshop 1-2 May, 2007.JNCC Report No. 405.

148. JNCC (2022) The Marine Habitat Classification for Britain and Ireland Version 22.04. Available at: https://mhc.jncc.gov.uk/

149. Lynam, C. P., Garcia, C., Chen, Z., Thomas, G. E., Hicks, N., Bolam, S. G., & Russell, D. J. (2025). Ecological recovery of benthic fauna from contamination near oil and gas platforms. *Marine Pollution Bulletin*, 221, 118470.

150. Raymond, C., Gorokhova, E., & Karlson, A. M. (2021). Polycyclic aromatic hydrocarbons have adverse effects on benthic communities in the baltic sea: implications for environmental status assessment. *Frontiers in Environmental Science*, 9, 624658.

151. Szava-Kovats, Robert C. (2008). Grain-size normalization as a tool to assess contamination in marine sediments: Is the <63µm fraction fine enough? Marine Pollution Bulletin, Volume 56, Issue 4,2008, Pages 629-632, ISSN 0025-326X,

152. Tillin, H.M., Hiscock, K., Lloyd, K.A., & Watson, A.J., (2023). Urticina felina and sand-tolerant fauna on sand-scoured or covered circalittoral rock. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available at: https://www.marlin.ac.uk/habitat/detail/290

153. Tillin, H.M. & Watson, A.J., (2023). Polychaete-rich deep Venus community in offshore gravelly muddy sand. In Tyler-Walters H. Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available at: https://www.marlin.ac.uk/habitat/detail/1117

154. West, V., Maher, E. & Alexander, D. (2024). Reef Habitat in Irish Intertidal and Nearshore Waters. Irish Wildlife Manuals, No. 150. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland

9 FISH, SHELLFISH AND TURTLE ECOLOGY

9.1 Introduction

Section 9.1 remains unchanged.

9.2 Consultation

Section 9.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

9.3 Legislation, policy and guidance

Section 9.3 remains unchanged.

9.4 Impact assessment methodology

Section 9.4 (upfront text) remains unchanged. Updates are made to Sections 9.4.1 and 9.4.2 below.

9.4.1 Study area

Section 9.4.1 is replaced in its entirety by paragraphs 1-7 and Figure 9-1 is replaced by Figure 9-A below. This revision has been made in response to FIR Item 11a (see **FIR Response Document).**

1. The study areas for the fish, shellfish and turtle ecology assessment have been amended following consultation responses and are shown in **Figure 9-A**. It is important to note that the study areas are defined to ensure a comprehensive broadscale understanding of the receiving environment is presented within the description of the existing environment. The ICES regional study area and National study area provide context and an understanding of the potential presence of migratory species or species with a broad spatial distribution.
2. The study areas have been informed through reference to the predicted ZoI and defined spatially on the basis of International Council for the Exploration of the Sea (ICES) statistical rectangles where the offshore development area is located to allow reference to be made to the comprehensive dataset. ICES statistical rectangles are the smallest spatial unit over which relevant fisheries data is aggregated. These are as follows:
    - ICES statistical rectangle 35E4 where the entire array site and the southeast section of the offshore export cable corridor is located; and
    - ICES statistical rectangle 35E3 where the northwest section of the cable corridor is contained.

3. The local study area includes the onshore and offshore infrastructure including the marine area around the onshore substation location and the extent of the River Liffey. All direct impacts are contained within the local study area.

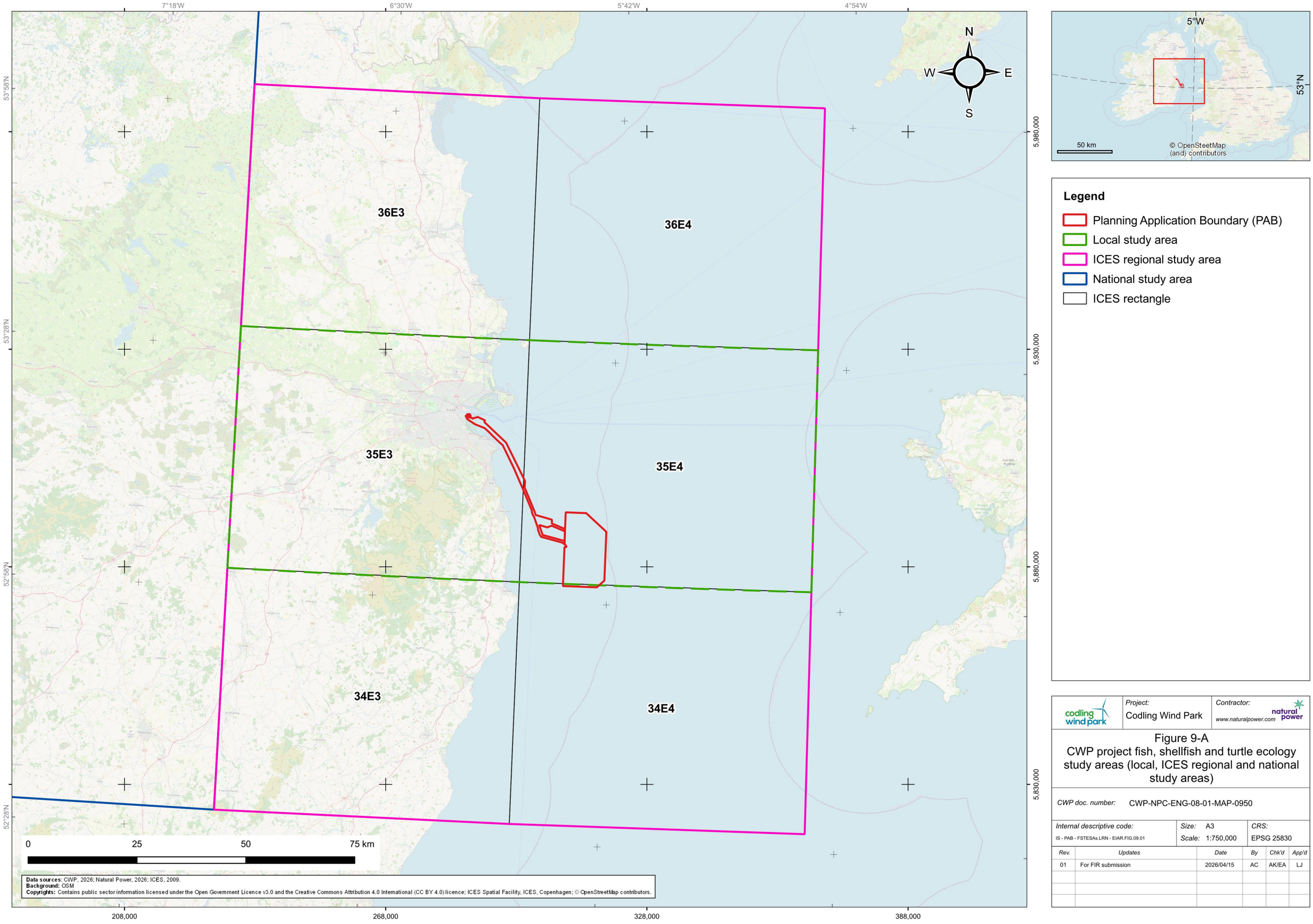
4. The ICES regional study area, which has been updated following An Coimisiún Pleanála's (ACP's) request under FIR item 11a and is now referred to as the ICES regional study area, has been used to provide regional context against which impacts are assessed, and ensures data coverage for near field indirect impacts (i.e., impacts arising from sediment dispersion and underwater noise) and comprises of 35E4 and 35E3, as well as adjacent ICES statistical rectangles to the north and south. These are as follows:

   - ICES statistical rectangles 36E3 and 36E4, to the north; and
   - ICES statistical rectangle 34E3 and 34E4, to the south.

5. The National study area has been defined as the Irish Sea using ICES division 27.7.a, to reflect international reporting (e.g., OSPAR) and provides data against which far-field indirect impacts can be considered.

6. Where appropriate, a broader area encompassing the whole of Ireland and Northern Ireland has been used for the purpose of describing diadromous fish migration routes (see **Section 9.2**). This wider area for diadromous fish is used due to consultee concerns in relation to migrating salmonids.

7. All study areas (and the associated assessment of impacts) extend up to the low water mark where they border an intertidal area.



Legend

- Planning Application Boundary (PAB)
- Local study area
- ICES regional study area
- National study area
- ICES rectangle

codling wind park	*Project:* Codling Wind Park	*Contractor:* natural power www.naturalpower.com

Figure 9-A
CWP project fish, shellfish and turtle ecology study areas (local, ICES regional and national study areas)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-0950

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN - EIAR.FIG.09.01	A3	EPSG 25830
	Scale: 1:750,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

9.4.2 Data and information sources

Site-specific surveys

Section 9.4.2 remains unchanged and should also now be read in conjunction with the additional text provided in paragraph 8 below. This revision has been made to respond to observations and compliment FIR Item 11a (see **FIR Response Document**).

8. To supplement and validate the existing characterisation of the receiving environment for the EIA, Environmental deoxyribonucleic acid (eDNA) surveys were undertaken in June and October 2025 at 18 locations covering the area in and around the offshore development area, including 2 stations within the River Liffey, to provide information on fish species present with a focus on the presence of migratory fish species such as salmon. Water samples were taken from three height locations (bottom, mid and top) within the water column, processed on board and analysed in a laboratory. Full details are provided in the supporting eDNA report (**Appendix 9-A CWP Migratory Fish eDNA Survey Report 2025**).

Desk Study

Section 9.4.2 remains unchanged apart from Table 9-2 which is replaced by Table 9-A which is updated to add the Marine Institute (2024) data for spanning and nursery areas. This revision has been made in response to FIR Item 11d (see **FIR Response Document**).

Table 9-A Data sources for fish, shellfish and turtle ecology

Data	Source	Date	Notes
Commercial landings data by ICES statistical rectangle	Sea Fisheries Protection Authority (SFPA)	2021	Irish landings (weight) into Irish ports
Commercial landings data by port	SFPA	2022	Landings data (weight) by <10 m vessels into Irish ports from sales notes
Commercial landings data by ICES division	International Council for the Exploration of the Sea (ICES)	2022a	Landings data (weight) for all ports that fished in ICES division 27.7.a
International Bottom Trawl Survey (IBTS)	ICES	2022b	Catch per Unit Effort (CPUE) values calculated from the Northern Irish Groundfish Survey (NIGFS)
	ICES	2020	Spatial distribution of species presented as numbers caught per hour during the 2019 summer / autumn IBTS survey
Shellfish Stocks and Fisheries Review 2011	MI & BIM	2011	Spatial data on the fishing fleet and landings of shellfish species around Ireland with notable work on the status of and recommendations for the whelk fishery

Data	Source	Date	Notes
Shellfish Stocks and Fisheries Review 2023	MI & BIM	2023	Spatial data on the fishing fleet and landings of shellfish species around Ireland
The Stock Book 2022	Marine Institute	2022	Annual Review of Fish Stocks in 2022 with Management Advice for 2023
Atlas of Commercial Fisheries Around Ireland	Gerritsen & Kelly	2019	Detailed maps of fishing activity around Ireland, including Irish landings for key commercial species
Folk 16 seabed substrate and European Nature Information System (EUNIS) map	Diesing and Stephens	2018	Spatial dataset with regional coverage of the Irish and Celtic Sea
Tope Tagging in Irish Waters	Clarke	2003	Recapture distribution of tope around the coasts of Ireland and the UK tagged by the Central Fisheries Board
Western Irish Sea Nephrops Grounds Underwater TV (UWTV) Survey Report 2019 and catch options for 2020	Lundy *et al*.	2019	Main results and findings of the 17th annual underwater television survey on the 'Irish sea west Nephrops grounds' ICES assessment area, Functional Unit 15
Nephrops grounds	Ireland's Marine Atlas	2016	Nephrops habitats or grounds in waters around Ireland
Ireland Red List - Cartilaginous fish	Clarke *et al*.	2016	Spatial distribution and habitat usage of red list cartilaginous fish in Irish waters
Irish fishing activity: dredge, static gear, trawl activity and aquaculture sites	Ireland's Marine Atlas	2016	Location of fishing activity (<15 m vessels) in Irish waters
Key fish species spawning and nursery grounds	Marine Institute	2024	Spatial distributions of spawning and nursery grounds for fish species around the UK and Ireland
	Ireland's Marine Atlas (superseded by Marine Institute (2024)	2016	
	Ellis *et al*.	2012	
	Coull *et al*.	1998	
Distribution and relative abundance of demersal fishes from beam trawl surveys in the Irish sea	Parker-Humphreys	2004	Spatial distributions of major fish and selected commercial shellfish species from Centre for Environment, Fisheries and Aquaculture Science (CEFAS) beam trawl surveys in ICES Division VIIa
Irish Sea Roundfish Surveys	Armstrong *et al*.	2008	Time-series of data on catch-rates, distribution and age composition from Irish Sea roundfish surveys

Data	Source	Date	Notes
Larval distribution of commercial fish species in waters around Ireland	Dransfield *et al*.	2004	Baseline survey on the larval distribution of commercial fish species off the west, north and south coasts of Ireland
Irish Sea seed mussel beds	Bord Iascaigh Mhara	2021	Spatial extent of Irish Sea seed mussel beds
Migrations, fishery interactions and management units of sea bass	Pawson *et al*.	2007	Tagging study of seabass around the coasts of England, Wales, Southern Ireland, and the Channel Isles
The distribution of the European sea bass in Irish waters	O'Neill	2017	Distribution and putative spawning locations in Irish waters
The Status of Irish Salmon Stocks	Gargan *et al*.	2021	The Status of Irish Salmon Stocks in 2020 with Catch Advice for 2021
The ocean distribution of Atlantic salmon	Rickardsen *et al*.	2021	Migration study using satellite tags on post-spawned salmon
Atlantic salmon smolts in the Irish Sea	Barry *et al*.	2020	Telemetry study investigating migration routes for Atlantic salmon leaving the east coast of Ireland
Salmon and sea trout migration – COMPASS project	Barry *et al*.	2022	Salmon and sea trout detection data
Eel management and monitoring objectives	Inland Fisheries Ireland (IFI)	2021	Activity report of the Technical Expert Group on Eel (TEGE) 2020
Twaite shad migration	Davies *et al*.	2020	Marine phase and river fidelity of twaite shad in the UK and Ireland
Fishing, abundance, and life history traits of the anadromous sea lamprey in Europe	Beaulaton *et al*.	2008	Data on the exploitation, abundance, and life history traits at the European scale
Aspects of Brook lamprey Spawning in Irish Waters	Rooney *et al*.	2013	Survey of Brook lamprey spawning activity in Irish river catchments
Distribution and abundance of basking sharks in Irish waters	Berrow and Heardman, 1994; Witt *et al*., 2012	Various years	Sightings scheme
Migration and seasonal abundance of basking sharks	Doherty *et al*., 2017; Lieber *et al*., 2020; Sims *et al*., 2003	Various years	Tracking studies
A review of the biology, ecology and conservation status of basking sharks	Sims and Quayle, 1998	Various years	Review

Data	Source	Date	Notes
'TURTLE' database	http://data.nbn.org.uk/	Various years	Opportunistically recorded sightings, strandings and bycatch of marine turtles throughout Ireland and the UK

9.4.3 Impact Assessment

Section 9.4.3 (upfront text) remains unchanged.

Sensitivity of receptor

Section 9.4.3 (sensitivity of receptor) remains unchanged, apart from Table 9-3 which is replaced by Table 9-B, below. This revision adds NMPF species and streamlines the value criteria. This update has been made in response to FIR Item 11c (see **FIR Response Document).**

Table 9-B Receptor sensitivity definitions

Sensitivity	Criteria
High	**Adaptability**: The receptor cannot avoid or adapt to an impact. **Tolerance**: The receptor has no or very low capacity to accommodate the proposed form of change. **Recoverability**: The effect on the receptor is anticipated to be permanent (i.e., over 60 years) and recovery is not anticipated. **Value:** The receptor is of international importance (e.g., Annex II species under the Habitats Directive, or OSPAR list of threatened or declining species, or National Marine Policy Framework Species (NMPF)).
Medium	**Adaptability**: The receptor has a limited ability to avoid or adapt to an impact. **Tolerance**: The receptor has a moderate to low capacity to accommodate the proposed form of change. **Recoverability**: The receptor is anticipated to recover fully within the medium term (i.e., 7–15 years) to long term (15–60 years). **Value**: The receptor is of national importance (e.g., Ireland's red list species, Scottish Priority Marine Features, Northern Ireland Priority Species).
Low	**Adaptability**: The receptor has a reasonable capacity to avoid or adapt to an impact. **Tolerance**: The receptor has a high capacity to accommodate the proposed form of change. **Recoverability**: The receptor is anticipated to recover fully within the short term (i.e., 1–7 years). **Value**: The receptor is of national importance (e.g., Ireland's red list species, Scottish Priority Marine Features, Northern Ireland Priority Species).
Very Low	**Adaptability**: The receptor has a high capacity to avoid or adapt to an impact.

Sensitivity	Criteria
	Tolerance: The receptor has a high capacity to accommodate the proposed form of change. **Recoverability**: The receptor is anticipated to recover fully and will be temporary (i.e., lasting <1 year). **Value**: The receptor is not nationally or internationally protected.

Magnitude of impact

This section remains unchanged.

Significance of effect

This section remains unchanged.

9.5 Assumptions and limitations

Section 9.5 remains unchanged except for Table 9-6 which is replaced by Table 9-C, below to incorporate the 2024 update to Ireland's Marine Atlas. This update has been made in response to FIR Item 11d (see **FIR Response Document)**.

Table 9-C Data Limitations

Data type	Data limitations
Landings data	There are limitations to this data namely, not all species or vessel sizes are represented; each ICES statistical rectangle covers an area of 30 nautical miles (NM) square and therefore, identifying exact areas within the rectangles where fish were caught is not possible; landings data are recorded for each member state which may be subject to different landings regulations. When used in combination with other data sources, this source still provides relevant data of species present.
ICES catch data	Catch figures do not include estimates for non-reported landings. For 2018–2020 data, Ireland has reported catches in certain areas as confidential following Eurostat guidelines on statistical confidentiality. These have been treated as zero values as actual numbers have not been provided. When used in combination with other data sources, this source still provides relevant data of species present.
Landings data by <10 m vessels into Irish ports from sales notes	Data from <10 m vessels are not available at ICES statistical rectangle level, only by port. Caution should be taken with this data as these species may have been caught from ICES statistical rectangles outside the defined study area. When used in combination with other data sources, this source still provides relevant data of species present.

Data type	Data limitations
Fisheries Independent data e.g., ICES survey data	Data are limited to certain species due to the selectivity of the gear used. The Irish Groundfish Survey only has a few stations in the study areas. Data from the Northern Irish Groundfish Survey (NIGFS) have therefore been used for CPUE estimates due to better spatial overlap with the study areas. When used in combination with other data sources, this source still provides relevant data of species present.
Spawning and nursery ground data	There are limitations with the use of the Coull *et al*. (1998) and Ellis *et al*. (2012) papers, which includes: the age of the papers themselves, that only certain species are included and that spawning distributions are under continual revision. These data are still considered relevant based on the long dataset from which they are built. However, these data have been supplemented with more up-to-date information from Marine Institute (2024) spawning and nursery areas (further detail in **Section 9.6.3 Spawning and Nursery Grounds**).

9.6 Existing environment

Updates to Section 9.6 are detailed in Sections 9.6.1 to 9.6.3 and 9.6.6 below. A new header and section is provided in relation to the 2025 eDNA survey.

The additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document.**

9.6.A eDNA survey

Section 9.6.A is a new section which has been added to account for the 2025 eDNA surveys to respond to observations and to compliment FIR item 11a (see **FIR Response Document)**.

9. A total of 112 fish species were detected during the spring and autumn eDNA surveys, indicating diverse fish communities are present in the survey area. DNA read counts were slightly higher in the spring survey than in the autumn survey. The most common species detected were European sprat (*Sprattus sprattus*) and whiting (*Merlangius merlangus*) which were both present at all 18 stations in spring and 15 stations in autumn followed by Common dragonet (*Callionymus lyra*) present at 16 stations in spring and 15 in autumn. Atlantic herring (*Clupea harengus*) and Common dab (*Limanda limanda*) were also present at the majority of stations in spring and autumn.

9.6.1 Commercial Species

Section 9.6.1 has been replaced in its entirety by paragraphs 10 to 16, Table 9-D to Table 9-E and Plate 9-A to Plate 9-B. This update has been made in response to FIR Item 11a (see **FIR Response Document**). Specifically, FIR Item 11a requests that impacts are reassessed using a study area only comprising ICES Rectangles 36E3; 36E4; 35E3; 35E4; 34E3; and 34E4, these are described as the ICES regional study area.

10. The following section describes the species targeted by commercial fisheries, consideration of impacts on the fishery itself is provided in **Chapter 12 Commercial Fisheries**. Commercial fisheries data provides an insight into the range of species found within the study area(s). SFPA data includes

information on Irish vessels landing into Irish ports for individual ICES statistical rectangles within the study area (SFPA, 2021) (**Figure 9-A**).

11. Five years' worth of fisheries data was examined to provide a list of species recorded in commercial fisheries landings by Irish vessels into Irish ports (SFPA, 2021; average live weight tonnage 2017 - 2021) (**Table 9-D**).

12. For the ICES statistical rectangles that cover the local study area (35E3 and 35E4) there were a total of 15 fish species and five shellfish species recorded over the five-year period. In the inshore rectangle (35E3) where the north west section of the offshore export cable corridor (OECC) is located, there were low catches (by weight), with razor / knife clams (*Solenidae* sp.) Norway lobster (*Nephrops norvegicus*) and sword razor shell (*Ensis* sp.) dominating the landings (**Plate 9-A**). This is expected due to the relatively small sea area in this rectangle and the shallow water depths (maximum ~33 m). In rectangle 35E4 where the array site and the south east section of the OECC is located whelk (*Buccinum undatum*) was the dominant species by weight (**Plate 9-A**), followed by blonde ray (*Raja brachyura*), small-spotted catshark (*Scyliorhinus canicula*), European plaice (*Pleuronectes platessa*), great Atlantic scallop (*Pecten maximus*), and haddock (*Melanogrammus aeglefinus*) (**Plate 9-B**).

13. For the ICES regional study area, the ICES statistical rectangles in the north (36E3, 36E4) recorded 20 fish species and six shellfish species. The catches were dominated by European sprat (*Sprattus sprattus*), haddock, and anglerfish (*Lophiidae sp.*) **(Plate 9-B**). Shellfish landings from 36E3 were dominated by common edible cockle (*Cerastoderma edule*), sword razor shell, and whelk, whereas shellfish landings from 36E4 were dominated by Norway lobster, great Atlantic scallop, and whelk (**Plate 9-A**).

14. The ICES statistical rectangles in the south of the ICES regional study area (34E3 and 34E4) recorded 10 fish species and two shellfish species. The catches were dominated by whelk, haddock, blonde ray and small-spotted catshark (**Plate 9-A, Plate 9-B**).

Table 9-D Commercial fish and shellfish species landed by Irish vessels into Irish ports in the ICES statistical rectangles covering the local and ICES regional study areas (2017–2021)

ICES statistical rectangle	Study area	Species caught
35E3	Local study area	Anglerfish (*Lophiidae* sp.), Common sole, Norway lobster, Razor / knife clams (*Solenidae* sp.), Sword razor shell (*Ensis* sp.)
35E4	Local study area	Anglerfish, Atlantic cod (*Gadus morhua*), Blonde ray (*Raja brachyura*), Brill (*Scophthalmus rhombus*), Common sole (*Solea solea*), Cuckoo ray (*Raja naevus*), European plaice (*Pleuronectes platessa*), Great Atlantic Scallop (*Pecten maximus*), Haddock (*Melanogrammus aeglefinus*), Lemon Sole (*Microstomus kitt*), Megrims (*Lepidorhombus* sp.), Norway lobster (*Nephrops norvegicus*), Pollack (*Pollachius pollachius*), Small-spotted catshark (*Scyliorhinus canicula*), Thornback ray (*Raja clavata*), Turbot (*Psetta maxima*), Whelk (*Buccinum undatum*)
34E3	ICES Regional study area	Whelk
34E4	ICES Regional study area	Anglerfish, Atlantic cod, Blonde ray, Common sole, European hake, European plaice, Haddock, Norway lobster, Small-spotted catshark, Turbot, Whelk

ICES statistical rectangle	Study area	Species caught
36E3	ICES Regional study area	Anglerfish, Atlantic cod, Common edible cockle (*Cerastoderma edule*), European sprat, Haddock, Norway lobster, Razor/knife clams, Sword razor shell, Thornback ray, Whelk
36E4	ICES Regional study area	Anglerfish, Atlantic cod, Blonde ray, Brill, Common edible cockle, Common sole, Common squids (*Loligo* sp.), European hake, European plaice, European sprat, Great Atlantic scallop, Gurnards (*Triglidae* sp.), Haddock, Lemon Sole, Ling, Megrims, Norway lobster, Pollack, Razor / knife clams, Sword razor shell, Thornback ray, Turbot, Whelk, Whiting, Witch

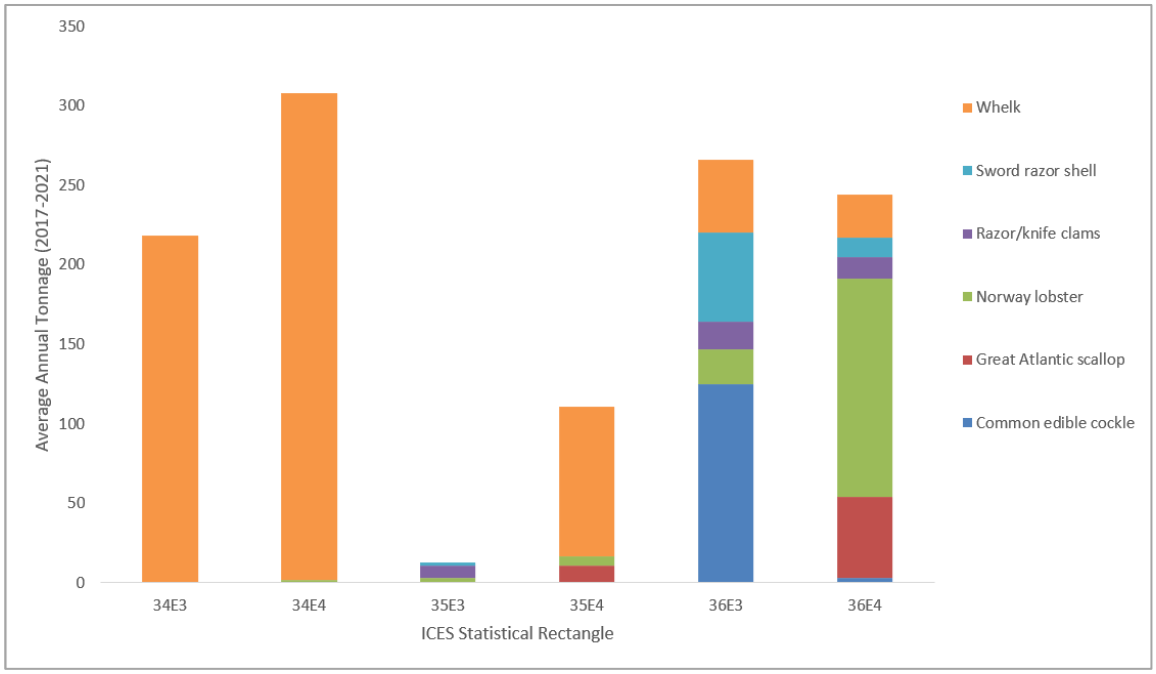


Plate 9-A Shellfish species landed by Irish vessels into Irish ports in the ICES statistical rectangles covering the local and ICES regional study area (Average Live Weight Tonnage, SFPA 2017–2021)

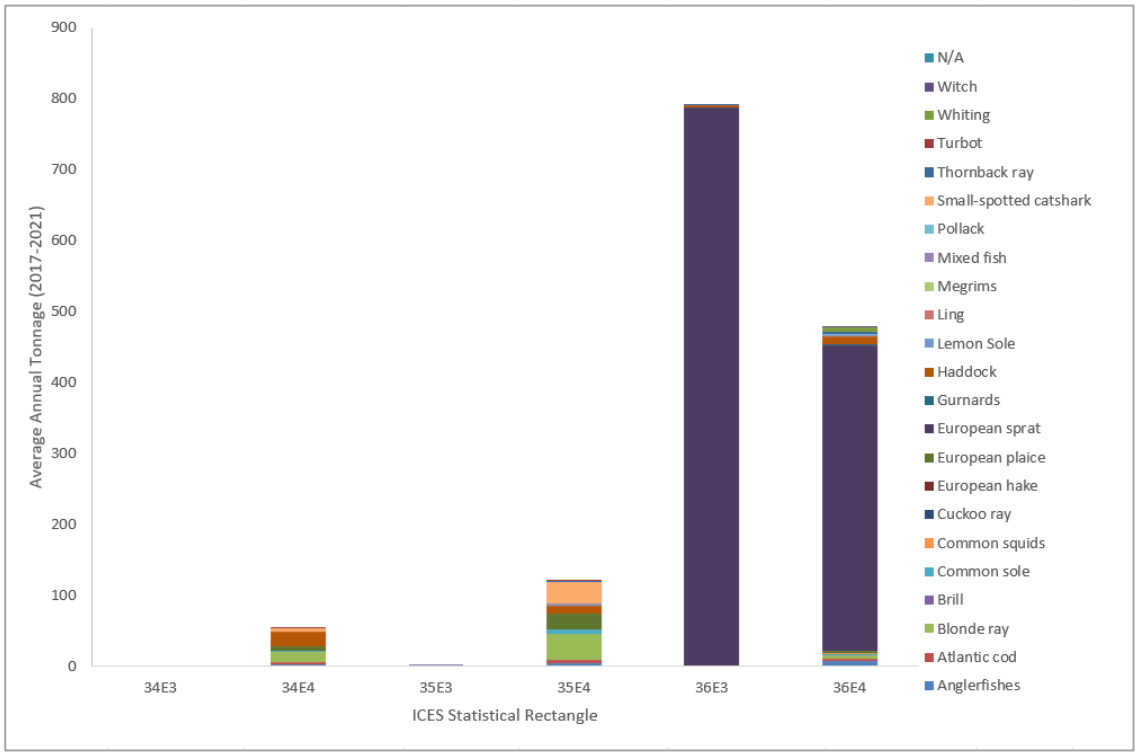


Plate 9-B Fish / elasmobranch species landed by Irish vessels into Irish ports in the ICES statistical rectangles covering the local and ICES regional study area (Average Live Weight Tonnage, SFPA 2017–2021)

15. Additional information on species that are landed by under 10 m vessels (only shellfish) into Irish ports can be obtained from examination of sales note data (SFPA, 2022) (**Table 9-E**). The ports within the local, ICES regional, and national study areas are also shown in **Table 9-E**. The species landed into ports within the local study area are whelk, velvet swimming crab, razor / knife clams, edible crab, European lobster and sword razor shell. Landings into ports within the ICES regional study area include the common edible cockle. Caution should be taken with this data which is reported at the spatial scale of the ICES division, and species may have been caught from ICES statistical rectangles outside the defined ICES regional study area.

16. Additional landing's data from inshore pot fishing (<15 m vessels) from Ireland's Marine Atlas (2016) show whelk, lobster and crab effort within the local study area.

Table 9-E Species landed by <10 m vessels into Irish ports within the local and ICES regional study areas from sales notes (SFPA, 2021)

Study Area	Ports	Landed species
Local study area	Dun Laoghaire, Howth, Malahide	Whelk, velvet swimming crab, razor / knife clams, edible crab, European lobster and sword razor shell
ICES regional study area	Annagassan, Arklow, Balbriggan, Clogherhead, Courtown, Drogheda, Loughshinny, Mornington, Skerries, Wicklow	Whelk, edible crab, velvet swimming crab, common edible cockle, sword razor shell, razor / knife clams, European lobster

9.6.2 Fisheries Independent Surveys

Section 9.6.2 is replaced in its entirety by paragraphs 17 to 21 and Table 9-F below. This revision has been made in response to FIR Item 11a (see **FIR Response Document**).

17. The Northern Irish Groundfish Survey (NIGFS) is conducted annually as part of the internationally coordinated International Bottom Trawl Survey (IBTS) (ICES, 2020). The aim is to investigate spatial and temporal changes in the relative abundance and distribution of fish assemblages and obtain the biological parameters of commercial fish species in ICES division 27.7.a, within which the ICES regional study area sits, for stock assessment purposes.

18. NIGFS data provides information on additional fish species that are not commercially targeted and therefore can be missing from fisheries landings data. The small mesh size also captures small species and juveniles of commercial species whose biomass is underrepresented in fisheries dependent data.

19. Abundances recorded under the NIGFS are presented below as number of individuals captured per 30 minutes of trawling (i.e., Catch per Unit Effort (CPUE)) in 2017–2021 (ICES, 2022b; ICES, 2020) (**Table 9-F**). Therefore, these values are not directly comparable with the commercial landings data presented above.

20. In the local study area plaice, whiting, queen scallop, Atlantic herring, European sprat and small-spotted catshark dominated the catches (**Table 9-F**).

21. In the ICES regional study area, the species above also dominated the catches, along Atlantic horse mackerel (*Trachurus trachurus*), common dab (*Limanda limanda*), spotted ray (*Raja montagui*), Norway lobster, haddock, and grey gurnard (*Eutrigla gurnardus*) (**Table 9-F**).

Table 9-F Top ten species recorded during the NIGFS (presented as number of individuals captured per 30 minutes of trawling) in the ICES statistical rectangles covering the local and ICES regional study areas 2017-2021 (ICES, 2022b)

Study Area	ICES Statistical Rectangle	Species
Local study area	35E3	Plaice, Whiting, Queen scallop, Atlantic herring, European sprat, Common dab (*Limanda limanda*), Spotted ray (*Raja montagui*), Grey gurnard (*Eutrigla gurnardus*), Common dragonet (*Trisopterus minutus*), Poor cod (*Trisopterus minutus*)
	35E4	Small-spotted catshark, Plaice, Whiting, Queen scallop, Atlantic herring, Spotted ray, Haddock, Poor cod, Grey gurnard, European sprat
ICES regional study area	34E3	Atlantic herring, Whiting, Small-Spotted catshark, Common dab, European Sprat, Atlantic horse mackerel, Common dragonet (*Callionymus lyra*), Grey gurnard, Poor cod, Plaice
	34E4	Small-spotted catshark, Whiting, Spotted ray, Poor cod, Broadnose skate (*Bathyraja brachyurops*), European sprat, Atlantic herring, Atlantic horse mackerel, Plaice, Starry smooth hound
	36E3	Plaice, Atlantic herring, Whiting, Common dab, Norway lobster, European sprat, Long rough dab (*Hippoglossoides platessoides*), Haddock, Grey gurnard, Common dragonet
	36E4	Haddock, Small-spotted catshark, Whiting, Atlantic herring, Norway lobster, Plaice, Grey gurnard, Atlantic mackerel, European sprat, Poor cod

9.6.3 Spawning and Nursery Grounds

Section 9.6.3 remains unchanged except for paragraphs 64 and 68 which are replaced by paragraphs 22 and 23 below and Table 9-10 is replaced by Table 9-G and Figure 9-2 to Figure 9-20 are replaced by Figure 9-B to Figure 9-T below. This update has been made in response to FIR Item 11a (see **FIR Response Document)**.

22. A range of fish and shellfish species are known to spawn and / or have nursery grounds which overlap with the ICES regional study area (Marine Institute, 2024; Ellis *et al*., 2012; Coull *et al*., 1998). These are listed in **Table 9-G** together with their spawning times and the intensity of spawning (where it has been defined). Visualization of the spawning and nursery habitats in comparison to the offshore development area can be seen below in **Figure 9-B** to **Figure 9-T**. The spawning times are provided in Coull *et al*. (1998) and the spawning / nursery intensity has been taken from Ellis *et al*. (2012) (and Coull *et al*., 1998 where available). Spawning and nursery habitats also occur in the wider ICES regional study area, with similar species as described above. Further detail regarding the wider spawning and nursery habitats can be found under **Section 9.10**.

23. Herring spawn on well-oxygenated gravel and sandy gravel with little fine material (Ellis *et al*., 2012). Coull *et al*. (1998) cites spawning to occur between January–March in southwest Ireland, and August–September in northwest Ireland. Coull *et al*. (1998) and Marine Institute (2024), show there is no overlap of herring spawning habitat with the offshore development area (**Figure 9-D**) and the closest spawning habitats for herring are >50 km from the local study area near the Isle of Man and southern Irish coast respectively, with the closely related sprat having limited grounds in Dundalk Bay (> 75 km to the north) which is outside of the ICES regional study area of the proposed development. Herring are known to spawn in and around Dundalk Bay during February to April (Cefas, 2011).

Table 9-G Spawning and nursery grounds present in the ICES Regional Study Area (Marine Institute, 2024, 2016; Ellis *et al.*, 2012; Coull *et al.*, 1998)

Species	Spawning areas within the ICES Regional Study Area Blank = Data not assessed in the reference			Nursery areas within the ICES Regional Study Area Blank = Data not assessed in the reference			Spawning times (Coull *et al.*, 1998)
	Coull *et al.* (1998)	Ellis *et al.* (2012)	Marine Institute (2024)	Coull *et al.* (1998)	Ellis *et al.* (2012)	Marine Institute (2024)	
Anglerfish					Yes – low intensity		
Atlantic cod	Yes – high intensity	Yes – high intensity	Yes	Yes	Yes – high intensity	Yes	January–April
Atlantic herring	No		No	Yes	Yes – high intensity	Yes	January–March (SW Ireland) August–September (NW Ireland)
Atlantic mackerel					Yes – low intensity	Yes	March–July
Blue whiting (*Merlangus poutassou*)	No		No	No	No	No	April–June
Common skate (*Dipturus batis*)					No		
Common sole	Yes – low intensity	Yes – low intensity		No	No		March–May
European hake		Yes – low intensity			No		

Species	Spawning areas within the ICES Regional Study Area Blank = Data not assessed in the reference			Nursery areas within the ICES Regional Study Area Blank = Data not assessed in the reference			Spawning times (Coull *et al.*, 1998)
	Coull *et al.* (1998)	Ellis *et al.* (2012)	Marine Institute (2024)	Coull *et al.* (1998)	Ellis *et al.* (2012)	Marine Institute (2024)	
European sprat	Yes						May–August
Haddock			Yes	Yes		Yes	February–May
Horse mackerel		Yes – low intensity				Yes	
Lemon sole	Yes			Yes			April–September
Ling (*Molva molva*)		Yes – low intensity					
Megrim			No			No	
Norway lobster	Yes – high intensity		Yes	Yes		Yes	April–June
Norway pout (*Trisopterus esmarkii*)	No			No			January–May
Plaice	Yes – high intensity	Yes – high intensity		Yes	Yes – low intensity		January–March
Saithe (*Pollachius virens*)	No			No			January–April

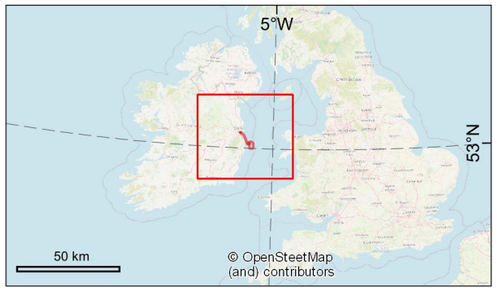
Species	Spawning areas within the ICES Regional Study Area Blank = Data not assessed in the reference			Nursery areas within the ICES Regional Study Area Blank = Data not assessed in the reference			Spawning times (Coull *et al.*, 1998)
	Coull *et al.* (1998)	Ellis *et al.* (2012)	Marine Institute (2024)	Coull *et al.* (1998)	Ellis *et al.* (2012)	Marine Institute (2024)	
Sandeel (*Ammodytes* sp.)		Yes – low intensity			Yes – low intensity		November–February
Spotted ray					Yes – low intensity		
Spurdog (*Squalus* sp.)					Yes – high intensity		
Thornback ray					Yes – low intensity		
Tope (*Galeorhinus galeus*)		Yes – low intensity			Yes – low intensity		
Whiting	Yes – high intensity	Yes – low intensity	Yes	Yes	Yes – high intensity	Yes	February–June

Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0
25
50
75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity

Anglerfish not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al* (2012), Copenhagen; © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-B
Anglerfish spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-0634

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.ANGLERFISH - EIAR. FIG.09.02

Size: A3

Scale: 1:750,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Coull *et al.* (1998)

Ellis *et al.* (2012)

Marine Institute (2024)

7°15'W 6°15'W 5°15'W

54°45'N 53°15'N 51°45'N

6,124,000 5,984,000 5,844,000 5,704,000

240,000 300,000 360,000

N W E S

Scale: 1:1,000,000
0 7.5 15 km

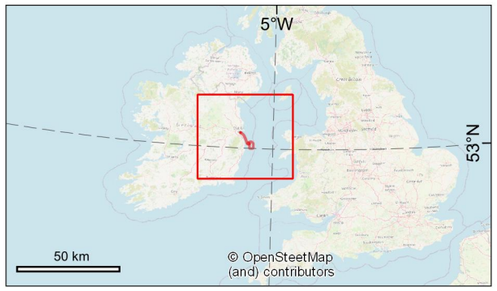
Scale: 1:1,100,000
0 7.5 15 km

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity
- Spawning ground undetermined intensity

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity
- Spawning ground high intensity
- Spawning ground low intensity

Marine Institute (2024)

- Nursery ground
- Spawning ground

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-C
Atlantic cod spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-0635

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.COD - EIAR.FIG.09.03	A3	EPSG 25830
	Scale: 1:1,800,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/21	AC	AK/EA	LJ

Coull *et al.* (1998)

Ellis *et al.* (2012)

Marine Institute (2024)

N

W E

S

7°15'W 6°15'W 5°15'W

54°45'N 53°15'N 51°45'N

6,124,000 5,984,000 5,844,000 5,704,000

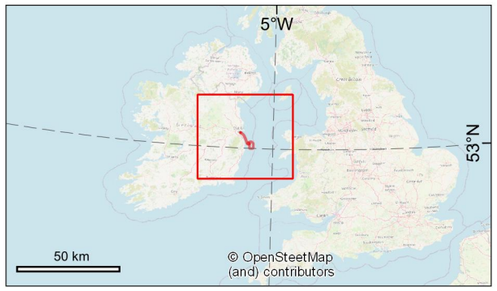
240,000 300,000 360,000

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground low intensity
- Spawning ground undetermined intensity

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity

Marine Institute (2024)

- Nursery ground
- Spawning ground

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-D
Atlantic herring spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-0633

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.HERRING - EIAR.FIG. 09.04

Size: A3

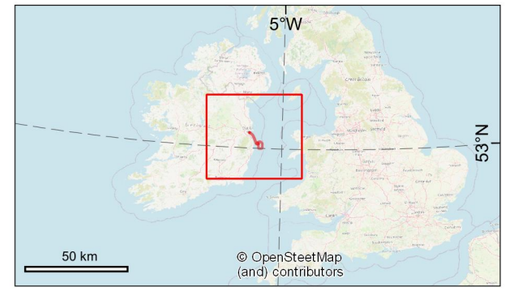
Scale: 1:1,800,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/21	AC	AK/EA	LJ

Ellis *et al.* (2012)

Marine Institute (2024)



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity

Marine Institute (2024)

- Nursery ground

Atlantic mackerel is not covered in Marine Institute (2024) dataset. Whilst included in Coull et al. 1998, the species is not represented at a scale relevant to the refined project area and is therefore not shown.

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence.; © OpenStreetMap contributors.

codling wind park	*Project:* Codling Wind Park	*Contractor:* natural power www.naturalpower.com

Figure 9-E
Atlantic mackerel spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1136

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.ATLANTIC.MACKEREL - EIAR.FIG.09.05	A3	EPSG 25830
	Scale: 1:1,200,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Coull *et al.* (1998)

Ellis *et al.* (2012)

7°8'W 6°8'W 5°8'W

54°24'N 53°36'N 52°48'N 52°0'N

6,056,000 5,956,000 5,856,000 5,756,000

240,000 300,000 360,000

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); Ellis *et al.* (2012); © OpenStreetMap contributors.

N W E S

Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground low intensity

Ellis et al. (2012)

- Nusery ground high intensity
- Spawning ground high intensity
- Spawning ground low intensity

Common sole not covered in Marine Institute (2024) dataset.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-F
Common sole spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1137

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.COMMON.SOLE - EIAR.FIG.09.06

Size: A3

Scale: 1:1,200,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

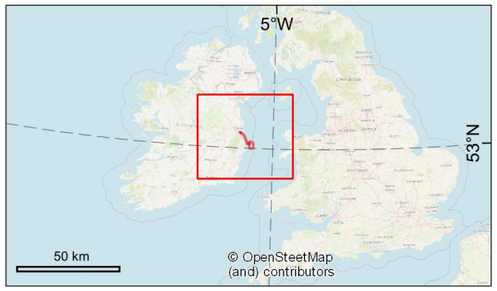
Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0
25
50
75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al* (2012), Copenhagen; © OpenStreetMap contributors.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground low intensity

European hake is not covered in Coull et al. (1998) dataset. Whilst included in Marine Institute (2024), the species is not represented at a scale relevant to the refined project area and is therefore not shown.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-G
European hake spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1138

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.EUROPEAN.HAKE - EIAR.FIG.09.07

Size: A3

Scale: 1:750,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Coull *et al.* (1998)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0
25
50
75 km

Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Spawning ground undetermined intensity

European sprat not covered in Marine Institute (2024) and Ellis et al. (2012) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al* (1998), Copenhagen; © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-H
European sprat spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1139

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.EUROPEAN.SPRAT - EIAR.FIG.09.08

Size: A3

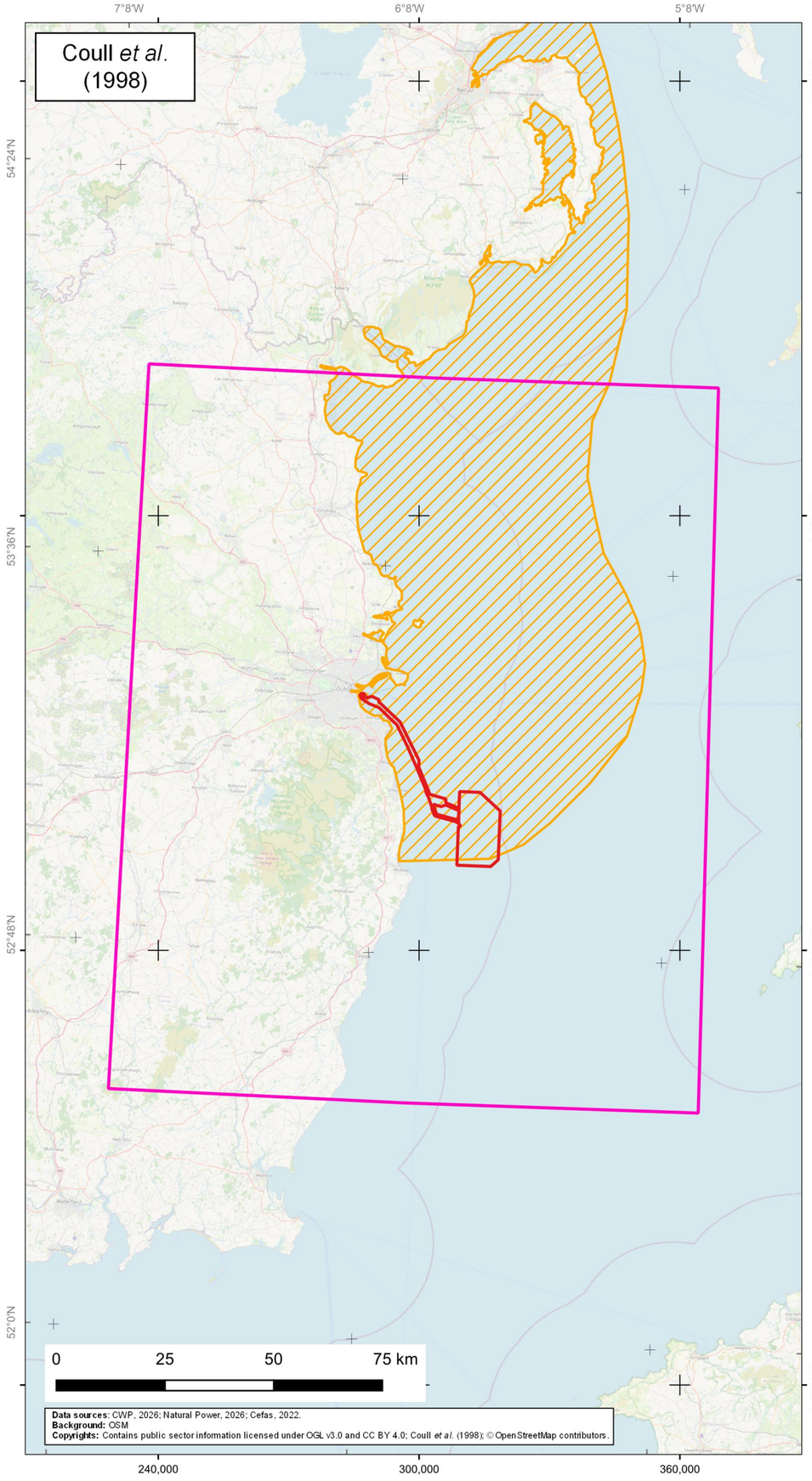
Scale: 1:750,000

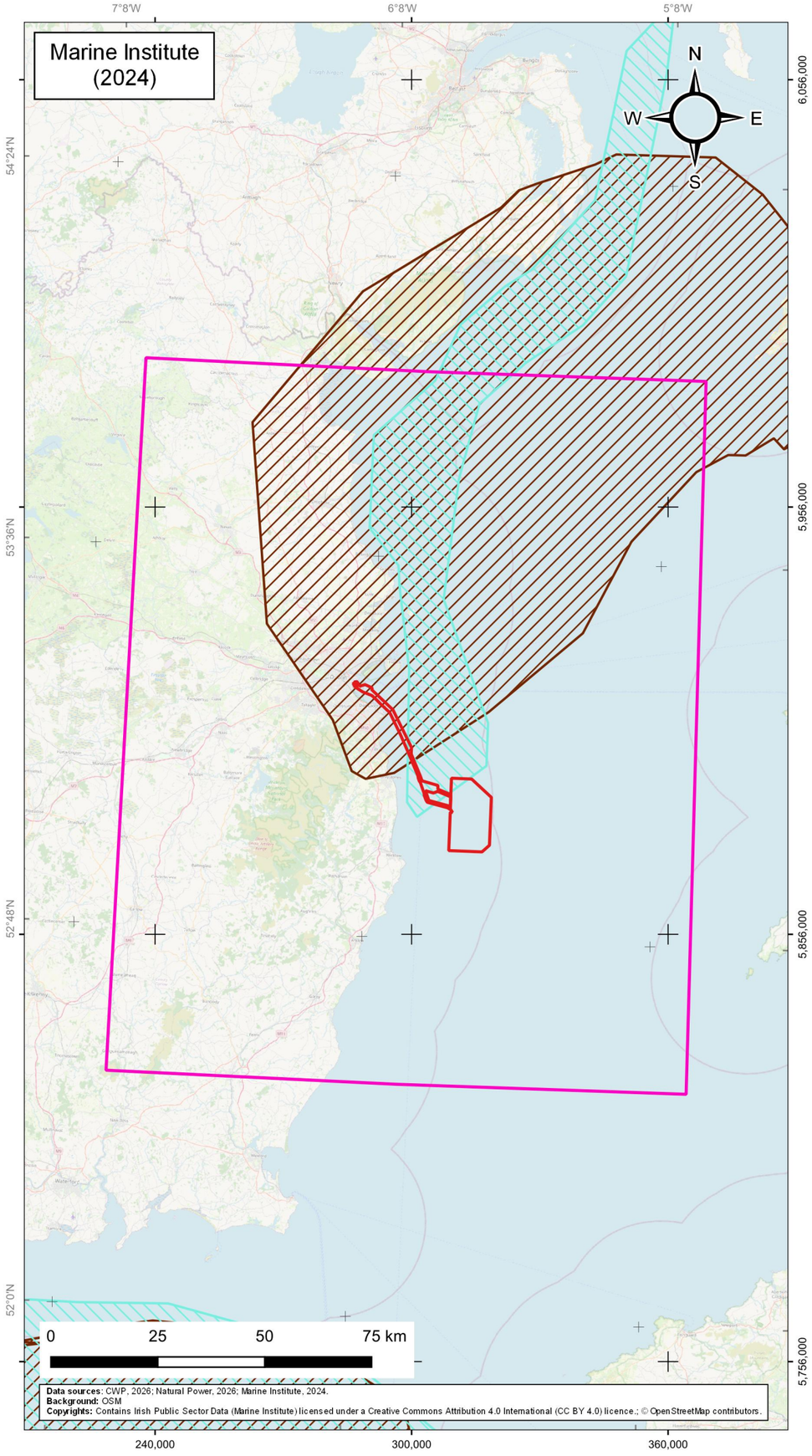
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Coull *et al.* (1998)

Marine Institute (2024)





Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity

Marine Institude (2024)

- Nursery ground
- Spawning ground

Haddock not covered in Ellis et al. (2012) dataset.

codling wind park	*Project:* Codling Wind Park	*Contractor:* natural power www.naturalpower.com

Figure 9-I
Haddock spawning and / or nursery habitats compared to the offshore development area

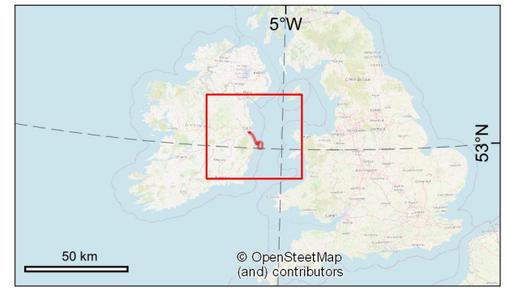
CWP doc. number: CWP-NPC-ENG-08-01-MAP-1140

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.HADDOCK - EIAR.FIG. 09.09	*Scale:* 1:1,200,000	EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Ellis *et al.* (2012)

Marine Institute (2024)



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Spawning ground low intensity

Marine Institude (2024)

- Nursery ground

Atlantic horse mackerel not covered in Coull et al. (1998) dataset.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.

codling wind park	Project: Codling Wind Park	Contractor: natural power www.naturalpower.com	

Figure 9-J
Atlantic horse mackerel spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1141

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.HORSE.MACKEREL - EIAR.FIG.09.10	A3	EPSG 25830
	Scale: 1:1,200,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Coull *et al.* (1998)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al* (1998), Copenhagen; © OpenStreetMap contributors.

Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground undetermined intensity

Lemon sole not covered in Marine Institute (2024) and Ellis et al. (2012) datasets.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-K
Lemon sole spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1142

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.LEMON.SOLE - EIAR. FIG.09.11

Size: A3

Scale: 1:750,000

CRS: EPSG 25830

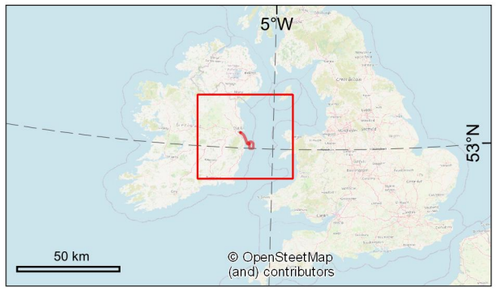
Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0 25 50 75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Spawning ground low intensity

Ling not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al* (2012), Copenhagen; © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-L
Ling spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1143

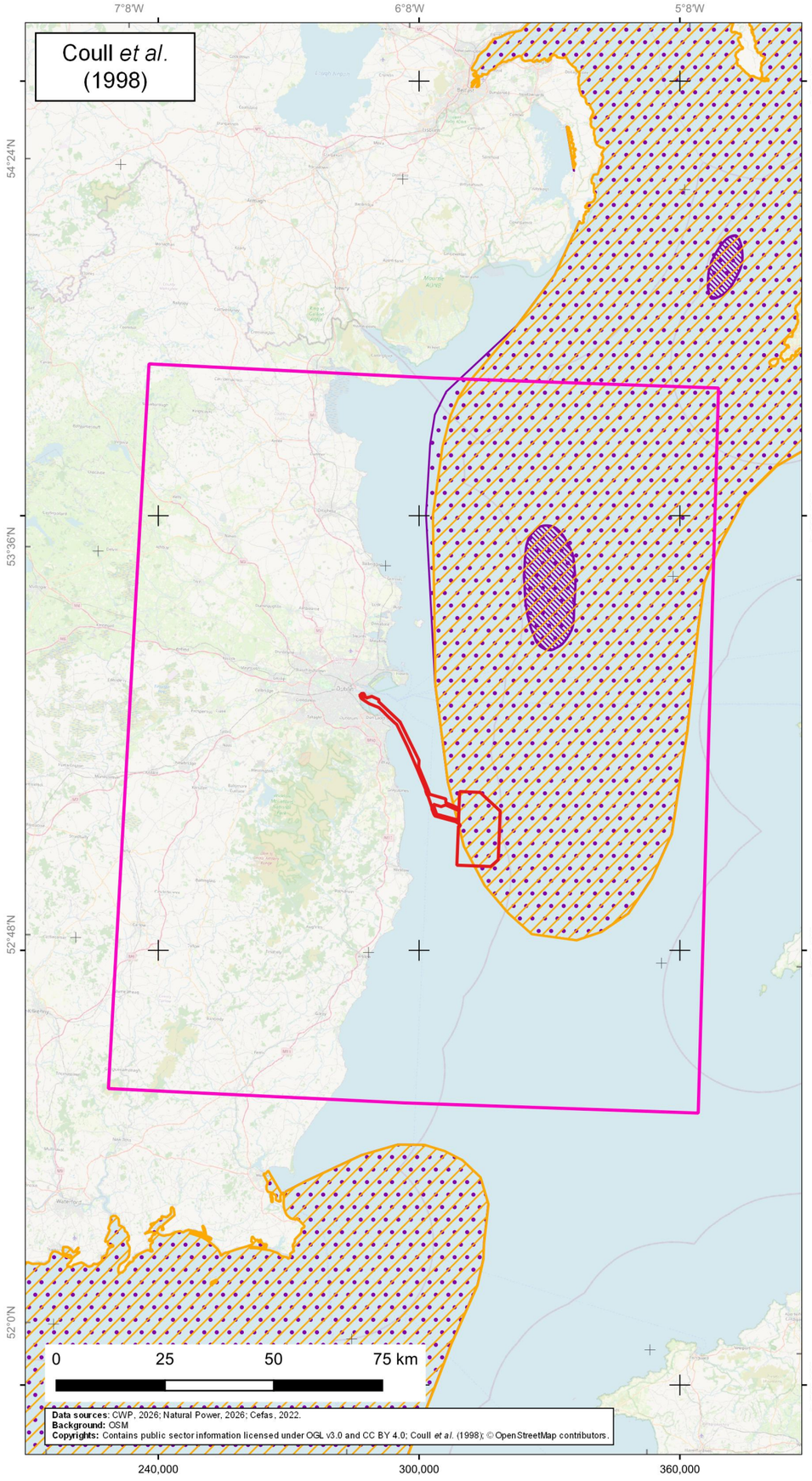
Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.LING - EIAR.FIG.09.12

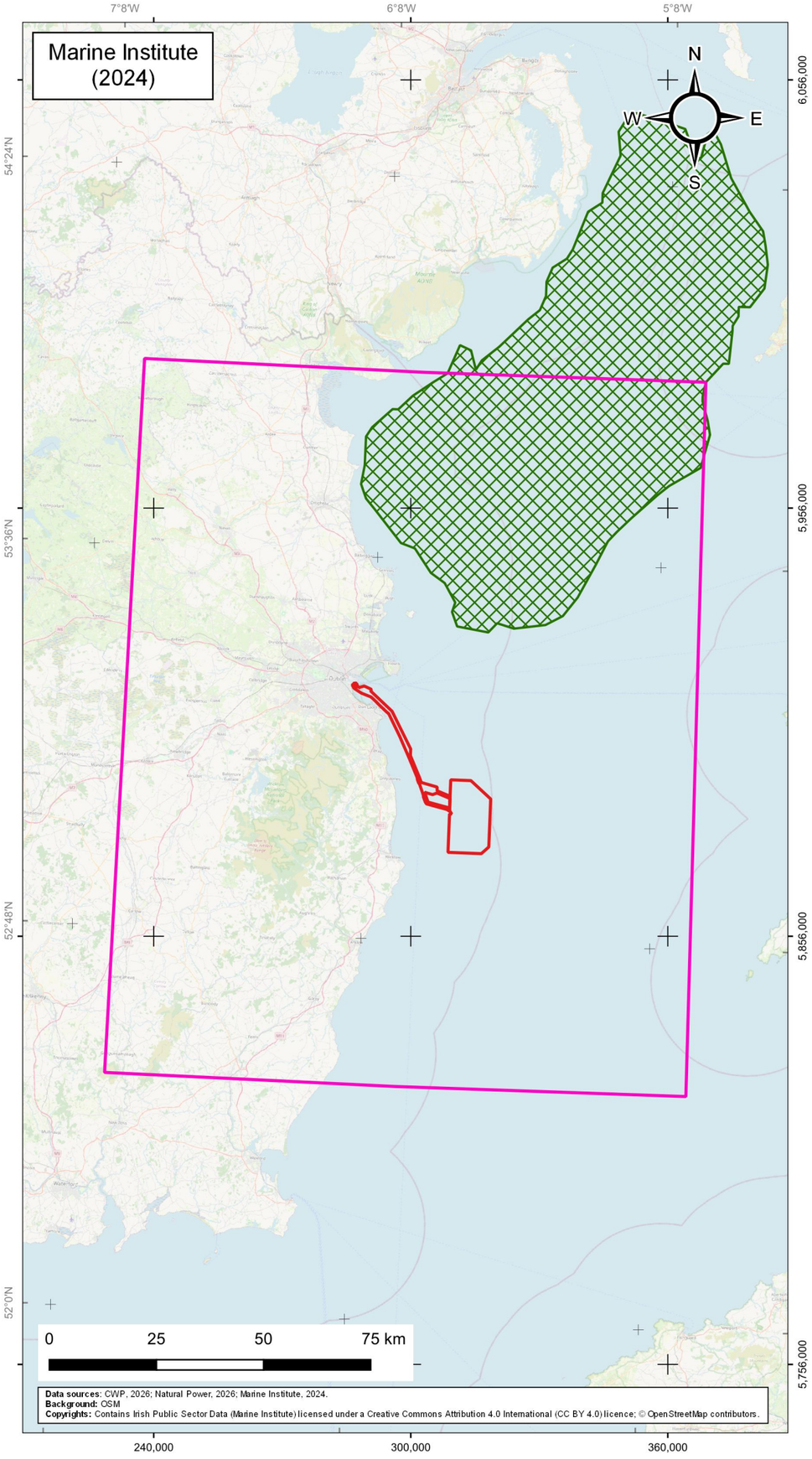
Size: A3

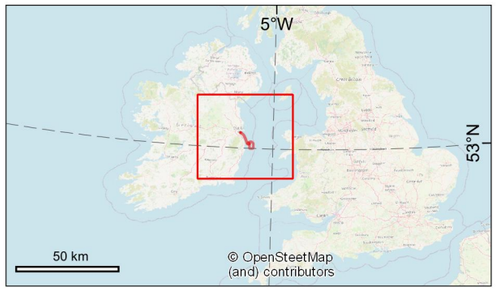
Scale: 1:750,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ







Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground undetermined intensity

Marine Institude (2024)

- Nursery and spawning ground

Norway lobsters (Nephrops) not covered in Ellis et al. (2012) dataset.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-M
Norway lobsters (Nephrops) spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1144

Internal descriptive code: IS - PAB - FSTESAs.LRN.SNG.NEPHROPS (NORWAY.LOBSTER) - EIAR.FIG.09.13

Size: A3

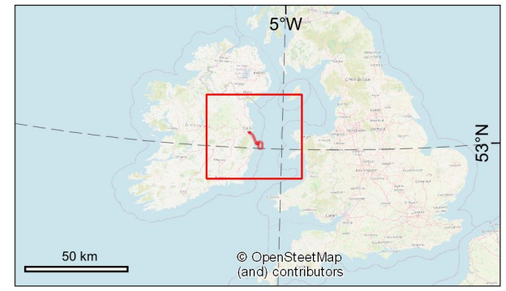
Scale: 1:1,200,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Coull *et al.* (1998)

Ellis *et al.* (2012)



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity
- Spawning ground undetermined intensity

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground high intensity
- Spawning ground low intensity

European plaice not covered in Marine Institute (2024) dataset.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-N
European plaice spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1145

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.EUROPEAN.PLAICE - EIAR.FIG.09.14

Size: A3

Scale: 1:1,200,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

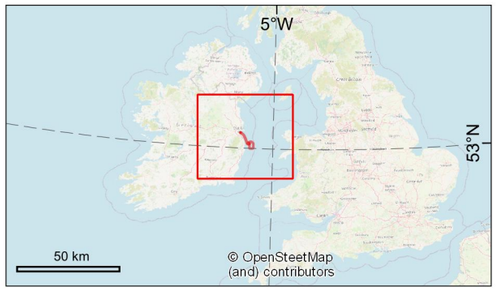
Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al* (2012), Copenhagen; © OpenStreetMap contributors.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground low intensity

Sandeel is not covered in Marine Institute (2024) dataset. Whilst included in Coull et al. 1998, the species is not represented at a scale relevant to the refined project area and is therefore not shown.

codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-O
Sandeel spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1146

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.SANDEEL - EIAR.FIG. 09.15

Size: A3

Scale: 1:750,000

CRS: EPSG 25830

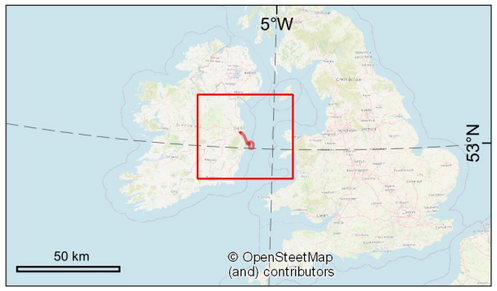
Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0
25
50
75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity

Spotted ray not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
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Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-P
Spotted ray spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1147

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.SPOTTED.RAY - EIAR.FIG.09.16	A3	EPSG 25830
	Scale: 1:750,000	

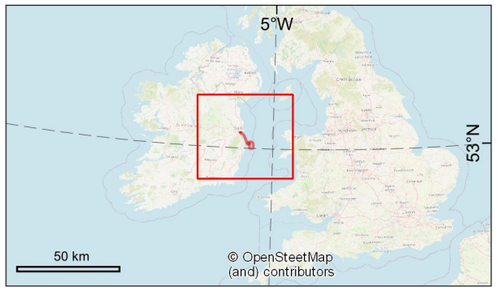
Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0 25 50 75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground high intensity

Spurdog not covered in Ellis et al. (2012) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-Q
Spurdog spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1148

Internal descriptive code: IS - PAB - FSTESAs.LRN..SNG.SPURDOG - EIAR.FIG. 09.17

Size: A3

Scale: 1:750,000

CRS: EPSG 25830

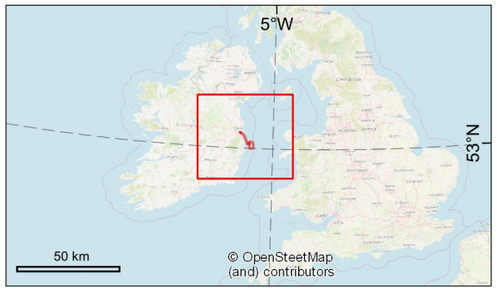
Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000

N
W
E
S

0 25 50 75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity

Thornback ray not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
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Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-R
Thornback ray spawning and / or nursery habitats compared to the offshore development area

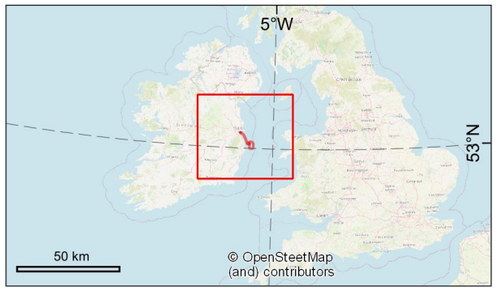
CWP doc. number: CWP-NPC-ENG-08-01-MAP-1149

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.THORNBACK.RAY - EIAR.FIG.09.18	A3	EPSG 25830
	Scale: 1:750,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	AK/EA	LJ

Ellis *et al.* (2012)

7°18'W
6°30'W
5°42'W
4°54'W
53°58'N
53°28'N
52°58'N
52°28'N
5,980,000
5,930,000
5,880,000
5,830,000
208,000
268,000
328,000
388,000
N
W
E
S
0
25
50
75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground low intensity

Tope not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al* (2012), Copenhagen; © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-S
Tope spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1150

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.TOPE - EIAR.FIG.09.19	*Scale:* 1:750,000	EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/15	AC	VR/EA	LJ

Coull *et al.* (1998)

Ellis *et al.* (2012)

Marine Institute (2024)

7°15'W 6°15'W 5°15'W

54°45'N 53°15'N 51°45'N

6,124,000 5,984,000 5,844,000 5,704,000

240,000 300,000 360,000

N W E S

Scale: 1:1,000,000
0 7.5 15 km

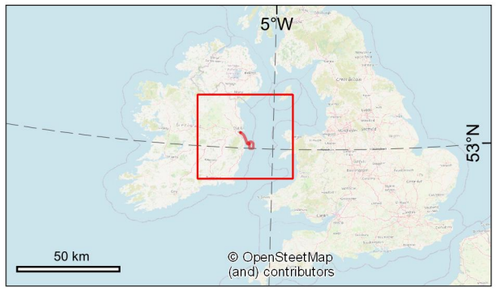
Scale: 1:1,100,000
0 7.5 15 km

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)
- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity

Ellis et al. (2012)
- Nursery ground high intensity
- Nursery ground low intensity
- Spawning ground low intensity

Marine Institute (2024)
- Nursery ground
- Spawning ground

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-T
Whiting spawning and / or nursery habitats compared to the offshore development area

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1151

Internal descriptive code:	*Size:*	*CRS:*
IS - PAB - FSTESAs.LRN..SNG.WHITING - EIAR.FIG. 09.20	A3	EPSG 25830
	Scale: 1:1,800,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/21	AC	AK/EA	LJ

9.6.4 Basking Shark

Section 9.6.4 remains unchanged.

9.6.5 Marine Turtles

Section 9.6.5 remains unchanged.

9.6.6 Species of Conservation Importance

Section 9.6.6 remains unchanged except for Table 9-17 which is replaced by Table 9-H below. This update adds the NMPF status into the table, and has been made in response to FIR Item 11c (see **FIR Response Document**).

Table 9-H Vulnerable species, or species of conservation importance which are considered to occur in the vicinity of the CWP offshore development area. *Only species with International Union for the Conservation of Nature (IUCN) designations categorised as threatened (i.e., 'vulnerable', 'endangered', and 'critically endangered' are listed here).

Species	Annex II Species (JNCC, 2022b)	Northern Ireland Priority Species (DAERA, 2022)	OSPAR Threatened/ Declining Species (OSPAR, 2022)	Ireland Red List of Cartilaginous Fish (Clarke *et al.*, 2016)	IUCN Red List* (IUCN, 2022)	Captured in ICES regional study area by NIGFS	Conservation status (NPWS, 2019)	NMPF
Twaite shad	X	X					Stable	X
Allis shad	X	X	X				Not provided	X
Atlantic salmon	X	X	X				Stable	X
Sea lamprey	X		X				Stable	X
River lamprey	X	X					Unknown	X
Freshwater pearl mussel	X				X		Deteriorating	X
Lesser sandeel (*Ammodytes marinus*)		X						
European eel		X	X		X			X

Species	Annex II Species (JNCC, 2022b)	Northern Ireland Priority Species (DAERA, 2022)	OSPAR Threatened/ Declining Species (OSPAR, 2022)	Ireland Red List of Cartilaginous Fish (Clarke *et al*., 2016)	IUCN Red List* (IUCN, 2022)	Captured in ICES regional study area by NIGFS	Conservation status (NPWS, 2019)	NMPF
Atlantic herring		X				X		
Common skate		X	X	X	X			X
Atlantic cod		X	X		X			X
Tope		X		X	X			X
Monkfish		X						
Whiting		X				X		
Hake		X						
Ling		X						
Plaice		X				X		
Seatrout		X						
Mackerel		X				X		
Sole		X						X
Spiny dogfish		X	X	X	X			X
Angel shark (*Squatina squatina*)		X	X	X	X			X

Species	Annex II Species (JNCC, 2022b)	Northern Ireland Priority Species (DAERA, 2022)	OSPAR Threatened/ Declining Species (OSPAR, 2022)	Ireland Red List of Cartilaginous Fish (Clarke *et al*., 2016)	IUCN Red List* (IUCN, 2022)	Captured in ICES regional study area by NIGFS	Conservation status (NPWS, 2019)	NMPF
Horse mackerel		X				X		
Spotted ray			X	X		X		X
Thornback ray			X	X				X
Undulate ray (*Raja undulata*)		X		X	X			X
Cuckoo ray (*Leucoraja naevus*)				X				X
Electric ray (*Tetronarce nobiliana*)				X				
Blonde ray				X				X
Bull huss (*Scyliorhinus stellaris*)				X	X			X
Small-eyed ray (*Raja microocellata*)				X				X

Species	Annex II Species (JNCC, 2022b)	Northern Ireland Priority Species (DAERA, 2022)	OSPAR Threatened/ Declining Species (OSPAR, 2022)	Ireland Red List of Cartilaginous Fish (Clarke *et al.*, 2016)	IUCN Red List* (IUCN, 2022)	Captured in ICES regional study area by NIGFS	Conservation status (NPWS, 2019)	NMPF
Starry smooth hound				X	X	X		X
Small-spotted catshark				X		X		

9.6.7 Identification of Receptors

Section 9.6.7 remains unchanged except for Table 9-18 which is replaced by Table 9-I below. This update adds the NMPF status into the table and has been made in response to FIR Item 11c (see **FIR Response Document**).

Table 9-I Fish, shellfish and turtle Valued Ecological Receptors (VERS)

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
Shellfish									
Razor / knife clams	*Solenidae sp.*	X							
Norway lobster	*Nephrops norvegicus*	X	X	X					
Sword razor shell	*Ensis sp.*	X							
Whelk	*Buccinum undatum*	X							
Great Atlantic scallop	*Pecten maximus*	X							
Edible crab	*Cancer pagurus*	X							

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
European lobster	*Homarus Gammarus*	X							
Elasmobranchs									
Blonde ray	*Raja brachyura*	X				X (Status: Near Threatened; Population trend: Decreasing)		X	X
Small-spotted catshark	*Scyliorhinus canicula*	X				X (Status: Least Concern, Population trend: Stable)			
Cuckoo ray	*Raja naevus*	X				X (Status: least concern; Population trend: Unknown)		X	X
Thornback ray	*Raja clavata*	X		X		X (Status: Near Threatened; Population trend: Decreasing)	X (Threatened)	X	X
Spotted ray	*Raja montagui*			X		X (Status: Least Concern, Population trend: Stable)	X (Threatened)	X	X

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
Spurdog*	*Squalus sp.*			X	N/A	N/A	N/A	N/A	X
Spiny dogfish*	*Squalus acanthias*					X (Status: Vulnerable; Population trend: Decreasing)	X (Threatened)	X	X
Tope	*Galeorhinus galeus*			X		X (Status: Critically Endangered; Population Trend: Decreasing)		X	X
Common skate	*Dipturus batis*					X (Status: Critically Endangered; Population Trend: Decreasing)	X (Threatened)	X	X
Angel shark	*Squatina squatina*					X (Status: Critically Endangered; Population Trend: Decreasing)	X (Threatened)	X	X
Undulate ray	*Raja undulata*					X (Status: Endangered; Population Trend: Decreasing)		X	X

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
Basking shark	*Cetorhinus maximus*					X (Status: Endangered; Population Trend: Decreasing)	X	X	X
Marine Fish									
Haddock	*Melanogrammus aeglefinus*	X	X	X					
Whiting	*Merlangius merlangus*		X	X				X	
European plaice	*Pleuronectes platessa*	X	X	X				X	
Atlantic mackerel	*Scomber scombrus*			X				X	

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
Atlantic horse mackerel	*Trachurus trachurus*			X				X	
Lemon sole	*Microstomus kitt*		X	X					
Common sole	*Solea solea*		X					X	X
Sandeel	*Ammodytes sp.*			X				X	
Atlantic herring	*Clupea harengus*			X				X	
European sprat	*Sprattus sprattus*		X						
Atlantic cod	*Gadus morhua*	X	X	X		X (Status: Vulnerable; Population trend: Unspecified)	X	X	X
European smelt	*Osmerus eperlanus*					X (Status: Least concern; Population Trend: Unknown)		X	

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
Anglerfish	*Lophius piscatorius*			X		X (Status: Least concern; Population Trend: Unknown)			
European hake	*Merluccius merluccius*					X (Status: Least concern; Population Trend: Unknown)		X	
Ling	*Molva molva*		X					X	
Migratory Fish									
Twaite shad	*Alosa fallax*				X			X	X
Allis shad	*Alosa alosa*				X		X	X	X
Atlantic salmon**	*Salmo salar*				X		X	X	X
Sea lamprey	*Petromyzon marinus*				X		X	X	X
River lamprey	*Lampetra fluviatilis*				X			X	X

Receptor (species)	Latin Name	Species of Local Commercial Importance	Spawning and / or nursery grounds in the ICES regional study area		Species of Conservation Importance				
			Spawning grounds	Nursery grounds	Annex II Species	Ireland / IUCN Red List Species	OSPAR threatened / declining	Northern Ireland Priority Species	NMPF
European eel	*Anguilla anguilla*					X (Status: Critically Endangered; Population Trend: Decreasing)	X	X	X
Seatrout**	*Salmo trutta*							X	
Leatherback turtle	*Dermochelys coriacea*					X (Status: Endangered; Population Trend: Decreasing)	X	X	X

*Note: Spawning and / or nursery grounds data are only available to a species level for spurdog (*Squalus sp.*); however, there is more specific information regarding Species of Conservation Importance for the identified sub-species spiney dogfish (*Squalus acanthias*); hence, the species and sub-species are both included in the table.

**It is recognized that these two species support Fresh Water Pearl Mussels (FWPM) as host species. Should significant effects on these receptors be identified, then effects on FWPM will be considered. If no significant effects are identified, then it is considered that there will be no significant effect on FWPM as there are no other direct or indirect impacts on FWPM that may arise from the CWP Offshore Development.

9.6.8 Climate change and natural trends

Section 9.6.8 remains unchanged.

9.6.9 Predicted future baseline

Section 9.6.9 remains unchanged.

9.7 Scope of the assessment

Section 9.7 remains unchanged.

9.8 Assessment parameters

Section 9.8 remains unchanged.

9.9 Primary mitigation measures

Section 9.9 remains unchanged except for Table 9-22 which is replaced by Table 9-J below. This update has been made in response to the Ecological Vessel Management Plan (FIR Item 7u) and the Marine Mammal Mitigation Protocol (FIR Items 10a,10c and 10t).

Table 9-J Primary mitigation measures

Project element	Description
All offshore infrastructure (Construction)	• Bedform clearance operations will be undertaken only where necessary, thereby minimising sediment disturbance and alteration to seabed morphology. •
Offshore cables (Operation)	Cables will be suitably buried or protected by other means where burial is not practicable. This will reduce the potential for effects relating to the presence of Electromagnetic Fields (EMF).
All offshore infrastructure (Construction and Operation)	A **Construction Environmental Management Plan** (CEMP) has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of: • The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e. ecological clerk of works) and contractor requirements (i.e. method statements for specific construction activities);

Project element	Description
	• Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project; • Measures proposed to ensure effective handling of chemicals, oils and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
All offshore infrastructure (Construction, Operation and Decommissioning)	An **Ecological Vessel Management Plan** (EVMP) has been prepared to determine vessel routing to and from construction sites and ports and to include a code of conduct for vessel operators. The EVMP includes details of: • The types and specifications of vessels for the CWP Project; • How vessels will be monitored and coordinated; • Vessel speeds transiting inside or within 2km of The Murrough SPA from November to March, inclusive; and • The use of defined transit routes to site from key construction and operation ports, where practicable to do so. The EVMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
All offshore infrastructure (Construction) (relevant measures in the MMMP will also apply to marine megafauna)	A **Marine Mammal Mitigation Protocol** (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the construction of the CWP Project. The MMMP is based on DAHG (2014) guidance. The MMMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction. **Primary mitigation measures in the MMMP for geophysical surveys (Multibeam, single beam, side-scan sonar & sub-bottom profiler surveys)**: • Pre-survey visual watch of 500 m monitored zone radius by an marine mammal observer (MMO) for 30 min. • Ramp-up where possible

Project element	Description
	• Activities to commence only when effective pre-survey visual monitoring is possible • Pre-survey monitoring and a subsequent ramp-up procedure (where possible) to be used after a break in sound output of over 30 min **Primary mitigation measures in the MMMP for unexploded ordnance (UXO)**: • Preference for low order clearance over high order clearance where possible • Only using minimum quantity of explosive as donor charge • Activities to occur in daylight only • Activities to commence only when effective pre-clearance visual monitoring is possible • Pre-detonation MMO watch of 1 km radius monitored zone for 30 min • To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required. • Pre-clearance acoustic deterrent device (ADD) use if permanent threshold shift (PTS) impact range exceeds 1 km mitigation zone **Primary mitigation measures in the MMMP for piling**: • To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. • Pre-piling visual watch of 1 km radius monitored zone for 30 min by an MMO (supplemented by PAM) • Pile driving to commence with a 20 minute soft start at 10% hammer energy and 10 blows/min rate, followed by a ramp-up • Pre-piling monitoring and a subsequent soft start (where possible) to be used after a break in piling of over 30 min • Activities to commence only when effective pre-piling visual monitoring is possible • Additionally, piling works along the River Liffey channel will not be permitted between March and May to avoid noise impact during the salmon smolt run
All offshore infrastructure (Decommissioning)	A **Rehabilitation Schedule** is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.

Project element	Description
All offshore infrastructure (Decommissioning)	A **Marine Mammal Mitigation Protocol** (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the decommissioning of the CWP Project. The MMMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of decommissioning. As a minimum, it is expected that an MMO watch and a passive acoustic monitoring (PAM) watch (to supplement the MMO) will likely be required for any underwater noise generating activity that has predicted the potential for auditory injury to marine mammals.

9.10 Impact assessment

Section 9.10 (upfront text) remains unchanged.

Section 9.10 remains unchanged except for updates to Section 9.10.1 (Impacts 1-4) and Section 9.10.2 (Impacts 1-5) below.

9.10.1 Construction phase

Impact 1: Temporary seabed habitat disturbance

Other than paragraphs 124 to 126, Impact 1 is replaced in its entirety by paragraphs 24 to 65 below. Tables 9-23 to Table 9-25 are replaced with Table 9-K to Table 9-Q. This revision has been made in response to FIR Item 11c and 11e (see **FIR Response Document**).

Receptor sensitivity

Mobile fish with spawning and nursery areas that overlap the offshore development area

24. The following description is relevant only for those works within the offshore development area i.e. for works within the Planning Application Boundary. As such reference is made to the offshore development area when identifying those receptors that are present, but the assessment is based on the distribution of the receptor within the ICES regional study area.

25. Mobile fish with spawning and nursery areas that overlap the offshore development area are listed below in **Table 9-K**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information from **Table 9-I**. Across the receptor group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing the area of disturbance, with the exception being sandeel, a less mobile species and therefore only a medium capacity (adaptability) to avoid the impact. The tolerance of the majority of species within this group is considered to be high for the impact of temporary seabed habitat disturbance. This is because most species are highly mobile and can move away from the area of impact, and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. For some species with low mobility or high habitat fidelity,

tolerance is considered to be low as they cannot easily relocate to another area and as such are more susceptible to adverse effects of temporary seabed habitat disturbance.

26. Several species in the area, including elasmobranchs and sandeel, are considered to have increased reliance on benthic habitats during various life stages e.g., spawning in sandeels. However, the majority of fish species, even those that are considered benthic (e.g. flatfishes), or benthopelagic (e.g. cod) are highly mobile with the ability to easily avoid disturbance from construction activities, and broadcast large numbers of pelagic eggs which are not sensitive to habitat disturbance. More information is provided in the proceeding paragraphs for fish species with greater reliance on benthic habitats.

27. Despite the offshore development area being located within an area with mapped (Ellis *et al*., 2012) sandeel spawning habitat (**Figure 9-O**), the benthic characterisation survey (**Chapter 8 Subtidal and Intertidal Ecology**) has shown the majority of the offshore development area does not have suitable sediment for sandeel (i.e., clean sands), with the array area comprising circalittoral and infralittoral coarse sediment with a small area of mixed sediment. Similarly the OECC area comprises the same habitats offshore (i.e. coarse sediment), quickly graduating to sandy mud / muddy sand and sand towards landfall (**Chapter 8 Subtidal and Intertidal Ecology**). Sandeel have low adaptability and tolerance based on their limited motility and specific habitat requirements. Recoverability is medium based on a precautionary approach to recovery (NatureScot, 2025) noting they are highly fecund (Rowley, 2008) resulting in an overall high sensitivity.

28. Mapped anglerfish nursery grounds (Ellis *et al*., 2012) overlap the offshore development area (**Figure 9-B**). They are long lived, highly mobile species predominantly found on sandy or muddy bottoms, but can also be present on shell, gravel, and occasionally rocky areas (Reeve, 2008). They are opportunistic with a low degree of prey sensitivity (Nedreass, 2020) and are therefore considered to have a high adaptability and tolerance for change. Mature females are typically found in more inshore, shallower waters (Nedreass, 2020) resulting in an overall very low sensitivity.

29. Some elasmobranch species (including spotted ray, thornback ray and tope shark) lay demersal eggs and have nursery grounds which overlap the offshore development area (Ellis *et al*., 2012) (**Figure 9-P, Figure 9-R** and **Figure 9-S**). These species are assigned a high value as they are categorised as NMPF species. The species are common around the UK and Ireland, found at a range of depths to below 100 m (spotted ray), 10 – 60 m (thornback ray) and up to 500 m (tope shark) (Gibson-Hall, 2018; Barnes, 2008; Snowden, 2008). Spotted ray show preference for soft sandy substratum (Gibson-Hall, 2018), thornback ray are commonly found on mud and sand, but less frequently recorded on coarser sediments (Snowden, 2008) with juveniles favouring rocky areas providing shelter. Given these specific habitat requirements and the relatively low number of eggs produced, rays are considered to have low adaptability and medium tolerance and recoverability. Tope shark are highly mobile and show no clear sediment reliance or preference and therefore considered highly adaptive with medium recoverability. Rays and tope are therefore assigned overall sensitivities of high and medium, respectively.

30. As per **Table 9-K**, sensitivity for this species group ranges from very low to high.

Table 9-K Mobile fish with overlapping spawning / nursery habitat sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Anglerfish	High	High	High	Low	Very Low
Haddock	High	High	High	Low	Very Low
Whiting	High	High	High	Low	Very Low

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
European plaice	High	High	High	Low	Very Low
Atlantic mackerel	High	High	High	Low	Very Low
Atlantic horse mackerel	High	High	High	Low	Very Low
Lemon sole	High	High	High	Low	Very Low
Common sole	High	High	High	Low	Very Low
European sprat	High	High	High	Low	Very Low
Sandeel	Low	Low	Medium	Low	High
Ling	High	High	High	Low	Very Low
Atlantic cod	High	High	High	Medium	Low
Thornback ray	Low	Medium	Medium	High	High
Spotted ray	Low	Medium	Medium	High	High
Tope	High	High	Medium	High	Medium

Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development area

31. Mobile fish and turtle species without spawning and nursery areas overlapping the offshore development area are listed below in **Table 9-L**. Sensitivity has been determined based upon **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing the area of temporary seabed habitat disturbance. The tolerance of the species within this group is considered to be medium to high for the impact of temporary seabed habitat disturbance. This is because all species are highly mobile and can move away from the area of impact and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. Recoverability is high for the majority of receptors in this group based on fecundity should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. For basking shark and marine turtles, recovery is low due to their greater age at maturity and lower fecundity (Wilson *et al.*, 2020). Value ranges from low to high according to conservation status.

32. Several species in the area without mapped spawning or nursery grounds (including some elasmobranchs), may have increased reliance on benthic habitats during various life stages e.g., spawning. However, the majority of fish species, even those that are considered benthic or benthopelagic (e.g. hake) are highly mobile with the ability to easily avoid disturbance from construction activities and broadcast large numbers of pelagic eggs which are not sensitive to habitat disturbance. More information is provided in the proceeding paragraphs for fish species with greater reliance on benthic habitats.

33. Elasmobranch species with no overlapping mapped spawning grounds in the area are oviparous laying demersal eggs (including cuckoo ray or the blonde ray, as listed in **Table 9-L**). Others are viviparous, giving birth to live young (including spurdog). Although there are no known, mapped areas of key

habitat overlap, the potential for interaction lowers their tolerance and recoverability if impacted by temporary habitat disturbance, and sensitivity ranges from low to medium.

34. As per **Table 9-L**, sensitivity for this species group ranges from very low to medium.

Table 9-L Mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development area sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Small-spotted catshark	High	High	Medium	Low	Low
Cuckoo ray	High	High	Medium	High	Medium
Blonde ray	High	High	Medium	High	Medium
Seatrout	High	High	High	Low	Very Low
Atlantic herring	High	High	High	Low	Very Low
European smelt	High	High	High	Low	Very Low
Undulate ray	High	Medium	Medium	High	Medium
Twaite shad	High	High	High	High	Low
Allis shad	High	High	High	High	Low
Atlantic salmon	High	High	High	High	Low
Sea lamprey	High	High	High	High	Low
River lamprey	High	High	High	High	Low
European eel	High	High	High	High	Low
Common skate	High	Medium	Medium	High	Medium
Angel shark	High	High	High	High	Low
Basking shark	High	High	Low	High	Medium
Leatherback turtle	High	High	Low	High	Medium
European hake	High	High	High	Low	Very Low
Spurdog	High	High	High	High	Low

Shellfish

35. Shellfish species are listed below in **Table 9-M**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**.

Across the species group, all are non-mobile or low mobility species and therefore have a low to very low capacity (adaptability) to avoid the impact by fleeing the disturbed area. The tolerance of the species within this group is considered to be low for the impact of temporary seabed habitat disturbance. This is because the species group are not mobile and cannot move away from the area of impact and as such, they are more susceptible to adverse effects of temporary seabed habitat disturbance such as physical harm and damage. Recoverability is high based on fecundity should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value is low according to conservation status.

36. As per **Table 9-M**, sensitivity for shellfish is medium for the group.

Table 9-M Shellfish sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Razor / knife clams	Very low	Low	High	Low	Medium
Norway lobster	Very low	Low	High	Low	Medium
Sword razor shell	Very low	Low	High	Low	Medium
Whelk	Very low	Low	High	Low	Medium
Great Atlantic scallop	Very low	Low	High	Low	Medium
Edible crab	Low	Low	High	Low	Medium
European lobster	Low	Low	High	Low	Medium

Magnitude of impact

Mobile fish with spawning and nursery areas that overlap the offshore development area

37. Mobile fish with spawning and nursery areas that overlap the offshore development area are at risk of having the habitats within those spawning and nursery grounds impacted by temporary seabed habitat disturbance from the construction of the offshore infrastructure.

38. The effect on receptors will be a loss of available spawning area or harm or loss of low mobility individuals caused by physical disturbance to the seabed, or through behavioural responses leading to avoidance of the area thereby reducing the overall available area within which spawning or nursery activities may take place.

39. Based upon the Project Design and LOD, the percentage overlap of infrastructure within the array site has been calculated based upon the percentage of overlap of any spawning or nursery ground with the array site. Within the OECC, the area of effect assumes the maximum extent of those activities with the largest footprint, such as boulder clearance, occurring within the overlapping area of any spawning or nursery grounds.

40. The greatest percentage of spawning or nursery area affected (based upon the available spawning and nursery areas within the ICES regional study area is 1.05 % and 0.24 % for cod spawning and cod and European plaice nursery habitats, respectively (**Table 9-N**).

41. Of the species with spawning or nursery areas that overlap the offshore development area, substrate spawners are considered at the greatest risk from temporary seabed habitat disturbance, as this may result in direct disturbance to a key life stage for the species. The duration of this impact is short (no

more than 3 years in duration), and disturbance events will not persist for this entire period, instead acting as discrete events throughout the construction phase. It is recognised that some areas may see repeated disturbance within the construction period, though these will be minimal.

42. Substrate spawning species with overlapping spawning areas are:

- Thornback ray (**Figure 9-R**);
- Spotted ray (**Figure 9-P**); and
- Sandeel (**Figure 9-O**).

43. Non-substrate spawners with overlapping spawning or nursery grounds are:

- Norway lobster (**Figure 9-M**);
- Tope (**Figure 9-S**);
- Haddock (**Figure 9-I**);
- Whiting (**Figure 9-T**);
- European plaice (**Figure 9-N**);
- Atlantic mackerel (**Figure 9-E**);
- Atlantic horse mackerel (**Figure 9-J**);
- Lemon sole (**Figure 9-K**);
- Common sole (**Figure 9-F**);
- European sprat (**Figure 9-H**);
- Atlantic cod (**Figure 9-C**);
- Anglerfish (**Figure 9-B**); and
- Ling (**Figure 9-L**).

44. The greatest percentage of a substrate spawning species' spawning area affected (based upon the available spawning and nursery areas within the ICES regional study area) is < 0.25 % for all species (**Table 9-N**).

45. Reductions in spawning or nursery habitat at this scale for both substrate and water column spawning species is considered negligible in terms of the species' ability to maintain functional processes. No effect on populations or cohort size is predicted to arise as a result of temporary seabed habitat disturbance during construction on species with spawning or nursery areas overlapping the offshore development area.

Table 9-N Temporary habitat disturbance based on infrastructure within the offshore development area (% overlap) compared to mapped spawning and nursery grounds in the ICES regional study area when considering PD and representative scenario parameters

	Spawning grounds						Nursery grounds			
Receptor (species)	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998) - Lower Intensity**	**Coull *et al.* (1998- Higher Intensity**	**Coull *et al.* (1998) - Undetermined Intensity**	**Marine Institute (2024)**	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998)**	**Marine Institute (2024)**
Norway lobster					0.17 %				0.17 %	
Thornback ray							0.22 %			
Spotted ray							0.22 %			
Spurdog	No overlap with the CWP offshore development area									
Tope							0.16 %			
Haddock						0.44 %			0. 21%	0.11 %
Whiting	0.14 %		0.28 %	0.28 %		0.15 %	0.2 %	0.18 %	0.08 %	
European plaice	0.17 %	0.23%	0.41 %				0.24 %			
Atlantic mackerel	0.14 %									0.09 %
Atlantic horse mackerel										0.09 %
Lemon sole					0.11 %				0.11 %	

	Spawning grounds						Nursery grounds			
Receptor (species)	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998) - Lower Intensity**	**Coull *et al.* (1998- Higher Intensity**	**Coull *et al.* (1998) - Undetermined Intensity**	**Marine Institute (2024)**	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998)**	**Marine Institute (2024)**
Common sole	0.14 %		0.52 %							
Sandeel	0.14 %						0.23 %			
Atlantic herring	No overlap with the CWP offshore development area									
European sprat					0.001 %					
Atlantic cod	0.17 %		0.27 %	1.05 %		0.214 %		0.24 %	0.17 %	0.15 %
Angler fish							0.09 %			
European hake	No overlap with the CWP offshore development area									
Ling	0.14 %									

Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development area

46. The effect on receptors will be a temporary loss of available habitat area, caused by physical disturbance to the seabed, or through behavioural responses leading to avoidance of the area thereby reducing the overall available habitat for activities such as foraging.

47. Mobile fish and turtles may use the offshore development area for a wide range of biological functions, from migration to feeding for example. Temporary seabed habitat disturbance may reduce the available area for foraging or other life history requirements; however this represents a short-term impact that affects a negligible proportion of the natural range of all the species that may be present in this area. Extensive areas of comparable habitat are also available outside the affected area.

Shellfish

48. For temporary seabed habitat disturbance, the effect on receptors will be a loss of suitable habitat, physical injury or mortality, or reduced fitness through increased energetic requirements, such as re-establishment of burrows. Shellfish species are typically less mobile than fish receptors and may burrow or live within the sediment. As such, they can be more susceptible to direct effects arising from temporary seabed habitat disturbance.

49. The duration of this impact is short (no more than three years in duration), and disturbance events will not persist for this entire period, instead acting as discrete events throughout the construction phase. It is recognised that some areas may see repeated disturbance within the construction period, though these will be minimal.

50. Overall, the effects of temporary habitat disturbance may affect up to c. 4.4 % of the available habitats that may be utilised by shellfish within the offshore development area, and a negligible proportion of the available habitats within the wider local and ICES regional study areas. *Nephrops norvegicus* has overlapping spawning and nursery grounds (as per Coull *et al*. (1998)), and based upon the overlap of potential activities, the area of Nephrops habitat affected is 0.02 %. However, most of the habitat in the offshore development area is not suitable for Nephrops as it is coarse sediments and sands, and there is no evidence of Nephrops fishing in the array site (as per **Chapter 12 Commercial Fisheries**). Nephrops prefer muddy sediments which are not present in the array site or along much of the OECC, therefore it is expected that negligible levels of suitable habitat for Nephrops will be impacted.

Summary of magnitude of impact

51. Across all receptor groups assessed, the magnitude of impact arising from temporary seabed habitat disturbance during construction has been evaluated.

52. The assessment considers the spatial extent of disturbance, the short-term and intermittent nature of construction activities, the limited proportion of spawning, nursery or foraging habitat affected and the availability of extensive comparable habitat within the ICES regional study area. Taking a

precautionary approach and applying the highest magnitude identified across all receptor groups, the overall magnitude of impact of temporary seabed habitat disturbance is considered to be **negligible.**

Significance of effect

53. Significance has been determined by applying the impact assessment matrix presented in **Section 9.4.3**, which considers receptor sensitivity in combination with the assessed magnitude of impact.

Mobile fish with spawning and nursery areas that overlap the offshore development area

54. The significance of effect has been summarised by each receptor in **Table 9-O**. The assessment considers the receptor sensitivity and the likely magnitude of the potential impact to provide a significance conclusion which aligns with the matrix approach presented in **Section 9.4.3**.

Table 9-O Determination of Significance for mobile fish with spawning and nursery areas that overlap the offshore development area based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Anglerfish	Very Low	Negligible	**Imperceptible** (not significant)
Haddock	Very Low	Negligible	**Imperceptible** (not significant)
Whiting	Very Low	Negligible	**Imperceptible** (not significant)
European plaice	Very Low	Negligible	**Imperceptible** (not significant)
Atlantic mackerel	Very Low	Negligible	**Imperceptible** (not significant)
Atlantic horse mackerel	Very Low	Negligible	**Imperceptible** (not significant)
Lemon sole	Very Low	Negligible	**Imperceptible** (not significant)
Common sole	Very Low	Negligible	**Imperceptible** (not significant)
European sprat	Very Low	Negligible	**Imperceptible** (not significant)
Sandeel	High	Negligible	**Slight** (not significant)
Ling	Very Low	Negligible	**Imperceptible** (not significant)
Atlantic cod	Low	Negligible	**Not significant**
Thornback ray	High	Negligible	**Slight** (not significant)
Spotted ray	High	Negligible	**Slight** (not significant)
Tope	Medium	Negligible	**Slight / Not significant** (not significant)

55. In summary, the 'mobile fish with spawning and nursery areas that overlap the offshore development area' group is defined as having medium sensitivity overall (sensitivity ranges between very low to high for individual species of the group). The magnitude of impact is predicted to be negligible. This results in a slight / not significant assessment outcome, which is not significant. Therefore, the impact

of temporary seabed habitat disturbance from construction is considered to be **not significant** for mobile fish species with overlapping spawning or nursery habitat.

56. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

57. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development area

58. The significance of effect has been summarised by each receptor in **Table 9-P.**

Table 9-P Determination of Significance for mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development area based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Small-spotted catshark	Low	Negligible	**Not significant**
Cuckoo ray	Medium	Negligible	**Slight / Not significant** (not significant)
Blonde ray	Medium	Negligible	**Slight / Not significant** (not significant)
Seatrout	Very Low	Negligible	**Imperceptible** (not significant)
Atlantic herring	Very Low	Negligible	**Imperceptible** (not significant)
European smelt	Very Low	Negligible	**Imperceptible** (not significant)
Undulate ray	Medium	Negligible	**Slight / Not significant** (not significant)
Twaite shad	Low	Negligible	**Not significant**
Allis shad	Low	Negligible	**Not significant**
Atlantic salmon	Low	Negligible	**Not significant**
Sea lamprey	Low	Negligible	**Not significant**
River lamprey	Low	Negligible	**Not significant**
European eel	Low	Negligible	**Not significant**
Common skate	Medium	Negligible	**Slight / Not significant** (not significant)
Angel shark	Low	Negligible	**Not significant**
Basking shark	Medium	Negligible	**Slight / Not significant** (not significant)
Leatherback turtle	Medium	Negligible	**Slight / Not significant** (not significant)
European hake	Very Low	Negligible	**Imperceptible** (not significant)
Spurdog	Low	Negligible	**Not significant**

59. In summary, this 'mobile fish and turtle species without spawning ground overlap' group is identified as having medium sensitivity overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. This results in a slight /

not significant assessment which is not significant. The impact of temporary seabed habitat disturbance from construction is considered to be **not significant** for mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development area.

60. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

61. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Shellfish

62. The significance of effect has been summarised by each receptor in the below **Table 9-Q**.

Table 9-Q Determination of Significance for shellfish habitats based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Norway lobster	Medium	Negligible	**Slight** (not significant)
Whelk	Medium	Negligible	**Slight** (not significant)
Razor / knife clams	Medium	Negligible	**Slight** (not significant)
Sword razor shell	Medium	Negligible	**Slight** (not significant)
Great Atlantic scallop	Medium	Negligible	**Slight** (not significant)
Edible crab	Medium	Negligible	**Slight** (not significant)
European lobster	Medium	Negligible	**Slight** (not significant)

63. In summary, the 'shellfish' group are identified as having medium sensitivity overall (sensitivity is medium for all individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight significance assessment outcome, which is not significant. The impact of temporary seabed habitat disturbance from construction is considered to be **not significant** for shellfish species.

64. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

65. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 2: Noise and Vibration

Other than Figure 9-21, Impact 2 is replaced in its entirety by paragraphs 66 to 225, Table 9-R to Table 9-UU and Figure 9-U to Figure 9-QQ. These details are presented in Impact 2a, Impact 2b, Impact 2c and Impact 2d. This update has been made in response to FIR Item 11c and 11g (see **FIR Response Document**).

In order to fully and properly respond to the FIR items of relevance, the impact has been restructured and represented, and includes the commitment made by the applicant to mitigate potential impacts from underwater noise during the construction of the project, notably that CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750 m at WTG and OSS piling events.

Impact 2a: Noise and Vibration: Pile Driving Noise

66. Fish, shellfish, and turtles may be affected by underwater noise and vibration arising from construction activities. Underwater noise and vibration may arise from piling or other construction activities including cable installation.

67. Modelling of noise sources to develop propagation models from piling events at four representative piling locations within the array site (**Figure 9-U**) has been undertaken (see **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations** and **Appendix 9-C Underwater Noise Modelling Assessment**). These locations were selected as representative locations of the differing conditions that occur within the site and therefore differing degrees of noise propagation. Thresholds for mortality and recovery from impact piling related impacts are considered as either a single strike peak Sound Pressure Level (SPL_{peak}) or a Cumulative Sound Exposure Level (SEL_{cum}), both of which are provided in this assessment. Additionally, the reaction of fish to sound can be considered in two ways; the first is a fleeing model based on a fish fleeing from a sound source, and the second is a stationary model which considers that the fish receiving the increase in noise and vibration levels does not move away. Both of these options are provided within this assessment, with the stationary model used as the representative scenario or 'worst case' throughout this assessment. However, it is considered that in almost all cases, fish will flee the area of elevated underwater noise and vibration, unless there are key drivers (i.e., presence of functional habitat during critical life phases such as a spawning ground) which may cause them to remain relatively static.

68. During monopile installation, piles are generally expected to be driven (impact piling), however, vibropiling or drilling may also be used. As per the representative scenario approach the assessment focuses on impact piling as it presents the greatest noise and vibration generating capacity. Due to the bathymetry of the array site, the south-east corner of the array site has the largest potential area of sound propagation and will be used as the assessment point for species that do not have spawning / nursery grounds. Where spawning / nursery information exists, the overlap will be assessed against all modelling locations to determine the greatest degree of overlap. Noise modelling was also undertaken in the Liffey where piling will be required. In the Liffey two model scenarios are considered, one where a single pile is installed at a time, and a second model where two piles are installed simultaneously. A summary of the greatest overlap between the noise modelling contours and known spawning and nursery habitats from Coull *et al*. (1998), Ellis *et al*. (2012) and the Marine Institute (2024) has been provided. Highlighted maximums of the largest impact arising from the piling of the array site only is presented under each hearing type, as the largest overlap of the Liffey modelling outputs with spawning or nursery habitat was <0.5 % for both fleeing and stationary animals in all cases. For the full outputs of all the overlap areas, refer to **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**. Barrier effects for migratory species into the River Liffey from piling noise and vibration is also considered.

69. The CWP Project will employ at source noise abatement to noise levels do not exceed 169 dB $L_{E,p,ss,05}$ at 750 m at WTG and OSS piling events; this will considerably reduce the areas of effect. This assessment has been conducted using the mitigated underwater noise modelling outputs. The unmitigated underwater noise modelling outputs and assessment presented in **EIAR Volume Chapter 9 Fish, Shellfish and Turtle Ecology** are considered to be highly precautionary.

70. Part of the primary mitigation measures (**Section 9.9;** see the MMMP) includes the use of a soft-start to impact piling. This involves a gradual ramping up of the piling power over an incremental time period in order to reach full power. It is expected that starting the activity at a lower power will allow for nearby marine species, including fish, to flee the area, reducing the likelihood of mortality and injury effects (JNCC, 2010). Additionally, there are three piling scenarios with different levels of impact (listed

below). Due to the bathymetry of the site affecting sound propagation, the follow specific scenarios have been used across the site:

- Scenario 1 (slow soft start and ramp up, single pile in 24 hrs) is the only scenario considered in the SE corner outputs;
- Scenario 2 (soft start, single pile in 24 hrs) is the only scenario considered in the NE and SW corner outputs; and
- Scenario 3 (soft start, two piles in 24 hrs) is the only scenario considered in the NW corner.

71. In addition to piling, other noise generating activities are predicted to occur during the construction phase such as clearance of UXO, geophysical surveys, and construction activities other than piling (e.g. cable installation, seabed preparation, and scour protection installation). This additional noise and vibration has the potential to affect fish, shellfish and turtles, and is assessed below.

72. There are two main categories of sound detection, each related to the different ways in which sound propagates; these are noise detection through sound pressure, and through particle motion. Particle motion is the displacement, velocity and acceleration of particles which stimulate the specially designed sensors, such as otolithic organs within fish ears (Popper *et al*., 2014). Sound pressure, a deviation from ambient pressure caused by a sound wave (Pulsar Instruments PLC, 2019), can be detected by gas filled organs such as the swim bladder (Popper *et al*., 2014). Different species have different physiological adaptations which affect how they use or respond to sound and vibration (Popper *et al*., 2014). These differences, or hearing types, have been used to classify the assessment groups (**Table 9-R**). Within each hearing group, thresholds of sound levels have been established that cause mortality, recoverable injury and temporary threshold shift (TTS; a temporary reduction in hearing sensitivity that may cause a decrease in communication, predator / prey detection as assessment of the environment (Popper *et al*., 2014)). Where a hearing type includes species with spawning / nursery grounds in the area, the modelling location that produces the greatest spatial overlap of noise and vibration related effects has been chosen as the representative scenario (**Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**).

73. Receptors are grouped according to the following criteria for the assessment against noise and vibration during construction, with the detailed criteria presented in **Table 9-R**:

- Group one hearing type;
- Group two hearing type;
- Group three hearing type;
- Group four hearing type;
- Shellfish; and
- Turtles.

74. Undertaking the assessment using the above groups is considered to provide a suitable level of assessment, which takes account of any potential fish, shellfish, or turtle receptor that may be affected

by the construction activities, whilst focussing on those that are of most relevance to the assessment (see **Section 9.6**).

Table 9-R Classification of species by hearing type as per Popper *et al*. (2014)

Group	VER Species	Piling			Explosion (UXO)
		Mortality and potential mortal injury	Recoverable injury	Temporary Threshold Shift	Mortality and potential mortal injury
Group one – Fishes without a swim bladder or any other gas-filled body cavities. These species are considered to only be sensitive to particle motion.	Blonde ray, small-spotted catshark, cuckoo ray, thornback ray, spotted ray, tope, common skate, angel shark, spurdog / spiny dogfish, Undulate ray, European plaice, sandeel, sea lamprey, river lamprey, lemon sole, common sole, basking shark	≥219 dB SELcum ≥213 dB peak	≥216 dB SELcum ≥213 dB peak	≥186 dB SELcum	229–234 dB peak
Group 2 – Fishes with swim bladders or other gas-filled body cavities which are not involved in hearing. These species are also considered only to be sensitive to particle motion and include salmonids and some pelagic species, such as mackerel.	Atlantic salmon, sea trout, Atlantic mackerel, whiting, Atlantic horse mackerel, ling, European hake, haddock	≥210 dB SELcum ≥207 dB peak	≥203 dB SELcum ≥207 dB peak	≥186 dB SELcum	229–234 dB peak
Group 3 – Fishes with swim bladders or other gas-filled body cavities which are involved in hearing. These species are considered to be sensitive to both particle motion and sound pressure and include gadoids, such as cod, and some pelagic species, such as herring. Due to their ability to detect the pressure component of underwater	Atlantic herring, European sprat, Atlantic cod, European smelt*, twaite shad, allis shad, European eel*, angler fish*.	≥207 dB SELcum ≥207 dB peak	≥203 dB SELcum ≥207 dB peak	≥186 dB SELcum	229–234 dB peak

Group	VER Species	Piling			Explosion (UXO)
		Mortality and potential mortal injury	Recoverable injury	Temporary Threshold Shift	Mortality and potential mortal injury
noise, the frequency sensitivity ranges of these species and their acuity levels are greater, hence this group is frequently referred to as the 'hearing specialists'.					
Group 4 – Eggs and larvae	All species	≥210 dB SELcum ≥207 dB peak	N/A	N/A	>13mm s-1
Shellfish	Razor / knife clams, Norway lobster, sword razor shell, whelk, great Atlantic scallop, edible crab, European lobster	N/A	N/A	N/A	N/A
Turtles	Leatherback turtle	≥210 dB SELcum ≥207 dB peak	N/A	N/A	N/A

*Denotes uncertainty with species hearing mechanism; therefore, placed in the most precautionary grouping

Receptor sensitivity

Group One

75. As per **Table 9-R**, group one species have been classed based on their hearing type, and are listed below in **Table 9-S**. Sensitivity has been determined based upon the definitions set out in **Table 9-B,** with information feeding this assessment coming from **Table 9-I**. Lamprey are able to detect low tone sound, eliciting a mild behavioural response (increase in swimming and decrease in resting behaviour) (Mickle *et al.,* 2018). They are considered to have low sensitivity to noise, categorised as group one hearing species (Popper *et al*., 2014) i.e., fish which do not possess a swim bladder but are able to detect particle motion and as such are not considered sensitive to changes in sound pressure levels (Popper *et al*., 2014; Popper & Hawkins, 2019; Popper *et al.,* 2022).

76. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing during the soft start, with the exception being sandeel, a less mobile species and therefore only a medium capacity (adaptability) to avoid the impact. Recoverability ranges from low to high based on fecundity should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status. Group one fish have a low ability to perceive sound and lack of gas filled organ and thus a high tolerance to the impact. This high tolerance to underwater noise and vibration is also

utilised within the modelling which accounts for the distances over which sound can be perceived by these species.

77. As per **Table 9-S**, sensitivity for group one species ranges from very low to medium.

Table 9-S Group one species sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Small-spotted catshark	High	High	Medium	Low	Low
Cuckoo ray	High	High	Medium	High	Medium
Blonde ray	High	High	Medium	High	Medium
European plaice	High	High	High	Low	Very Low
Sandeel	Medium	High	High	Low	Low
Lemon sole	High	High	High	Low	Very Low
Common sole	High	High	High	High	Low
Undulate ray	High	High	Medium	High	Medium
Thornback ray	High	High	Medium	High	Medium
Spotted ray	High	High	Medium	High	Medium
Spurdog / spiny dogfish	High	High	Medium	High	Medium
Sea lamprey	High	High	High	High	Low
River lamprey	High	High	High	High	Low
Tope	High	High	Medium	High	Medium
Common skate	High	High	Medium	High	Medium
Angel shark	High	High	Medium	High	Medium
Basking shark	High	High	Low	High	Medium

Group Two

78. As per **Table 9-R**, group two species have been classed based on their hearing type and are listed in **Table 9-T**. Sensitivity has been determined based upon the definitions set out in **Table 9-B,** with information feeding this assessment coming from **Table 9-I**. Atlantic salmon are categorised as group two hearing species (Popper *et al.*, 2014), meaning they are susceptible to barotrauma and can detect sound pressure in addition to particle motion. Despite this ability to detect sound pressure noise, it is considered that salmonids (including Atlantic salmon) are not particularly sensitive to noise (Hawkins

and Johnstone, 1978). Atlantic salmon have a poor ability to respond to noise and have a narrow frequency span and limited ability to discriminate between different noises.

79. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing during the soft start. Recoverability is high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status. Group two fish have a moderate ability to perceive sound and presence of a swim bladder. The thresholds utilised within the modelling already account for the moderate tolerance to sound related impacts, and as most receptors will only be affected at a behavioural level, which will not have any long-term effects on populations, tolerance is assessed as moderate.

80. As per **Table 9-T**, sensitivity for group two species ranges from low to medium.

Table 9-T Group two species sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
European hake	High	Medium	High	Low	Low
Sea trout	High	Medium	High	Low	Low
Atlantic mackerel	High	Medium	High	Low	Low
Whiting	High	Medium	High	Low	Low
Atlantic horse mackerel	High	Medium	High	Low	Low
Ling	High	Medium	High	Low	Low
Haddock	High	Medium	High	Low	Low
Atlantic salmon	High	Medium	High	High	Medium

Group Three

81. As per **Table 9-R**, group three species have been classed based on their hearing type, and are listed in **Table 9-U**. Sensitivity has been determined based upon the definitions set out in **Table 9-B,** with information feeding this assessment coming from **Table 9-I**. Although shad are considered a group three hearing species i.e., fish with swim bladders or other gas filled chambers involved in hearing (Popper *et al*., 2014), they are thought to be less sensitive to low-frequency noise (e.g., from piling) compared to other hearing specialists (Popper *et al*., 2004). Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing during the soft start. Recoverability is high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status. Group three fish are considered to be the most sensitive to sound related impacts due to the presence of morphological adaptations for detecting sound, or use of sound during critical life history activities. The thresholds utilised within the modelling already account for the

receptors ability to perceive sound, and as most receptors will only be affected at a behavioural level, which will not have any long-term effects on populations, tolerance is assessed as low.

82. As per **Table 9-U**, sensitivity for group three species ranges from low to medium.

Table 9-U Group three species sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Anglerfish	High	Low	High	Low	Low
European smelt	High	Low	High	Low	Low
Atlantic herring	High	Low	High	Low	Low
European sprat	High	Low	High	Low	Low
Atlantic cod	High	Low	High	High	Medium
Twaite shad	High	Low	High	High	Medium
Allis shad	High	Low	High	High	Medium
European eel	High	Low	High	High	Medium

Group Four

83. With spawning and / or nursery grounds present in the area, there is the potential for eggs and larvae to be in the area affected by noise and vibration. Species with spawning or nursery areas in proximity to the CWP Project range from very low to medium in terms of their sensitivities; and these values will be applied to their respective eggs / larvae. The sensitivities are the same as established in **Table 9-S, Table 9-T** and **Table 9-U.**

84. It is considered that there is no overlap or potential for impact on any species which spawns in freshwater environments, or where spawning and nursery areas are known not to occur within the Irish sea, for example European eel and Atlantic salmon have been excluded from the below assessment since eel are known to spawn in the Sargasso Sea and salmon spawn upstream and there is therefore no route to impact on the spawning areas of either species. Other species where there is no route to impact to eggs or larvae include allis shad, twaite shad, sea lamprey, river lamprey, sea trout, European smelt and leatherback turtle. Additionally, spurdog / spiney dogfish, tope, common skate, angle shark, and basking shark all produce live young, which are considered under the species-specific hearing type categories above and therefore not considered here.

Shellfish

85. As per **Table 9-R**, shellfish species have been grouped based upon their ability to only detect the particle motion element of sound, and are listed below in **Table 9-V**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. Across the species group, all are non-mobile species and therefore have a low to very low

capacity (adaptability) to avoid the impact by fleeing during the soft start. Shellfish perceive the particle motion element of sound only, and the majority of any effects will be behavioural in nature (if observable) and as such tolerance is considered high. Recoverability is high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value is low according to conservation status.

86. As per **Table 9-V,** sensitivity for shellfish species is low for the group.

Table 9-V Shellfish sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Razor / knife clams	Very low	High	High	Low	Low
Norway lobster	Low	High	High	Low	Low
Sword razor shell	Very low	High	High	Low	Low
Whelk	Very low	High	High	Low	Low
Great Atlantic scallop	Very low	High	High	Low	Low
Edible crab	Low	High	High	Low	Low
European lobster	Low	High	High	Low	Low

Turtles

87. As per **Table 9-R**, turtles are classed into their own hearing group, and are listed in **Table 9-W**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. Turtles are a mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing during the soft start. Turtles are unlikely to be present in the area in large numbers, therefore any effects are unlikely to lead to any population level consequences, as such, tolerance is assessed as high. Recoverability is low based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value is medium according to conservation status.

88. As per **Table 9-W**, sensitivity for turtles is medium.

Table 9-W Turtle sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Leatherback turtle	High	High	Low	Medium	Medium

Magnitude of impact

Group One

89. The identification of thresholds (as per Popper *et al*., 2014), as well as the representative scenario (SE modelling location) outputs for group one species are listed in **Table 9-X** for pile driving with the implementation of mitigation. The maximum, mean and minimum values represent the radius of impact from the modelling location which is directly influenced by the bathymetry within the receiving environment. A visualisation of the sound level contours for group one species can be seen in **Figure 9-V**, and where relevant species-specific overlaps with established data sources on nursery / spawning habitats can be seen in **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations.**

Table 9-X Underwater noise modelling outputs for pile driving for Group one species (greatest area effect from all scenarios)

					Array – representative scenario (SE modelling location)				Liffey		
Activity	**Response**	**Level**	**Risk**	**Threshold**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**	**Minimum (m)**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**
Piling	Stationary	SPL_{peak}	Mortality and potential mortal injury	≥213 dB	<0.01	<50	<50	<50	<0.01	<50	<50
			Recoverable injury	≥213 dB	<0.01	<50	<50	<50	<0.01	<50	<50
		SEL_{cum}	Mortality and potential mortal injury	≥219 dB	0.06	140	140	140	0.03	370	260
			Recoverable injury	≥216 dB	0.15	230	220	220	0.4	550	330
			Temporary Threshold Shift	≥186 dB	230	13,000	8,500	7,000	25	11000	1300
	Fleeing	SEL_{cum}	Mortality and potential mortal injury	≥219 dB	<0.01	<50	<50	<50	<0.01	<100	<100
			Recoverable injury	≥216 dB	<0.01	<50	<50	<50	<0.01	<100	<100
			Temporary Threshold Shift	≥186 dB	5.7	2,300	1,200	600	3.2	3500	630

Mortality

90. Group one fish at risk of mortality and potential mortal injury in the array piling operations area (**Table 9-X**) under the stationary model with noise abatement may be observed over an area of approximately <0.01 km^2 or a maximum distance of <50 m from the source for peak sound pressure level, and an area of 0.06 km^2 or a maximum distance of 140 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 50 m from the source when the fleeing model is used. Fish are expected to flee when not engaged in active spawning or other life critical behaviours, and as such the majority of individuals will be affected over these smaller distances.

91. Group one fish at risk of mortality and potential mortal injury in the proximity to the onshore substation (Liffey) piling operations (**Table 9-X**) under the stationary model may be observed over an area of less than 0.01 km^2 or a maximum distance of less than 50 m from the source for peak sound pressure level, and an area of 0.03 km^2 or a maximum distance of 370 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 100 m from the source when the fleeing model is used.

92. Of the group one hearing species, the following have spawning (S) and / or Nursery (N) grounds in the ICES regional study area: Thornback ray (N), Spotted ray (N), Tope (N), Spurdog (N) / Spiny dogfish, European plaice (S / N), Sandeel (S / N), Lemon sole (S / N), Common sole (S), and Haddock (S / N). Of note, while present in the area, there is no overlap between Spurdog spawning / nursery habitat.

93. The overlap of the noise modelling contours with the known spawning and nursery habitat within the ICES regional study area has been calculated in **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations** with maximum values highlighted in **Table 9-Z**, based upon the stationary and fleeing model. For visualisation of the noise overlap (based on the stationary model model) with spawning and nursery grounds, refer to **Figure 9-W** to **Figure 9-CC**.

94. The greatest percentage of area affected by mortality under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group one nursery and spawning species (**Table 9-Z**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any noise impacts will only affect a small number of individuals of such species.

95. The greatest percentage of area affected by mortality under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group one spawning and nursery species (**Table 9-Z**).

96. Piling is a temporary impact of a maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities. It is however a reoccurring event which produces sound levels that may result in the mortality of species within the above ranges / overlaps. For group one species, there is a maximum area of mortality of 0.06 km^2, and a negligible overlap of mortality noise (based on the stationary model) with spawning / nursery habitat (<0.01 % of habitat within the ICES regional study area). Primary mitigation measures (**Section 9.9**) including soft start and the proposed noise limit will provide an opportunity for all individuals to move out of the areas of potential mortality.

97. The magnitude of impact for mortality and mortal injury for group one species is therefore considered to be negligible.

Recoverable Injury

98. Group one fish at risk of recoverable injury for the array site piling operations area (**Table 9-X** under the stationary model with noise abatement are predicted to occur within an area of <0.01 km^2 or a maximum distance of <50 m from the source for peak sound pressure level, and an area of 0.15 km^2

or a maximum distance of 230 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 50 m from the source when the fleeing model is used.

99. Group one fish at risk of recoverable injury in proximity to the onshore substation (Liffey) piling operations (**Table 9-X**) under the stationary model are predicted to occur within an area of less than 0.01 km^2 or a maximum distance of less than 50 m from the source for peak sound pressure level, and an area of 0.4 km^2 or a maximum distance of 550 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 100 m from the source when the fleeing model is used.

100. The greatest percentage of spawning or nursery area affected by recoverable injury under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is up to 0.01 % for multiple species (**Table 9-Z; Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any effect will only affect a small number of individuals of such species.

101. The greatest percentage of spawning or nursery area affected by recoverable injury under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group one spawning and nursery species (**Table 9-Z; Appendix 9-B**)

102. Piling is a temporary impact of maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities. It is however a reoccurring event which produces sound levels that may result in the recoverable injury of species within the above ranges / overlaps. For group one species, there is a maximum area of recoverable injury of 0.15 km^2, and a negligible overlap of spawning / nursery habitat (≤0.01 % of habitat within the ICES regional study area). Primary mitigation measures (**Section 9.9**) including soft start will provide an opportunity for all individuals to move out of the areas of potential recoverable injury.

103. The magnitude of impact for recoverable injury for group one species is therefore considered to be negligible.

Temporary Threshold Shift (TTS) / Behavioural responses

104. Group one fish at risk of TTS during the array piling operations (following the implementation of mitigation) under the stationary model are predicted to occur within an area of 230 km^2 or a maximum distance of 13 km from the source for cumulative level exposure. These values drop significantly to 5.7 km^2 or a maximum of 2.3 km from the source when the fleeing model is used.

105. Group one fish at risk of TTS in proximity to the onshore substation (Liffey) piling operations under the stationary model are predicted to occur within an area of 25 km^2 or a maximum distance of 11 km from the source for cumulative level exposure. These values drop significantly to 3.2 km^2 or a maximum of 3.5 km from the source when the fleeing model is used.

106. The greatest percentage of area affected by TTS under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 4.68 % and 6.14 % for European plaice nursery and spawning areas respectively (**Table 9-Z; Appendix 9-B**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that noise impacts will only affect a small number of individuals of such species.

107. The greatest percentage of area affected by TTS under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 0.14 % (**Table 9-Z; Appendix 9-B**).

108. Impact piling operations will last a maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities, and any impacts will be temporary. A maximum of two piles will be driven per day at the array site, for a total of seven

hours of piling in a 24-hour period. While the percentage of overlap of a spawning area provides useful context, it does not take into account the short term and temporary nature of the work compared to the duration of available spawning potential. As such the proportion of spawning potential impacted has been calculated in **Table 9-Y**, using the TTS area as the greatest modelled area of impact. When availability of spawning duration is factored in, the greatest impact to spawning potential is 0.75 %. When compared to the available spawning habitat and duration, the impact is considered negligible, and effects will be imperceptible.

Table 9-Y Group one temporal overlap results and spawning potential (based on the stationary model) (presented only for species where there is greater than 1 % overlap with spawning habitat)

Species and spawning period (months)*	Spawning period (hours in one season) [total piling hours = 262.5]	Spawning potential (km^2h)	Impacted spawning potential (km^2h)	Percentage of spawning potential impacted (%)
European plaice (January – March)	2136	5,169,134	39,014	0.75%
Lemon sole (April – September)	4368	45,888,349	60,790	0.13 %
Common sole (March – May)	2184	18,840,555	60,592	0.32%
Sandeel (November – February)	2856	14,620,100	60,790	0.42 %

Spawning period as per information presented in **Table 9-G** in months, converted here to hours.

Spawning potential (km^2h) is the total potential spawning habitat (regardless of habitat use intensity) available to each species in the ICES regional study area (km^2) multiplied by the spawning period (h) to provide a spatio-temporal reference.

Impacted spawning potential is the area of spawning habitat overlap by the noise contours (within the ICES regional study area) (km^2) over time (h) (i.e., multiplied by the maximum number of piling hours (262.5h)).

The proportion of spawning potential impacted is the total impacted spawning potential in relation to the total spawning potential.

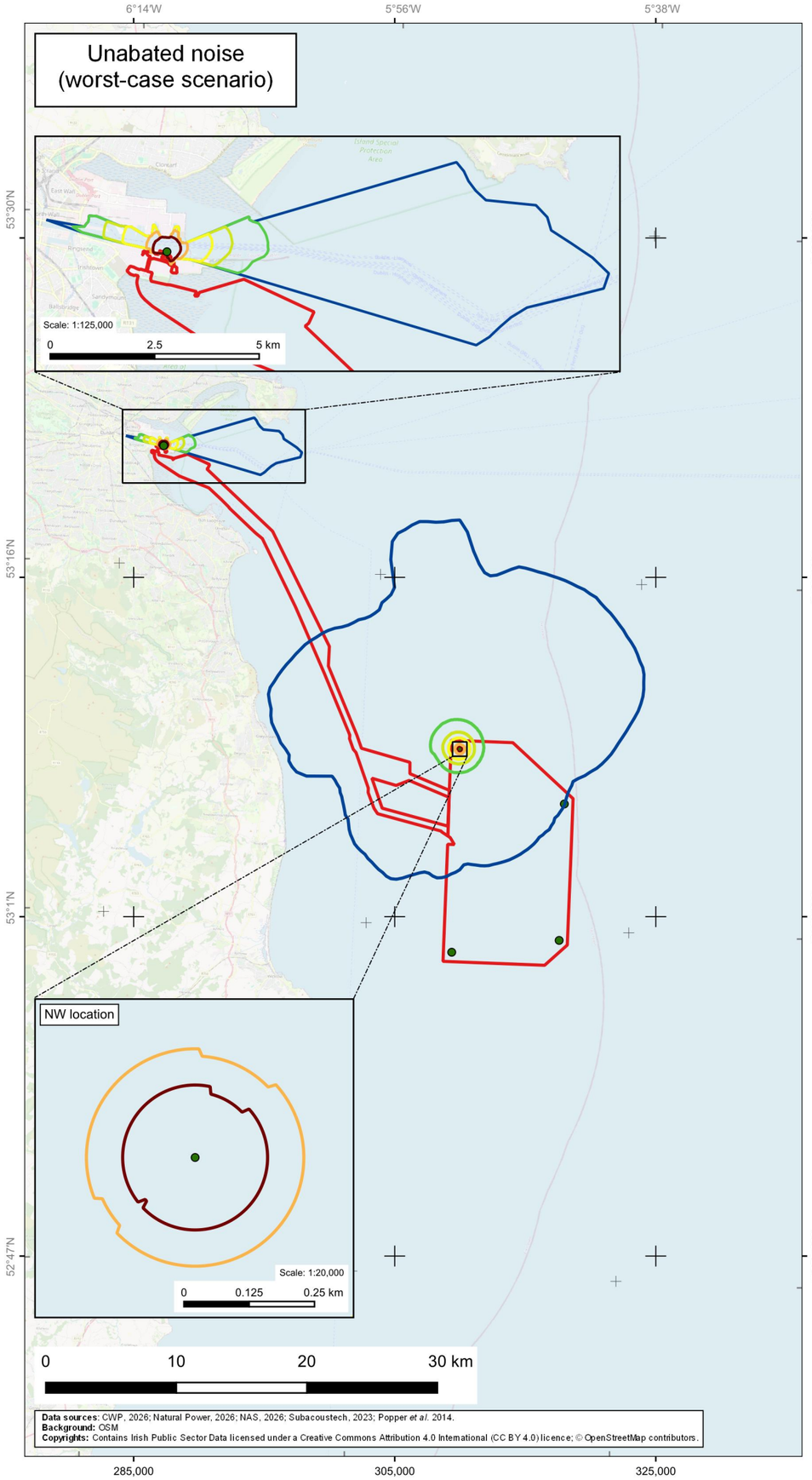
109. It is also recognised that there may be behavioural responses which extend beyond the threshold of the TTS areas. These behavioural responses are likely to be akin to predator avoidance responses and will decrease both in severity and in the percentage of the population affected as distance increases from the noise source (Knaap *et al*., 2021). Such behavioural responses will be short term, and due to the behavioural nature of the effects, recovery will be very fast, with potential for habituation over the term of the construction phase.

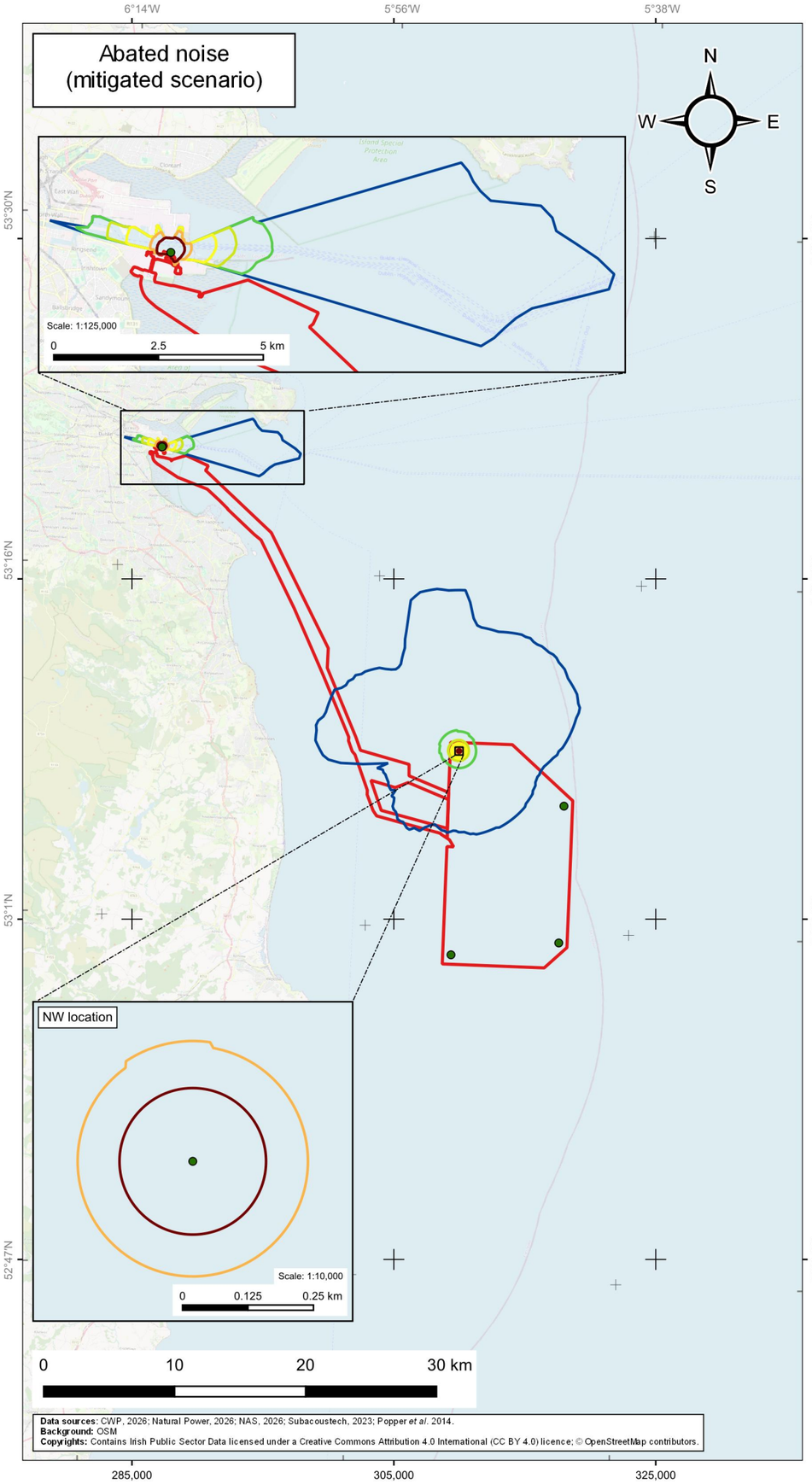
110. The magnitude of impact for temporary threshold shift and behavioural effects for group one species is therefore considered to be negligible.

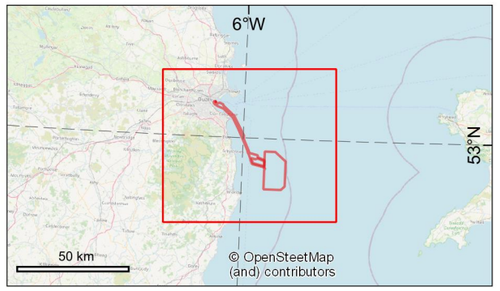
Table 9-Z Group one maximum noise overlap calculations of the spawning / nursery activity with the greatest overlap

Species	Spawning			Nursery		
	Mortality	Recoverable Injury	TTS	Mortality	Recoverable Injury	TTS
Fleeing						
Sandeel	<0.01 %	<0.01 %	0.08%	<0.01 %	<0.01 %	0.14%
European plaice	<0.01 %	<0.01 %	0.12%	<0.01 %	<0.01 %	0.14%
Lemon sole	<0.01 %	<0.01 %	0.07%	<0.01 %	<0.01 %	0.07%
Common sole	<0.01 %	<0.01 %	0.08%			
Thornback ray				<0.01 %	<0.01 %	0.13%
Spotted ray				<0.01 %	<0.01 %	0.13%
Tope				<0.01 %	<0.01 %	0.10%
Stationary						
Sandeel	<0.01 %	<0.01 %	2.68%	<0.01 %	<0.01 %	4.52%
European plaice	<0.01 %	0.01 %	6.14%	<0.01 %	<0.01 %	4.68%
Lemon sole	<0.01 %	<0.01 %	2.30%	<0.01 %	<0.01 %	2.21%
Common	<0.01 %	<0.01 %	2.68%			

Species	Spawning			Nursery		
	Mortality	Recoverable Injury	TTS	Mortality	Recoverable Injury	TTS
sole						
Thornback ray				<0.01 %	<0.01 %	4.24%
Spotted ray				<0.01 %	<0.01 %	4.22%
Tope				<0.01 %	<0.01 %	3.16%







Legend

- Planning Application Boundary (PAB)
- Local study area
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 207 dB
- 210 dB
- 216 dB
- 219 dB

codling wind park	*Project:* Codling Wind Park	*Contractor:* natural power www.naturalpower.com

Figure 9-U
Noise modelling locations and unabated and abated noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1152

Internal descriptive code:	*Size:*	*CRS:*
WE - PAB..DPNMLs - - EIAR.FIG.09.21	A3	EPSG 25830
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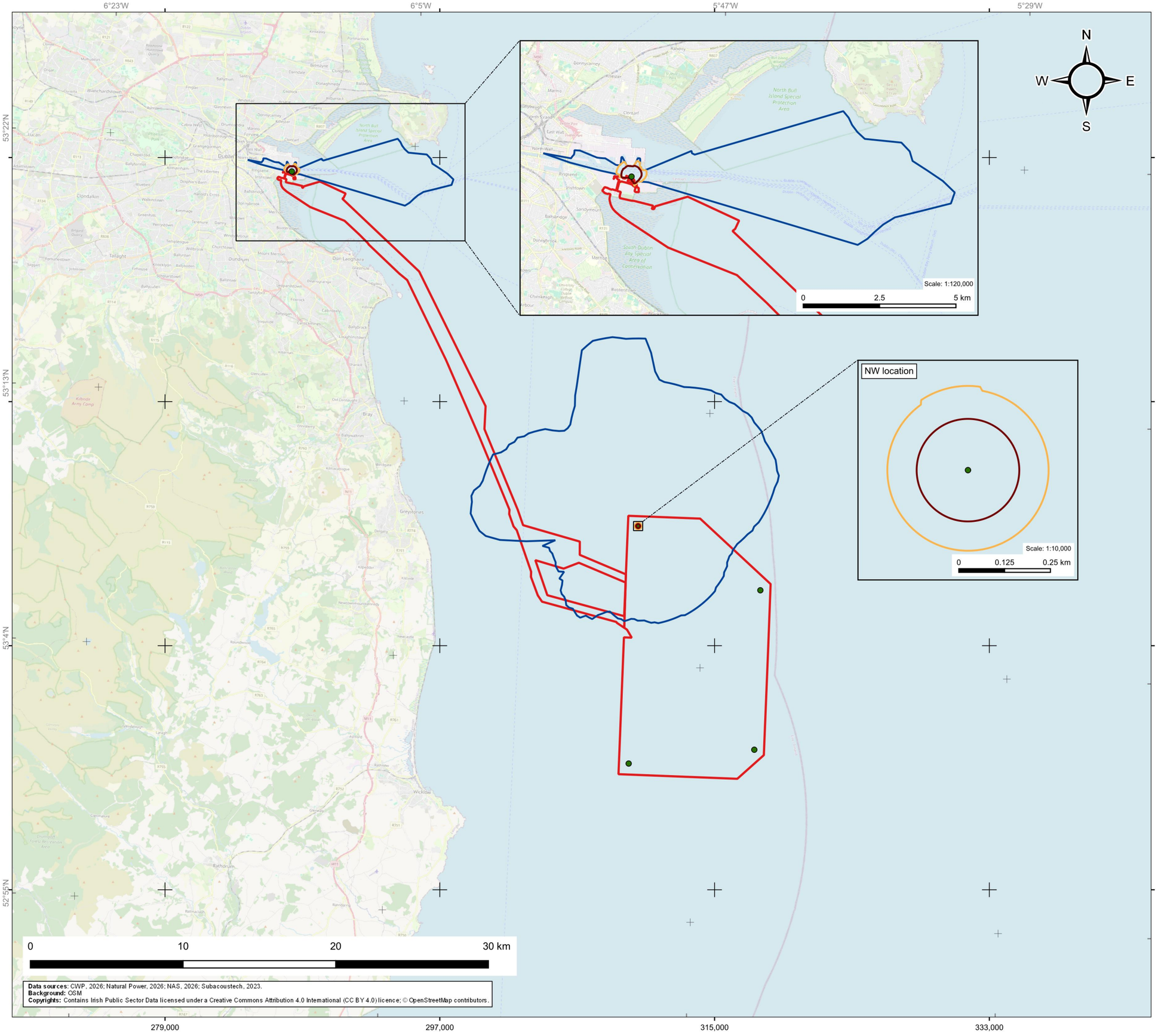
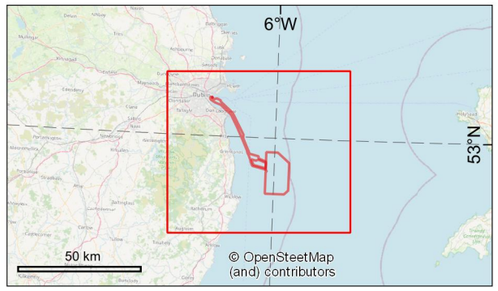
Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/27	AC	AK/EA	ME





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com

Figure 9-V
Group one noise modelling for species without nursery or spawning habitat

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1153

Internal descriptive code:	*Size:*	*CRS:*
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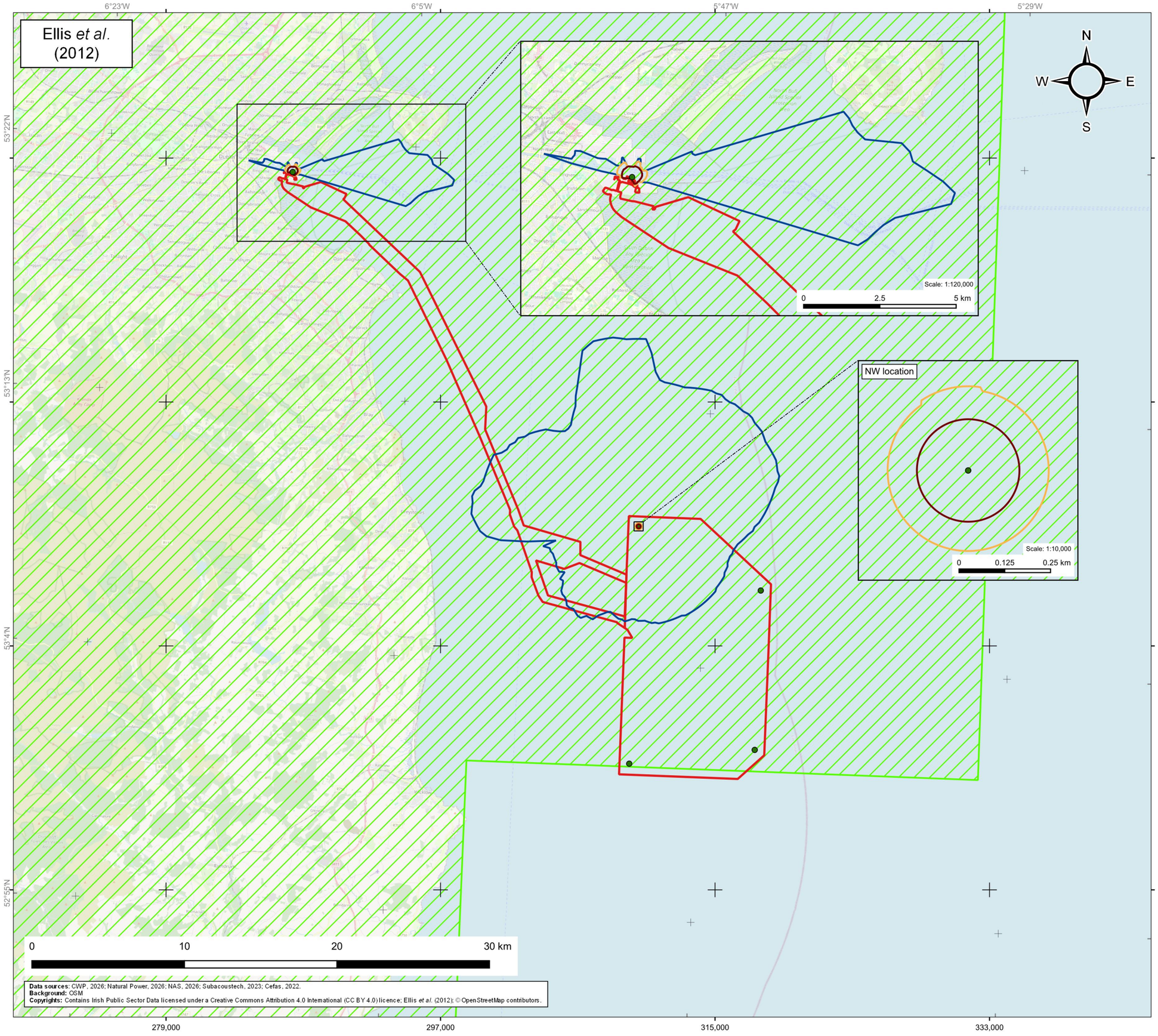
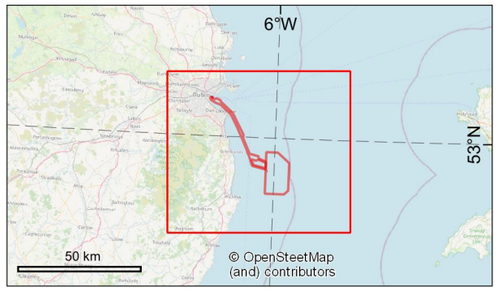
	Scale: 1:240,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Ellis *et al.* (2012)





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Ellis et al. (2012)

- Nursery ground low intensity

Thornback ray not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-W
Thornback ray spawning and / or nursery overlap with noise modelling

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1154

Internal descriptive code: OFFSH-ALL - PAB, DPNMLs, DPNM.CONT.WTG.NW, DPNM.CONT. SS.PP - FSTESAs LRN, SNG.THORNBACK RAY - EIAR.FIG.09.23

Size: A3

Scale: 1:240,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Ellis *et al.* (2012)

6°23'W
6°5'W
5°47'W
5°29'W
53°22'N
53°13'N
53°4'N
52°55'N
5,916,000
5,900,000
5,884,000
5,868,000
279,000
297,000
315,000
333,000

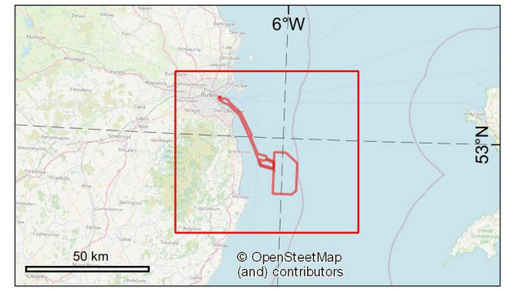
N
W
E
S

Scale: 1:120,000
0 2.5 5 km

NW location

Scale: 1:10,000
0 0.125 0.25 km

0 10 20 30 km



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Ellis et al. (2012)

- Nursery ground low intensity

Spotted ray not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-X
Spotted ray spawning and / or nursery overlap with noise modelling

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1155

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESEAs.LRN..SNG.SPOTTED.RAY - (EIAR.FIG.09.24)

Size: A3
Scale: 1:240,000
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Ellis *et al.* (2012)

6°23'W
6°5'W
5°47'W
5°29'W
53°22'N
53°13'N
53°4'N
52°55'N
5,916,000
5,900,000
5,884,000
5,868,000
279,000
297,000
315,000
333,000

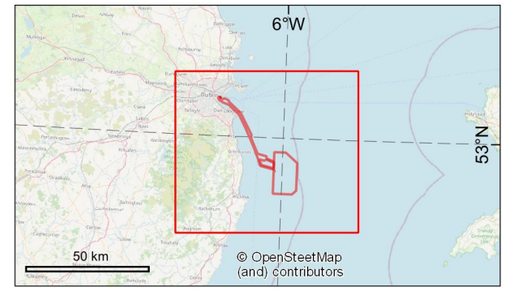
N
W
E
S

Scale: 1:120,000
0 2.5 5 km

NW location

Scale: 1:10,000
0 0.125 0.25 km

0 10 20 30 km



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Ellis et al. (2012)

- Nursery ground low intensity

Tope not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

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Contractor: natural power www.naturalpower.com

Figure 9-Y
Tope spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1156

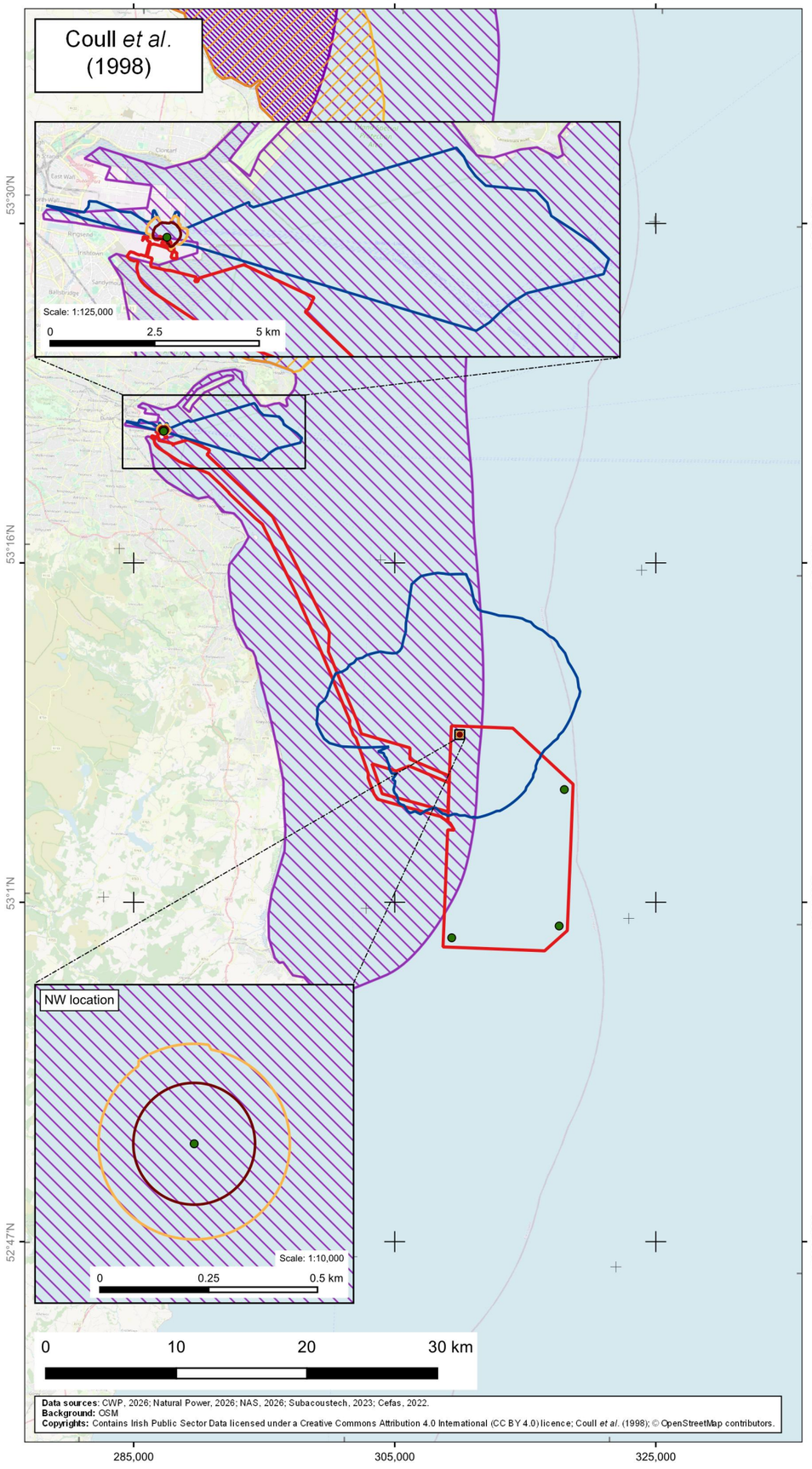
Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.TOPE - (EIAR.FIG.09.25)

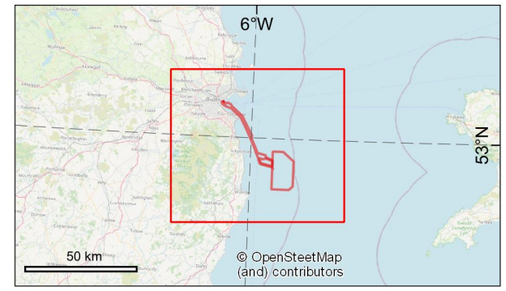
Size: A3
Scale: 1:240,000
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Coull *et al.* (1998)

Ellis *et al.* (2012)





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground high intensity
- Spawning ground low intensity

European plaice not covered in Marine Institute (2024) dataset.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

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Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-Z
European plaice spawning and / or nursery overlap with noise modelling contours

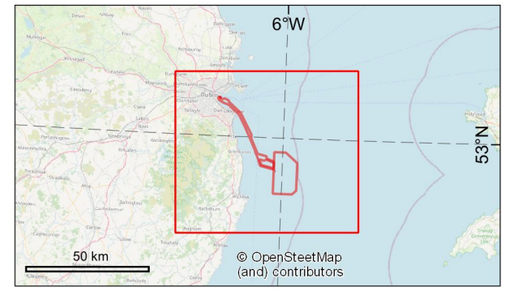
CWP doc. number: CWP-NPC-ENG-08-01-MAP-1157

Internal descriptive code: OFFSH.ALL - PAS. DPNMLs. DPNM.CONT.WTG.NW. DPNM.CONT.SS.PP - FSTESAs.LRN. SNS.EUROPEAN.PLAICE - EIAR.FIG.09.26

Size: A3
Scale: 1:400,000
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Ellis *et al.* (2012)



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground low intensity

Sandeel is not covered in Marine Institute (2024) dataset. Whilst included in Coull et al. 1998, the species is not represented at a scale relevant to the refined project area and is therefore not shown.

codling wind park	Project: Codling Wind Park	Contractor: natural power www.naturalpower.com

Figure 9-AA
Sandeel spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1158

Internal descriptive code:	*Size:*	*CRS:*
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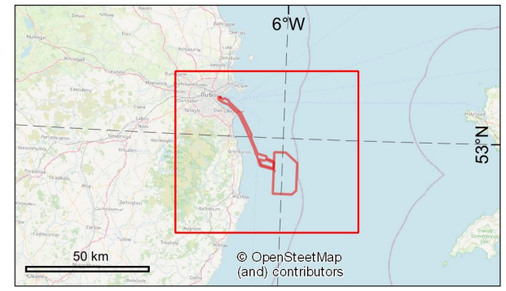
	Scale: 1:240,000	

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

Coull *et al.* (1998)



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground undetermined intensity

Lemon sole not covered in Marine Institute (2024) and Ellis et al. (2012) datasets.

NW location

Scale: 1:120,000
0 2.5 5 km

Scale: 1:10,000
0 0.125 0.25 km

0 10 20 30 km

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al.* (1998); © OpenStreetMap contributors.

6°23'W 6°5'W 5°47'W 5°29'W
53°22'N 53°13'N 53°4'N 52°55'N
279,000 297,000 315,000 333,000
5,916,000 5,900,000 5,884,000 5,868,000

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-BB
Lemon sole spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1159

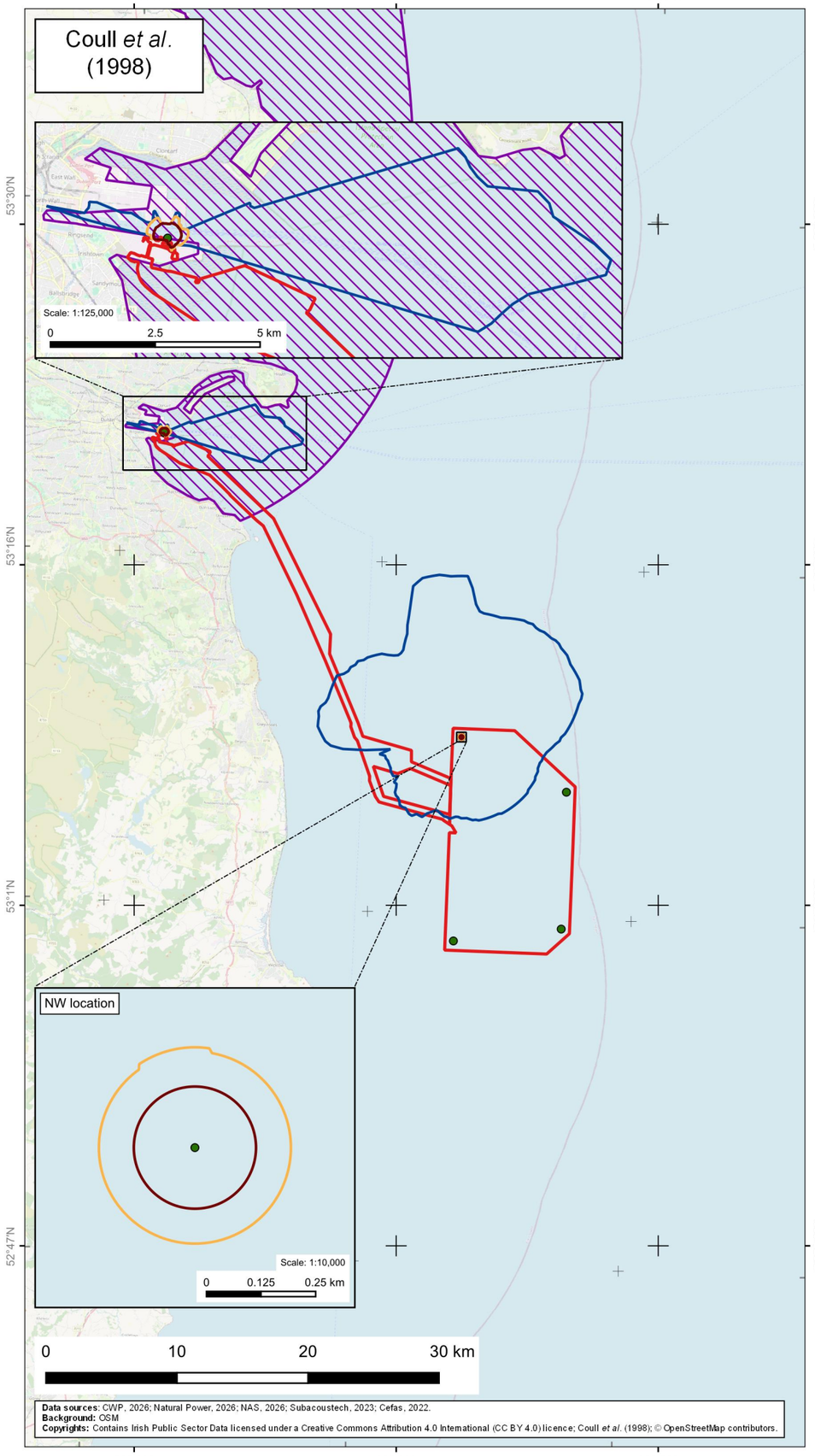
Internal descriptive code: OFFSH.ALL - PAB, DPNMLs, DPNM.CONT.WTG.SE, DPNM.CONT.SS.PP - FSTESAs.LRN. SNG.LEMON.SOLE - (EIAR.FIG.09.28)

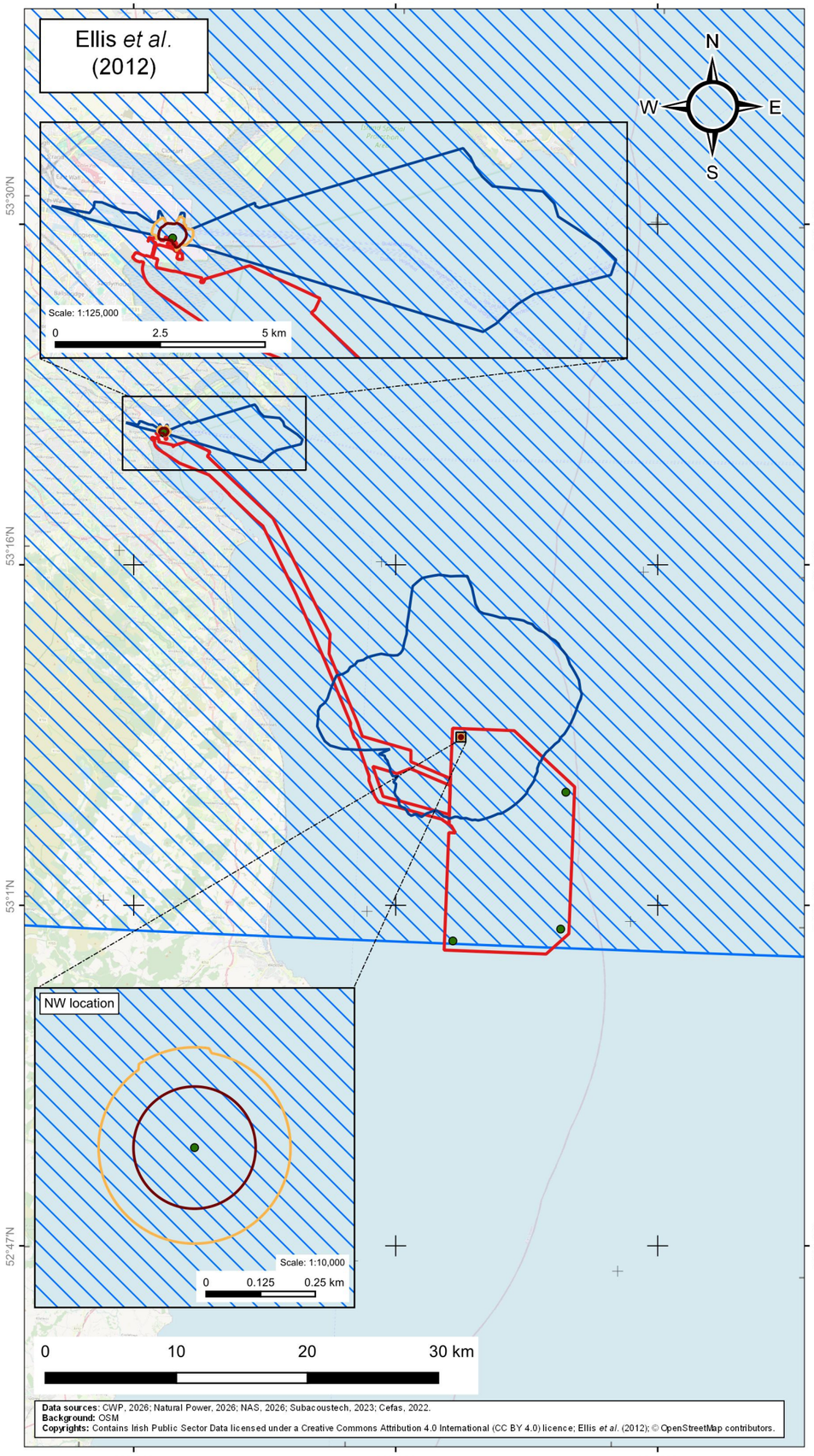
Size: A3
Scale: 1:240,000
CRS: EPSG 25830

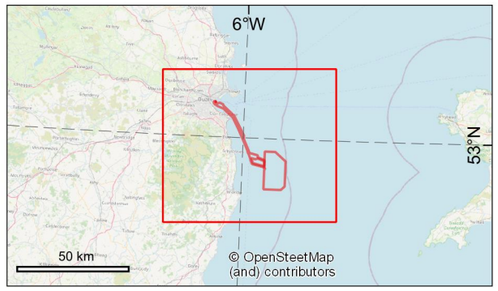
Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	VR

Coull *et al.* (1998)

Ellis *et al.* (2012)







Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 216 dB
- 219 dB

Coull et al. (1998)

- Spawning ground low intensity

Ellis et al. (2012)

- Spawning ground low intensity

Common sole not covered in Marine Institute (2024) dataset.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-CC
Common sole spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1160

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.NE.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.COMMON.SOLE - (EIAR.FIG.09.29)

Size: A3

Scale: 1:400,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Group Two

111. The identification of thresholds (as per Popper *et al*., 2014), as well as the representative scenario (SE modelling location) outputs for group two species are listed in **Table 9-AA** for pile driving. The maximum, mean and minimum values represent the largest radius of impact from the modelling location which is directly influenced by the bathymetry within the receiving environment. A visualisation of the sound level contours for group two species can be seen in **Figure 9-DD**, and where relevant species-specific overlaps with established data sources on nursery / spawning habitats can be seen in **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**.

Table 9-AA Underwater noise modelling outputs for pile driving for Group two species

					Array – representative scenario (SE modelling location)				Liffey		
Activity	**Response**	**Level**	**Risk**	**Threshold**	**Area (km2)**	**Maximum (m)**	**Mean (m)**	**Minimum (m)**	**Area (km2)**	**Maximum (m)**	**Mean (m)**
Piling	Stationary	SPL_{peak}	Mortality and potential mortal injury	≥207 dB	0.02	70	70	70	<0.01	<50	<50
			Recoverable injury	≥207 dB	0.02	70	70	70	<0.01	<50	<50
		SEL_{cum}	Mortality and potential mortal injury	≥210 dB	0.86	550	520	500	1	1100	450
			Recoverable injury	≥203 dB	6.2	1,600	1,400	1,300	2.8	2,400	630
			Temporary Threshold Shift	≥186 dB	230	13,000	8,500	7,000	25	11,000	1,300
	Fleeing	SEL_{cum}	Mortality and potential mortal injury	≥210 dB	<0.01	<50	<50	<50	<0.1	<100	<100
			Recoverable injury	≥203 dB	<0.01	<50	<50	<50	< 0.1	100	<100
			Temporary Threshold Shift	≥186 dB	5.7	2,300	1,200	600	3.2	3,500	630

Mortality

112. As per **Table 9-AA,** group two fish mortality for the array site piling operations (following the implementation of mitigation) under the stationary model is predicted to occur within an area of approximately 0.02 km^2 or a maximum distance of 70 m from the source for peak sound pressure level, and an area of 0.86 km^2 or a maximum distance of 550 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 50 m from the source when the fleeing model is used.

113. As per **Table 9-AA,** group two fish mortality in proximity to the onshore substation (Liffey) piling operations under the stationary model is predicted to occur within an area of less than 0.01 km^2 or a maximum distance of less than 50 m from the source for peak sound pressure level, and an area of 1 km^2 or a maximum distance of 1,100 m from the source for cumulative level exposure. These values drop significantly to less than 0.1 km^2 or less than 100 m from the source when the fleeing model is used.

114. Of the group two hearing species, the following have spawning (S) and / or Nursery (N) grounds in the area: Atlantic mackerel (S / N), haddock (S / N) whiting (S / N), ling (S) and Atlantic horse mackerel (N). Of note, while present in the area, there is no noise overlap between European hake spawning or nursery habitat.

115. The overlap of the noise modelling contours with the known spawning and nursery habitat within the regional area has been calculated in **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations** and maximum values have been presented in **Table 9-CC**, based upon the stationary and fleeing model. For visualisation of the noise overlap (based on the stationary model) with spawning and nursery grounds, refer to **Figure 9-EE** to **Figure 9-II**.

116. The greatest percentage of area affected by mortality under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 0.02 % and 0.05 % for haddock spawning (**Table 9-CC; Appendix 9-B**).

117. The greatest percentage of area affected by mortality under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group two spawning and nursery species (**Table 9-CC; Appendix 9-B**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any noise impacts will only affect a small number of individuals of such species.

118. Piling is a temporary impact of a maximum 78 days over the construction period for the array site, and for 14 days (of up to 8 hours per day) for the onshore substation activities. It is however a reoccurring event which produces sound levels that may result in the mortality of species within the above ranges. For group two species, there is a maximum area of mortality of 0.86 km^2, and a negligible overlap of mortality noise (based on the stationary noise model) with spawning / nursery habitat area. Primary mitigation measures (**Section 9.9**) including soft start will provide an opportunity for all individuals to move out of the areas of potential mortality.

119. The magnitude of impact for mortality and mortal injury for group two species is therefore considered to be negligible.

Recoverable Injury

120. Group two fish at risk of recoverable injury for the array piling operations under the stationary model are predicted to occur within an area of approximately 0.02 km^2 or a maximum distance of 70 m from the source for peak sound pressure level, and an area of 6.2 km^2 or a maximum distance of 1600 m

from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or a maximum distance of less than 50 m from the source when the fleeing model is used.

121. Group two fish at risk of recoverable injury in proximity to the onshore substation (Liffey) piling operations under the stationary model are predicted to occur within an area of <0.01 km^2 or a maximum distance of <50 m from the source for peak sound pressure level, and an area of 2.8 km^2 or a maximum distance of 2,400 m from the source for cumulative level exposure. These values drop significantly to less than 0.1 km^2 or a maximum distance of <100 m from the source when the fleeing model is used.

122. The greatest percentage of area affected by recoverable injury under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 0.38 % and 0.11 % for haddock spawning and nursery, respectively (**Table 9-CC; Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**).

123. The greatest percentage of area affected by recoverable injury under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group two spawning and nursery species (**Table 9-CC; Appendix 9-B**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any noise impacts will only affect a small number of individuals of such species.

124. Impact piling operations will last a maximum of 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities and any impacts will be temporary. It is however a reoccurring event which produces sound levels that may result in the recoverable injury of species with the above ranges / overlaps. For Group two species, there is a maximum area of recoverable injury of 6.2 km^2, and a negligible overlap of mortality noise with spawning / nursery habitat (<1 % of habitat within the ICES regional study area at the most). As such, the magnitude for recoverable injury is considered negligible for **both the fleeing and stationary models**. Primary mitigation measures (**Section 9.9**) including soft start will provide an opportunity for all individuals to move out of the areas of potential recoverable injury.

125. The magnitude of impact for recoverable injury for group two species is therefore considered to be negligible.

Temporary Threshold Shift (TTS) / Behavioural responses

126. Group two fish at risk of TTS during the array piling operations under the stationary model are predicted to occur within an area of 230 km^2 or a maximum distance of 13 km from the source for cumulative level exposure. These values drop significantly to 5.7 km^2 or a maximum of 2.3 km from the source when the fleeing model is used.

127. Group two fish at risk of TTS in proximity to the onshore substation (Liffey) piling operations under the stationary model are predicted to occur within an area of 25 km^2 or a maximum distance of 11 km from the source for cumulative level exposure. These values drop significantly to 3.2 km^2 or a maximum of 3.5 km from the source when the fleeing model is used.

128. The greatest percentage of area affected by TTS under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 10.62 % and 3.99 % for haddock spawning and nursery, respectively (**Table 9-CC; Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**). It should be noted that the ICES regional study area does not contain the full extent of all available spawning and nursery grounds in the Irish sea, and as such the assessment provides a highly conservative value for the proportion of spawning or nursery habitats affected. In reality, considerably more spawning or nursery habitat is available to all species

ensuring minimal impact on spawning behaviours which can be undertaken across this wide availability of suitable alternative habitat.,

129. The greatest percentage of area affected by TTS under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is ≤0.18 % for all species (**Table 9-CC; Appendix 9-B**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any effect will only affect a small number of individuals of such species.

130. Impact piling operations will last a maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities and any impacts will be temporary. A maximum of two piles will be driven per day at the array site, for a total of seven hours of piling in a 24-hour period. While the percentage of overlap of a spawning area provides useful context, it does not take into account the short term and temporary nature of the work compared to the duration of available spawning potential. As such the proportion of spawning potential impacted has been calculated in **Table 9-BB**, using the TTS area as the greatest modelled area of impact. When availability of spawning duration is factored in, the greatest impact to spawning potential is 0.98 % (haddock). When compared to the available spawning habitat and duration, the impact is considered negligible, and effects will be imperceptible.

Table 9-BB Group two temporal overlap results and spawning potential (based on the stationary model) (presented only for species where there is greater than 1 % overlap with spawning habitat)

Species and spawning period (months)*	Spawning period (hours in one season) [total piling hours = 262.5]	Spawning potential (km^2h**)	Impacted spawning potential (km^2h)	Percentage of spawning potential impacted (%)***
Haddock (February - May)	2,856	4,679,607	45,678	0.98 %
Whiting (February - June)	3,576	8,401,277	27,935	0.33 %
Atlantic mackerel (March - July)	3,648	31,466,172	60,592	0.19 %
Ling (February - May)	2,856	24,634,700	60,592	0.25 %

Spawning period as per **Table 9-G** in months, converted to hours.

Spawning potential (km^2h) is the total potential spawning habitat available to each species in the ICES regional study area (km^2) multiplied by the spawning period (h) to provide a spatio-temporal reference.

Impacted spawning potential is the area of spawning habitat overlap by the noise contours (within the ICES regional study area) (km^2) over time (h) (i.e., multiplied by the maximum number of piling hours (262.5h)).

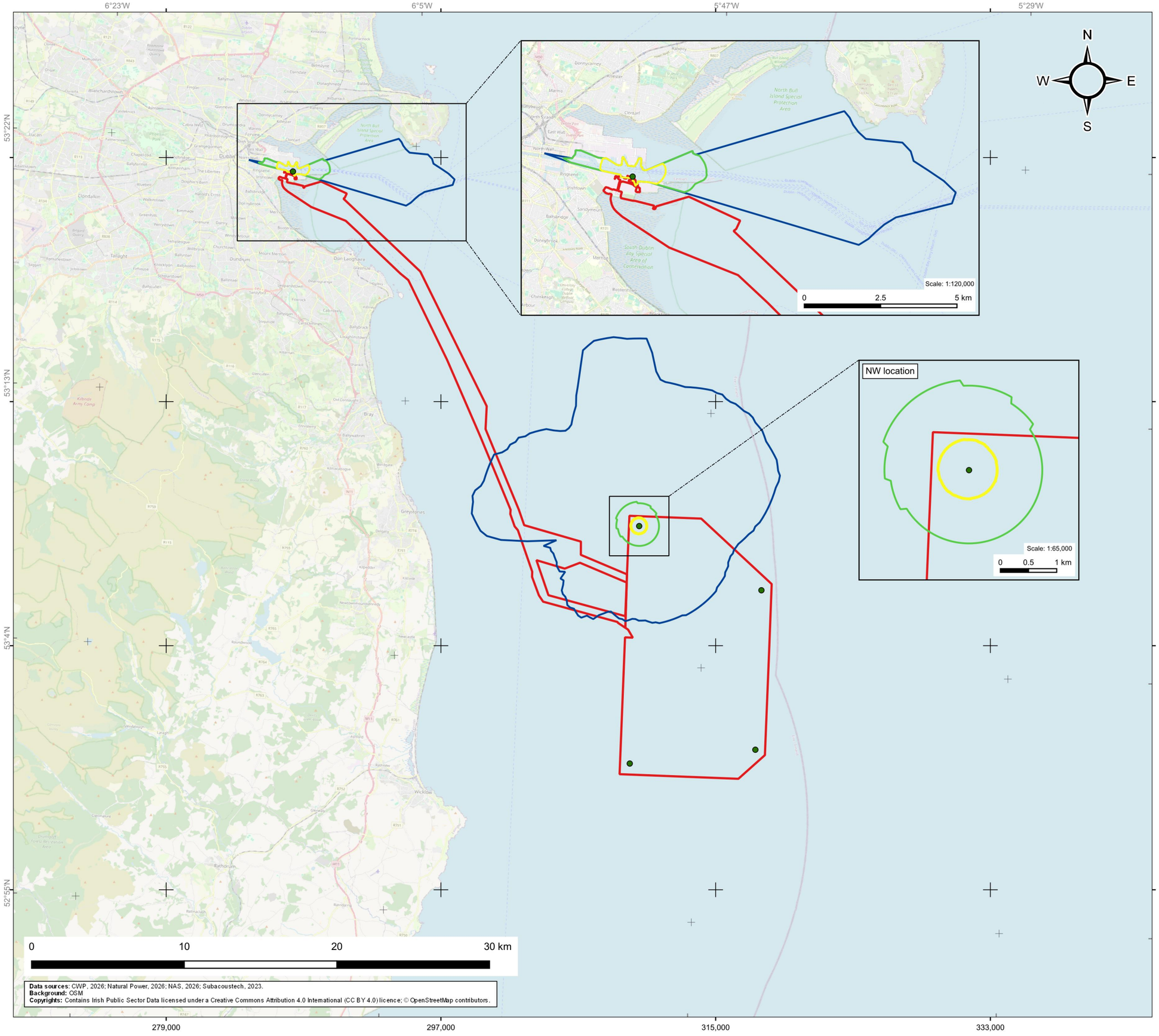
The proportion of spawning potential impacted is the total impacted spawning potential in relation to the total spawning potential.

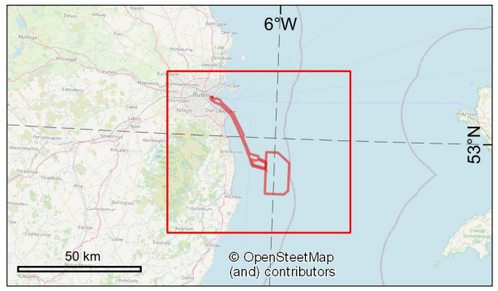
131. It is also recognised that there may be behavioural responses which extend beyond the threshold of the TTS areas. These behavioural responses are likely to be akin to predator avoidance responses and will decrease both in severity and in the percentage of the population affected as distance increases from the noise source (Knaap *et al*., 2021). Such behavioural responses will be short term, and due to the behavioural nature of the effects, recovery will be very fast, with potential for habituation over the term of the construction phase.

132. The magnitude of impact for temporary threshold shift ad behavioural effects for group two species is therefore considered to be negligible.

Table 9-CC Group two maximum noise overlap calculations of the spawning / nursery activity with the greatest overlap

	Spawning			Nursery		
Species	**Mortality**	**Recoverable Injury**	**TTS**	**Mortality**	**Recoverable Injury**	**TTS**
Fleeing						
Atlantic mackerel	<0.01 %	<0.01 %	0.08%	<0.01 %	<0.01%	0.05%
Atlantic horse mackerel	<0.01 %	<0.01 %	<0.01 %	<0.01 %	<0.01 %	0.05%
Whiting	<0.01 %	<0.01 %	0.08%	<0.01 %	<0.01 %	0.05%
Haddock	<0.01 %	<0.01 %	0.18%	<0.01 %	<0.01 %	0.12%
Ling	<0.01 %	<0.01 %	0.08%			
Stationary						
Atlantic mackerel	<0.01 %	0.07%	2.68%	<0.01 %	0.05%	1.80%
Atlantic horse mackerel	<0.01 %	<0.01 %	<0.01 %	0.01 %	0.05%	1.80%
Whiting	0.01 %	0.07%	4.53%	0.01 %	0.05%	2.53%
Haddock	0.05%	0.38%	10.62%	0.01%	0.11%	3.99%
Ling	0.01 %	0.07%	2.68%			





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 210 dB

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-DD
Group two noise modelling for species without nursery or spawning habitat

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1161

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.G2 - (EIAR.FIG.09.30)

Size: A3

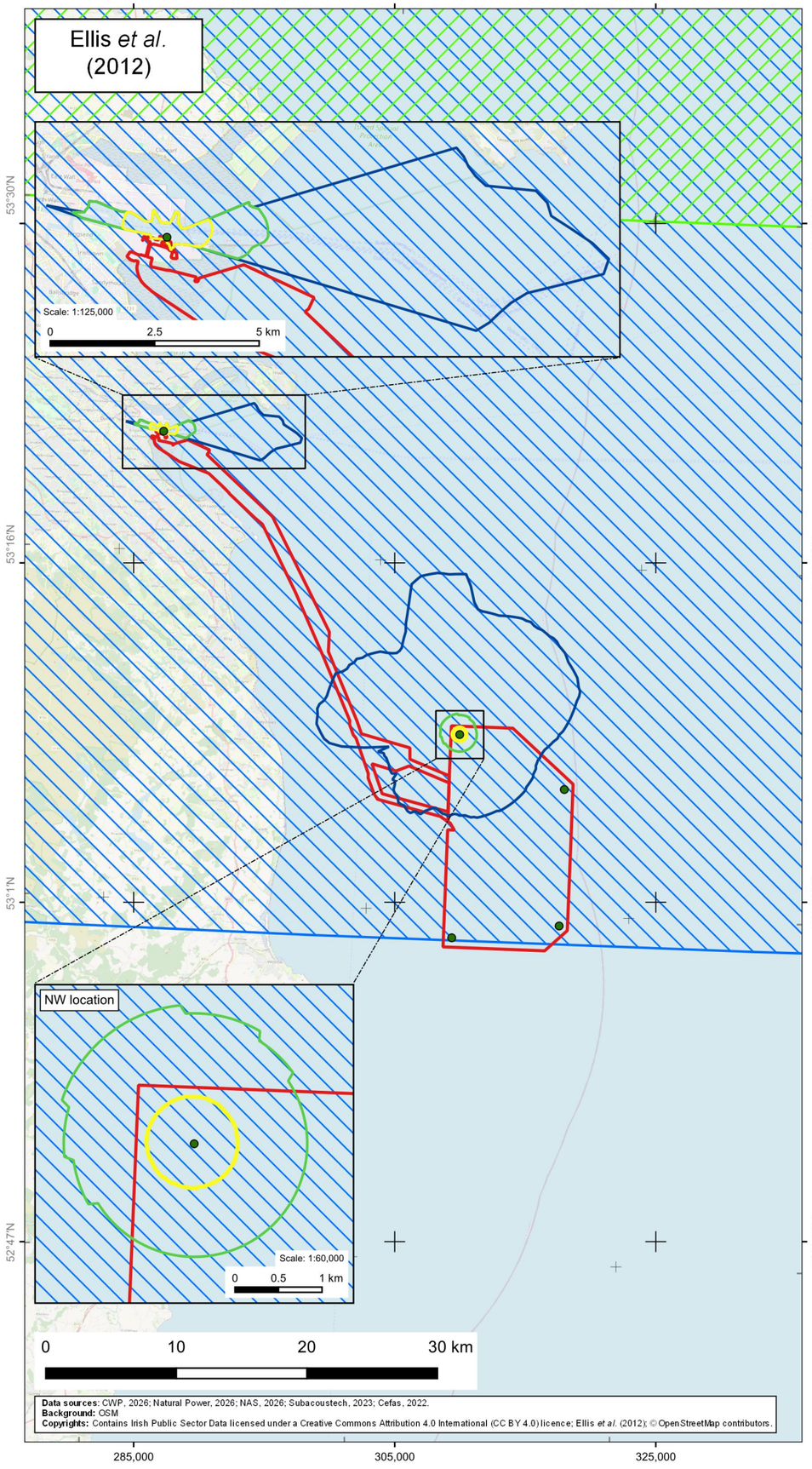
Scale: 1:240,000

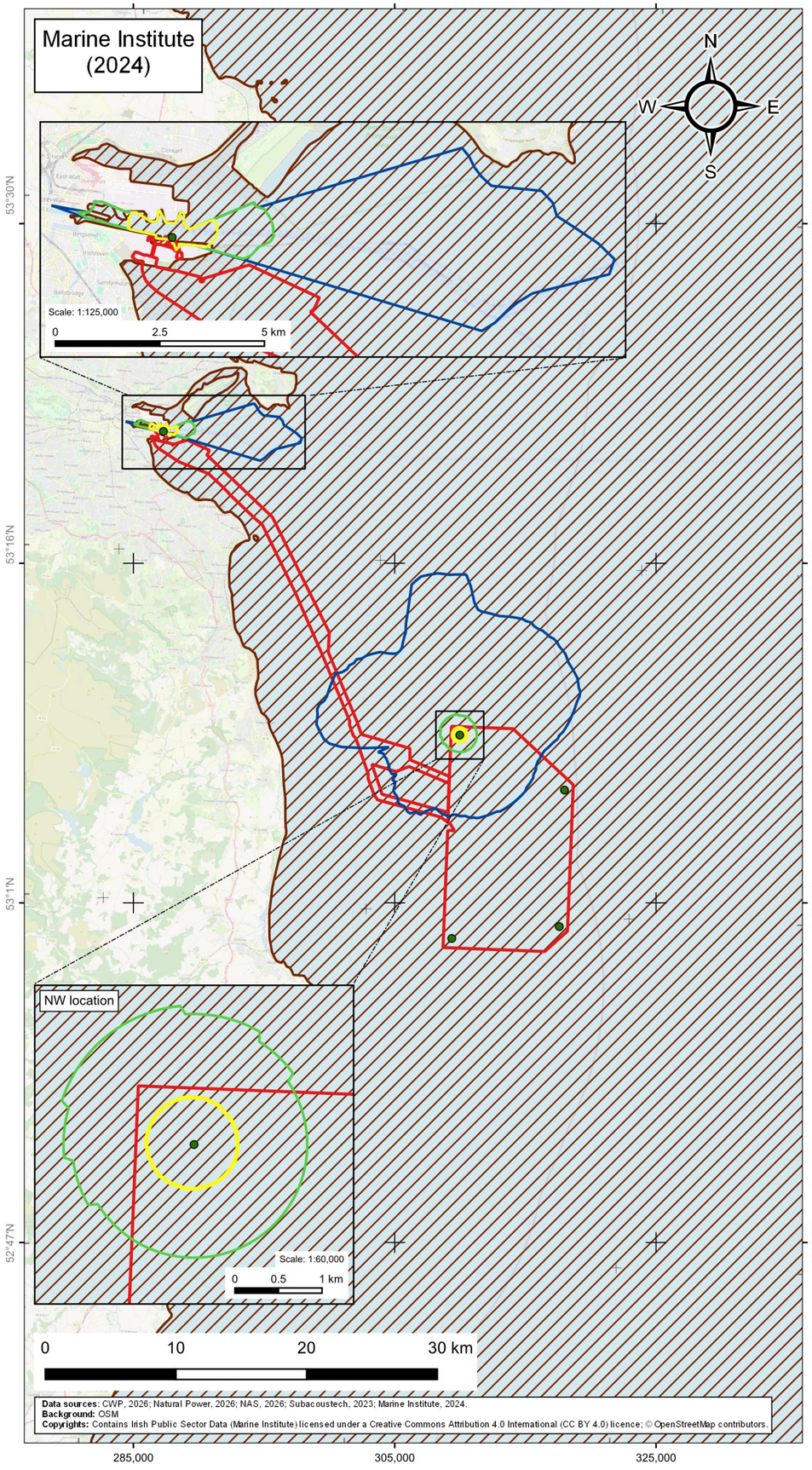
CRS: EPSG 25830

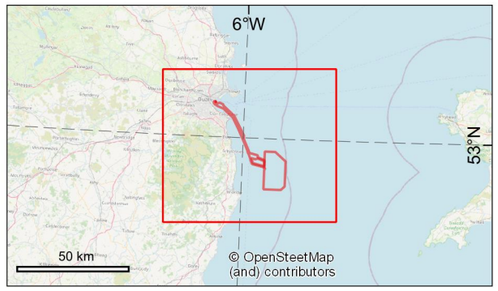
Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Ellis *et al.* (2012)

Marine Institute (2024)







Legend

- Planning Application Boundary (PAB)
- Local study area
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 210 dB

Ellis et al. (2012)

- Nursery ground low intensity
- Spawning ground low intensity

Marine Institute (2024)

- Nursery ground

Atlantic mackerel, whilst included in Coull et al. 1998, the species is not represented at a scale relevant to the refined project area and is therefore not shown.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-EE
Atlantic mackerel spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1162

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.NE.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.ATLANTIC.MACKEREL - (EIAR.FIG.09.31)

Size: A3

Scale: 1:400,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	VR

Ellis *et al.* (2012)

6°23'W
6°5'W
5°47'W
5°29'W
53°22'N
53°13'N
53°4'N
52°55'N
5,916,000
5,900,000
5,884,000
5,868,000
279,000
297,000
315,000
333,000

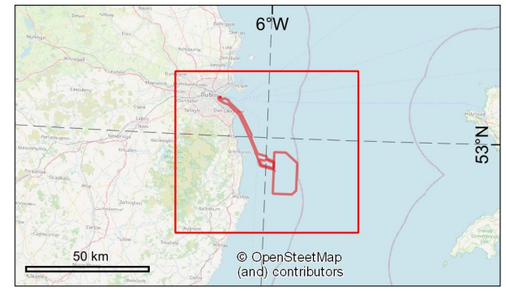
N
W
E
S

Scale: 1:120,000
0 2.5 5 km

NW location

Scale: 1:65,000
0 0.5 1 km

0 10 20 30 km



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 210 dB

Ellis et al. (2012)

- Spawning ground low intensity

Ling not covered in Marine Institute (2024) and Coull et al. (1998) datasets.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-FF
Ling spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1163

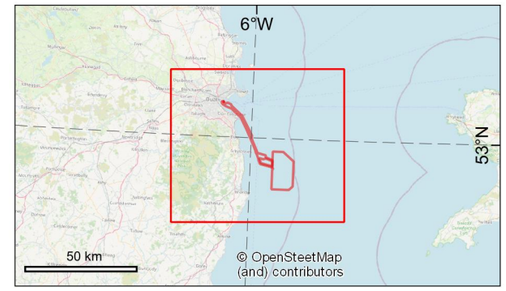
Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.NE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.LING - (EIAR.FIG.09.32)

Size: A3
Scale: 1:240,000
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Ellis *et al.* (2012)

Marine Institute (2024)



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 210 dB

Ellis et al. (2012)

- Spawning ground low intensity

Marine Institute (2024)

- Nursery ground

Atlantic horse mackerel not covered in Coull et al. (1998) dataset.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-GG
Atlantic horse mackerel spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1164

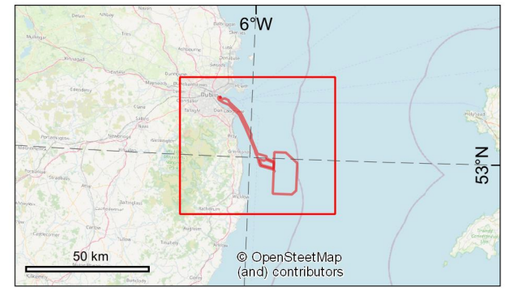
Internal descriptive code:	Size:	CRS:
OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.HORSE.MACKEREL - EIAR.FIG.09.33	A3	EPSG 25830
	Scale: 1:400,000	

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Coull *et al.* (1998)

Ellis *et al.* (2012)

Marine Institute (2024)



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 210 dB

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity
- Spawning ground low intensity

Marine Atlas (2024)

- Nursery ground
- Spawning ground

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-HH
Whiting spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1165

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.NW.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.WHITING - (EIAR.FIG. 09.34)

Size: A3

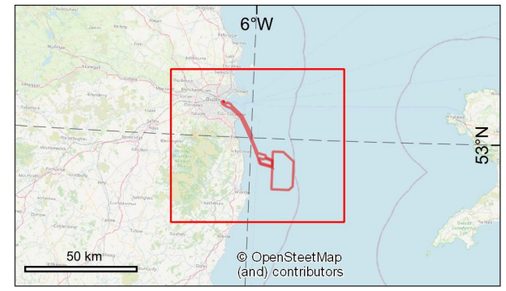
Scale: 1:550,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Coull *et al.* (1998)

Marine Institute (2024)



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 210 dB

Coull et al. (1998)

- Nursery ground undetermined intensity

Marine Institute (2024)

- Nursery ground
- Spawning ground

Haddock not covered in Ellis et al. (2012) dataset.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-II
Haddock spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1166

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.NE.NW..DPNM.CONT. SS.PP - FSTESAs.LRN..SNG.HADDOCK - (EIAR.FIG.09.35)

Size: A3

Scale: 1:400,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Group Three

133. The identification of thresholds (as per Popper *et al*., 2014), as well as the representative scenario (SE modelling location) outputs for group three species are listed in **Table 9-DD** for pile driving. The maximum, mean and minimum values represent the largest radius of impact from the modelling location which is directly influenced by the bathymetry within the receiving environment. A visualisation of the sound level contours for group three species can be seen in **Figure 9-KK,** and where relevant species-specific overlaps with established data sources on nursery / spawning habitats can be seen in **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**.

Table 9-DD Underwater noise modelling outputs for pile driving for Group three species

					Array – representative scenario (SE modelling location)				Liffey		
Activity	**Response**	**Level**	**Risk**	**Threshold**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**	**Minimum (m)**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**
Piling	Stationary	SPL_{peak}	Mortality and potential mortal injury	≥207 dB	0.02	70	70	70	<0.01	<50	<50
			Recoverable injury	≥207 dB	0.02	70	70	70	<0.01	<50	<50
		SEL_{cum}	Mortality and potential mortal injury	≥207 dB	2.0	860	790	740	1.6	1600	520
			Recoverable injury	≥203 dB	6.2	1,600	1,400	1,300	2.8	2,400	630
			Temporary Threshold Shift	≥186 dB	230	13,000	8,500	7,000	25	11,000	1,300
	Fleeing	SEL_{cum}	Mortality and potential mortal injury	≥207 dB	<0.01	<50	<50	<50	<0.1	<100	<100
			Recoverable injury	≥203 dB	<0.01	<50	<50	<50	<0.1	100	<100
			Temporary Threshold Shift	≥186 dB	5.7	2,300	1,200	600	3.2	3,500	630

Mortality

134. Group three fish mortality for the array piling operations area under the stationary model is predicted to occur within an area of approximately 0.02 km^2 or a maximum distance of 70 m from the source for peak sound pressure level, and an area of 2 km^2 or a maximum distance of 860 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 50 m from the source when the fleeing model is used.

135. Group three fish mortality in proximity to the Liffey piling operations under the stationary model is predicted to occur within an area of approximately <0.01 km^2 or a maximum distance of <50 m from the source for peak sound pressure level, and an area of 1.6 km^2 or a maximum distance of 1.6 km from the source for cumulative level exposure. These values drop significantly to less than 0.1 km^2 or less than 100 m from the source when the fleeing model is used.

136. Of the group three hearing species, the following have spawning (S) and / or nursery (N) grounds in the regional area: European sprat (S), anglerfish (N), and Atlantic cod (S / N). Of note, while present in the National study area, there is no TTS (stationary) noise overlap between Atlantic herring spawning habitat (**Figure 9-JJ**).

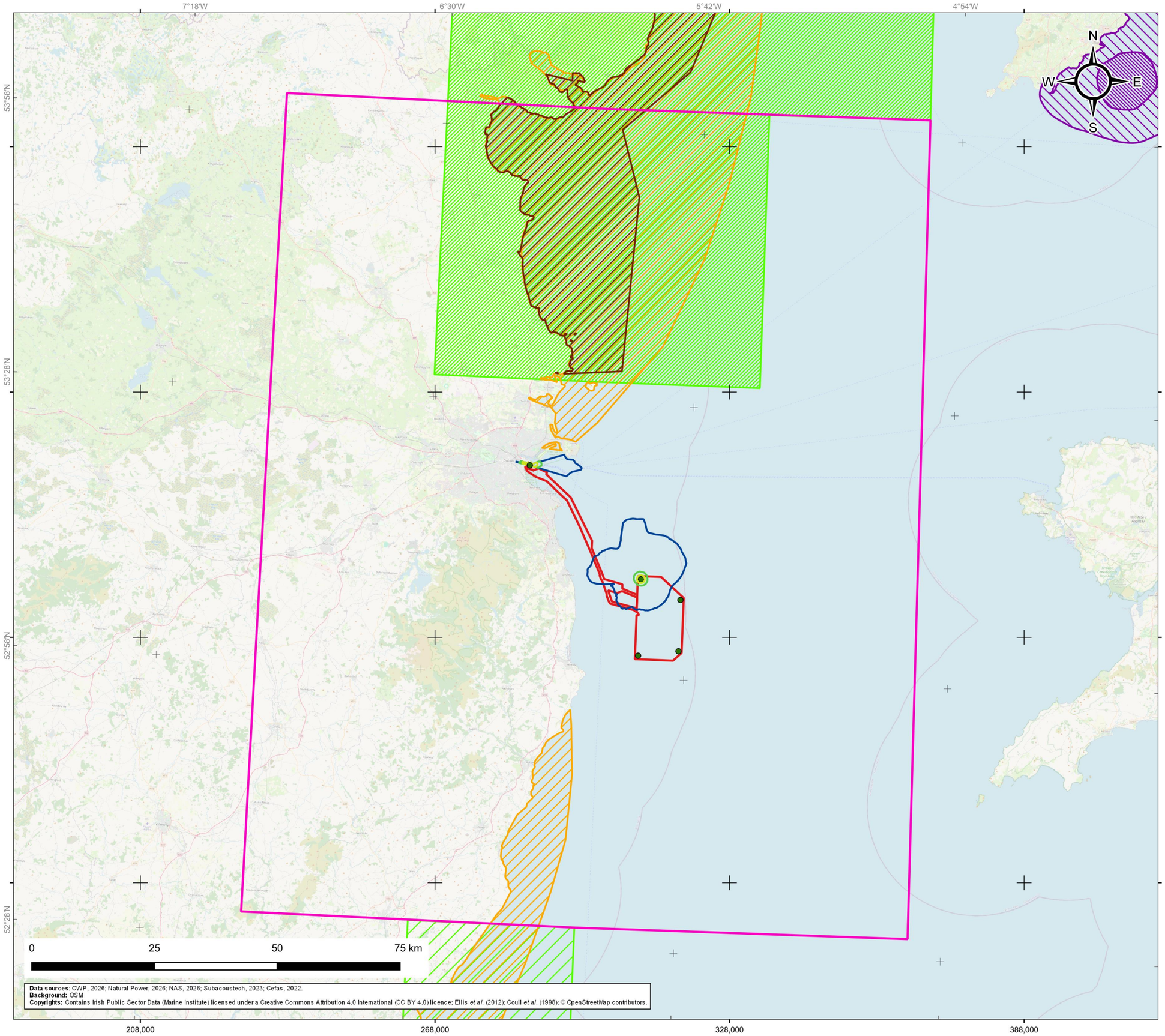
137. The overlap of the noise modelling contours with the known spawning and nursery habitat within the ICES regional study area has been calculated in **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations** and maximum values presented in **Table 9-FF** based upon the stationary and fleeing model. For visualisation of the noise overlap (based on the stationary model) with spawning and nursery grounds, refer to e.g. **Figure 9-LL** and **Figure 9-MM**.

138. The greatest percentage of area affected by mortality under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 0.06 % and 0.04 % for Atlantic cod spawning and nursery, respectively (**Table 9-FF; Appendix 9-B**).

139. The greatest percentage of area affected by mortality under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group three spawning and nursery species (**Table 9-FF; Appendix 9-B**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any noise impacts will only affect a small number of individuals of such species.

140. Piling activities will last a maximum 78 days over the construction period for the array site, and for 14 days (of up to 8 hours per day) for the onshore substation activities and any impacts will be temporary. It is however a reoccurring event which produces sound levels that may result in the mortality of species with the above ranges / overlaps. For Group three species, there is a maximum area of mortality of 2 km^2, and a negligible overlap of mortality noise (based on the stationary model) with spawning / nursery habitat (<0.1 % of habitat within the ICES regional study area). As such, the magnitude for mortality is considered negligible for **both the fleeing and stationary models**. Primary mitigation measures (**Section 9.9**) including soft start, and the proposed noise limit, will provide an opportunity for all individuals to move out of the areas of potential mortality.

141. The magnitude of impact for mortality and mortal injury for group three species is therefore considered to be negligible.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 207 dB

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity

Marine Institute (2024)

- Nursery ground

codling wind park	*Project:* Codling Wind Park	*Contractor:* www.naturalpower.com natural power

Figure 9-JJ
Herring spawning grounds in relation to the Group three stationary TTS noise contours (>186 dB)

CWP doc. number: CWP-NPC-CON-09-MAP-2153

Internal descriptive code:	*Size:*	*CRS:*
N/A	A3	EPSG 25830
	Scale: 1:750,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/28	AC	AK/EA	ME

Recoverable Injury

142. Group three fish at risk of recoverable injury during the array piling operations under the stationary model are predicted to occur within an area of approximately 0.02 km^2 or a maximum distance of 70 m from the source for peak sound pressure level, and an area of 6.2 km^2 or a maximum distance of 1600 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or a maximum distance of less than 50 m from the source when the fleeing model is used.

143. Group three fish at risk of recoverable injury in proximity to the onshore substation (Liffey) piling operations under the stationary model are predicted to occur within an area of approximately <0.01 km^2 or a maximum distance of <50 m from the source for peak sound pressure level, and an area of 2.8 km^2 or a maximum distance of 2.4 km from the source for cumulative level exposure. These values drop significantly to less than 0.1 km^2 or a maximum distance of 100 m from the source when the fleeing model is used.

144. The greatest percentage of area affected by recoverable injury under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 0.19 % and 0.12 % for Atlantic cod spawning and nursery, respectively (**Table 9-FF; Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**).

145. The greatest percentage of area affected by recoverable injury under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.01 % for all group three spawning and nursery species (**Table 9-FF; Appendix 9-B**).It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any effect will only affect a small number of individuals of such species.

146. Piling is a temporary impact of maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities. It is however a reoccurring event which produces sound levels that may result in the recoverable injury of species with the above ranges / overlaps. For Group three species, there is a maximum area of recoverable injury of 6.2 km^2, and a negligible overlap of mortality noise with spawning / nursery habitat (<0.2 % of habitat within the ICES regional study area at the most). As such, the magnitude for recoverable injury is considered negligible for **both the fleeing and stationary models**. Primary mitigation measures (**Section 9.9**) including soft start will provide an opportunity for all individuals to move out of the areas of potential recoverable injury.

147. The magnitude of impact for recoverable injury for group three species is therefore considered to be negligible.

Temporary Threshold Shift (TTS) / Behavioural responses

148. Group three fish at risk of TTS during the array piling operations under the stationary model are predicted to occur within an area of 230 km^2 or a maximum distance of 13 km from the source from cumulative level exposure. These values drop significantly to 5.7 km^2 or a maximum of 2.3 km from the source when the fleeing model is used.

149. Group three fish at risk of TTS in proximity to the onshore substation (Liffey) piling operations under the stationary model are predicted to occur within an area of 25 km^2 or a maximum distance of 11 km from the source for cumulative level exposure. These values drop significantly to 3.2 km^2 or a maximum of 3.5 km from the source when the fleeing model is used.

150. The greatest percentage of area affected by TTS under the stationary model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is 5.88 % and 4.01 %

for Atlantic cod spawning and nursery, respectively (**Table 9-FF; Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations**).

151. The greatest percentage of area affected by TTS under the fleeing model (based upon the overlap with available spawning and nursery areas within the ICES regional study area) is <0.2 % (TTS ZoI in **Table 9-X;** full detail in **Appendix 9-B**). It is recognised that fish species not engaged in spawning activities may be present in the area, however, it is considered that any noise impacts will only affect a small number of individuals of such species.

152. Impact piling operations will last a maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities, and any impacts will be temporary. A maximum of two piles will be driven per day at the array site, for a total of seven hours of piling in a 24-hour period. While the percentage of overlap of a spawning area provides useful context, it does not take into account the short term and temporary nature of the work compared to the duration of available spawning potential. As such the proportion of spawning potential impacted has been calculated in **Table 9-EE**, using the TTS area as the greatest area of impact with a modelled threshold. When availability of spawning duration is factored in, the greatest impact to spawning potential 0.54 % (Atlantic cod). When compared to the available spawning habitat and duration, the impact is considered negligible, and effects will be imperceptible.

Table 9-EE Group three temporal overlap results and spawning potential (based on the stationary model) (presented only for species where there is greater than 1 % overlap with spawning habitat)

Species and spawning period (months)*	Spawning period (hours in one season) [total piling hours = 262.5]	Spawning potential (km^2h**)	Impacted spawning potential (km^2h)	Percentage of spawning potential impacted (%)***
European sprat (May – August)	2928.00	37,718,909	60,790	0.16 %
Atlantic cod (January - April)	2856.00	9,620,615	51,988	0.54 %

Spawning period as per **Table 9-G** in months, converted to hours.

Spawning potential (km^2h) is the total potential spawning habitat available to each species in the ICES regional study area (km^2) multiplied by the spawning period (h) to provide a spatio-temporal reference.

Impacted spawning potential is the area of spawning habitat overlap by the noise contours (within the ICES regional study area) (km^2) over time (h) (i.e., multiplied by the maximum number of piling hours (262.5h)).

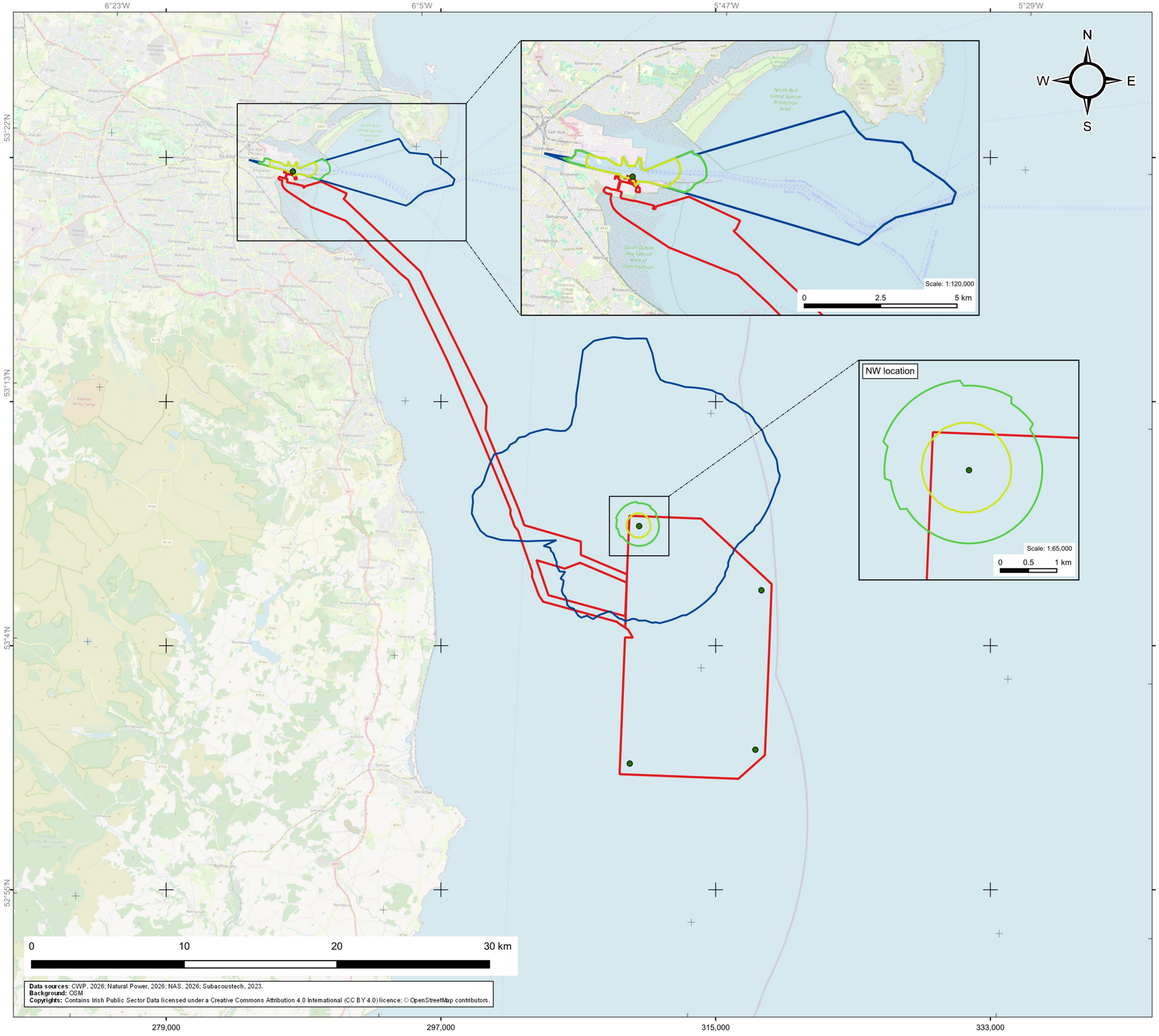
The proportion of spawning potential impacted is the total impacted spawning potential in relation to the total spawning potential.

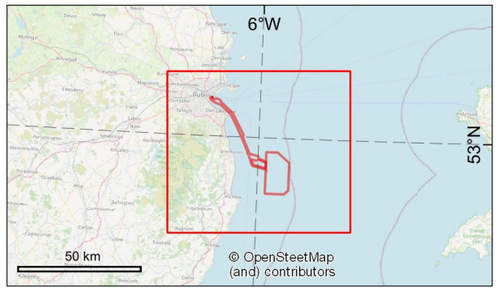
153. It is also recognised that there may be behavioural responses which extend beyond the threshold of the TTS areas. These behavioural responses are likely to be akin to predator avoidance responses and will decrease both in severity and in the percentage of the population affected as distance increases from the noise source (Knaap *et al*., 2021). Such behavioural responses will be short term, and due to the behavioural nature of the effects, recovery will be very fast, with potential for habituation

over the term of the construction phase. The magnitude of impact for temporary threshold shift and behavioural effects for group three species is therefore considered to be negligible.

Table 9-FF Group three maximum noise overlap calculations of the spawning / nursery activity with the greatest overlap

	Spawning			Nursery		
Species	**Mortality**	**Recoverable Injury**	**TTS**	**Mortality**	**Recoverable Injury**	**TTS**
Fleeing						
Anglerfish				<0.01 %	<0.01 %	0.05%
European sprat	<0.01 %	<0.01 %	0.05%			
Atlantic cod	<0.01 %	<0.01 %	0.09%	<0.01 %	<0.01 %	0.13%
Stationary						
Anglerfish				0.02%	0.05%	1.80%
European sprat	0.02%	0.05%	1.80%			
Atlantic cod	0.06%	0.19%	5.88%	0.04%	0.12%	4.01%





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 207 dB

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-KK
Group three noise modelling for species without nursery or spawning habitat

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1167

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.G3 - (EIAR.FIG.09.36)

Size: A3

Scale: 1:240,000

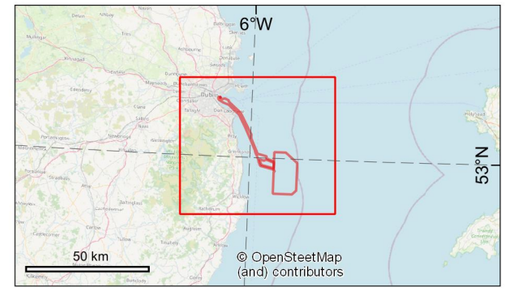
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Coull *et al.* (1998)

Ellis *et al.* (2012)

Marine Institute (2024)



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 207 dB

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground high intensity
- Spawning ground low intensity

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity
- Spawning ground low intensity

Marine Atlas (2024)

- Nursery ground
- Spawning ground

Scale: 1:160,000
0 2.5 5 km

0 10 20 30 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.

codling wind park	*Project:* Codling Wind Park	*Contractor:* natural power www.naturalpower.com

Figure 9-LL
Atlantic cod spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1169

Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.NE.NW..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.COD - (EIAR.FIG.09.38)

Size: A3 *Scale:* 1:550,000 *CRS:* EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	VR

Coull *et al.* (1998)

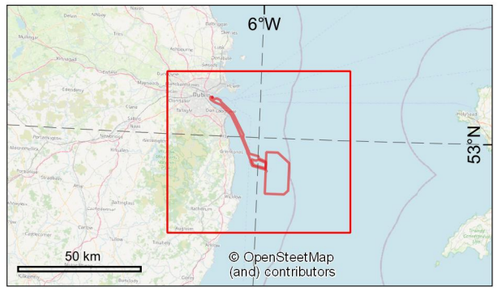
6°23'W
6°5'W
5°47'W
5°29'W
53°22'N
53°13'N
53°4'N
52°55'N
5,916,000
5,900,000
5,884,000
5,868,000
279,000
297,000
315,000
333,000

N
W
E
S

Scale: 1:120,000
0 2.5 5 km

NW location
Scale: 1:65,000
0 0.5 1 km

0 10 20 30 km



Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 186 dB
- 203 dB
- 207 dB

Coull et al. (1998)

- Spawning ground undetermined intensity

European sprat is not covered in Marine Institute (2024) and Ellis et al. (2012) datasets.

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023; Cefas, 2022.
Background: OSM
Copyrights: Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Coull *et al.* (1998); © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-MM
European sprat spawning and / or nursery overlap with noise modelling contours

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1170

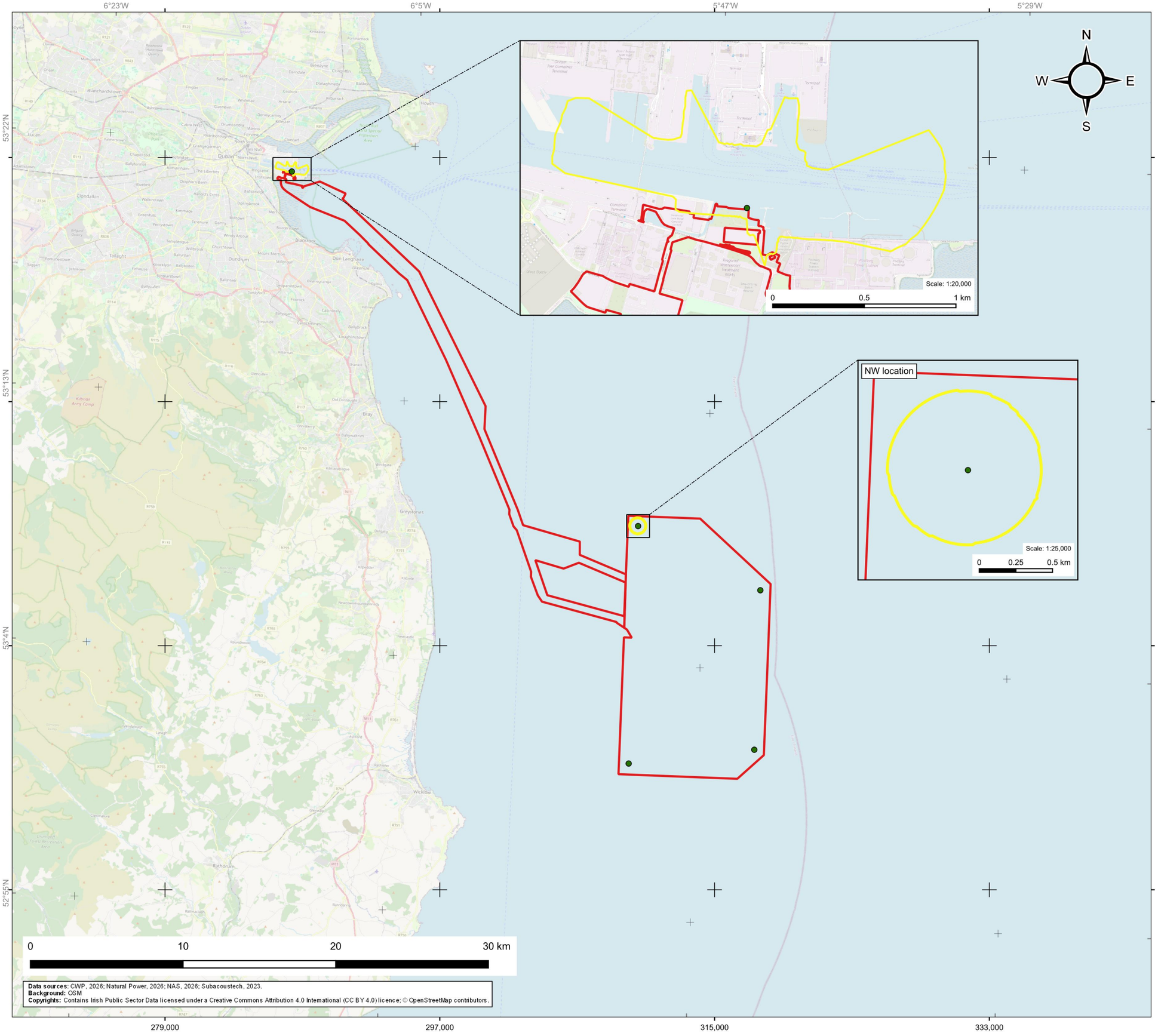
Internal descriptive code: OFFSH.ALL - PAB..DPNMLs..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.EUROPEAN.SPRAT - EIAR.FIG.09.39

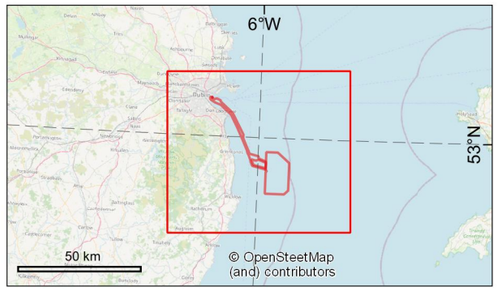
Size: A3
Scale: 1:240,000
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Group Four

154. The identification of thresholds (as per Popper *et al*., 2014), as well as the representative scenario (SE modelling location) outputs for group four species are listed in **Table 9-GG** for pile driving. The maximum, mean and minimum values represent the largest radius of impact from the modelling location which is directly influenced by the bathymetry within the receiving environment. A visualisation of the sound level contours for group four species can be seen in **Figure 9-NN**.





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

North West and Liffey noise modelling contours

- 210 dB

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-NN
Group four and turtle noise modelling for species without nursery or spawning habitat

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1171

Internal descriptive code: OFFSH.ALL - PAB..DPNM.Ls..DPNM.CONT.WTG.SE..DPNM.CONT.SS.PP - FSTESAs.LRN..SNG.G4 - (EIAR.FIG.09.40)

Size: A3

Scale: 1:240,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/27	AC	AK/EA	ME

Table 9-GG Underwater noise modelling outputs for pile driving for Group four species

					Array – representative scenario (SE modelling location)				Liffey		
Activity	**Response**	**Level**	**Risk**	**Threshold**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**	**Minimum (m)**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**
Piling	Stationary	SPLpeak	Mortality and potential mortal injury	≥207 dB	0.02	70	70	70	<0.01	<50	<50
		SELcum	Mortality and potential mortal injury	≥210 dB	0.86	550	520	500	1	1100	450

Mortality

155. As per **Table 9-GG**, for the array site piling operations under the stationary model, mortality may occur in an area of approximately 0.02 km^2 or a maximum distance of 70 m from the source for peak sound pressure level, and an area of 0.86 km^2 or a maximum distance of 550 m from the source for cumulative level exposure.

156. In proximity to the onshore substation (Liffey) piling operations under the stationary model, mortality may occur in an area of approximately <0.01 km^2 or a maximum distance of <50 m from the source for peak sound pressure level, and an area of 1 km^2 or a maximum distance of 1.1 km from the source for cumulative level exposure.

157. The magnitude of impact for mortality and mortal injury for group four receptors is therefore considered to be negligible.

Shellfish

158. Whilst a subset of bony fish are able to detect sound pressure, due to the lack of compressible gas-filled organs or cavities which play an important role in such detection, marine invertebrates (including whelk) are not considered to be sensitive to the pressure component of underwater noise (Di Franco *et al*., 2020; Cook *et al*., 2017; Roberts and Elliott, 2017; Edmonds *et al*., 2016; Roberts *et al*., 2016; Mooney *et al*., 2012). However, it is now understood that all fishes and many marine invertebrates can detect the particle motion components of sound (Popper *et al*., 2022; Hawkins *et al*., 2021; Nedelec *et al*., 2016). Furthermore, recent thinking is that fishes and invertebrates that live on or close to the substrate are able to detect substrate-borne vibrations from activities where there is direct contact of a sound source with the substrate (e.g., through impact piling) or where sound energy enters the substrate through the water from intense sources (e.g., air guns) (Hawkins *et al*., 2022; Roberts and Elliott, 2017).

159. Based on the current literature to date, there is no evidence of mortality-associated population effects (such as reduced abundance or catch rates) of invertebrates following exposure to anthropogenic sound sources such as those typical of drilling, impact piling or survey work (Bluewise Marine, 2023). Research on invertebrates provides evidence for low-frequency sound detection abilities which may result in short term, temporary, behavioural responses in marine invertebrate species (Roberts and Breithaupt, 2016; Carroll *et al*., 2017, Bluewise Marine, 2023). For example, Norway lobster was shown to exhibit repressed burying and reduced locomotion behaviour in response to impact piling sound exposure (Solan *et al.,* 2016). The European hermit crab (*Pagurus bernhardus*) showed an increased delay in antipredator responses due to noise related disturbance, potentially leading to a higher risk of predation (Tidau *et al*., 2016).

160. The only shellfish species for which there is spawning / nursery information is Norway lobster. While it is established above that shellfish lack sound detecting organs, temporary changes in behaviour are known to occur, therefore the area of this impact for Norway lobster is presented in **Table 9-HH**.

161. Piling is a temporary impact of a maximum 78 days over the construction period for the array site piling, and for 14 days (of up to 8 hours per day) for the onshore substation activities. A maximum of two piles will be driven per day at the array site, for a total of seven hours of piling in a 24-hour period. While the percentage of overlap of a spawning area provides useful context, it does not take into account the short term and temporary nature of the work compared to the duration of available spawning potential. As such the proportion of spawning potential impacted has been calculated in **Table 9-HH**, using the TTS area as the greatest area of impact with a modelled threshold. When availability of spawning duration is factored in, the greatest impact to spawning potential is 0.36 %

(Norway lobster). When compared to the available spawning habitat and duration, the impact is considered negligible, and effects will be imperceptible.

162. The magnitude of impact on shellfish species is therefore considered to be negligible.

Table 9-HH Shellfish temporal overlap results (based on the stationary model) (presented only for species where there is greater than 1 % overlap with spawning or nursery habitat)

Species and spawning period (months)*	Spawning period (hours in one season) [total piling hours = 262.5]	Spawning potential (km^2h**)	Impacted spawning potential (km^2h)	Percentage of spawning potential impacted (%)***
Norway lobster (*Nephrops norvegicus*) (April – June)	2,160	15,169,178.32	54,912.34	0.36%

Spawning period as per **Table 9-G** in months, converted to hours.

Spawning potential (km^2h) is the total potential spawning habitat available to each species in the ICES regional study area (km^2) multiplied by the spawning period (h) to provide a spatio-temporal reference.

Impacted spawning potential is the area of spawning habitat overlap by the noise contours (within the ICES regional study area) (km^2) over time (h) (i.e., multiplied by the maximum number of piling hours (262.5h)).

The proportion of spawning potential impacted is the total impacted spawning potential in relation to the total spawning potential.

Turtles

163. The identification of thresholds (as per Popper *et al*., 2014), as well as the representative scenario (SE modelling location) outputs for turtle species are listed in **Table 9-II** for pile driving. The maximum, mean and minimum values represent the radius of impact from the modelling location which is directly influenced by the bathymetry within the receiving environment. A visualisation of the sound level contours for turtles can be seen in **Figure 9-NN.**

Table 9-II Underwater noise modelling outputs for pile driving for turtles

					Array – representative scenario (SE modelling location)				Liffey		
Activity	**Response**	**Level**	**Risk**	**Threshold**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**	**Minimum (m)**	**Area (km^2)**	**Maximum (m)**	**Mean (m)**
Piling	Stationary	SPL_{peak}	Mortality and potential mortal injury	≥207 dB	0.02	70	70	70	<0.01	<50	<50
		SEL_{cum}	Mortality and potential mortal injury	≥210 dB	0.86	550	500	520	1	1100	450
	Fleeing	SEL_{cum}	Mortality and potential mortal injury	≥210 dB	<0.01	<50	<50	<50	<0.1	<100	<100

Mortality

164. As per **Table 9-II**, turtle mortality for the array site piling operations following the implementation of mitigation under the stationary model is predicted to occur within an area of approximately 0.02 km^2 or a maximum distance of 70 m from the source for peak sound pressure level, and an area of 0.86 km^2 or a maximum distance of 550 m from the source for cumulative level exposure. These values drop significantly to less than 0.01 km^2 or less than 50 m from the source when the fleeing model is used.

165. As per **Table 9-II,** turtle mortality in proximity to the onshore substation (Liffey) piling operations under the stationary model is predicted to occur within an area of less than 0.01 km^2 or a maximum distance of less than 50 m from the source for peak sound pressure level, and an area of 1 km^2 or a maximum distance of 1,100 m from the source for cumulative level exposure. These values drop significantly to less than 0.1 km^2 or less than 100 m from the source when the fleeing model is used.

166. Part of the primary mitigation measures (**Section 9.9**) includes the use of a soft start to piling activities as part of the MMMP. The mitigation will also ensure that there are no turtles within the area when piling begins.

167. The magnitude of impact for mortality and mortal injury for turtle species is therefore considered to be negligible.

Summary of magnitude of impact

168. Across all receptor groups assessed, the magnitude of impact arising from noise and vibration during construction has been evaluated. The CWP Project will implement mitigation for pile driving and this assessment has been conducted using the mitigated underwater noise modelling outputs.

169. The assessment considers the spatial extent of mortality, recoverable injury and TTS / behavioural responses, the short-term and intermittent nature of the various construction activities considered, the limited proportion of spawning and nursery habitat affected, and the availability of extensive comparable habitat within the ICES regional study area.

170. For all species, there is a maximum area of TTS of 230 km^2, or an overlap of stationary TTS noise with spawning / nursery areas of between <0.01 % to 10.62 % of habitat within the ICES regional study area, and effects on spawning potential of no greater than 0.98 %.

171. Taking a precautionary approach and applying the greatest magnitude identified across all receptor groups, the overall magnitude of impact arising from noise and vibration during construction is considered to be **negligible** for both fleeing and stationary models.

Significance of effect

Group One

172. The significance of effect has been summarised by each receptor in **Table 9-JJ.**

Table 9-JJ Determination of Significance for group one VERs based upon greatest received magnitude of effect

Species	Sensitivity	Mortality / mortal injury		Recoverable injury		TTS	
		Magnitude	Significance	Magnitude	Significance	Magnitude	Significance
Small-spotted catshark	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Cuckoo ray	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Blonde ray	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
European plaice	Very Low	Negligible	**Imperceptible** (not significant)	Negligible	**Imperceptible** (not significant)	Negligible	**Imperceptible** (not significant)
Sandeel	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Lemon sole	Very Low	Negligible	**Imperceptible** (not significant)	Negligible	**Imperceptible** (not significant)	Negligible	**Imperceptible** (not significant)
Common sole	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Undulate ray	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Thornback ray	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Spotted ray	Medium	Negligible	**Slight / Not significant (**not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)

Species	Sensitivity	Mortality / mortal injury		Recoverable injury		TTS	
		Magnitude	Significance	Magnitude	Significance	Magnitude	Significance
Spurdog / spiny dogfish	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Sea lamprey	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
River lamprey	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Tope	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Common skate	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Angel shark	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Basking shark	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)

173. In summary, the 'group one' fish are identified as having medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. This results in a slight / not significant assessment outcome, which is not significant. The impact of noise and vibration from piling is considered to be **not significant** for all group one species, based on the stationary model.

174. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

175. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Group Two

176. The significance of effect has been summarised by each receptor in **Table 9-KK.**

Table 9-KK Determination of Significance for group two fish based upon greatest received magnitude of effect

Species	Sensitivity	Mortality / mortal injury		Recoverable injury		TTS	
		Magnitude	Significance	Magnitude	Significance	Magnitude	Significance
European hake	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Sea trout	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Atlantic mackerel	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Whiting	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Atlantic horse mackerel	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Ling	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Haddock	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Atlantic salmon	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)

177. In summary, group two fish are identified as having low to medium sensitivities. The magnitude of impact is predicted to be negligible. The greatest significance assessed for the group species is slight / not significant, which is not significant. The impact of noise and vibration from construction activities is considered to be **not significant** for all group two species.

178. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

179. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Group Three

180. The significance of effect has been summarised by each receptor in **Table 9-LL**.

Table 9-LL Determination of Significance for group three VERs based upon greatest received magnitude of effect

Species	Sensitivity	Mortality / mortal injury		Recoverable injury		TTS	
		Magnitude	Significance	Magnitude	Significance	Magnitude	Significance
Anglerfish	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
European smelt	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Atlantic herring	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
European sprat	Low	Negligible	**Not significant**	Negligible	**Not significant**	Negligible	**Not significant**
Atlantic cod	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight** (not significant)
Twaite shad	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
Allis shad	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)
European eel	Medium	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)	Negligible	**Slight / Not significant** (not significant)

181. In summary, the 'group three' fish are identified as having medium sensitivity overall, sensitivity ranges between low to medium for individual species of the group. The magnitude of impact is predicted to be negligible. This results in a slight / not significant assessment outcome, which is not significant. The impact of noise and vibration from construction activities is considered to be **not significant** for all group three species, based on the stationary model.

182. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

183. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Group Four

184. The significance of effect has been summarised by each receptor in **Table 9-MM**.

Table 9-MM Determination of Significance for group four (eggs and larvae) based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Small-spotted catshark	Low	Negligible	**Not significant**
Cuckoo ray	Medium	Negligible	**Slight / Not significant** (not significant)
Blonde ray	Medium	Negligible	**Slight / Not significant** (not significant)
European plaice	Very Low	Negligible	**Imperceptible** (not significant)
Sandeel	Low	Negligible	**Not significant**
Lemon sole	Very Low	Negligible	**Imperceptible** (not significant)
Common sole	Low	Negligible	**Not significant**
Undulate ray	Medium	Negligible	**Slight / Not significant** (not significant)
Thornback ray	Medium	Negligible	**Slight / Not significant** (not significant)
Spotted ray	Medium	Negligible	**Slight / Not significant** (not significant)
European hake	Low	Negligible	**Not significant**
Atlantic mackerel	Low	Negligible	**Not significant**
Whiting	Low	Negligible	**Not significant**
Atlantic horse mackerel	Low	Negligible	**Not significant**
Ling	Low	Negligible	**Not significant**
Haddock	Low	Negligible	**Not significant**
Anglerfish	Low	Negligible	**Not significant**
Atlantic herring	Low	Negligible	**Not significant**
European sprat	Low	Negligible	**Not significant**
Atlantic cod	Low	Negligible	**Not significant**

185. In summary, the 'group four' receptors are identified as having medium sensitivity, (overall sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact for all species is assessed as negligible. This results in a slight assessment outcome, which is not significant. The impact of noise and vibration from construction activities is considered to be not significant for all group four species, based on the stationary model.

186. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

187. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Shellfish

188. The significance of effect has been summarised by each receptor in **Table 9-NN**.

Table 9-NN Determination of Significance for shellfish based upon greatest received magnitude of effect

Species	Sensitivity	Mortality / mortal injury	
		Magnitude	Significance
Razor / knife clams	Low	Negligible	**Not significant**
Norway lobster	Low	Negligible	**Not significant**
Sword razor shell	Low	Negligible	**Not significant**
Whelk	Low	Negligible	**Not significant**
Great Atlantic scallop	Low	Negligible	**Not significant**
Edible crab	Low	Negligible	**Not significant**
European lobster	Low	Negligible	**Not significant**

189. In summary, the 'shellfish' group is identified as having low sensitivity, overall (is low for all individual species of the group). The magnitude of impact is predicted to be negligible for mortality. This results in a not-significant assessment outcome. The impact of noise and vibration from impact piling is considered to be **not significant** for all shellfish species, based on a stationary model.

190. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

191. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Turtles

192. The sensitivity of turtles is medium. As impact magnitude is assessed to be negligible, the potential effect of mortality or mortal injury as a result of noise and vibration on turtles from piling operations is slight / not significant and therefore **not significant**.

193. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

194. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 2b Noise and Vibration: Array site and OECC UXO clearance

Receptor sensitivity

195. As the effects of UXO clearance are irrelevant of hearing type, all species are included in **Table 9-OO**. Sensitivity has been determined based upon the definitions set out in **Table 9-B** with information feeding this assessment coming from **Table 9-I**. As this is an instantaneous impact, all species have a low ability to adapt. Tolerance within the group is low as due to the instantaneous nature of the impact, the nature of impact considered is one of mortality and mortal injury. Recoverability is low based on the lowest level of fecundity within the receptor group, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. As all species are considered here, and on a precautionary basis, value is high according to greatest conservation status.

196. As per **Table 9-OO**, sensitivity for all species is high.

Table 9-OO Fish, shellfish and turtle sensitivity to UXO clearance

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
All receptors	Low	Low	Low	High	**High**

Magnitude of impact

197. As a form of mitigation, the applicant commits to low order UXO clearance wherever practicable. To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required.

198. The detonation of an UXO results in a single pressure wave that emanates from the source, therefore only SPL_{peak} is considered here in terms of thresholds (Popper *et al.*, 2014). All hearing groups have the same threshold, with mortality and mortal injury occurring up to 810 m from the UXO detonation (**Table 9-PP**). Though the consequences of the impact are severe, the area of impact is considered to be negligible in the context of the wider availability of habitat and the extents of the known spawning and nursery grounds in the area. Therefore, the magnitude of impact from potential UXO detonations is considered to be negligible.

Table 9-PP Threshold and area of impact for UXO clearance events

Activity	Response	Level	Risk	Threshold	Area (km^2)	Maximum (m)	Mean (m)	Minimum (m)
UXO	N/A	SPL_{peak}	Mortality and potential mortal injury	229–234 dB peak	-	810 (229 dB) –490 (234 dB)	-	-

Significance of effect

199. The significance of effect has been summarised by each receptor in **Table 9-QQ.**

Table 9-QQ Determination of Significance for UXO clearance events based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
All receptors	High	Negligible	Slight (not significant)

200. In summary, all receptors are identified as having a high sensitivity. The magnitude of impact is predicted to be negligible. Therefore, the significance is slight, which is not significant. The impact of noise and vibration from UXO clearance is considered to be **not significant** for all species.

201. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

202. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 2c Noise and Vibration: Surveys and General Construction Noise

Receptor sensitivity

203. The effects of geophysical surveys are not dependant of hearing type, all species are assessed and included in **Table 9-RR** (see **Appendix 9-B Noise Overlap With Spawning And Nursery Ground Calculations)**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. As this is impact does not allow time for receptors to flee, all species have a low ability to adapt to this. Tolerance within the group is high, as effects on all receptors are expected to be behavioural at greatest (and which is likely to be habituated to). Recoverability is low based on the lowest level of fecundity within the receptor group, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value is high according to greatest conservation status.

204. As per **Table 9-RR**, sensitivity for all species is medium.

Table 9-RR Fish, shellfish and turtle sensitivity to survey and construction noise

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
All receptors	Low	High	Low	High	Medium

Magnitude of impact

205. Geophysical surveys will be used to survey the offshore development area, which is minimal within the context of the wider habitat availability. Such surveys will typically be of short duration (days / weeks), though only act in any one area for a transient amount of time. Surveys may occur more than once in any given area, though frequency will likely be infrequent.

206. Based on the current literature to date, there is no evidence of mortality or population effects (such as reduced abundances) of fish or invertebrates following exposure to anthropogenic sound sources such as those typical of survey work. Research on invertebrates provides evidence for low-frequency sound detection abilities which may result in short term behavioural responses in a number of marine invertebrate species (Roberts and Breithaupt, 2016; Carroll *et al*., 2017). There is little to no research on fish responses to geophysical survey work, however as the typical devices used to survey the seabed (e.g., side scan sonar, or multi beam echosounder) are also used to detect fish underwater with no observed behavioural response to the noise emitted from the scanning sonar devices, no effects are predicted from the use of high frequency geophysical survey equipment. Where low frequency equipment is used, it is considered that this may elicit a small scale behavioural (avoidance) response.

207. For turtles, use of survey equipment will adhere to the mitigations described for marine mammals (see **Chapter 11 Marine Mammals**) which will also mitigate the impacts on turtles and remove any risk of injury or harm.

208. Activities will occur at sporadic intervals across the estimated three-year construction phase. Activities may occur more than once in any given area, though frequency will likely be infrequent. As none of the general construction activities involve a percussive impact, the magnitude of noise will be significantly less than those from piling. There is the potential that generated nose will result in short term behavioural responses (i.e., avoidance of the area), but this will occur over very small areas in the context of the wider availability of habitat. Therefore, magnitude is determined to be negligible.

Significance of effect

209. The significance of effect has been summarised by each receptor in **Table 9-SS.**

Table 9-SS Determination of Significance for geophysical surveys based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
All receptors	Medium	Negligible	Slight / Not significant (not significant)

210. In summary, all receptors are identified as having medium sensitivities to the impact of noise and vibration. The magnitude of impact is predicted to be negligible. All species experience the same

significance (slight / not significant), which is not significant. The impact of noise and vibration from geophysical surveys and general construction noise is considered to be **not significant** for all species.

211. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

212. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 2d *Noise and Vibration: Barrier effects on migratory species*

Receptor sensitivity

213. Anadromous species sensitivity have been based on spawning ecology, and as such may vary from those set out in relation to noise exposure above.

214. Sensitivity is presented in **Table 9-TT**, and has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment presented in **Table 9-I**. Across the receptor group, all species require fresh water to complete their life cycle, and therefore have a low capacity (adaptability) to avoid the impact. The tolerance of the majority of species within this group is considered to be high for the impact of noise and vibration as in the main this impact will result in some behavioural response, and in the majority of cases, fish will be able to move through the estuary between piling events where they have a strong preference to do so (e.g., adult salmon migration), or will be able to delay slightly their upstream migration with minimal impact on subsequent phases of their lifecycle (e.g. European eel). The salmon / trout smolt are considered to have a lower tolerance as they are generally considered to be more at risk of predation and other pressures. Recoverability is high based on the rapid return to normal behaviour such as foraging, shortly following disturbance (Hawkins and Johnstone, 1978), and the fecundity of all species, and as the majority of responses will be behavioural. These species are mobile receptors with the ability to flee from noise and are transient (i.e., only passing through) receptors within or in close proximity to the CWP Project. Value ranges from low to high according to conservation status.

215. As per **Table 9-TT**, sensitivity this species group ranges from low to high.

Table 9-TT Migratory species sensitivities

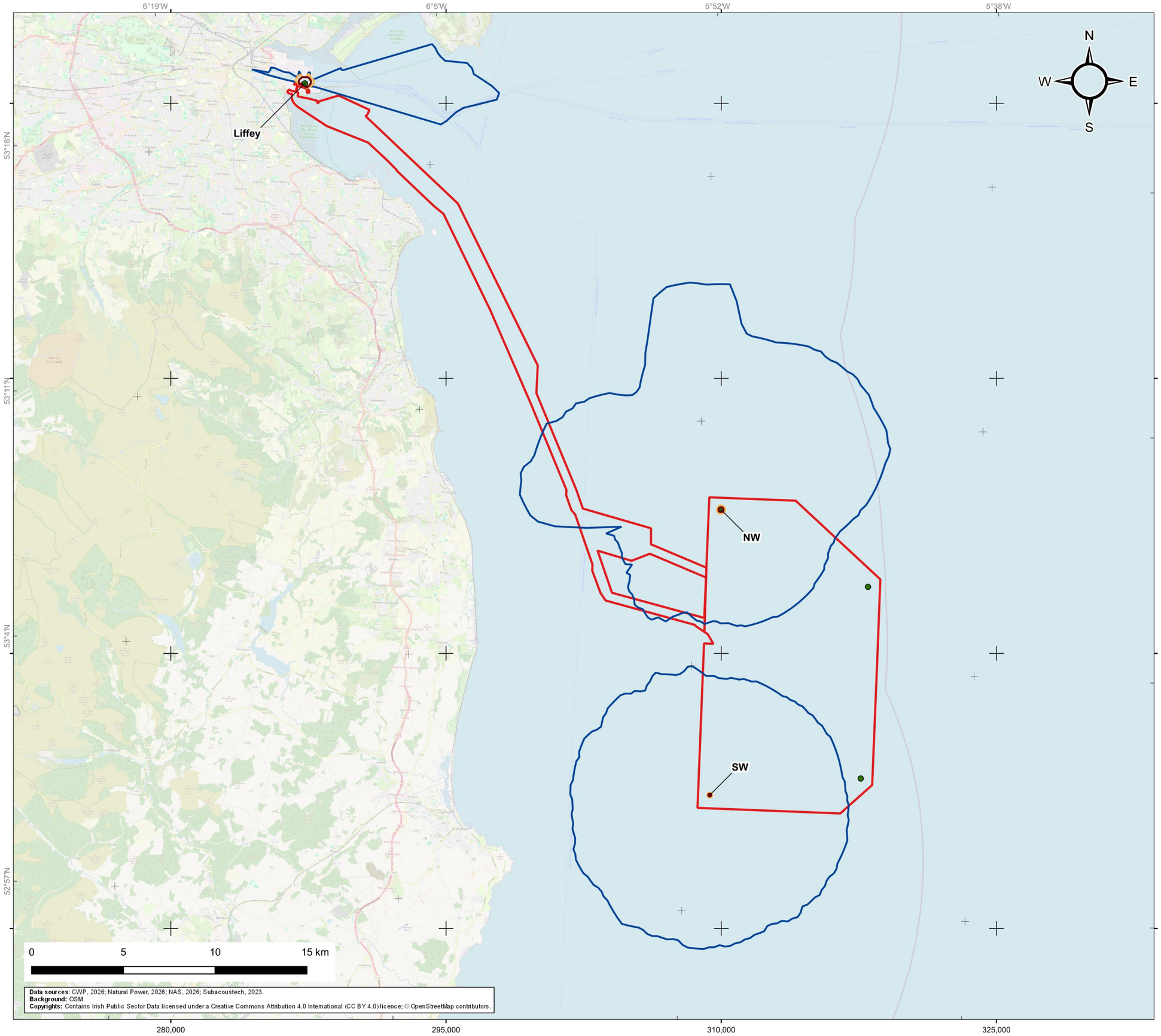
Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Allis shad	Low	Medium	High	High	Medium
Twaite shad	Low	Medium	High	High	Medium
Atlantic Salmon	Low	High	High	High	Medium
Sea trout	Low	High	High	Low	Low
Salmon/trout smolt	Low	Medium	High	High	High
Sea lamprey	Low	High	High	High	Medium
River lamprey	Low	High	High	High	Medium
European Eel	Low	High	High	High	Medium

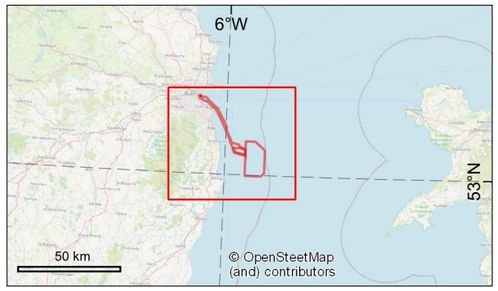
Magnitude of impact

216. The River Liffey is not a designated site SAC for any migratory fish species. In fisheries assessments of the river, Atlantic salmon, brown / sea trout, sea and river lamprey (*Lampetra* sp.), and European eel were the only migratory species recorded (Delanty, Feeney & Shephard, 2022; Tritus, 2020). Given the river is not designated for either shad species, and none were observed during fisheries assessments or identified during the site specific eDNA survey, it is concluded that they are not present in a degree that population level impacts could occur and no barrier to migration exists for these species from the CWP Project.

217. It is also considered that there may be an interaction with migrating species in the marine environment, with piling noise (at a level with the potential to lead to TTS and behavioural changes) present in the coastal strip between the CWP Project area and the coast. In this area, though it recognised that there may be some interaction of underwater noise with migrating individuals, levels are non-injurious and are present within an areas of increased background noise (i.e. wave action near to and onto the coast), and the strong biological imperative for migration is likely to ensure that migration is not disrupted by the predicted noise levels. Furthermore the impact is intermittent and as such is not considered to represent a barrier to migration in the marine environment.

218. In order to provide a more representative visualisation of the planned scenarios (i.e. not the worst case unabated noise), the abated noise modelling contours are presented for group one, group two and group three species (**Figure 9-OO, Figure 9-PP, Figure 9-QQ**)





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

Noise modelling contour

- 186 dB
- 216 dB
- 219 dB

Data sources: CWP, 2026; Natural Power, 2026; NAS, 2026; Subacoustech, 2023.
Background: OSM
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codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-OO
Abated noise modelling for the Western piling locations for Group one fish species

CWP doc. number: CWP-NPC-CON-09-MAP-2154

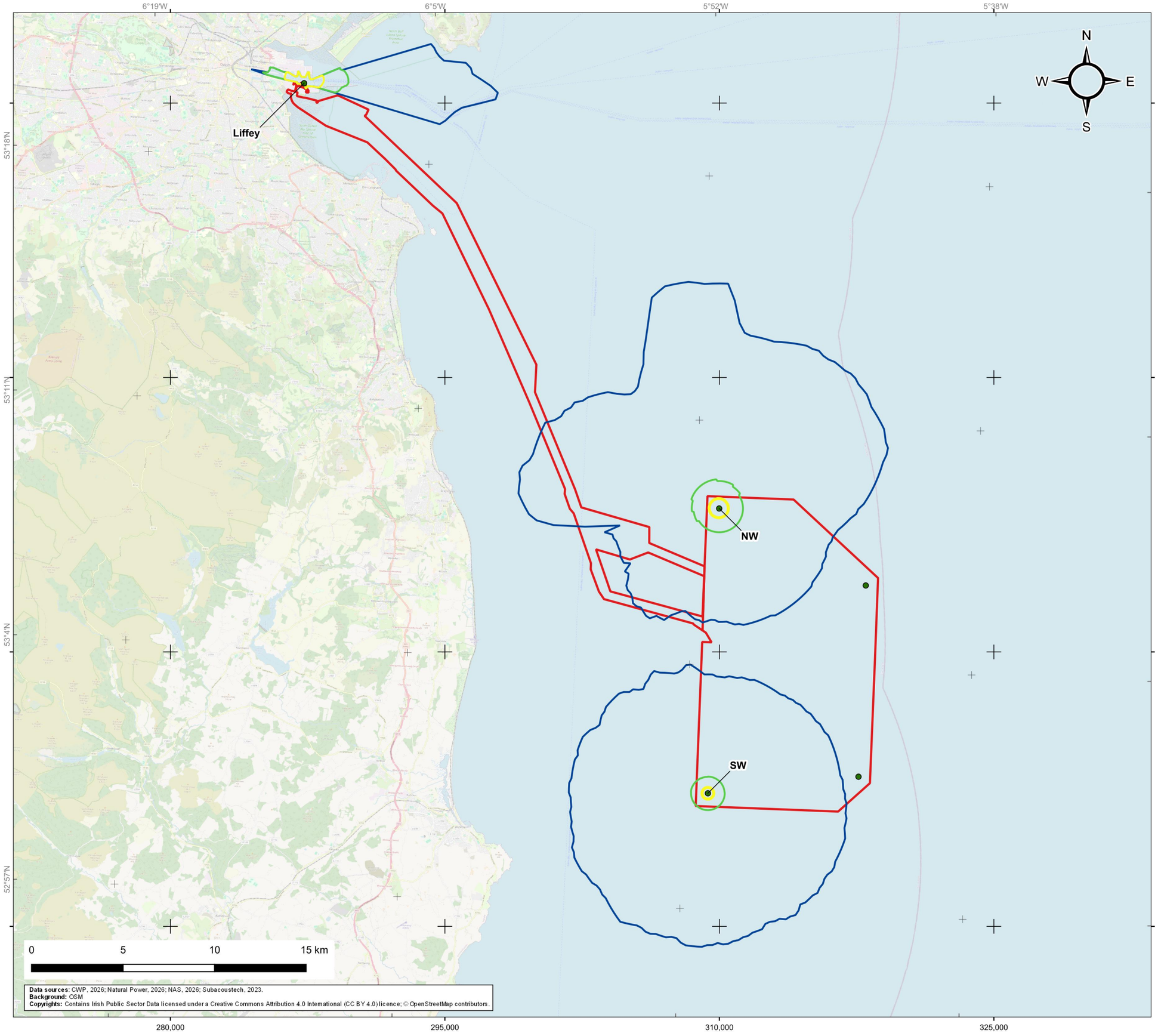
Internal descriptive code: N/A

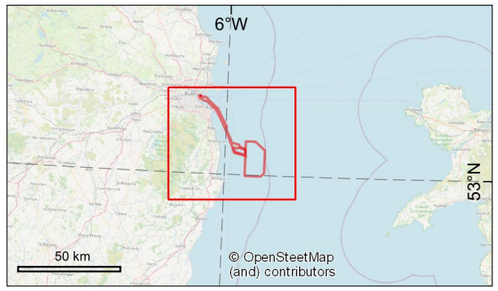
Size: A3

Scale: 1:200,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/28	AC	AK/EA	ME





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

Noise modelling contour

- 186 dB
- 203 dB
- 210 dB

codling wind park

Project: Codling Wind Park

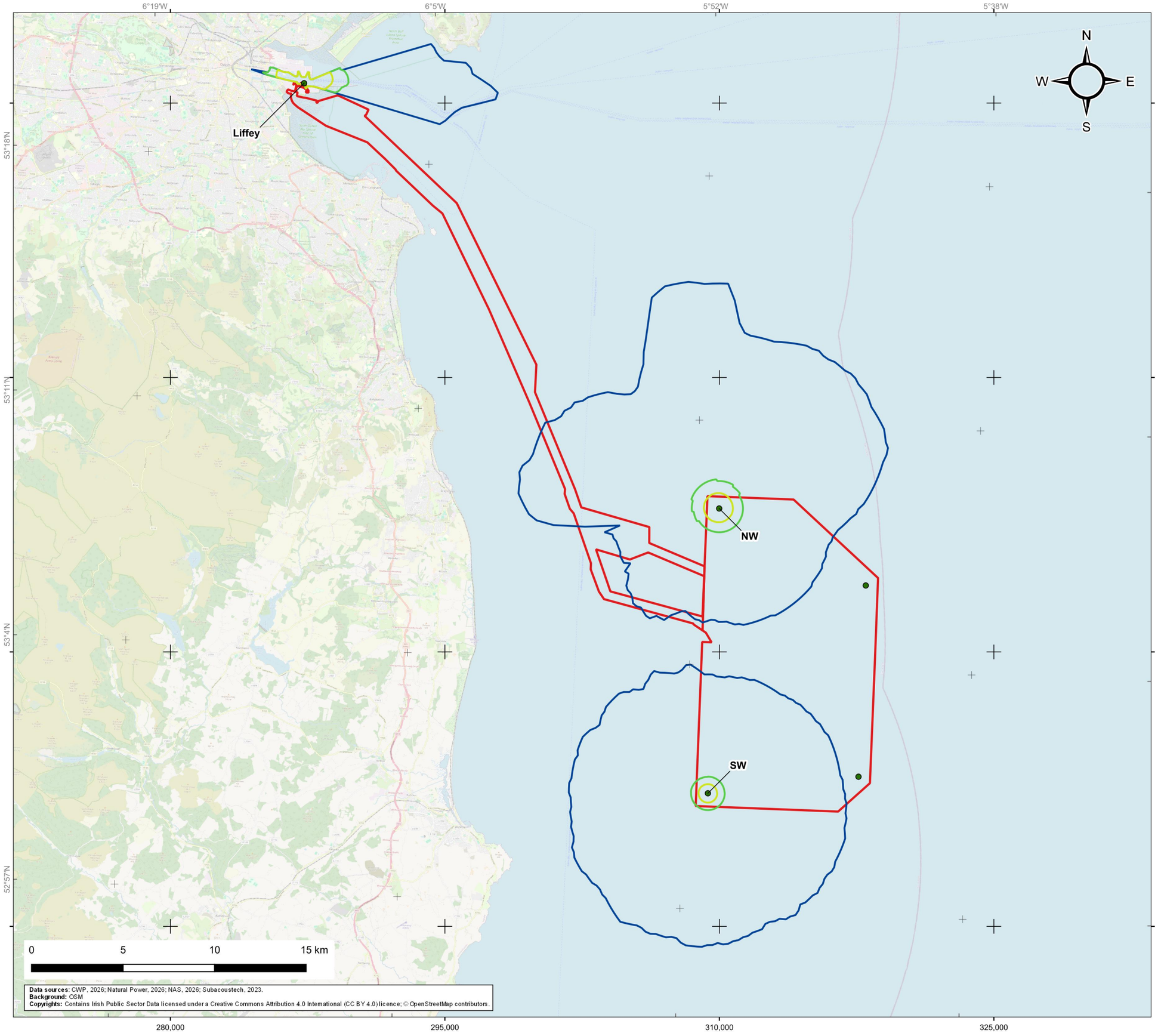
Contractor: www.naturalpower.com — natural power

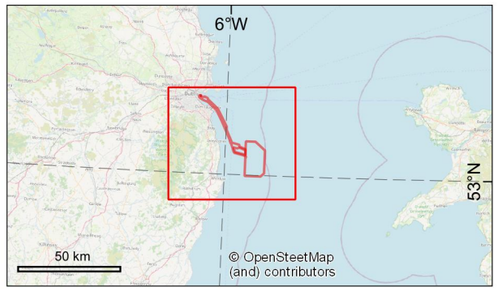
Figure 9-PP
Abated noise modelling for the Western piling locations for Group two fish species

CWP doc. number: CWP-NPC-CON-09-MAP-2155

Internal descriptive code:	*Size:*	*CRS:*
N/A	A3	EPSG 25830
	Scale: 1:200,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/28	AC	AK/EA	ME





Legend

- Planning Application Boundary (PAB)
- Pile driving noise modelling location

Noise modelling contour

- 186 dB
- 203 dB
- 207 dB

codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com — natural power

Figure 9-QQ
Abated noise modelling for the Western piling locations for Group three fish species

CWP doc. number: CWP-NPC-CON-09-MAP-2156

Internal descriptive code:	*Size:*	*CRS:*
N/A	A3	EPSG 25830
	Scale: 1:200,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/28	AC	AK/EA	ME

219. European eel spawn in the Sargasso Sea and enter freshwater during maturation. Lamprey species spawn in freshwater and the juveniles develop in the riverine environment for up to 8 years in some cases prior to migrating into the marine environment. As lamprey species enter or leave freshwater habitats at a relatively developed stage, and juvenile eels (elvers) migrate upstream at night, they are not considered likely to suffer damage or mortality level effects as they are highly mobile and can avoid such areas of increased underwater noise and vibration. In addition, as the duration of piling is short in relation to the developed nature of these individuals, it is considered that any impact is temporary and will not constitute a barrier to the migration of these species.

220. Adult salmon and trout utilising the River Liffey are well progressed and developed and are not considered likely to suffer damage or mortality level effects as they are highly mobile and can avoid such areas of increased underwater noise. Salmon are also considered not overly sensitive to noise and vibration and exhibit minimal to no response when exposed to piling noise (Harding *et al*., 2016). In addition, as the duration of piling at the onshore substation in the River Liffey is short term (2 weeks, with up to 8 hours of piling per 24 hour period). As this receptor group will be highly driven to migrate upstream, it is considered they will migrate quickly past any areas of increased underwater noise and vibration. As such, it is considered that any impact is highly temporary, if present at all, and will not constitute a barrier to the migration of these species in their adult phase.

221. Atlantic salmon and sea trout leave freshwater at the smolt stage. Smolts are not as mobile as the adult fish and will likely be present in the estuarine environment for a period of time as they acclimate to salinity changes prior to commencing their at sea migration. Salmon and sea trout are known to synchronise smolt runs where they are both present in a river (Harvey *et al*., 2020). The following mitigation for Atlantic Salmon and Sea Trout smolt will be implemented by the project and is considered to negate any potential impacts on downstream migrating smolt from piling noise:

- Piling works along the River Liffey Channel will not be permitted between March and May (inclusive) to avoid noise and vibration impact during the smolt run, which occurs in the river between these months (CEFAS, n. d.; ESB, 2022).

222. As such, magnitude of impact on migratory species is considered low.

Significance of effect

223. The significance of effect has been summarised by each receptor in **Table 9-UU.**

Table 9-UU Determination of Significance for barrier effects based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Allis shad	Medium	Low	**Slight / Not significant** (not significant)
Twaite shad	Medium	Low	**Slight / Not significant** (not significant)
Atlantic salmon	Medium	Low	**Slight / Not significant** (not significant)
Sea trout	Low	Low	**Slight** (not significant)
Salmon/trout smolt	High	Low	**Moderate / Slight**

Species	Sensitivity	Magnitude	Significance
Sea lamprey	Medium	Low	**Slight / Not significant** (not significant)
River lamprey	Medium	Low	**Slight / Not significant** (not significant)
European eel	Medium	Low	**Slight / Not significant** (not significant)

224. In summary, the migratory species group are identified as having up to high sensitivity and the magnitude of impact is predicted to be low. This results in a moderate / slight assessment outcome, and with the mitigation that negates the impact on salmon smolt, it is considered that the significance of effect is slight, and **not significant**. The impact of barrier effects on migratory species in the River Liffey from noise and vibration is considered to be **significant** in the absence of mitigation for Atlantic salmon and sea trout smolt only, and **not significant** for Atlantic salmon, sea trout, Allis shad, twaite shad, sea lamprey, river lamprey and European eel, based on the stationary model.

225. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

Impact 3: Temporary disturbance of the seabed leading to increases in SSC and associated deposition.

Impact 3 is replaced in its entirety by paragraphs 226 to 272, Table 9-VV to Table 9-AAA and Figure 9-RR to Figure 9-TT. This revision has been made in response to FIR Item 11c and 11e (see **FIR Response Document**).

226. Installation of WTGs, cable installation, and associated works such as dredging, the deposit of dredged material, and trenching, will result in temporary disturbance to the seabed leading to increases in SSC and subsequent deposition which may result in smothering effects.

227. The duration of this impact is short (intermittent, no more than three years in duration); however, it is recognised that these activities may occur as discrete events on multiple occasions throughout this entire period. It is also recognised that some areas may see repeated disturbance within the construction period, though these will be infrequent.

228. The extent over which this impact may affect receptors can extend beyond the offshore development area and could therefore potentially affect fish, turtle and shellfish receptors within and beyond the offshore development area. However, given the mobile nature of most fish species, it is considered that most individuals will be able to avoid the affected area, and that there will be sufficient suitable alternative habitat available to ensure effects are negligible. In addition, most fish, turtle and shellfish species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, or have life history traits that expose them to high levels of SSC (e.g., migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). Those species which are considered at increased risk of increased SSC and sediment deposition are a number of shellfish species, and species with spawning / nursery grounds in the area (particularly those that spawn on the seabed and whose eggs are therefore at greater risk of smothering impacts).

229. There are two key activities that will result in the largest levels of SSC, dredging and trenching, as fully described in **Chapter 6 Marine Geology, Sediments, and Coastal Processes** and **Appendix 6-A Modelling Report Addendum** and summarised below.

230. During dredge disposal and trenching activities, SSC's local to the release locations are predicted to be enhanced to up to c. 400 mg/L.

231. Enhanced SSCs are transient, and concentrations are predicted to reduce to baseline levels no more than 12 days after the release activity.

Dredging and dredge disposal

232. Suspended sediment plumes created during dredge disposal operations are predicted to enhance SSC levels in the near field (i.e., to the point of release) and far field (i.e., up to *c*. 7 km) from the point of release).

233. The predicted transport of sediment plumes and subsequent deposition during dredge disposal activities within the offshore development area can be summarised as follows:

234. Modelled representative scenarios of dredge disposal activities within the array site indicated the predominant direction of travel for SSC plumes is North-South / slight East. In one scenario, a maximum transient increase in SSC of 250 mg/L was predicted to travel a maximum of up to 7 km over *c*.11 days resulting in a cumulative sediment deposition thickness of *c*. 3 cm, near the disposal location. In another a maximum increase of 250 mg/L was predicted to travel up to 6 km over *c*. 11 days resulting in a cumulative sediment deposition thickness of *c*. 3 cm, near the disposal location. Modelled representative scenarios of dredge disposal activities within the OECC predicted: a maximum transient increase in SSC of 400 mg/L, travelling up to 6 km North-South / slight East resulting in a cumulative sediment deposition thickness of *c*. 4 cm, near the disposal location. In a final scenario, a maximum increase in SSC of 125 mg/L, travelling a maximum of 4 km North-South resulting in a cumulative sediment deposition thickness of *c*. 3 cm, near the disposal location.

Trenching

235. A consequence of cable installation will be the liberation of sediment into suspension within the water column, just above the seabed. Jetting results in greater sediment suspension, introducing the potential for distribution of greater volumes of material over a larger spatial area than other cable laying techniques which may be employed during construction and thus is assessed as the representative scenario. This method involves fluidising the material to form a narrow trench into which the cable is laid.

236. Based upon the representative scenario, the predicted transport of sediment plumes generated during cable installation activities across the array site indicates the finest sediments will potentially be transported North-South / slight East up to 6 km, over *c.* 11 days, at an increase of 80 mg/L, resulting in a cumulative sediment deposition thickness of *c.*< 1 cm, near the release location. However, these plumes are transient, rapidly decreasing as sand sized sediments deposit to the bed and finer sediments are dispersed.

237. The predicted transport of sediment plumes generated during cable installation activities across the OECC were for a maximum increase in SSC of 140 mg/L being transported for up to 5 km North-South / slight East, over *c.* 12 days, resulting in a cumulative sediment deposition thickness of *c.*< 1 cm, near the release location.

238. Deposited sediments would be reworked and rapidly integrated into the prevailing sediment transport regime, and thus would have negligible impact on the prevailing environment. Consequently, enhanced SSC and the predicted deposition thickness would not discernible above natural variation observed during storm events, with SSC's predicted, in the representative scenario, to reduce to baseline levels within c. 11 days following trenching operations.

239. In addition to the modelled scenarios above, **Appendix 6-A Modelling Report Addendum,** provides aggregated outputs incorporating the maximum, though transient, spatial extent of SSCs generated over the full construction campaign, which represent the disposal of dredge arisings, cable trenching, and WTG foundation installation. Combination A represents the maximum potential footprint and

depositional thickness and results in a potential footprint area of 9 km^2 for cumulative deposition levels of 1cm and above. However, this footprint area assumes all activities considered would take place simultaneously and does not account for the erosion, entrainment, mobilisation and transportation of deposited sediments between activities.

Receptor Sensitivity

Mobile fish with overlapping spawning and nursery areas

240. Mobile fish with spawning and nursery areas that overlap the ICES regional study area and which may be affected by increases in SSC are listed in **Table 9-G**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing the area of disturbance, with the exception being sandeel, a less mobile species and therefore only a medium capacity (adaptability) to avoid the impact, although as noted below the ability to adapt is considered immaterial as a result of the high tolerance of sandeel to SSC and deposition.

241. The tolerance of species within this group is considered to be high for the impact of suspended sediments and deposition. This is because most species are highly mobile and can move away from the area of impact, and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. This includes European sprat which are highly mobile and pelagic spawners (Munk *et al*., 2024). Sandeels use the sand as predation cover and also in which to hibernate during the winter. The thickness of sediments outside the immediate vicinity of the disposal location is <1 cm in all cases, and this level of sediment is predicted to be remobilised and dispersed through natural tidal and wave forces rapidly after settlement. This level of sediment deposition is similar to that which sandeels will experience through natural dispersal and movement of sediments, and it has been demonstrated that sandeels can tolerate a degree of sediment deposition by adjusting their depth within the sediment to maintain oxygen availability (Behrens *et al*., 2007; Latto *et al*., 2013). Species that spawn on the substrate (such as thornback ray, spotted ray, sand eel) have the potential for their eggs to be impacted by sediment deposition through reduced oxygenation. However, the spatial extent of the impact is negligible in the context of the wider availability of suitable substrate, there are no areas of high intensity spawning of substrate spawning fish in the area potentially affected, and any deposited sediments will be transient, being rapidly dispersed through natural tidal and wave action.

242. All fish species within this group have a relatively high fecundity and therefore a high recoverability. Value ranges from low to high based upon conservation status.

243. As per **Table 9-VV**, sensitivity for mobile fish with overlapping spawning and nursery areas that may be affected by increases in SSC ranges from very low to medium.

Table 9-VV Mobile fish with spawning and nursery areas that overlap the offshore development area sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Anglerfish	High	High	High	Low	Very low
Haddock	High	High	High	Low	Very low
Whiting	High	High	High	Low	Very low

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
European plaice	High	High	High	Low	Very low
Atlantic mackerel	High	High	High	Low	Very low
Atlantic horse mackerel	High	High	High	Low	Very low
Lemon sole	High	High	High	Low	Very low
Common sole	High	High	High	High	Low
European sprat	High	High	High	Low	Very low
Sandeel	Medium	High	High	Low	Low
Ling	High	High	High	Low	Very low
Atlantic cod	High	High	High	High	Low
Thornback ray	High	Medium	High	High	Medium
Spotted ray	High	Medium	High	High	Medium
Tope	High	High	High	High	Low

Mobile fish and turtle species with no overlapping spawning and nursery areas

244. Mobile fish and turtle species with spawning and nursery areas that would not be affected by increases in SSC are listed in **Table 9-WW**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing the area of disturbance. Atlantic herring, although recognised as a pelagic species, require demersal habitats of coarse substrate such as gravel and stones for spawning purposes (Munk et al., 2024) reducing their adaptability to increased SSC in spawning terms. The survival and development of herring eggs have been reported to be insensitive to even high concentrations of SSC, but studies have concluded that smothering from resulting deposition is likely to be detrimental unless the material is removed rapidly by the current making tolerance to this impact moderate (Birklund and Wijsam, 2005).The tolerance of the other species within this group is considered to be high for the impact of suspended sediment and deposition. This is because the extents and levels of SSC are likely to be similar to those experienced by species naturally, and as most species are highly mobile, and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions should that be required. Recoverability ranges from low to high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status**.**

245. As per **Table 9-WW**, sensitivity for group two species ranges from very low to medium.

Table 9-WW Mobile fish species with no overlapping spawning and nursery grounds sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Small-spotted catshark	High	High	High	Low	Very Low
Cuckoo ray	High	High	High	High	Low
Blonde ray	High	High	High	High	Low
Seatrout	High	High	High	Low	Very Low
Atlantic herring	Medium	Medium	High	Low	Medium
European smelt	High	High	High	Low	Very Low
Undulate ray	High	High	High	High	Low
Twaite shad	High	High	High	High	Low
Allis shad	High	High	High	High	Low
Atlantic salmon	High	High	High	High	Low
Sea lamprey	High	High	High	High	Low
River lamprey	High	High	High	High	Low
European eel	High	High	High	High	Low
Common skate	High	High	High	High	Low
Angel shark	High	High	High	High	Low
Basking shark	High	High	Low	High	Medium
Leatherback turtle	High	High	Low	High	Medium
European hake	High	High	High	Low	Very Low
Spurdog	High	High	High	High	Low

Shellfish

246. Shellfish species are listed in **Table 9-XX.** Sensitivity has been determined based upon the definitions set out in **Table 9-B** with information feeding this assessment coming from **Table 9-L**. Across the species group, all are non-mobile species and therefore have a low to very low capacity (adaptability) to avoid the impact by fleeing the disturbed area. The tolerance of the species within this group is considered to be high for the impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition. This is because while the species group are not mobile and cannot move away from the area of impact, as substrate dwelling species they are adapted to deal with varying levels of sediment and as such they are less susceptible to adverse effects of sediment deposition, particularly at the levels described. Recoverability is high based on fecundity, should individuals be

lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value is low according to conservation status.

247. As per **Table 9-XX** sensitivity for shellfish species is low for the group.

Table 9-XX Shellfish sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Razor / knife clams	Very low	High	High	Low	Low
Norway lobster	Very low	High	High	Low	Low
Sword razor shell	Very low	High	High	Low	Low
Whelk	Very low	High	High	Low	Low
Great Atlantic scallop	Very low	High	High	Low	Low
Edible crab	Low	High	High	Low	Low
European lobster	Low	High	High	Low	Low

Magnitude of Impact

Mobile fish with overlapping spawning and nursery areas

248. For temporary habitat disturbance resulting in SSC and associated deposition, the effect on receptors may include the smothering of substrate spawning species eggs and / or a loss of available spawning area, caused by physical disturbance to the seabed. Additionally, it may cause increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills) or through behavioural responses leading to avoidance of the area thereby reducing the overall available area within which spawning or nursery activities may take place.

249. The maximum extent of elevated SSC is up to 7 km, with a maximum deposition of *c.* 4 cm and a total deposition footprint area from all construction activities of 9km^2 (for deposition level 1 cm of greater) as per **Appendix 6-A Modelling Report Addendum**. Of the species with spawning and / or nursery habitat, Atlantic herring, Spurdog / spiny dogfish and European hake are outside the affected area and therefore not assessed within this section (see mobile fish and turtle species with spawning / nursery habitat that does not overlap the offshore development area below). All species to be assessed are included in **Table 9-N**.

250. The potential overlap of spawning or nursery areas is negligible within the context of the ICES regional study area, particularly when it is considered that the area of greatest SSC will be within 1 km of the activities, and outside this area, the SSC levels will rapidly decrease as the plume disperses. Given the mobile nature of these fish species (except sandeel), and the size of the spawning areas relative to the area affected by increased SSC, it is considered that individuals will be able to avoid the affected area, if required, noting it will be well within the tolerance of all species, with no impact on overall

spawning efficacy, and that there will be sufficient suitable alternative habitat available to ensure effects are negligible.

251. **Figures 9-RR and Figure 9-TT** illustrate the maximum, though transient, spatial extent of SSCs and cumulative deposition generated over the full construction campaign, incorporating results from modelled scenarios, which represent the disposal of dredge arisings, cable trenching, and WTG foundation installation, in relation to sandeel spawning and nursery grounds. These figures illustrate that the majority of increases in SSC and sediment deposition are confined within the offshore development area, with only minimal levels of increased SSC or deposition occurring outside the offshore development area. Whilst there is overlap with sandeel nursery grounds, the area with the potential to be impacted by increase in SSC and deposition from CWP construction activities is negligible in the context of the surrounding sandeel nursey grounds and only has the potential to be impacted by the lowest modelled levels of SSC and deposition.

Mobile fish and turtle species with no overlapping spawning and nursery areas

252. The maximum extent of elevated SSC is up to 7 km, with a maximum deposition of c. 4 cm and a total deposition footprint area from all construction activities of 9 km2 (for deposition level 1 cm of greater) as per **Appendix 6-A Modelling Report Addendum**.

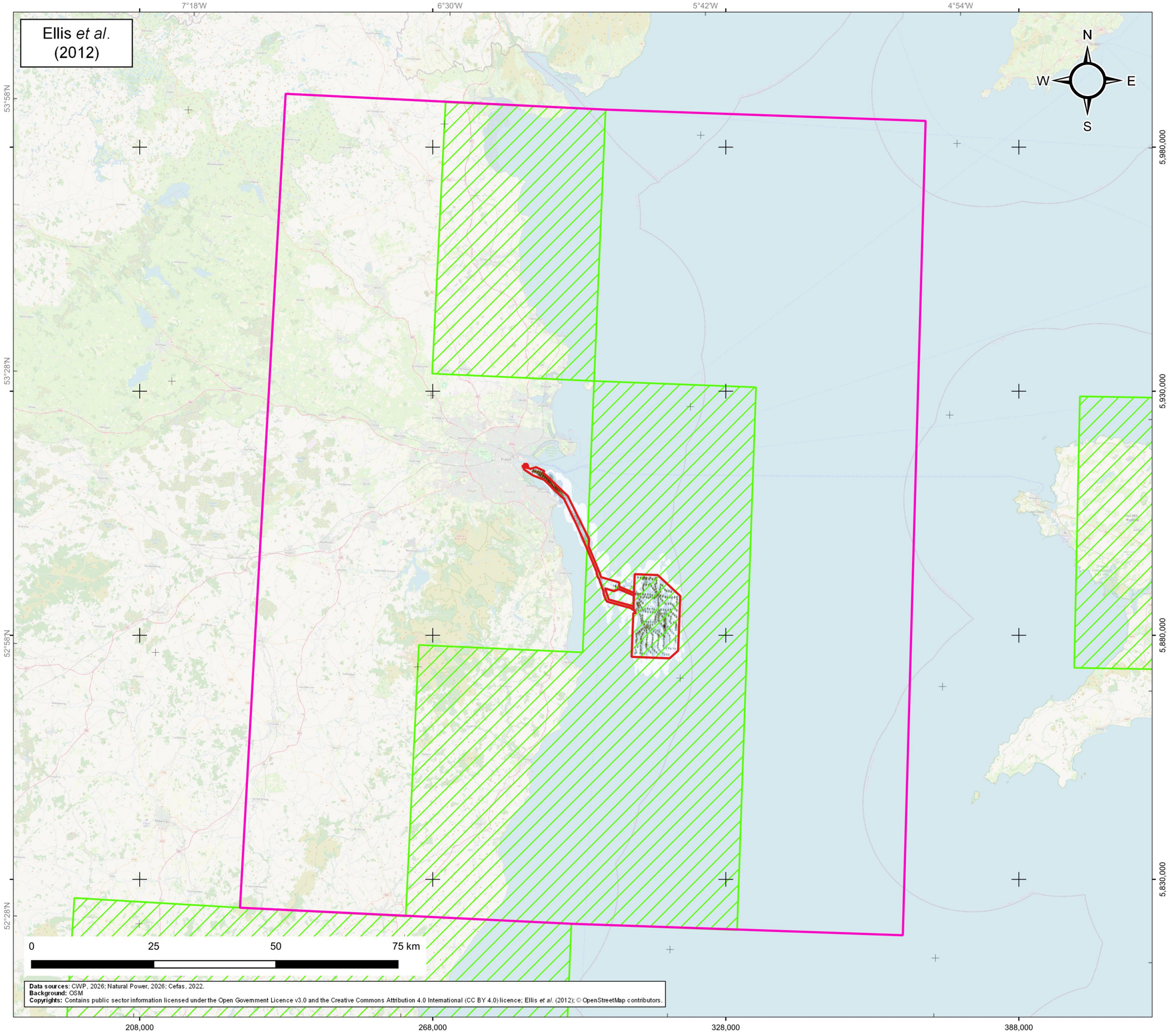
253. The effect on receptors from temporary habitat disturbance resulting in SSC and associated deposition may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat.

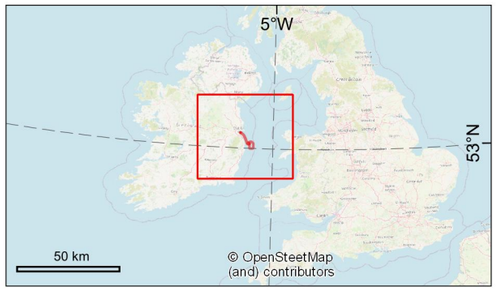
254. Although Atlantic herring eggs have a moderate sensitivity to sediment deposition, no herring spawning areas overlap with the modelled area of sediment deposition, and therefore it is highly unlikely there will any herring eggs will be impacted by temporary increases in sediment deposition.

255. **Figure 9-SS** illustrates the maximum, though transient, spatial extent of SSCs and cumulative deposition generated over the full construction campaign, incorporating results from modelled scenarios, which represent the disposal of dredge arisings, cable trenching, and WTG foundation installation, in relation to herring spawning and nursery grounds. These figures illustrate that there is no overlap

256. Given the mobile nature of most fish species and the highly localised area of effect, it is considered that any individuals will be able to avoid the affected area, and that there will be sufficient suitable alternative habitat available to ensure effects are negligible. In addition, fish are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, or through having life history traits that expose then to increased levels of SSC (e.g. migration through estuarine environments, feeding on organisms within the sediment, or through their preferred location in the water column being in or on the seabed).

Ellis *et al.* (2012)





Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity

Suspended sediment concentration (mg/L)

- 0 - 5
- 5 - 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 75
- 75 - 90
- 90 - 105
- 105 - 120
- 120 - 135
- > 135

Sandeel is not covered in Marine Institute (2024) dataset. Whilst included in Coull et al. 1998, the species is not represented at a scale relevant to the refined project area and is therefore not shown.

codling wind park	*Project:* Codling Wind Park	*Contractor:* natural power www.naturalpower.com

Figure 9-RR
Sandeel spawning and nursery grounds in relation to increases in suspended sediment concentrations (SSC) and deposition

CWP doc. number: CWP-NPC-CON-09-MAP-2158

Internal descriptive code:	*Size:*	*CRS:*
N/A	*Scale:* 1:750,000	EPSG 25830

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01	For FIR submission	2026/04/28	AC	AK/EA	ME

Coull *et al.* (1998)

Ellis *et al.* (2012)

Marine Institute (2024)

N

W E

S

7°15'W 6°15'W 5°15'W

54°45'N 53°15'N 51°45'N

6,124,000 5,984,000 5,844,000 5,704,000

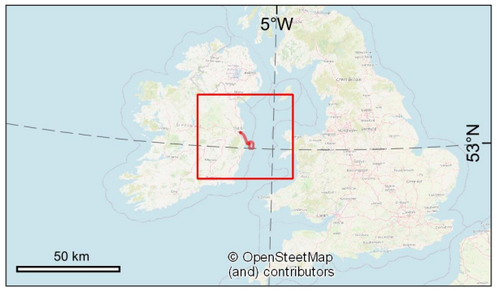
240,000 300,000 360,000

Scale: 1:1,000,000

Scale: 1:1,100,000

0 7.5 15 km

0 25 50 75 km



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Coull et al. (1998)

- Nursery ground undetermined intensity
- Spawning ground undetermind intensity
- Spawning ground low intensity

Ellis et al. (2012)

- Nursery ground high intensity
- Nursery ground low intensity

Marine Institute (2024)

- Nursery ground
- Spawning ground

Cumulative deposition thickness (m)

- < 0.002
- 0.002 - 0.005
- 0.005 - 0.010
- 0.010 - 0.015
- 0.015 - 0.020
- 0.020 - 0.025
- 0.025 - 0.030
- 0.030 - 0.035
- 0.035 - 0.040
- 0.040 - 0.045
- > 0.045

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Coull *et al.* (1998); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under OGL v3.0 and CC BY 4.0; Ellis *et al.* (2012); © OpenStreetMap contributors.

Data sources: CWP, 2026; Natural Power, 2026; Marine Institute, 2024.
Background: OSM
Copyrights: Contains Irish Public Sector Data (Marine Institute) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence; © OpenStreetMap contributors.

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 9-SS
Atlantic herring spawning and nursery grounds in relation to modified sediment deposition

CWP doc. number: CWP-NPC-CON-09-MAP-2159

Internal descriptive code: N/A

Size: A3

Scale: 1:1,800,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
01	For FIR submission	2026/04/28	AC	AK/EA	ME

Ellis *et al.* (2012)

7°18'W 6°30'W 5°42'W 4°54'W

53°58'N 53°28'N 52°58'N 52°28'N

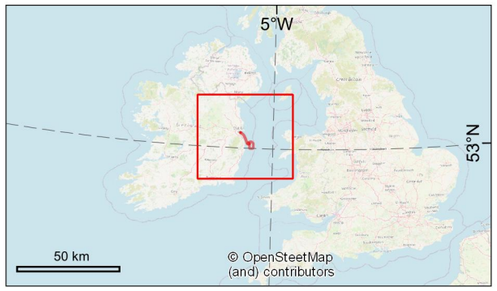
5,980,000 5,930,000 5,880,000 5,830,000

208,000 268,000 328,000 388,000

N W E S

0 25 50 75 km

Data sources: CWP, 2026; Natural Power, 2026; Cefas, 2022.
Background: OSM
Copyrights: Contains public sector information licensed under the Open Government Licence v3.0 and the Creative Commons Attribution 4.0 International (CC BY 4.0) licence; Ellis *et al.* (2012); © OpenStreetMap contributors.



Legend

- Planning Application Boundary (PAB)
- ICES regional study area

Ellis et al. (2012)

- Nursery ground low intensity

Cumulative deposition thickness (m)

- < 0.002
- 0.002 - 0.005
- 0.005 - 0.010
- 0.010 - 0.015
- 0.015 - 0.020
- 0.015 - 0.020
- 0.020 - 0.025
- 0.025 - 0.030
- 0.030 - 0.035
- 0.040 - 0.045
- > 0.045

Sandeel is not covered in Marine Institute (2024) dataset. Whilst included in Coull et al. 1998, the species is not represented at a scale relevant to the refined project area and is therefore not shown.

codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 9-TT
Sandeel spawning and nusresy grounds in relation to modelled sediment deposition

CWP doc. number: CWP-NPC-CON-09-MAP-2160

Internal descriptive code:	*Size:*	*CRS:*
N/A	A3	EPSG 25830
	Scale: 1:750,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
01	For FIR submission	2026/04/28	AC	AK/EA	ME

Shellfish

257. For temporary habitat disturbance leading to increases in SSC and associated deposition, the effect on receptors may include the smothering of substrate dwelling species and / or loss of available habitat area, caused by physical disturbance to the seabed. Additionally, it may cause increase of energetic costs (decreased ability to find prey, increased metabolic cost for excavating burrows) or through behavioural responses leading to avoidance of the area (for more mobile species) thereby reducing the overall available habitat.

258. The shellfish species that are present within the local study area are all species that live on or within the substrate. As such, these species are regularly exposed and adapted to increases in SSC and levels of deposition through natural hydrodynamic processes that re-mobilise, transport, and deposit sediments in the area. These species are considered to be tolerant to the levels of SSC and transient deposition predicted to arise from the predicted activities (assessments based upon Norway lobster, sword razor clams, and edible crab (Hill and Sabatini, 2008; Hill, 2006; Neal and Wilson, 2008; Marshall and Wilson, 2008)). While there are no such assessments available for whelk or European lobster, given the similar physiology and bottom dwelling habits to the assessed species, similar conclusions are drawn.

259. The increases in SSC are temporary, transient, and will return to background levels within a short period, no longer than 125 days. The levels of deposition away from the immediate location of disposal events are very low (<2 - 3 cm), decreasing rapidly in thickness with distance and are predicted to be transient and thus will be remobilised into the natural sediment transport regime within a short period following settlement. The total deposition footprint area from all construction activities is 9km^2 (for deposition level 1 cm of greater).

Summary of magnitude of impact

260. Based upon the short-term nature of exposure, transient presence of increased level of SSC and the very small spatial extent of the impact, it is predicted that the magnitude of temporary disturbance to the seabed leading to increases in SSC and subsequent deposition, for spawning and non-spawning adult fish and shellfish, and developing juveniles and eggs will be negligible.

Significance of Effect

Mobile fish with overlapping spawning and nursery areas

261. The significance of effect has been summarised by each receptor in **Table 9-YY.**

Table 9-YY Determination of Significance for mobile fish with overlapping spawning and nursery areas based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
European hake	Very low	Low	**Not significant**
Anglerfish	Very low	Low	**Not significant**
Haddock	Very low	Low	**Not significant**

Species	Sensitivity	Magnitude	Significance
Whiting	Very low	Low	**Not significant**
European plaice	Very low	Low	**Not significant**
Atlantic mackerel	Very low	Low	**Not significant**
Atlantic Horse mackerel	Very low	Low	**Not significant**
Lemon sole	Very low	Low	**Not significant**
Common sole	Low	Low	**Not significant**
European sprat	Very low	Low	**Not significant**
Sandeel	Low	Low	**Not significant**
Ling	Very low	Low	**Not significant**
Atlantic cod	Low	Low	**Not significant**
Thornback ray	Medium	Low	**Slight** (not significant)
Spotted ray	Medium	Low	**Slight** (not significant)
Tope	Low	Low	**Not significant**

262. In summary, the 'mobile fish with overlapping spawning / nursery grounds' group have medium sensitivity overall, (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight assessment outcome, which is not significant. Therefore, the impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition is considered to be **not significant** for all mobile fish with overlapping spawning and nursery areas.

263. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

264. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Mobile fish and turtle species with no overlapping spawning and nursery areas

265. The significance of effect has been summarised by each receptor in **Table 9-ZZ**.

Table 9-ZZ Determination of Significance for mobile fish and turtle species with no overlapping spawning and nursery areas based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Small-spotted catshark	Very Low	Negligible	**Imperceptible** (not significant)
Cuckoo ray	Low	Negligible	**Not significant**
Blonde ray	Low	Negligible	**Not significant**
Seatrout	Very Low	Negligible	**Imperceptible** (not significant)

Species	Sensitivity	Magnitude	Significance
Atlantic herring	Medium	Negligible	**Slight / Not significant**
European smelt	Very Low	Negligible	**Imperceptible** (not significant)
Undulate ray	Low	Negligible	**Not significant**
Twaite shad	Low	Negligible	**Not significant**
Allis shad	Low	Negligible	**Not significant**
Atlantic salmon	Low	Negligible	**Not significant**
Sea lamprey	Low	Negligible	**Not significant**
River lamprey	Low	Negligible	**Not significant**
European eel	Low	Negligible	**Not significant**
Common skate	Low	Negligible	**Not significant**
Angel shark	Low	Negligible	**Not significant**
Basking shark	Medium	Negligible	**Slight / Not significant** (not significant)
Leatherback turtle	Medium	Negligible	**Slight / Not significant** (not significant)
European hake	Very Low	Negligible	**Imperceptible** (not significant)
Spurdog	Low	Negligible	**Not significant**

266. In summary, the 'mobile fish and turtle species with no overlapping spawning and nursery areas' group have medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight / not significant assessment outcome, which is not significant. The impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition is considered to be **not significant** for mobile fish and turtle species with no overlapping spawning and nursery areas.

267. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

268. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Shellfish

269. The significance of effect has been summarised by each receptor in **Table 9-AAA.**

Table 9-AAA Determination of Significance for shellfish habitats based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Norway lobster	Low	Negligible	**Not significant**
Whelk	Low	Negligible	**Not significant**
Razor / knife clams	Low	Negligible	**Not significant**
Sword razor shell	Low	Negligible	**Not significant**
Great Atlantic scallop	Low	Negligible	**Not significant**
Edible crab	Low	Negligible	**Not significant**
European lobster	Low	Negligible	**Not significant**

270. In summary, the 'shellfish' group is identified as having low sensitivity overall (sensitivity is low for all individual species of the group). The magnitude of impact is predicted to be negligible. this results in a not **significant** outcome. The impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition is considered to be **not significant** for shellfish.

271. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

272. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 4: Collision with vessels

Impact 4 remains unchanged except for paragraph 372 which is replaced by paragraph 273 below, and Table 9-66 is replaced by Table 9-BBB below. This update has been made in response to FIR Item 11c (see **FIR Response Document**).

Table 9-BBB Collision vulnerable species sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Basking shark	Low	Low	Low	High	High
Leatherback turtle	Low	Low	Low	High	High

273. In summary, this group is identified as having high sensitivity, overall (sensitivity is high for all individual species of the group). The magnitude of impact is predicted to be negligible. This results in a slight assessment outcome which is not significant. The impact of collision with vessels is considered to be **not significant** for basking shark and leatherback turtle.

Impact 5: Accidental Pollution Events

This section (Impact 5) remains unchanged.

Impact 6: Invasive Non-Native Species

This section (Impact 6) remains unchanged.

9.10.2 Operation and maintenance

Impact 1: Long-term habitat loss

Except for paragraphs 401 to 404, Impact 1 is replaced in its entirety by paragraphs 274 to 306 and Table 9-CCC to Table 9-III. This update has been made in response to FIR Item 11c (see **FIR Response Document**).

Impact 1 also includes an update to correct a typographical error identified in the existing EIAR **Volume 3**, **Chapter 9 Fish, Shellfish and Turtle Ecology**. In paragraph 432 of the existing EIAR chapter it is incorrectly stated that the area of Nephrops habitat affected is >0.01%. The update below addresses this typographical error to state < 0.01%. It is noted by the Applicant that this correction has no material bearing on the conclusions of assessment presented in paragraph 439 of EIAR **Volume 3**, **Chapter 9 Fish, Shellfish and Turtle Ecology**.

Receptor sensitivity

Mobile fish with spawning and nursery areas that overlap the offshore development area

274. Mobile fish with spawning and nursery areas that overlap the offshore development area are listed in **Table 9-CCC.** The offshore development area is considered as a suitable criteria for selecting relevant receptors as the impact of long term habitat loss will only affect areas within the offshore development area. Nevertheless, any quantitative assessments are undertaken against the spatial extent of available spawning and nursery habitat within the ICES regional study area. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-G**. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by moving to a new area, with the exception being sandeel, a less mobile species and therefore only a medium capacity (adaptability) to avoid the impact. The tolerance of the majority of species within this group is considered to be high for the impact of long-term habitat loss. This is because most species are highly mobile and can move away from the area of impact, and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. For some species with low mobility or high habitat fidelity, such as sandeels, tolerance is considered to be medium as they cannot easily relocate to another area and, as such, they are more susceptible to adverse effects of long-term habitat loss. Species which are considered highly mobile but that use the substrate in the immediate area for spawning (i.e., thornback ray and spotted ray) are considered to have medium tolerance and adaptability as although adults or juveniles are unlikely to be adversely affected, impacts to eggs may arise. Recoverability is high based on fecundity, should

individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status.

275. As per **Table 9-CCC**, sensitivity for this species group to long-term habitat loss ranges from very low to medium.

Table 9-CCC Mobile fish with spawning and nursery areas that overlap the offshore development area sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Anglerfish	High	High	High	Low	Very low
Haddock	High	High	High	Low	Very low
Whiting	High	High	High	Low	Very low
European plaice	High	High	High	Low	Very low
Atlantic mackerel	High	High	High	Low	Very low
Atlantic horse mackerel	High	High	High	Low	Very low
Lemon sole	High	High	High	Low	Very low
Common sole	High	High	High	High	Low
European sprat	High	High	High	Low	Very low
Sandeel	Medium	Medium	High	Low	Medium
Ling	High	High	High	Low	Very low
Atlantic cod	High	High	High	High	Low
Thornback ray	Medium	Medium	High	High	Medium
Spotted ray	Medium	Medium	High	High	Medium
Tope	High	High	High	High	Low

Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development area

276. Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development are listed below in **Table 9-DDD**. The offshore development area is considered as a suitable criteria for selecting relevant receptors as the impact of long term habitat loss will only affect areas within the offshore development area. Nevertheless, any quantitative assessments are undertaken against the spatial extent of available spawning and nursery habitat within the ICES regional study area. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-G**. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing the area of impact. The tolerance of the species within this group is considered to be high for the impact of temporary habitat loss. This is because most species are highly mobile and can move away from the area of impact and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. Recoverability ranges from low to high based on fecundity, should individuals be

lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status.

277. As per **Table 9-DDD**, sensitivity for this species group ranges from very low to medium.

Table 9-DDD Mobile fish / turtle species with no overlapping spawning and nursery grounds sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Small-spotted catshark	High	High	High	Low	Very Low
Cuckoo ray	High	High	High	High	Low
Blonde ray	High	High	High	High	Low
Seatrout	High	High	High	Low	Very Low
Atlantic herring	High	High	High	Low	Very Low
Undulate ray	High	High	High	High	Low
Twaite shad	High	High	High	High	Low
Allis shad	High	High	High	High	Low
Atlantic salmon	High	High	High	High	Low
Sea lamprey	High	High	High	High	Low
River lamprey	High	High	High	High	Low
European eel	High	High	High	High	Low
Common skate	High	High	High	High	Low
Angel shark	High	High	High	High	Low
Basking shark	High	High	Low	High	Medium
Leatherback turtle	High	High	Low	High	Medium
European hake	High	High	High	Low	Very low
Spurdog	High	High	High	High	Low

Shellfish

278. Shellfish species are listed below in **Table 9-EEE**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-G**. Across the species group, there is limited mobility and therefore a low to very low capacity (adaptability) to avoid the impact by fleeing the affected area. The tolerance of the species within this group is considered to be low for the impact of long-term habitat loss. This is because the species group are not mobile and cannot move away from the area of impact and, as such, they are more susceptible to adverse effects of long-term habitat loss such as direct damage. Recoverability is high based on

fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value is low according to conservation status.

279. As per **Table 9-EEE,** sensitivity for shellfish species is medium for the group.

Table 9-EEE Shellfish sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Razor / knife clams	Very low	Low	High	Low	Medium
Norway lobster	Very low	Low	High	Low	Medium
Sword razor shell	Very low	Low	High	Low	Medium
Whelk	Very low	Low	High	Low	Medium
Great Atlantic scallop	Very low	Low	High	Low	Medium
Edible crab	Low	Low	High	Low	Medium
European lobster	Low	Low	High	Low	Medium

Magnitude of impact

Mobile fish with spawning and nursery areas that overlap the offshore development area

280. Potential for long-term habitat or loss, may arise from periodic maintenance works, and the presence of infrastructure including scour and cable protection. The effect on receptors will be a loss of available spawning area, caused by physical loss of the seabed, or through behavioural responses leading to avoidance of the area thereby reducing the overall available area within which spawning, or nursery activities may take place.

281. Species that have spawning and / or nursery grounds within the offshore development area are at risk of having those spawning and nursery grounds impacted by long-term habitat loss throughout the lifetime of the CWP Project.

282. Based on the EIAR **Volume 3, Chapter 4 Project Description** and the intended locations of the offshore infrastructure, the greatest percentage of spawning habitat affected (based on comparison to the ICES regional study area) is 0.02 % (Atlantic cod) including consideration of the LoD of the offshore infrastructure. Similarly, the greatest percentage of nursery habitat affected (based on comparison to the ICES Regional study area) is 0.012 % for European plaice, sandeel, and Atlantic cod including consideration of the LoD of the offshore infrastructure (**Table 9-FFF**).

283. Of the species with overlapping spawning and nursery habitat, substrate spawners are considered at the greatest risk from long term habitat disturbance / loss, as this may result in direct disturbance to a key life stage for the species.

284. Substrate spawning species with overlapping spawning areas are:

- Thornback ray (**Figure 9-R**)
- Spotted ray (**Figure 9-P**)

- Sandeel (**Figure 9-O**)

285. Non-substrate spawners with overlapping spawning or nursery grounds are:

- Norway lobster (**Figure 9-M**)
- Tope (**Figure 9-S**)
- Haddock (**Figure 9-I**)
- Whiting (**Figure 9-T**)
- European plaice (**Figure 9-N**)
- Atlantic mackerel (**Figure 9-E**)
- Atlantic horse mackerel (**Figure 9-J**)
- Lemon sole (**Figure 9-K**)
- Common sole (**Figure 9-F**)
- European sprat (**Figure 9-H**)
- Atlantic cod (**Figure 9-C**)
- Anglerfish (**Figure 9-B**)
- Ling (**Figure 9-L**)

286. The following species have known spawning or nursery habitat within the National study area, but do not have any overlap with the offshore development area. Therefore, they are considered under mobile species with no overlapping spawning or nursery habitats below.

- Spurdog / spiny dogfish (**Figure 9-Q**)
- European hake (**Figure 9-G**)
- Atlantic herring (**Figure 9-D**)

287. The greatest percentage of a substrate spawning species' spawning area affected (based upon the available spawning and nursery areas within the ICES regional study area) is <0.01 % for sandeel.. Reductions in spawning or nursery habitat at this scale for both substrate and non-substrate spawning species is considered negligible in terms of the species' ability to maintain functional processes. No effect on populations or cohort size is predicted to arise as a result of long-term habitat loss on species with spawning or nursery areas overlapping the offshore development area. In terms of long-term habitat loss, any loss caused by maintenance activities will be small in extent compared to the wider available habitat.

Table 9-FFF Long-term habitat loss based on intended locations of offshore infrastructure (% overlap) compared to mapped spawning and nursery grounds in the ICES regional study area.

	Spawning Grounds						Nursery Grounds			
Receptor (species)	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998) - Lower Intensity**	**Coull *et al.* (1998- Higher Intensity**	**Coull *et al.* (1998) - Undetermined Intensity**	**Marine Institute (2024))**	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998)**	**Marine Institute (2024)**
Norway lobster					<0.01 %				<0.01 %	
Thornback ray							0.011%			
Spotted ray							0.011%			
Spurdog	No overlap with the CWP Project offshore development area									
Tope							<0.01 %			
Haddock						0.014%			<0.01 %	<0.01 %
Whiting	<0.01 %		<0.01 %	<0.01 %		<0.01 %	<0.01 %	<0.01 %	<0.01 %	
European plaice	<0.01 %	<0.01 %	0.013%				0.012%			
Atlantic mackerel	<0.01 %									<0.01 %
Atlantic horse mackerel										<0.01 %

	Spawning Grounds						Nursery Grounds			
Receptor (species)	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998) - Lower Intensity**	**Coull *et al.* (1998- Higher Intensity**	**Coull *et al.* (1998) - Undetermined Intensity**	**Marine Institute (2024))**	**Ellis *et al.* (2012) - Low intensity**	**Ellis *et al.* (2012) - High intensity**	**Coull *et al.* (1998)**	**Marine Institute (2024)**
Lemon sole					<0.01 %				<0.01 %	
Common sole	<0.01 %		<0.01 %							
Sandeel	<0.01 %						0.012%			
Atlantic herring	No overlap with the CWP Project offshore development area									
European sprat					<0.01 %					
Atlantic cod	<0.01 %		<0.01 %	0.020%		<0.01 %		0.012%	<0.01 %	<0.01 %
Angler fish							<0.01 %			
European hake	No overlap with the CWP Project offshore development area									
Ling	<0.01 %									

Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development area

288. Potential long-term habitat loss may arise from periodic maintenance works, and the presence of infrastructure including scour and cable protection, or through behavioural responses leading to avoidance of the area thereby reducing the overall available habitat for activities such as foraging.

289. Mobile fish / turtles may use the offshore development area for a wide range of biological functions, from migration to feeding. Long-term habitat loss may reduce the available habitat, however, this represents an impact that affects a negligible proportion of the natural range of all the species that may be present in this area. Extensive areas of comparable habitat are also available outside the affected area.

Shellfish

290. The potential loss of habitat may arise from periodic maintenance works, the presence of infrastructure such as turbine foundations, scour protection, or through use of cable protection where cables cannot be buried. The maximum potential area affected by long-term habitat loss is 492,520 m^2 within the array site and 105,000 m^2 within the OECC. *Nephrops norvegicus* has overlapping spawning and nursery grounds (as per Coull *et al*. (1998)), and based upon the overlap of potential activities, the area of Nephrops habitat affected is <0.01 % (**Table 9-FFF**). However, most of the habitat is not suitable for Nephrops as it is coarse sediments and sands, and there is no evidence of Nephrops fishing in the offshore development area (as per EIAR **Volume 3**, **Chapter 12 Commercial Fisheries)**. Nephrops prefer muddy habitats in which they can burrow, therefore it is expected that no Nephrops habitat will be impacted.

291. However, the presence of the infrastructure, scour protection, and cable protection in the marine environment also increases habitat heterogeneity which can increase biodiversity, as well as providing refugia for a number of species, particularly mobile shellfish such as whelks and crustaceans. The additional biodiversity can increase food resource for species, and the habitat heterogeneity and refugia can provide protection against predators. As such, though the availability of existing habitat will be decreased very slightly, the increased level of biodiversity and habitat heterogeneity can provide positive effects for shellfish species.

292. Though the duration of this impact is long, the area affected is negligible in the context of wider availability of equivalent habitat within the ICES regional study area and beyond, and there may be

considerable positive effects arising through increased heterogeneity of the seabed, as a result of the introduced infrastructure and materials. As such, the magnitude of impact for all species is low.

293. In terms of long-term habitat loss, reduction in habitat is considered negligible in terms of the species' ability to maintain functional processes. No effect on populations or cohort size is predicted to arise as a result of long-term habitat loss on shellfish species.

Summary of magnitude of impact

294. The magnitude of effect across all species with spawning or nursery habitat affected by long-term habitat loss is considered to be negligible.

Significance of effect

Mobile fish with spawning and nursery areas that overlap the offshore development area

295. The significance of effect has been summarised by each receptor in **Table 9-GGG**.

Table 9-GGG Determination of significance for Mobile fish with spawning and nursery areas that overlap the offshore development area based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Anglerfish	Very low	Negligible	**Imperceptible** (not significant)
Haddock	Very low	Negligible	**Imperceptible** (not significant)
Whiting	Very low	Negligible	**Imperceptible** (not significant)
European plaice	Very low	Negligible	**Imperceptible** (not significant)
Atlantic mackerel	Very low	Negligible	**Imperceptible** (not significant)
Atlantic horse mackerel	Very low	Negligible	**Imperceptible** (not significant)
Lemon sole	Very low	Negligible	**Imperceptible** (not significant)
Common sole	Low	Negligible	**Not significant**
European sprat	Very low	Negligible	**Imperceptible** (not significant)
Sandeel	Medium	Negligible	**Slight / Not significant** (not significant)
Ling	Very low	Negligible	**Imperceptible** (not significant)
Atlantic cod	Low	Negligible	**Not significant**
Thornback ray	Medium	Negligible	**Slight / Not significant** (not significant)
Spotted ray	Medium	Negligible	**Slight / Not significant** (not significant)
Tope	Low	Negligible	**Not significant**

296. In summary, the 'mobile fish with spawning and nursery areas that overlap the offshore development area group is identified as medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight / not significant assessment outcome, which is not significant. Therefore, the impact of long-term habitat loss is considered to be **not significant** for mobile fish with spawning and nursery areas that overlap the offshore development area.

297. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

298. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Mobile fish and turtle species without spawning and nursery areas that overlap the offshore development area

299. The significance of effect has been summarised by each receptor in **Table 9-HHH.**

Table 9-HHH Determination of Significance for Mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development are based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Small-spotted catshark	Very Low	Negligible	**Imperceptible** (not significant)
Cuckoo ray	Low	Negligible	**Not significant**
Blonde ray	Low	Negligible	**Not significant**
Seatrout	Very Low	Negligible	**Imperceptible** (not significant)
Atlantic herring	Very Low	Negligible	**Imperceptible** (not significant)
Undulate ray	Low	Negligible	**Not significant**
Twaite shad	Low	Negligible	**Not significant**
Allis shad	Low	Negligible	**Not significant**
Atlantic salmon	Low	Negligible	**Not significant**
Sea lamprey	Low	Negligible	**Not significant**
River lamprey	Low	Negligible	**Not significant**
European eel	Low	Negligible	**Not significant**
Common skate	Low	Negligible	**Not significant**
Angel shark	Low	Negligible	**Not significant**
Basking shark	Medium	Negligible	**Slight / Not significant** (not significant)
Leatherback turtle	Medium	Negligible	**Slight / Not significant** (not significant)

Species	Sensitivity	Magnitude	Significance
European hake	Very low	Negligible	**Imperceptible** (not significant)
Spurdog	Low	Negligible	**Not significant**

300. In summary, the 'mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development area' group is identified as medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible, this results in a slight / not significant assessment outcome, which is not significant. The impact of long-term habitat loss is considered to be **not significant** for mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development area.

301. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

302. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Shellfish

303. The significance of effect has been summarised by each receptor in **Table 9-III**.

Table 9-III Determination of Significance for shellfish habitats based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Norway lobster	Medium	Negligible	**Slight / not significant** (not significant)
Whelk	Medium	Negligible	**Slight / not significant** (not significant)
Razor / knife clams	Medium	Negligible	**Slight / not significant** (not significant)
Sword razor shell	Medium	Negligible	**Slight / not significant** (not significant)
Great Atlantic scallop	Medium	Negligible	**Slight / not significant** (not significant)
Edible crab	Medium	Negligible	**Slight / not significant** (not significant)
European lobster	Medium	Negligible	**Slight / not significant** (not significant)

304. In summary, the 'shellfish' group is identified as having medium sensitivity, overall (sensitivity is medium for all individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight / not significant assessment outcome, which is not significant. Therefore, the impact of long-term habitat loss is considered to be **not significant** for shellfish.

305. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

306. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9.**

Impact 2: EMF from Cables

Impact 2 has been replaced in its entirety with paragraphs 307 to 347, Table 9-JJJ to Table 9-OOO and Plate 9-C to Plate 9-E. This update has been made in response to FIR Item 11c (see **FIR Response Document**).

Paragraph 312 has also been added in response to FIR Item 11j (see **FIR Response Document**).

307. As electricity passes through cables, electromagnetic fields are produced. These consist of electrical fields, magnetic fields, and induced electrical fields which are produced when a conductor (such as seawater) passes through the magnetic field. Standard cables include shielding to prevent the passage of electrical fields, therefore there will not be an impact resulting from direct electrical fields. However, magnetic fields will be emitted by the cable, and as such, induced magnetic fields may also be present. This assessment considers available habitat within the ICES regional study area, but notes that impacts of EMF are limited to the offshore development area only.

308. There is a maximum of approximately 146 km of OECC cable, 8.6 km of inter-connector cable and 139 km of inter-array cabling proposed to be installed for the CWP Project. Cables will mostly be protected by burial, although where required, cable protection will be used (for further details, refer to EIAR **Volume 3**, **Chapter 4 Project Description**). Burial or protection of a marine cable, as proposed by the CWP Project acts as a buffer between the potential source of EMF and the receptor.

309. Based upon the predicted cable arrangements, the magnetic field strength at the sediment surface (assuming a minimum depth of cover of 1 m) will be 1.5 µT for a 1400 Cu mild steel cable (**Plate 9-C**) 2.05 µT for a 1800 Cu mild steel cable (**Plate 9-D**) and 4.7 µT for an 1800 Cu stainless steel cable **Plate 9-E**). These values fall sharply as distance from the cable increases, with levels back to near zero within 2 m of the cable.

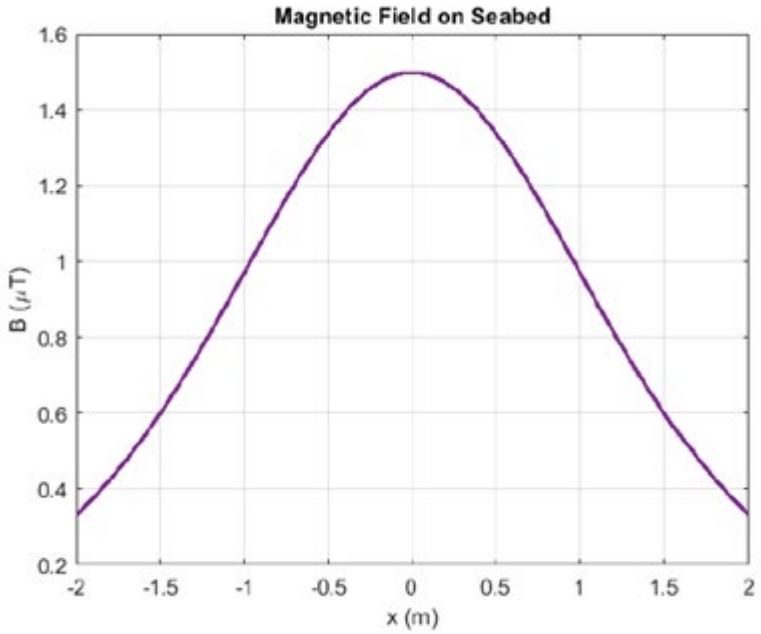


Plate 9-C OECC Magnetic field at seabed surface – 1400 Cu, mild steel – 1064A – 2 m depth of burial

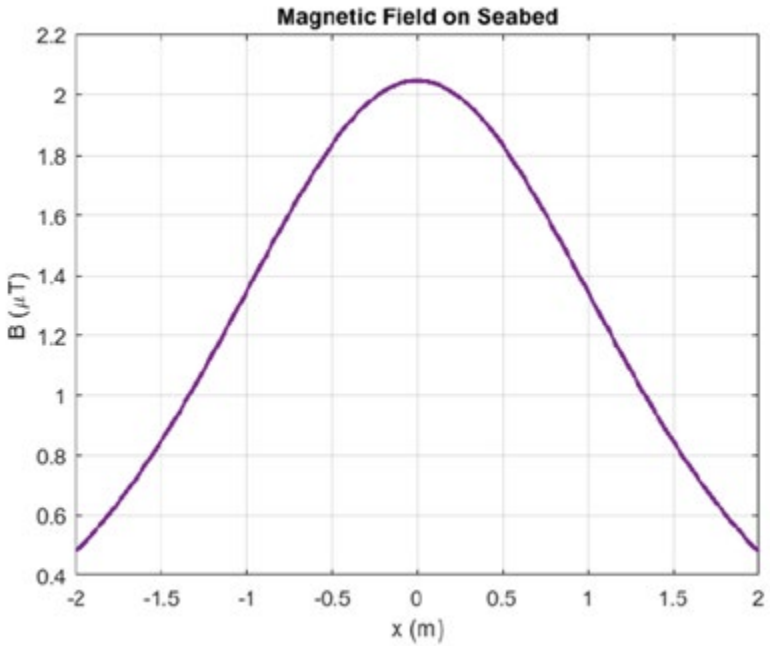


Plate 9-D Magnetic field at seabed surface – 1800 Cu, mild steel – 1083A – 2 m depth of burial

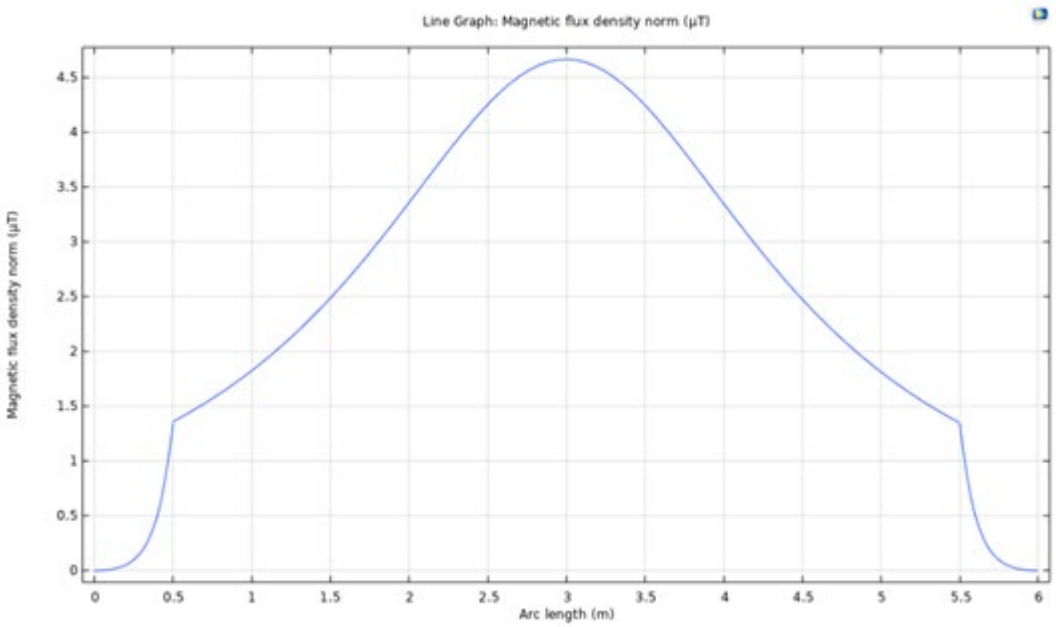


Plate 9-E IAC magnetic field at seabed surface – 1800 Cu, stainless steel – 1083A – 2 m depth of burial

310. Receptors are grouped according to the following criteria for the assessment against EMF from cables during operation and maintenance:

- Elasmobranchs and turtles;
- Other fish; and
- Shellfish.

311. The magnetic flux present at the cable surface is considerably higher than on the seabed, however the magnetic field reduces rapidly with distance. Magnetic field density at the cable surface approximately may be as high as 1600 μT, however this is expected to reduce to less than 30 μT at the seabed surface for a buried cable (which is less than the Earth's magnetic field which is approximated at 50 μT in the UK) and further reduce to zero within approximately 6 m (Tripp, 2024). For an AC export cable for the Dudgeon and Sheringham Shoal Extension projects, EMF for a surface laid cable at 0 m above the seabed was predicted to range from 17.97 to 56.54 μT.

312. Undertaking the assessment using the above groups is considered to provide a suitable level of assessment, which takes account of any potential fish, shellfish, or turtle receptor that may be affected by the CWP Project, whilst focussing on those that are of most relevance to the assessment (see **Section 9.6.6**.

313. Elasmobranchs are considered to be potentially sensitive to EMF with a number of different species present. The ability of elasmobranch species to detect electric fields is well known. Most species within this large group of fish possess anatomical structures called ampullae of Lorenzini which are used for

the detection of prey, predators, conspecific detection, and in some species, navigation (Tricas & Gill, 2011).

314. Sea turtles that cross subsea power cables could be deviated from their migration pattern as it studies have shown anthropogenic magnetic fields can affect migration behaviours (Snoek *et al.*, 2016).

Receptor sensitivity

Elasmobranchs and Turtles

315. Elasmobranch and turtle species are listed in **Table 9-JJJ.** Sensitivity has been determined based upon the definitions set out in **Table 9-B,**with information feeding this assessment coming from **Table 9-R**. Adaptability is considered high as all are mobile species and there is considerable equivalent habitat within the immediate area. The presence of EMF may result in behavioural changes such as attraction or avoidance of a discrete area or changes in normal behaviours such as foraging (Gill *et al.*, 2009), as such tolerance is considered high. Recoverability ranges from low to high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status.

316. As per **Table 9-JJJ**, sensitivity for elasmobranch and turtle species to the impact of EMF from cables is very low to medium for the group.

Table 9-JJJ Elasmobranch and turtle sensitivities to EMF

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Blonde ray	High	High	High	High	Low
Small-spotted catshark	High	High	High	Low	Very low
Cuckoo ray	High	High	High	High	Low
Thornback ray	High	High	High	High	Low
Spotted ray	High	High	High	High	Low
Spurdog	High	High	High	High	Low
Tope	High	High	High	High	Low
Common skate	High	High	High	High	Low
Angel shark	High	High	High	High	Low
Undulate ray	High	High	High	High	Low
Basking shark	High	High	Low	High	Medium
Leatherback turtle	High	High	Low	High	Medium

Other fish

317. The majority of the fish species present lack the specific adaptations to detect EMF fields present in elasmobranchs, although they may still be able to detect EMF field changes in the environment (Gill *et al*., 2005).

318. Species are listed in **Table 9-KKK**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I.** Adaptability is considered high as all are mobile species (except sandeel which has limited ability to avoid any impact and as such has a medium adaptability) and there is considerable equivalent habitat within the immediate area.

319. Sandeel bury into the sediment for most of the year may therefore encounter EMF both at the seabed and within the sediment. However, burial depths are considered to be relatively shallow of up to 50 cm depth (during winter months) for sandeel (Rowley, 2008), maintaining distance between themselves and the cable, and studies of sandeel larvae behaviour in relation to energised cables show no behavioural response in relation to EMF (Cresci *et al*., 2022). Sandeel possess medium adaptability based on their largely static nature, however, are considered to have high tolerance and recoverability based on high fecundity and good motility. Overall, sensitivity is low.

320. Other general teleost fish (including, but not limited to, haddock, whiting and mackerel) and flatfish (including sole, lemon sole and European plaice) have high adaptability tolerance and recoverability to EMF given their high motility, fecundity and pelagic lifestyle. Value differs depending on the national or international importance of the species, and sensitivity for these fish ranges from very low to low.

321. Lampreys possess electroreceptors and therefore experience sensitivity to weak, low frequency electric fields (Bodznick and Preston, 1983) during larval and adult life-history stages (Verhelst *et al*., 2025; Ronan, 1988). No clear functions have been identified for electroreception in adult (sea) lampreys (Chung-Davidson *et al*., 2008) and uncertainty remains (Verhelst *et al*., 2025) on how lampreys use electroreceptors, however it is suggested they have a role in prey-detection, predator avoidance and detection of conspecifics (England and Robert, 2022; Tricas and Carlson, 2012; Chung-Davidson *et al*., 2008; Wilkens and Hoffmann, 2005). There is no evidence to suggest lamprey possess an ability to respond to B fields (NorthConnect, 2018; Gill & Bartlett 2010). Lamprey have a high value, based on international importance and however, overall sensitivity remains low based on high adaptability, tolerability and recoverability of the species.

322. Anguillids, the family of eels, (including the European eel) possess a magnetic map, clearly evident in juvenile eels used for orientation (Naisbett-Jones *et al*., 2017), and migration as adults (Hutchinson *et al*., 2021). Eels are known to be sensitive to EMFs and the swimming speeds of eels have been observed in-situ with Westerberg and Lagenfelt (2008) reporting significantly lower swimming speeds around AC cables. There is evidence suggesting the possibility of short term changes (tens of minutes) in the speed and timing of migration with AC electric cable exposure, even though no effect has been seen on the overall swimming direction (Öhman *et al*., 2007; Westerberg and Lagenfelt, 2008). Orpwood *et al*. (2015) presents no evidence to suggest any behavioural responses to magnetic fields (including differences in movement, startle responses or any other changes). Any effects seen will be temporary, mild behavioural effects such as change in swimming direction and a reduction in swimming speed (Hermans and Schilt, 2022; Westerberg 2008. Öhman *et al*. 2007). Despite these potential temporary effects, overall, it is concluded that EMF do not cause a barrier to movement of European eels therefore resulting in no impediments to migration over electrified cables (Orpwood *et al*., 2015; Westerberg, 2000; Westerberg and Begout-Anras 2000; Öhman *et al*., 2007). Eels have a high value, based on international importance and however, overall sensitivity remains low based on high adaptability, tolerability and recoverability of the species.

323. The presence of EMF from cables may result in behavioural changes such as attraction or avoidance of a discrete area or changes in normal behaviours such as foraging (Gill *et al*., 2009), as such

tolerance is generally considered high. Recoverability is high based on fecundity, should individuals be lost from the population (not considered likely based on the predicted effects) or based on the ability for receptors to revert to pre-impact behaviours.

324. Value ranges from low to high according to conservation status.

Table 9-KKK Sensitivity for other fish species to EMF

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Haddock	High	High	High	Low	Very low
Whiting	High	High	High	Low	Very low
European plaice	High	High	High	Low	Very low
Atlantic mackerel	High	High	High	Low	Very low
Atlantic horse mackerel	High	High	High	Low	Very low
Lemon sole	High	High	High	Low	Very low
Common sole	High	High	High	High	Low
Sandeel	Medium	High	High	Low	Low
Atlantic herring	High	High	High	Low	Very low
European sprat	High	High	High	Low	Very low
Atlantic cod	High	High	High	High	Low
European smelt	High	High	High	Low	Very low
Anglerfish	High	High	High	Low	Very low
European hake	High	High	High	Low	Very low
Ling	High	High	High	Low	Very low
Twaite shad	High	High	High	High	Low
Allis shad	High	High	High	High	Low
Atlantic salmon	High	High	High	High	Low
Sea lamprey	High	High	High	High	Low
River lamprey	High	High	High	High	Low
European eel	High	High	High	High	Low
Seatrout	High	High	High	Low	Very low

Shellfish

325. It is suggested that shellfish (particularly those that undergo migration) have the ability to detect EMF fields (Scott *et al.*, 2020). Additionally, those which exhibit burrowing behaviour i.e., Nephrops have the potential to be closer to the EMF source when in the sediment.

326. Shellfish species are listed below in **Table 9-LLL**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-I**. Across the species group, all are low mobility species and therefore have a low to very low capacity (adaptability) to avoid the impact should adults or juveniles be present in the area affected by EMF. Norway lobster create burrows up to 30 cm deep (Hill and Sabatini, 2008; Rice and Chapman, 1981) and can experience EMF when buried or on the sediment surface. The presence of EMF may result in behavioural or physiological changes such as attraction or avoidance of a discrete area or changes in normal behaviours such as foraging (Scott *et al.*, 2018; Taormina *et al.*, 2018; Gill *et al.*, 2009), and physiological changes as such tolerance is considered high. All shellfish species have a relatively high fecundity and therefore a high recoverability. Value is low according to conservation status.

327. As per **Table 9-LLL**, sensitivity for shellfish species is low for the group.

Table 9-LLL Shellfish sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Razor / knife clams	Very low	High	High	Low	Low
Norway lobster	Very low	High	High	Low	Low
Sword razor shell	Very low	High	High	Low	Low
Whelk	Very low	High	High	Low	Low
Great Atlantic scallop	Very low	High	High	Low	Low
Edible crab	Low	High	High	Low	Low
European lobster	Low	High	High	Low	Low

Magnitude of impact

Elasmobranchs and Turtles

328. A study commissioned by the MMO (2014) evaluated the results of environmental data associated with post-consent monitoring of licence conditions of UK Round 1 and Round 2 OWFs, and some European sites. The report concluded that from the results of post-consent monitoring conducted to date, there is no evidence to suggest that EMF pose a significant risk to elasmobranchs at a site or population level, and little uncertainty remains (MMO, 2014). In a study on elasmobranchs response to EMF, it was determined that while elasmobranch species did respond to the presence of EMF from

a subsea cable, species remained present in the vicinity of the cable regardless of EMF presence (Gill *et al*., 2009).

329. In addition, the NPS EN-3 Renewable Energy Infrastructure (2011) and MMO (2014) both conclude that effects from EMF are not predicted to be significant for fish and more specifically, elasmobranchs. Additionally, the earth's magnetic field is typically between 22 µT and 67 µT (British Geological Survey, n. d.).

330. The maximum level predicted to arise from OECC, IAC, and interconnector cables (**Plate 9-7** of the EIAR) from the cables is 4.9 µT and is well below the background levels all the receptors experience. Any effects on elasmobranch and turtle are anticipated to only occur within the immediate vicinity of the cable, as the maximum magnetic flux density occurring at the cable surface, decreases rapidly with distance (Hutchison *et al*., 2020; Copping *et al*., 2016), with EMF at the cable surface typically several orders of magnitude higher than those measured at the sediment surface 1 m above the buried cable. The anticipated EMF at 0 m above the seabed for a surface laid cable is predicted to range from 17.97 to 56.54 µT (Tripp, 2024). It should however be noted that should cables be surface laid, non-burial cable protection methods will ensure separation between the cable surface and any fish or shellfish receptors.

Other fish

331. The presence of EMF from cables may result in behavioural changes such as attraction or avoidance of a discrete area or changes in normal behaviours such as foraging (Gill *et al*., 2009).

332. As stated above, the NPS EN-3 Renewable Energy Infrastructure (2001) and MMO (2014) both conclude that effects from EMF are not predicted to be significant for fish, in particular where cables are buried or subject to secondary protection as is the case for the CWP Project. A review of the potential effects of EMF was also conducted on Atlantic salmon by Marine Scotland. It determined that salmonoids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong *et al*., 2015).

333. Additionally, the earth's magnetic field is typically between 22 µT and 67 µT (British Geological Survey, n. d.). The maximum level, as derived from **Plate 9-7** of the EIAR, from the cables is 4.9 µT, well below the background levels all the receptors experience. Any effects on fish are anticipated to only occur within the immediate vicinity of the cable, as the maximum magnetic flux density occurring at the cable surface, decreases rapidly with distance (Hutchison *et al*., 2020; Copping *et al*., 2016), with EMF at the cable surface typically several orders of magnitude higher than those measured at the sediment surface 1 m above a buried cable. The anticipated EMF at 0 m above the seabed for a surface laid cable is predicted to range from 17.97 to 56.54 µT (Tripp, 2024). It should however be noted that should cables be surface laid, non-burial cable protection methods will ensure separation between the cable surface and any fish or shellfish receptors.

Shellfish

334. No behavioural or physiological changes have been observed in shellfish below exposure levels of 200 µT (Scott *et al*., 2020), a value far higher than the predicted maximum of 4.9 µT (**Plate 9-7** of the EIAR)**.** Additionally, the earth's magnetic field is typically between 22 µT and 67 µT (British Geological Survey, n. d.). Any effects on shellfish are anticipated to only occur within the immediate vicinity of the cable, as the maximum magnetic flux density occurring at the cable surface, decreases rapidly with

distance (Hutchison *et al.*, 2020; Copping *et al.*, 2016). In addition, if cables are surface laid, non-burial cable protection methods will ensure separation between the cable surface and any shellfish receptors.

Summary of magnitude of impact

335. Cables will be buried, or where not buried protected by other means to ensure separation between any receptor and the cable surface and the levels of EMF received by all receptors are thus similar or lesser than those experienced as part of the natural background. Given the anticipated maximum magnetic field of 26.5μT at the sea bed assuming a cable buried at 1m depth, reducing to 1μT at 4.4m vertically above the cables. Background measurements of the magnetic field are approximately 50μT in the southern North Sea (Tasker *et al.*, 2010). There is potential that, where areas of rough terrain are encountered, burial depths shallower than 1m would be achieved which could result in EMF levels higher than 26.5μT however levels would still be below those expected to result in significant physiological or behavioural impacts on fish and shellfish ecology receptors and along the majority of the cable routes EMF would be below ambient/background measurements. The area affected by EMF is limited to only those locations where cables are installed, and as such the extent of the impact in relation to wider available habitat, which is extensive in the immediate and wider area, is minimal. Considering the limited effects on receptors, and highly limited spatial scale of the impact the magnitude of impact from EMF on fish and shellfish receptors is considered to be negligible.

Significance of effect

Elasmobranchs and Turtles

336. The significance of effect has been summarised by each receptor in **Table 9-MMM**

Table 9-MMM Determination of Significance for elasmobranchs based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Blonde ray	Low	Negligible	**Not significant**
Small-spotted catshark	Very low	Negligible	**Imperceptible** (not significant)
Cuckoo ray	Low	Negligible	**Not significant**
Thornback ray	Low	Negligible	**Not significant**
Spotted ray	Low	Negligible	**Not significant**
Spurdog	Low	Negligible	**Not significant**
Tope	Low	Negligible	**Not significant**
Common skate	Low	Negligible	**Not significant**
Angel shark	Low	Negligible	**Not significant**
Undulate ray	Low	Negligible	**Not significant**
Basking shark	Medium	Negligible	**Slight / Not significant** (not significant)
Leatherback turtle	Medium	Negligible	**Slight / Not significant** (not significant)

337. In summary, the 'elasmobranchs and turtles' group is identified as having medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight / not significant assessment outcome, which is **not significant**. Therefore, the impact of EMF from cables is considered to be **not significant** for elasmobranch and turtle species.

338. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

339. Based on the predicted level of effect, it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Other fish

340. The significance of effect has been summarised by each receptor in **Table 9-NNN.**

Table 9-NNN Determination of Significance for other fish species based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Haddock	Very low	Negligible	**Imperceptible** (not significant)
Whiting	Very low	Negligible	**Imperceptible** (not significant)
European plaice	Very low	Negligible	**Imperceptible** (not significant)
Atlantic mackerel	Very low	Negligible	**Imperceptible** (not significant)
Atlantic horse mackerel	Very low	Negligible	**Imperceptible** (not significant)
Lemon sole	Very low	Negligible	**Imperceptible** (not significant)
Common sole	Low	Negligible	**Not significant** (not significant)
Sandeel	Low	Negligible	**Not significant** (not significant)
Atlantic herring	Very low	Negligible	**Imperceptible** (not significant)
European sprat	Very low	Negligible	**Imperceptible** (not significant)
Atlantic cod	Low	Negligible	**Not significant** (not significant)
European smelt	Very low	Negligible	**Imperceptible** (not significant)
Anglerfish	Very low	Negligible	**Imperceptible** (not significant)
European hake	Very low	Negligible	**Imperceptible** (not significant)
Ling	Very low	Negligible	**Imperceptible** (not significant)
Twaite shad	Low	Negligible	**Not significant** (not significant)
Allis shad	Low	Negligible	**Not significant** (not significant)
Atlantic salmon	Low	Negligible	**Not significant** (not significant)
Sea lamprey	Low	Negligible	**Not significant** (not significant)

Species	Sensitivity	Magnitude	Significance
River lamprey	Low	Negligible	**Not significant** (not significant)
European eel	Low	Negligible	**Not significant** (not significant)
Seatrout	Very low	Negligible	**Imperceptible** (not significant)

341. In summary, the 'other fish group' is identified as having medium sensitivity overall (sensitivity ranges between very low to low for individual species of the group). The magnitude of impact is predicted to be negligible. This results in a slight / not significant assessment outcome. Therefore, the impact of EMF from cables is considered to be **not significant** for all other fish species.

342. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

343. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Shellfish

344. The significance of effect has been summarised by each receptor in **Table 9-OOO.**

Table 9-OOO Determination of Significance for shellfish habitats based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Norway lobster	Low	Negligible	**Not significant**
Whelk	Low	Negligible	**Not significant**
Razor / knife clams	Low	Negligible	**Not significant**
Sword razor shell	Low	Negligible	**Not significant**
Great Atlantic scallop	Low	Negligible	**Not significant**
Edible crab	Low	Negligible	**Not significant**
European lobster	Low	Negligible	**Not significant**

345. In summary, shellfish are identified as having low sensitivity overall (sensitivity is low for all individual species of the group). The magnitude of impact is predicted to be negligible. All species experience

the same significance (not significant), which is not significant. Therefore, the impact of EMF from cables is considered to be **not significant** for shellfish.

346. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

347. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 3: Operational Noise

Impact 3 remains unchanged except for paragraph 489 which is replaced by paragraph 348, below. This update has been made in response to FIR Item 11c (see **FIR Response Document**).

348. In summary, the sensitivity of all receptors is medium and the magnitude the of impact for all species is assessed as negligible. This results in a slight / not significant assessment outcome, which is not significant. Therefore, the impact of operational noise is considered to be not significant for all receptors.

Impact 4: Temporary disturbance of the seabed including associated increases in SSC and deposition

Impact 4 is replaced in its entirety by paragraphs 349 to 380 and Table 9-PPP to Table 9-UUU. This update has been made in response to FIR Item 11c (see **FIR Response Document**).

349. Operation and maintenance activities and their associated vessels, have the potential to cause a temporary disturbance of the seabed including associated increases in SSC and deposition which may result in smothering effects.

350. Receptors are grouped according to the following criteria for the assessment against temporary disturbance of the seabed including associated increases in SSC and deposition during Operation and Maintenance:

- Mobile fish with overlapping spawning and nursery areas;
- Mobile fish and turtle species with no overlapping spawning and nursery areas; and
- Shellfish.

351. Undertaking the assessment using the above groups is considered to provide a suitable level of assessment, which takes account of any potential fish, shellfish, or turtle receptors that may be affected by the operation and maintenance activities, whilst focussing on those that are of most relevance to the assessment (**Section 9.6.6**).

Receptor Sensitivity

Mobile fish with overlapping spawning and nursery areas overlap the

352. Mobile fish with spawning and nursery areas that overlap the ICES regional study area and that could be impacted by increases in SSC are listed below in **Table 9-PPP.** Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-R**. Across the species group, all are mobile species and therefore have a high capacity

(adaptability) to avoid the impact by fleeing the area of temporary disturbance, with the exception being sandeel, a less mobile species and therefore only a medium capacity (adaptability) to avoid the impact.

353. The tolerance of the majority of species within this group is considered to be high for the impact of suspended sediments and deposition that may arise during O&M. This is because most species are highly mobile and can move away from the area of impact and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. Sandeels use the sand as spawning substrate, predation cover and also in which to hibernate during the winter. The thickness of sediments outside the immediate vicinity of the disposal location is <1 cm in all cases, and this level of sediment is predicted to be remobilised and dispersed through natural tidal and wave forces rapidly after settlement. This level of sediment deposition is similar to that which sandeels will experience through natural dispersal and movement of sediments, and it has been demonstrated that sandeels can tolerate a degree of sediment deposition by adjusting their depth within the sediment to maintain oxygen availability (Behrens *et al*., 2007; Latto *et al*., 2013). Species that spawn on the substrate (such as thornback ray, spotted ray, sandeel) have the potential for their eggs to be impacted by sediment deposition through reduced oxygenation. However, the spatial extent of the impact is negligible in the context of the wider availability of suitable substrate, there are no areas of high intensity spawning of substrate spawning fish in the area potentially affected, and any deposited sediments will be transient, being rapidly dispersed through natural tidal and wave action.

354. All fish species within this group have a relatively high fecundity and therefore a high recoverability. Value ranges from low to medium based upon conservation status.

355. As per **Table 9-PPP**, sensitivity for this species group to temporary disturbance of the seabed including associated increases in SSC and deposition, ranges from very low to medium.

Table 9-PPP Mobile fish with overlapping spawning/ nursery habitat sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Anglerfish	High	High	High	Low	Very low
Haddock	High	High	High	Low	Very low
Whiting	High	High	High	Low	Very low
European plaice	High	High	High	Low	Very low
Atlantic mackerel	High	High	High	Low	Very low
Atlantic Horse mackerel	High	High	High	Low	Very low
Lemon sole	High	High	High	Low	Very low
Common sole	High	High	High	High	Low
European sprat	High	High	High	Low	Very low
Sandeel	Medium	High	High	Low	Low
Ling	High	High	High	Low	Very low
Atlantic cod	High	High	High	High	Low
Thornback ray	High	Medium	High	High	Medium

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Spotted ray	High	Medium	High	High	Medium
Tope	High	High	High	High	Low

Mobile fish and turtle species with no overlapping spawning and nursery areas

356. Mobile fish and turtle species with spawning and nursery areas that would not be affected by increases in SSC are listed below in **Table 9-QQQ**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-R**. Across the species group, all are mobile species and therefore have a high capacity (adaptability) to avoid the impact by fleeing the area of disturbance. Atlantic herring, although recognised as a pelagic species, require demersal habitats of coarse substrate such as gravel and stones for spawning purposes (Munk *et al.*, 2024) reducing their adaptability to increased SSC in spawning terms. The survival and development of herring eggs have been reported to be insensitive to even high concentrations of SSC, but studies have concluded that smothering from resulting deposition is likely to be detrimental unless the material is removed rapidly by the current making tolerance to this impact moderate (Birklund and Wijsam, 2005). The tolerance of the other species within this group is considered to be high for the impact of suspended sediment and deposition. This is because most species are highly mobile and can move away from the area of impact and have extensive equivalent habitat in the surrounding area which can be utilised for the same functions. Recoverability ranges from low to high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. Value ranges from low to high according to conservation status.

357. As per **Table 9-QQQ**, sensitivity for this species group ranges from very low to medium.

Table 9-QQQ Mobile fish and turtle species with no overlapping spawning and nursery areas sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Small-spotted catshark	High	High	High	Low	Very Low
Cuckoo ray	High	High	High	Low	Very Low
Blonde ray	High	High	High	Low	Very Low
Seatrout	High	High	High	Low	Very Low
Atlantic herring	Medium	Medium	High	Low	Medium
Undulate ray	High	High	High	Low	Very Low
Twaite shad	High	High	High	High	Low
Allis shad	High	High	High	High	Low
Atlantic salmon	High	High	High	High	Low
Sea lamprey	High	High	High	High	Low
River lamprey	High	High	High	High	Low
European eel	High	High	High	Medium	Low

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Common skate	High	High	High	Medium	Low
Angel shark	High	High	High	Medium	Low
Basking shark	High	High	Low	Medium	Medium
Leatherback turtle	High	High	Low	Medium	Medium
European hake	High	High	High	Low	Very Low
Spurdog	High	High	High	Medium	Low

Shellfish

358. Shellfish species are listed in **Table 9-RRR**. Sensitivity has been determined based upon the definitions set out in **Table 9-B**, with information feeding this assessment coming from **Table 9-R**. Across the species group, all are non-mobile or limited mobility species and therefore have a low to very low capacity (adaptability) to avoid the impact by fleeing the disturbed area. The tolerance of the species within this group is considered to be high for the impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition. This is because while the species group are not mobile and cannot move away from the area of impact, as substrate dwelling species they are adapted to deal with varying levels of sediment and as such they are less susceptible to adverse effects of sediment deposition. Recoverability is high based on fecundity, should individuals be lost from the population or based on the ability for receptors to revert to pre-impact behaviours. The value of all species is considered to be low according to conservation status.

359. As per **Table 9-RRR** sensitivity for shellfish species is low for the group.

Table 9-RRR Shellfish sensitivities

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Razor / knife clams	Very low	High	High	Low	Low
Norway lobster	Very low	High	High	Low	Low
Sword razor shell	Very low	High	High	Low	Low
Whelk	Very low	High	High	Low	Low
Great Atlantic scallop	Very low	High	High	Low	Low
Edible crab	Low	High	High	Low	Low
European lobster	Low	High	High	Low	Low

Magnitude of Impact

Mobile fish with overlapping spawning and nursery areas

360. For temporary disturbance of the seabed leading to increases in SSC and associated deposition, the effect on receptors may include the smothering of substrate spawning species eggs and / or a loss of available spawning area, caused by deposition on the seabed. Additionally, it may cause increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills) or through behavioural responses leading to avoidance of the area thereby reducing the overall available area within which spawning or nursery activities may take place.

361. The potential overlap of spawning or nursery areas with operational phase SSC and deposition is negligible within the context of the ICES regional study area, particularly when it is considered that the area of disturbance will be much smaller than construction activities, producing smaller plumes of sediment. Given the mobile nature of these fish species (except sandeel), and the size of the spawning areas, relative to the area affected by increased SSC, it is considered that individuals will be able to avoid the affected area, if required, with no impact on overall spawning efficacy, and that there will be sufficient suitable alternative habitat available to ensure effects are negligible.

Mobile fish and turtle species with no overlapping spawning and nursery areas

362. For temporary habitat disturbance resulting from SSC and associated deposition, the effect on receptors may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat or through behavioural responses leading to avoidance of the area thereby reducing the overall available habitat.

363. Although Atlantic herring eggs have a moderate sensitivity to sediment deposition, no herring spawning areas overlap with the offshore development area or modelled area of sediment deposition, and therefore it is highly unlikely there will any herring eggs will be impacted by temporary increases in sediment deposition.

364. While increased SSCs may result in an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), given the mobile nature of most fish species and the highly localised area of effect (much smaller than that during construction), it is considered that any individuals will be able to avoid the affected area, and that there will be sufficient suitable alternative habitat available to ensure effects are negligible. In addition, fish are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, or through having life history traits that expose then to increased levels of SSC (e.g. migration through estuarine environments, feeding on organisms within the sediment, or through their preferred location in the water column being in or on the seabed).

Shellfish

365. The impact upon shellfish receptors may include the smothering of substrate dwelling species and / or loss of available habitat area, caused by physical disturbance to the seabed. Additionally, it may cause increase of energetic costs (decreased ability to find prey, increased metabolic cost for excavating burrows) or through behavioural responses leading to avoidance of the area (for more mobile species) thereby reducing the overall available habitat.

366. The shellfish species that are present within the local study area are all species that live on or within the substrate. As such, these species are regularly exposed to increases in SSC and levels of

deposition through natural hydrodynamic processes that re-mobilise, transport, and deposit sediments in the area.

367. The increases in SSC are temporary, transient, and will return to background levels within a short period. The levels of deposition away from the immediate location of disturbance will be much lower than construction levels and thus will be remobilised into the natural sediment transport regime within a short period following settlement.

Summary of magnitude of impact

368. The species present are generally considered to be tolerant to the levels of SSC and transient deposition predicted to arise from the predicted activities. As such, it is predicted that the magnitude of temporary seabed disturbance including associated increases in SSC and deposition will be negligible.

Significance of effect

Mobile fish with overlapping spawning and nursery areas

369. The significance of effect has been summarised by each receptor in **Table 9-SSS**.

Table 9-SSS Determination of Significance for mobile fish with overlapping spawning habitats based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Anglerfish	Very low	Negligible	**Imperceptible** (not significant)
Haddock	Very low	Negligible	**Imperceptible** (not significant)
Whiting	Very low	Negligible	**Imperceptible** (not significant)
European plaice	Very low	Negligible	**Imperceptible** (not significant)
Atlantic mackerel	Very low	Negligible	**Imperceptible** (not significant)
Atlantic Horse mackerel	Very low	Negligible	**Imperceptible** (not significant)
Lemon sole	Very low	Negligible	**Imperceptible** (not significant)
Common sole	Low	Negligible	**Not significant**
European sprat	Very low	Negligible	**Imperceptible** (not significant)
Sandeel	Low	Negligible	**Not significant**
Ling	Very low	Negligible	**Imperceptible** (not significant)
Atlantic cod	Low	Negligible	**Not significant**
Thornback ray	Medium	Negligible	**Slight / Not significant** (not significant)
Spotted ray	Medium	Negligible	**Slight / Not significant** (not significant)
Tope	Low	Negligible	**Not significant**

370. In summary, the 'mobile fish with overlapping spawning and nursery areas' group have medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group), and the magnitude of impact is predicted to be low. this results in a slight assessment outcome, which is not significant. Therefore, the impact of temporary disturbance of the seabed and associated increases in SSC and deposition is considered to be **not significant** for all species with the group.

371. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

372. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Mobile fish and turtle species with no overlapping spawning and nursery areas

373. The significance of effect has been summarised by each receptor in **Table 9-TTT**.

Table 9-TTT Determination of Significance for mobile fish and turtle species with no overlapping spawning and nursery areas based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Small-spotted catshark	Very Low	Negligible	**Imperceptible** (not significant)
Cuckoo ray	Low	Negligible	**Not significant**
Blonde ray	Low	Negligible	**Not significant**
Seatrout	Low	Negligible	**Not significant**
Atlantic herring	Medium	Negligible	**Slight / Not significant** (not significant)
Undulate ray	Low	Negligible	**Not significant**
Twaite shad	Low	Negligible	**Not significant**
Allis shad	Low	Negligible	**Not significant**
Atlantic salmon	Low	Negligible	**Not significant**
Sea lamprey	Low	Negligible	**Not significant**
River lamprey	Low	Negligible	**Not significant**
European eel	Low	Negligible	**Not significant**
Common skate	Low	Negligible	**Not significant**
Angel shark	Low	Negligible	**Not significant**
Basking shark	Medium	Negligible	**Slight / Not significant** (not significant)
Leatherback turtle	Medium	Negligible	**Slight / Not significant** (not significant)
European hake	Very Low	Negligible	**Imperceptible** (not significant)
Spurdog	Low	Negligible	**Not significant**

374. In summary, the 'mobile fish and turtle species with no overlapping spawning and nursery areas' group is identified as having medium sensitivity, overall (sensitivity ranges between very low to medium for individual species of the group). The magnitude of impact is predicted to be negligible. this results in a slight / not significant assessment outcome, which is not significant. Therefore, the impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition during the operational phase is considered to be **not significant** for all mobile fish and turtle species with spawning and nursery areas that do not overlap the offshore development area.

375. Where flexibility in the proposed design exists, no other scenario would lead to a more significant effect.

376. Based on the predicted level of effect, it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Shellfish

377. The significance of effect has been summarised by each receptor in **Table 9-UUU**

Table 9-UUU Determination of Significance for shellfish habitats based upon greatest received magnitude of effect

Species	Sensitivity	Magnitude	Significance
Norway lobster	Low	Negligible	**Not significant**
Whelk	Low	Negligible	**Not significant**
Razor/knife clams	Low	Negligible	**Not significant**
Sword razor shell	Low	Negligible	**Not significant**
Great Atlantic scallop	Low	Negligible	**Not significant**
Edible crab	Low	Negligible	**Not significant**
European lobster	Low	Negligible	**Not significant**

378. In summary, the 'shellfish' group is identified as having low sensitivity, overall (sensitivity is low for all individual species of the group). The magnitude of impact is predicted to be negligible. this results in a not significant outcome. The impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition is therefore considered to be **not significant** for all shellfish species.

379. Where flexibility in the proposed design exists there is no other scenario which would lead to a materially different effect significance.

380. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the primary mitigation described in **Section 9.9**.

Impact 5: Collision with vessels

Impact 5 remains unchanged except for Table 9-91 and paragraph 534 which have been replaced by Table 9-VVV and paragraph 381 below. This revision has been made in response to FIR Item 11c (see **FIR Response Document**).

Table 9-VVV Collision vulnerable species sensitivity

Species	Adaptability	Tolerance	Recoverability	Value	Sensitivity
Basking shark	Low	Low	Low	High	High
Leatherback turtle	Low	Low	Low	High	High

381. In summary, this group is identified as having high sensitivity, overall (sensitivity is high for all individual species of the group). The magnitude of impact is predicted to be negligible. This results in a slight assessment outcome, which is not significant. Therefore, the impact of collision with vessels during operation and maintenance is considered to be **not significant** for basking shark and turtle.

Impact 6: Accidental Pollution Events

Impact 6 remains unchanged.

Impact 7: Invasive Non-Native Species

Impact 7 remains unchanged.

9.10.3 Decommissioning phase

Section 9.10.3 remains unchanged.

9.11 Cumulative Impacts

Section 9.11 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

9.12 Transboundary Impacts

Section 9.12 remains unchanged.

9.13 Inter-relationships

Section 9.13 remains unchanged.

9.14 Potential monitoring requirements

Section 9.14 remains unchanged.

9.15 Impact assessment summary

Section 9.15 remains unchanged.

9.16 References

Section 9.16 should now be read in conjunction with paragraphs 382 to 455 below.

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10 ORNITHOLOGY

10.1 Introduction

Section 10.1 remains unchanged.

10.2 Consultation

Section 10.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

10.3 Legislation, policy and guidance

Section 10.3 remains unchanged, except for updates to Section 10.3.3 below.

10.3.1 Legislation

Section 10.3.1 remains unchanged.

10.3.2 Policy

Section 10.3.2 remains unchanged.

10.3.3 Guidance

Section 10.3.3 remains unchanged, with the exception of the addition of references to updated guidance used in the addressing of the FIR items.

- JNCC (2022) Joint SNCB Interim Advice on the Treatment of Displacement for Red-Throated Diver (see **FIR Response Document**).
- NatureScot (2023) Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds;
- NatureScot (2023) Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional responses, displacement and barrier effects of Marine birds;
- Irish Aviation Authority 2026, Guidance Material on Off-Shore Wind Farms, IAA.

10.4 Impact assessment

Section 10.4 remains unchanged except for changes to Section 10.4.2.

10.4.1 Study areas

This section remains unchanged.

10.4.2 Data and information sources

The upfront text (paragraph 32) remains unchanged. Updates under Offshore Site specific surveys and Offshore Desk study are outlined below.

Offshore

Target Species

This section remains unchanged.

Site specific surveys

This section remains unchanged, with the exception of, the following site-specific surveys which have been added to paragraph 35. These surveys were undertaken to validate the ornithological baselines presented in EIAR **Volume 4, Appendix 10.05 Offshore Ornithology Baseline Characterisation Report**, and to address perceived data-gaps raised within the Commission's request for additional information (*inter alia* FIR Item 7b and 7d):

- Digital aerial surveys
  - Array site (plus 4 km buffer): 5 surveys, undertaken approximately monthly between April 2024 and August 2024, inclusive;
  - Array site (plus 4 km buffer to the north, east and south, 10 km buffer to the west and full coverage of offshore areas of The Murrough SPA): 6 surveys, undertaken approximately monthly between November 2024 and April 2025, inclusive; and
  - Array site (plus 10 km buffer [all directions]): 10 surveys, undertaken approximately monthly between May 2025 and February 2026, inclusive.
- Boat-based European Seabirds at Sea (ESAS) surveys
  - Array site (plus 4 km buffer): 2 surveys, undertaken in June and July 2025.
- Diurnal intertidal surveys
  - All intertidal areas of South Dublin Bay [export cable landfall]: 24 surveys, undertaken approximately twice per month between January 2025 and January 2026, inclusive.
- Dusk intertidal tern roost surveys
  - All intertidal areas of South Dublin Bay [export cable landfall]: 4 surveys, undertaken at approximately two-weekly intervals between mid-July and mid-September 2025.
- Boat-based migratory bird surveys
  - Array site (plus 4 km buffer): 2 surveys, undertaken in April and May 2025 and 3 surveys, undertaken in August to October 2025.
- Boat-based nocturnal acoustic recording

- Array site (north, central and south locations): 29 survey nights between 20/05/2025 and 30/06/2025 and 23 survey nights between 08/09/2025 and 20/10/2025.

- Migratory headland vantage point surveys
  - Bray Head, Wicklow Head and Kilmichael Point: approximately 36 hrs of survey effort at each location in March-April 2025 and approximately 36 hrs of survey effort at each location in September-November 2025

Desk Study

This section remains unchanged. However, the following additional key data sources to inform baseline characterisations were also added to those listed in Table 10-2 of the EIAR.

- Jessopp *et al*., 2018 - The seasonal distribution and abundance of seabirds in the western Irish Sea [ObSERVE phase I data]
- Giralt Paradell *et al*., 2024 - Aerial Surveys of Cetaceans and Seabirds in Irish waters: Occurrence, distribution and abundance in 2021-2023 [ObSERVE phase II data]
- Cork Ecology, 2023 - Wicklow Head colony count and productivity data;
- Wernham *et al*., 2002 - The Migration Atlas: movements of the birds of Britain and Ireland;
- Spina *et al*., 2022 - The Eurasian African Bird Migration Atlas.
- Redfern *et al*., 2020 - Upwelling systems in the migration ecology of roseate Terns (*Sterna dougallii*) breeding in northwest Europe

Intertidal (between MLWS and MHWS)

This section remains unchanged.

Onshore (>MHWS)

This section remains unchanged.

Estuarine / Liffey

This section remains unchanged except for changes under the tern and Black guillemot survey sections.

Target species

This section remains unchanged.

Transect and point count surveys

This section remains unchanged.

Tern surveys

This section remains unchanged but should now be read in conjunction with the additional text provided in paragraph 1 below. This update has been made in response to FIR Item 1c (see **FIR Response Document**).

1. Field surveys to examine the terns breeding at the Poolbeg colonies were carried out on 16 June 2025, 26 June 2025 and 10 July 2025. The surveys utilised experienced personnel to confirm and examine the presence of terns at the sites. The surveys estimated the number of breeding birds and breeding success from total count in June and July 2025. Observations of fledged young were also recorded.

Black guillemot survey

This section remains unchanged but should now be read in conjunction with the additional text provided in paragraph 2 below. This update has been made in response to FIR Item 1c (see **FIR Response Document**).

2. Field surveys to estimate the active nests for Black guillemot in proximity to the onshore substation site were carried out on 16 June 2025, 26 June 2025 and 10 July 2025. The surveys utilised experienced personnel to estimate the presence of nests.

Desk study

This section remains unchanged.

10.4.3 Impact assessment

This section remains unchanged.

10.5 Assumptions and limitations

The upfront text (paragraph 98) remains unchanged. Updates to Section 10.5.1 and 10.5.2 are detailed below.

10.5.1 Offshore

Section 10.5.1 remains unchanged with the exception of paragraph 99 which is replaced by paragraph 3 below.

3. There is a high degree of variability in the marine environment, both spatially and temporally. However, as the offshore baseline site characterisation for this EIAR has been based on two years of digital aerial survey data, informed by further data from fifteen boat-based ESAS surveys over a 22-month period, it is considered to be representative of the array site and surrounding 4 km buffer area for the purpose of impact assessment. This is supported by additional digital aerial surveys undertaken from April 2024 to February 2026 (19 surveys) and additional boat-based ESAS surveys undertaken in June and July 2025 (2 surveys), which validate that the levels of site use by ornithological receptors within the array and surrounding buffer areas outlined within **Appendix 10.05 Offshore Ornithology Baseline Characterisation Report** constitute an appropriate basis for impact assessment. Furthermore, extending the area of digital aerial survey coverage to include a 10 km buffer around the array site, during the 24/25 and 25/26 non-breeding seasons, has facilitated the reassessment of displacement impacts to red-throated diver, thereby removing baseline dataset limitations raised during consultation relating to incomplete coverage of areas potentially affected by displacement impacts for this receptor. Similarly, additional site-specific surveys to further characterise migratory

bird passage over the array site, undertaken in response to consultation, support the baseline outlined within **Appendix 10.05 Offshore Ornithology Baseline Characterisation Report**.

10.5.2 Intertidal

Section 10.5.2 remains unchanged with the exception of paragraph 103 which is replaced by paragraph 4 below.

4. Due to Covid-19 restrictions throughout April and early May 2020, no surveys were undertaken during this period; a total of three surveys missed. Surveys were, however, undertaken during this period in 2021. No interannual variation is therefore accounted for in April count data and the extent to which interannual variation is incorporated into May counts is somewhat reduced relative to other months. Despite this limitation, given the large number of surveys undertaken (45) across the remainder of the two-year period, the resultant dataset describing the distribution and abundance of ornithological receptors throughout the year is considered suitably robust to inform impact assessment, with the absence of data from April and early May 2020 considered unlikely to have impacted assessment conclusions or resultant mitigation design decisions. This is supported by additional intertidal surveys undertaken from January 2025 to January 2026 (24 surveys), which validate that the levels of site use by ornithological receptors within intertidal landfall areas outlined within **Appendix 10.05 Offshore Ornithology Baseline Characterisation Report** constitute an appropriate basis for impact assessment.

10.5.3 Onshore

This section remains unchanged.

10.5.4 Estuarine / Liffey

This section remains unchanged.

10.6 Existing environment

Section 10.6 remains unchanged except for updates to Section 10.6.1 and Section 10.6.2 below. The data and information provided in Section 10.6 of the EIAR, and supporting appendices, accurately characterises the baseline environment for the purposes of EIA. Additional data and information obtained since the submission of the CWP Project planning application (Section 10.4.2) validates and supports the existing baseline characterisation. This is further described in **Appendix C - Data validation statements of the FIR Response Document**. **Appendix 10-D Baseline and Contemporary Data Comparison** also provides a full account as to the validity of the ornithological baseline as a robust and representative dataset upon which to base the impact assessment when compared with data from more recent validation surveys.

10.6.1 Offshore – array site and OECC

Section 10.6.1 remains unchanged.

10.6.2 Intertidal – export cable route intertidal landfall area

Section 10.6.2 remains unchanged.

10.6.3 Onshore (>MHWS)

Section 10.6.3 remains unchanged.

10.6.4 Estuarine / Liffey

Section 10.6.4 remains unchanged.

10.6.5 Designated sites

Section 10.6.5 remains unchanged.

10.6.6 Receptor importance

Section 10.6.6 remains unchanged.

10.6.7 Climate change and natural trends

Section 10.6.7 remains unchanged.

10.6.8 Predicted future baselines

Section 10.6.8 remains unchanged, with the exception of paragraphs 5 to 8, which are added after paragraph 147.

5. In relation to the submission of further information (2026), a suite of surveys to characterise site use by ornithological receptors has been undertaken to confirm that assessments based upon the original application's baseline datasets remain valid. This includes:

    - Coastal vantage point surveys, boat-based transect surveys of the array site and surrounding areas and stationary boat-based nocturnal acoustic surveys within the array site. [Further information provided in **Appendix 10-B Migration Survey Report** of the **EIAR Addendum**].
    - Digital Aerial Surveys (DAS) and boat-based ESAS Surveys, of the array site and surrounding areas [Further information provided in **Appendix 10-C ESAS Survey Report** and **Appendix 10-D Baseline and Contemporary Survey Data Comparison** of the **EIAR Addendum**]; and
    - Intertidal surveys of the OECC landfall area [Further information provided in **Appendix 10-E Intertidal Crepuscular Tern Survey Report** and **Appendix 10-F Intertidal Waterbirds Survey Report** of the **EIAR Addendum**].

6. **Appendix 10-D Baseline and Contemporary Survey Data Comparison** of the **EIAR Addendum** provides a full account as to the validity of the ornithological baseline as a robust and representative

dataset upon which to base the assessment, when compared with the contemporary validation surveys.

7. The additional data summarised within this section and presented in full in **Appendix 10-D** *et seq ibid*, validates and supports the existing baseline characterisation presented in Section 6 of EIAR Chapter 10 Ornithology. Analysis of this data has demonstrated no material change to the current baseline for all relevant receptors. It can therefore be concluded that no material change to the existing assessment conclusions would result from the additional data, and therefore a revised impact assessment to account for this data is not required.

8. Similarly, for estuarine/Liffey ornithology, surveys were undertaken at the onshore substation site in June and July 2025 to observe tern and Black guillemot species within the estuarine/Liffey study area. Details of the species observed during these surveys are presented in **Appendix 10-A Tern and Black Guillemot Survey Report 2025**. Analysis of this data has demonstrated no material change to the current baseline for all relevant receptors. It can therefore be concluded that no material change to the existing assessment conclusions would result from the additional data, and therefore a revised impact assessment to account for this data is not required.

10.7 Scope of the assessment

This section remains unchanged, with the exception that artificial lighting impacts to Manx shearwater are now scoped-in to the assessment in response to FIR item 7o (see **FIR Response Document**). Paragraphs 9 and 10, below, replace paragraph 148 and 149, and Table 10-A replaces Table 10-26.

9. EIA Scoping Reports for the offshore and onshore infrastructure were published on the 6 January 2021 and 6 May 2021, respectively. The Scoping Reports were uploaded to the CWP Project website and shared with regulators, prescribed bodies and other relevant consultees, inviting them to provide relevant information and to comment on the proposed approach being adopted by the Applicant in relation to the both the offshore and onshore elements of the EIA.

10. Based on responses to the Scoping Report, further consultation and refinement of the CWP Project design (including consultation with ACP in 2025), potential impacts to ornithology scoped into the assessment are listed below in **Table 10-A**.

Table 10-A: Potential impacts scoped-in to the assessment

Impact No.	Description of impact	Notes
Construction		
Offshore and intertidal impacts		
Offshore / intertidal Impact 1	Direct effects on offshore and intertidal habitats during construction phase activities.	Removal or alteration of habitats in such a way as to affect their value to ornithological receptors or prevent or reduce the use of those habitats by receptor.
Offshore / intertidal Impact 2	Disturbance and displacement to ornithological receptors in offshore and intertidal habitats during construction phase activities.	Behavioural responses to wind farm infrastructure or associated activity leading to effective indirect habitat loss through the avoidance of use of particular areas, or barrier effects through additional energetic consequences from the avoidance

Impact No.	Description of impact	Notes
		of passage through particular areas.
Offshore / intertidal Impact 3	Changes in prey availability for ornithological receptors in offshore and intertidal habitats from construction phase activities.	Redistribution or other effects to prey species which change their availability to foraging birds and resultant redistribution of ornithological receptors.
Offshore / intertidal Impact 4	Accidental pollution in offshore and intertidal habitats during construction phase activities.	Effects arising from the accidental release of materials during proposed works which may impact ornithological features by causing mortality or reductions in fitness or reduce the quality of the habitats which they use.
Offshore / intertidal Impact 5	Accidental introduction or spread of invasive species in offshore and intertidal habitats during construction phase activities.	Effects arising from the accidental release or redistribution of non-native invasive species during proposed works which may impact ornithological features directly or reduce the quality of the habitats which they use.
Onshore impacts *assessed alongside estuarine / Liffey impacts		
Onshore Impact 1	Direct effects on onshore habitats during construction phase activities.	The main construction phase impacts associated specifically with the OTI include the loss of nesting, breeding and roosting sites through habitat loss and degradation and the disturbance / displacement of protected bird species.
Onshore Impact 2	Disturbance and displacement to ornithological receptors in onshore habitats (through noise, human presence and / or presence of OTI) during construction phase activities	
Onshore Impact 3	Onshore habitat degradation as a result of the introduction / spread of non-native invasive plant species	
Estuarine / Liffey impacts *assessed alongside onshore impacts		
Estuarine / Liffey Impact 1	Direct effects on estuarine / Liffey habitats during construction phase activities.	The main construction phase impacts associated specifically with the OTI include the loss of nesting, breeding and roosting sites through habitat loss and degradation and the disturbance / displacement of protected bird species within the estuarine / Liffey area.
Estuarine / Liffey Impact 2	Disturbance and displacement to ornithological receptors in estuarine / Liffey habitats (through noise, human presence and / or presence of OTI) during construction phase activities.	
Operation and Maintenance		
Offshore and intertidal impacts		
Offshore / intertidal Impact 1	Direct effects on offshore and	Removal or alteration of habitats in

Impact No.	Description of impact	Notes
	intertidal habitats during the operation and maintenance phase.	such a way as to affect their value to ornithological receptors or prevent or reduce the use of those habitats by receptor.
Offshore / intertidal Impact 2	Disturbance and displacement to ornithological receptors in offshore and intertidal habitats during operation and maintenance phase activities.	Behavioural responses to wind farm infrastructure or associated activity leading to effective indirect habitat loss through the avoidance of use of particular areas, or barrier effects (array site only) through additional energetic consequences from the avoidance of passage through particular areas.
	Artificial lighting impacts to Manx shearwater in the offshore environment during the operation and maintenance phase	The presence of artificial light associated with the project has the potential to lead to impacts upon Manx shearwater through attraction and/or disorientation.
Offshore / intertidal Impact 3	Changes in prey availability for ornithological receptors in offshore and intertidal habitats during the operation and maintenance phase.	Redistribution or other effects to prey species which change their availability to foraging birds and resultant redistribution of ornithological receptors.
Offshore / intertidal Impact 4	Accidental pollution in offshore and intertidal habitats during operation and maintenance phase activities.	Effects arising from the accidental release of materials during proposed works which may impact ornithological features by causing mortality or reductions in fitness or reduce the quality of the habitats which they use.
Offshore / intertidal Impact 5	Accidental introduction or spread of invasive species in offshore and intertidal habitats during operation and maintenance phase activities.	Effects arising from the accidental release or redistribution of non-native invasive species during proposed works which may impact ornithological features directly or reduce the quality of the habitats which they use.
Offshore / intertidal Impact 6	Collision with operational Wind Turbine Generators (WTGs) within array site only.	Where ornithological receptors fly through project infrastructure, specifically turbines within the offshore array site, collision with rotating blades of the wind turbines may result in the death or injury of individuals.
Estuarine / Liffey impacts		
Estuarine / Liffey Impact 1	Disturbance / displacement (noise, human presence and / or lighting) to protected bird species during	The main impacts during the operational phase associated with the OTI include the disturbance of

Impact No.	Description of impact	Notes
	operation and maintenance activities.	protected bird species within the vicinity of the onshore substation.
Estuarine / Liffey Impact 2	Presence of buildings and infrastructure in close proximity to a protected species breeding colony, causing potential disturbance / displacement via shadow affects or increase of predation threat.	The presence of the buildings and infrastructure could cast a shadow on surrounding habitat which could potentially impact the breeding colony of Common and Arctic terns on the CDL dolphin (approximately 25 m) from the onshore substation buildings. The presence of the buildings and infrastructure could also create perching opportunities for species such as peregrine falcon or hooded crow (*Corvus cornix*), which may increase the actual or perceived, predator threat on the nesting colony.
Decommissioning		
Offshore and intertidal impacts		
Offshore / intertidal Impact 1	Direct effects on offshore and intertidal habitats during decommissioning phase activities.	Potential impacts during the decommissioning phase are considered to arise from similar pathways to those anticipated during the construction phase and to be of similar or smaller magnitude than during the construction phase.
Offshore / intertidal Impact 2	Disturbance and displacement to ornithological receptors in offshore and intertidal habitats during decommissioning phase activities.	
Offshore / intertidal Impact 3	Changes in prey availability for ornithological receptors in offshore and intertidal habitats from decommissioning phase activities.	
Offshore / intertidal Impact 4	Accidental pollution in offshore and intertidal habitats during decommissioning phase activities.	
Offshore / intertidal Impact 5	Accidental introduction or spread of invasive species in offshore and intertidal habitats during decommissioning phase activities.	
Onshore and Estuarine / Liffey impacts		
Onshore and Estuarine / Liffey Impact 1	Direct effects on onshore and Estuarine / Liffey habitats during decommissioning phase activities.	Potential impacts during the decommissioning phase are considered to arise from similar pathways to those anticipated during the construction phase and to be of similar or smaller magnitude than during the
Onshore and Estuarine / Liffey Impact 2	Disturbance and displacement to ornithological receptors in onshore and Estuarine / Liffey habitats (through noise, human presence	

Impact No.	Description of impact	Notes
	and / or presence of OTI) during decommissioning phase activities.	construction phase.
Onshore Impact 3	Onshore habitat degradation as a result of the introduction / spread of non-native invasive plant species during decommissioning phase activities.	

10.8 Assessment parameters

Section 10.8 remains unchanged.

10.9 Primary mitigation measures

Section 10.9 remains unchanged with the exception of Table 10-31, which is replaced in its entirety with Table 10-B. This update has been made in response to the Ecological Vessel Management Plan (FIR Item 7u) and the Marine Mammal Mitigation Protocol (FIR Items 10a,10c and 10t).

Table 10-B Primary mitigation measures

Project Element	Description
All offshore infrastructure	Positions of WTGs and OSSs have been informed by a wide range of site-specific data, including metocean data (e.g., wind speed and direction), geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation. Designing and optimising the layout of the WTGs has considered multiple constraints identified from analysis of these datasets, alongside the consideration of layout principles taken from relevant guidance on the design of OWFs. A summary of the key actions taken to avoid or otherwise reduce impacts is provided below: • The WTG layout options include Search and Rescue (SAR) access lanes to allow a SAR resource to fly on the same orientation continuously through the array site. This is provided to minimise risks to surface vessels and / or SAR resource transiting through the array site. • Archaeological exclusion zones (AEZs) around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. • The locations of offshore infrastructure been developed to avoid known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa* which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be

Project Element	Description
	undertaken to facilitate the micro-siting around sensitive habitats such as *Sabellaria spinulosa*. • The WTG layout options have been developed to avoid or minimise interaction with known areas of high fishing density, where possible. As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence. • A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided.
All offshore infrastructure	A Construction Environmental Management Plan (CEMP) has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of: • The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e., ecological clerk of works) and contractor requirements (i.e., method statements for specific construction activities); • Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project; • Measures proposed to ensure effective handling of chemicals, oils and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
WTGs and OSSs	A **Marine Mammal Mitigation Protocol** (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the construction of the CWP Project. The MMMP is based on DAHG (2014) guidance. The MMMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
WTGs	All WTGs for both layout options will feature a minimum blade tip clearance of 36 m above Mean Sea Level (MSL) (+37.72 m LAT). This is beyond the minimum 22 m clearance required for safety of navigation and has been set by the Applicant to reduce the potential collision risk for offshore ornithology receptors.

Project Element	Description
Onshore substation	The Codling Wind Park **Onshore Substation Architectural Design Statement** accompanies the planning application. As part of the design of the façade for the onshore substation bird of prey deterrents were incorporated at 2 locations: • Creating a steep angle (+60°) to the band between the brick base and metal cladding of the façade; and • Raising of the metal cladding above roof parapet, impairing hunting birds' view of target platform.
All offshore infrastructure	An Ecological Vessel Management Plan (EVMP) has been prepared to determine vessel routing to and from construction sites and ports and to include a code of conduct for vessel operators. The EVMP includes details of: • The types and specifications of vessels for the CWP Project; • How vessels will be monitored and coordinated; • Vessel speeds transiting inside or within 2km of The Murrough SPA from November to March, inclusive; and • The use of defined transit routes to site from key construction and operation ports, where practicable to do so. The EVMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
All infrastructure	A Rehabilitation Schedule is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.

10.10 Impact assessment

Section 10.10 remains unchanged except for changes detailed below for Sections 10.10.2 and 10.10.3. As noted in Section 10.6, the analysis of any new ornithological survey data has demonstrated no material change to the current baseline, in EIAR **Volume 3**, **Chapter 10 Ornithology** for all relevant receptors. It has therefore been concluded that no material change to the existing assessment conclusions would result from the additional data, and therefore a revised impact assessment to account for this additional data is not required.

The changes made here in Section 10.10 are in response to Item 7 of the FIR (see **FIR Response Document**).

10.10.1 Introduction

Section 10.10.1 remains unchanged.

10.10.2 Construction phase

Section 10.10.2 remains unchanged except for changes to:

- Offshore and intertidal – construction: impact 2 – disturbance and displacement
- Onshore and estuarine / Liffey – construction: impact 2 – disturbance and displacement

The changes are detailed under the relevant impacts.

Offshore and intertidal – construction: impact 1 – direct effects on habitat

This section remains unchanged.

Offshore and intertidal – construction: impact 2 – disturbance and displacement

Offshore – array site and OECC (below MLWS)

This section remains unchanged.

Intertidal – OECC (MLWS to MHWS)

The Intertidal – OECC (MLWS to MHWS) section remains unchanged except for updates to the Magnitude of impact and Additional mitigation sections, detailed below.

Impact screening

This section remains unchanged.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except that paragraph 11, below, follows paragraph 570. This revision has been made in response to FIR Item 7q (see **FIR Response Document**).

11. Furthermore, and in order to help contextualise the above impacts to the South Dublin Bay intertidal waterbird populations, further information has also been provided which enumerates the proportion of each species' regional population potentially impacted. This includes the Preferred Alignment (PA) and Alternative Alignment for the purposes of Modelling (AAM) scenarios. For all species (with the exception of knot), the proportion of the species regional populations predicted to be impacted by construction phase disturbance is <0.8%. For knot, the proportion of the regional population predicted to be impacted is 1.74%. **Appendix 10-G Regional Population Assessment** provides further details on the assessment of disturbance impacts to regional intertidal waterbird populations.

Significance of effects

This section remains unchanged.

Additional mitigation

In response to consultation with the National Parks and Wildlife Service (NPWS) an agreement to extend construction phase intertidal restrictions from the end of March to mid-April was confirmed. The first bullet point of paragraph 574 has been amended to say:

- During the period September to mid-April, inclusive, the following restrictions will apply to the proposed CWP construction: [subsequent bullet points remain unchanged].

Similarly, where mitigation measures are referenced in the first sentence of paragraph 575 "…(excluding activities between September and March inclusive…" is replaced by:

- "…(excluding activities between September and mid-April inclusive…"

Offshore and intertidal – construction: impact 3 – changes in prey availability

This section remains unchanged.

Offshore and intertidal – construction: impact 4 – pollution

This section remains unchanged.

Offshore and intertidal – construction: impact 5 – introduction of invasive non-native species

This section remains unchanged.

Onshore and estuarine / Liffey – construction: impact 1 – direct effects on habitat

This section remains unchanged.

Onshore and estuarine / Liffey – construction: impact 2 – disturbance and displacement

Onshore

This section remains unchanged.

Estuarine/Liffey

This section remains unchanged with the exception of an update to the additional mitigation section below. This update is in response to a submission from Birdwatch Ireland on the planning application.

Impact Screening

This section remains unchanged.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged.

Significance of the effect

This section remains unchanged.

Additional mitigation

This section remains unchanged with the exception of an update to paragraph 699, which is replaced with paragraph 12. The change to paragraph 699 relates to the restricted period, changing from 1 May to mid-April and relates to the experience of personnel dealing with the monitoring and response requirements. This update is in response to a submission from Birdwatch Ireland on the planning application.

12. Mitigations applicable to terns have been detailed in a tern disturbance report prepared by ALCnature (**Appendix 10.9**) a breakdown of these mitigations includes the following:

General restrictions period:

- The period from mid-April – 15 August will be defined as the tern breeding season and restrictions may apply as detailed below. The latter date may require amendment subject to progress of the breeding season and this should be monitored as the season progresses.

- Visual screening:
  - A solid screen (hoarding) of 2.5m in height.
  - Erected and maintained to a height which hides / screens all activities, up to and including the maximum height extent of operating machinery within 75 m of the CDL tern colony.
  - Screening duration period mid-April – 15 August.
  - Working (movement and noise of machinery or personnel) above hoarding height and within 40 metres, limited to periods of <5 minutes per hour.

- Construction sequencing:
  - A visualisation of the following proposed mitigation measures can be seen in Figure 10-12
  - below.
  - All works out of line of sight and beyond 75 m of the CDL tern colony (except piling or works involving high intensity or long duration noise or vibration) may proceed at any time.
  - No works within line of sight of tern colony (or above hoarding height within 50 m), to proceed during mid April – 15 August.
  - Works behind hoarding during mid April – 15 August (except high noise / vibration activities, such as piling – restricted to outside 75 m buffer) are acceptable.

- Noise & lighting limits:
  - High noise & vibration activities (e.g., piling) restricted within 75 m buffer zone of tern colony mid April – 15 August.
  - No lighting on exterior of hoarding in line of sight of tern colony mid April – 15 August.

- No works in hours of darkness mid April – 15 August.

- Monitoring and response:
  - Monitoring of tern colony response to be carried out to structured plan throughout breeding season to enable response to disturbance events (enabling or restricting work subject to response observed).
  - Monitoring will be undertaken by a qualified individual familiar with seabird and tern behaviour experience.

- Special measures during fledging period:
  - During the period when chicks are fledging and may leave the colony platform (typically July – mid Aug) they may move to shoreline areas to seek dry perches and there is risk of tern chicks entering the site and adults defending chicks on or close to the site by attacking personnel. The potential loss of chicks through exclusion of adults or through injury on site is apparent and during this period a trained ecologist should be on hand to locate and capture chicks in close proximity to the site and relocate them to suitable safe areas to avoid these issues.

Residual effect

This section remains unchanged.

Onshore – construction impact 3 – introduction / spread of non-native species.

This section remains unchanged.

10.10.3 Operation and maintenance phase

Section 10.10.3 remains unchanged except for changes to:

- Offshore and intertidal – operation and maintenance: impact 2 – disturbance and displacement
- Offshore – operation and maintenance: impact 6 – collision
- Estuarine / Liffey – operation and maintenance: impact 2 – presence of buildings / infrastructure

The changes are detailed under the relevant impacts.

Offshore and intertidal – operation and maintenance: impact 1 – direct effects on habitat

This section remains unchanged.

Offshore and intertidal – operation and maintenance: impact 2 – disturbance and displacement

This section remains unchanged except for updates in response to FIR item 7j (screening in of kittiwake) and in response to FIR item 7k (addressing red-throated diver) detailed below.

Offshore – array site and OECC (below MLWS)

The upfront text (paragraphs 744-747) remains unchanged.

The changes for FIR Item 7j relate to:

- The replacement of paragraph 750 and Table 10-98 to accommodate the change, to screening in kittiwake for disturbance and displacement impacts.
- The addition of new receptor sensitivity, impact magnitude, and significance of effect subsections which inform the impact assessment of operation and maintenance phase disturbance and displacement impacts to kittiwake associated with array site infrastructure.

The changes for FIR Item 7k relate to

- Table 10-C below replaces Table 10-98 under Impact screening. The maximum bio-season mean peak density has been updated for red-throated diver and an explanatory footnote has been added to the foot of the Table 10-C.
- Updates under the receptor sensitivity and impact magnitude subsections.

Impact screening

Paragraph 750 is replaced by paragraph 13 below and Table 10-98 is replaced by Table 10-C below.

Array site

13. Seabird species which are insensitive to disturbance and displacement effects and / or make minimal use of areas within or surrounding the array site (i.e., where maximum mean peak bio-seasonal densities recorded within the array site or surrounding buffer are considered to be low or very low – i.e., <0.5 individuals per km^2) are not considered to be at risk of indirect habitat loss impacts above a significance level of imperceptible and therefore are not considered further in assessment in relation to such impacts from operation and maintenance phase activities within the array site. An exception to this screening approach is made in relation to kittiwake following feedback from the Commission that displacement impacts associated with offshore wind farm array infrastructure are to be screened in and assessed in accordance with criteria defined by Scottish regulatory advisors (NatureScot, 2023). **Table 10-C** presents the seabird species in relation to their sensitivity to disturbance or displacement during operation of Codling Wind Park (CWP) and whether they are screened in and considered in subsequent assessment or screened out for further consideration in relation to disturbance and displacement impacts.

Table 10-C Screening of seabird species within CWP for risk of disturbance and displacement during operation

Species	Sensitivity to displacement (operational)	Maximum bio-season mean peak density (birds/km sq). Array Site + 2 km buffer (10 km buffer for divers)	Screened in or out
Kittiwake	very low	5.936 (high)	In*
Common gull	very low	0.231 (low)	Out
Black-headed gull	very low	0.051 (very low)	Out

Species	Sensitivity to displacement (operational)	Maximum bio-season mean peak density (birds/km sq). Array Site + 2 km buffer (10 km buffer for divers)	Screened in or out
Little gull	very low	0.255 (low)	Out
Great black-backed gull	very low	0.291 (low)	Out
Herring gull	very low	1.231 (medium)	Out
Lesser black-backed gull	very low	0.040 (very low)	Out
Roseate tern	very low	0.013 (very low)	Out
Common tern	very low	2.922 (medium)	Out
Arctic tern	very low	1.126 (medium)	Out
Sandwich tern	very low	0.035 (very low)	Out
Little tern	very low	0.025 (very low)	Out
Guillemot	medium	58.100 (very high)	In
Razorbill	medium	18.990 (very high)	In
Black guillemot	medium	0.076 (very low)	Out
Puffin	medium	0.408 (low)	In
Red-throated diver	high	0.240** (low)	In
Great northern diver	high	0.051 (very low)	Out
Fulmar	very low	0.114 (low)	Out
Manx shearwater	medium	4.900 (medium)	In
Gannet	low to medium	0.457 (low)	In
Cormorant	low	0.055 (very low)	Out
Shag	low	0.190 (low)	Out

* This species is screened in in relation to feedback from the Commission; **Displacement impacts to red-throated diver have been assessed within suitable habitats which lie within a 10 km buffer of the array site in response to FIR item 7k; Total peak abundance estimate (134.343 individuals in February) divided by area of suitable habitat within a 10 km buffer of the array site (560.12 km^2)

Receptor sensitivity

Kittiwake: the additional receptor sensitivity subsection is addressed in paragraphs 14 to 18 below.

Red-throated diver: paragraphs 19 to 24 below replace paragraphs 774 to 779.

Array site

Seabird species

Kittiwake

14. Kittiwake are considered to be relatively insusceptible to disturbance and displacement impacts in

relation to vessel activity (Bradbury *et al*., 2014). The nature and extent of spatial responses by this species to the presence of Wind Turbine Generator (WTG) infrastructure are, however, presently somewhat contested within published literature. Although kittiwake are generally considered to demonstrate low levels of sensitivity to vessel activity (Fliessbach *et al*., 2019; Garthe & Hüppop, 2004; Furness *et al*., 2013), a majority of studies indicate that this receptor experiences no displacement (Heinänen & Skov, 2018; Dierschke *et al*., 2016; Trinder *et al*., 2024), or indeed slight attraction (Vanermen *et al*., 2023; Pollock *et al*., 2024) whereas a minority of studies advocate that displacement has occurred (Peschko *et al*., 2020).

15. Peak densities of kittiwake recorded within the array site and surrounding 2 km buffer are considered to be high. Kittiwake forage over large areas during breeding (mean maximum foraging range + 1 SD = 300.6 km, Woodward *et al*., 2019) and non-breeding periods (Furness, 2015). As such, this indicates that although the location of potential disturbance and displacement inducing infrastructure may correspond with areas of importance to kittiwake, the receptor has considerable ability to avoid such impacts within its broader foraging area.

16. The tolerance of kittiwake to operation and maintenance phase disturbance and displacement impacts within the array site and surrounding areas is therefore assessed to be high.

17. The conservation importance of kittiwake is assessed to be very high (**Table 10-21, Section 10.6.6** of **Volume 3, Chapter 10 Ornithology** of the EIAR).

18. When receptor tolerance and importance are considered together as per **Table 10-9**, **Section 10.4.3** of **Chapter 10 Ornithology** of the EIAR, overall receptor sensitivity is assessed as medium (i.e. high tolerance and very high importance).

Red-throated diver

19. On the basis of scientific literature (Garthe and Hüppop, 2004; Schwemmer *et al*., 2011; Furness and Wade 2012; Furness *et al*., 2013; Bradbury *et al*., 2014; Dierschke *et al*., 2016; Fliessbach *et al*., 2019; Jarrett *et al*., 2022) and observed distributional responses from Offshore Wind Farm (OWF) post-construction monitoring, red-throated diver are considered to be highly or very highly susceptible to disturbance and displacement impacts in relation to vessel activity and are widely recognised among seabird species as being particularly sensitive the presence of WTGs.

20. This receptor is assessed as having limited habitat preferences and high sensitivity to disturbance and displacement in relation to construction phase activities and infrastructure in the array site. This species is assumed to experience survival or productivity consequences resultant from potential displacement. Furthermore, non-habituation to the presence of vessel traffic (i.e., avoidance of regularly used shipping lanes) has been documented for this receptor (Burger *et al*., 2019).

21. Although peak densities of red-throated diver recorded within the potentially impacted area are relatively low, the overall potentially impacted extent of suitable habitat is relatively large. This is due to the large distances at which this receptor may exhibit displacement behaviour in response to the presence of WTGs.

22. The tolerance of red-throated diver to operation and maintenance phase disturbance and displacement impacts within the array site and surrounding area is therefore assessed to be low.

23. The conservation importance of red-throated diver is assessed to be high (**Table 10-21**).

24. When receptor tolerance and importance are considered together as per **Table 10-9**, overall receptor sensitivity receptor sensitivity is assessed as high (i.e., low tolerance and high importance).

Magnitude of impact

Kittiwake: the additional impact magnitude subsection is addressed in paragraphs 25 to 37 and by the addition of Table 10-D and Table 10-E below.

Red-throated diver: paragraphs 38 to 57 below replace paragraphs 850 to 873.

Array site

Indirect habitat loss and barrier effects to seabird species

Kittiwake

25. Following consultation responses, distributional response (displacement) impacts to kittiwake are assessed in accordance with NatureScot (2023) guidance, which recommends a displacement rate of 30% and mortality rates of 1% and 3% during breeding and non-breeding seasons. Displacement matrices highlighting these displacement and mortality rates are presented within **Appendix 10-H Kittiwake Displacement Matrices**. Annual estimated displacement-related mortality for kittiwake, associated with a 30% displacement rate and 1% mortality rate scenario is 7.475 individuals. This level of mortality is broken down further into the relevant bio-seasons in **Table 10-D**. The annual estimated displacement-related mortality associated with a 30% displacement rate and a 3% mortality rate scenario is 22.426 individuals, which is similarly broken down further into the relevant bio-seasons in **Table 10-E**. The bio-seasons used align with NatureScot guidance which determines the breeding season as being April to August (see NatureScot Guidance note 9: Guidance to support offshore wind applications: Seasonal periods for birds in the Scottish marine environment; NatureScot, 2020). Impact magnitude is determined by contextualising annual and bio-seasonal mortality estimates against the respective annual or seasonal regional populations and estimated annual baseline levels of mortality within those populations. The baseline mortality is calculated using the age specific demographic rates and age class proportions as presented in **Table 10-15** in accordance with standard practice.

Table 10-D Estimated bio-seasonal and annual changes in baseline mortality to Kittiwake from disturbance and displacement impacts (30% displacement, 1% associated mortality)

Bio-season (months)	Seasonal abundance (array site plus 2 km buffer)	Regional baseline populations and baseline mortality rates (individuals per annum)		Estimated number of individuals subject to mortality	Increase in baseline mortality (%)
		Population	Baseline mortality		
Return migration (Dec - Mar)	585.804	708,147	110,471	1.757	0.002%
Migration-free breeding (Apr - Aug)	543.039	Method 1: 404,443	63,093	1.629	0.003%
		Method 2: 131,860	20,570		0.008%
Post-breeding migration (Sep - Nov)	1362.959	928,207	144,800	4.089	0.003%
Annual (BDMPS)	2491.802	928,207	144,800	7.475	0.005%
Annual (Biogeographic)		5,100,000	795,600		0.001%

Table 10-E Estimated bio-seasonal and annual changes in baseline mortality to Kittiwake from disturbance and displacement impacts (30% displacement, 3% associated mortality)

Bio-season (months)	Seasonal abundance (array site plus 2 km buffer)	Regional baseline populations and baseline mortality rates (individuals per annum)		Estimated number of individuals subject to mortality	Increase in baseline mortality (%)
		Population	Baseline mortality		
Return migration (Dec - Mar)	585.804	708,147	110,471	5.272	0.005%
Migration-free breeding (Apr - Aug)	543.039	Method 1: 404,443	63,093	4.887	0.008%
		Method 2: 131,860	20,570		0.024%
Post-breeding migration (Sep - Nov)	1362.959	928,207	144,800	12.267	0.008%
Annual (BDMPS)	2491.802	928,207	144,800	22.426	0.015%
Annual (Biogeographic)		5,100,000	795,600		0.003%

26. During the return migration bio-season, the mean peak abundance of Kittiwake within the array site plus 2 km buffer is estimated to be 585.804 individuals. On the basis of displacement and mortality rates of 30% and 1%, respectively, this equates to a predicted displacement mortality of 1.757 individuals. On the basis of displacement and mortality rates of 30% and 3%, respectively, this equates to a predicted displacement mortality of 5.272 individuals. The return migration bio-season Kittiwake regional baseline population is estimated to be 708,147 individuals, with the associated baseline mortality of 110,471 individuals (from an average mortality rate of 15.6% –**Table 10-15**). Assuming the upper and lower rates of mortality (i.e. 1 and 3%) the project may result in an additional mortality of 1.757 or 5.272 individuals, which is an increase in regional bio-seasonal mortality of 0.002% or 0.005% respectively from the baseline.

27. This level of impact during the return migration bio-season is considered to be of negligible magnitude.

28. The migration-free breeding season, which corresponds with the breeding season as defined in NatureScot Guidance, Kittiwake regional baseline population is estimated to be 404,443 individuals (Method 1: where the seasonal population is considered to include breeding adults within mean maximum foraging range plus 1 SD of the array site, plus the estimate of immature individuals present in the preceding bio-season), or 131,860 individuals (Method 2: where the seasonal population is considered to include breeding adults within mean maximum foraging range plus 1 SD of the array site, plus a number of immatures derived from the stable age ratio of adults to non-adults (**Table 10-15**), multiplied by the number of breeding adults).

29. By multiplying seasonal abundance estimates with baseline mortality rates from **Table 10-15** (15.6%), the total number of regional Kittiwake baseline mortalities during each migration-free breeding season is estimated to be 63,093 individuals (using breeding season regional population estimation Method 1), or 20,570 individuals (using breeding season regional population estimation Method 2).

30. Additional potential mortality of 1.629 individuals (30% displacement with 1% associated mortality), or

4.887 individuals (30% displacement with 3% associated mortality), would therefore increase the regional bio-seasonal mortality by 0.003% or 0.008% respectively from baseline for migration-free breeding season regional population estimates derived using Method 1 and by 0.008% or 0.024% respectively from baseline for migration-free breeding season regional population estimates derived using Method 2.

31. Immaterial of whether Method 1 or Method 2 is adopted, or whether a 1% or 3% mortality is applied. this level of impact during the migration-free breeding bio-season is considered to be of negligible magnitude.

32. During the post-breeding migration bio-season, the mean peak abundance of Kittiwake within the array site plus 2 km buffer is estimated to be 1,362.959 individuals. On the basis of displacement and mortality rates of 30% and 1%, respectively, this equates to a predicted displacement mortality of 4.089 individuals. On the basis of displacement and mortality rates of 30% and 3%, respectively, this equates to a predicted displacement mortality of 12.267 individuals. The post-breeding migration bio-season Kittiwake regional baseline population is estimated to be 928,207 individuals, with the associated baseline mortality 144,800 individuals (from an average mortality rate of 15.6% – **Table 10-15**). Additional mortality of either 4.089 or 12.267 individuals, would therefore increase the regional bio-seasonal mortality by 0.003% or 0.008% respectively from baseline.

33. This level of impact during the post-breeding migration bio-season is considered to be of negligible magnitude.

34. Annual (all seasons combined) estimated mortality resulting from displacement from the array site plus 2 km buffer is 7.475 individuals (30% displacement with 1% associated mortality), or 22.426 individuals (30% displacement with 3% associated mortality). Using the largest regional bio-season population of 928,207 individuals (**Table 10-14**) as a proxy for the maximum regional population across the year, and an average baseline mortality rate of 15.6% (**Table 10-15**), the predicted regional mortality across all seasons is estimated to be 144,800 individuals. Additional mortality of 7.475 or 22.426 individuals would therefore increase regional annual mortality by 0.005% or 0.015% respectively from baseline.

35. Similarly, for the estimated biogeographic population of 5,100,000 individuals (**Table 10-14**), using an average baseline mortality rate of 15.6% (**Table 10-15**), the predicted biogeographic mortality across all seasons is estimated to be 795,600 individuals. Additional mortality of 7.475 or 22.426 individuals would therefore increase biogeographic annual mortality by 0.001% or 0.003% respectively from baseline.

36. This level of annual impact to the regional and biogeographic populations is considered to be of negligible magnitude.

37. For each bio-season and on an annual basis, the magnitude of the potential impact is therefore considered to be negligible, as it represents no discernible increase to baseline mortality levels as a result of displacement.

Red-throated diver

38. Red-throated diver is widely recognised as being particularly sensitive to human activities in marine areas, including through the disturbance effects of vessel traffic and the presence of WTGs (Garthe and Hüppop 2004; Schwemmer *et al*., 2011; Furness and Wade 2012; Furness *et al*., 2013; Bradbury *et al*., 2014). However, studies to quantify displacement rates, distances at which displacement occurs, and consequences of displacement have documented a wide range of observed responses.

Displacement rate selection and justification

39. For example, a review from the English southern North Sea for the Norfolk Vanguard OWF examination found the strongest evidence-led position to be a displacement rate of 90% affecting the array site and a 2 km buffer and a 1% mortality rate of displaced birds (MacArthur Green, 2019). However, analysis and interpretation of pre-, during- and post-construction survey results from the

Irish Sea/Liverpool Bay area for the constructed Gwynt y Môr and Rhyl Flats OWFs, which enabled an assessment as to the identification of changes in the abundance and distribution of red-throated diver throughout the Gwynt y Môr construction and operation, found that the operation of Gwynt y Môr currently appears to have had little influence on the presence of red-throated diver in this area (APEM, 2011; RWE Renewables, 2019).

40. Such variability in red-throated diver displacement response estimates between studies is likely to be a consequence of differing conditions between studies, and differing pressures. These would include differences in baseline characterisation methods such as survey platform, programme duration and timings, as well as site conditions such as array design and proximity to diver foraging areas. In a meta-analysis of post-construction monitoring from a number of OWFs in the UK and the North Sea, Hall (2024) found that the extent to which red-throated divers exhibited within-windfarm displacement responses was influenced by WTG diameter, turbine spacing and density of turbines. Birds exhibited less of a distributional response to array sites comprised of fewer, larger turbines compared to older OWFs with smaller, more densely distributed WTGs. The approach to assessing red-throated diver displacement follows a similar rationale to that applied for auk species in the EIAR, where mortality and displacement rates were justified using precautionary, evidence-based approach.

41. For the assessment of displacement rates of red-throated diver, three distance bands, extending out to 10 km, were used. This allows the assessment to reflect the decay in displacement response to WTGs with increasing distance from the array site; a phenomenon which has been widely observed in studies relating to red-throated diver displacement (Heinänen *et al*., 2020; Mendel *et al*., 2019). This is considered to be a more appropriate method for calculating displacement rate over the larger distance of 10 km, rather than the application of a uniform rate across the entire study area. Hall (2024) further demonstrates that diver responses to OWF construction are highly variable, with some sites showing strong avoidance while others exhibit limited displacement beyond a few kilometres. The Applicant has precautionarily applied displacement rate of 100% within the array site, with progressively lower displacement assumptions in the surrounding bands (57.175% in the 0 km to 5 km band and 34.025% in the 5 km to 10 km band; see **Appendix 10-I Design-based Density, Abundance Estimates and Distributional Response of the Red-throated Diver** and **Appendix 10-J Parameterisation of Red-throated Diver Displacement Rates** and **Table 10-F**).

42.

Table 10-F: Displacement rates used in the assessment of red-throated diver

Region	Displacement rate
Array site	100%
0 km to 5 km buffer	57.175%
5 km to 10 km buffer	34.025%

Mortality rate selection and justification

43. A 1% mortality rate for displaced individuals has been applied, this is in accordance with the Joint Nature Conservation Committee (JNCC) guidance (JNCC, 2022) which is considered relevant in a regional Irish Sea context. Beyond the regional context this conservative rate is also supported by studies from the German Bight, which indicate that, while divers are displaced from turbine areas, there is little evidence of associated population-level declines. This is likely due to redistribution into alternative habitats and low intra-specific competition (BioConsult SH, 2020; Dierschke *et al*., 2017). These findings support the conclusion that displacement does not necessarily equate to significant mortality, and justify the precautionarily proportionate approach adopted for the assessment of red-throated diver displacement.

44. Site-specific Digital Aerial Surveys (DAS) data which were used to inform the EIAR provide evidence as to the spatial variation in habitat quality for red-throated divers wintering in the region. The shallow waters of Codling Bank itself, and nearshore areas, provide comparatively more favourable conditions, whereas the shipping route which traverses a north-south alignment through waters to the west of the array site and the outer reaches of the 10 km buffer comprise sub-optimal habitat, characterised by deeper water and comparatively heavy vessel traffic. These areas consistently supported very low diver densities during aerial surveys, indicating that any displacement from these zones would have negligible ecological consequences for red-throated diver. The relative importance of diver habitats (and therefore the potential impact of displacement from the array site) declines sharply with distance from the array footprint (Hall, 2024; JNCC, 2022).

45. Red-throated diver is a relatively long-lived species with individuals typically breeding for many seasons and producing relatively few young each year. Substantial increases to mortality rates, particularly if they affect breeding adults, would therefore be likely to result in population level effects. The absence of any population change, derived from a large and long-term monitoring dataset (Vilela *et al.*, 2020), is therefore indicative that the probability of individuals experiencing mortality or fitness effects from displacement leading to demographic consequences is very low. This absence provides support for a very low (i.e. 1%) displacement mortality rate to be used for OWF displacement impact assessment, rather than a high (i.e. 10%) displacement mortality rate.

46. In a UK Crown Estate (2019) commissioned plan level Habitats Regulations Assessment (HRA) for English waters, when considering potential impact of displacement to Red-throated Divers from Gwynt Y Môr OWF in the Welsh part of the Irish Sea, it is stated that: “There is no evidence currently available that displacement will directly result in the mortality of individual birds. Mortality as a consequence of displacement is more likely to occur as a result of increased densities outside of the impacted area, which may lead to increased competition for resources. Displacement of birds from lower density areas, which are likely to be of lower habitat quality is less likely to result in mortality than would be the case in areas of high density and hence higher habitat quality. It is assumed that there are more opportunities for birds in lower quality habitats to relocate to habitats of similar quality. As such, the use of a 1% mortality rate is considered appropriate for this assessment.”

47. When this rationale is presented in the context of observed diver habitat use within the western Irish Sea (i.e., Figure 78 within Jessop *et al*., 2018), displacement of red-throated diver from the CWP array site, which is not among the highest density areas within the region, may also be considered as displacement of birds from lower density, areas. Such displacement from relatively lower quality habitats, where there is a large amount of similar (or better) quality habitat within the western Irish Sea region is therefore unlikely to result in significant increases in intra-specific competition within the region and, as such, the use of a 1% mortality rate is further supported for this assessment.

48. The displacement matrices provided in **Appendix 10-I Design-based Density, Abundance Estimates, and Distributional Response of the Red-throated Diver** estimate mortality for displaced red-throated divers across a range of rates (0.5%–10%). However, the Applicant considers that mortality is likely to occur at the very low end of this range and has applied a 1% displacement mortality rate, consistent with current statutory guidance in the UK (JNCC, 2022). Whilst the guidance is for the UK this assumption is supported by empirical evidence from the German Bight, where extensive monitoring and modelling have shown strong displacement responses to OWFs but limited evidence of mortality. The evidence demonstrates divers avoiding turbine arrays and adjacent areas up to 10 to 15 km away (Heinänen *et al*., 2020; Mendel *et al*., 2023), but despite this pronounced avoidance, there is little evidence of a corresponding decline in the overall red-throated diver population within the region (BioConsult SH; 2020). This suggests that displaced individuals are able to redistribute into alternative habitats without significant demographic consequences, likely due to low baseline densities and limited intra-specific competition for prey resources (Dierschke *et al*., 2017). Based on these findings, and in line with JNCC’s interim advice, the 1% mortality rate remains the most appropriate and precautionary assumption for this assessment (JNCC, 2022).

49. Red-throated diver are unlikely to experience significant levels of increased density-dependant competition or interference as a result of redistribution in avoidance of OWFs, as this species utilises prey species and does not typically aggregate in high densities within marine foraging areas (Diershke et al., 2017).

Application of selected displacement and mortality rates

50. The annual estimated potential mortality for red-throated diver occupying suitable habitats within 10 km of the array site is 1.473 individuals. In **Table 10-G** this is presented as constituent estimated mortalities within relevant bio-seasons and distance bands from the array site and magnitude of impact is estimated by calculating proportional increase in baseline mortality within each bio-season and annually within each distance band with respect to regional and wider biogeographic populations. Regional and biogeographic baseline estimates are derived using overall baseline mortality rates calculated from age-specific demographic rates and age class proportions as presented in **Table 10-15, Section 10.6.1** of **Chapter 10 Ornithology** of the EIAR**.**

51. Seasonal and annual displacement mortality of red-throated diver from the array site and associated buffers is summarised in **Table 10-G** below.

Table 10-G Estimated seasonal and annual displacement mortality of red-throated diver within the array sand associated suitable habitat buffer areas. A mortality rate of 1% of displaced individuals is applied in all cases.

Season	Area (displacement rate)	Peak	Displacement mortality
Post-breeding migration (Sep – Nov)	Array site (100%)	0	0.000
	0-5 km buffer (57.175%)	7.637	0.044
	5-10 km buffer (34.025%)	14.714	0.050
	Total in season	**22.351**	**0.094**
Migration free winter (Dec – Jan)	Array site (100%)	28.489	0.285
	0-5 km buffer (57.175%)	19.091	0.109
	5-10 km buffer (34.025%)	31.230	0.106
	Total in season	**71.810**	**0.500**
Return migration (Feb – Apr)	Array site (100%)	28.489	0.285
	0-5 km buffer (57.175%)	99.275	0.568
	5-10 km buffer (34.025%)	7.807	0.027
	Total in season	**135.571**	**0.880**
Total in all areas over all non-breeding seasons		**229.732**	**1.473**

52. **Table 10-H** shows how red-throated diver displacement mortality predicted to occur as a consequence of the CWP Project influences the baseline mortalities of both the non-breeding BDMPS (Furness, 2015) and biogeographic populations of this species.

Table 10-H Increase to baseline mortality as a result of displacement mortality to red-throated diver occupying suitable habitats within 10 km of the proposed development

Bio-season	Seasonal peak abundance*	Regional baseline populations and baseline mortality rates (individuals per annum)		Estimated number of individuals subject to mortality	Increase in baseline mortality (%)
		Population	Baseline mortality		
Return migration	135.571	12,717	2,849	0.879	0.031
Migration-free breeding season	[Species is functionally absent during this bio-season]				
Post-breeding migration	22.351	12,717	2,849	0.094	0.003
Migration-free winter	78.810	4,148	929	0.500	0.054
Annual (BDMPS)	**135.571**	**12,717**	**2,849**	**1.473**	**0.052**
Annual (Biogeographic)		**27,000**	**6,048**		**0.024**

**Occupying appropriate habitat within 10 km of the array site*

53. During the return migration bio-season, the peak abundance of red-throated diver within the array site plus suitable habitats within a 10 km buffer is estimated to be 135.571 individuals. On the basis of the distance-specific displacement rates described above and a mortality rate of 1%, this equates to a predicted displacement mortality of 0.879 individuals. The return migration bio-season red-throated diver regional baseline population is estimated to be 12,717 individuals, with the associated baseline mortality 2,849 individuals (from an average mortality rate of 22.4% – **Table 10-15**). Additional mortality of 0.879 individuals would therefore increase regional bio-seasonal mortality by 0.031% from baseline. This level of impact during the return migration bio-season is considered to be of negligible magnitude.

54. During the post-breeding migration bio-season, the peak abundance of red-throated diver within the array site plus suitable habitats within a 10 km buffer is estimated to be 22.351 individuals. On the basis of the distance-specific displacement rates described above and a mortality rate of 1%, this equates to a predicted displacement mortality of 0.094 individuals. The post-breeding migration bio-season Red-throated diver regional baseline population is estimated to be 12,717 individuals, with the associated baseline mortality 2,849 individuals (from an average mortality rate of 22.4% – **Table 10-15**). Additional mortality of 0.094 individuals would therefore increase regional bio-seasonal mortality by 0.003% from baseline. This level of impact during the post-breeding migration bio-season is considered to be of negligible magnitude.

55. During the migration-free non-breeding bio-season, the peak abundance of red-throated diver within the array site plus suitable habitats within a 10 km buffer is estimated to be 78.810 individuals. On the basis of the distance-specific displacement rates described above and a mortality rate of 1%, this equates to a predicted displacement mortality of 0.500 individuals. The migration-free non-breeding bio-season red-throated diver regional baseline population is estimated to be 4,148 individuals, with the associated baseline mortality to be 929 individuals (from an average mortality rate of 22.4% – **Table 10-15**). Additional mortality of 0.500 individuals would therefore increase regional bio-seasonal mortality by 0.054% from baseline. This level of impact during the migration-free non-breeding bio-

season is considered to be of low magnitude.

56. Annual (all seasons combined) estimated mortality resulting from displacement from the array site plus suitable red-throated diver habitats within a 10 km buffer is 1.473 individuals. Using the largest regional bio-seasonal BDMPS population of 12,717 individuals (Furness, 2015; **Table 10-14**) as a proxy for the maximum regional population across the year, and an average baseline mortality rate of 0.224 (**Table 10-15**), the natural predicted regional mortality across all seasons is estimated to be 2,849 individuals. Additional mortality of 1.473 individuals would therefore increase regional annual mortality by 0.052% from baseline. This level of annual impact to the regional population is considered to be of negligible magnitude. For the estimated biogeographic population of 27,000 individuals (**Table 10-14**), using an average mortality rate of 0.224 (**Table 10-15**), the natural predicted biogeographic mortality across all seasons is estimated to be 6,048 individuals. Additional mortality of 1.473 individuals would therefore increase biogeographic annual mortality by 0.024% from baseline. This level of annual impact to the biogeographic population is considered to be of negligible magnitude.

57. Impact magnitudes inferred using the banded approach to displacement and utilising the winter 2024/25 DAS data yield negligible impact magnitudes. It is however noted that previous survey campaigns at the proposed CWP Project area have recorded higher numbers of red-throated divers within the array site plus the original 4 km buffer, resulting in greater abundances when the data are extrapolated to account for site coverage and availability bias. The non-breeding season peak abundance of red-throated diver as recorded in the winter 2024/25 DAS campaign was 236.732 birds on suitable habitats within 10 km of the array site, whereas data used to inform the original EIAR assessment yielded a mean peak abundance of 449.045 birds during the non-breeding season within 4 km of the array site. Additional surveys undertaken in the winters of 24/25 and 25/26 validate the existing characterisation surveys as being appropriate for EIAR. The detailed analysis of the 24/25 validation surveys do, however, record lower abundances than those within the EIAR. The raw winter 25/26 data align with original 24/25 data and support this magnitude statement. Despite absolute numbers of birds predicted to experience mortality being low or very low in all bio-seasons, regional populations of red-throated diver are small and, particularly during the migration-free breeding season, the certainty associated with regional population estimates is low. In order to account for this apparent inter-annual variability, an impact magnitude of low is considered to be appropriately conservative for red-throated diver, rather than negligible. Overall, the magnitude of this impact has therefore been assessed as low.

Significance of the effect

The additional impact significance subsection is addressed in paragraph 58 below and precedes paragraph 914.

Array site

Indirect habitat loss and barrier effects to seabird species

Kittiwake

58. In accordance with the matrix approach outlined to determine impact significance level in **Table 10-11**, as receptor sensitivity is assessed to be moderate and impact magnitude is assessed to be negligible, the potential effect of displacement and disturbance, through indirect habitat loss and barrier effects, during the operational phase upon kittiwake is considered to be **Imperceptible**, and **Not Significant** in EIA terms.

Intertidal – OECC (MLWS to MHWS)

This section remains unchanged.

Offshore and intertidal – operation and maintenance: impact 2a – artificial lighting impacts

Offshore – array site and OECC (below MLWS)

This section (paragraphs 59 to 75 and Table 10-I) has been prepared and added to the EIAR as the Applicant's response to Item 7o in the **FIR Response Document**, which relates to the assessment of artificial light impacts upon Manx shearwater within the offshore environment.

Item 7o of the FIR (artificial light emissions) requests that the Applicant carries out an assessment on "*the effects of artificial light emissions associated with CWP on Manx shearwater in the EIAR*".

The FIR goes on to acknowledge that "*effects may be difficult to quantify in terms of changes to collision risk or displacement effects"* and that *"a qualitative assessment and consideration of effects is required*".

This section provides a qualitative assessment as to the potential impacts of marine lighting from the Project upon Manx shearwater within an EIAR context and comprises an additional offshore impact (**Impact 2a – Artificial lighting impacts**), which is considered after operational phase disturbance and displacement responses within **Section 10.10.3** (operation and maintenance) within the project-alone assessment (**Section 10.10**).

Impact screening

59. WTGs and associated offshore infrastructure (i.e. offshore sub-stations (OSSs)) associated with the proposed development will be subject to an obligatory Lighting and Marking Plan (LMP), a draft of which accompanied the planning application.

60. Sources of artificial lighting installed on WTGs and associated infrastructure is designed to comply with specific minimum lighting requirements. Marine lighting and marking during Operation and Maintenance (O&M) will be discussed and agreed with Irish Lights, and will be in compliance with the relevant guidance, namely the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) O139 Recommendations on the Marking of Man-Made Offshore Structures (IALA,

2021) and IALA G1162 Guidance on the Marking of Man-Made Offshore Structures (IALA, 2021).

61. Aviation lighting requirements will be discussed and agreed with the Irish Aviation Authority (IAA) and will give due consideration to the most up-to-date guidance in relation to the marking of offshore wind farms, currently IAA ASAM No. 18, Guidance Material on Offshore Wind Farms, Issue 2 (IAA, 2015).

62. The lighting of WTGs and OSSs is required as a safety measure to ensure that any offshore infrastructure is visible and navigable for both vessels and aircraft. The presence of such artificial lighting within the marine environment has the potential to lead to impacts upon Manx shearwater, through attraction and/or disorientation from artificial lighting.

63. Manx shearwater is a burrow-nesting migratory procellarid which breeds in western Europe and whose wintering grounds are located in the sub-equatorial western Atlantic. As such, breeding and migrating individuals, as well as newly emerged fledglings from colonies within a very large area have the potential to be exposed to marine lighting from the CWP Project during the breeding season.

64. This species has been screened in with relation to the potential effects of artificial lighting impacts within the offshore environment during the operation and maintenance phase.

Receptor sensitivity

65. Manx shearwater is a burrow-nesting seabird species which displays nocturnal behaviours when in close proximity to its breeding colonies; a strategy designed to minimise predation risk from diurnal predators such as gulls (McSorley *et al.*, 2008). Although it is well documented that this species can become attracted to and disorientated by artificial lighting generated by bright nearshore structures such as oil tankers, lighthouses and coastal settlements (Syposz *et al.*, 2018, Pembrokeshire Coast National Park Authority, 2021), there is little evidence available regarding this species' responses to artificial WTG navigation lighting, which is limited in comparison (Deakin *et al.*, 2022). Manx shearwater has a very large foraging range, with the mean maximum foraging range plus one standard deviation being 2,365.5 km (Woodward *et al.*, 2019). Furthermore, it is considered that artificial lighting impacts may affect emergent fledglings more than other age classes (Syposz *et al.*, 2018). Given the evidence relating to artificial lighting responses primarily affecting juveniles emerging from nesting burrows, with limited evidence to suggest that offshore impacts are significantly influencing Manx shearwater behaviour, as well as the very large areas of marine habitat available to this species, the tolerance of Manx shearwater in relation to impacts as a result of artificial lighting is assessed as being high.

66. The conservation importance of Manx shearwater is assessed to be high (**Table 10-21**).

67. When receptor tolerance and importance are considered together as per **Table 10-9**, overall receptor sensitivity is assessed as medium (i.e. high tolerance and high importance).

Magnitude of impact

68. Although there is theoretical connectivity between Manx shearwater breeding colonies and projects out to a by-sea distance of 2,365.5 km (mean max. foraging range plus 1 S.D.; Woodward et al., 2019), it is considered that impacts from artificial lighting from the array site would be so small as to be imperceptible in terms of any resultant changes to baseline mortality for those colonies which are considered to be sufficiently distant from the array site (conservatively considered to be approximately 500 km from the array site). **Section 10.6.1** utilises two methods for estimating the total regional breeding population of Manx shearwater. The regional breeding population estimates are inclusive of all individuals (i.e. both adults and immatures) which are present within this species' specific bio-season (Furness *et al.*, 2015) (**Table 10-14**). Full details of methods 1 and 2, used to estimate the regional populations of Manx shearwater can be found in **Section 10.6.1**. Method 1 estimates a regional population of 2,125,206 during the migration-free breeding period, while Method 2 estimates 2,736,288 birds during this same period. The estimated regional population of Manx shearwater during

post-breeding migration is 1,585,474. **Table 10-I** provides the baseline and updated DAS estimated mean peak bio-seasonal abundances of Manx shearwater within the array site plus a 2 km buffer with the estimated bio-seasonal regional population for this species. In all cases, the estimated abundance of Manx shearwater within the array site plus a 2 km buffer is very small (less than a hundredth of a percent, with the exception of baseline post-breeding migration and baseline return migration, which are still less than a tenth of one percent of their respective regional bio-seasonal populations).

Table 10-I: Estimated bio-seasonal mean peak abundance of Manx shearwater as a proportion of the bio-seasonal regional populations

Bio-season	Seasonal abundance (mean peak within array site plus 2 km buffer)		Regional baseline populations	Proportion of regional population within array site plus 2 km	
	April 2024 to October 2025	Baseline		April 2024 to October 2025	Baseline
Migration-free breeding season	144.04	180.16	Method 1: 2,125,206	0.007%	0.008%
			Method 2: 2,736,288	0.005%	0.007%
Post-breeding migration	29.01	1,125.06	1,585,474	0.002%	0.071%
Non-breeding season	0	0	0	N/A	
Return migration	77.25	780.41	1,585,474	0.005%	0.049%

69. Estimates as to the distance from which artificial lighting may lead to attraction and/or disorientation impacts to seabirds range from several tens of metres to in excess of 10 km (Deakin *et al*., 2022). The nearest Manx shearwater breeding colony to the array site is Aberdaron Coast and Bardsey Island SPA (57.78 km by sea). The limit for a direct line of sight between a Manx shearwater flying at 12 m above MSL (Johnston & Cook; 2016) and lighting mounted on a nacelle at a height of 175.72 m above MSL (per **Chapter 4 Project Description**) is calculated as being approximately 59.717 km (assuming an Earth radius of 6,378 km). Any artificial lighting emanating from OWF infrastructure or associated vessels will not be directly visible from any breeding colonies and as such there is considered to be no connectivity between emergent burrow-nesting fledglings and impacts from project-related artificial lighting. It is considered likely that any emerging fledglings or indeed adult birds at sea would encounter artificial lighting from other sources, such as commercial vessels, and oil and gas installations before coming into range of lights associated with the CWP Project.

70. Minimum lighting recommendations outlined above require an illumination intensity that is significantly less powerful than the examples used by Deakin *et al*. (2022) in their assessment of impacts to nocturnal procellarids (i.e. villages, lighthouses and offshore oil platforms). It is considered that artificial lighting at sea generated by WTGs and associated vessels and infrastructure is unlikely to impact upon Manx shearwater to the same degree. It is therefore concluded that lighting attraction to OWFs is unlikely to occur and as such the magnitude of impact from artificial lighting to Manx shearwater is negligible.

Significance of effect

71. The assessment of significance of effect of artificial lighting impacts to Manx shearwater is determined through consideration of both the impact magnitude and receptor sensitivity, as outlined in the effect significance matrix (**Table 10-11**).

72. The magnitude of impact to Manx shearwater as a result of artificial lighting effects is assessed as being negligible, and the sensitivity of Manx shearwater assessed as being medium. The significance of effect of artificial lighting impacts during the operation and maintenance phase to all Manx shearwater is therefore assessed as being imperceptible, which is **not significant** in EIA terms.

73. With regards to the cumulative effects assessment (CEA), only potential impacts assessed as being "not significant" or above are included. The impact of artificial lighting upon Manx shearwater within the marine environment is assessed as being "imperceptible". As such, this impact is not taken forward to the CEA, as there is no potential for an imperceptible impact to contribute to a cumulative effect.

Additional mitigation

74. As any impacts resulting from artificial lighting during the operation and maintenance phase within the array site are assessed to be imperceptible (and therefore **not significant** in EIA terms), no additional mitigation is necessary.

Residual effect

75. As no additional measures are required to mitigate for impacts as a result of artificial lighting during the operation and maintenance phase within the array site, residual effects are assessed to be imperceptible, and therefore **not significant** in EIA terms.

Offshore and intertidal – operation and maintenance: impact 3 – changes in prey availability

This section remains unchanged.

Offshore and intertidal – operation and maintenance: impact 4 – pollution

This section remains unchanged.

Offshore and intertidal – operation and maintenance: impact 5 – introduction of invasive non-native species

This section remains unchanged.

Offshore – operation and maintenance: impact 6 – collision

This section remains unchanged except for updates in response to FIR item 7e (roseate tern), FIR Item 7n (proxy species), FIR Item 7r (Great black-backed gull and PVA outputs) and FIR Item 7m (Gannet) which are detailed below.

Offshore – array site

The upfront text (paragraphs 993-994) remains unchanged.

The changes for FIR Item 7e relate to:

- Impact screening to screen in the roseate tern with the replacement of paragraphs 995 to 997 with paragraphs 76 to 79, below and Table 10-115 is replaced by Table 10-J below.
- The addition of receptor sensitivity, magnitude of impact and significance of effect sections for the impact assessment of operation and maintenance phase collision risk impacts to roseate tern.

The changes for FIR Item 7n relate to:

- FIR Item 7n of the FIR (proxy species) requests that the Applicant considers "*species-specific sensitivities within their assessments where available and must provide appropriate and clear justification if proxy species or data are used*". Accordingly, Table 10-115 has been replaced with Table 10-J, in which references to proxy species for collision risk screening have been removed for red-throated diver and cormorant.

The changes for FIR Item 7r relate to:

- The Magnitude of Impact / Great black-backed gull subsection is replaced by a revised subsection which includes additional consideration of PVA outputs for breeding season impacts.
- The Significance of the effect / Great black-backed gull subsection is replaced by a revised subsection.

The changes for FIR Item 7m relate to:

- For FIR Item 7m, the Magnitude of Impact / Gannet subsection is replaced by a revised subsection below.

Seabirds

Impact screening

Roseate tern: replacement of paragraphs 995 to 997 with paragraphs 76 to 79, below and Table 10-115 is replaced by Table 10-J below.

Proxy species: Table 10-115 of the EIAR is replaced by Table 10-J, below. References to proxy species for collision risk screening have been removed for red-throated diver and cormorant.

76. In line with best practice, a screening process was undertaken based on the density of flying birds recorded within the array site and consideration of their risk from collision, based on published information on flight heights (Johnstone *et al.* 2014), with the results presented in **Table 10-J**. This screening process screened out those species where the risk of collision is considered to be very low, such as fulmar which fly very close to the sea surface so have a very low risk from collisions with operational turbines (e.g., Furness and Wade, 2012; Wade *et al*., 2016). Species were also screened out if their densities in flight within the array site were very low (i.e., where estimated peak density in flight within the array site was less than 0.1 birds per km^2), as this was also evidence of very low potential for collision events to occur. Where a species' risk of collision was assessed to be low and

its estimated peak density in flight within the array site was also assessed to be low (i.e., <0.5 birds per km^2), these were screened out.

77. An exception to this screening approach has been made in relation to roseate tern following consultation and ACP's observation (Item 7e of the FIR Request) that "*Roseate Tern migrate across the Irish Sea including between this colony and Coquet Island SPA (188 breeding pairs) in the UK … Migrating Roseate Tern may pass through the Codling Wind Park (CWP) array site (Redfern et al., 2020)*". This was taken into account when making the screening decision for roseate tern.

78. Following this revised screening process, seven species were identified as meeting the screening criteria for CRM assessment; kittiwake, common gull, great black-backed gull, herring gull, roseate tern, common tern and gannet, with roseate tern and great black backed gull added.

79. For species screened out, the combination of low risk and / or density means that there remains no potential for a likely significant effect, either on a project-alone or a cumulative basis, and those species are not considered further in this section.

Table 10-J Screening of key seabird species for risk of collision (ASL = above sea level)

Species	Risk of collision		Estimated peak monthly density of birds in flight in array site (birds/km^2)	Screened in or out	Explanation
	Desk-based review (Garthe & Hüppop, 2004; Furness & Wade, 2012; Wade *et al.*, 2016)	Percentage of flight activity at PCH (>36 m ASL per Johnston *et al.*, 2014)			
Kittiwake	medium	1.72 (low)	3.773 (high)	in	Medium / low risk of collision and flying birds occurring at high peak density within array site. Potential for non-negligible collision mortality.
Common gull	medium	6.01 (high)	0.150 (low)	in	Medium / high risk of collision and flying birds occurring at low peak density within array site. Potential for non-negligible collision mortality.
Black-headed gull	medium (uses common gull and Kittiwake as a proxy, as most similar species)	4.29 (medium)	0.050 (very low)	out	Medium risk of collision but flying birds occurring at very low peak density within Array Site. No potential for non-negligible collision mortality.
Little gull	medium (uses common gull and Kittiwake as a proxy, as most similar species)	1.61 (low)	0.302 (low)	out	Medium / low risk of collision and flying birds occurring at low peak density within array site. No potential for non-negligible collision mortality.
Great black-backed gull	high	12.21 (very high)	0.192 (low)	in	High / very high risk of collision and flying birds occurring at low peak density within array site. Potential for non-negligible collision mortality.
Herring gull	high	10.93 (very high)	0.876 (medium)	in	High / very high risk of collision and

Species	Risk of collision		Estimated peak monthly density of birds in flight in array site (birds/km^2)	Screened in or out	Explanation
	Desk-based review (Garthe & Hüppop, 2004; Furness & Wade, 2012; Wade *et al*., 2016)	Percentage of flight activity at PCH (>36 m ASL per Johnston *et al*., 2014)			
					flying birds occurring at medium peak density within array site. Potential for non-negligible collision mortality.
Lesser black-backed gull	high	8.88 (high)	0.033 (very low)	out	High risk of collision and flying birds occurring at very low peak density within array site. No potential for non-negligible collision mortality.
Roseate tern	low (uses common and Arctic tern as a proxy, as most similar species)	0.41-0.76 (low)	0[5]	in	Low risk of collision and no flying birds observed within array site.
Common tern	low	0.41 (low)	1.825 (medium)	in	Low risk of collision and flying birds occurring at medium peak density within array site. Potential for non-negligible collision mortality.
Arctic tern	low	0.76 (low)	0.489 (low)	out	Low risk of collision and flying birds occurring at low peak density within array site. No potential for non-negligible collision mortality.
Sandwich tern	low	1.65 (low)	0.029 (very low)	out	Low risk of collision and flying birds occurring at very low peak density within array site. No potential for non-

[5] Although no roseate terns were recorded within the array site during baseline DAS surveys (0 bird per km^2), Roseate Tern have been screened in on a precautionary basis in light of FIR Item 7e from ACP.

Species	Risk of collision		Estimated peak monthly density of birds in flight in array site (birds/km^2)	Screened in or out	Explanation
	Desk-based review (Garthe & Hüppop, 2004; Furness & Wade, 2012; Wade *et al*., 2016)	Percentage of flight activity at PCH (>36 m ASL per Johnston *et al*., 2014)			
					negligible collision mortality.
Little tern	low	No data – but other tern species have 0.41% to 1.65% of flight activity >36 m (low)	0.025 (very low)	out	Low risk of collision and flying birds occurring at very low peak density within array site. No potential for non-negligible collision mortality.
Guillemot	very low	0 (very low)	2.252 (medium)	out	Flying birds occurring at medium peak density within array site but very low risk of collision. No potential for non-negligible collision mortality.
Razorbill	very low	0 (very low)	0.475 (low)	out	Very low risk of collision and flying birds occurring at low peak density within array site. No potential for non-negligible collision mortality.
Black guillemot	very low	Not available (very low, based on flight behaviours of other auk species)	0	out	Low risk of collision and no flying birds observed within array site. No potential for non-negligible collision mortality.
Puffin	very low	0.06 (very low)	0.276 (low)	out	Very low risk of collision and flying birds occurring at low peak density within array site. No potential for non-negligible collision mortality.
Red-throated diver	moderate*	0.62 (very low)	0	out	Very low risk of collision and flying birds occurring at

Species	Risk of collision		Estimated peak monthly density of birds in flight in array site (birds/km^2)	Screened in or out	Explanation
	Desk-based review (Garthe & Hüppop, 2004; Furness & Wade, 2012; Wade *et al*., 2016)	Percentage of flight activity at PCH (>36 m ASL per Johnston *et al*., 2014)			
					very low peak density within array site. No potential for non-negligible collision mortality.
Great northern diver (uses Black-throated diver as a proxy, as most similar species)	very low	0.05 (very low)	0	out	Very low risk of collision and flying birds occurring at very low peak density within array site. No potential for non-negligible collision mortality.
Fulmar	very low	0.1 (very low)	0.075 (very low)	out	Very low risk of collision and flying birds occurring at low peak density within array site. No potential for non-negligible collision mortality.
Manx shearwater	very low	0.01 (very low)	1.725 (medium)	out	Flying birds occurring at medium peak density within array site but very low risk of collision. No potential for non-negligible collision mortality.
Gannet	medium	1.97 (low)	0.200 (low)	In	Medium / low risk of collision and flying birds occurring at low peak density within array site. Potential for non-negligible collision mortality.
Cormorant	low*	0.07 (very low)	0.025 (very low)	out	Very low risk of collision and flying birds occurring at very low peak

Species	Risk of collision		Estimated peak monthly density of birds in flight in array site (birds/km^2)	Screened in or out	Explanation
	Desk-based review (Garthe & Hüppop, 2004; Furness & Wade, 2012; Wade *et al*., 2016)	Percentage of flight activity at PCH (>36 m ASL per Johnston *et al*., 2014)			
					density within array site. No potential for non-negligible collision mortality.
Shag	very low	0.11 (very low)	0.025 (very low)	out	Very low risk of collision and flying birds occurring at very low peak density within array site. No potential for non-negligible collision mortality.

* Bradbury *et al*. (2014)

Receptor sensitivity

Roseate tern: paragraphs 80 to 82 are added to address receptor sensitivity.

Roseate tern

80. Roseate tern is considered to have high tolerance to collision impacts within the array site during the operation and maintenance phase. Although there is no information relating to what proportion of this species' flight activity is spent at altitudes overlapping with wind turbine blades, information on the flight behaviours of closely related common and Arctic tern (species with similar foraging behaviours which are considered the most appropriate available proxy species for which flight height distribution data are available) indicates them as having a low inherent susceptibility to collision mortality (Garthe & Hüppop, 2004; Furness & Wade, 2012). Additionally, peak levels of site use by roseate terns are likely to be low. This is because no roseate terns were recorded within the CWP array site during baseline DAS surveys, and although tagging data for roseate tern show that some individuals from the Rockabill SPA and Coquet Island SPA roseate tern colonies may pass through the CWP array site on migration (Redfern *et al*., 2020), due to the resolution of the tagging data is it unclear what proportion of individuals from these two SPAs this represents (it is assumed only a very small number of individuals from these colonies will pass through the wind farm site each year). Furthermore, it is recognised that migratory birds have very high tolerance to collision impacts associated with infrastructure within the array site during the operation and maintenance phase (Woodward *et al*., 2023) as a result of the very low levels of collision impacts, which in turn are unlikely to have any noticeable effect on reproductive and survival rates.

81. The conservation importance of roseate tern is assessed to be high (**Table 10-21**).

82. When receptor tolerance and importance are considered together as per **Table 10-9**, overall receptor sensitivity is assessed as medium (i.e., high tolerance and high importance).

Magnitude of impact

Roseate tern: the replacement of paragraphs 1018, 1020 and 1021 with paragraph 83, 84 and 86 below respectively and the addition of paragraph 85.

Roseate tern: The additional magnitude of impact subsection is addressed in paragraphs 120 to 131 and Table 10-M below.

Great black-backed gull: The Great black-backed gull subsection (paragraphs 1057 to 1070) is replaced by a revised subsection which includes additional consideration of PVA outputs for breeding season impacts (paragraphs 87 to 104, below). Table 10-119 is replaced with Table 10-K.

Gannet: The Gannet subsection (paragraphs 1102 to 1119) is replaced by a revised subsection (paragraphs 105 to 119, below) and Table 10-122 is replaced by Table 10-L below.

83. Collision risk modelling was run for both OWF Design Options (A and B) for all species assessed other than roseate tern. The CRM parameters for both Design Options, including percentage of time WTGs are predicted to be operational, are provided in **Appendix 10.3 Collision Risk Modelling** of the EIAR.

84. Monthly collision rates and total annual collisions for Design Option A for all species assessed other than roseate tern are shown in **Table 10-116**. Monthly collision rates and total annual collisions under both Design Options A and B are presented for Herring gull only. Monthly collision rates and total annual collisions under Design Option B for all other species than roseate tern are presented in **Appendix 10.03 Collision Risk Modelling** of the EIAR.

85. For roseate tern, the MS mCRM tool (Caneco *et al.,* 2022) was used to quantify collision risk for both OWF Design Options (A and B). The number of breeding pairs at (Rockabill SPA (1776 breeding pairs) and Coquet Island SPA (118 breeding pairs)) were used to calculate the regional population. Other SPAs for which roseate tern is listed as a feature do not lie on a migratory pathway that would take them through the SPA during spring or autumn migration. Without suitable alternative data being available it was assumed as a worst-case scenario that all of the individuals from these two populations may fly through the CWP array site. The mCRM parameters used and species biometric data are provided in **Appendix 10-K Roseate Tern Collision Risk Modelling**.

86. For all species (with the exception of roseate tern) where there is considered to be sufficient site-specific flight data from baseline datasets (as justified in **Section 2.1** of **Appendix 10.3 Collision Risk Modelling** of the EIAR) Band Option 1 Collision Risk Models outputs are presented in this chapter (with Band Option 2 outputs also included within **Appendix 10.3 Collision Risk Modelling** of the EIAR). Band Option 2 Collision Risk Model outputs, which make use of generic flight height distributions from Johnston *et al*. (2014a, b), are presented for all other species. Where sufficiently robust site-specific data are available to permit Band Option 1 CRM, assessment conclusions have focused upon the use of these data, with Band Option 2 CRM outputs provided for comparative purposes; an approach consistent with advice received within the NPWS review of the east coast Phase 1 Projects Offshore Ornithology Assessment Method Statement (ABPmer, 2023). The approach to CRM for roseate tern is expanded upon below.

Great black-backed gull

87. Monthly estimated mortality rates associated with WTG Layout Option A are presented in **Table 10-116**. For Band Option 2 models these vary from a minimum of 0 (ten months) to a maximum of 3.659 in May (and 0.488 in December). On an annual basis, with Band Option 2 models, the estimated mortality rate for collision risk from the proposed development is 4.147 individuals. Monthly estimated mortality rates associated with WTG Layout Option B are presented in **Appendix 10.3 Collision Risk Modelling** of the EIAR.

88. Monthly estimates for WTG Layout Option A for Band Option 2 models are grouped into relevant bio-seasons in **Table 10-K**

89. The magnitude of impact is estimated by calculating the increase in baseline mortality within each bio-season with respect to the regional populations and their overall baseline mortality rates as described in **Section 10.6**, which are based on age specific demographic rates and age class proportions as presented in **Table 10-15**.

90. For great black-backed gull, as site-specific flight height information is not considered suitably robust to inform CRM (**Appendix 10.3 Collision Risk Modelling** of the EIAR), Band Option 2 CRM outputs are used to define collision mortality impact magnitude.

Table 10-K Great black-backed gull bio-season collision risk estimates

Design	BO	Bio-season (months)	Regional baseline populations and baseline mortality rates (individuals per annum)		Collisions (min – max)	Increase in baseline mortality (%)
			Population	Baseline mortality		
A	2	Breeding (Apr – Aug)	Method 1: 33,032	3,238	3.659 (0.383 – 11.04)	0.113 (0.012 – 0.341)
			Method 2: 2,041	194		1.886 (0.197 – 5.691)
		Non-breeding (Sep – Oct)	53,181	5,052	0.488 (0.028 – 1.453)	0.010 (0.001 – 0.029)
		Annual (BDMPS)	53,181	5,052	4.147 (0.411 – 12.493)	0.082 (0.008 – 0.247)
		Annual (Biogeographic)	440,000	42,180	4.147 (0.411 – 12.493)	0.010 (0.001 – 0.030)

91. The breeding great black-backed gull regional baseline population is estimated to be 33,032 individuals (Method 1: where the seasonal population is considered to include breeding adults within mean maximum foraging range plus 1 SD of the array site, plus the estimate of immature individuals present in the preceding bio-season), or 2,041 individuals (Method 2: where the seasonal population is considered to include breeding adults within mean maximum foraging range plus 1 SD of the array site, plus a number of immatures derived from the stable age ratio of adults to non-adults (**Table 10-15**), multiplied by the number of breeding adults).

92. By multiplying seasonal abundance estimates by mortality rates from **Table 10-15** (9.5%), the total number of regional great black-backed gull baseline mortalities during each breeding season is estimated to be 3,138 individuals (using breeding season regional population estimation Method 1), or 194 individuals (using breeding season regional population estimation Method 2).

93. For Band Option 2 models, during the breeding season great black-backed gull collision mortality was estimated to be 3.659 individuals for WTG Layout Option A.

94. Additional collision mortality would therefore increase regional seasonal mortality by 0.113 or 1.886% from baseline for breeding season regional population estimation Methods 1 and 2, respectively for WTG Layout Option A. As such, breeding season impacts in relation to population estimation Method

2 meet the criteria for undertaking Population Viability Analysis (PVA) to inform impact magnitude conclusion decision making.

95. Accordingly, PVA was undertaken for impact levels associated with the design scenario with the highest predicted impact. Total project alone predicted collision mortality (for WTG Layout Option A, the most impactful design scenario) of great black-backed gulls during the breeding season is calculated to be 3.659 individuals (**Table 10-K**). This impact is predicted in relation to a Method 2 breeding season population estimate of 2,041 individuals. This equates to a relative impact to the survival rate of 0.0017927 (i.e. 3.659 / 2,041).

96. Counterfactual outputs from density independent PVA models for project-only predicted impacts using the Natural England PVA tool (Model parameters provided in **Appendix 10-L Great Black-backed Gull Population Viability Analysis Parameter Log** yielded a median Counterfactual Growth Rate (CGR) value of 0.998 and a median Counterfactual Population Size (CPS) value of 0.950. Of these the CGR value is the most appropriate reference for interpretation of a density independent PVA model output (Jitlal *et al.*, 2017).

97. The regional breeding population of great black-backed gull has increased from a total of 786 individuals breeding within maximum foraging range of the array site during surveys for the third Irish and UK seabird census (Seabird 2000 – with surveys between 1998 and 2002), to a total of 980 individuals for the fourth Irish and UK seabird census (Seabirds Count, Burnell *et al.*, 2023 – with surveys between 2015 and 2021).

98. In the context of an increasing regional population, CGR values exceeding 0.995 indicate no significant adverse effect to the regional great black-backed gull population. As such, collision mortality impacts during the breeding season are assessed to be low.

99. The non-breeding great black-backed gull regional baseline population is estimated to be 53,181 individuals, with a baseline mortality of 5,052 individuals (from an average annual mortality rate of 0.095 – **Table 10-15**). For Band Option 2 models, during the non-breeding season great black-backed gull collision mortality was estimated to be 0.488 individuals for WTG Layout Option A. Additional collision mortality would therefore increase regional seasonal mortality by 0.010% from baseline for WTG Layout Option A.

100. This level of impact during the non-breeding season is of negligible magnitude for WTG Layout Option A.

101. For Band Option 2 models, annual (all seasons combined) estimated mortality resulting from collisions is 4.147 individuals for WTG Layout Option A. Using the largest regional season population of 53,181 individuals (**Table 10-14**) as a proxy for the maximum regional population across the year, and an average annual baseline mortality rate of 0.095 **Table 10-15**), the predicted regional baseline mortality across all seasons is estimated to be 5,052 individuals. Additional collision mortality would therefore increase regional annual mortality by 0.00082% from baseline for WTG Layout Option A.

102. Similarly, for the estimated biogeographic population of 440,000 individuals (**Table 10-14**), using an average mortality rate of 0.095 (**Table 10-15**), the predicted biogeographic baseline mortality across all seasons is estimated to be 41,800 individuals. Additional collision mortality would therefore increase biogeographic annual mortality by 0.010% and from baseline for WTG Layout Option A.

103. This level of annual impact to the regional and biogeographic populations is of negligible magnitude for WTG Layout Option A.

104. Although impact magnitudes during the non-breeding season and on an annual basis are assessed to be negligible, as the magnitude of impacts during the breeding season is assessed to be low, the overall potential impact magnitude is low for WTG Layout Option A.

Gannet

105. Site-specific flight height data for gannet are of sufficient quantity such that Band Option 1 is considered to be the most appropriate basis on which to undertake the assessment. Monthly estimated mortality rates associated with Design option A (which is the representative scenario assessed herein) are presented in **Table 10-116**. For Band Option 1 (using site specific flight height) models, these vary from a minimum predicted collision mortality of 0.036 in October to a maximum predicted collision mortality of 0.258 in May. On an annual basis, with Band Option 1 (using site specific flight height) models, the predicted collision mortality from CWP is 0.894 individuals. Monthly estimated mortality rates associated with Design B are presented in **Appendix 10.3 Collision Risk Modelling** of the EIAR.

106. Monthly estimates for Design option A for Band Option 1 models are considered grouped into relevant seasons in **Table 10-L**.

107. The magnitude of the predicted impact is estimated by calculating the increase in baseline mortality rate within each season with respect to the regional populations and the overall baseline mortality rates as described in **Section 10.6**, which are based on age specific demographic rates and age class proportions as presented in **Table 10-15**

108. Unlike the other receptors screened in for assessment in relation to collision mortality, Gannet are also considered to experience displacement from areas surrounding operational WTG turbines (**Section 10.10**). Birds which avoid turbine arrays cannot simultaneously collide with turbines within those arrays. The proportion of individuals demonstrating macro-avoidance spatial responses (i.e., avoidance of the entire array site), may be used as a correction to improve collision mortality estimates for this species. Following precedent set by UK SNCB guidance (2022) which has been adopted by recent OWF projects in the UK and in line with displacement proportions used for this species in the displacement assessment of this chapter (**Section 10.6**), seasonal collision mortalities and their associated effects on regional mortality rates associated with a 70% macro avoidance rate are also provided in **Table 10-L**.

109. For Gannet, as site-specific flight height information is considered suitably robust to inform CRM (**Appendix 10.3 Collision Risk Modelling** of the EIAR), Band Option 1 CRM outputs are used to define collision mortality impact magnitude (**Table 10-10**. Band Option 2 CRM outputs (using generic flight height distributions from Johnstone *et al*. (2014) for Gannet are presented in **Appendix 10.3 Collision Risk Modelling** of the EIAR for completeness.

Table 10-L Gannet seasonal collision risk estimates. (BO = Band Option, CI = Confidence Interval). Grey shading to highlight that NatureScot, 2023, guidance advocates that macro avoidance rates are not applied to collision mortality estimates for the migration-free breeding season.

Design	BO	Season (months)	Regional baseline populations and baseline mortality rates (individuals per annum)		Gannet collision estimates and baseline mortality increases before consideration of macro avoidance		Gannet collision estimates and baseline mortality increases after correction for macro avoidance (assuming 70% macro avoidance rate)	
			Population	Baseline mortality	Collisions (95% CI)	Increase in baseline mortality (%)	Collisions (95% CI)	Increase in baseline mortality (%)
A	1	Return migration (Dec – Mar)	644,739	116,698	0.326 (0.048 – 1.072)	0.000 (0.000 – 0.001)	0.098 (0.014 – 0.322)	0.000 (0.000 – 0.001)
		Migration-free breeding (Apr – Aug)	517,233	93,619	0.432 (0.033 – 1.640)	0.000 (0.000 – 0.002)	0.130 (0.010 – 0.492)	0.000 (0.000 – 0.001)
			420,257	76,067		0.001 (0.000 – 0.002)		0.000 (0.000 – 0.001)
		Post-breeding migration (Sep – Nov)	536,005	97,017	0.136 (0.024 – 0.437)	0.000 (0.000 – 0.000)	0.041 (0.007 – 0.131)	0.000 (0.000 – 0.000)
		Annual (BDMPS) Including 70% macro-avoidance in the migration-free breeding season	644,739	116,698	0.894 (0.105 – 3.149)	0.001 (0.000 – 0.003)	0.268 (0.032 – 0.945)	0.000 (0.000 – 0.001)
		Annual (Biogeographic) Including 70% macro-avoidance in	1,180,000	213,580		0.000 (0.000 – 0.001)		0.000 (0.000 – 0.000)

Design	BO	Season (months)	Regional baseline populations and baseline mortality rates (individuals per annum)		Gannet collision estimates and baseline mortality increases before consideration of macro avoidance		Gannet collision estimates and baseline mortality increases after correction for macro avoidance (assuming 70% macro avoidance rate)	
			Population	Baseline mortality	Collisions (95% CI)	Increase in baseline mortality (%)	Collisions (95% CI)	Increase in baseline mortality (%)
		the migration-free breeding season						

110. Using the Band Option 1 model, the return migration seasonal collision mortality was estimated to be 0.326 individuals without the 70% macro-avoidance correction and 0.098 individuals with a 70% macro-avoidance correction applied for Design option A. The return migration regional baseline population of gannet is estimated to be 644,739 individuals, and associated baseline mortality to be 116,698 individuals (from an average mortality rate of 0.181 – **Table 10-15**. Additional collision mortality, excluding or including corrections for macro avoidance, would therefore increase regional seasonal mortality by <0.001% from baseline. This level of impact during the return migration season is considered to be of negligible magnitude for Design option A.

111. The migration-free breeding seasonal collision mortality was estimated to be 0.432 individuals without the 70% macro-avoidance correction and 0.130 individuals with a 70% macro-avoidance correction applied for Design option A. The migration-free breeding season regional baseline population of gannet is estimated to be 517,233 individuals (Method 1: where the seasonal population includes breeding adults within the mean maximum foraging range plus 1 SD of the array site, plus the estimate of immature individuals present in the preceding season), or 420,257 individuals (Method 2: where the seasonal population includes breeding adults within the mean maximum foraging range plus 1 SD of the array site, plus a number of immatures derived from the stable age ratio of adults to non-adults (**Table 10-15**) multiplied by the number of breeding adults).

112. By multiplying seasonal abundance estimates by mortality rates from **Table 10-15** (18.1%), the total number of regional gannet baseline mortalities during each migration-free breeding season is estimated to be 93,619 individuals (using breeding season regional population estimation Method 1), or 76,067 individuals (using breeding season regional population estimation Method 2).

113. For Band Option 1 models, during the migration-free breeding season, gannet collision mortality was estimated to be 0.432 individuals for Design option A without the 70% macro-avoidance correction and 0.130 individuals with a 70% macro-avoidance correction applied for Design option A. Additional collision mortality associated with the CWP project would therefore increase regional seasonal mortality by <0.001 or 0.001% from baseline for breeding season regional population estimation Methods 1 and 2, respectively for Design option A, with and without the application of a 70% macro-avoidance rate. This level of impact during the migration-free breeding season is considered to be of negligible magnitude for Design option A.

114. For Band Option 1 models during the post-breeding migration season, gannet collision mortality was estimated to be 0.136 individuals for Design option A, excluding 70% macro-avoidance. When the correction for a macro avoidance rate of 70% is applied, seasonal collision mortalities are estimated to be 0.041 individuals for Design option A. The post-breeding migration regional baseline population for gannet is estimated to be 536,005 individuals, and associated baseline mortality estimated to be 97,017 individuals (from an average mortality rate of 0.181 – **Table 10-15**. Additional collision mortality, excluding or including corrections for macro avoidance, would therefore increase regional seasonal mortality by <0.001% from baseline for Design option A. This level of impact during the post-breeding migration season is of negligible magnitude for Design option A.

115. Using the largest regional season population of 644,739 individuals (**Table 10-14**) as a proxy for the maximum regional population across the year, and an average baseline mortality rate of 0.181 (**Table 10-15**), the predicted regional mortality across all seasons is estimated to be as follows using Band Option 1 models and Design option A:

- Annual (all seasons combined, **without application of a 70% macro-avoidance rate**): 0.894 individuals, with an annual baseline mortality rate of 116,698 individuals. Additional collision mortality would therefore increase regional annual mortality by 0.001% from baseline for Design option A.
- Annual (all seasons combined, **with application of a 70% macro-avoidance rate**): 0.268 individuals, with an annual baseline mortality rate of 116,698 individuals. Additional collision mortality would therefore increase regional annual mortality by <0.001% from baseline for Design option A.

- Annual (all seasons combined, **with application of a 70% macro-avoidance rate for the non-breeding seasons only**): 0.571 individuals, with an annual baseline mortality rate of 116,698 individuals. Additional collision mortality would therefore increase regional annual mortality by <0.001% from baseline for Design option A.

116. Similarly, for the estimated biogeographic population of 1,180,000 individuals (**Table 10-14**), using an average mortality rate of 0.181 (**Table 10-15**), the predicted regional mortality across all seasons is estimated to be as follows using Band Option 1 models and Design option A:

- Annual (all seasons combined, **without application of a 70% macro-avoidance rate**): 0.894 individuals, with an annual baseline mortality rate of 213,580 individuals. Additional collision mortality would therefore increase regional annual mortality by <0.001% from baseline for Design option A.
- Annual (all seasons combined, **with application of a 70% macro-avoidance rate**): 0.268 individuals, with an annual baseline mortality rate of 213,580 individuals. Additional collision mortality would therefore increase regional annual mortality by <0.001% from baseline for Design option A.
- Annual (all seasons combined, **with application of a 70% macro-avoidance rate for the non-breeding seasons only**): 0.571 individuals, with an annual baseline mortality rate of 213,580 individuals. Additional collision mortality would therefore increase regional annual mortality by <0.001% from baseline for Design option A.

117. This level of annual impact to the regional and biogeographic populations is of negligible magnitude for Design option A.

118. For context, the increase to baseline mortality resulting project-only collision impacts to gannet as stated in the original EIAR was 0.001% when assessed against the annual bio-seasonal population and <0.001% when assessed against the bio-geographic population.

119. For each season, and on an annual basis, the magnitude of the potential impact is therefore negligible for Design option A (representative layout scenario), as they represent no discernible increase to baseline mortality levels as a result of predicted collisions.

Roseate tern

120. The bio-seasonal population estimate for roseate terns presented in **Table 10-14** is not considered to be adequality representative of the number individuals which may pass through the CWP array site. This is because this bio-seasonal population estimate considered individuals from breeding sites to the south of the CWP array site and doesn't consider individuals from the Coquet Island SPA (which has been shown to have connectivity with the Rockabill SPA population and Irish Sea (Redfern *et al.,* 2020). Therefore, the regional baseline population has been calculated using the latest counts of breeding pairs from both the Rockabill SPA and Coquet Island SPA. Using the demographic rates for roseate tern presented in **Table 10-15**, the number of immature birds from these two colonies was also calculated to provide an estimate of the total regional population.

121. The mCRM tool was used to quantify collision risk for both OWF Design Options (A and B) for both the Rockabill SPA and Coquet Island SPA roseate breeding tern populations (**Appendix 10-K: Roseate Tern Collision Risk Modelling).**

122. Predicted collision rates for Design Option A (representative scenario) are presented in **Table 10-M**.

Table 10-M Roseate tern bio-season collision risk estimates for Design Option A

Age class	Bio-season (months)*	Regional baseline populations and baseline mortality rates (individuals per annum)		Collisions (min – max)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Adult	Return migration (Apr – May)	3,788	443	0.23	0.052
	Post-breeding migration (Jul – Sep)	3,788	443	0.242	0.055
	Annual**	3,788	443	0.472	0.107
Immature	Return migration (Apr – May)	2,655	727	0.161	0.022
	Post-breeding migration (Jul – Sep)	2,655	727	0.170	0.023
	Annual**	2,655	727	0.331	0.046
Adults and Immatures	Annual	6,443	1,170	0.803	0.069

**The migration-free breeding bio-seasons for Rosete tern (June) has not been considered because there are no breeding colonies within foraging range of the CWP array site (mean-max foraging range of 12.6 km).*

***The annual population for roseate tern was taken to be the summation of the total number of breeding pairs from the Rockabill SPA and Coquet Island SPA. The number of immature birds was calculated using this figure and the proportion of immatures in the population (0.701).*

123. For adults, the return migration roseate tern regional baseline population is estimated to be 3,788 individuals, with a baseline mortality of 443 individuals (from an average mortality rate of 0.117 - **Table 10-15**). For Design Option A, during the return migration bio-season adult roseate tern collision mortality was estimated to be 0.23 individuals. Additional mortality would therefore increase bio-seasonal mortality by 0.052%. For immatures, the return migration roseate tern regional baseline population is estimated to be 2,655 individuals, with a baseline mortality of 727 individuals (from an average mortality rate of 0.274). For Design Option A, during the return migration bio-season immature roseate tern collision mortality was estimated to be 0.161 individuals. Additional mortality would therefore increase bio-seasonal mortality by 0.022%.

124. This level of impact during the return migration bio-season is considered to be of negligible magnitude for Design Option A.

125. There are no roseate tern breeding colonies within foraging range of the CWP array site (maximum foraging range of 23.9 km (Woodward *et al*., 2019), with CWP at a minimum distance of 47.36 km from the nearest colony; Rockabill SPA). As such there is no risk of collision for roseate tern during the migration-free breeding bio-season.

126. For adults, the post-breeding migration roseate tern regional baseline population is estimated to be

3,788 individuals, with a baseline mortality of 443 individuals (from an average mortality rate of 0.117– **Table 10-15**). For Design Option A, during the post-breeding bio-season adult roseate tern collision mortality was estimated to be 0.242 individuals. Additional mortality would therefore increase bio-seasonal mortality by 0.055%. For immatures, the post-breeding roseate tern regional baseline population is estimated to be 2,655 individuals, with a baseline mortality of 727 individuals (from an average mortality rate of 0.274 – **Table 10-15**). For Design Option A, during the post-breeding bio-season immature roseate tern collision mortality was estimated to be 0.170 individuals. Additional mortality would therefore increase bio-seasonal mortality by 0.023%.

127. This level of impact during the post-breeding migration bio-season is considered to be of negligible magnitude for Design Option A.

128. For adults, the annual (all seasons combined) roseate tern regional baseline population is estimated to be 3,788 individuals, with a baseline mortality of 443 individuals (from an average mortality rate of 0.117– **Table 10-15**). For Design Option A, annual estimated mortality resulting from collisions is 0.472 individuals. Additional collision mortality would therefore increase regional annual mortality by 0.107% from baseline for Design Option A. For immatures, the annual (all seasons combined) roseate tern regional baseline population is estimated to be 2,655 individuals, with a baseline mortality of 727 individuals (from an average mortality rate of 0.274 – **Table 10-15**). For Design Option A, annual estimated mortality resulting from collisions is 0.331 individuals. Additional collision mortality would therefore increase regional annual mortality by 0.046% from baseline for Design Option A.

129. For both adult and immature roseate terns combined the annual (all seasons combined) regional baseline population is estimated to be 6,443 individuals, with a baseline mortality of 1,170 individuals. For Design Option A, annual (all seasons combined) estimated mortality resulting from collisions is 0.803 individuals. Additional collision mortality would therefore increase regional annual mortality by 0.069% from baseline for Design Option A.

130. This level of annual impact to the regional and biogeographic populations is considered to be of negligible magnitude for Design Option A.

131. For each bio-season and on an annual basis, the magnitude of the potential impact is therefore considered to be negligible for Design Option A, as this represents no discernible increase to baseline mortality levels as a result of collision.

Significance of the effect

Great black-backed gull: the Significance of the effect subsection (paragraph 1123) is replaced by a revised subsection (paragraph 132, below).

Roseate tern: the additional Significance of effect subsection is addressed in paragraph 133 below.

Great black-backed gull

132. In accordance with the matrix approach outlined to determine impact significance level in **Table 10-11**, as receptor sensitivity is assessed to be medium and impact magnitude is assessed to be low, the potential effect of collision during the operational phase upon great black-backed gull is considered to be Slight, and Not Significant.

Roseate tern

133. In accordance with the matrix approach outlined to determine impact significance level in **Table 10-11**, as receptor sensitivity is assessed to be medium and impact magnitude is assessed to be negligible, the potential effect of collision during the operational phase upon roseate tern is considered to be **Imperceptible**, and **Not Significant** in EIA terms.

In their FIR item 7j, the Commission have asked for distributional response impacts to kittiwake to be assessed in accordance with NatureScot (2023) guidance. In this regard, NatureScot state "*For species where both collision risk and displacement are considered* [which incudes kittiwake when assessment is undertaken in accordance with FIR 7j], *we advise that these impacts should be considered as additive*."

The following sub-section (paragraphs 134 to 141 and Table 10-N) is therefore added to Section 10.10.3 Operation and maintenance phase. This addition has been made in response to FIR Item 7j (see **FIR Response Document**).

Offshore – operation and maintenance: collision and displacement additive impact

Offshore – array site

Kittiwake

134. Collision mortality estimates (from Band Option 1 models) and displacement mortality estimates (assuming 30% displacement with 1% or 3% associated mortality in matrix models) are presented in **Table 10-N** Minimum total additive estimates are calculated by adding collision mortality to 30% & 1% in main text displacement mortality, and maximum total additive estimates are calculated by adding collision mortality to 30% and 3% displacement mortality for each bio-season and annually. These summed values are contextualised against annual and bio-seasonal mortality estimates of the respective annual or seasonal regional populations.

Table 10-N Kittiwake bio-season collision risk and displacement additive estimates

Design	Bio-season (months)	Regional baseline populations and baseline mortality rates (individuals per annum)		Collision Mortality BO2 (Ind)	Displacement mortality (ind)		Total (ind)		Increase in baseline mortality (%)	
		Population	Baseline mortality		Min (30% / 1%)	Max (30% / 3%)	Min	Max	Min	Max
A	Return migration (Jan – Apr)	708,147	110,471	4.183	1.757	5.272	5.94	9.455	0.005%	0.009%
	Migration-free breeding (May – Jul)	Method 1: 404,443	63,093	4.249	1.629	4.887	5.878	9.136	0.009%	0.014%
		Method 2: 131,860	20,570						0.029%	0.044%
	Post-breeding migration (Aug-Dec)	928,207	144,800	9.85	4.089	12.267	13.939	22.117	0.010%	0.015%
	Annual (BDMPS)	928,207	144,800	18.282	7.475	22.426	25.757	40.708	0.018%	0.028%
	Annual (Biogeographic)	5,100,000	795,600						0.003%	0.005%

135. During the return migration bio-season, on the basis of displacement and mortality rates of 30% and 1%, respectively, this equates to a predicted collision plus displacement mortality of 5.940 individuals. On the basis of displacement and mortality rates of 30% and 3%, respectively, this equates to a predicted collision plus displacement mortality of 9.455 individuals. The return migration bio-season Kittiwake regional baseline population is estimated to be 708,147 individuals, and associated baseline mortality estimated to be 110,471 individuals (from an average mortality rate of 15.6% –**Table 10-15**). Additional mortality of 5.940 or 9.455 individuals would therefore increase regional bio-seasonal mortality by 0.005% or 0.009% respectively from baseline.

136. The migration-free breeding season Kittiwake regional baseline population is estimated to be 404,443 individuals (Method 1: where the seasonal population is considered to include breeding adults within mean maximum foraging range plus 1 SD of the array site, plus the estimate of immature individuals present in the preceding bio-season), or 131,860 individuals (Method 2: where the seasonal population is considered to include breeding adults within mean maximum foraging range plus 1 SD of the array site, plus a number of immatures derived from the stable age ratio of adults to non-adults (**Table 10-15**, multiplied by the number of breeding adults).

137. By multiplying seasonal abundance estimates by mortality rates from **Table 10-15** (15.6%), the total number of regional baseline kittiwake mortalities during each migration-free breeding season is estimated to be 63,093 individuals (using breeding season regional population estimation Method 1), or 20,570 individuals (using breeding season regional population estimation Method 2).

138. Additional mortality of 5.878 individuals (collision plus 30% displacement with 1% associated mortality), or 9.136 individuals (collision plus 30% displacement with 3% associated mortality), would therefore increase regional bio-seasonal mortality by 0.09% or 0.014% respectively from baseline for migration-free breeding season regional population estimates derived using Method 1 and by 0.029% or 0.044% respectively from baseline for migration-free breeding season regional population estimates derived using Method 2.

139. During the post-breeding migration bio-season, on the basis of displacement and mortality rates of 30% and 1%, respectively, this equates to a predicted collision plus displacement mortality of 13.939 individuals. On the basis of displacement and mortality rates of 30% and 3%, respectively, this equates to a predicted collision plus displacement mortality of 22.117 individuals. The post-breeding migration bio-season Kittiwake regional baseline population is estimated to be 928,207 individuals, and associated baseline mortality estimated to be 144,800 individuals (from an average mortality rate of 15.6% – **Table 10-15**). Additional mortality of 13.939 or 22.117 individuals would therefore increase regional bio-seasonal mortality by 0.010% or 0.015% respectively from baseline.

140. Annual (all seasons combined) estimated mortality resulting from collision plus displacement is 25.757 individuals (30% displacement with 1% associated mortality), or 40.708 individuals (30% displacement with 3% associated mortality). Using the largest regional bio-season population of 928,207 individuals (**Table 10-14**) as a proxy for the maximum regional population across the year, and an average baseline mortality rate of 15.6% (**Table 10-15**), the predicted regional baseline mortality across all seasons is estimated to be 144,800 individuals. Additional mortality of 25.757 or 40.708 individuals would therefore increase regional annual mortality by 0.018% or 0.028% respectively from baseline.

141. Similarly, for the estimated biogeographic population of 5,100,000 individuals **Table 10-14**), using an average mortality rate of 0.156 (**Table 10-15**), the predicted biogeographic mortality across all seasons is estimated to be 795,600 individuals. Additional mortality of 25.757 or 40.708 individuals would therefore increase biogeographic annual mortality by 0.003% or 0.005% respectively from baseline.

Migratory seabirds and non-seabirds

This section remains unchanged.

Estuarine / Liffey – operation and maintenance: impact 1 – disturbance and displacement.

The above header has been updated to correct an error identified in the existing EIAR chapter. In the existing EIAR, the header is incorrectly labelled with no impact number. It has been updated to impact 1 to address this error. It is noted by the Applicant that this correction has no material bearing on the conclusions of the assessment as presented in EIAR **Chapter 10 Ornithology**.

Estuarine / Liffey

Estuarine / Liffey – operation and maintenance: impact 2 – presence of buildings / infrastructure

The above header has been updated to correct an error identified in the existing EIAR chapter. In the existing EIAR, the header is incorrectly labelled as Impact 4. It has been updated to impact 2 to address this error. It is noted by the Applicant that this correction has no material bearing on the conclusions of the assessment as presented in EIAR **Chapter 10 Ornithology**.

Estuarine / Liffey

The upfront section remains unchanged but paragraphs 1152 and 1153 should now be read in conjunction with the additional text provided in paragraph 142 below. This update has been made in response to FIR Item 7p (see **FIR Response Document**).

142. The presence of buildings and infrastructure may result in a perceived threat of predation for the terns using the CDL Dolphin, by reducing visibility of predators for species.

Impact Screening

This section remains unchanged except for Table 10.130 which is replaced by Table 10-O below. This update has been made in response to FIR Item 7p (see **FIR Response Document**).

It is noted by the Applicant that this updated table has not resulted in a change to the species screened into the assessment from the existing **EIAR Volume 3, Chapter 10 Ornithology**. The change has no material bearing on the conclusions of the assessment as presented in the existing Chapter.

Table 10-O Impact screening of IEF species

Important Ecological Feature (IEF) species	Potential for impact	Rationale
Arctic tern	Yes	This species has been assessed as at risk to the presence of buildings and infrastructures. One breeding colony for this species was recorded near the onshore substation area during surveys, on the CDL Dolphin during estuarine / Liffey surveys, which is approximately 25m from the northern boundary of the onshore substation. The presence of a new building, which may cast a shadow onto the colony, along with the attendant perceived, or actual, predator risk, in close proximity to the CDL colony, presents a risk of colony desertion. tern colony desertion may be temporary, periodic or long term and there is evidence to show habituation to human activity and new structures is feasible in tern species. Once constructed, there is potential that the buildings and infrastructure may provide perching opportunities to avian predator species, such as Peregrine falcon and Hooded Crow, which may predate on the nearby tern colonies. Once constructed, there is potential that the buildings and infrastructure may result in a perceived threat of predation for the terns using the CDL Dolphin, by reducing visibility of predators for species. **Therefore, can be screened in and the significance of this impact and effects assessed.**
Common tern	Yes	This species has been assessed as at risk to the presence of buildings and infrastructures. One breeding colony for this species was recorded near the onshore substation area during surveys, on the ESB Dolphin within the estuarine / Liffey study area, which is approximately 250 m from the north-eastern boundary of the onshore substation. The presence of a new building, with the attendant perceived, or actual, predator risk, in close proximity to this ESB Dolphin colony, presents a risk of colony desertion. tern colony desertion may be temporary, periodic or long term and there is evidence to show habituation to human activity and new structures is feasible in tern species. Due to the distance of the colony and the buildings, there is no potential for the structures to cast a shadow on the colony. Once constructed, there is potential that the buildings and infrastructure may provide perching opportunities to avian predator species, such as Peregrine falcon and

Important Ecological Feature (IEF) species	Potential for impact	Rationale
		Hooded Crow, which may predate on the nearby tern colonies. **Therefore, can be screened in and the significance of this impact and effects assessed.**
Black guillemot	No	These species have been assessed as not at risk to *Impact 2 – Presence of buildings and infrastructures.* These IEF species will not be impacted by the presence of a new building, as no attendant perceived, or actual, predator risk is present due to the low numbers of these species recorded, the ecology the species (i.e., Black guillemot are cavity nesting species and so are not as exposed to predation on nest sites) and the in the case of the Black-headed gull, only wintering and non-breeding activity was noted, therefore the species is not dependent on the potentially impacted areas. Therefore, these species can be screened out for this impact.

Receptor sensitivity

The section remains unchanged.

Magnitude of impact

The section remains unchanged except for Table 10.132 which is replaced by Table 10-P below. This update has been made in response to FIR Item 7p (see **FIR Response Document**).

It is noted by the Applicant that this updated table has not resulted in a change to the assigned magnitude of impact from the existing EIAR **Volume 3**, **Chapter 10 Ornithology** and has no material bearing on the conclusions of the assessment as presented in the existing Chapter.

Table 10-P Magnitude of impact on IEF species

IEF species	Magnitude	Rationale
Arctic tern	low	Shadow Assessment The potential for the onshore substation buildings to cast a shadow on the CDL Dolphin was assessed using a detailed shadow assessment model (details of which can be seen in **Appendix 10.11**). The results from this model showed that there will be no

IEF species	Magnitude	Rationale
		shadow cast by the onshore substation buildings during the breeding tern period (May to August). Therefore, the magnitude of impact is assessed as being negligible for this aspect. Perching Opportunities During the O&M of the onshore substation, the constructed infrastructure / buildings have the potential to provide perching points, which may be used by avian predator species. The close proximity to the known breeding sites for this species, may lead to increased levels and threat of predation which may impact the long-term viability of the colonies, through for example increased adult or fledgling depredation, or risk of abandonment due to perceived risk. However as outlined in **Section 10.9** as part of the design for the façade of the buildings, bird of prey deterrents have been incorporated at 2 locations: 1. Creating a steep angle (+60°) to the band between the brick base and metal cladding of the façade; and 2. Raising of the metal cladding above roof parapet, impairing hunting birds' view of target platform. Reducing visibility of predators During the O&M of the onshore substation, the presence of buildings and infrastructure may result in a perceived threat of predation for the terns using the CDL Dolphin, by reducing visibility of predators for the species. **Figure 10-A** and **Figure 10-B** show the onshore substation from the east and west during the O&M phase. The Figures demonstrate that existing views from the CDL Dolphin will be maintained from all boundaries and that the onshore substation buildings are set back c. 25-30 m from the Dolphin. Any existing visibility of predators from the water's edge on all boundaries of the Dolphin will be maintained, with expanses of open water within the wider port environment. It is also recognised that the background environment for the CDL Dolphin, is a built environment with industrial facilities, waterborne and port infrastructure. This was evidenced in the '*Investigation of disturbance tolerance of terns breeding near to the*

IEF species	Magnitude	Rationale
		onshore substation site' which was included in EIAR **Volume 4**, **Appendix 10.9**. Additionally, there are other examples of tern colonies successfully coexisting within enclosed and industrial environments, including the Port of Edinburgh. This colony thrives and breeds alongside ongoing port activities, which includes a colony immediately adjacent to and below, tall crane structures of a similar height to the proposed onshore substation buildings. The Arctic tern colony located on the Farne Islands successfully nests within the enclosed walls of the courtyard of an historic site on Inner Farne. These terns have no effective line of sight below at least 1.5 m and breed successfully. This demonstrates that, with appropriate mitigation and site management, terns will co-exist within these dynamic environments**.** The current environment includes several extant predator threats such as Peregrine, large gull species, and Hooded Crow, in a future scenario the threat from these is estimated to be no higher than at present, given the mitigation measures proposed. The design of the onshore substation is considered appropriate for the site. This takes account of the design which has incorporated prey deterrents and its location south of the Dolphin, could potentially reduce the ability for ambush predators to impact the Dolphin. The overall magnitude of impact for this species is assessed as low.
Common tern	negligible	During the O&M of onshore substation, the constructed infrastructure / buildings have the potential to provide perching points, which may be used by avian predator species. The close proximity to the known breeding sites for this species and increased levels and threat of predation may impact the long-term viability of the colonies, due to reduced nesting and fledging rates and may cause the species to abandon colonies. However as outlined in **Section 10.9**, as part of the design for the façade of the buildings, bird of prey deterrents have been incorporated at 2 locations (see details above). The potential for the buildings and infrastructure to cast a shadow on the ESB dolphin is determined to be negligible due to the distance between the structure and the onshore substation (approximately 250 m).

IEF species	Magnitude	Rationale
		Therefore, based on the above and the distance of colony to the onshore substation the magnitude of impact for this is assessed to be negligible.

Significance of the effect

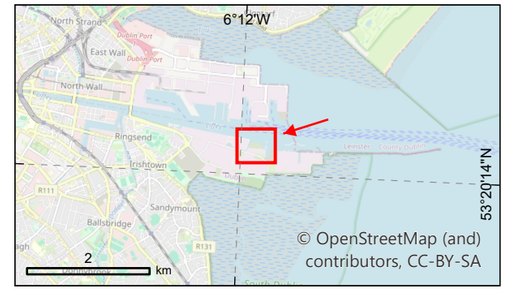
The section remains unchanged.

Additional mitigation

The section remains unchanged.

Residual effect

The section remains unchanged.



Data sources: FaulknerBrown, 2024
Background:
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codling wind park

Project: Codling Wind Park

Contractor: *Website:* *LOGO*

Figure 10.A
View (from east) of the onshore substation and CDL Dolphin

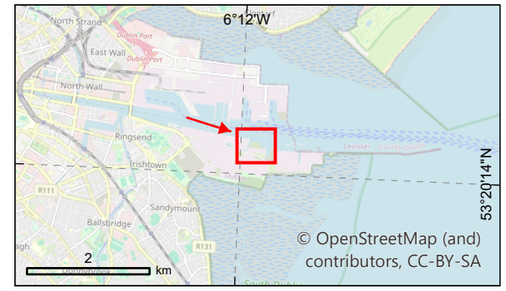
CWP doc. number: CWP-CWP-ENG-08-01-3DM-2077

Internal descriptive code:
PB - SS.PP.PHOTOMONTAGE.NE.FAR -
- (EIAR.Vol.03.Ch.10.FIG.10a..)

Size: A3
Scale:

CRS:

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	First issue	2026/03/12	EA	DM	ES



Data sources: FaulknerBrown, 2024
Background:
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codling wind park

Project: Codling Wind Park

Contractor: *Website:* *LOGO*

Figure 10.B
View (from west) of the onshore substation and CDL Dolphin

CWP doc. number: CWP-CWP-ENG-08-01-3DM-2078

Internal descriptive code: PB - SS.PP.PHOTOMONTAGE.NW.FAR - - (EIAR.Vol.03.Ch.10.FIG.10b..)

Size: A3

Scale:

CRS:

Rev.	Updates	Date	By	Chk'd	App'd
A	First issue	2026/03/12	EA	DM	ES

10.10.4 Decommissioning phase

Section 10.10.4 remains unchanged.

10.11 Cumulative impacts

Section 10.11 remains unchanged; however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

10.12 Transboundary impacts

Section 10.12 remains unchanged.

10.13 Inter-relationships

Section 10.13 remains unchanged.

10.14 Potential monitoring requirements

Section 10.14 remains unchanged.

10.15 Impact assessment summary

This section remains unchanged, with the exception that within Table 10-147, where additional mitigation measures are outlined in relation to construction and decommissioning phase disturbance and displacement impacts within the Intertidal OECC Landfall Area. The wording of this mitigation is replaced from:

> "*Seasonal restrictions (no construction activities within and otherwise potentially visually or acoustically impacting intertidal areas within South Dublin Bay between September and March, inclusive)*"

to:

> "*Seasonal restrictions (no construction activities within and otherwise potentially visually or acoustically impacting intertidal areas within South Dublin Bay between September and mid-April, inclusive)".*

10.16 References

The following references (paragraphs 143 to 225) are included in this section of the EIAR Addendum on account of being mentioned in relation to the content of this addendum (and having not been referenced previously within the EIAR **Volume 3**, **Chapter 10 Ornithology**), or, in response to FIR Item 7a, to amend for their omission for the EIAR **Volume 3**, **Chapter 10 Ornithology** or it's associated appendices:

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11 MARINE MAMMALS

11.1 Introduction

Section 11.1 remains unchanged.

11.2 Consultation

Section 11.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted

11.3 Legislation, policy and guidance

Section 11.3 remains unchanged, except for updates to Section 11.3.3 below

11.3.1 Legislation

Section 11.3.1 remains unchanged.

11.3.2 Policy

Section 11.3.2 remains unchanged.

11.3.3 Guidance

Section 11.3.3 remains unchanged but should now be read in conjunction with the additional text provided in paragraph 1 below.

1. The new principal guidance and best practice documents used to inform the assessment of potential impacts on marine mammals is summarised below:

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

11.4 Impact assessment methodology

Section 11.4, Paragraphs 15 and 16 remain unchanged. Updates to Section 11.4.1 to Section 11.4.3 are detailed below.

11.4.1 Study area

Section 11.4.1, Paragraphs 17 and 19 remain unchanged. Section 11.4.1, Paragraph 18 is replaced in its entirety by paragraph 2 below. This revision has been made in response to FIR Item 10r(i) (see **FIR Response Document**).

2. The study area for marine mammals has been defined at two spatial scales: (1) the Management Unit (MU) scale, and (2) the marine mammal survey area, which provides an indication of the local densities of each species within the CWP Project array site / project boundary through the use of aerial surveys. Site-specific surveys have been repeated since the original application was made, to include a 10 km buffer around the array area, as recommended in DCCAE (2018).

11.4.2 Data and information sources

Site specific surveys

Aerial and boat-based surveys

This section remains unchanged but should now be read in conjunction with the additional text provided in paragraphs 3 to 5 below. This update has been made in response to FIR Item 10r(i) (see **FIR Response Document**).

3. Between November 2024 and April 2025 there were six DAS conducted that covered the array area + 4 km buffer and an inshore survey area.

4. In response to FIR Item 10r, further site-specific surveys have been repeated since the original application was made, to include a 10 km buffer around the array area, as recommended in DCCAE (2018). The 10 km buffer surveys were conducted monthly between May 2025 and Nov 2025. The data are fully detailed in (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**). The composite dataset now comprises a substantial volume of data to support the EIA and NIS.

5. The additional survey data provided density estimates that are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the existing characterisation.

Landfall surveys

This section remains unchanged but should now be read in conjunction with the additional text provided in paragraph 6 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

6. In response to Item 10s, Points i and ii, the Applicant has conducted monthly seal haul-out surveys at the landfall site. Since the EIAR submission, 25 seal landfall surveys have been conducted in the

intertidal landfall survey area between January 2025 and January 2026. No harbour seals were sighted, and grey seals were confirmed to be present, though in low numbers.

Desk study

This section remains unchanged except for Table 11-A which should be read in conjunction with Table 11-3 Data sources. This revision has been prepared in response to FIR Item 10r (see **FIR Response Document**).

Table 11-A Data sources

Data source	Type of data	Temporal and spatial coverage
Additional Site-specific DAS	Aerial survey data.	Apr 2024-Apr 2025 monthly surveys of CWP array area +4 km buffer. May 2025 to Nov 2025 monthly surveys of CWP array area +10 km buffer.
Seal landfall surveys	Land based visual surveys of intertidal landfall survey area.	Oct 2019 – Mar 2023 anecdotal seal sightings. Winter 2024 anecdotal seal sightings. Jan-Dec 2025 dedicated seal surveys.
Gilles *et al.* (2025) Small Cetaceans Across the North Sea (SCANS) IV density surface	Predictive habitat-based models of cetaceans in European Atlantic waters in the summer of 2022 based on SCANS IV survey data.	Modelled density surfaces cover the entire SCANS IV survey area. CWP is located within SCANS IV block CS-D.
ObSERVE 2 (Giralt Paradell *et al.*, 2024)	Visual aerial surveys.	3 surveys: summer 2021, summer 2022 and the winter of 2022-2023. Offshore waters around Ireland, within and beyond Ireland's continental shelf. The offshore development area is entirely located within ObSERVE survey Stratum 5.
Berrow *et al.* (2024)	UAV surveys of seal haul outs sites.	10 seal haul-out sites in Dublin Bay and adjacent coastal waters were surveyed on 16 days between 30 June 2023 and 18 January 2024.
Morris *et al.* (2025) seal surveys	Aerial thermal-imaging of hauled out seals	August 2024, surveys covered the whole Irish coastline.
Dublin Port Company 3FM Project baseline (Dublin Port Company, 2025)	Cetacean vessel-based surveys and acoustic monitoring and seal vessel-based and haul-out surveys.	Data covering the Dublin coastal area from the Dublin Port's Alexandra Basin Redevelopment (ABR) Project from 2016 to 2021. Data from Masterplan Phase 2 (MP2) Project from 2022 to 2023.

11.4.3 Impact assessment

Section 11.4.3 remains unchanged except for updates to the Assessment methodology – auditory injury section below.

Sensitivity of receptor

This section remains unchanged.

Magnitude of impact

This section remains unchanged.

Significance of effect

This section remains unchanged.

Assessment methodology – auditory injury

The upfront text (paragraph 34) remains unchanged.

Auditory injury (PTS)

This section remains largely unchanged but should now be read in conjunction with paragraphs 7 to 9. This update has been made in response to FIR Items 10a and 10a Point iii(1) (see **FIR Response Document**). This new text does not replace the information provided in the original EIAR **Volume 3**, **Chapter 11 Marine Mammals**, but acts as supplementary information as to why TTS has not been assessed as auditory injury.

7. The Applicant highlights that the NPWS (2014) guidance is ambiguous as to whether TTS is classified as injury under the Wildlife Act as it states that TTS "*may constitute such an injury*". It is unclear how "*may*" should be interpreted. It is the opinion of the Applicant that TTS assessed at the TTS-onset level does not constitute injury and that predicted TTS-onset ranges should not require mitigation. This approach is also supported in Scotland, England, Wales, France, Denmark, the US and Australia which all consider TTS to be a reversible effect that is separate to PTS (auditory injury) which requires mitigation. A position statement regarding the application and assessment of TTS can be found in the SMRU Consulting TTS Position Statement (2025) (**Appendix 11-B SMRU Consulting TTS Position Statement**).

8. In summary, the TTS Position Statement states that:

- Whilst there is a lack of legal and regulatory consensus regarding the definition of 'auditory injury', most countries do not consider TTS to be auditory injury.
- TTS represents a short-term reduction in hearing sensitivity, typically recovering within an hour for small shifts (4–5 dB). Not all TTS-inducing exposures lead to tissue damage (and thus lead to physical injury).
- TTS effects from pile driving have been shown to be frequency-specific (e.g. 4-8 kHz in harbour porpoises). As such, their impact on marine mammal biological functions (communication, predator/prey detection) is currently considered to be limited.

- Current TTS-onset thresholds (NMFS, 2024) are based on the smallest measurable changes in hearing, not on levels likely to cause functional impairment. These thresholds were originally developed to support estimations of PTS-onset, not to serve as regulatory thresholds for ecologically significant impact.
- What level of threshold shift might be considered biologically meaningful is currently unknown, and no biologically meaningful TTS thresholds have been established.
- TTS predictions based on SEL_{cum} are highly conservative as they omit:
    - the potential for TTS recovery between pile strikes or during breaks in pile driving, and
    - distance-related effects on the impulsive characteristics of the sound.
- Until there is sufficient scientific evidence to indicate a level and duration of TTS that may have a biologically meaningful effect on individuals, it is more appropriate to focus environmental impact assessments on PTS (as true auditory injury) and behavioural disturbance (e.g. disruption to foraging or migration.

9. As such, the assessment of impacts in this EIAR Addendum does not consider TTS (except when used as a proxy for disturbance for UXO clearance).

Further, in response to Item 10a (see **FIR Response Document**), the Application has provided revised noise modelling and mapping including for modelled PTS contours for each species group both with and without noise abatement mitigation. This has been conducted using the new NMFS (2024) guidance on PTS thresholds which supersede Southall *et al.* (2019) (as was used in the application). The updated PTS thresholds used are provided below in paragraph 10, Table 11-B, which replaces Table 11-7 of **Volume 3**, **Chapter 11 Marine Mammals,** paragraph 11 and Plate 11-A which replace paragraph 40 and Plate 11-1 of the same.

Paragraphs 35 and 36 remain unchanged.

10. The PTS-onset thresholds used in this assessment to calculate PTS-onset impact ranges are those presented in NMFS (2024), which are detailed in **Table 11-B**. These include two different thresholds covering 'instantaneous' PTS (SPL_{peak}, sound pressure from a single noise pulse), and 'cumulative' PTS (SEL_{cum}, accumulated sound energy over 24 hours), with the latter thresholds being frequency-weighted to marine mammal functional hearing groups.

Table 11-B PTS-onset thresholds for impulsive noise from NMFS (2024).

Functional hearing group	Species relevant to this assessment	Cumulative PTS (SEL_{cum} dB re 1 μPa^2s weighted)	Instantaneous PTS (SPL_{peak} dB re 1 µPa unweighted)
Very High Frequency (VHF) Cetacean	Harbour porpoise	159	202
High Frequency (HF) Cetacean	Bottlenose dolphin, common dolphin and Risso's dolphin	193	230
Low Frequency (LF) Cetacean	Minke whale	183	222
Phocid carnivores (seals) in water (PCW)	Grey and harbour seal	183	223

Paragraphs 38 and 39 remain unchanged.

11. The physiological damage that sound energy can cause is mainly restricted to energy occurring in the frequency range of a species' hearing range. Therefore, for the cumulative sound exposure level

(SEL_{cum}), sound has been weighted based on species group specific weighting curves given in NMFS (2024) (**Plate 11-A**).

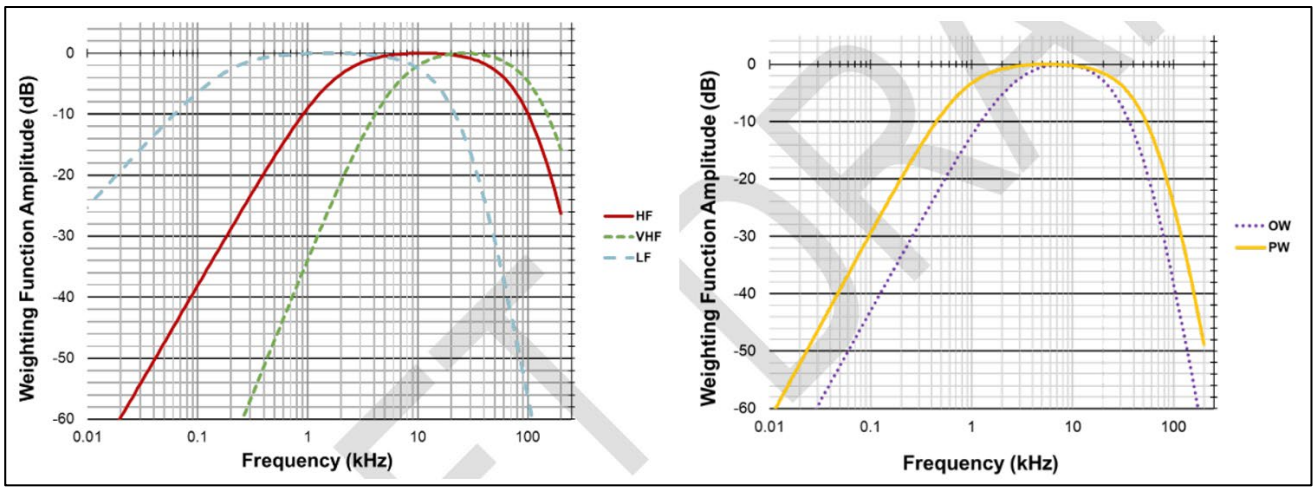


Plate 11-A Auditory weighting functions for low frequency (LF), high frequency (HF) and very high frequency (VHF) cetaceans as well as phocid carnivores (seals) in water (PCW) taken from NMFS (2024)

Auditory injury (PTS) – pre-construction surveys

This section remains unchanged.

Auditory injury (PTS) – pile driving

This section remains unchanged except for reference to PTS thresholds from Southall *et al.* (2019) which have been replaced by NMFS (2024) PTS thresholds. This update has been made in response to FIR Item 10a (see **FIR Response Document**). This change is factored into the updated assessment for: Impact 5: Auditory injury (PTS) from piling – WTGs and OSSs.

Auditory injury (PTS) – UXO clearance

This section remains unchanged except for reference to PTS thresholds from Southall *et al.* (2019) which have been replaced by NMFS (2024) PTS thresholds. This update has been made in response to FIR Item 10a (see **FIR Response Document**). This change is factored into the updated assessment for: Impact 5: Auditory injury (PTS) from UXO clearance (when using TTS as a proxy for disturbance).

Auditory injury (PTS) – other construction activities and geophysical surveys

This section remains unchanged except for paragraph 50 which is replaced in its entirety by paragraph 12 below. This update has been made to correct an error identified in the existing EIAR **Volume 3**, **Chapter 11 Marine Mammals**. In paragraph 50 of the existing EIAR chapter it is incorrectly stated that **Appendix 9.4 UWN Assessment** provided PTS ranges for geophysical surveys. The update below addresses this error.

12. An assessment of the PTS impacts from other construction activities (i.e., excluding impact piling and UXO clearance) is presented in **Appendix 9.4 Under Water Noise (UWN) Assessment** (with the

exception of geophysical surveys, for which accepted Effective Deterrence Ranges (EDRs) are adopted). This includes an assessment of the potential PTS-onset impact ranges for:

- Cable laying: Noise from the cable laying vessel and any other associated noise during the offshore cable installation;
- Dredging: Dredging may be required on site for seabed preparation work for certain foundation options, as well as for the export cable, array cables and interconnector cable installation. Suction dredging has been assumed as a worst-case;
- Rock placement: Potentially required on site for installation of offshore cables (cable crossings and cable protection) and scour protection around foundation structures;
- Trenching: Plough trenching may be required during offshore cable installation; and
- Vessel noise: Vessel noise from large and medium sized vessels.

Assessment methodology – disturbance

Assessment of disturbance – pre-construction surveys

This section has been replaced in its entirety by paragraphs 13-14 below. This update has been made in response to FIR Item 10j (see **FIR Response Document**).

13. The potential for disturbance from pre-construction geophysical surveys has been assessed using the recommended ranges provided in JNCC (2025d) for harbour porpoise. This is in accordance with recent advice provided on Maritime Usage Licences by the Maritime Area Regulatory Authority (MARA) in Ireland. The effective deterrence ranges (EDRs) recommended for geophysical equipment are:

    - Sub Bottom Profilers (all types): 3 km
    - Ultrasonic Baseline (USBL): 3 km
    - Multiple-transducer SBES or MBES with an operating frequency of ≤12 kHz operating in waters ≤200 m depth: 3 km

14. In the absence of recommended EDRs for other species, the same EDRs are assumed for all marine mammals.

Assessment of disturbance – pile driving

This section remains unchanged.

Dose-response function – Harbour porpoise

This section remains largely unchanged. However, in response to FIR Item 10a and 10k, the Graham *et al.* (2017) dose-response function has been modelled with and without a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events.

Dose-response function – other species

Section 11.4.3, sub-heading 'Dose response function – other species' remains largely unchanged. However, in response to FIRI Item 10a and 10k, the Graham *et al.* (2017) dose-response function has been modelled with and without a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events (see **FIR Response Document).**

Level B harassment

This section remains largely unchanged. However, in response to FIR Item 10a and 10k, the Level B harassment threshold dose-response function has been modelled with and without a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events (see **FIR Response Document)**.

Effective Deterrence Ranges (EDRs)

This sub-heading 'Effective Deterrence Ranges (EDRs)' was not included in Section 11.4.3 of the EIAR **Volume 3, Chapter 11 Marine Mammals**. However, the inclusion of this sub-heading in Section 11.4.3 of the EIAR Addendum (Part 1) has been made in response to FIR Item 10k (see **FIR Response Document**).

15. There is updated guidance available on the EDRs that should be applied to assess the significance of noise disturbance in the context of the 'the assessment and management of impulsive noise in Special Areas of Conservation' (SACs) for harbour porpoise, published by JNCC (2025d). In the absence of recommended EDRs for other marine mammals, the porpoise EDRs are used to assess impacts for all cetacean species.

EDRs without noise abatement

16. The weighted average of reported effects ranges across 14 studies (included 8 estimated EDRs) for the installation of monopiles and pin piles without noise abatement, was 17.4 km. It is noted that EDRs of <15 km have been reported for unabated piling, including from recent analyses of highly relevant projects, and that comparable data collection is planned for several projects in UK waters in 2025 (Brown *et al.*, 2025). However, the majority of evidence supports an EDR in the region of 15 – 20 km. To remain conservative, JNCC advises that for monopiles or pin piles without noise abatement, an EDR of 20 km is appropriate in the assessments (JNCC, 2025d).

EDRs with noise abatement

The weighted average of reported effects ranges across seven relevant studies (including four estimated EDRs) for installation of monopiles and pin piles with noise abatement, was 10.8 km. However, the majority of evidence supports an EDR in the region of 10 – 15 km. It is important to note that an EDR of 10 - 15 km assumes a reduction in broadband Sound Exposure Level Single-Strike (SEL_{SS}) @ 750 m of approximately 10 dB or more. To remain conservative, JNCC advises that for monopiles or pin piles with noise abatement, an EDR of 11 km is appropriate in the assessments (JNCC, 2025d).

Dose-response function – seals

This section remains largely unchanged. However, in response to FIR Item 10a and 10k, the Whyte *et al.* (2020) dose-response function has been modelled with and without a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events (see **FIR Response Document**).

Disturbance from UXO clearance

The upfront section (paragraphs 70 – 72) remain unchanged.

EDR – 26 km for high order UXO clearance

This section and section header is replaced in its entirety by the following section "EDR – high order UXO clearance with noise abatement" and paragraphs 17 and 18 below. This revision has been made due to an update in guidance (JNCC (2025d).

EDR – high order UXO clearance with noise abatement

17. To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required. The latest guidance provided in JNCC (2025d) is that for high-order UXO clearance with a bubble curtain, an EDR of 10 km should be used to assess the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs in England, Wales and Northern Ireland.

18. In the absence of recommended EDRs for other species, the same 10 km EDR is assumed for all marine mammals; this is considered conservative as harbour porpoise are generally more responsive to underwater noise disturbance.

EDR – 5 km for low order UXO clearance

This section remains unchanged but should now be read in conjunction with paragraphs 19 and 20 provided below.

19. The latest guidance provided in JNCC (2025d) confirms that for low-order UXO clearance, an EDR of 5 km should be used to assess the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs in England, Wales and Northern Ireland.

20. In the absence of recommended EDRs for other species, the same 5 km EDR is assumed for all marine mammals; this is considered appropriate.

TTS as a proxy for disturbance

This section remains unchanged except for reference to TTS thresholds from Southall *et al.* (2019) in paragraph 80 which has been replaced by NMFS (2024) TTS thresholds. This update has been made in response to Item 10a (see **FIR Response Document**).

Assessment of other impact pathways

This section remains unchanged.

Population modelling

This section remains unchanged.

11.5 Assumptions and limitations

Section 11.5, including the associated Section 11.16 'Annex 1 – Assumptions and limitations', remain unchanged. In addition, **Appendix 11 -B SMRU Consulting TTS Position Statement** has been included to further explain why TTS is not assessed.

11.6 Existing environment

The upfront section (paragraph 91) remains unchanged.

Updates from Section 11.6.1 to 11.6.7 and Section 11.6.8 are detailed below. Section 11.6.9 remains unchanged. The additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document**

11.6.1 Harbour porpoise

Paragraphs 92 - 94 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 21 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

21. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for harbour porpoise (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**).

11.6.2 Bottlenose dolphin

Paragraphs 95 - 99 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 22 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

22. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for bottlenose dolphins (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**).

11.6.3 Common dolphin

Paragraphs 100 - 103 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 23 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

23. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for common dolphins (**Appendix 11-A Update to Marine Mammal Baseline Characterisation).**

11.6.4 Risso's dolphin

Paragraphs 104 - 107 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 24 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

24. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for Risso's dolphins (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**).

11.6.5 Minke whale

Paragraphs 108 - 111 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 25 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

25. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for minke whales (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**).

11.6.6 Grey seal

Paragraphs 112 - 114 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 26 below. This update has been made in response to FIR Items 10r(i) and 10s (see **FIR Response Document**).

26. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for grey seals (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**).

11.6.7 Harbour seal

Paragraphs 115 - 117 remain unchanged but should now be read in conjunction with the additional text provided in paragraph 27 below. This update has been made in response to FIR Items 10r(i) and 10s (see FIR **Response Document**).

27. The findings from the new data sources are within anticipated variation of the previous comparable dataset, and the results therefore validate and support the 2024 EIAR baseline characterisation for harbour seals (**Appendix 11-A Update to Marine Mammal Baseline Characterisation**).

11.6.8 Climate change and natural trends

Section 11.6.8 remains unchanged.

11.6.9 Summary

Section 11.6.9 remains unchanged.

Marine mammal density estimates change on a daily, monthly, seasonal and annual basis given the fact that they are highly mobile species with large home ranges. Density estimates obtained from different survey methods each have their own set of assumptions and limitations. Thus, it is expected that for a range of surveys conducted within the Irish Sea, there will be a large variety of resulting density estimates.

For this reason, several density estimates were presented in the EIAR **Volume 3**, **Chapter 11 Marine Mammals** quantitative assessment for cetaceans. Since the submission of the 2024 Application, additional density estimates have become available (see full details in **Appendix 11-A Update to Marine Mammal Baseline Characterisation).** The additional data has served to further validate the density estimates used in the quantitative assessment in the 2024 Application. This **EIAR Addendum (Part 1)** therefore uses the same density estimates as was used in the 2024 EIAR for the quantitative impact assessment.

For completeness, **Appendix 11-C Assessment of disturbance from mitigated pile driving – Full results** presents the quantitative assessment for disturbance from pile driving using both the density estimates presented in the 2024 Application, and using new density estimates that have become available since. The **Appendix 11-C** has demonstrated that despite the different density estimates available, none result in a significant impact to marine mammals.

11.7 Scope of the assessment

Section 11.7 remains unchanged.

11.8 Assessment parameters

Section 11.8 remains unchanged except for changes to Section 11.8.4 below.

11.8.1 Background

Section 11.8.1 remains unchanged.

11.8.2 Options and dimensional flexibility

Section 11.8.2 remains unchanged.

11.8.3 Limit of deviation

Section 11.8.3 remains unchanged.

11.8.4 Pile driving assessment parameters

This section remains unchanged except for an update in Appendix reference. The reference to EIAR **Volume 4**, **Appendix 9.4 UWN Assessment** has been replaced with **Appendix 9-C Underwater Noise Modelling Assessment**. This update has been made in response to *inter alia* FIR Item 10a (see **FIR Response Document**).

28. Underwater noise modelling of pile driven WTG foundations has been undertaken by Subacoustech Environmental Limited using the INSPIRE model. Full details of the underwater noise modelling methods can be found in **Appendix 9-C Underwater Noise Modelling Assessment**.

WTG

This section remains unchanged but should now be read in conjunction with paragraph 29 below. This update has been made in response to FIR Item 10a (see **FIR Response Document**).

29. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. Therefore, the assessment of PTS and distance from pile driving is also presented for mitigated piling. For mitigated pile driving, the piling parameters and locations remain the same, except for the limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m.

Onshore substation (River Liffey)

This section remains unchanged.

11.9 Primary mitigation measures

Section 11.9 remains unchanged except for Table 11-18 which is replaced in its entirety by Table 11-C below. The updates are associated with the:

- Marine Mammal Mitigation Protocol (MMMP). These updates have been made in response to FIR items 10a, 10c, and 10t (see **FIR Response Document**).
- Ecological Vessel Management Plan (EVMP). This update has been made in response to FIR item 7u (see **FIR Response Document**).

Table 11-C Primary mitigation measures

Project element	Primary mitigation measure
Pollution	A **Construction Environmental Management Plan** (CEMP) has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of:

Project element	Primary mitigation measure
	• The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e., ecological clerk of works) and contractor requirements (i.e., method statements for specific construction activities); • Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project; • Measures proposed to ensure effective handling of chemicals, oils and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
Increased underwater noise – geophysical surveys	A **Marine Mammal Mitigation Protocol** (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the construction of the CWP Project. The MMMP is based on DAHG (2014) guidance. The MMMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction. **Primary mitigation measures in the MMMP for geophysical surveys (Multibeam, single beam, side-scan sonar & sub-bottom profiler surveys)**: • Pre-survey visual watch of 500 m radius monitored zone by an MMO for 30 min • Ramp-up where possible • Activities to commence only when effective pre-survey visual monitoring is possible • Pre-survey monitoring and a subsequent ramp-up procedure (where possible) to be used after a break in sound output of over 30 min
Increased underwater noise – UXO clearance	A **Marine Mammal Mitigation Protocol** (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the construction of the CWP Project. The MMMP is based on DAHG (2014) guidance. The MMMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction. **Primary mitigation measures in the MMMP for UXO**: • Preference for low order clearance over high order clearance where possible • Only using minimum quantity of explosive as donor charge • Activities to occur in daylight only

Project element	Primary mitigation measure
	• Activities to commence only when effective pre-clearance visual monitoring is possible • Pre-detonation MMO watch of 1 km radius monitored zone for 30 min • To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required. • Pre-clearance ADD use if PTS impact range exceeds 1 km mitigation zone
Increased underwater noise – piling	A **Marine Mammal Mitigation Protocol** (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the construction of the CWP Project. The MMMP is based on DAHG (2014) guidance. The MMMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction. **Primary mitigation measures in the MMMP for piling**: • To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. • Pre-piling visual watch of 1 km radius monitored zone for 30 min by an MMO (supplemented by PAM) • Pile driving to commence with a 20 minute soft start at 10% hammer energy and 10 blows/min rate, followed by a ramp-up • Pre-piling monitoring and a subsequent soft start (where possible) to be used after a break in piling of over 30 min • Activities to commence only when effective pre-piling visual monitoring is possible • Additionally, piling works along the River Liffey channel will not be permitted between March and May to avoid noise impact during the salmon smolt run.
Vessel collisions and vessel disturbance	An **Ecological Vessel Management Plan** (EVMP) has been prepared to determine vessel routing to and from construction sites and ports and to include a code of conduct for vessel operators. The EVMP includes details of: • The types and specifications of vessels for the CWP Project; • How vessels will be monitored and coordinated; • Vessel speeds transiting inside or within 2km of The Murrough SPA from November to March, inclusive; and • The use of defined transit routes to site from key construction and operation ports, where practicable to do so. The EVMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
Decommissioning	A **Rehabilitation Schedule** is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact

Project element	Primary mitigation measure
	methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.
Decommissioning	A Marine Mammal Mitigation Protocol (MMMP) has been prepared to outline the mitigation requirements for minimising the impacts on marine mammals during the decommissioning of the CWP Project. The Decommissioning MMMP (section 11 of the MMMP) will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of decommissioning. As a minimum, it is expected that an MMO watch and a PAM watch (to supplement the MMO) will likely be required for any underwater noise generating activity that has predicted the potential for auditory injury to marine mammals.

11.10 Impact assessment

Updates to Section 11.10.1 and 11.10.2 are detailed below. Section 11.10.3 remains unchanged.

11.10.1 Construction phase

From pre-construction surveys

This section remains unchanged with the exception of paragraph 147 and Table 11-19 have been replaced in their entirety by paragraph 30 and Table 11-D below. This is due to the update in guidance from Southall et al., (2019) to NMFS (2024) for PTS thresholds and marine mammal hearing ranges.

30. The assessment on the potential effects on relevant species is undertaken with consideration of their auditory sensitivities. Marine mammal hearing groups and auditory injury criteria from NMFS (2024), and the corresponding species of relevance to this assessment, are summarised in **Table 11-D**. There are no audiogram data currently available for low-frequency cetaceans; therefore, predictions are based on the hearing anatomy for each species and considerations of the frequency range of vocalisations.

Table 11-D Marine mammal hearing groups, estimated hearing range and sensitivity and injury criteria and corresponding species relevant to this assessment (NMFS, 2024)

Hearing Group	Species	Estimated hearing range	Estimated region of greatest sensitivity†	Estimated peak sensitivity†
Low-frequency (LF) cetaceans	Minke whale	7 Hz – 36 kHz	1 Hz – 8 kHz	2.8 kHz
High-frequency (HF) cetaceans	Bottlenose dolphin Common dolphin Risso's dolphin	150 Hz –160 kHz	8 – 90 kHz	45 kHz

Hearing Group	Species	Estimated hearing range	Estimated region of greatest sensitivity†	Estimated peak sensitivity†
Very high-frequency (VHF) cetacean	Harbour porpoise	200 Hz – 165 kHz	22 – 140 kHz	64 kHz
Phocid carnivores in water (PCW)	Harbour seal Grey seal	40 Hz – 90 kHz	1.3 – 31 kHz	6.3 kHz

†Region of greatest sensitivity represents low-frequency (F1) and high-frequency (F2) inflection points, while peak sensitivity is the frequency at which the lowest threshold was measured (T0) (NMFS, 2024)

Magnitude of Impact

This section remains unchanged, despite the change in PTS thresholds from Southall et al., (2019) to NMFS (2024).

Receptor sensitivity

This section remains unchanged.

Primary mitigation

The 'Primary mitigation' header has been introduced at this location. This update has been included to confirm the applicable primary mitigation detailed in Table 11-C.

31. CWP has committed to a geophysical survey MMMP **(Updated MMMP)** that complies with DAHG (2014) guidance. This includes:

- Pre-survey visual watch of 500 m radius monitored zone by an MMO for 30 min
- Ramp-up where possible
- Activities to commence only when effective pre-survey visual monitoring is possible
- Pre-survey monitoring and a subsequent ramp-up procedure (where possible) to be used after a break in sound output of over 30 min

Significance of effect

This section remains unchanged with the exception of the removal of the subheading 'Prior to application of primary mitigation measures'.

Additional mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 2: Disturbance from pre-construction surveys

This section has been updated to consider updated disturbance EDRs from JNCC (2025d). This revision has been made due to an update in guidance.

Magnitude of impact

This section has been replaced in its entirety with paragraphs 32 to 34 and Table 11-E. This revision has been made due to the availability of new guidance from JNCC (2025d) and in response to FIR Item 10j (see **FIR Response Document).**

32. The number of animals predicted to be disturbed by geophysical surveys has been assessed using the guidance from JNCC (2025d), which recommends a 3 km EDR is used to assess significant disturbance to harbour porpoise from sub bottom profilers (SBPs), ultra-short baselines (USBLs), and Multiple-transducer SBES or MBES with an operating frequency of ≤12 kHz operating in waters ≤200 m depth. In the absence of guidance for other species, the same 3 km EDR is assumed for all marine mammals.

33. For all marine mammal species less than 0.1% of the MU is predicted to be impacted by geophysical survey activity (**Table 11-E**).

34. It is anticipated that the noise emitted from geophysical survey equipment will be rapidly attenuated with distance from source such that noise levels at which behavioural disturbance would be anticipated to occur will be of small spatial extent. In particular, it is noted that those sources with higher source levels (SBP, UHRS), along with the SBI, are highly directional, with noise levels outside of the main beam considerably lower and therefore with limited horizontal propagation of noise levels. The consequence of the impact is short-term, intermittent over the course of a geophysical survey campaign, with temporary behavioural effects. It is predicted that any disturbance arising from the geophysical survey works within the Proposed Development will be of localised spatial extent. The effect is likely to occur but at low frequency. Although the effect could affect a **very small proportion** of the receptor populations, population trajectories would not be altered. Therefore, the magnitude of behavioural disturbance due to geophysical surveys has been assessed as **Negligible.**

Table 11-E Number of animals predicted to be disturbed by pre-construction geophysical surveys, assuming a 3 km EDR (JNCC, 2025d)

Species	Density (#/km²)		Number impacted	MU	% MU
Harbour porpoise	0.1225	CWP surveys (2020-2022)	3	62,517	0.00%
	0.2803	SCANS IV block density	8		0.01%
Bottlenose dolphin	0.2352	SCANS IV block density	7	8,236	0.08%
Common dolphin	0.2810	CWP surveys (2020-2022)	8	102,656	0.01%
	0.0272	SCANS IV block density	1		0.00%
Risso's dolphin	0.0008	CWP surveys (2020-2022)	<1	12,262	<0.01%
	0.0022	SCANS IV block density	<1		<0.01%
Minke whale	0.0019	CWP surveys (2020-2022)	<1	20,118	0.00%

Species	Density (#/km^2)		Number impacted	MU	% MU
	0.0137	SCANS IV block density	<1		0.00%
Grey seal	0.1563	Carter et al (2022) average across array area & ECC	4	6,056	0.07%
Harbour seal	0.0075	Carter et al (2022) average across array area & ECC	<1	1,365	<0.07%

Receptor sensitivity

This section remains unchanged

Significance of the effect

Prior to application of primary mitigation measures

This section is now addressed after the Primary mitigation section. See paragraph 36 below.

Primary mitigation

This section has been replaced in its entirety with paragraph 35 below. This update was made in response to FIR Item 10j (see **FIR Response Document).**

35. CWP has committed to a geophysical survey MMMP (**updated MMMP**) that complies with DAHG (2014) guidance. This includes:

- Pre-shooting MMO watch of 500m radius for 30 min
- Ramp-up where possible.
- Activities to commence only when effective pre-survey visual monitoring is possible
- Pre-survey monitoring and a subsequent ramp-up procedure (where possible) to be used after a break in sound output of over 30 min

Significance of effect

This section including the subheading 'Prior to application of primary mitigation measures' is replaced with paragraph 36.

36. The sensitivity of marine mammals to disturbance from geophysical surveys has been assessed as Low for all species. The magnitude of impact has been assessed as Negligible for all marine mammals. Thus, **Negligible (not significant)** impacts are assessed for all species**.**

Additional mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 3: Auditory injury (PTS) from UXO clearance

This section has been updated to consider updated PTS-onset thresholds.

This section remains unchanged with the exception of paragraphs 180 – 182, which should now be read in conjunction with the additional text provided in paragraph 37 below. This update has been made in response to FIR Item 10t (see **FIR Response Document**).

37. To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required.

Magnitude of impact

This section has been replaced in its entirety by paragraphs 38 to 40 and Tables 11-22 and 11-23 are replaced with Table 11-F and Table 11-G. This revision has been made due to the change in PTS thresholds from Southall et al., (2019) to NMFS (2024) and the commitment to the implementation of noise abatement in the event high order clearance is required.

38. UXO detonation is defined as a single pulse, as a result, animal fleeing assumptions do not apply. **Table 11-F** provides the predicted PTS impact ranges for low order clearance, high order clearance without mitigation and high order clearance with a bubble curtain. Note, unmitigated high order clearance is provided for information only to understand the reduction in impact range resulting from the bubble curtain. Unmitigated high order clearance will not occur.

39. For low order clearance, the maximum PTS impact range is 990 m for harbour porpoise (**Table 11-F**). For all species, <1 individual is predicted to be within the PTS impact range. This is of **Negligible** magnitude.

40. For high order clearance with noise abatement (assessment assumption, bubble curtain), the maximum PTS impact range for a 750 kg UXO + donor is 5.1 km for harbour porpoise (**Table 11-F**). There is predicted to be up to 23 harbour porpoise within the PTS impacted area (**Table 11-G**), which is considered to be a **Low** magnitude. For all other species, <1 individual is predicted to be within the PTS impact range, which is of **Negligible** magnitude.

Table 11-F Summary of the auditory injury (PTS-onset) impact ranges (in meters) for low-order UXO clearance and the maximum UXO size for high-order clearance (full results for all charge sizes are available in **Appendix 9-C Underwater Noise Modelling Assessment**)

NMFS (2024)	PTS (Weighted $L_{E,p,wtd,ss}$)				PTS (Unweighted $L_{p,pk}$)			
	LF	HF	VHF	PCW	LF	HF	VHF	PCW
Low order								
0.25 kg	130	< 50	170	< 50	130	60	990	110
High order - unmitigated								
750 kg + donor	6500	< 50	2200	1300	1800	830	14000	1600
High order – with noise abatement (assessment assumption: bubble curtain)								
25 kg + donor	210	< 50	260	< 50	210	100	1600	190
750 kg + donor	1100	< 50	910	230	670	290	5100	610

Table 11-G Number of animals predicted to experience PTS from high order UXO clearance of a 750 kg UXO.

Species	PTS range (km)	Impact area (km^2)	Density (#/km^2)		# impacted
High order 750 kg + donor with noise abatement (assessment assumption: bubble curtain)					
Harbour porpoise	5.1	87.71	0.1225	CWP surveys (2020-2022)	10
			0.2803	SCANS IV block density	23
Minke whale	1.1	3.80	0.0019	CWP surveys (2020-2022)	<1
			0.0137	SCANS IV block density	<1
Grey seal	0.61	1.17	0.1563	Carter et al (2022) average across array area & ECC	<1
Harbour seal	0.61	1.17	0.0075	Carter et al (2022) average across array area & ECC	<1

Receptor sensitivity

This section remains unchanged.

Significance of effect

This section has been replaced with paragraphs 41 to 42. This update is in response to FIR Item 10t (see **FIR Response Document).**

Prior to application of primary mitigation measures

41. Low order clearance:

- Harbour porpoise: The sensitivity has been assessed as **Low**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.
- Minke whale: The sensitivity has been assessed as **Medium**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.
- Dolphins: The sensitivity has been assessed as **Low**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.
- Seals: The sensitivity has been assessed as **Low**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.

42. High order clearance with noise abatement (assessment assumption bubble curtain):

- Harbour porpoise: The sensitivity has been assessed as **Low**, and the magnitude of impact has been assessed as **Low**. Therefore, the significance of effect is **Minor (Not significant)**.
- Minke whale: The sensitivity has been assessed as **Medium**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.
- Dolphins: The sensitivity has been assessed as **Low**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.
- Seals: The sensitivity has been assessed as **Low**, and the magnitude of impact has been assessed as **Negligible**. Therefore, the significance of effect is **Negligible (Not significant)**.

Primary mitigation

This section has been replaced with paragraph 43 to align with DAHG Guidance (2014) and in response to FIR Items 10c, 10t and 10z (see **FIR Response Document**).

43. CWP has committed to a UXO MMMP (**updated MMMP**) that complies with DAHG (2014) guidance (for blasting, since no UXO clearance specific guidance is available). This includes:

- Preference for low order clearance over high order clearance where possible
- Only using minimum quantity of explosive as donor charge
- Activities to occur in daylight only
- Pre-detonation MMO watch of 1 km radius for 30 min
- To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required
- Pre-clearance ADD use if PTS impact ranges exceed the 1 km mitigation zone*.

** For the maximum UXO charge size of 750 kg + donor + bubble curtain, the maximum PTS impact range for harbour porpoise is 5.1 km. In this instance, the ADD duration would be adjusted to deter animals from a 5.1 km radius of the UXO. This equates to deterrence of up to 23 porpoise (Table 11-H). The recent review of the evidence base of the application of ADDs as marine mammal mitigation (Phillips et al., 2025) states that the Lofitech seal scarer has the potential for disturbance at 7 km for harbour porpoise, with a high confidence evidence score; the Ace Aquatec: Midfrequency Acoustic Startle Response Device is stated to have the potential for exclusion up to 6 km for harbour porpoise, with a high confidence evidence score; and the Gael Force: SeaGuard seal deterrent is stated to have the potential for deterrence up to 3.5 km for harbour porpoise, with a high confidence evidence score. For the high-order clearance of a UXO with a bubble curtain, the effective deterrent range is expected to be 10 km (JNCC, 2025d), which equates to deterrence of up to 88 porpoise (Table 11-I). The deterrence from the pre-clearance UXO will be less than the deterrence from the UXO clearance event itself. Therefore, the ADD can serve to mitigate the risk of PTS without resulting in excessive*

deterrence/displacement. It is noted that the likelihood of high-order UXO clearance at CWP is extremely low, given the low probability of UXO presence in the area and the commitment to low order clearance as the primary method.

Additional mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 4: Disturbance from UXO clearance

This section has been updated to consider: 1) updated density estimates, 2) updated EDRs for high and low order clearance and 3) updated TTS-onset thresholds (used as a proxy for disturbance).

Magnitude of impact

The upfront section (paragraph 196) has been replaced in its entirety by paragraph 44. This revision has been made due to the new guidance of EDRs for UXOs.

44. This assessment of disturbance impacts to marine mammals from UXO clearance presents results for each of the following behavioural disturbance thresholds:

- 10 km effective deterrence range (EDR) for high-order UXO clearance using noise abatement (bubble curtain);
- 5 km EDR for low-order UXO clearance; and
- TTS-onset thresholds for both high- and low-order UXO clearance

26 km EDR

The 26 km EDR section has been replaced in its entirety by the "10 km EDR (high-order UXO clearance using noise abatement)" section below (paragraphs 45 to 47 and Table 11-24 is replaced with Table 11-H). This revision has been made due to the new guidance of EDRs for UXOs, and updated density estimates becoming available for marine mammals.

10 km EDR (high-order UXO clearance using noise abatement)

45. There is no guidance available from NPWS on the methodology that should be used to assess disturbance from high order detonation UXO clearance. Reference is therefore made to JNCC (2025d) which suggests that an EDR of 10 km is applied to high-order clearance with a bubble curtain. In the absence of agreed metrics and Irish guidance, the 10 km EDR has been used here. It is also important to note that high order detonation with a bubble curtain will only be used by the CWP Project where

avoidance or low order clearance (deflagration) is not feasible; the CWP Project will preferentially clear UXO through deflagration.

46. The resulting number of animals, proportion of the reference population and impact magnitude is detailed in **Table 11-H**.

47. The greatest estimated disturbance occurs for bottlenose dolphins, where 74 dolphins (0.90% MU) are predicted to be disturbed, and for grey seals where 49 grey seals (0.81% MU) are predicted to be disturbed. For all other marine mammal species less than 0.15% of the MU are predicted to be impacted. It is expected that the detonation of a UXO would elicit a startle response and potentially very short duration behavioural responses and would therefore not be expected to cause widespread and prolonged displacement (JNCC, 2020). The consequence of the impact is therefore short-term, intermittent over the course of a UXO clearance campaign, with temporary behavioural effects that are very unlikely to alter survival and reproductive rates to the extent that the population trajectory would be altered. For all marine mammal species, the impacts are assessed as **Low** magnitude.

Table 11-H Estimated number of marine mammals potentially at risk of disturbance during high-order UXO clearance using noise abatement (bubble curtain) (10 km EDR; assuming an impact area of 314 km^2)

Species	Density (#/km^2)		Number impacted	MU	% MU
Harbour porpoise	0.1225	CWP surveys (2020-2022)	38	62,517	0.06%
	0.2803	SCANS IV block density	88		0.14%
Bottlenose dolphin	0.2352	SCANS IV block density	74	8,236	0.90%
Common dolphin	0.2810	CWP surveys (2020-2022)	88	102,656	0.09%
	0.0272	SCANS IV block density	9		0.01%
Risso's dolphin	0.0008	CWP surveys (2020-2022)	1	12,262	0.01%
	0.0022	SCANS IV block density	1		0.01%
Minke whale	0.0019	CWP surveys (2020-2022)	1	20,118	0.00%
	0.0137	SCANS IV block density	4		0.02%
Grey seal	0.1563	Carter et al (2022) average across array area & ECC	49	6,056	0.81%
Harbour seal	0.0075	Carter et al (2022) average across array area & ECC	1	1,365	0.07%

5 km EDR

This 5 km EDR section has been replaced in its entirety by the section "5 km EDR (low-order UXO clearance)" detailed below (paragraphs 48 to 49 and Table 11-25 is replaced with Table 11-I). This revision has been made due to the new guidance of EDRs for UXOs, and updated density estimates becoming available for marine mammals.

5 KM EDR (low-order UXO clearance)

48. It is important to note that high-order detonation represents the very worst-case scenario for UXO clearance, as it is proposed that that low-order clearance methods (deflagration) will be used as mitigation instead. Following updated guidance, the resulting number of animals, proportion of the reference population and impact magnitude for low-order clearance impacts are detailed in **Table 11-I**.

49. The greatest estimated disturbance occurs for bottlenose dolphins and grey seals, where 18 dolphins (0.22% MU) and 12 grey seals (0.20% MU) are predicted to be disturbed. For all other marine mammal species less than 0.1% of the MU are predicted to be impacted. It is expected that the detonation of a UXO would elicit a startle response and potentially very short duration behavioural responses and would therefore not be expected to cause widespread and prolonged displacement (JNCC, 2020). The consequence of the impact is short-term, intermittent over the course of a UXO clearance campaign, with temporary behavioural effects that are very unlikely to alter survival and reproductive rates to the extent that the population trajectory would be altered. Therefore, disturbance impacts associated with low-order UXO clearance on all marine mammals are assessed as **Low** magnitude.

Table 11-I Estimated number of marine mammals potentially at risk of disturbance during high-order UXO clearance (5 km EDR; assuming an impact area of 78.5 km^2)

Species	Density (#/km^2)		Number impacted	MU	% MU
Harbour porpoise	0.1225	CWP surveys (2020-2022)	10	62,517	0.02%
	0.2803	SCANS IV block density	22		0.04%
Bottlenose dolphin	0.2352	SCANS IV block density	18	8,236	0.22%
Common dolphin	0.2810	CWP surveys (2020-2022)	22	102,656	0.02%
	0.0272	SCANS IV block density	2		0.00%
Risso's dolphin	0.0008	CWP surveys (2020-2022)	1	12,262	0.01%
	0.0022	SCANS IV block density	1		0.01%
Minke whale	0.0019	CWP surveys (2020-2022)	1	20,118	0.00%
	0.0137	SCANS IV block density	1		0.00%
Grey seal	0.1563	Carter et al (2022) average across array area & ECC	12	6,056	0.20%
Harbour seal	0.0075	Carter et al (2022) average across array area & ECC	1	1,365	0.07%

TTS as a proxy for disturbance

This section has been replaced in its entirety by paragraphs 50 to 52 and Tables 11-26 and 11-27 are replaced by Table 11-J and Table 11-K. This revision has been made due to the new guidance of EDRs for UXOs, and updated density estimates becoming available for marine mammals.

50. UXO detonation is defined as a single pulse, as a result, animal fleeing assumptions do not apply. **Table 11-J** provides the predicted TTS impact ranges (as a proxy for disturbance) for low order

clearance, high order clearance without mitigation and high order clearance with noise abatement (bubble curtain). Note, unmitigated high order clearance is provided for information only to understand the reduction in impact range resulting from the bubble curtain. Unmitigated high order clearance will not occur.

51. **Table 11-K** details the number of animals predicted to be disturbed by UXO clearance using TTS as a proxy for disturbance. For low order clearance, the maximum disturbance impact is to 3 harbour porpoise individuals (1 or <1 individual is expected to be disturbed for each other marine mammal species). This is of **negligible** magnitude.

52. For high order clearance of a 750 kg UXO + donor with a bubble curtain as mitigation, the maximum impact is to 79 harbour porpoise, 10 minke whales and 5 grey seals (<1 dolphin or harbour seal). This is of **Low** magnitude.

Table 11-J Summary of the TTS-onset impact ranges (m) (used as a proxy for disturbance) for low-order UXO clearance and the maximum UXO size for high-order clearance (full results for all charge sizes are available in **Appendix 9-C Underwater Noise Modelling Assessment**)

NMFS (2024)	TTS (Weighted $L_{E,p,wtd,ss}$)				TTS (Unweighted $L_{p,pk}$)			
	LF	HF	VHF	PCW	LF	HF	VHF	PCW
Low order								
0.25 kg	1800	< 50	1200	380	230	100	1800	210
High order - unmitigated								
750 kg + donor	76000	420	5100	16000	3400	1500	26000	26000
High order – with noise abatement (assessment assumption: bubble curtain)								
750 kg + donor	15000	90	3100	3200	1200	550	9500	1100

Table 11-K Number of animals disturbed by UXO clearance using TTS as a proxy for disturbance (Note: the maximum impact range for dolphins is 550 m for high order equating to <1 animal).

Species	TTS range (km)	Impact area (km^2)	Density (#/km^2)		# impacted	% MU
Low order						
Harbour porpoise	1.8	10.18	0.1225	CWP surveys (2020-2022)	1	0.00
			0.2803	SCANS IV block density	3	0.00
Minke whale	1.8	10.18	0.0019	CWP surveys (2020-2022)	1	0.00
			0.0137	SCANS IV block density	<1	0.00
Grey seal	0.38	0.45	0.1563	Carter et al (2022) average across array area & ECC	0	0.00
Harbour seal	0.38	0.45	0.0075	Carter et al (2022) average across array area & ECC	0	0.00
High order 750 kg + donor with noise abatement (assessment assumption: bubble curtain)						
Harbour porpoise	9.5	283.53	0.1225	CWP surveys (2020-2022)	35	0.06%
			0.2803	SCANS IV block density	79	0.13%
Minke whale	15	706.86	0.0019	CWP surveys (2020-2022)	1	0.00%
			0.0137	SCANS IV block density	10	0.05%
Grey seal	3.2	32.17	0.1563	Carter et al (2022) average across array area & ECC	5	0.08
Harbour seal	3.2	32.17	0.0075	Carter et al (2022) average across array area & ECC	0	0.00

Receptor sensitivity

This section remains unchanged.

Primary mitigation

This section has now been introduced ahead of the Significance of effect section. The section has been amended to align with DAHG (2014) guidance and in response to FIR 10c, 10t and 10z (see **FIR Response Document**).

53. CWP has committed to a UXO MMMP (**updated MMMP**) that complies with DAHG (2014) guidance (for blasting, since no UXO clearance specific guidance is available). This includes:

- Preference for low order clearance over high order clearance where possible
- Only using minimum quantity of explosive as donor charge
- Activities to occur in daylight only
- Pre-detonation MMO watch of 1 km radius for 30 min

- To mitigate potential impacts from underwater noise associated with high order UXO clearance, CWP commits to the implementation of noise abatement in the event high order clearance is required
- Pre-clearance ADD use if PTS impact ranges exceed the 1 km mitigation zone.

Significance of effect

This section is replaced in its entirety by paragraphs 54 to 56 below. This revision has been made due to the new guidance of EDRs for UXOs becoming available for marine mammals.

10 km EDR (high-order clearance with noise abatement)

54. The sensitivity of all marine mammals to disturbance from UXO detonation has been assessed as **Low**. The magnitude of impact has been assessed as **Low** for all mammals, therefore the significance of the effect of disturbance from high-order UXO clearance with a bubble curtain (using a 10 km EDR) is assessed as **Minor (Not significant).**

5 km EDR (low-order UXO clearance)

55. The sensitivity of all marine mammals to disturbance from UXO detonation has been assessed as **Low**. The magnitude of impact has been assessed as **Low** for all mammals, therefore the significance of the effect of disturbance from low-order UXO clearance (using a 5 km EDR) is assessed as **Minor (Not significant).**

TTS as a proxy for disturbance

56. The sensitivity of all marine mammals to disturbance from UXO detonation has been assessed as **Low**. The magnitude of impact has been assessed as **Low** for all mammals, therefore the significance of the effect of disturbance from UXO clearance (using a TTS as a proxy for disturbance) is assessed as **Minor (Not significant).**

Additional mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 5: Auditory injury (PTS) from piling – WTGs and OSSs

This section has been updated to consider: 1) updated PTS-onset thresholds and 2) mitigated pile driving (FIR Item 10a).

Harbour porpoise

Magnitude of impact

This section has been replaced in its entirety by paragraphs 57 to 59. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

57. Full results are presented in **Appendix 9-C Underwater Noise Modelling Assessment**.

58. The maximum unmitigated PTS-onset range for harbour porpoise is 1 km. Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

59. The maximum mitigated PTS-onset range for harbour porpoise is 140 m (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m). This is of **Negligible** magnitude.

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section (paragraph 232) has been replaced in its entirety by paragraph 60 below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Prior to application of primary mitigation measures

60. The sensitivity of harbour porpoise to PTS from WTG pile driving has been assessed as **Low** and the magnitude of mitigated impact (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m) has been assessed as **Negligible**. Therefore, significance of the effect is assessed as **Negligible (Not significant)**.

Primary mitigation

This section has been replaced in its entirety by paragraphs 61 below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

61. CWP has committed to a piling MMMP (**updated MMMP**) that complies with DAHG (2014) guidance. This includes:

- To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events.
- Pre-piling visual watch of 1 km radius monitored zone for 30 min by an MMO (supplemented by PAM)

- Pile driving to commence with a 20 minute soft start at 10% hammer energy and 10 blows/min rate, followed by a ramp-up
- Pre-piling monitoring and a subsequent soft start (where possible) to be used after a break in piling of over 30 min
- Activities to commence only when effective pre-piling visual monitoring is possible

Additional mitigation

This section has been replaced in its entirety by paragraph 62 below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

62. None required as the impact is not significant.

Residual effect

This section has been replaced in its entirety by paragraph 63 below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

63. The residual effect is **Negligible (Not significant)**.

Dolphins

Magnitude of impact

This section has been replaced in its entirety by paragraphs 64 to 66 . This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

64. Full results are presented in **Appendix 9-C Underwater Noise Modelling Assessment**.

65. The maximum unmitigated PTS-onset range for dolphin species is <50 m. Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

66. The maximum mitigated PTS-onset range for dolphin species is <50 m (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m). This is of **Negligible** magnitude.

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section has been replaced in its entirety by paragraphs 67. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

67. The sensitivity of dolphin species to PTS from WTG pile driving has been assessed as **Low** and the magnitude of mitigated impact (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m) has

been assessed as **Negligible**. Therefore, significance of the effect is assessed as **Negligible (Not significant)**.

Primary mitigation

This section has been replaced in its entirety by paragraphs 68. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

68. CWP has committed to a piling MMMP (**updated MMMP**) that complies with DAHG (2014) guidance. This includes:

- To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events.
- Pre-piling visual watch of 1 km radius monitored zone for 30 min by an MMO (supplemented by PAM)
- Pile driving to commence with a 20 minute soft start at 10% hammer energy and 10 blows/min rate, followed by a ramp-up
- Pre-piling monitoring and a subsequent soft start (where possible) to be used after a break in piling of over 30 min
- Activities to commence only when effective pre-piling visual monitoring is possible
- Additionally, piling works along the River Liffey channel will not be permitted between March and May to avoid noise impact during the salmon smolt run

Additional mitigation

This section has been replaced in its entirety by paragraph 69. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

69. None required as the impact is not significant.

Residual effect

This section remains unchanged.

Minke whales

Magnitude of impact

This section has been replaced in its entirety by paragraphs 70 to 72. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

70. Full results are presented in **Appendix 9-C Underwater Noise Modelling Assessment**.

71. The maximum unmitigated PTS-onset range for minke whales is 8 km. Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

72. The maximum mitigated PTS-onset range for minke whales is <100 m (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m). This is of **Negligible** magnitude.

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section has been replaced in its entirety by paragraph 73. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Prior to the application of mitigation measures

73. The sensitivity of minke whales to PTS from WTG pile driving has been assessed as **Low** and the magnitude of mitigated impact (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m) has been assessed as **Negligible**. Therefore, significance of the effect is assessed as **Negligible (Not significant)**.

Primary mitigation

This section has been replaced in its entirety by paragraph 74. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

74. CWP has committed to a piling MMMP (**updated MMMP**) that complies with DAHG (2014) guidance. This includes:

- To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events.
- Pre-piling visual watch of 1 km radius monitored zone for 30 min by an MMO (supplemented by PAM)
- Pile driving to commence with a 20 minute soft start at 10% hammer energy and 10 blows/min rate, followed by a ramp-up
- Pre-piling monitoring and a subsequent soft start (where possible) to be used after a break in piling of over 30 min
- Activities to commence only when effective pre-piling visual monitoring is possible

Additional mitigation

This section has been replaced in its entirety by paragraph 75. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

75. None required as the impact is not significant.

Residual effect

This section has been replaced in its entirety by paragraph 76. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

76. The residual effect is **Negligible (Not significant)**.

Seals

Magnitude of impact

This section has been replaced in its entirety by paragraphs 77 to 79. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

77. Full results are presented in **Appendix 9-C Underwater Noise Modelling Assessment**.

78. The maximum unmitigated PTS-onset range for seal species is <50 m. Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

79. The maximum mitigated PTS-onset range for seal species is <50 m (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m). This is of **Negligible** magnitude.

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section has been replaced in its entirety by paragraph 80. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

80. The sensitivity of seal species to PTS from WTG pile driving has been assessed as **Low** and the magnitude of mitigated impact (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m) has been assessed as **Negligible**. Therefore, significance of the effect is assessed as **Negligible (Not significant)**.

Primary mitigation

This section has been replaced in its entirety by paragraph 81. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

81. CWP has committed to a piling MMMP (an **updated MMMP** accompanies this FIR) that complies with DAHG (2014) guidance. This includes:

- To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events.
- Pre-piling visual watch of 1 km radius monitored zone for 30 min by an MMO (supplemented by PAM)
- Pile driving to commence with a 20 minute soft start at 10% hammer energy and 10 blows/min rate, followed by a ramp-up
- Pre-piling monitoring and a subsequent soft start (where possible) to be used after a break in piling of over 30 min
- Activities to commence only when effective pre-piling visual monitoring is possible

Additional mitigation

This section has been replaced in its entirety by paragraph 82. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

82. None required as the impact is not significant.

Residual effect

This section has been replaced in its entirety by paragraph 83. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

83. The residual effect is **Negligible** (**Not significant**).

Impact 6: Disturbance from piling – WTGs and OSSs

Impact 6 Disturbance from piling has been updated to consider mitigated pile driving. For completeness, **Appendix 9-C Underwater Noise Modelling Assessment** presents the quantitative assessment for disturbance from pile driving using both the density estimates presented in the **EIAR Volume 3, Chapter 11 Marine Mammals** (the 2024 estimates and presented here), and using new density estimates that have become available since. **Appendix 9-C** has demonstrated that despite the different density estimates available, none result in a significant effect to marine mammals.

Harbour porpoise

Magnitude of impact

This section has been replaced in its entirety by paragraphs 84 to 89, Table 11-L to Table 11-N, Figure 11-A and Plate 11-B. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Dose-response function

84. The maximum number of harbour porpoise predicted to be disturbed on a single piling day, for unmitigated pile driving, is 1,928 porpoise, equating to 3.08% of the MU when a monopile foundation is installed at the SE location (**Table 11-L and Figure 11-A**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

85. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of porpoise predicted to be disturbed per piling day is reduced to a maximum of 668 individuals at the SE location using the Irish Sea density surface (Evans and Waggitt, 2023). This equates to 1.07% of the MU (**Table 11-L and Figure 11-A**).

Table 11-L Harbour porpoise predicted to experience disturbance from WTG piling (using the dose-response function). Blue cell = value taken forwards for population modelling.

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	1,254	634	796	434
		% MU (62,517)	2.01	1.01	1.27	0.69
SCANS IV block CS-D (Gilles et al., 2023)	0.2803	# animals	1,569	823	940	507
		% MU (62,517)	2.51	1.32	1.50	0.81
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	1,928	1,010	1,171	629
		% MU (62,517)	3.08	1.62	1.87	1.01
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	420	188	225	118
		% MU (62,517)	0.67	0.30	0.36	0.19
SCANS IV block CS-D (Gilles et al., 2023)	0.2803	# animals	534	246	271	141
		% MU (62,517)	0.85	0.39	0.43	0.23
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	**668**	304	345	180
		% MU (62,517)	**1.07**	0.49	0.55	0.29

EDRs

86. The maximum number of harbour porpoise predicted to be disturbed on a single piling day, for unmitigated pile driving assuming a 20 km EDR is 448 porpoise (**Table 11-M and Figure 11-A**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

87. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of porpoise predicted to be disturbed per piling day assuming an 11 km EDR is reduced to 136 individuals (**Table 11-M and Figure 11-A**).

Table 11-M Harbour porpoise predicted to experience disturbance from WTG piling (using the EDR approach)

Density (#/km^2)			Unmitigated (20 km EDR)	Mitigated (11 km EDR)
SCANS III density surface (Lacey et al., 2022), average across array area	0.2303	# animals	289	88
		% MU (62,517)	0.46	0.14
SCANS IV block CS-D (Gilles et al., 2023)	0.2803	# animals	352	107
		% MU (62,517)	0.56	0.17
Irish Sea density surface (Evans and Waggitt, 2023), average across array area	0.3566	# animals	448	136
		% MU (62,517)	0.72	0.22

Population modelling

88. To determine the magnitude of this impact on a population level, Interim Population Consequences of Disturbance (iPCoD) modelling was conducted. The modelling assumed 78 WTG piling days between April and October 2031 and that 668 harbour porpoise are disturbed on every piling day (based on the dose response modelling at SE location using the Irish Sea density surface, which results in the greatest potential impact). This is highly precautionary since the modelling shows that the number of animals impacted at other modelling locations (west locations) is significantly lower, and in practice the majority of piling events will be in the shallower areas to the west and north rather than the spatially limited deeper area in the SE.

89. The iPCoD results show that the level of disturbance is not sufficient to result in any changes at the population level, since the impacted population is predicted to continue at a stable trajectory, the same as the un-impacted population and at 99.99% of the size of the unimpacted population (**Table 11-N** and **Plate 11-B**). This is considered to be a **Negligible** magnitude since the disturbance is expected to be temporary and short term, will occur over less than a year (maximum 78 days WTG piling) and is predicted to impact a very small proportion of the MU population, which is not expected to result in any change to the population trajectory.

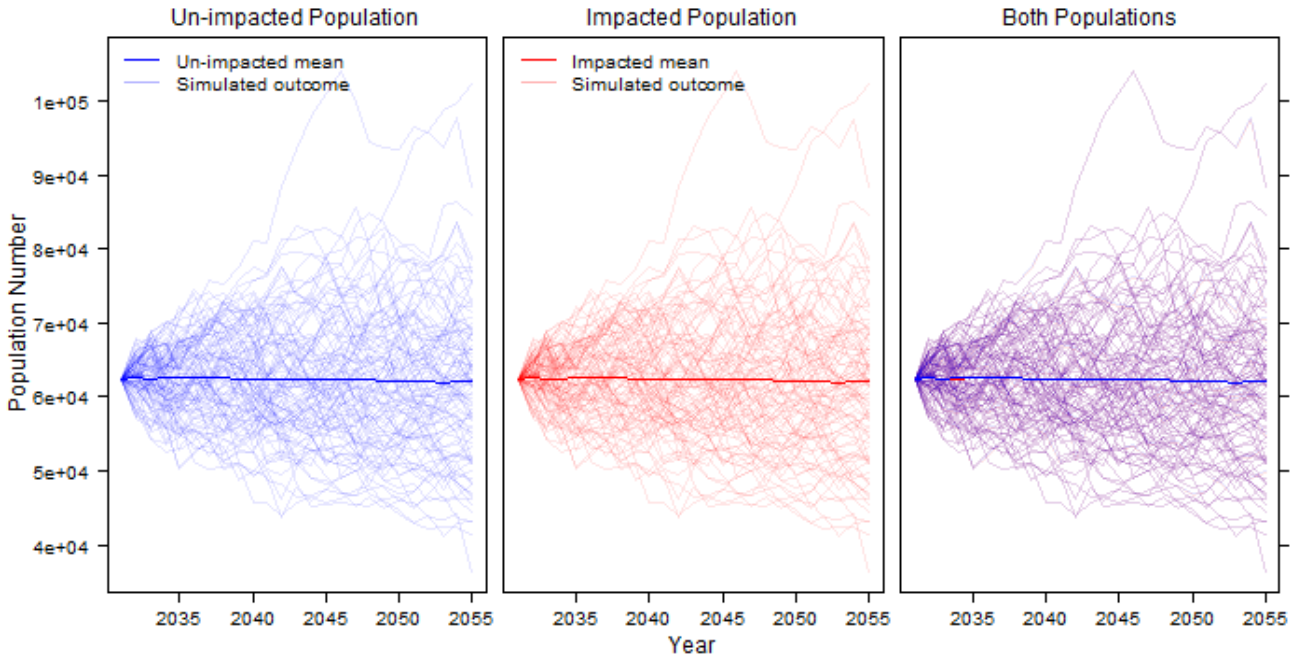


Plate 11-B Predicted population trajectories for the un-impacted (baseline) and impacted harbour porpoise iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 668 harbour porpoise per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

Table 11-N Predicted mean population size for the un-impacted (baseline) and impacted harbour porpoise iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 668 harbour porpoise per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

	Unimpacted population mean size	Impacted population mean size	Impacted population size as a % of the unimpacted population size
Start 2031 (before piling commences)	62,516	62,516	100.00%
End 2031 (after piling ends)	62,571	62,567	99.99%
End 2036 (6 years after piling ends)	62,676	62,668	99.99%
End 2042 (12 years after piling ends)	62,298	62,290	99.99%
End 2048 (18 years after piling ends)	62,231	62,222	99.99%

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section has been replaced in its entirety by paragraph 90. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

90. The sensitivity of porpoise to disturbance from WTG pile driving has been assessed as **Low** and the magnitude of mitigated impact (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m) has been assessed as **Negligible**. Therefore, significance of the effect is assessed as **Negligible (Not significant)**.

Primary mitigation

The heading 'Primary mitigation' has been introduced and is detailed in paragraph 91 below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

91. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

Additional mitigation

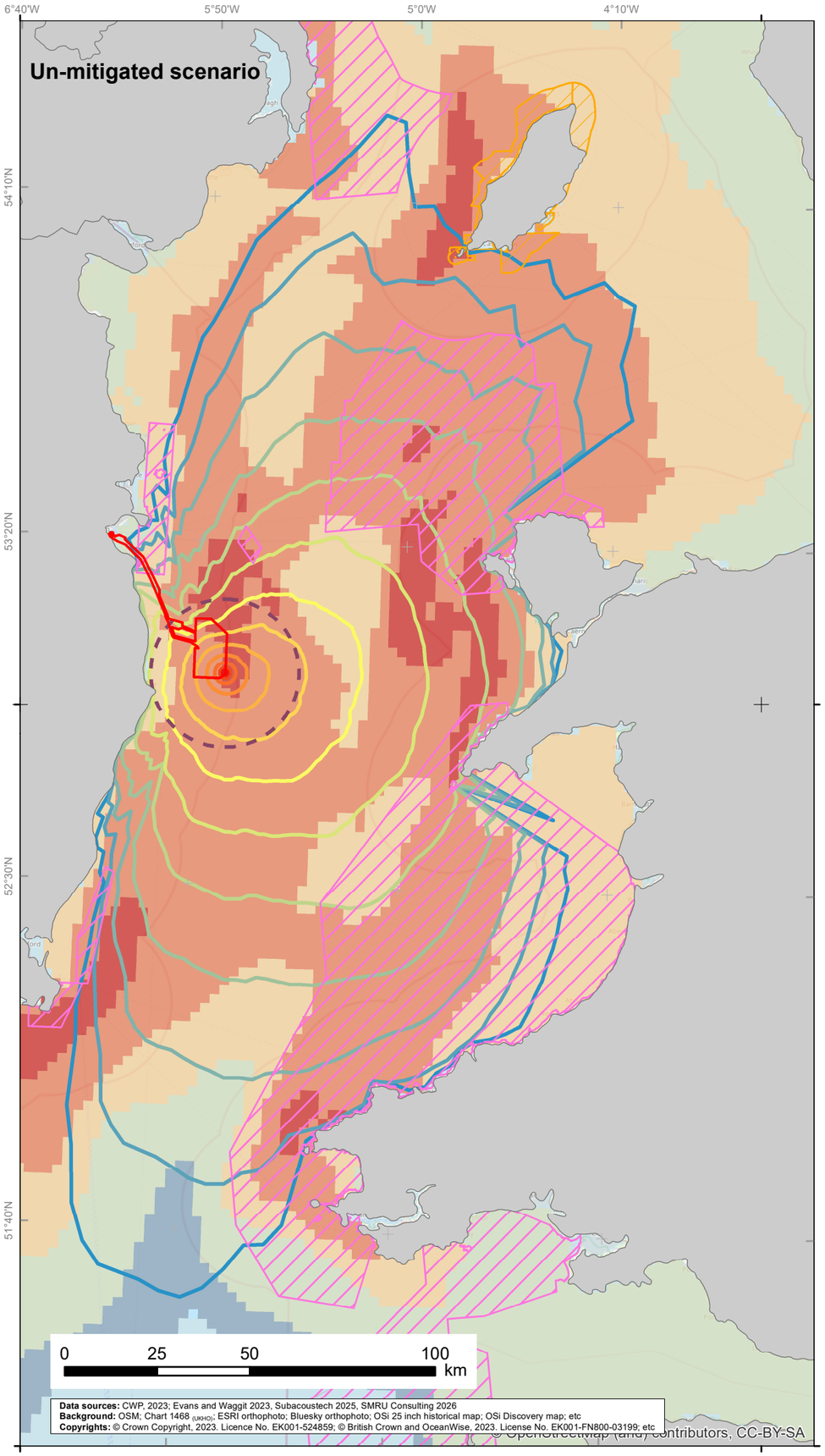
This section has been replaced in its entirety by paragraph 92. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

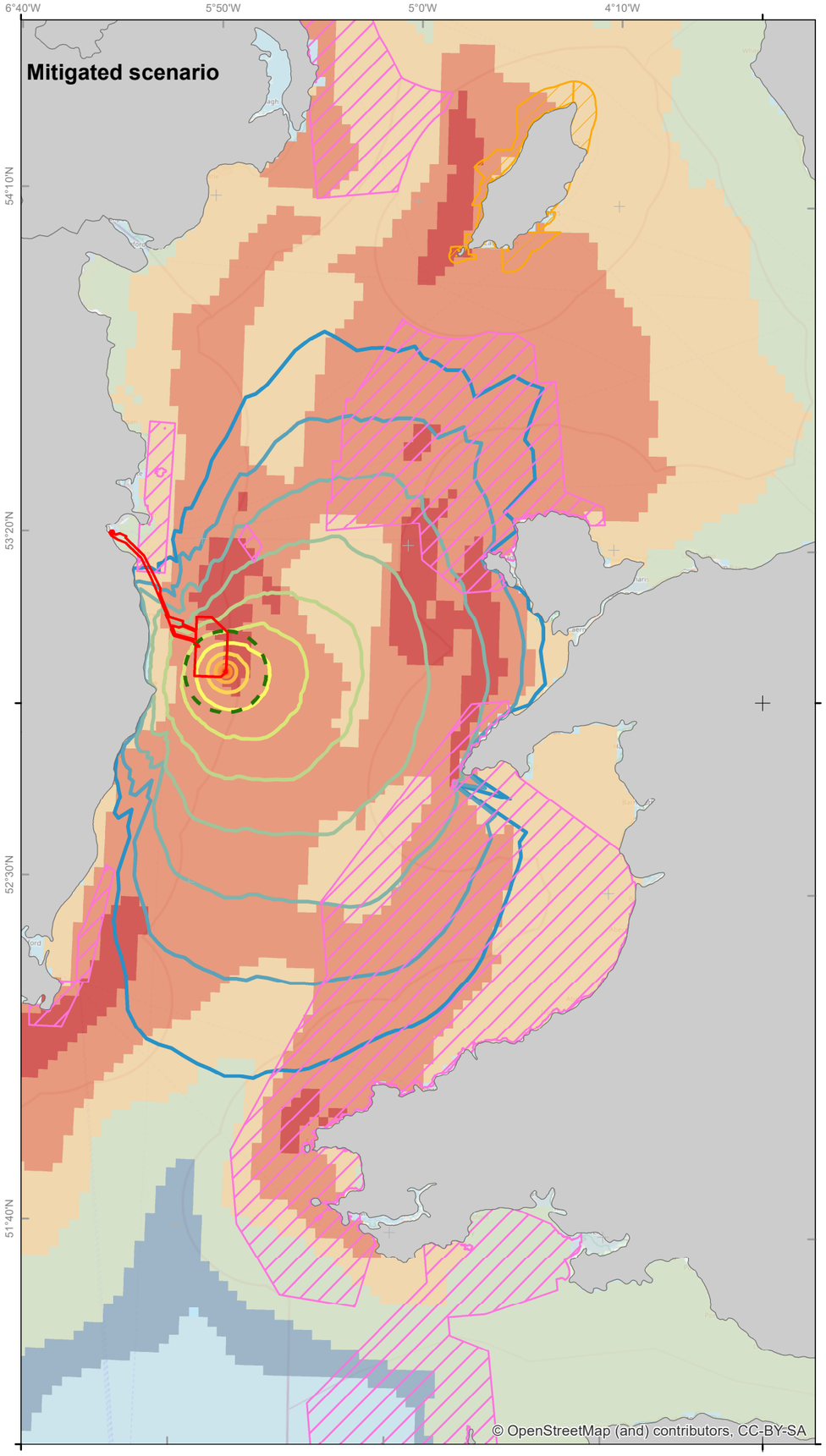
92. None required as the impact is not significant.

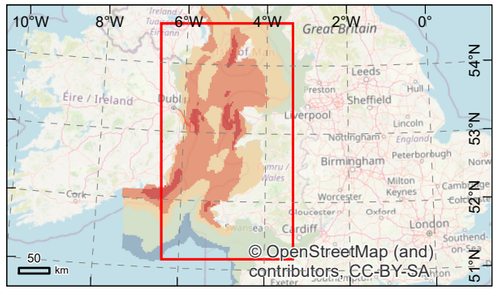
Residual effect

This section has been replaced in its entirety by paragraph 93. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

93. The residual effect is **Negligible** (**Not significant**).







Legend

- Planning application boundary
- Harbour porpoise SACs
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR

Evans and Waggit 2023 harbour porpoise density (animals/km²)

- 0.00
- 0.01 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5

Noise contours: SEL_{ss} dB re µPa²s

- 120
- 125
- 130
- 135
- 140
- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 11-A
Harbour porpoise disturbance from piling

CWP doc. number: CWP-SMR-CON-09-MAP-2061

Internal descriptive code: N/A

Size: A3

Scale: 1:1,400,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	First issue	2025/11/27	AS	RRS	
B	Second issue	2026/02/17	AS	RRS	
C	Third issue	2026/03/10	AS	RRS	

Bottlenose dolphins

Magnitude of impact

This section has been replaced in its entirety by paragraphs 94 to 102, Table 11-O to Table 11-R, Figure 11-B and Plate 11-C. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Dose-response function

94. The maximum number of bottlenose dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving, is 1,316 dolphins, equating to 15.81% of the MU when a monopile foundation is installed at the SE location using the SCANS IV block CS-D density (**Table 11-O and Figure 11-B**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

95. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of dolphins predicted to be disturbed per piling day is reduced to 448 individuals at the SE location using the SCANS IV block CS-D density (**Table 11-O and Figure 11-B**). This equates to 5.38% of the MU.

Table 11-O Bottlenose dolphins predicted to experience disturbance from WTG piling (using the dose-response function). Blue cell = value taken forwards for population modelling.

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	135	75	82	48
		% MU (1,069)	12.63	7.02	7.67	4.49
SCANS IV block CS-D (Gilles et al., 2023)	0.2352	# animals	1,316	690	789	426
		% MU (8,326)	15.81	8.29	9.48	5.12
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	28	12	10	3
		% MU (496)	5.65	2.42	2.02	0.60
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	47	24	24	14
		% MU (1,069)	4.40	2.25	2.25	1.31
SCANS IV block CS-D (Gilles et al., 2023)	0.2352	# animals	**448**	207	227	118
		% MU (8,326)	**5.38**	2.49	2.73	1.42
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	7	2	2	1
		% MU (496)	1.41	0.40	0.40	0.20

Level B harassment

96. The maximum number of bottlenose dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving, is 282 dolphins, equating to 3.39% of the MU when a monopile foundation is installed at the SE location using the SCANS IV block CS-D density (**Table 11-P and Figure 11-B**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

97. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of dolphins predicted to be disturbed per piling day is reduced to 64 individuals at the SE location using the SCANS IV block CS-D density (**Table 11-P and Figure 11-B**). This equates to 0.41% of the MU.

Table 11-P Bottlenose dolphins predicted to experience disturbance from WTG piling (using the Level B harassment threshold)

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	32	16	12	8
		% MU (1,069)	2.99	1.50	1.12	0.75
SCANS IV block CS-D (Gilles et al., 2023)	0.2352	# animals	282	121	100	64
		% MU (8,326)	3.39	1.45	1.20	0.77
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	1	1	<1	<1
		% MU (496)	0.20	0.20	<0.20	<0.20
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	4	2	1	1
		% MU (1,069)	0.37	0.19	0.09	0.09
SCANS IV block CS-D (Gilles et al., 2023)	0.2352	# animals	34	18	10	10
		% MU (8,326)	0.41	0.22	0.12	0.12
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	<1	<1	<1	<1
		% MU (496)	<0.20	<0.20	<0.20	<0.20

EDRs

98. The maximum number of bottlenose dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving assuming a 20 km EDR is 296 dolphins using the SCANS IV block CS-D density (

99. **Table 11-Q and Figure 11-B**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

100. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of dolphins predicted to be disturbed per piling day assuming an 11 km EDR is reduced to 89 individuals using the SCANS IV block CS-D density **(Table 11-Q and Figure 10-B**).

Table 11-Q bottlenose dolphins predicted to experience disturbance from WTG piling (using the EDR approach)

Density (#/km^2)			Unmitigated (20 km EDR)	Mitigated (11 km EDR)
SCANS III density surface (Lacey et al., 2022), average across array area	0.0358	# animals	45	14
		% MU (1,069)	4.21	1.27
SCANS IV block CS-D (Gilles et al., 2023)	0.2352	# animals	296	89
		% MU (8,326)	3.55	1.07
Irish Sea density surface (Evans and Waggitt, 2023), average across array area	0.0008	# animals	1	<1
		% MU (496)	0.20	<0.20

Population modelling

101. To determine the magnitude of this impact at a population level, iPCoD modelling was conducted. The modelling assumed 78 WTG piling days between April and October 2031 and that the number of bottlenose dolphins are disturbed on every piling day was 448 (based on the SE modelling using the dose-response function and the SCANS IV block CS-D density), using an MU size of 8,326 dolphins. This is highly precautionary since a) the modelling shows that the number of animals impacted at other modelling locations (west locations) is significantly lower and b) the porpoise dose-response function will likely overestimate dolphin response.

102. The iPCoD results show that the level of disturbance is not sufficient to result in any changes at the population level, since the impacted population is predicted to continue at a stable trajectory, the same as the un-impacted population, and at 99.6% of the unimpacted population size (**Plate 11-C and Table 11-R**). This is considered to be a **Negligible** magnitude since the disturbance is expected to be temporary and short term, will occur over less than a year (maximum 78 days WTG piling) and is predicted to impact a mall proportion of the MU population, which is not expected to result in any change to the population trajectory.

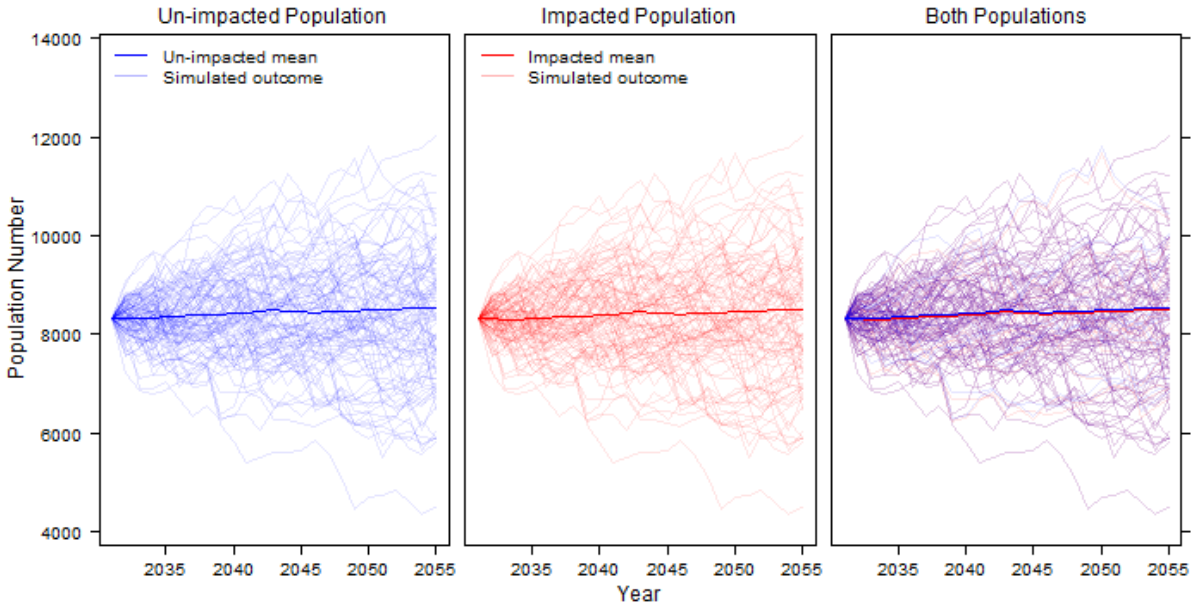


Plate 11-C Predicted population trajectories for the un-impacted (baseline) and impacted bottlenose dolphin iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 448 dolphins per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

Table 11-R Predicted mean population size for the un-impacted (baseline) and impacted bottlenose dolphins iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 448 dolphins per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

	Unimpacted population mean size	**Impacted population mean size**	**Impacted population size as a % of the unimpacted population size**
Start 2031 (before piling commences)	8,322	8,322	100.00%
End 2031 (after piling ends)	8,321	8,312	99.89%
End 2036 (6 years after piling ends)	8,381	8,348	99.61%
End 2042 (12 years after piling ends)	8,491	8,458	99.61%
End 2048 (18 years after piling ends)	8,475	8,443	99.62%

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section has been replaced in its entirety by paragraph 103. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

103. The sensitivity of bottlenose dolphins to disturbance from WTG pile driving has been assessed as **Low** and the magnitude of impact has been assessed as **Negligible**. Therefore, significance of the effect is assessed as **Negligible (Not significant)**.

The Mitigation section is replaced by the Primary mitigation (paragraph 104) and Additional mitigation (paragraph 105) sections below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Primary mitigation

104. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

Additional mitigation

105. None required as the impact is not significant.

Residual effect

This section has been replaced in its entirety by paragraph 106. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

106. The residual effect is **Negligible** (**Not significant**).

Un-mitigated scenario

Mitigated scenario

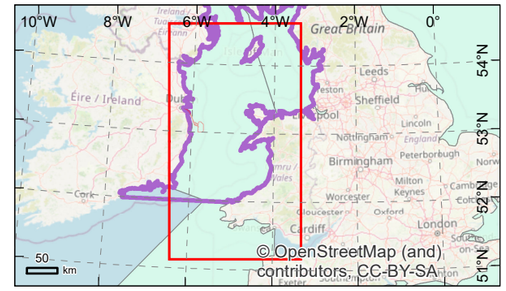
CS-D

CS-E

CS-C

6°40'W 5°50'W 5°0'W 4°10'W

54°10'N 53°20'N 52°30'N 51°40'N



Legend

- Planning application boundary
- Irish Sea MU
- SCANS IV blocks
- Bottlenose dolphin SACs
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR
- Level B threshold 160 dB re 1 µPa (SPL_{rms})

Noise contours: SEL_{ss} dB re µPa²s

- 120
- 125
- 130
- 135
- 140
- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

0 25 50 100 km

Data sources: CWP, 2023; Gillies et al. 2025, Subacoustech 2025, SMRU Consulting 2026
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
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codling wind park

Project: Codling Wind Park

SMRU Consulting
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Figure 11-B
Bottlenose dolphin disturbance from piling

CWP doc. number: CWP-SMR-CON-09-MAP-2062

Internal descriptive code: N/A

Size: A3

Scale: 1:1,400,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	First issue	2025/11/27	AS	RRS	
B	Second issue	2026/02/17	AS	RRS	
C	Third issue	2026/03/10	AS	RRS	

Common dolphins

Magnitude of impact

This section has been replaced in its entirety by paragraphs 107 to 113, Table 11-S to Table 11-U and Figure 11-C. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Dose-response function

107. The maximum number of common dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving, is 1,573 dolphins, equating to 1.53% of the MU when a monopile foundation is installed at the SE location using the CWP site-specific survey density[6] **(Table 11-S**). The more representative density for the wider impacted area is the SCANS III density surface, which predicts disturbance to up to 189 common dolphins per piling day at the SE location (**Table 11-S and Figure 11-C**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

108. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of dolphins predicted to be disturbed per piling day is reduced to 535 individuals at the SE location using the CWP site-specific survey density[7] (**Table 11-S)**. This equates to 0.52% of the MU. The more representative density for the wider impacted area is the SCANS III density surface, which predicts disturbance to up to 66 common dolphins per piling day at the SE location (**Table 11-S** and **Figure 11-C**); it is relevant to note that other locations, such the NW or NE result in significantly fewer individuals potentially being disturbed (16 and 28 respectively).

[6] Note: the dose-response contours extend well beyond the site-specific survey area and thus this density estimate is unlikely to be representative of common dolphins in the wider impacted area.
[7] Note: the dose-response contours extend well beyond the site-specific survey area and thus this density estimate is unlikely to be representative of common dolphins in the wider impacted area.

Table 11-S Common dolphins predicted to experience disturbance from WTG piling (using the dose-response function)

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	189	112	91	51
		% MU (102,656)	018	0.11	0.09	0.05
SCANS IV block CS-D (Gilles et al., 2023)	0.0272	# animals	152	80	91	49
		% MU (102,656)	0.15	0.08	0.09	0.05
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	235	103	89	30
		% MU (102,656)	0.23	0.10	0.09	0.03
CWP site-specific surveys (2020-2022)*	0.281	# animals	1,573	825	942	508
		% MU (102,656)	1.53	0.80	0.92	0.49
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	66	35	28	16
		% MU (102,656)	0.06	0.03	0.03	0.02
SCANS IV block CS-D (Gilles et al., 2023)	0.0272	# animals	52	24	26	14
		% MU (102,656)	0.05	0.02	0.03	0.01
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	55	17	18	5
		% MU (102,656)	0.05	0.02	0.02	0.00
CWP site-specific surveys (2020-2022)*	0.281	# animals	**535**	247	271	141
		% MU (102,656)	**0.52**	0.24	0.26	0.14

* Note: the dose-response contours extend well beyond the site-specific survey area and thus this density estimate is unlikely to be representative of common dolphins in the wider impacted area.

Level B harassment

109. The maximum number of common dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving, is 337 dolphins, equating to 0.33% of the MU when a monopile foundation is installed at the SE location using the CWP site-specific survey density (**Table 11-T and Figure 11-C**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

110. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of dolphins predicted to be disturbed per piling day is reduced to 40 individuals at

the SE location using the CWP site-specific survey density (**Table 11-T and Figure 11-C**). This equates to 0.04% of the MU.

Table 11-T Common dolphins predicted to experience disturbance from WTG piling (using the level B harassment threshold)

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	46	22	14	9
		% MU (102,656)	0.04	0.02	0.01	0.01
SCANS IV block CS-D (Gilles et al., 2023)	0.0272	# animals	33	14	12	7
		% MU (102,656)	0.03	0.01	0.01	0.01
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	6	1	1	<1
		% MU (102,656)	0.01	0.00	0.00	0.00
CWP site-specific surveys (2020-2022)	0.281	# animals	337	144	119	76
		% MU (102,656)	0.33	0.14	0.12	0.07
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	6	3	2	2
		% MU (102,656)	0.01	0.00	0.00	0.00
SCANS IV block CS-D (Gilles et al., 2023)	0.0272	# animals	4	2	1	1
		% MU (102,656)	0.00	0.00	0.00	0.00
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	<1	<1	<1	<1
		% MU (102,656)	0.00	0.00	0.00	0.00
CWP site-specific surveys (2020-2022)	0.281	# animals	40	21	12	12
		% MU (102,656)	0.04	0.02	0.01	0.01

EDRs

111. The maximum number of common dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving assuming a 20 km EDR is 353 dolphins using the CWP site-specific survey density (**Table 11-U and Figure 11-C**). Please note, CWP has committed to a limit on underwater

noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

112. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of dolphins predicted to be disturbed per piling day assuming an 11 km EDR is reduced to 107 individuals using the CWP site-specific survey density (**Table 11-U and Figure 11-C**).

Table 11-U Common dolphins predicted to experience disturbance from WTG piling (using the EDR approach)

Density (#/km²)			**Unmitigated (20 km EDR)**	**Mitigated (11 km EDR)**
SCANS III density surface (Lacey et al., 2022), average across array area	0.0436	# animals	55	17
		% MU (102,656)	0.05	0.02
SCANS IV block CS-D (Gilles et al., 2023)	0.0272	# animals	34	10
		% MU (102,656)	0.03	0.01
Irish Sea density surface (Evans and Waggitt, 2023), average across array area	0.0003	# animals	<1	<1
		% MU (102,656)	0.00	0.00
CWP site-specific surveys (2020-2022)	0.281	# animals	353	107
		% MU (102,656)	0.34	0.10

113. The harbour porpoise dose-response function has been used as a proxy for common dolphin response in the absence of similar empirical data. It is anticipated that this approach will be overly precautionary as evidence suggests that dolphins are less sensitive to disturbance compared to harbour porpoise. In any case, the disturbance is expected to be temporary and short term, will occur over less than a year (maximum 78 days WTG piling), this is considered to be of **Low** magnitude since temporary behavioural effects are expected in a small proportion of the population, any impact to vital rates of individuals may occur only in the short term (over a limited number of breeding cycles).

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section remains unchanged.

The Mitigation section is replaced by the Primary mitigation (paragraph 114) and Additional mitigation (paragraph 115) sections below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Primary mitigation

114. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

Additional mitigation

115. None required as the impact is not significant.

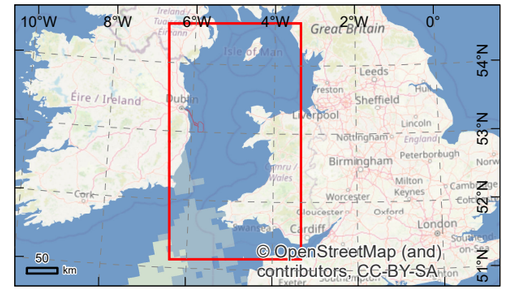
Residual effect

This section has been replaced in its entirety by paragraph 116. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

116. The residual effect is **Negligible** (**Not significant**).

Un-mitigated scenario

Mitigated scenario



Legend

- Planning application boundary
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR
- Level B threshold 160 dB re 1 µPa (SPL_{rms})

SCANS III common dolphin density (animals/km²)

- 0.00 - 0.07
- 0.07 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 1.00
- >1.00

Noise contours: SEL_{ss} dB re µPa²s

- 120
- 125
- 130
- 135
- 140
- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

0 25 50 100 km

Data sources: CWP, 2023;Lacey et al. 2022, Subacoustech 2025, SMRU Consulting 2026
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
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codling wind park

Project: Codling Wind Park

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Figure 11-C
Common dolphin disturbance from piling

CWP doc. number: CWP-SMR-CON-09-MAP-2063

Internal descriptive code: N/A

Size: A3

Scale: 1:1,400,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	First issue	2025/11/27	AS	RRS	
B	Second issue	2026/02/17	AS	RRS	
C	Third issue	2026/03/10	AS	RRS	

Risso's dolphins

Magnitude of impact

This section has been replaced in its entirety by paragraphs 117 to 123, Table 11-V to Table 11-X and Figure 11-D . This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Dose-response function

117. The maximum number of Risso's dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving, is 61 dolphins, equating to 0.50% of the MU when a monopile foundation is installed at the SE location using the Irish Sea density surface (**Table 11-V and Figure 11-D**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

118. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of dolphins predicted to be disturbed per piling day is reduced to 21 individuals at the SE location (**Table 11-V and Figure 11-D**). This equates to 0.17% of the MU.

Table 11-V Risso's dolphins predicted to experience disturbance from WTG piling (using the dose-response function)

Density (#/km^2)			**SE**	**SW**	**NE**	**NW**
Unmitigated Piling						
SCANS IV block CS-D (Gilles et al., 2023)	0.0022	# animals	12	6	7	4
		% MU (12,262)	0.10	0.05	0.06	0.03
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	61	30	36	18
		% MU (12,262)	0.50	0.24	0.29	0.15
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS IV block CS-D (Gilles et al., 2023)	0.0022	# animals	4	2	2	1
		% MU (12,262)	0.03	0.02	0.02	0.01
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	21	8	11	5
		% MU (12,262)	0.17	0.07	0.09	0.04

Level B harassment

119. The maximum number of Risso's dolphin predicted to be disturbed on a single piling day, for unmitigated pile driving, is 11 dolphins, equating to 0.09% of the MU when a monopile foundation is installed at the SE location (**Table 11-W and Figure 11-D**). Please note, CWP has committed to a limit

on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

120. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of dolphins predicted to be disturbed per piling day is reduced to 2 individuals at the SE location (**Table 11-W and Figure 11-D**). This equates to 0.02% of the MU.

Table 11-W Risso's dolphins predicted to experience disturbance from WTG piling (using the level B harassment threshold)

Density (#/km²)			**SE**	**SW**	**NE**	**NW**
Unmitigated Piling						
SCANS IV block CS-D (Gilles et al., 2023)	0.0022	# animals	3	1	1	1
		% MU (12,262)	0.02	0.01	0.01	0.01
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	11	3	6	4
		% MU (12,262)	0.09	0.02	0.05	0.03
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS IV block CS-D (Gilles et al., 2023)	0.0022	# animals	0	0	0	0
		% MU (12,262)	0.00	0.00	0.00	0.00
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	2	<1	1	1
		% MU (12,262)	0.02	0.00	0.01	0.01

EDRs

121. The maximum number of Risso's dolphins predicted to be disturbed on a single piling day, for unmitigated pile driving assuming a 20 km EDR is 12 dolphins (**Table 11-X and Figure 11-D**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

122. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the maximum number of dolphins predicted to be disturbed per piling day assuming an 11 km EDR is reduced to 4 individuals (**Table 11-X and Figure 11-D**).

Table 11-X Risso's dolphins predicted to experience disturbance from WTG piling (using the EDR approach)

Density (#/km^2)			Unmitigated (20 km EDR)	Mitigated (11 km EDR)
SCANS IV block CS-D (Gilles et al., 2023)	0.0022	# animals	3	1
		% MU (12,262)	0.02	0.01
Irish Sea density surface (Evans and Waggitt, 2023) average across array area	0.0098	# animals	12	4
		% MU (12,262)	0.10	0.03

123. This is considered to be a **Negligible** magnitude since the disturbance is expected to be temporary and short term, will occur over less than a year (maximum 78 days WTG piling) and is predicted to impact a very small proportion of the MU population, which is not expected to result in any change to the population trajectory.

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section remains unchanged.

The Mitigation section is replaced by the Primary mitigation (paragraph 124) and Additional mitigation (paragraph 125) sections below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Primary mitigation

124. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events.

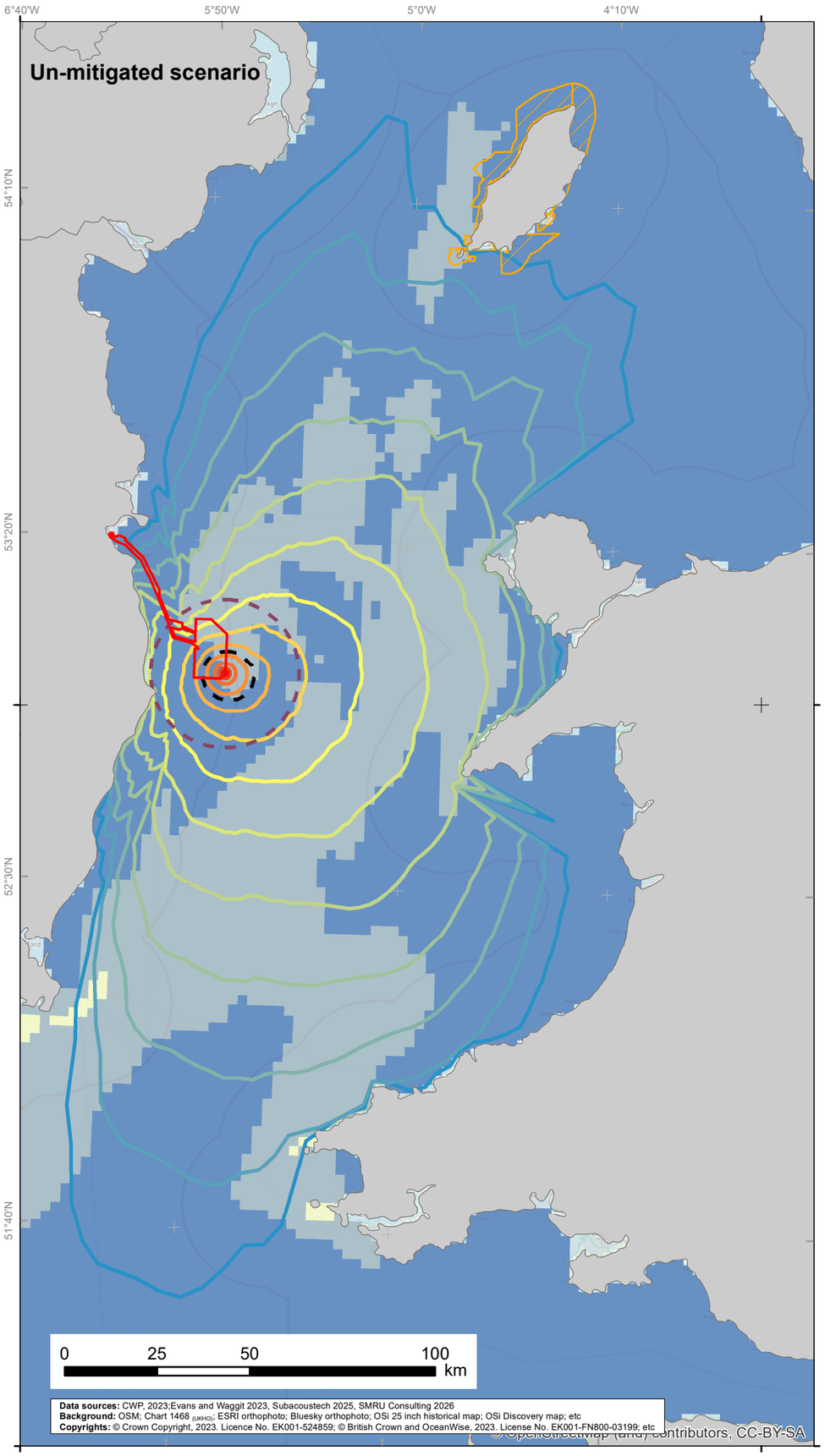
While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

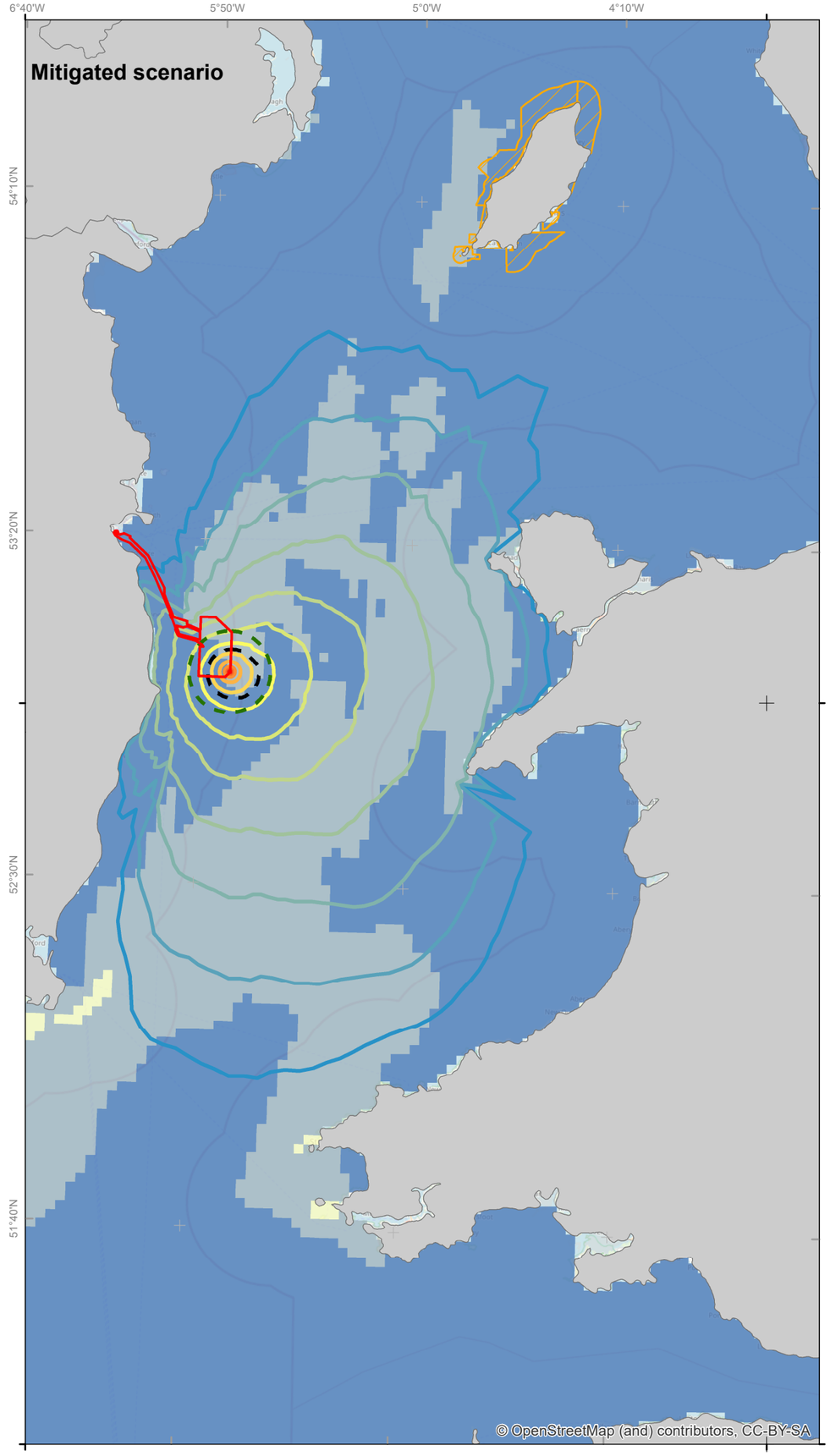
Additional mitigation

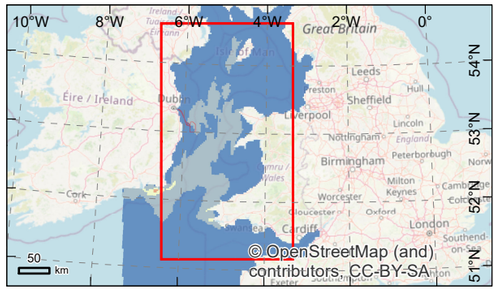
125. None required as the impact is not significant.

Residual effect

This section remains unchanged.







Legend

- Planning application boundary
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR
- Level B threshold 160 dB re 1 µPa (SPL_{rms})

Evans and Waggit 2023 Risso's dolphin density (animals/km²)

- 0.00 - 0.01
- 0.02 - 0.04
- 0.05 - 0.07
- 0.08 - 0.10
- > 0.10

Noise contours: SEL_{ss} dB re µPa²s

- 120
- 125
- 130
- 135
- 140
- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

codling wind park

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Figure 11-D
Risso's dolphin disturbance from piling

CWP doc. number: CWP-SMR-CON-09-MAP-2064

Internal descriptive code: N/A

Size: A3

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CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	First issue	2025/11/27	AS	RRS	
B	Second issue	2026/02/17	AS	RRS	
C	Third issue	2026/03/10	AS	RRS	

Minke whales

Magnitude of impact

This section has been replaced in its entirety by paragraphs 126 to 133, Table 11-Y to Table 11-BB, Plate 11-D and Figure 11-E. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Dose-response function

126. The maximum number of minke whale predicted to be disturbed on a single piling day, for unmitigated pile driving, is 91 whales, equating to 0.45% of the MU when a monopile foundation is installed at the SE location using the Irish Sea density surface (**Table 11-Y and Figure 11-E**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

127. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of minke whale predicted to be disturbed per piling day is reduced to 31 individuals at the SE location Irish Sea density surface (**Table 11-Y and Figure 11-E**). This equates to 0.15% of the MU.

Table 11-Y Minke whales predicted to experience disturbance from WTG piling (using the dose-response function). Blue cell = value taken forwards for population modelling.

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	83	42	57	32
		% MU (20,118)	0.41	0.21	0.28	0.16
SCANS IV block CS-D (Gilles et al., 2023)	0.0137	# animals	77	40	46	25
		% MU (20,118)	0.38	0.20	0.23	0.12
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	91	44	56	26
		% MU (20,118)	0.45	0.22	0.28	0.13
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	28	13	16	9
		% MU (20,118)	0.14	0.06	0.08	0.04
SCANS IV block CS-D (Gilles et al., 2023)	0.0137	# animals	26	12	13	7
		% MU (20,118)	0.13	0.06	0.06	0.03
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	**31**	11	17	7
		% MU (20,118)	**0.15**	0.05	0.08	0.03

Level B harassment

128. The maximum number of minke whale predicted to be disturbed on a single piling day, for unmitigated pile driving, is 18 whales, equating to 0.09% of the MU when a monopile foundation is installed at the SE location **(Table 11-Z** and **Figure 11-E**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

129. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of minke whale predicted to be disturbed per piling day is reduced to 2 individuals at the SE location (**Table 11-Z** and **Figure 11-E**). This equates to 0.00% of the MU.

Table 11-Z Minke whales predicted to experience disturbance from WTG piling (using the level B harassment threshold)

			SE	SW	NE	NW
Unmitigated Piling						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	18	8	7	5
		% MU (20,118)	0.09	0.04	0.03	0.02
SCANS IV block CS-D (Gilles et al., 2023)	0.0137	# animals	16	7	6	4
		% MU (20,118)	0.08	0.03	0.03	0.02
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	18	3	7	3
		% MU (20,118)	0.09	0.01	0.03	0.01
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)						
SCANS III density surface (Lacey et al., 2022)	Grid cell specific	# animals	2	1	1	1
		% MU (20,118)	0.01	0.00	0.00	0.00
SCANS IV block CS-D (Gilles et al., 2023)	0.0137	# animals	2	1	1	1
		% MU (20,118)	0.01	0.00	0.00	0.00
Irish Sea density surface (Evans and Waggitt, 2023)	Grid cell specific	# animals	1	<1	1	1
		% MU (20,118)	0.00	0.00	0.00	0.00

EDRs

130. The maximum number of minke whales predicted to be disturbed on a single piling day, for unmitigated pile driving assuming a 20 km EDR is 22 whales (**Table 11-AA and Figure 11-E**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

131. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of dolphins predicted to be disturbed per piling day assuming an 11 km EDR is reduced to 7 whales (**Table 11-AA and Figure 11-E**).

Table 11-AA Minke whales predicted to experience disturbance from WTG piling (using the EDR approach)

Density (#/km^2)			Unmitigated (20 km EDR)	Mitigated (11 km EDR)
SCANS III density surface (Lacey et al., 2022), average across array area	0.0178	# animals	22	7
		% MU (20,118)	0.11	0.03
SCANS IV block CS-D (Gilles et al., 2023)	0.0137	# animals	17	5
		% MU (20,118)	0.08	0.03
Irish Sea density surface (Evans and Waggitt, 2023), average across array area	0.0068	# animals	9	3
		% MU (20,118)	0.04	0.01

Population modelling

132. To determine the magnitude of this impact on a population level iPCoD modelling was conducted. The modelling assumed 78 WTG piling days between April and October 2031 and that 31 minke whales are disturbed on every piling day (based on the SE modelling). This is highly precautionary since the modelling shows that the number of animals impacted at other modelling locations (west locations) is significantly lower, and in practice the majority of piling events will be in the shallower areas to the west and north rather than the spatially limited deeper area in the SE.

133. The iPCoD results show that the level of disturbance is not sufficient to result in any changes at the population level under either scenario, since the impacted population is predicted to continue at a stable trajectory, the same as the un-impacted population (**Plate 11-D and Table 11-BB**). This is considered to be a **Negligible** magnitude since the disturbance is expected to be temporary and short term, will occur over less than a year (maximum 78 days WTG piling) and is predicted to impact a very small proportion of the MU population, which is not expected to result in any change to the population trajectory.

Plate 11-D Predicted population trajectories for the un-impacted (baseline) and impacted minke whale iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 31 whales per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

Table 11-BB Predicted mean population size for the un-impacted (baseline) and impacted minke whale iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting either 31 whales per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

	Unimpacted population mean size	**Impacted population mean size**	**Impacted population size as a % of the unimpacted population size**
Start 2031 (before piling commences)	20,120	20,120	100%
End 2031 (after piling ends)	20,103	20,103	100%
End 2036 (6 years after piling ends)	20,159	20,159	100%
End 2042 (12 years after piling ends)	20,065	20,065	100%
End 2048 (18 years after piling ends)	20,020	20,020	100%

Receptor sensitivity

This section remains unchanged except for paragraph 330 which is replaced with paragraph 134. This update is in response to FIR Item 10m (see **FIR Response Document).**

134. Since minke whales are known to forage in UK waters in the summer months, there is the potential for displacement to impact on reproductive rates. However, due to their large size and capacity for energy storage, it is expected that minke whales will be able to tolerate temporary displacement from foraging areas much better than harbour porpoise and individuals are expected to be able to recover from any impact on vital rates. Research suggests that minke whales' energy acquisition strategy in the summer foraging months is to maximise energy intake (Christiansen et al., 2013) which makes them more resilient against temporary reductions in prey availability or habitat disruption (Gardiner et al., 2025). For example, minke whales in the Gulf of Saint Lawrence maintain reproductive stability through efficient energy storage and flexible foraging behaviour, enabling them to withstand environmental variability and temporary habitat or prey disruptions without significant reproductive decline (Gardiner et al., 2025). Therefore, minke whales have been assessed as having a Low sensitivity to disturbance from pile driving.

Significance of the effect

This section remains unchanged.

The Mitigation section is replaced by the Primary mitigation (paragraph 135) and Additional mitigation (paragraph 136) sections below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Primary mitigation

135. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

Additional mitigation

136. None required as the impact is not significant.

Residual effect

This section is replaced with paragraph 137 below.

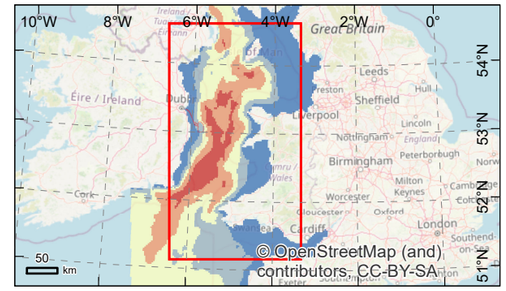
137. The residual effect is **Negligible** (Not significant).

Un-mitigated scenario

Mitigated scenario

6°40'W 5°50'W 5°0'W 4°10'W

54°10'N 53°20'N 52°30'N 51°40'N



Legend

- Planning application boundary
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR
- Level B threshold 160 dB re 1 µPa (SPL_{rms})

Evans and Waggit 2023 minke whale density (animals/km²)

- 0.000 - 0.005
- 0.006 - 0.010
- 0.011 - 0.015
- 0.016 - 0.020
- > 0.020

Noise contours: SEL_{ss} dB re µPa²s

- 120
- 125
- 130
- 135
- 140
- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

0 25 50 100 km

Data sources: CWP, 2023;Evans and Waggit 2023, Subacoustech 2025, SMRU Consulting 2026
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
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Figure 11-E
Minke whale disturbance from piling

CWP doc. number: CWP-SMR-CON-09-MAP-2065

Internal descriptive code:	*Size:* A3	*CRS:*
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A	First issue	2025/11/27	AS	RRS	
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C	Third issue	2026/03/10	AS	RRS	

Harbour seals

Magnitude of impact

This section has been replaced in its entirety by paragraphs 138 to 139, Table 11-CC and Figure 11-F. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

138. The maximum number of harbour seals predicted to be disturbed on a single piling day using the harbour seal dose-response function is two seals, equating to 0.15% of the MU when a monopile foundation is installed at the NW location (**Table 11-CC and Figure 11-F**). The NW location generates the highest predicted impact to harbour seals given the underlying density surface which identifies higher densities of harbour seals to the north west of the CWP Project. Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

139. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), no harbour seals are predicted to be disturbed at any piling location (**Table 11-CC and Figure 11-F**). This is considered to be a **Negligible** magnitude.

Table 11-CC Harbour seal predicted disturbance from WTG piling (using the dose-response approach)

		SE	SW	NE	NW
Unmitigated piling					
Habitat preference map (Carter *et al.*, 2020, Carter *et al.*, 2022)	# animals	1	0	1	2
	95% CI	0 – 1	0 – 1	0 – 2	0 – 5
	% MU	0.07	0.00	0.07	0.15
	95% CI	0.00 – 0.07	0.00 – 0.07	0.00 – 0.15	0.00 – 0.37
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)					
Habitat preference map (Carter *et al.*, 2020, Carter *et al.*, 2022)	# animals	0	0	0	0
	95% CI	0	0	0	0 – 1
	% MU	0.00	0.00	0.00	0.00
	95% CI	0.00	0.00	0.00	0.00 – 0.07

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section remains unchanged.

The Mitigation section is replaced by the Primary mitigation (paragraph 140) and Additional mitigation (paragraph 141) sections below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Primary mitigation

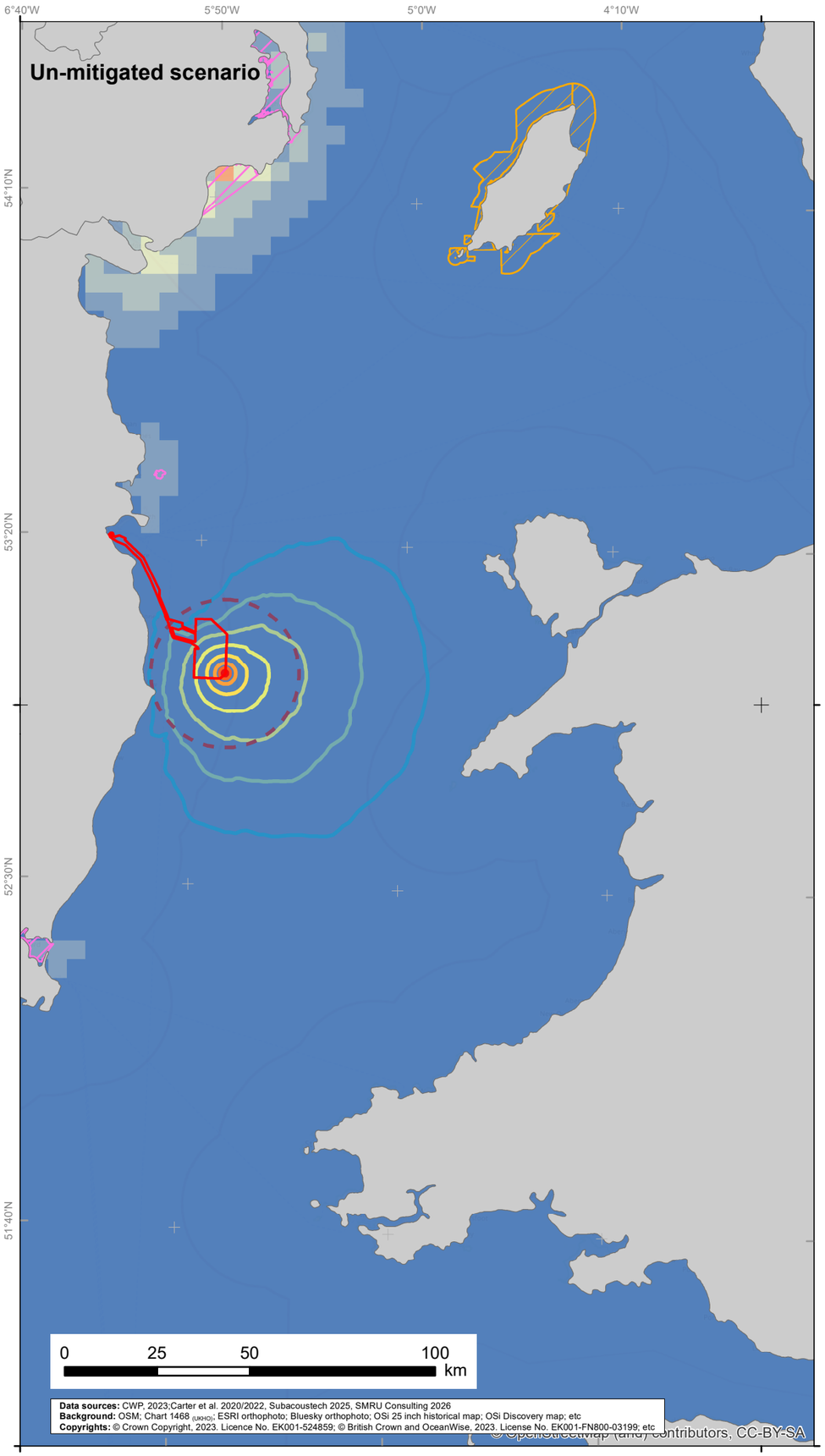
140. To mitigate potential impacts from underwater noise during the construction of the project, CWP commits to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events. While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

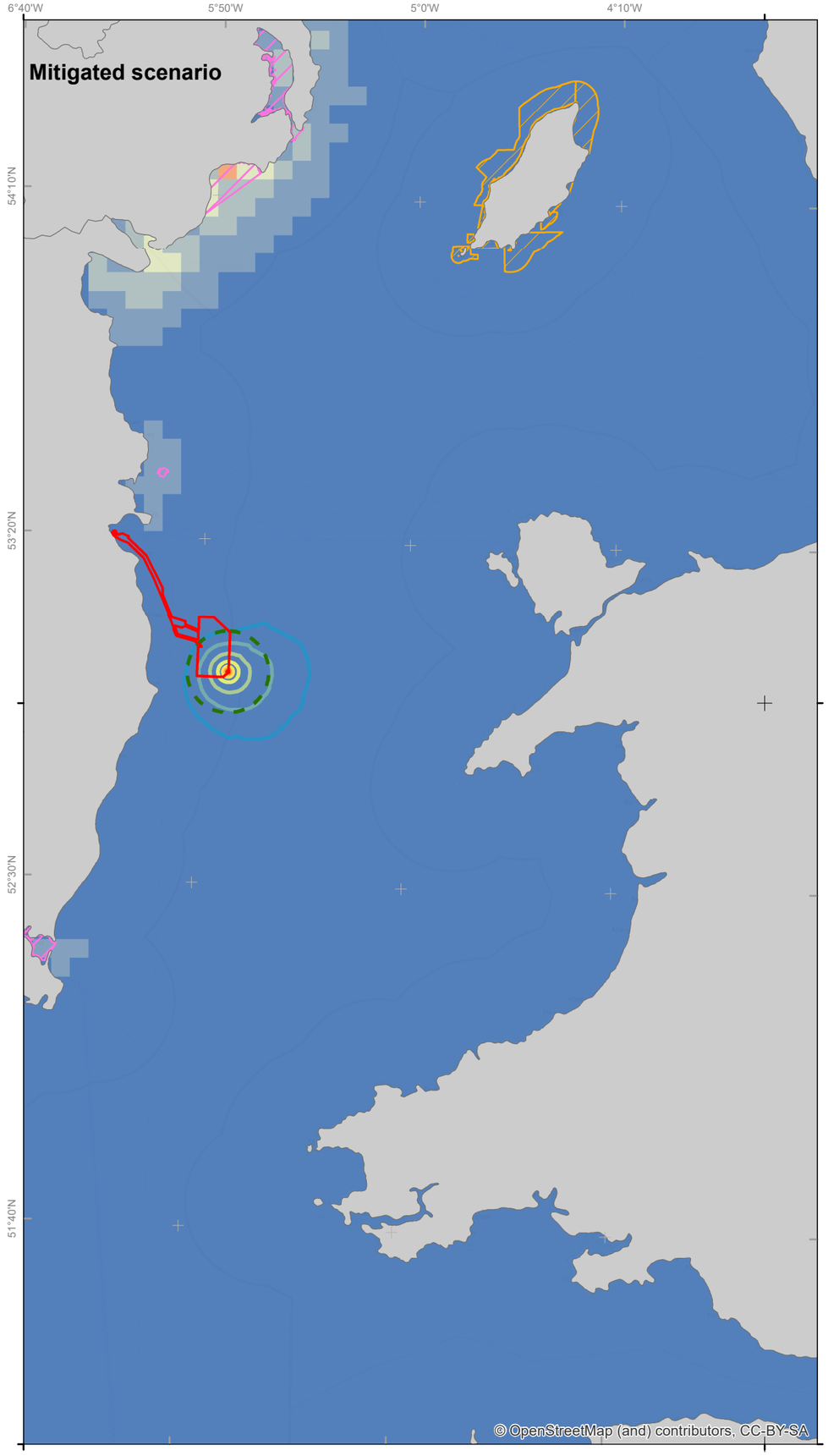
Additional mitigation

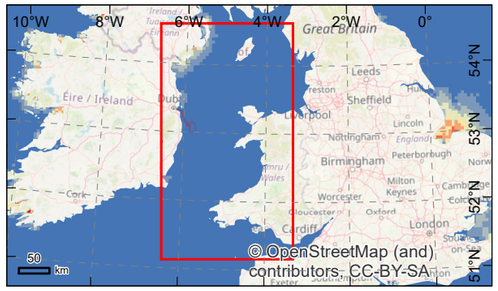
141. None required as the impact is not significant.

Residual effect

This section remains unchanged.







Legend

- Planning application boundary
- Harbour seal SACs
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR

Carter et al. 2020/2022 harbour seal density (animals/km²)

- 0.00 - 0.09
- 0.10 - 0.33
- 0.34 - 0.66
- 0.67 - 1.15
- 1.16 - 1.86
- 1.87 - 3.08
- 3.09 - 5.00
- > 5.00

Noise contours: SEL_{ss} dB re µPa²s

- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

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Figure 11-F
Harbour seal disturbance from piling

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A	First issue	2025/11/27	AS	RRS	
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C	Third issue	2026/03/10	AS	RRS	

Grey seals

Magnitude of impact

This section has been replaced in its entirety by paragraphs 142 to 145, Table 11-DD to ,Table 11-EE, Plate 11-E and Figure 11-G. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

142. The maximum number of grey seals predicted to be disturbed on a single piling day, for unmitigated pile driving, is 212 seals, equating to 3.50% of the MU when a monopile foundation is installed at the SE location (**Table 11-DD and Figure 11-G**). Please note, CWP has committed to a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m at WTG and OSS piling events, so unmitigated ranges are presented for information purposes only.

143. When noise reduction is used (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m), the number of grey seals predicted to be disturbed per piling day is reduced to 26 individuals at the SE location (**Table 11-DD and Figure 11-G**). This equates to 0.43% of the MU.

Table 11-DD Grey seal predicted disturbance from WTG piling (using the dose-response approach). Blue cell = value taken forwards for population modelling.

		SE	SW	NE	NW
Unmitigated piling					
Habitat preference map (Carter *et al.*, 2020, Carter *et al.*, 2022)	# animals	212	57	90	62
	% MU	3.50%	0.94%	1.49%	1.02%
	# animals 95% CI	16 – 420	4 – 114	6 – 180	5 – 121
	MU 95% CI	0.26 – 6.94	0.07 – 1.88	0.10 – 2.97	0.08 – 2.00
Mitigated Piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m)					
Habitat preference map (Carter *et al.*, 2020, Carter *et al.*, 2022)	# animals	**26**	6	9	8
	% MU	**0.43%**	0.10%	0.15%	0.13%
	# animals 95% CI	2 – 52	0 – 11	0 – 18	0 – 17
	MU 95% CI	0.03 – 0.86	0.00 – 0.18	0.00 – 0.30	0.00 – 0.28

144. To determine the magnitude of this impact on a population level, iPCoD modelling was conducted. The modelling assumed 78 WTG piling days between April and October 2031 and that 26 grey seals are disturbed on every piling day (based on the SE modelling). This is highly precautionary since the modelling shows that the number of animals impacted at other modelling locations (west locations) is much lower.

145. The iPCoD results show that the level of disturbance is not sufficient to result in any changes at the population level, since the impacted population is predicted to continue on the same trajectory as the unimpacted population (**Plate 11-E** and **Table 11-EE**). This is considered to be a **Negligible** magnitude since the disturbance is expected to be temporary and short term, will occur over less than

a year (maximum 78 days WTG piling) and is predicted to impact a very small proportion of the MU population, which is not expected to result in any change to the population trajectory.

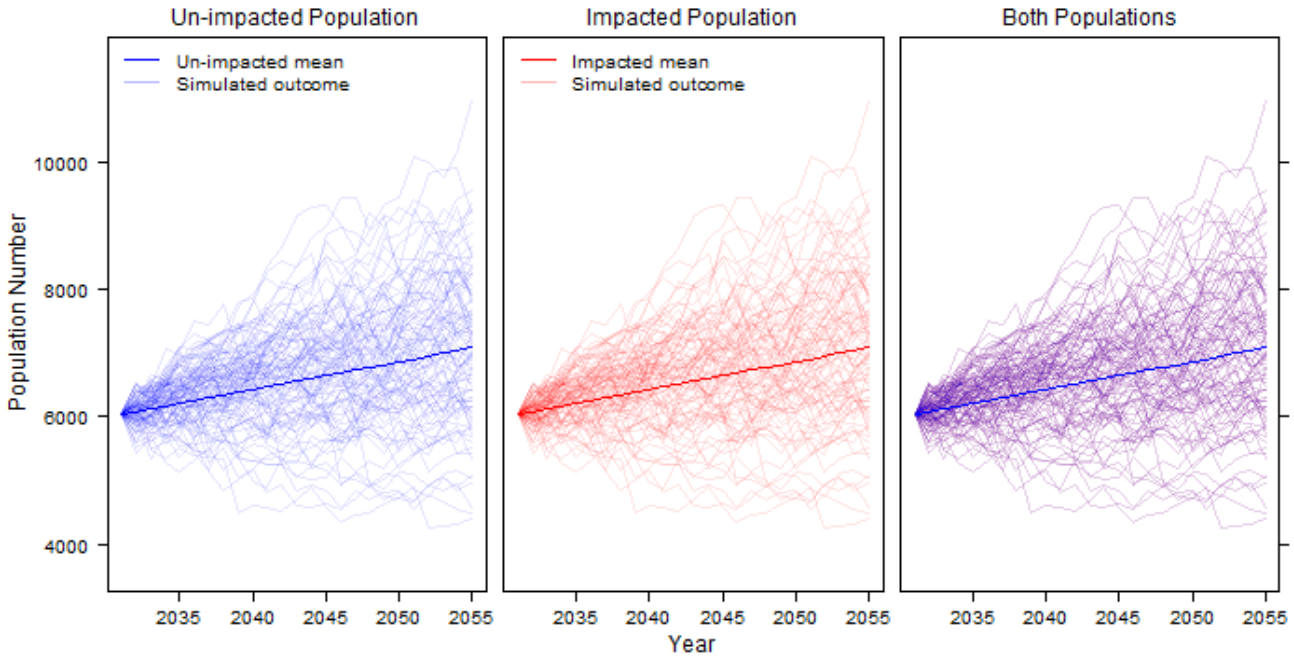


Plate 11-E Predicted population trajectories for the un-impacted (baseline) and impacted grey seal iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 26 seals per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

Table 11-EE Predicted mean population size for the un-impacted (baseline) and impacted grey seal iPCoD simulation. Impacted population modelled with 78 days piling in 2031, impacting 26 seals per day from mitigated piling (assuming a limit on underwater noise of 169 dB $L_{E,p,ss,05}$ at 750m).

	Unimpacted population mean size	**Unimpacted population mean size**	**Impacted population size as a proportion of the unimpacted population size**
Start 2031 (before piling commences)	6,054	6,054	100%
End 2031 (after piling ends)	6,085	6,085	100%
End 2036 (6 years after piling ends)	6,297	6,297	100%
End 2042 (12 years after piling ends)	6,564	6,564	100%
End 2048 (18 years after piling ends)	6,813	6,813	100%

Receptor sensitivity

This section remains unchanged.

Significance of the effect

This section remains unchanged.

The Mitigation section is replaced by the Primary mitigation (paragraph 146) and Additional mitigation (paragraph 147) sections below. This revision has been made in response to FIR Item 10a (see **FIR Response Document**).

Primary mitigation

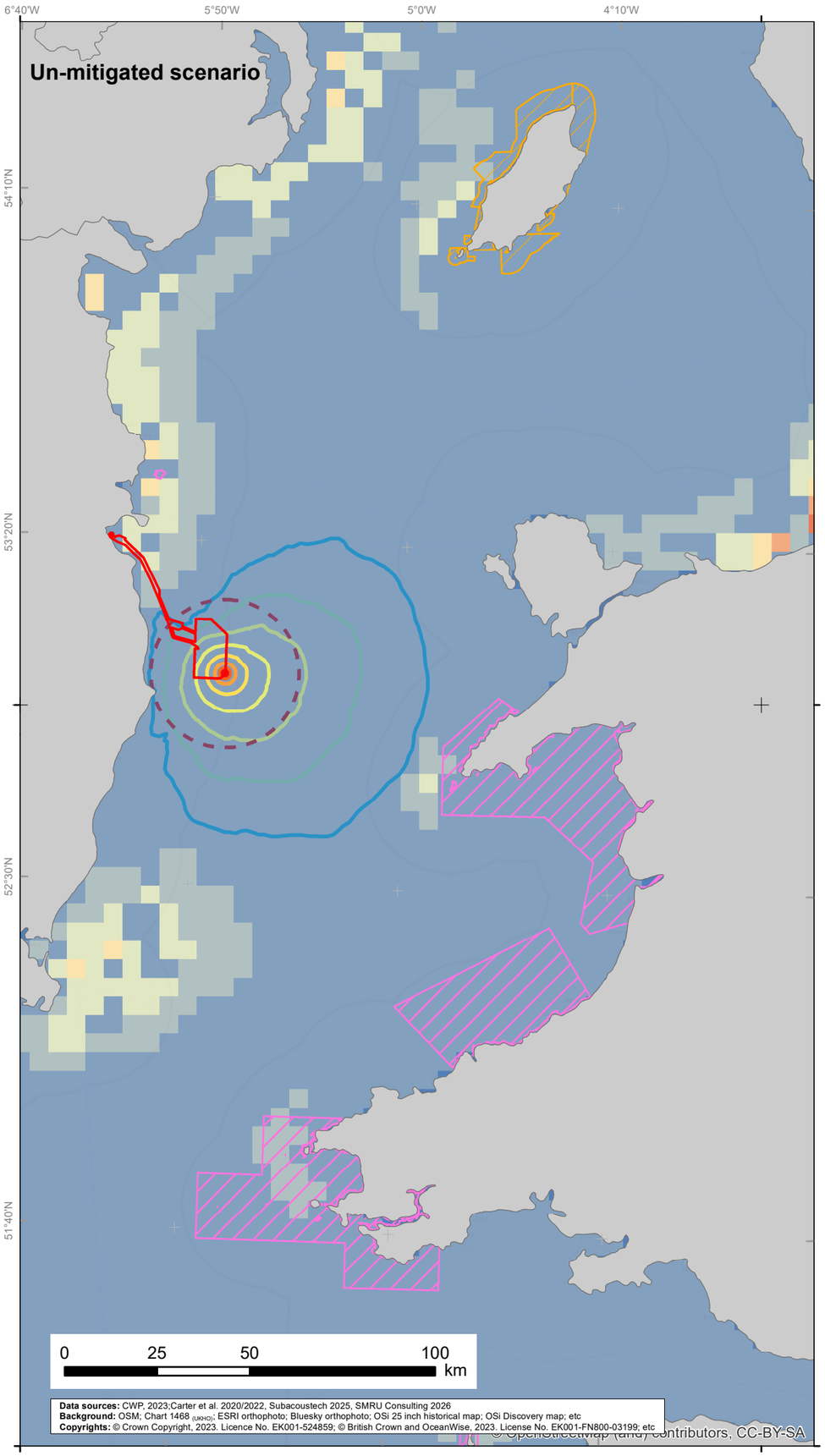
146. The primary mitigation included within this assessment is the use of noise reduction methods to reduce noise levels by 10 dB at 750 m. While this primary mitigation was designed to negate the risk of auditory injury (PTS), it also provides some reduction in the disturbance impact.

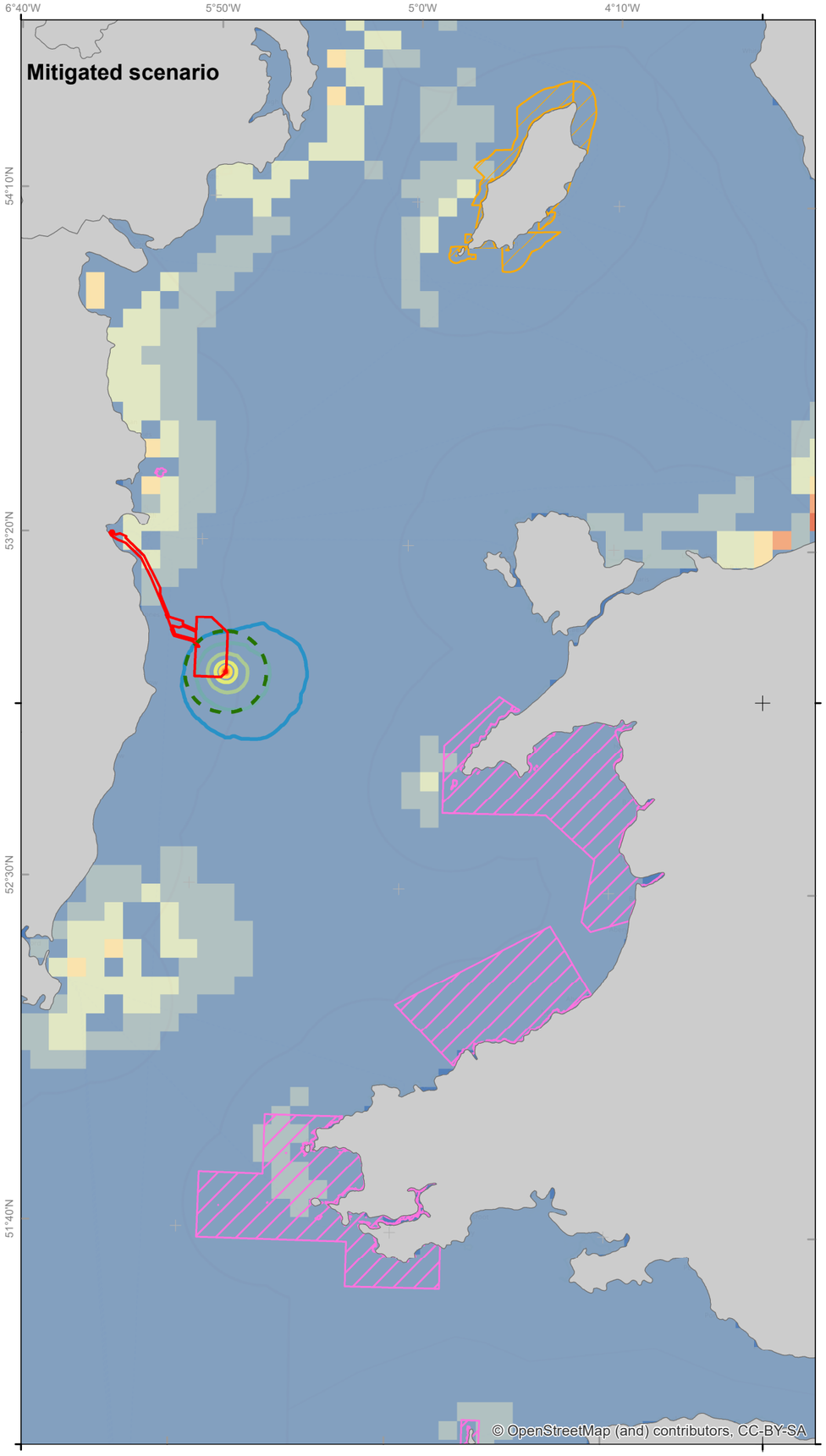
Additional mitigation

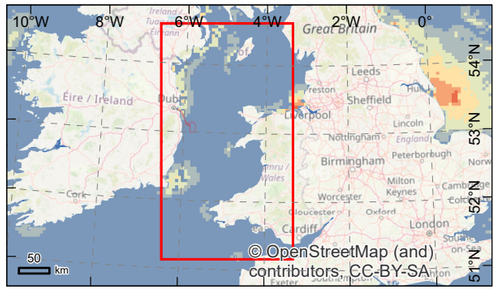
147. None required as the impact is not significant.

Residual effect

This section remains unchanged.







Legend

- Planning application boundary
- Grey seal SACs
- Manx Marine Nature Reserves
- SE location 20km EDR
- SE location 11km EDR

Carter et al. 2020/2022 grey seal density (animals/km²)

- 0.00
- 0.01 - 0.27
- 0.28 - 0.56
- 0.57 - 0.99
- 1.00 - 1.67
- 1.68 - 2.79
- 2.80 - 5.00
- > 5.00

Noise contours: SEL_{ss} dB re µPa²s

- 145
- 150
- 155
- 160
- 165
- 170
- 175
- 180

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Figure 11-G
Grey seal disturbance from piling

CWP doc. number: CWP-SMR-CON-09-MAP-2067

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	Scale: 1:1,400,000	

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B	Second issue	2026/02/17	AS	RRS	
C	Third issue	2026/03/10	AS	RRS	

Impact 7: Auditory injury (PTS) from piling – onshore substation

This section remains unchanged.

Impact 8: Disturbance from piling – onshore substation

This section remains unchanged.

Impact 9: Auditory injury (PTS) from other construction activities

This section remains unchanged.

Impact 10: Disturbance from other construction activities

This section remains unchanged.

Impact 11: Vessel collision

This section remains unchanged.

Impact 12: Disturbance from vessels

This section remains unchanged.

Impact 13: Indirect impacts to prey

This section remains unchanged.

11.10.2 Operation and maintenance (O&M) phase

Impact 1: Auditory injury (PTS) from operational noise

This section has been updated to consider updated PTS-onset thresholds.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section is replaced in its entirety with paragraph 148. This revision has been made in response to FIR Item 10a (see **FIR Response Document).**

148. The underwater noise modelling (**Appendix 9-C Underwater Noise Modelling Assessment**) predicts PTS and TTS impact ranges of <50 m for both 15 and 21 MW WTGs. Therefore, the magnitude of impact of PTS from operational noise is considered Negligible.

Significance of the effect

This section remains unchanged.

Additional mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 2: Disturbance from operational noise

This section has been replaced in its entirety by paragraphs 149 to 159. This revision has been made in response to FIR Item 10o (see **FIR Response Document).**

Receptor sensitivity

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

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

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

precautionarily assumed that both species of seals, and minke whales have a Low sensitivity to disturbance from operational noise.

Magnitude of impact

152. Most studies conducted on operational noise from bottom-fixed OWFs to date were conducted at wind farms with relatively small-sized, geared WTGs (Tougaard *et al.*, 2020). Using data from bottom-fixed foundation WTGs of <1 to 6 MW capacity, Tougaard *et al.* (2020) showed that as WTG size increases, the underwater sound pressure level also increases. Stöber and Thomsen (2021) also noted a difference in underwater noise levels generated by geared vs direct-drive WTGs, with one example of the latter being 10 dB quieter than the average geared WTG of equivalent capacity. Tougaard *et al.* (2020) present a formula, based on the published data for the operational wind farms, that allows broadband noise level to be estimated based on the application of wind speed, WTG size (by nominal power output) and distance from the WTG. As presented in the underwater noise modelling report (**Appendix 9-C Underwater Noise Modelling Assessment**), this formula suggests that marine mammals may experience behavioural disturbance (using the precautionary level B harassment 120 dB SPL_{rms} threshold) within 190 m from an operational WTG at CWP. This formula is largely derived from data from geared WTGs, and therefore it can be anticipated that the operation of the direct drive WTG will result in even smaller disturbance ranges.

153. A recent study of wind farms in German waters provides the most comprehensive assessment to date of operational noise from bottom-fixed foundation WTGs (Bellmann *et al.*, 2023). Results draw upon noise measurements from 24 operational wind farms with WTGs of 2.3 to 8 MW 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. 100 m) and when the WTGs were operating close to their nominal power. Mean sound pressure levels at nominal power varied between 112 and 131 dB (mean across study of 120 dB).

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

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

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

157. The impact of underwater noise during the operational phase of CWP is considered to be localised to the very immediate vicinity of the CWP WTGs. It is unlikely to lead to the exclusion of animals within

the CWP array area, and therefore, at most, affecting a small proportion of receptor population and without an alteration to population trajectories. This aligns with a **Low** magnitude score.

Significance of the effect

158. The sensitivity of porpoise and dolphin species to disturbance from operational noise has been assessed as **Very Low**. The magnitude of the impact to marine mammals for disturbance from operational noise has been assessed as **Low**. Therefore, the effect significance of disturbance from operational noise is assessed as **Negligible (Not significant).**

159. The sensitivity of minke whales and seal species to disturbance from operational noise has been assessed as **Low**. The magnitude of the impact to marine mammals for disturbance from operational noise has been assessed as **Low**. Therefore, the effect significance of disturbance from operational noise is assessed as **Minor (Not significant)**.

Additional Mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 3: Vessel collision

This section remains unchanged.

Impact 4: Disturbance from vessels

This section remains unchanged.

Impact 5: Indirect impacts to prey

This section remains unchanged.

11.10.3 Decommissioning phase

Section 11.10.3 remains unchanged.

11.11 Cumulative impacts

Section 11.11 remains unchanged; however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

11.12 Transboundary impacts

Section 11.12 remains unchanged.

11.13 Inter-relationships

Section 11.13 remains unchanged.

11.14 Potential monitoring requirements

Section 11.14 remains unchanged.

11.15 Impact assessment summary

Section 11.15 remains unchanged.

11.16 References

Section 11.16 remains unchanged but should be read in conjunction with the references listed in paragraphs 160 – 195 below.

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11.17 Annex 1 – Assumptions and limitations

In response to FIR Items 10a and 10a Point iii (1), additional text has been included here for information. This text does not replace the information provided in the original application (**Volume 3**, **Chapter 11 Marine Mammals)** but acts as supplementary information as to why TTS has not been assessed as auditory injury.

196. The Applicant highlights that the NPWS (2014) guidance is ambiguous as to whether TTS is classified as injury under the Wildlife Act as it states that TTS "*may constitute such an injury*". It is unclear how "*may*" should be interpreted. It is the opinion of the Applicant that TTS assessed at the TTS-onset level does not constitute injury and that predicted TTS-onset ranges should not require mitigation. This approach is also supported in Scotland, England, Wales, France, Denmark, the US and Australia which all consider TTS to be a reversible effect that is separate to PTS (auditory injury) which requires mitigation. A position statement regarding the application and assessment of TTS can be found in the SMRU Consulting TTS Position Statement (2025) (**Appendix 11-B SMRU Consulting TTS Position Statement**).

197. In summary, the TTS Position Statement states that:

- Whilst there is a lack of legal and regulatory consensus regarding the definition of 'auditory injury', most countries do not consider TTS to be auditory injury.
- TTS represents a short-term reduction in hearing sensitivity, typically recovering within an hour for small shifts (4–5 dB). Not all TTS-inducing exposures lead to tissue damage (and thus lead to physical injury).
- TTS effects from pile driving have been shown to be frequency-specific (e.g. 4-8 kHz in harbour porpoises). As such, their impact on marine mammal biological functions (communication, predator/prey detection) is currently considered to be limited.
- Current TTS-onset thresholds (NMFS, 2024) are based on the smallest measurable changes in hearing, not on levels likely to cause functional impairment. These thresholds were originally developed to support estimations of PTS-onset, not to serve as regulatory thresholds for ecologically significant impact.
- What level of threshold shift might be considered biologically meaningful is currently unknown, and no biologically meaningful TTS thresholds have been established.
- TTS predictions based on SEL_{cum} are highly conservative as they omit:
    - the potential for TTS recovery between pile strikes or during breaks in pile driving, and
    - distance-related effects on the impulsive characteristics of the sound.

198. Until there is sufficient scientific evidence to indicate a level and duration of TTS that may have a biologically meaningful effect on individuals, it is more appropriate to focus environmental impact assessments on PTS (as true auditory injury) and behavioural disturbance (e.g. disruption to foraging or migration.

199. It is also noted that the NMFS (2024) guidance differentiates between "auditory injury" and "TTS". Where TTS is defined as:

> *"A temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (ANSI 1995; Yost 2007). Based on data from cetacean TTS measurements (see Southall et al. 2019 for a review), a TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to session variation in a subject's normal hearing ability (Schlundt et al. 2000; Finneran et al. 2000; Finneran et al. 2002)"*

200. and auditory injury is defined as:

“Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).”

12 COMMERCIAL FISHERIES

12.1 Introduction

Section 12.1 remains unchanged.

12.2 Consultation

Section 12.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

12.3 Legislation, policy and guidance

12.3.1 Legislation

Section 12.3.1 remains unchanged.

12.3.2 Policy

Section 12.3.2 remains unchanged.

12.3.3 Guidance

Section 12.3.3 remains unchanged but should now be read in conjunction with the additional information provided in paragraphs 1 to 2 below. This update has been made to ensure all relevant guidance is documented. This update has been made in response to FIR Item 1b (see **FIR Response Document**).

1. In addition, to the guidance documents listed above, the following guidance documents are of relevance to offshore wind development and commercial fisheries:
    - Seafood/ORE Working Group – Dispute Resolution Mechanism (DRM) (DECC / Seafood-ORE Working Group).
    - Use of Fishing Vessels for Commercial Work on ORE Projects – A Guide to Registration (DECC / Seafood-ORE Working Group).
    - Seafood/ORE Working Group Annual Report 2024 (DECC / Seafood-ORE Working Group).
    - Seafood/ORE Working Group Annual Report 2025 (DECC / Seafood-ORE Working Group).
    - Guidance Note for Applicants applying for a Maritime Area Consent (MAC) (MARA, latest guidance note and toolkit materials, 2025).
    - The Maritime Navigation Safety & Emergency Response Guidance Documents for Offshore Renewable Energy Installations (OREI) (Department of Transport / Irish Coast Guard; published 4 June 2025 and updated 24 September 2025).
    - Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2025). Best Practice Guidance for Offshore Renewables Developments.
2. These additional guidance documents have been considered in the context of offshore wind and fisheries interactions; however, they do not introduce any new requirements or evidence that would

materially change the commercial fisheries assessment approach, baseline characterisation, impact assessment, or mitigation measures set out in **Volume 3**, **Chapter 12** of the EIAR.

12.4 Impact assessment methodology

Section 12.4 remains unchanged.

12.5 Assumptions and limitations

Section 12.5 remains unchanged.

12.6 Existing environment

Section 12.6 remains unchanged but should now be read in conjunction with the additional text provided in paragraphs 3 to 33 below. The additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document.**

This update has been made to ensure the description of the existing environment accounts for the latest available statistics from the Sea-Fisheries Protection Agency (SFPA). This update has been made in response to FIR Item 1b (see **FIR Response Document**). A revision of the impact assessment was not required as a result of the updated statistics.

12.6.1 Overview of commercial fisheries landings in the local study area

Section 12.6.1 remains unchanged but should now be read in conjunction with the additional text provided in in paragraphs 3 to 33 below.

Landings by port

3. The Sea-Fisheries Protection Authority (SFPA) publishes an Annual Statistics dataset comprising downloadable annual reports/spreadsheets on commercial fishing activity, including statistics relating to landings in Irish ports and landings by Irish sea-fishing vessels (including Irish vessels landing both domestically and abroad, and non-Irish vessels landing into Irish ports). These annual publications provide port-level summaries (e.g. landed weight and first sales value) and are released as part of the SFPA's wider suite of official fisheries statistics. The latest annual update (SFPA, 2025) for landings by port is summarised below.

4. The key ports that vessels operating within the CWP project and local study area land into are (in alphabetical order) Arklow, Dún Laoghaire, Greystones, Howth, Kilmore Quay and Wicklow. Details of landings into these ports, from all sea area (i.e., not necessarily limited to the local study area), are discussed below for the time period 2020 to 2024.

5. Landings at Arklow (**Plate 12-A**) show moderate interannual variability over the period 2020–2023, remaining broadly stable at between approximately 500 and 610 tonnes. A notable increase is evident in 2024, when landed weight rises sharply to around 850 tonnes, representing the highest level

recorded over the five-year period. This increase follows a dip in landings in 2022 and a partial recovery in 2023, indicating a recent change in either fishing activity, stock availability, or reporting patterns.

6. In contrast, first sales value at Arklow displays a consistent downward trend across the same period. Values decline from approximately €1.45 million in 2020 and €1.40 million in 2021 to around €1.15 million in 2022, before falling further to approximately €0.84 million in 2023 and 2024. The divergence observed in 2024, where landed weight increases substantially while first sales value remains low, suggests a reduction in average price per tonne, potentially reflecting changes in market conditions, species composition of landings, or wider economic factors affecting the sector.

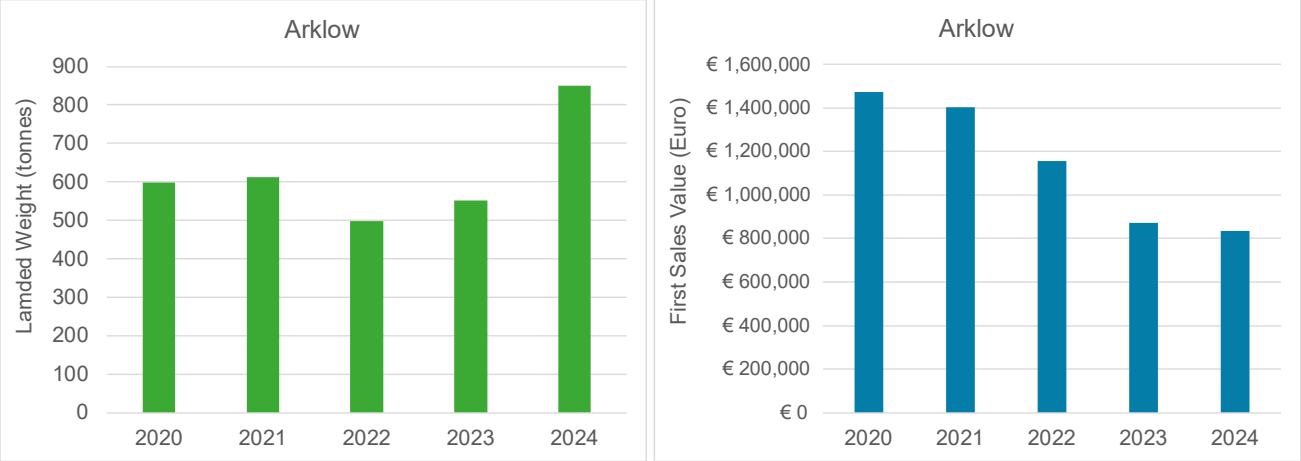
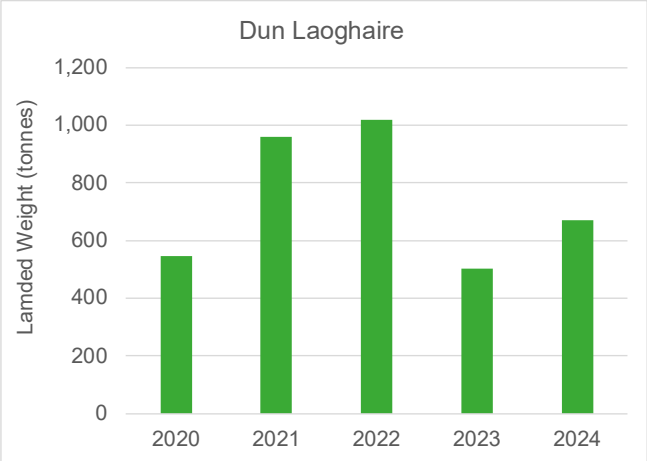


Plate 12-A Arklow landings (tonnes) and first sales value (€) by year, 2020–2024 based on data from declarations and sales notes for all vessels landing into Ireland (data source: SFPA, 2025)

7. Landings at Dún Laoghaire (**Plate 12-B**) show pronounced variability over the period 2020–2024. Landed weight increases markedly from approximately 550 tonnes in 2020 to around 950 tonnes in 2021, peaking at just over 1,000 tonnes in 2022. This is followed by a substantial reduction in 2023 (around 500 tonnes), before partially recovering in 2024 to approximately 670 tonnes. Overall, the series indicates a strong mid-period peak in activity, followed by a sharp contraction and subsequent partial rebound.

8. First sales value at Dún Laoghaire mirrors this pattern but with even greater magnitude of change. Value rises sharply from approximately €0.9 million in 2020 to around €4.5 million in 2021, reaching a peak of roughly €7.5 million in 2022. Values then decline considerably in 2023 (approximately €2.5 million) before increasing again in 2024 to around €3.0 million. The coincidence of peak landed weight and peak value in 2022 suggests that both volume and either unit price and/or species composition

contributed to the highest first sales returns in that year, with subsequent reductions indicating a notable shift in landings and/or market conditions thereafter.



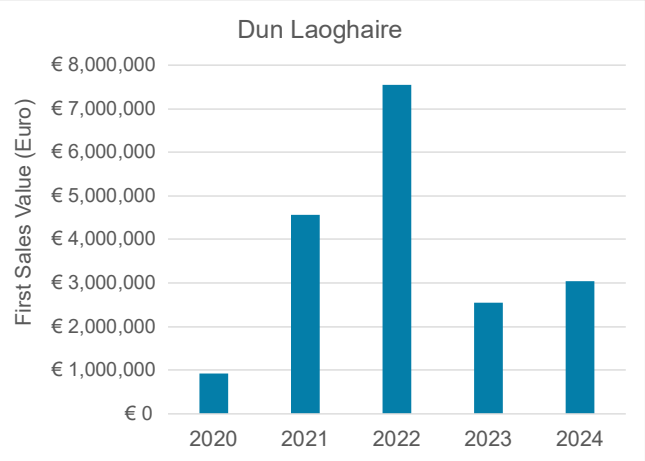
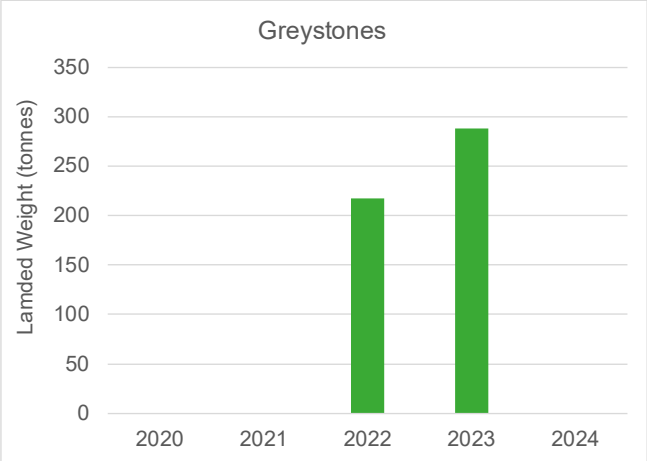


Plate 12-B Dún Laoghaire landings (tonnes) and first sales value (€) by year, 2020–2024 based on data from declarations and sales notes for all vessels landing into Ireland (data source: SFPA, 2025)

9. Landings at Greystones (**Plate 12-C**) are only reported for two years within the 2020 to 2024 period. Available data indicate landed weight of approximately 220 tonnes in 2022, increasing to around 290 tonnes in 2023. No landings are shown for 2020, 2021 or 2024 in the figure. First sales value is similarly only available for 2022 and 2023, increasing from approximately €440,000 in 2022 to around €530,000 in 2023, with no values reported for the other years.

10. The limited availability of data (two years only) is likely attributable to data screening and suppression rules applied by the SFPA, whereby figures are removed where the number of vessels making landings falls below the threshold required for release. As a result, the figures presented should be interpreted as partial, with apparent gaps reflecting confidentiality controls rather than an absence of fishing activity.



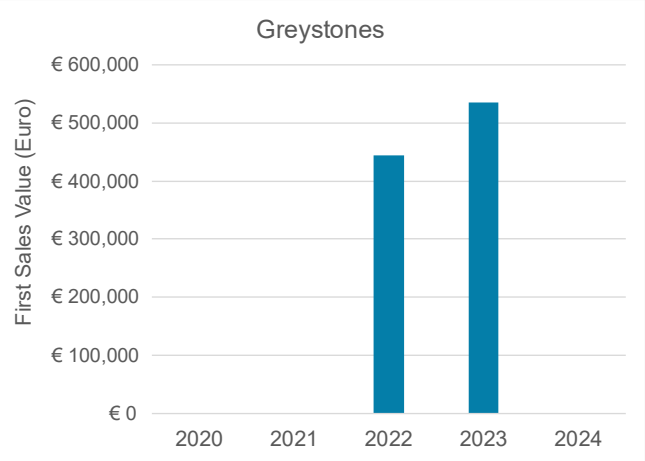


Plate 12-C Greystones landings (tonnes) and first sales value (€) by year, 2020–2024 based on data from declarations and sales notes for all vessels landing into Ireland (data source: SFPA, 2025)

11. Landings at Howth (**Plate 12-D**) show a marked reduction from 2020 to 2021, followed by relative stability through to 2024. Landed weight is highest in 2020 at approximately 5,000 tonnes, before

falling to around 3,100 tonnes in 2021. Landings then remain broadly consistent at approximately 3,300 tonnes in 2022 and 2023, before declining slightly again in 2024 to around 2,900 tonnes. Overall, the period is characterised by a substantial initial drop after 2020 and a gradual downward trend thereafter.

12. First sales value at Howth follows a different pattern, increasing through to 2022 before declining in the final two years. Value rises from approximately €10.6 million in 2020 to around €12.9 million in 2021, peaking at roughly €14.2 million in 2022. This is followed by a decrease to approximately €13.3 million in 2023 and further to around €11.7 million in 2024. The combination of reduced landed weight relative to 2020 but higher first sales values in 2021 to 2023 suggests an increase in average price per tonne and/or a shift towards higher value species during those years, with a softening in 2024.

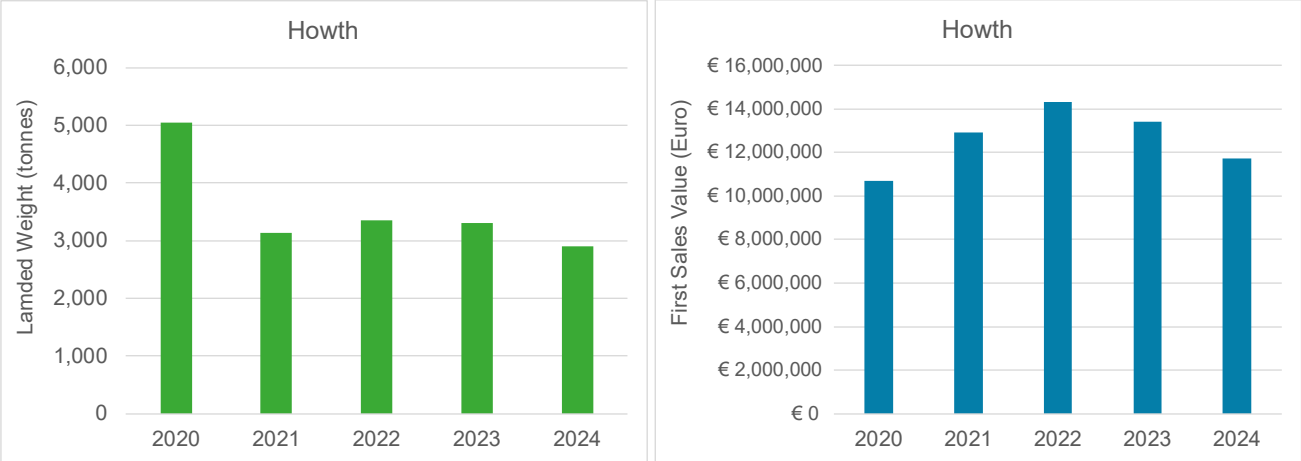


Plate 12-D Howth landings (tonnes) and first sales value (€) by year, 2020–2024 based on data from declarations and sales notes for all vessels landing into Ireland (data source: SFPA, 2025)

13. Landings at Kilmore Quay (**Plate 12-E**) remain relatively high and generally stable over the period 2020 to 2024, fluctuating within a narrower range than several other ports. Landed weight is approximately 3,800 tonnes in 2020, increases to around 4,150 tonnes in 2021, then dips to roughly 3,650 tonnes in 2022. Landings rise again to a peak of approximately 4,300 tonnes in 2023, before decreasing slightly in 2024 to around 4,140 tonnes. Overall, the series indicates interannual variability but no sustained upward or downward trend across the five-year period.

14. First sales value at Kilmore Quay shows greater year-to-year variability than landed weight, with a general pattern of an initial decline followed by partial recovery. Value is highest in 2020 at approximately €16.8 million, falling to around €13.2 million in 2021. It then increases again in 2022 to roughly €14.0 million, before decreasing to approximately €13.0 million in 2023 and rising slightly in 2024 to around €13.6 million. The comparatively modest changes in landed weight alongside more

pronounced changes in first sales value suggest that market price and/or the composition of landings (species and grades) are key drivers of annual value in this port.

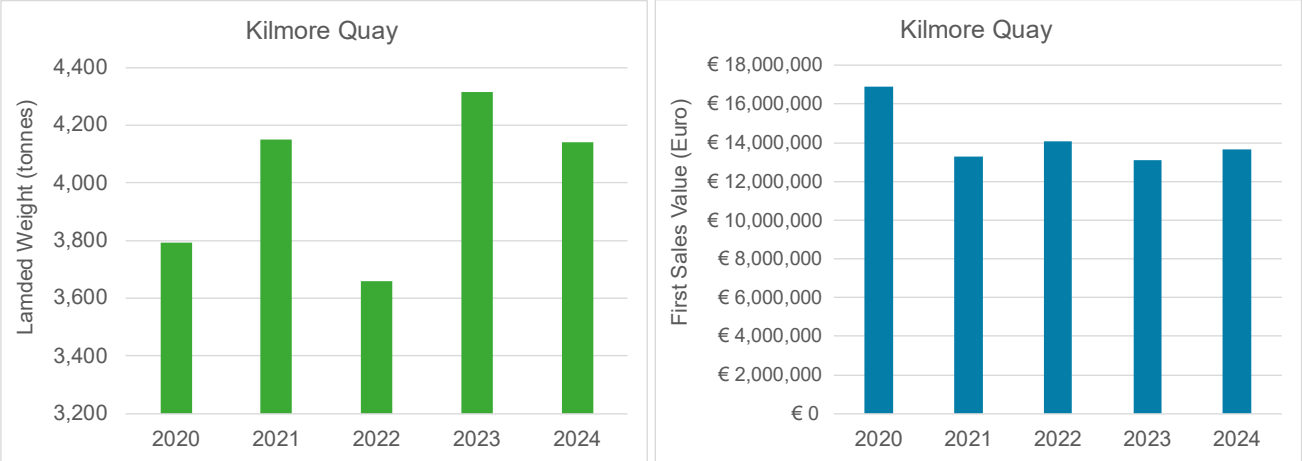


Plate 12-E Kilmore Quay landings (tonnes) and first sales value (€) by year, 2020–2024 based on data from declarations and sales notes for all vessels landing into Ireland (data source: SFPA, 2025)

15. Landings at Wicklow (**Plate 12-F**) show an overall decline over the period 2020 to 2024, with some year-to-year fluctuation. Landed weight is approximately 2,000 tonnes in 2020 and increases slightly to around 2,100 tonnes in 2021, before falling to roughly 1,700 tonnes in 2022. Landings recover modestly in 2023 (around 1,750 tonnes) but decrease again in 2024 to approximately 1,400 tonnes, the lowest level observed in the period. Overall, this indicates a reduction in landed volumes at Wicklow since 2021.

16. In interpreting these trends, it should be noted that annual landings recorded for a given port can be influenced not only by changes in fishing effort or stock availability, but also by vessel landing behaviour. Vessel owners are not restricted to landing into their 'home' port and may choose to land catches at alternative ports for operational, logistical, or market-related reasons. As such, part of the decline observed at Wicklow over the period may reflect redistribution of landings to neighbouring ports (for example, increased landings at Arklow), rather than an equivalent reduction in underlying fishing activity.

17. First sales value at Wicklow follows a broadly similar pattern of reduction towards 2024, although with a notable increase in 2023. Value is highest in 2020 at approximately €3.6 million, falls in 2021 (no bar shown in the figure), and is around €3.0 million in 2022. Values rise again in 2023 to approximately €3.4 million before declining to roughly €2.3 million in 2024. The increase in value in 2023 despite only

a modest change in landed weight suggests higher average prices and/or a shift toward higher value species or grades in that year, followed by a decline in both volume and value in 2024.

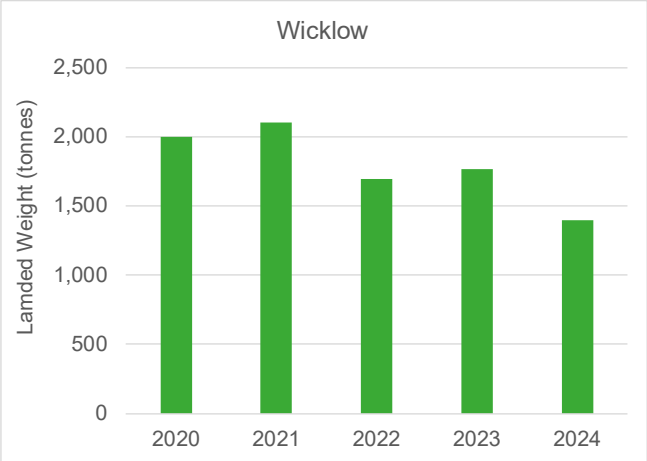


Plate 12-F Wicklow landings (tonnes) and first sales value (€) by year, 2020–2024 based on data from declarations and sales notes for all vessels landing into Ireland (data source: SFPA, 2025)

18. Across the five ports, landed weight and first sales value show variable and, in several cases, contrasting trends over 2020 – 2024. Howth and Wicklow show an overall reduction in landed volumes relative to 2020 – 2021, while Kilmore Quay remains broadly stable at a consistently high level, and Dún Laoghaire exhibits a pronounced peak in both landings and value in 2022 followed by a decline and partial recovery. Arklow is notable for a substantial increase in landed weight in 2024 compared with earlier years, while first sales value continues to trend downward. Overall, these patterns indicate that changes in value do not consistently track changes in landed weight across ports and years.

19. Interpreting the relationship between landed weight and first sales value is, however, constrained by the absence of species-level information in the data presented. Changes in the mix of landings (e.g., a greater proportion of higher value, lower weight species) could result in relatively stable values year-to-year despite declining landed weight, or conversely, higher landings with lower overall value where the catch comprises lower value species. In addition, first sales values may be influenced by changes in market prices for key higher value species and export-linked products, meaning that price movements, rather than changes in volume alone, could drive interannual variability in value.

Landings by species

20. SFPA landings data are also available by species; however, these totals represent landings into all Irish ports from all sea areas by all vessels, and they do not distinguish the sea area in which the species was caught.

21. **Plate 12-G** presents the average annual first sales value (2020–2024) of landings by Irish vessels into Irish ports, disaggregated by species. The distribution is strongly skewed, with a small number of species accounting for the majority of value. Atlantic mackerel (*Scomber scombrus*) is the highest value species (c. €76.2 million per annum), followed by Norway lobster (*Nephrops norvegicus*) (€60.3 million) and anglerfish (*Lophius spp.*) (€48.8 million). Together, these three species account for approximately 45% of the total average annual first sales value across all species shown.

22. A second tier of high-value species includes European hake (Merluccius merluccius) (€36.9 million), blue whiting (*Micromesistius poutassou*) (€29.0 million) and edible crab (*Cancer pagurus*) (€21.5 million). Several additional species contribute materially but at lower levels (e.g. megrims

(*Lepidorhombus spp.*), common sole (*Solea solea*), European lobster (*Homarus gammarus*), haddock (*Melanogrammus aeglefinus*), jack/horse mackerels (*Trachurus spp.*), and Great Atlantic scallop (*Pecten maximus*), each broadly in the €10 to 15 million range). Beyond these, there is a range of approximately seven species, each contributing less than c. €10 million per annum (including a range of demersal fish, squid, shellfish and minor pelagic species), including whelk (*Buccinum undatum*), which is one of the key target species in the local study area.

23. **Plate 12-H** shows that average annual landed weight (2020–2024) by all vessels into Irish ports is dominated by a small number of pelagic and mixed-species categories, with blue whiting the largest by volume (c. 95,000 tonnes) followed by Atlantic mackerel (c. 60,000 tonnes). Other comparatively high-volume species include boarfish (*Capros aper*), European hake, European sprat (*Sprattus sprattus*), and anglerfish, while most remaining species contribute relatively small landed weights.

24. In comparison with first sales value, the highest-volume species are not always the highest-value species. For example, blue whiting contributes the greatest tonnage but ranks below several species in value, whereas Norway lobster, edible crab, and common sole generate relatively high value despite much lower landed weights. This highlights how overall landings value is strongly influenced by species composition and unit price, rather than volume alone.

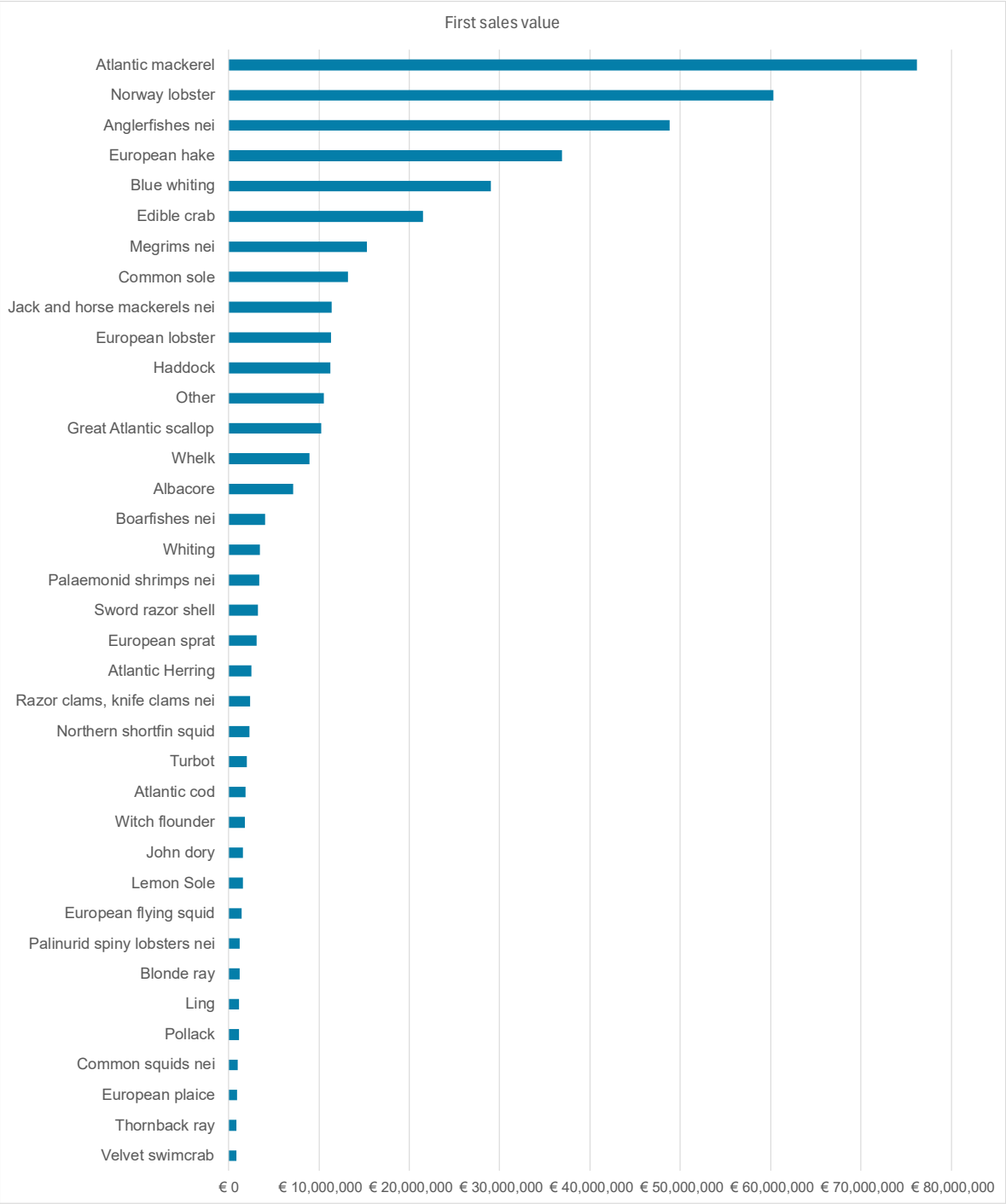


Plate 12-G Average annual first sales value (€) of landings by Irish vessels into Irish ports, by species (2020–2024). (data source: SFPA, 2025)

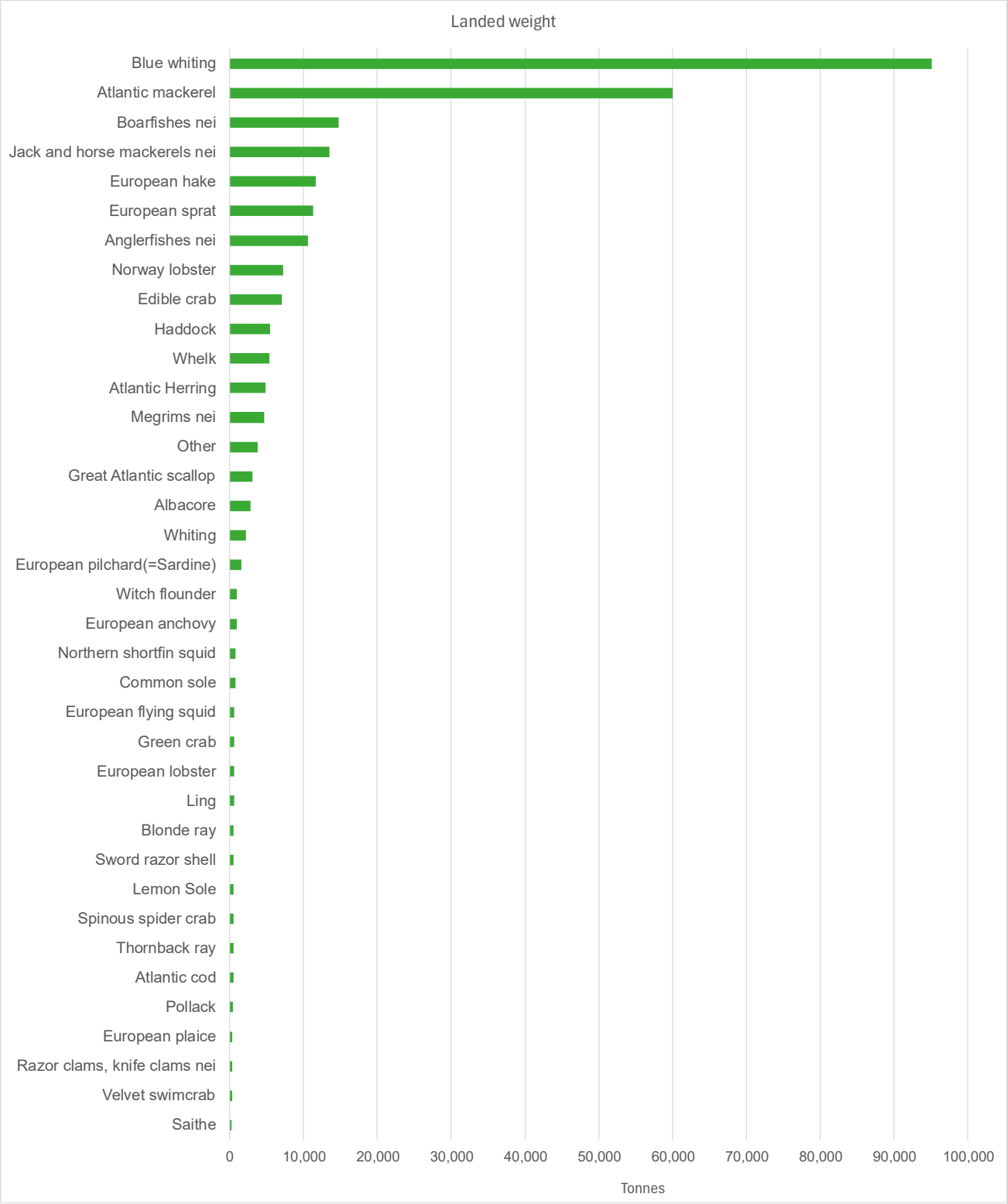


Plate 12-H Average annual weight (tonnes) of landings by Irish vessels into Irish ports, by species (2020–2024). (data source: SFPA, 2025)

25. **Plate 12-I** shows that whelk landed weight (tonnes) remains broadly stable over 2020 to 2024, fluctuating within a relatively narrow range. Landings are approximately 5,500 to 5,900 tonnes in 2020 to 2021, reduce to around 4,900 tonnes in 2022, increase again to approximately 5,700 tonnes in 2023, and then decline to about 4,700 tonnes in 2024. Overall, landings exhibit interannual variability but no clear sustained upward trend across the period, with 2024 representing the lowest landed weight shown.

26. In contrast, first sales value (€) is consistently high and shows a modest increase through to 2023 before declining in 2024. Value rises from approximately €8.6 million in 2020 to around €8.9 to €9.1 million in 2021 to 2022, peaking at roughly €10.1 million in 2023, before decreasing to approximately €8.0 million in 2024. The divergence between relatively stable landings and variable value suggests that year-to-year changes in price and market conditions (including demand and export dynamics) are important drivers of first sales value in addition to landings volume.

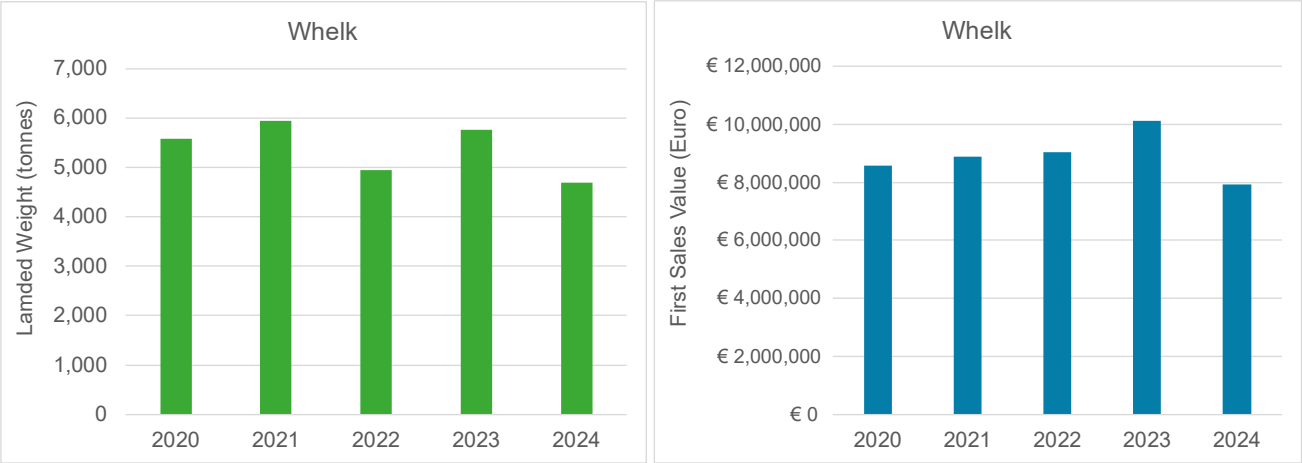
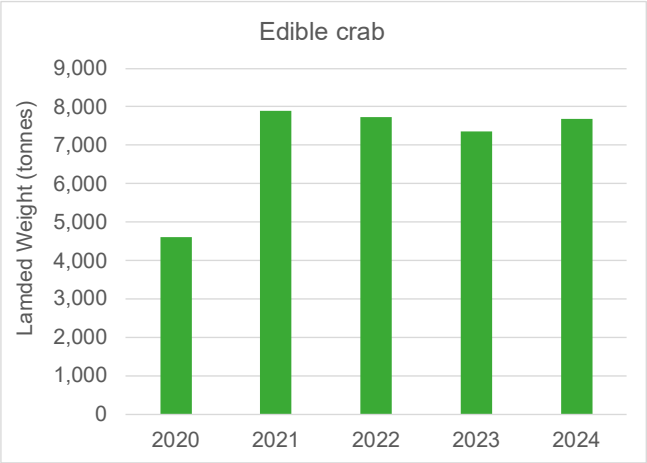


Plate 12-I Whelk landings by all vessels into Irish ports (2020–2024): landed weight (tonnes) and first sales value (€) (data source: SFPA, 2025)

27. **Plate 12-J** show trends in edible crab landings (tonnes) and first sales value (€) for 2020 to 2024. Landed weight increases substantially from approximately 4,600 tonnes in 2020 to around 7,900 tonnes in 2021, remaining relatively stable thereafter at roughly 7,300 - 7,700 tonnes over 2022 to 2024. First sales value follows a similar pattern but with greater variability, rising from approximately €8.5 million in 2020 to around €23 million in 2021, peaking at roughly €33 million in 2022, before declining to approximately €20 - 22 million in 2023 to 2024. The divergence between broadly stable landed weight from 2021 onwards and the more pronounced fluctuations in value indicates that market price and/or grading/species mix are important drivers of annual value, in addition to changes in landings volume.

28. Edible crab is primarily caught using pots in inshore waters, and the relevant potting grounds are understood to be mainly inshore of the array area.



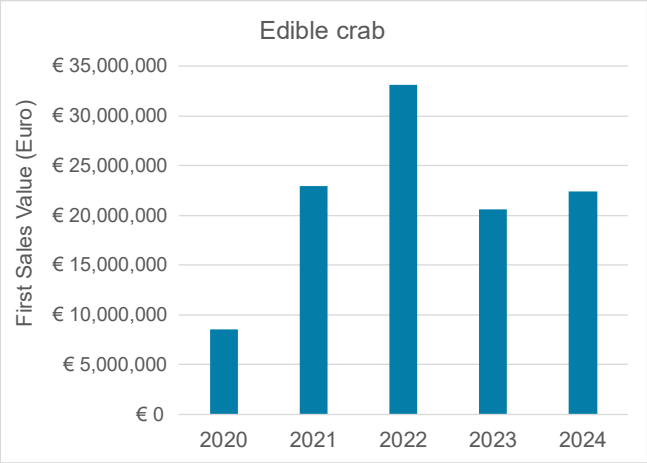
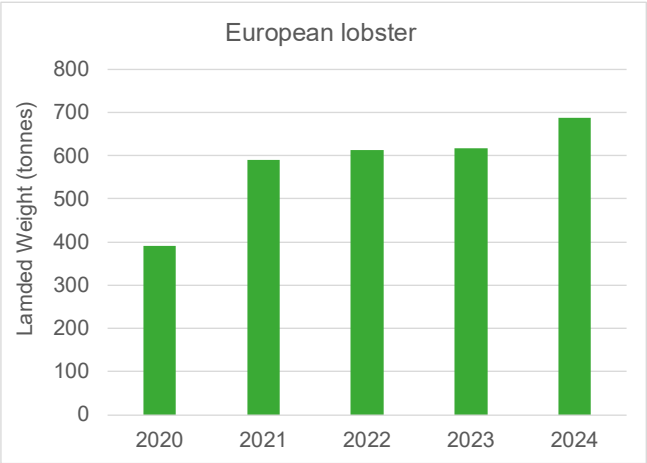


Plate 12-J Edible crab landings by all vessels into Irish ports (2020–2024): landed weight (tonnes) and first sales value (€) (data source: SFPA, 2025)

29. **Plate 12-K** shows trends in European lobster landings (tonnes) and first sales value (€) over 2020 to 2024. Landed weight increases steadily across the period, rising from approximately 390 tonnes in 2020 to around 590 tonnes in 2021, remaining broadly stable at ~620 tonnes in 2022 to 2023, and then increasing further to approximately 690 tonnes in 2024. Overall, this indicates sustained growth in lobster landings compared with the 2020 baseline, with the highest landed weight recorded in 2024.

30. First sales value follows a broadly similar upward pattern, but with greater year-to-year variability. Value increases from approximately €5.3 million in 2020 to around €10.9 million in 2021, peaking at roughly €16.1 million in 2022. Values then decline to approximately €11.4 million in 2023 before increasing again to around €12.6 million in 2024. The contrast between relatively stable or increasing landed weight and the fluctuations in value suggests that changes in market price, size/grade, and/or sales conditions are influencing annual value in addition to landings volume.



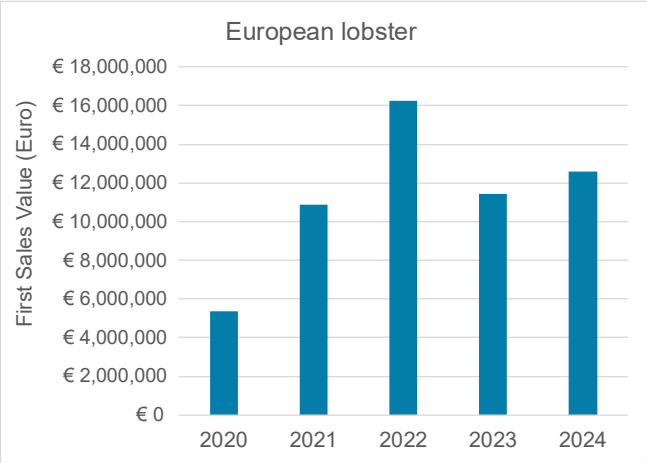


Plate 12-K Lobster landings by all vessels into Irish ports (2020–2024): landed weight (tonnes) and first sales value (€) (data source: SFPA, 2025)

Stock Information

31. The Shellfish Stocks and Fisheries Review has been updated in 2024 (Marine Institute and BIM, 2024) and provides an overview of selected shellfish stock assessments, alongside supporting information on landings and the relevant legislative and regulatory context. While whelk is referenced in the review's regulatory discussion, it is not included as an assessed stock. A summary of key points for edible crab and lobster relevant to the east coast (defined here as Dublin to Wexford) is provided below.

32. Edible crab: Management of the edible crab fishery is principally through a minimum landing size (140 mm carapace width) and kilowatt-day effort limits for larger vessels, including within a biologically sensitive area extending from north Mayo south and east to Waterford. For assessment purposes, ICES (WG Crab) identifies stock units, which on the Irish coast are delineated using tagging data, the distribution of fishing activity and larval distribution; crab stocks off the southwest and southeast coasts are noted as being exploited mainly by Irish vessels under 13 m inside 12 nm, reflecting a predominantly inshore fishery. In terms of status, standardised indices of stock abundance declined during 2015–2019 and were stable at low levels during 2020–2024, with advice indicating the need to reduce fishing mortality. Catch-rate indicators also show a decline in targeted trips, with landings per unit effort (LPUE) decreasing from around 2.3 kg/pot (2015) to around 1 kg/pot (2023).

33. Lobster: Management of the lobster fishery is principally through a minimum landing size (87 mm), a maximum landing size (127 mm) and a prohibition on landing v-notched lobsters, supported by an active v-notching programme. The Shellfish Review finds that these measures collectively protect approximately 25–47% of lobster reproductive potential (varying by region and year), and that nominal stock-status indicators (including LPUE and discard-related indicators) were stable during 2013–2023 in most coastal areas. Management advice is to maintain existing conservation measures and to target v-notching (preferably on lobsters over 95 mm) in areas where the prevalence of v-notched and/or over-127 mm lobsters is low, supported by continued monitoring through sampling programmes.

12.6.2 Fishing grounds

Section 12.6.2 remains unchanged.

12.6.3 Recreational fishing

Section 12.6.3 remains unchanged.

12.6.4 Aquaculture

Section 12.6.4 remains unchanged.

12.6.5 Identification of receptors

Section 12.6.5 remains unchanged.

12.6.6 Climate change and natural trends

Section 12.6.6 remains unchanged.

12.6.7 Predicted future baseline

Section 12.6.7 remains unchanged.

12.7 Scope of the assessment

Section 12.7 remains unchanged.

12.8 Assessment parameters

Section 12.8 remains unchanged except for an update to Table 12-8 below.

12.8.1 Background

Section 12.8.1 remains unchanged.

12.8.2 Options and dimensional flexibility

Section 12.8.2 remains unchanged except for Table 12-8 which is replaced by Table 12-A below. This update has been made in response to FIR Item 18a (see **FIR Response Document**). The updates to the table are limited to the cable burial depth in the zone of greater burial depth adjacent to Dún Laoghaire Harbour (Operations and Maintenance, Offshore export cables trench depth (m)).

12.8.3 Limit of deviation

Section 12.8.3 remains unchanged.

Table 12-A Representative scenario summary

Impact	Representative scenario details	Value	Notes / assumptions
Construction			
Impact 1: Loss of grounds or restricted access to fishing grounds within the array site	Permanent infrastructure		The duration of the construction phase relates to the extent of fishing exclusion and hence the potential to restrict access to fishing grounds. As the duration is the same for both Layout Options, the infrastructure (number of WTGs) would lead to a representative scenario under which fishing activities would be excluded from the offshore development area. Layout Option A forms the representative scenario as this represents the greatest level of temporary loss or restricted access to established fishing grounds, and therefore Layout Option A forms the basis of the assessment for Impact 1: in this chapter. Layout Option B, or any other scenario resulting in a lower level of loss or restricted access would not introduce new or different impacts and would not result in a materially different effect of significance. The construction footprint comprises the full permanent seabed area of structures, scour protection, cable crossings and cable protection plus the temporary footprint of preparatory works. The impact area also incorporates advisory safe passing distances around major activities. It is important to note that the temporal aspect of construction works will not apply in full throughout the offshore construction phase, as activities will be completed sequentially.
	Progressive installation of WTGs	75	
	Progressive installation of OSSs	3	
	Array site total area (km^2)	125	
	Progressive installation of inter-array and interconnector cables across the array site for the duration of construction (i.e., fishing activities cannot be undertaken in the area of inter-array or interconnector cable installation)		
	Length of inter-array cabling on the seabed (km)	120 - 139	
	Length of interconnector cabling on the seabed (km)	7.4 - 8.6	
	Length of inter-array and interconnector cabling requiring cable protection (km)	29.8	
	Total area of seabed covered by cable protection (m^2)	208,600	
	IACs and interconnectors minimum depth of cover (m)	1.0	
	Installation methods and effects		
	Advisory safe passing distances around construction activities within the array site (m)		

Impact	Representative scenario details	Value	Notes / assumptions
	Total construction duration for the WTGs and the OSSs (months)	30	
Impact 2: Loss of grounds or restricted access to fishing grounds within the OECC	Permanent infrastructure		The duration of the construction phase relates to the extent of fishing exclusion and hence the potential to restrict access to fishing grounds. The duration of construction and all project details relating to the OECC are the same for both Options. The construction footprint of the OECC comprises the full permanent seabed area of scour protection, cable crossings and cable protection plus the temporary footprint of preparatory and installation works. The impact area also incorporates advisory safe passing distances around major activities. It is important to note that the temporal aspect of temporary works will not apply in full throughout the offshore construction phase, as activities will be completed sequentially.
	OECC total area (km^2)	40.1	
	Total length of offshore export cables (km)	126 - 146	
	Total area of seabed covered by export cable protection (m^2)	105,000	
	Offshore export cables minimum depth of cover (m)	1.4 (except cables buried within the zone of greater burial depth adjacent to DL Harbour which will have a minimum depth of cover of 3 m)	
	Installation methods and effects		
	Advisory safe passing distances around construction activities (m)		

Impact	Representative scenario details	Value	Notes / assumptions
	Total construction duration for the cable installation in the OECC (months)	12	
Impact 3: Displacement of fishing activity into other areas	As described for Impact 1 and Impact 2		Construction activities resulting in the maximum level of displacement of fishing activity are a product of the areas of temporary exclusion as defined in Construction Impact 1 and Impact 2.
Impact 4: Interference with fishing activities	Permanent infrastructure		The maximum number of vessels transits and the maximum number of round trips would result in the greatest potential for conflict / interaction between construction vessels and fishing vessels and gear. Layout Option A forms the representative scenario as this represents the maximum number of vessels transits and the maximum number of round trips and, and therefore Option A forms the basis of the assessment for Impact 4: in this chapter. Layout Option B, or any other scenario resulting in a lower number of vessels and duration of the construction programme would not introduce new or different impacts and would not result in an effect of materially different significance.
	Progressive installation of WTGs	75	
	Progressive installation of OSSs	3	
	Installation methods and effects	Peak vessels / round trips	
	Seabed preparation vessels (including surveys, UXO investigation and boulder clearance)	4 / 20	
	WTG and OSS monopile installation vessels (includes installation vessel, feeder vessel and anchor handlers)	6 / 43	
	TP installation vessels	7 / 43	
	Scour protection installation vessels (including filter layer and seabed preparation)	7 / 107	

Impact	Representative scenario details	Value	Notes / assumptions
	WTG installation vessels (includes installation vessel, feeder vessel and anchor handlers)	4 / 50	
	OSS topside installation vessels	4 / 20	
	Seabed preparation vessels (including Trailing Suction Hopper Dredger (TSHD) for sand wave clearance and disposal off site, pre-lay grapnel run (PLGR), offshore substation structure (OSS) removal, boulder clearance, pre-crossing protection and survey vessel)	7 / 548	
	Array cable and interconnector installation vessels (includes support, cable protection and anchor handling vessels	6 / 39	
	Export cable installation vessels (including at landfall) (includes support, cable protection and anchor-handling vessels)	5 / 43	
	Nearshore export cable installation vessels (including at landfall) (includes barges, tugs, and small work boats)	17 / 118	
	Commissioning vessels	2 / 48	

Impact	Representative scenario details	Value	Notes / assumptions
	General support vessels (including guard vessel, project Service Operation Vessel (SOV) and work boats)	4 / 506	
	Crew Transfer Vessels (CTVs)	2 / 824	
	Maximum total construction vessels	75 / 2,409	
	Peak vessels on site simultaneously	38	
Impact 5: Potential for snagging of gear	As described for Impact 1 and Impact 2		Offshore works, such as construction anchoring, jack up legs or cable trenching can produce seabed obstructions which can represent a potential fastening risk and damage to fishing gear. Potential for objects to be dropped on the seabed during construction-related activities.
Impact 6: Increased steaming times to fishing grounds	Installation methods and effects		The infrastructure (number of WTGs) would lead to a representative scenario under which fishing activities would be excluded from the offshore CWP Project area. Layout Option A forms the representative scenario as this represents the greatest level of the maximum potential disruption to established steaming routes, and therefore Option A forms the basis of the assessment for Impact 6: in this chapter. Layout Option B, or any other scenario resulting in a lower level of disruption to established steaming routes would not introduce new or different impacts and would not result in an effect of materially different significance.
	Progressive installation of WTGs	75	
	Progressive installation of OSSs	3	
	Advisory safe passing distances (radius) around construction activities (m)		
	Peak vessels on site simultaneously	38	

Impact	Representative scenario details	Value	Notes / assumptions
Impact 7: Effects on commercially exploited species	As per **Chapter 9 Fish, Shellfish and Turtle Ecology**.		The scenario assessed in **Chapter 9 Fish, Shellfish and Turtle Ecology** forms the highest disturbance to commercially important species.
Operations and maintenance			
Impact 1: Loss of grounds or restricted access to fishing grounds within the array site	Permanent infrastructure		Layout Option A represents the maximum loss of fishing grounds. The Applicant will, where practicable, bury all cables to a minimum depth of cover. In cases where depth of cover is inadequate due to unforeseeable seabed conditions, cable protection will be implemented as mitigation to avoid risks to other marine operations. A preliminary cable burial risk assessment, involving a peer review of environmental considerations, ground conditions, and anticipated installation considerations, has been undertaken to identify locations that may require cable protection. This exercise has determined an anticipated maximum extent and volume of cable protection within the array site and OECC, which has been used as a basis for the EIA.
	Number of WTGs	75	
	Number of OSSs	3	
	Length of inter-array cabling on the seabed (km)	120–139	
	Length of interconnector cabling (km)	7.4–8.6	
	Total length of offshore export cables (km)	126.0–146.0 (3 alternating current (AC) cables)	
	Total area of seabed covered by inter-array and interconnector cable protection (m^2), including secondary protection of rock placement (height: 1.25 m; width: 7 m).	208,600	
	Total area of seabed covered by export cable protection (m^2), including secondary protection of rock placement (height: 1.5 m; width: 7 m) and use of mattresses for cable crossing (height: 1.5 m; width: 7 m)	105,000	

Impact	Representative scenario details	Value	Notes / assumptions
	O&M vessels		
	Peak vessels on site simultaneously	14	
Impact 2: Loss of grounds or restricted access to fishing grounds within the OECC	Total length of offshore export cables (km)	126.0–146.0 (3 alternating current (AC) cables)	Options are the same for the OECC and neither Layout Option A nor B impact the design scenario for the OECC.
	Total area of seabed covered by export cable protection (m^2)	105,000	
Impact 3: Displacement of fishing activity into other areas	As described for Impact 1 and Impact 2		Operational activities resulting in the maximum level of displacement of fishing activity are a product of the areas of temporary exclusion required during major maintenance activities and long-term exclusion due to physical presence of the wind farm infrastructure, as defined in Operation Impact 1.
Impact 4: Interference with fishing activities	As described for Impact 1 and Impact 2		Either scenario represents the maximum potential number of vessel transits during operation and maintenance and, as such, the greatest potential for conflict between operation and maintenance vessels and fishing operations. As the maximum number is the same for both options, impact does not vary between scenarios.
Impact 5: Potential for snagging of gear	As described for O&M Impact 1 and Impact 2		WTG Option A represents the greatest presence of obstacles on the seabed that may represent a fastening/safety risk to fishing vessels and therefore forms the representative scenario for the assessment.

Impact	Representative scenario details	Value	Notes / assumptions
Impact 6: Increased steaming times to fishing grounds	As described for O&M Impact 1 and Impact 2		Operational activities resulting in the maximum level of displacement of fishing activity are a product of the areas of temporary exclusion as defined in O&M phase impacts 1 & 2.
Impact 7: Effects on commercially exploited species	As per **Chapter 9 Fish, Shellfish and Turtle Ecology**.		The scenario assessed in **Chapter 9 Fish, Shellfish and Turtle Ecology** forms the highest disturbance to commercially important species.
Decommissioning			
Impact 1: Loss of grounds or restricted access to fishing grounds within the Array Site	For the purposes of the EIA, at the end of the operational lifetime of the CWP Project, all offshore infrastructure will be rehabilitated. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • The WTGs and OSS topsides shall be completely removed; • Following WTG and OSS topside decommissioning and removal, the monopile foundations will be cut below the seabed level, to a depth that will ensure the remaining foundation is unlikely to become exposed. This is likely to be approximately one metre below seabed, although the exact depth will depend upon the sea-bed conditions and site characteristics at the time of decommissioning; • All cables and associated cable protection in the offshore environment shall be wholly removed. It is likely that equipment similar to that which is used to install the cables may be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables is anticipated to be the same as the area impacted during the installation of the cables; and • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project and the assumptions around the number of vessel on site, and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above, it is anticipated that for the purposes of a representative scenario, the works will be analogous with the construction phase works.		
Impact 2: Loss of grounds or restricted access to fishing grounds within the OECC			
Impact 3: Displacement of fishing activity into other areas			
Impact 4: Interference with fishing activities			

Impact	Representative scenario details	Value	Notes / assumptions
Impact 5: Potential for snagging of gear			
Impact 6: Increased steaming times to fishing grounds			
Impact 7: Effects on commercially exploited species			

12.9 Primary mitigation measures

Section 12.9 remains unchanged with the exception of Table 12-10, which is replaced in its entirety with Table 12-B. This update has been made in relation to:

- Offshore cable burial depths, which is in response to FIR Item 18a; and
- The Navigational Safety Plan, which is in response to FIR Item 2a and 2b

Table 12-B Primary mitigation measures

Project element	Description
Construction Environmental Management Plan (CEMP)	A CEMP has been prepared to provide a management framework to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of: • The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e., ecological clerk of works) and contractor requirements (i.e., method statements for specific construction activities); • Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project. • Measures proposed to ensure effective handling of chemicals, oils and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through the conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority prior to the start of construction.
The array layout has been developed to ensure that the impacts on commercial fisheries are minimised and to maximise the potential for coexistence	Positions of WTGs and OSSs have been informed by a wide range of site-specific data, including metocean data (e.g., wind speed and direction), geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation. Designing and optimising the layout of the WTGs has considered multiple constraints identified from analysis of these datasets, alongside the consideration of layout principles taken from

Project element	Description
	relevant guidance on the design of OWFs. A summary of the key actions taken to avoid or otherwise reduce impacts is provided below: • The WTG layout options include Search and Rescue (SAR) access lanes to allow a SAR resource to fly on the same orientation continuously through the array site. This is provided to minimise risks to surface vessels and / or SAR resource transiting through the array site. • Archaeological exclusion zones (AEZs) around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. • The locations of offshore infrastructure been developed to avoid known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa*, which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micrositing around sensitive habitats, such as *Sabellaria spinulosa*. • The WTG layout options have been developed to avoid or minimise interactions with known areas of high fishing density, where possible. As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence, aligning orientation with the way fishing activity occurs. • A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided.
Navigational Safety Plan (NSP) and advisory safe passing distances	A NSP has been prepared for shipping and navigation purposes, including the safe navigation of fishing vessels. The NSP includes details of: • Advisory safe passing distances around structures and works; • Marine coordination and communication to manage the movements of project vessels; • Marking of all infrastructure associated with the project (including subsea cables) on appropriately scaled Admiralty Charts; • Procedures in relation to Local Notices to Mariners, to be updated and re-issued during construction and prior to planned maintenance works; • Consultation with the relevant harbour authorities; • Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably the COLREGs and International Convention for the Safety of Life at Sea (SOLAS); • Use of a guard vessel(s) as deemed appropriate by risk assessment; and • Confirmation that vessels used in operations will be appropriately licensed and have the requisite Certificates, e.g. Irish Load Line Cert, in place beforehand

Project element	Description
	The NSP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
Burial of cables	The Applicant will, where practicable, bury all cables within the offshore development area: • IACs and interconnector cables will have a minimum depth of cover of 1.0 m; and • Offshore export cables will have a minimum depth of cover of 1.4 m (except cables buried within the zone of greater burial depth adjacent to DL Harbour, which will have a minimum depth of cover of 3.0 m). Except in the zone of greater burial depth, in cases where burial is inadequate due to unforeseeable seabed conditions, and at cable crossings, cable protection will be implemented as mitigation to avoid risks to other marine operations
Production of a FMMS	A Fisheries Management and Mitigation Strategy (FMMS) has been prepared to provide an overview of the Applicant's approach to fisheries liaison and mitigation with regards to the CWP Project. This includes measures proposed to facilitate co-existence with the commercial fishing industry with the aim of minimising potential impacts to fisheries stakeholders as far as possible. The FMMS includes details of: • The roles and responsibilities of the Fisheries Liaison Officer and other relevant fisheries liaison roles; • Approach to disseminating information and communicating with fisheries stakeholders; • Procedures to facilitate coexistence; and • Code of good practice for all vessels The FMMS will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated prior to the start of construction to reflect the most up-to-date policy and legislation on coexistence.
Rehabilitation Schedule	A Rehabilitation Schedule is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.

12.10 Impact assessment

Section 12.10 remains unchanged except for Section 12.10.2, which should now be read in conjunction with paragraphs 34 to 39.

12.10.1 Construction phase

Section 12.10.1 remains unchanged.

12.10.2 Operation and maintenance phase

Section 12.10.2 remains unchanged but should now be read in conjunction with the additional text provided in paragraphs 34 to 42 below. This update has been made to provide further context on experience relevant to commercial fishing vessels operating within operational wind farms. This update has been made in response to FIR Item 12a (see **FIR Response Document**).

Fishing activity operating within a wind farm

34. During the operational phase, the potential for co-location is increasingly discussed internationally in terms of the resumption of fishing activity within offshore wind farm arrays (i.e., turbines and inter-array infrastructure), where this can be achieved safely and without compromising asset integrity. ABPmer defines co-location as “two (or more) activities being actively managed together whilst sharing the same spatial area” and notes that, where wind farm locations cannot avoid established fishing grounds, enabling co-location depends on site-specific factors and requires early, constructive dialogue between developers and the fishing sector to identify and address practical barriers (ABPmer, 2024).

35. Within this context, the evidence base and emerging practice are most commonly focused on passive/static gears (including pots/traps/creels, handlines and gill nets), which may be more compatible with turbine arrays than mobile demersal gears. Vattenfall notes that passive fishing methods, using static gear, can allow smaller vessels to operate between turbines and may reduce the risk of gear snagging on cables, while also supporting more careful, lower-impact fishing compared with active methods such as trawling (Dahlström, 2025).

36. Demonstrating that fishing can resume within a wind farm therefore typically relies on a combination of project design/operational measures and evidence-building through trials and monitoring. ABPmer highlights potential adaptations that may support co-location, including array layout/orientation, provision of clear corridors, and improved cable mapping, alongside operational measures such as regular monitoring for cable exposure, fishing-friendly external cable protection, and improved lighting, navigation and alarm technology (ABPmer, 2024).

37. In parallel, collaborative research and pilot studies are being progressed to test practicality in situ; for example, the WIND4COCO work at the Lillgrund offshore wind farm (Dahlström, 2025) is investigating whether and how commercial fishing could coexist with offshore wind farms, including trials of selective fishing gear and evaluation of the broader potential for fishing within the array.

38. In addition, an increasing body of evidence from operational UK offshore wind farms with fixed foundations indicates that fishing activity can resume within wind farm array areas. This is evidenced

by multiple case studies from operational wind farms, where fishing activity has successfully resumed within wind farm footprints. Examples include:

- Moray East and Moray West Offshore Wind Farms (Scotland): Post-installation data has shown that static gear vessels, particularly potters, and mobile gears, particularly scallop dredgers have returned to operate within turbine arrays. Initiatives such as pre-lay and post-lay surveys have informed safe access for vessels.
- Rampion Offshore Wind Farm (England): Commercial fishing activity, particularly for whelks and crabs, resumed within the array following completion, with fishers reporting the ability to work safely between turbines provided that standard safety guidelines and Notices to Mariners are followed.
- Westermost Rough Offshore Wind Farm (England): Baseline and operational phase studies demonstrated compatibility of certain gear types (e.g. static pots) with the turbine layout, with continued access by small-scale local vessels. Based on six years of post-construction monitoring, fishers reported consistent catch rates of European lobsters within the array, and scientists noted no significant negative ecological impact on stocks.

39. **Appendix 12-A Evidence of fishing within OWF array areas** provides further project-specific evidence that fishing activity does occur within operational UK offshore wind farm arrays. This technical note was commissioned specifically for the CWP Project, in collaboration with Dublin Array, to identify and illustrate fishing presence within operational offshore wind farms using Automatic Identification System (AIS) data. The review covers six established UK offshore wind farms over a full 12-month period in 2023 (Moray East, Westermost Rough, Walney/Walney Extension, Rampion, Gwynt y Môr and Hornsea One), together with shorter 2025 periods for the more recently operational Seagreen and Moray West. The purpose of the note is not to claim that all fishing activity is feasible in all conditions, but to demonstrate that fishing vessels have been observed operating within array boundaries of operational wind farms.

40. The evidence presented in **Appendix 12-A** is particularly relevant because it includes examples of static-gear fisheries operating within arrays that are comparable to those considered for the CWP Project. The figures show fishing vessel activity within Westermost Rough, which is understood to support a lobster pot fishery, within Hornsea One, a brown crab pot fishery, and within Gwynt y Môr in the Irish Sea, which is a whelk fishery and therefore the most analogous example to the CWP Project. Taken together, these case studies provide visual, site-specific evidence that operational wind farm arrays can continue to be used by static-gear fisheries, including potting activity, once construction is complete and subject to the judgement of individual skippers, local conditions and safe operating practice.

41. This project-specific evidence is consistent with the broader findings of Fitkov-Norris et al. (2025), which assessed apparent fishing effort across 34 European offshore wind farms constructed between 2016 and 2022. That study found a statistically significant reduction in overall fishing effort within and close to offshore wind farms, driven principally by mobile gears such as trawlers and seiners, but importantly it found no statistically significant reduction for fixed gear fisheries. Within the study dataset, fixed gear comprised predominantly static gillnets and pots and traps, and the authors identify fixed gear fisheries as a candidate for co-location with offshore wind farms because they do not present the same interaction risks as towed gears and may, in some circumstances, benefit from the increase in hard substrate associated with wind farm infrastructure.

42. Fitkov-Norris et al. (2025) therefore provides an important wider evidence base for distinguishing between gear types when considering operational coexistence. Fitkov-Norris et al. (2025) found no statistically significant reduction in fixed/static gear effort within or near offshore wind farms relative to baseline conditions before construction. As pots and traps formed part of the fixed-gear category

analysed, the study supports the conclusion that potting activity can resume within array areas during operation without an observed reduction in effort compared with pre-construction levels.

12.10.3 Decommissioning Phase

Section 12.10.3 is unchanged.

12.11 Cumulative Impacts

Section 12.11 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The CEA Report brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

12.12 Transboundary Impacts

Section 12.12 remains unchanged.

12.13 Inter-relationships

Section 12.13 remains unchanged.

12.14 Potential monitoring requirements

Section 12.14 remains unchanged.

12.15 Impact assessment summary

Section 12.15 remains unchanged.

12.16 References

Section 12.16 remains unchanged but should now be read in conjunction with the additional references (paragraphs 43 to 58) provided below.

43. Dahlström, M. (2025) 'Offshore wind power and passive fishing – the active way to use space', Vattenfall – News/The Edit, 26 August.

44. Department of Agriculture, Food and the Marine (2021). Ireland's Seafood Development Programme 2021–2027. Government of Ireland, Dublin.

45. Department of Communications, Energy and Natural Resources (2014). Offshore Renewable Energy Development Plan. Government of Ireland, Dublin.

46. Department of Housing, Local Government and Heritage (2021). National Marine Planning Framework. Government of Ireland, Dublin.

47. Department of the Environment, Climate and Communications (2024). Ireland's National Energy and Climate Plan (NECP). Government of Ireland, Dublin.

48. Department of the Environment, Climate and Communications (2024). Offshore Renewable Energy Development Plan II – Future Framework. Government of Ireland, Dublin.

49. Department of the Environment, Climate and Communications (2025). Climate Action Plan 2025 (CAP25). Government of Ireland, Dublin.

50. Department of Transport and Irish Coast Guard (2025). Maritime Navigation Safety and Emergency Response Guidance for Offshore Renewable Energy Installations. Government of Ireland, Dublin.

51. European Union (2013). Regulation (EU) No 1380/2013 of the European Parliament and of the Council on the Common Fisheries Policy. Official Journal of the European Union, L354.

52. Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2025). Best Practice Guidance for Offshore Renewables Developments. FLOWW.

53. Fitkov-Norris, B., Witt, M.J. and Simmons, B.I. (2025). Offshore wind farms act as de facto marine reserves. Science of the Total Environment, 994, 179973.

54. Marine Institute and Bord Iascaigh Mhara (BIM) (2024). Shellfish Stocks and Fisheries Review 2024: An assessment of selected stocks. Marine Institute and Bord Iascaigh Mhara, Ireland. ISBN: 978-1-902895-88-8.

55. Maritime Area Regulatory Authority (MARA) (2025). Guidance Note for Applicants Applying for a Maritime Area Consent (MAC), Version 6. MARA, Dublin.

56. Seafood/Offshore Renewable Energy Working Group (2024). Annual Report. Department of the Environment, Climate and Communications, Dublin.

57. Seafood/Offshore Renewable Energy Working Group (2025). Annual Report. Department of the Environment, Climate and Communications, Dublin.

58. Walmsley, S. (2024) 'Offshore wind and fishing activities: is co-location possible?', ABPmer

13 OFFSHORE BATS

13.1 Introduction

Section 13.1 remains unchanged.

13.2 Consultation

Section 13.2 remains unchanged. **Appendix B Schedule of Post Application Consultations** of the **FIR Response Document** provides an overview of EIA and FIR related consultation undertaken by the Applicant since the CWP Project planning application was submitted.

13.3 Legislation, policy and guidance

Section 13.3 remains unchanged.

13.4 Impact assessment methodology

The upfront text (paragraphs 20-21) remain unchanged. Updates to Sections 13.4.1 to 13.4.3 are detailed below.

13.4.1 Study area

The study area defined in Section 13.4.1 remains unchanged and was used in the additional 2025 headland surveys. However, additional boat-based surveys were undertaken within the array site. Details of these supplementary surveys are provided in **Appendix 13-A Offshore Bat Survey Report 2025** which should be read in conjunction with the EIAR **Volume 3**, **Chapter 13 Offshore Bats**.

13.4.2 Data and information sources

Changes throughout Section 13.4.2 have been made to include additional data published since submission of the EIAR and to include reference to the additional baseline surveys undertaken in 2025 in response to FIR Item 14a (see **FIR Response Document**).

Desk study

Section 13.4.2 remains unchanged except for Table 13-2 which is now replaced by Table 13-A below to include additional literature published since submission of the initial application.

Table 13-A Data sources

Data	Source	Date [8]	Notes
Bat records within 10 km of the potential landfall on the Welsh Coast.	Cofnod – North Wales Environmental Information Service	14 November 2022	All records of bats from the last 15 years within 10 km of the static detectors along the Welsh coast.
Bat records within 10 km of the potential landfall on the Irish Coast.	BC Ireland	21 January 2023	All records of bat roosts and sensitive records from the last 15 years within 10 km of the static detectors along the Irish coast.
Bat records within 10 km of the potential landfall on the Irish Coast.	Biodiversity Maps (Biodiversity Ireland, 2022)	21 October 2022	All publicly available records within 10 km of the static detectors along the Irish coast from the last 15 years.
Designated sites database – GB.	Multi-Agency Geographic Information for the Countryside (MAGIC) database MAGIC (defra.gov.uk)	21 October 2022	Publicly available information on nationally and internationally designated sites within 10 km of the static detectors along the Welsh coast.
Background research – All-Ireland Nathusius's [*sic*] Pipistrelle Bat Project (Department of Housing, Local Government and Heritage, 2021).	BC Ireland	15 November 2021	BC Ireland research from 2015 – 2021 into the distribution and potential migration of Nathusius' pipistrelles within and to Ireland.
Background research – Bat Migration Project Report (2017 to 2018) (Dyer, 2019).	NRW	20 March 2019	Research into Nathusius' pipistrelle and Leisler's bat migration from Wales to Ireland using static bat detectors, including looking at the areas around South Stack Lighthouse and Bardsey Island as potential landfall points and using ferries to record bats at sea.
Further information on the Mammals in a Sustainable Environment (MISE) Project (MISE, 2015) (which included coastal bat surveys at South Stack Lighthouse) was sought to provide background information.	NRW	20 October 2022	Research into potential bat migratory movements between Ireland and Wales, which provides additional context included within the desk study section.

[8] The dates given are the dates the database search was conducted or the date published for reports.

Data	Source	Date [8]	Notes
The Status of EU Protected Habitats and Species in Ireland (NPWS, 2019).	NPWS	April 2019	Overview of the population status and trends of protected mammals (including all bat species) in Ireland, used in the assessment of population vulnerability.
Irish Bat Monitoring Programme 2018-2021 (Aughney, Roche, and Langton, 2022).	NPWS	2022	Overview of the population status and trends of bat species, based on the targeted monitoring, in Ireland, used in the assessment of population vulnerability.
North Sea Ferries Bat Migration Research Report (BSG 2014a).	BSG	2014	Research, using ferry mounted static bat detectors, into use of the North Sea by bats.
Bat Migration (Fleming, 2019).	Fleming	2019	A literature review of known migrating bat species used in the assessment of which species may be present in the offshore environment.
Assessing migration of bat species and interactions with Offshore Wind Farms in British Waters. (Hooker, et al 2024)	Natural England	September 2025	A literature review of studies that examined bat migration within the British Isles and between the British Isles and Europe.
All-Ireland Nathusius's pipistrelle bat project – Summary of work undertaken in 2024. Project Icarus Ireland: Tracking long-range movements of Leisler's bats *Nyctalus Leisleri* in Ireland. (Department of Housing, Local Government and Heritage, 2025a).	NPWS	February 2025	Tracking of 13 Leisler's bats tagged in Dublin in September 2024 to look for indications of long distance migrations.
All-Ireland Nathusius's pipistrelle bat project – Project Icarus Ireland: Tracking long-range movements of Leisler's bats *Nyctalus Leisleri* in Ireland (2025) (Department of Housing, Local Government and Heritage, 2025bd).	NPWS	November 2025	Tracking of eight Leisler's bats tagged near Dublin (Portrane and Marlay Park) in September 2025 to look for indications of migration.

Site specific surveys

2022 CWP bat activity surveys

This section (paragraphs 26 – 29) and Table 13-3 remain unchanged but should now be read in conjunction with paragraphs 1 – 4 below to include reference to the additional baseline surveys undertaken in 2025. This update was made in response to FIR Item 14a (see **FIR Response Document**). Further details on the additional baseline survey methodology is provided in **Appendix 13-A Offshore Bat Survey Report 2025**.

2025 CWP bat activity surveys

1. To provide an updated baseline a repeat of the 2022 headland surveys was undertaken. Full details of these surveys are provided in **Appendix 13-A Offshore Bat Survey Report 2025**. The surveys involved the same number (four per coast) and type (Wildlife Acoustics SM4) of bat detectors deployed in the same locations as shown in **Table 13-3**. The detectors were set to record from 30 minutes before sunset to 30 minutes after sunrise every night for the approximate 12-week long deployments with frequent battery and memory card changes throughout the deployment to minimise chances of detector failure. As with the 2022 surveys the timing of each 12-week deployment was timed to record as much of each migration period as possible. Due to access considerations, it was not possible to deploy and collect the detectors on exactly the same dates in both locations. As such, though each deployment was for the 12 weeks, to increase comparability of the data sets the following dates have been used in the analysis (when all static detectors were deployed):

    - 26 April – 07 July 2025; and
    - 22 August – 14 November 2025

2. Details of the deployment dates is provided in **Appendix 13-A Offshore Bat Survey Report 2025.**

3. In addition to the updated headlands surveys, boat-based surveys were undertaken within the array site in 2025. The surveys were undertaken during both the spring and the autumn migratory windows with two SM4 full spectrum (FS) bat detectors deployed on a single survey vessel which attempted to cross between three sampling locations (North, Middle and South) spread in a line through the middle of the array site as shown in **Figure 1** of **Appendix 10-B Migration Survey Report**. When safely possible, the vessel was turned off at these stopping locations, to reduce the noise which could potentially obscure the bat calls. The duration of these stops varied across the surveyed nights depending on the sea conditions at each location, with occasional use of the engine necessary to move the vessel back into position. In autumn, where the night length exceeded 12 hours, the maximum working time for the crew, the survey started later than sunset to detect potential migration from Wales towards Ireland. The survey was intended to be undertaken every night within the following six-week period in both the spring and autumn migratory windows however not all nights were safe to survey:

    - spring migration 19/05/2025 – 30/06/2025; and
    - autumn migration 08/09/2025 – 20/10/2025.

4. Full details on the numbers of nights surveyed and duration of the stops is provided in **Appendix 13-A Offshore Bat Survey Report 2025**.

2021 Dublin Array OWF bat surveys

The section remains unchanged.

Data analysis

This section (paragraphs 31 – 34) remain unchanged but should be read in conjunction with the paragraphs 5 to 7 detailing the analysis methods used for the 2025 baseline surveys undertaken in response to FIR Items 14a and 14e (see **FIR Response Document**). Full details of the additional data analysis is provided within **Appendix 13.-A Offshore Bat Survey Report 2025.**

5. The 2025 headland surveys were analysed using the same software (Kaleidoscope automatic identification software), methods and proportion of manual verification as the 2022 surveys, as outlined in Paragraphs 31 – 33.

6. The boat-based bat detector surveys were analysed using the British Trust for Ornithology (BTO) Acoustic Pipeline (AP) tool to identify bat passes. The BTO AP tool is an online resource which provides tools for automatic detection and identification of birds, bats and other wildlife. Ultrasonic sound recordings were uploaded to the AP using a small desktop program. Passes with a probability score of less than 0.5 were manually verified (as recommended by the BTO). As were all calls assigned No ID, a random subset of the identified passes (10%), as well as all calls classified as *Myotis* species or brown long-eared and a random subset (10%) of calls classified as non-bat species to determine if bat calls were likely to be missed among such classifications. Overall, 3,218 passes were manually verified as detailed within **Appendix 13-A Offshore Bat Survey Report 2025**.

7. Social calls and feeding buzzes were logged by the AP classifier and during manual verification. Some social and feeding calls may have remained unrecorded among the data that was not verified manually (e.g. 12 social calls were found in the manually verified high probability subset). *Myotis* species were not identified further than genus due to the overlap between species frequency calls. Pipistrelle, long eared and *Nyctalus* bats were manually identified to species when possible but noted as genus when it was not possible to distinguish calls to species level. The time of all recorded bat passes was then cross checked with the location records for the vessel to identify whether the pass was recorded while within the harbour, in transit or within the array site.

Weather parameters

This section (paragraph 35) remains unchanged except for Table 13-5 which is replaced within Table 13-B below, to include for the weather station used as part of the additional boat-based surveys undertaken in response to FIR Item 14a (see **FIR response Document**).

Table 13-B Weather station locations used for analysis of bat passes

Bat detector locations	Latitude / longitude	Location
CWP Ireland - 2022	53.18859 / -6.07723	Bray Greystones Cliff Walk
CWP Wales – 2022	53.300487 / -4.683796	South Stack Road
Dublin Array OWF - 2021	53.275597 / -6.075862	Muglins Lighthouse
CWP Ireland – Bray Head 2025	53.175979 / -6.0741877	Bray Greystones Cliff Walk
CWP Ireland – Wicklow 2025	52.976698 / -6.0264333	Wicklow golf course
CWP Wales – 2025	53.292464 / -4.6784326	South Stack Cliffs
Boat-based surveys - 2025	53.15161 / -6.06407	Wicklow Harbour

Migration parameters

The section remains unchanged except for paragraphs 40 and 42 which are replaced with paragraphs 8 and 9 to include for the additional surveys undertaken in 2025 in response to FIR Item 14a and correction of an error noted during review of the data (see **FIR Response Document**).

8. In summary, the following parameters have been identified as suitable for migration and have been used in this assessment:

- Average overnight temperature above 13°C;
- Average wind speed below 5 m/s;
- Wind direction either easterly or westerly at the time of the calls; and
- Calls more than 103 minutes after sunset (or calls within 103 minutes of sunset during winds suitable for outwards migration).

9. The relative bat activity, using Bat Activity Index (BAI) as outlined in Eurobats Guidance (Rodrigues et al., 2015), was calculated looking at the mean number of bat passes per night across the survey season, looking at both the number of nights surveyed across all detectors over both spring and autumn. To assess the proportion of activity which was migratory, the number of potentially migratory passes for each species was divided by the number of nights surveyed. For the 2022 CWP baseline the combined number of nights surveyed was 665 nights (sum of the number of nights from each detector across the deployments on one side of the coast), the Dublin Array OWF data set included 596 nights and the 2025 CWP baseline surveyed 591 nights. The ratio of potentially migratory passes is the proportion of each recorded pass for each species considered associated with migration.

13.4.3 Impact assessment

Section 13.4.3 remains unchanged except for paragraph 43 which is replaced with paragraph 10 below which utilises updated population estimates which have been published since submission of the EIAR.

10. The desk study data and field survey recordings were used to characterise the receiving environment before evaluating likely significant effects on potentially migrating bats, using professional judgement and application of the EIA methodology. The significance of potential effects has been evaluated using

a systematic approach, based upon identification of the importance / value of receptors and their sensitivity to the project activity, together with the predicted magnitude of the impact. The latest population estimates for Ireland (BC Ireland, 2024 or NPWS, 2019 dependant on the species) and GB (BCT, 2025) have been used to inform the potential significance. Due to the lack of data on bat migrations, particularly between Ireland and Great Britian (GB), the assessment methodology has necessitated a broadly qualitative, risk-based approach whereby the likely risk of a significant effect is identified using professional judgement through reference to the literature, importance and sensitivity of the receptor, and the predicted magnitude of the impact.

Determining Important Ecological Features (IEFs)

This section remains unchanged.

13.5 Assumptions and limitations

Section 13.5 remains unchanged except for paragraph 64 which is replaced with paragraphs 11 and 12 below. This update is to account for the additional surveys which were undertaken in response to FIR Item 14a. In addition, Section 13.5 should be read in conjunction with the Limitations section of **Appendix 13-A Offshore Bat Survey Report 2025,** which details the limitations of the additional baseline surveys undertaken in response to FIR Item 14a (see **FIR Response Document**).

11. While Eurobats guidance (Rodrigues et al., 2015) recommends that surveys should be undertaken with detectors on vessels, this was not undertaken in 2022 due to the lack of suitable night ferries in the area. The chosen survey methods, including approximate detector locations and the omission of detectors on vessels were agreed during consultation. Where ferries have been used in attempts to detect bats at sea in other projects, these have had mixed success. For instance, surveys placing detectors as part of the MISE Research Project (MISE, 2015) (which was later included in the All-Ireland Nathusius's Pipistrelle Bat Project (Department of Housing, Local Government and Heritage, 2021), did not recorded any bat passes out at sea (Bat Workers Forum (BWF, 2020)). Other projects have had more success, for instance the BSG North Sea Ferries study (2014a) where detectors were deployed on two ferries for 171 and 177 nights, recording 19 and 34 bat passes respectively, all passes were by Nathusius' pipistrelle, Leisler's or soprano pipistrelle, with one unidentified pipistrelle (either common or Nathusius'). To supplement this dataset the publicly available survey information from other OWF in the Irish Sea was reviewed to provide additional information into bats in the offshore environment. This review is provided within the Offshore Bat Survey Report in **Appendix 13-A Offshore Bat Survey Report 2025**.

12. A survey vessel was chartered (the AMS Adventure) which allowed for boat-based surveys within the array site to be undertaken in 2025. One of the two SM4 bat detectors placed on the starboard side of the boat appears to have failed during the spring survey, recording only noise while the port side detector recorded 8,236 bat passes. The surveys were restricted by bad weather meaning it was not safe to survey on 13 nights in spring and 19 nights in autumn. In addition, while the boat aimed to survey at each of the three stopping points for 2-4 hours per stop during each survey this varied due to weather constraints or unsuitable sea conditions (e.g. swell height). Efforts were made to reduce noise levels from the vessel while stationery at these stopping points. However, background noise was generally high on the recordings collected which will have influenced the detectability of bat calls. Some recordings were made while in Wicklow Harbour, when the vessel was moored between surveys including on nights when it was not safe to survey due to the sea or weather conditions, which

highlights the effectiveness of the automated bat detectors and provides contextual information on the bats within the harbour.

13.6 Existing environment

13.6.1 Desk study

This section remains unchanged except for the 'migration in bats' and 'summary of 'desk study area' sub-sections. The additional data and information obtained since the submission of the CWP Project planning application validates and supports the existing baseline characterisation presented within the EIAR. This is summarised in **Appendix C - Data validation statements** of the **FIR Response Document.**

Designated sites

This section remains unchanged.

Contextual information

Migration in bats

This section remains unchanged but paragraphs 13 to 15 below should now be read after paragraph 75 to provide updated context from literature published since submission of the EIAR **Volume 3**, **Chapter 13 Offshore Bats.** This update is in response to FIR Item 14a (see **FIR Response Document**).

13. The review of bats and offshore wind farms commissioned by Natural England (2025) includes the potential for regional migration across the Celtic and Irish Seas by Nathusius pipistrelle and Leisler's bats with small peaks in activity recorded in May and September which may indicate potential migration. Key limitations from studies into possible migration were highlighted including that the studies were based on the logic that bats would cross via the shortest possible route, however bats may make landfall anywhere. However acoustic surveys indicate that Nathusius pipistrelle movement across the Southern-North Sea generally peaks during the autumn migration window (Mid-August to late October) as well as a peak in migratory activity in spring (Mid-April to Mid-May). For all other species which may migrate to/from GB and across the Celtic and Irish Sea (common pipistrelle, soprano pipistrelle and *Nyctalus* species) the extent and nature of behaviours at sea is not currently known.

14. The Natural England commissioned review (2025) highlights that peaks in migratory activity over sea, based on research across Europe and Scandinavia, typically occur when there are tailwinds from the east, wind speeds <5 m/s and air temperatures >15°C in addition to relatively high atmospheric pressure. While low to moderate wind speeds and wind direction are one of the strongest predictors of bat activity, bats will also migrate across open sea with low to moderate headwind or crosswind (Brabant *et al*., 2019, 2021; Lagerveld *et al*., 2021, 2023).

15. The All-Ireland Nathusius's pipistrelle project has been undertaking research into potential long distance movements of Leisler's bats through radio tagging in both 2024 and 2025. The 13 bats tagged in 2024 included two bats that moved across several counties, potentially suggesting roost shifting and four of the bats appeared to fly at over 1500 m above sea level. The 2025 study included the successful tagging of eight bats, one of which took flights in excess of 50 km north from Dublin into County Louth and another flew over 40 km north, but the study concluded that none of the recorded movements

suggested long distance migration in Ireland though such activity cannot be ruled out. No evidence of offshore activity was found though the potential for offshore migration and sea crossings by Irish bats to the UK remain possible.

Baseline species summary

This section remains unchanged.

Data search results

This section remains unchanged.

Summary of desk study data

Table 13-12 in the summary of desk data section has been replaced by Table 13-C below to allow for inclusion of the updated population estimates published since the submission of the EIAR. The population estimates have not been updated for all species, only those for which updated estimates are available i.e. common pipistrelle, soprano pipistrelle, Nathusius pipistrelle, Daubenton's bat, Leisler's bat and brown long-eared bats. This update is in response to FIR Item 14a (see **FIR Response Document**).

Table 13-C Population status and known migration information for bat species present on both sides of the Irish Sea.

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
Common pipistrelle	Broadly widespread and common across Ireland, with the favourable conservation status in Ireland found to be increasing with an estimated 1.8–4.2 million common pipistrelles in ROI (BC Ireland, 2024).	Common pipistrelle are known to migrate in the Baltic regions (Ahlén, Baagøe and Bach, 2009), but this has not been observed yet in central Europe. Distances between summer and winter roosts in Europe are typically between 10–20 km, and foraging is within 5 km of roosts (Rodrigues et al., 2015). However, some long-distance movements have been recorded (Hutterer et al., 2005) and low numbers have been recorded at sea (Department for Business, Energy & Industrial Strategy, 2022b). Wing shape and flight speed are suitable for migration and while typically low fliers on land, flight patterns offshore and during any migration may vary and largely remain unknown (BCT, 2022b). There is evidence to suggest common pipistrelles may be attracted to onshore turbines (Richardson et al., 2021); the comparability between this effect onshore and offshore has not yet been studied. All Pipistrellus species are at high risk of collision with wind turbines (Rodrigues et al., 2015).	Yes
Soprano pipistrelle	The most widespread bat species in Ireland, with an increasing population estimated at 1.2 – 2.7 million individuals in ROI (BC Ireland, 2024).	Soprano pipistrelle bats are the same size with the same wing shape as common pipistrelle bats and have been recorded offshore, including at all three of the Pembroke Islands (BSG, 2014b). Soprano pipistrelles are known to migrate across the Baltic Sea (Lindecke et al., 2019), though migration closer to Ireland is unknown. There is evidence of bats taking rests on offshore turbines (The Swedish Environmental Protection Agency, 2007), as they do with ferries and offshore platforms, particularly during migration. All Pipistrellus species are at a high risk of collision with wind turbines (Rodrigues et al., 2015).	Yes
Nathusius' pipistrelle	While maternity and hibernation roosts of Nathusius' pipistrelle have been found	Nathusius' pipistrelles are known to migrate between wintering areas in Western Europe and their breeding grounds in the Baltic States in	Yes

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
	in Northern Ireland, none have yet been identified in ROI, though suitable habitat is present, and the species may have been under-recorded. Nathusius' pipistrelles were first recorded in GB on the Shetland Isles in the 1940s (Heymer, 1964) and in Ireland in 1996 (NPWS, 2013). Studies are underway to find maternity and hibernation roosts (which are likely to be the end point of migration) in ROI. The population is estimated to be 4,100–6,900 individuals across Ireland (BC Ireland, 2024). Biodiversity Ireland (2022) shows a scattered distribution centred around Northern Ireland, though with scattered records elsewhere.	spring, and then the reverse in autumn (Russ et al., 2001). While seasonal migration between Russia and western Europe has been suggested since Strelkov, 1969, the presence of sedentary populations complicates the picture (Russ et al., 2001) as does the unknown extent of population mixing between sedentary and migratory individuals (Boston et al., 2006). However, migrations as far as 2,018 km were proven in 2021 when a ringed bat was recorded in London and then Russia (BCT, 2021). As with all bat species, there has not been enough research to identify UK / Ireland bat migration routes, however there are several projects underway which involve capturing and ringing Nathusius' pipistrelles which may provide data in the future (Department of Housing, Local Government and Heritage, 2021), (MISE, 2015). All Pipistrellus species are at a high risk of collision with wind turbines (Rodrigues et al., 2015).	
Leisler's	Leisler's bats are one of the most common species in ROI with 112,800 – 202,300 individuals (BC Ireland, 2024). They are widespread but more densely found in the southeast of Ireland, though the population is increasing. Wind energy is listed as one of the main threats to Leisler's bats (Marnell, Kelleher and Mullen, 2022).	In the North Sea Leisler's bats are one of the most common species recorded on offshore platforms (BSG, 2014a),and have been recorded migrating over 1,500 km within Europe, though distances over 1,000 km are more common (Wohlgemuth et al., 2004). Given the potential to fly offshore and presence in both GB and Ireland, it is assumed Leisler's can cross the Irish Sea (Jones et al., 2009). Leisler's bats are considered at a high risk of collision with wind turbines (Rodrigues et al., 2015).	Yes
Whiskered	Widespread but not common with a relatively dispersed but stable population, for which no estimates are	While there are some records of whiskered bats migrating (Jones et al., 2009; Heymer, 1964)[i], this species is generally considered to be sedentary. The same report which highlights the records of whiskered	No

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
	given (NPWS, 2019 or BC Ireland, 2024).	bats migrating (Jones et al., 2009, prepared on behalf of BCT) does not consider whiskered bats to migrate or undertake long-distance movements.	
Daubenton's	Monitoring of the Irish Daubenton's population suggests this relatively common and widespread species is currently stable (BC Ireland, 2022b). The estimated population of Daubenton's bats in ROI is 55,000–77,000 individuals (BC Ireland, 2024), with an estimated population of 108,000 in Wales (BCT, 2025).	Daubenton's bats have been recorded up to 10 km offshore (Ahlén et al., 2007), however as they are also thought to be non-migratory, current thought is that these records have been in relation to coastal / offshore foraging only (Ahlén, Baagøe and Bach, 2009). Eurobats (Rodrigues et al., 2015) provides the maximum foraging distance for Daubenton's on land as 15 km, however the distance offshore that they may forage at sea is unknown. As Daubenton's forage by gleaning invertebrates from the surface of the water, it is assumed any foraging activity will be undertaken at low heights, however further research into offshore flight heights and the potential uses of offshore infrastructure is recommended by BCT (2022b).	Yes – foraging only
Natterer's	BC Ireland (2022c) lists Natterer's as one of the rarest species in Ireland and as such the population is vulnerable to change, however the NPWS 2019 report lists the population as Favourable.	To date, no evidence of migration by Natterer's bats has been recorded, with no Natterer's bats recorded on North Sea platforms, offshore islands or on ferries. It is considered that this species does not undertake extensive migrations and is therefore unlikely to be encountered offshore.	No
Lesser horseshoe	The most recent estimate of the lesser horseshoe bat's population is 12,000–13,000 individuals (NPWS and The Vincent Wildlife Trust, 2022), distributed predominantly along the west of Ireland. Lesser horseshoes are experiencing declines in habitat (broad-leaved woodland and riparian areas) though the	A sedentary species, that is not known to migrate, the average distance between its roosts range from 5–50 km overland (UNEP / Eurobats, 2022). Lesser horseshoe bat echolocation is directional and they rely heavily on linear features to move through the landscape as such are unlikely to be found offshore, unless blown off course (as is the case with the greater horseshoe vagrant recorded in Ireland.	No

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
	population remains stable (NPWS, 2019).		
Brown long-eared bats	Widespread across ROI with recent estimates at 65,000–102,000 individuals (BC Ireland, 2024), with a recent significant increase in population seen in monitoring (NPWS, 2019). The population is therefore seen as favourable increasing.	There is no evidence to suggest brown long-eared bats are a migratory species and they are not recorded on North Sea platforms, offshore islands or on ferries.	No

13.6.2 CWP – static detector results

This section has been updated to add clarity around which baseline survey year is referenced following the additional surveys undertaken in 2025, in response to FIR Item 14a (see **FIR Response Document**).

In response to FIR Item 14e (see **FIR response Document)** paragraph 105 has been replaced with paragraph 16 below to add clarity in relation to the 2022 static detector results.

Similarly, Table 13-15 and Table 13-16 have been replaced with Table 13-D and Table 13-E respectively to further clarify the differences between the text and the table.

16. Using the above parameters for Leisler's calls recorded in Ireland, 2,745 of the 14,988 calls recorded are considered suitable for migration. An additional unidentified 161 *Nyctalus* sp. passes were recorded in Ireland during suitable weather conditions and times of night. As with Nathusius' pipistrelles, from the wind direction it is only possible to infer potential direction of travel, as no calls (meeting the previously mentioned parameters) were recorded during north-north-westerly winds. The peak number of Leisler's passes during suitable conditions for migration out of Ireland, of 144 passes per detector, was recorded at Ireland Location 4 on 23 June 2022 during south-west-westerly winds. In autumn the number of passes peaked on 22 August though this was during south-west-westerly winds which would theoretically encourage movement towards the Isle of Man. Though Leisler's bats are known to migrate around Europe, there is also a resident population in Ireland and the proportion which are associated with migration is unknown. By contrast, only 13 of the *Nyctalus* sp. recordings in Wales were during suitable conditions and at suitable times, and all were between 21 August 2022 and 10 September 2022.

Table 13-D BAI showing overall passes and potentially migratory passes in Ireland in 2022

Species potentially found offshore	Potentially migratory passes				Overall passes		
	BAI (mean bat activity per night)	Maximum bat passes per night on any one detector	Ratio of recorded calls considered migratory	Total number of passes (across all detectors)	BAI (mean bat activity per night)	Maximum bat passes per night on any one detector	Total number of passes (across all detectors)
Nathusius' pipistrelle	0.019549	2	0.106557	13	0.183459	13	122
Common pipistrelle	8.342857	397	0.074283	5,548	112.3113	1,736	74,687
Leisler's bat	4.12782	164	0.183147	2,745	22.53835	352	14,988
Nyctalus sp.	0.242105	15	0.14375	13	1.684211	73	1,120
Myotis sp.	–	–	–	–	0.052632	3	35

Table 13-E BAI showing overall passes and potentially migratory passes in Wales in 2022

Species potentially found offshore	Potentially migratory passes				Overall passes		
	BAI (mean bat activity per night)	Maximum bat passes per night on any one detector	Ratio of recorded calls considered migratory	Total number of passes (across all detectors)	BAI (mean bat activity per night)	Maximum bat passes per night on any one detector	Total number of passes (across all detectors)
Nathusius' pipistrelle	0.015038	9	0.25641	10	0.058647	12	39
Common pipistrelle	0.918797	94	0.087523	611	10.49774	309	6,981
Leisler's bat	–	–	–	0	–	–	0
Nyctalus sp.	0.019549	3	0.19697	13	0.099248	7	66
Myotis sp.	–	–	–	–	0.491729	14	327

An additional Section 13.6.A has been included below with a summary of the supplementary survey results following the additional baseline surveys undertaken in 2025 in response to FIR Item 14a.

In response to FIR Item 14e additional clarity regarding the 2022 CWP Static detector results is also provided in **Appendix 13-A Offshore Bat Survey Report 2025** to allow for comparison across the surveyed years and address FIR Item 14e (see **FIR Response document**).

13.6.A CWP – 2025 survey results

17. The static detectors deployed across the headlands in 2025 found similar results to the baseline surveys from 2022, excepting that Leisler's bats were recorded in Wales in 2025 despite not being recorded there during the 2022 surveys. This matches the results of the Dyer et al, (2019) paper for NRW with Leisler's bats recorded at South Stack lighthouse in 2017. In terms of abundance Wales 2 and Ireland 4 recorded the highest number of passes at each coast in both surveyed years (2022 and 2025). Overall, significantly more bat activity was recorded in Ireland than in Wales in both surveyed years, however more Nathusius' pipistrelle passes were recorded in Wales than Ireland in 2025 in contrast to the 2022 results. A comparison of the survey results across the surveyed years is provided in **Appendix 13-A Offshore Bat Survey Report 2025**. **Table 13-F** below provides a summary of the 2025 headland detector survey results by species and location.

Table 13-F Summary of bat passes recorded on each detector during the 2025 deployments

Location	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	*Pipistrellus* sp.	Noctule	Leisler's	*Nyctalus* sp.	*Myotis* sp.	Brown long-eared	Total bat passes per detector
Ireland 1	678	93	28	10	0	3,008	0	5	3	3,825
Ireland 2	599	158	21	56	0	3,628	0	11	36	4,509
Ireland 3	7,737	172	46	46	0	2,491	0	8	15	10,515
Ireland 4	70,316	11,076	113	176	0	2,511	0	41	17	84,250
Wales 1	1,488	17	84	23	283	12	46	142	60	2,155
Wales 2	5,122	23	177	85	440	20	15	83	64	6,029
Wales 3	1,939	4	70	63	106	39	19	18	83	2,341
Wales 4	4,304	10	11	22	105	52	43	13	56	4,616
Total passes per species in Ireland	79,330	11,499	208	288	0	11,638	0	65	71	103,099
Total passes per species in Wales	12,853	54	342	193	934	123	123	256	263	15,141

18. The boat-based surveys recorded no bats within the array site however 10,741 bat passes were recorded across the following species in Wicklow Harbour:

- Leisler's bats (8,232 passes);
- Common pipistrelle (2,091 passes);

- Nathusius pipistrelle (377 passes);
- *Myotis* bat (4 passes);
- Soprano pipistrelle 13 passes); and
- unknown *Pipistrellus* bats (23 pass).

19. Of the above passes, *Nyctalus* social calls (35 passes) and feeding buzzes (4 passes) as well as Pipistrellus social calls (23 passes) and a feeding buzz (1 pass) were recorded in the harbour.

20. Full survey results including the migration analysis is provided in the in **Appendix 13-A Offshore Bat Survey Report 2025**.

13.6.3 Dublin Array OWF results

Section 13.6.3 remains unchanged.

13.6.4 Climate change and natural trends

Section 13.6.4 remains unchanged.

13.6.5 Predicted future baseline

Section 13.6.5 remains unchanged.

13.7 Scope of the assessment

Section 13.7 remains unchanged.

13.8 Assessment parameters

Section 13.8 remains unchanged.

13.9 Primary mitigation measures

Section 13.9 remains unchanged with the exception of Table 13-24, which is replaced in its entirety with Table 13-G. This update has been made in relation to the Ecological Vessel Management Plan (EVMP) (FIR Item 7u).

Table 13-G Primary mitigation measures

Project Element	Description
WTG spacing	Positions of WTGs and OSSs have been informed by a wide range of site specific data, including metocean data (e.g., wind speed and direction), geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation. Designing and optimising the layout of the WTGs has considered multiple constraints identified from analysis of these datasets, alongside the consideration of layout principles taken from relevant guidance on the design of OWFs. A summary of the key actions taken to avoid or otherwise reduce impacts is provided below: • The WTG layout options include Search and Rescue (SAR) access lanes to allow a SAR resource to fly on the same orientation continuously through the array site. This is provided to minimise risks to surface vessels and / or SAR resource transiting through the array site. • Archaeological exclusion zones (AEZs) around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational or decommissioning phases. • The locations of offshore infrastructure been developed to avoid known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa*, which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micro-siting around sensitive habitats, such as those with *Sabellaria spinulosa*. • The WTG layout options have been developed to avoid or minimise interaction with known areas of high fishing density, where possible. As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence. • A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided.

Project Element	Description
Ecological Vessel Management Plan (EVMP)	An Ecological Vessel Management Plan (EVMP) has been prepared to determine vessel routing to and from construction sites and ports and to include a code of conduct for vessel operators. The EVMP includes details of: • The types and specifications of vessels for the CWP Project; • How vessels will be monitored and coordinated; • Vessel speeds transiting inside or within 2km of The Murrough SPA from November to March, inclusive; and • The use of defined transit routes to site from key construction and operation ports, where practicable to do so. The EVMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
Construction Environmental Management Plan (CEMP)	A CEMP has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of: • The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e., ecological clerk of works) and contractor requirements (i.e., method statements for specific construction activities); • Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project; • Measures proposed to ensure effective handling of chemicals, oils and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.

Project Element	Description
Rehabilitation Schedule	A Rehabilitation Schedule is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.

13.10 Impact assessment

Updates from Section 13.10.1 to 13.10.3 are detailed below.

13.10.1 Construction phase

The upfront section (paragraph 135) remains unchanged. Updates to construction phase Impact 1: Disturbance and Impact 2: Lighting sub-section are detailed below.

Impact 1: Disturbance

Impact 1 remains unchanged except for changes to the Receptor sensitivity and Magnitude of impact sections which are detailed below.

Receptor sensitivity

This section remains unchanged except for paragraph 139 which is replaced with paragraphs 21 – 23 below. This update is made in response to FIR Item 14g (**see FIR Response document**).

21. The number and species of bats which rest or roost while migrating or foraging at sea are unknown and as such the assessment of impacts is based on current knowledge, results from the baseline surveys and professional judgement. Following the surveys within the array site, no evidence of use by bats was identified however as a precaution it is assumed that bats may be present, but outside the range of detection. This would include construction vessels etc being investigated by bats in the offshore environment. However, to continue the precautionary approach National significance is applied to the population potentially present within the array site. As no bats were recorded offshore a negligible significance could be applied, but any bats in the offshore environment, would be notable and have the potential to be of National Significance. It is noted that though individual bats are not able to adapt to the potential collision and therefore a medium sensitivity may be applicable, the tolerance and recoverability of the receptor as a whole i.e. the National population of individual bat species is different across the species. All species which may be present in the array site are present in Ireland year-round and Leisler's bat, soprano pipistrelle and common pipistrelles are significantly

more widespread across Ireland than Nathusius' pipistrelles. Therefore, the receptor sensitivity is different across the species.

22. If affected by limited increases in mortality, there is unlikely to be a measurable increase or otherwise significant impact on population status of common species and they are therefore considered of Low sensitivity to potential impacts from the proposed development. Nathusius' pipistrelle bats are less common and therefore considered to have moderate population vulnerability to the impact and so are considered to be a medium sensitivity receptor. In addition Nathusius pipistrelles are considered to be the most likely to migrate, with known migrations between the UK and continental Europe and so may be considered of international importance despite the absence of evidence of presence within the array site. In the interest of proportional EIA this is not repeated within each receptor sensitivity section of the impact assessment.

23. Based on the above, of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's bat – low; and
- Daubenton's bat – low.

Magnitude of impact

This section remains unchanged except for:

- Paragraphs 141 and 142 which are replaced by paragraphs 24 to 26 below. This update accounts for the additional baseline surveys undertaken in 2025 in response to FIR Item 14a (**see FIR Response document**).

- Paragraph 144 is replaced by paragraph 27. This update accounts for updated population estimates which were published since the submission of the EIAR.

This additional information has not been found to affect the overall significance of the effect.

24. Daubenton's bats are known to forage up to 10 km offshore, though opportunistic foraging by other species during migration is anticipated. Overall, 35 *Myotis* sp. passes were recorded across the four CWP Project Ireland detectors in 2022 with 65 *Myotis* sp. passes in 2025 while eight *Myotis* sp. passes were recorded on the Dublin Array OWF detectors. Any of the *Myotis sp*., passes could be Daubenton's and as such to provide a worst-case scenario it has been assumed that they are all potentially foraging bats. The four (4) *Myotis* sp. passes recorded in Wicklow Harbour in 2025 are also assumed to be potentially foraging bats. Surveys for Dublin Array OWF were undertaken on offshore islands up to 11.89 km offshore. During these surveys Dalkey island, 0.39 km offshore, was the furthest offshore where *Myotis* sp. were recorded, and therefore consideration of foraging activity up to 10 km offshore is a highly precautionary approach.

25. Looking at **Table 13-D** and **Table 13-E**, the average number of recorded passes during conditions suitable for migration in 2022 (migration BAI) for *Nyctalus* sp. and Nathusius' pipistrelle was less than one per night across the surveyed season (BAI of 0.24 and 0.02 respectively in Ireland, 0.02 and 0.02 in Wales). The numbers were higher for Leisler's and common pipistrelles (migratory BAI of 4.13 and 8 in 2022), which would reflect the larger populations of these species, however when compared to overall BAI in Ireland, which was 112.31 for common pipistrelle and 22.54 for Leisler's, the migratory BAI was considered low. The ratio of migratory bat passes for every non migratory bat pass was 0.18:1

for Leisler's and 0.07:1 for common pipistrelle. In 2025 the BAI for potentially migratory passes was higher for all species as was the overall BAI. As shown in **Appendix 13-A Offshore Bat Survey Report 2025** the number of nights containing optimal conditions for migration increased in 2025 compared to 2022, and therefore the number of passes recorded during these conditions also increased. However, the ratio of calls which were recorded during optimal migration conditions were less than in 2022 except for common pipistrelle bats for which this ration increased from 0.0743:1 in Ireland in 2022 to 0.0997 in Ireland in 2025 and from 0.0875:1 in Wales in 2022 to 0.1338:1 in 2025. The potentially migratory BAI was higher across the recorded species in 2025 comparative to 2022.

26. It is worth noting that all of the CWP detectors were onshore and not all potentially migratory passes would be associated with migratory bats, however with current knowledge the migratory BAI or the number of individual bats cannot be further calculated.

27. Of the species potentially encountered in the area, Nathusius' pipistrelle have the lowest population in Ireland (estimated to be 4,100–6,900 individuals (BC Ireland, 2024)) and therefore the recoverability of this species is reduced, which is reflected in the receptor sensitivity above. Where individuals are disturbed the favourable conservation status of the species would not be at risk as less than 1% of the population would be affected. Given the scarcity of recorded incidences and number of vessels at sea at any one time, as well as the level to which bats roosting in such conditions are affected by disturbance, any impacts would not be discernible from annual variation. As such, although there is the potential for a negative impact it is considered to be of negligible magnitude.

Significance of the effect

This section remains unchanged.

Additional mitigation

This section (paragraph 147) is replaced with paragraph 28. This update is detailed in response to FIR Item 14h (**see FIR Response document**).

28. A Construction Environmental Management Plan (**CEMP**) has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. The **CEMP** will include the responsibilities of an experienced Ecological Clerk of Works (ECoW) with a bat licence, to be appointed throughout the construction phase of the project. Though considered to be of low likelihood, it is possible that bats will roost on the construction vessels, the WTGs or OSSs during construction. As such, the ECoW will be available for advice should any bats be seen resting or otherwise stopping on the vessels or infrastructure. The deliberate disturbance of bats would not be permitted unless they are in definitive need of care, in line with the Natural England 2025 literature review which highlights the occasional rescue of bats from offshore turbines. In this way a derogation licence is not required as bats will not be deliberately disturbed. Guides on how to identify the different bats, with life size photos, will also be available to the construction personnel to aid with identification of any bats which are seen, including during flight. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.

Residual effect

This section remains unchanged.

Impact 2: Lighting

Impact 2 remains unchanged except for changes to the Magnitude of impact section which are detailed below.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraph 154 which is replaced by paragraph 29 below. This update includes for the additional baseline surveys undertaken in 2025 in response to FIR Item 14a (**see FIR Response document**). This additional information has not been found to affect the overall significance of the effect.

29. *Myotis* bats in Wales are more than 10 km from any of the proposed works and so will not be affected. Though light sensitive, only very low numbers of Daubenton's bats are expected to be foraging at sea within the CWP Project area, with a BAI of 0.29 passes per night recorded across the CWP Ireland detectors in 2022 and 0.42 in 2025. This is further supported by the lack of *Myotis* recordings at Muglins (1.13 km offshore) or Kish Lighthouse (11.89 km offshore) within the Dublin Array OWF dataset. The area of works, south of the Dublin Port, is also already well used by vessels, including at night. Four (4) *Myotis* sp. passes were recorded in Wicklow Harbour in 2025, with an average of 0.03 passes per night while in Wicklow Harbour. The low level of *Myotis* activity would suggest the habitat is of less local value to *Myotis*.

Significance of the effect

This section remains unchanged.

Additional mitigation

This section remains unchanged.

13.10.2 Operation and maintenance

Updates to the 'Impact 1: Disturbance', Impact 2: Collision and Impact 3: Lighting sub-sections are detailed below.

Impact 1: Disturbance

Impact 1 remains unchanged except for changes to the Magnitude of impact and Additional mitigation sections which are detailed below.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraphs 163 – 165 which are replaced with paragraphs 30 –32. This update includes for the additional baseline surveys undertaken in 2025 in response to FIR Item 14a (**see FIR Response document**). This additional information has not been found to affect the overall significance of the effect.

30. The number and species of bats which roost on vessels or turbines at sea, and the number which migrate or forage out at such distances, are considered to be low based on current evidence, the baseline results and professional judgement. Looking at **Table 13-D and Table 13-E**, the ratio of the bats recorded in either Ireland or Wales which may be migratory compared to all calls, and thereby may cross this portion of sea twice a year, is at most was at most 0.26:1 for Nathusius' pipistrelles in Wales in 2022, which is compared to 0.11:1 for Nathusius' in Ireland in both 2022 and 2025.

31. The migratory BAI from Dublin Array OWF shows 6.65 for common pipistrelles, compared to 25.14 overall, and migratory BAI of 8.26 for Leisler's compared to overall BAI of 26.3. Across the CWP baseline surveys the BAI during conditions suitable for migration was higher in 2025 than 2022, as shown in **Appendix 13-A Offshore Bat Survey Report 2025**. The highest potentially migratory BAI was 71.28 for common pipistrelles in Ireland compared to an overall BAI of 184.49 in Ireland in 2025, up from 8.34 for migratory BAI and 112.31 for overall BAI in 2022. However, the ratios of potentially migratory passes compared with overall passes remain less than the previous highest which was 0.26:1 (Nathusius' pipistrelles in Wales in 2022).

32. The precautionary nature of the results and resulting proportion which could be associated with migration, would suggest that the numbers of bats which may migrate across this area is low compared to the overall bat activity within the area. Population estimates are provided in **Table 13-12**, however of the species potentially encountered in the area, Nathusius' pipistrelle have the lowest population in Ireland (estimated to be 4,100–6,900 individuals (BC Ireland, 2024).

Significance of the effect

This section remains unchanged.

Additional mitigation

This section (paragraph 170) is replaced with paragraph 33. This update is detailed in response to FIR Item 14h (**see FIR Response document**).

33. Though considered an unlikely scenario, measures included within the CEMP in relation to the approach to any bats seen resting on any vessels or infrastructure will remain in place during operation.

Residual effect

This section remains unchanged.

Impact 2: Collision

Impact 2 remains unchanged except for changes to the Magnitude of impact subsection which is detailed below.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraphs 178 and 179 which are replaced with paragraphs 34 – 36. This update accounts for the additional baseline surveys undertaken in 2025 and is made in response to FIR Item 14a (**see FIR Response document**). This additional information has not been found to affect the overall significance of the effect.

34. The ratio of the baseline calls which were potentially migratory, and could therefore be associated with movements offshore, was low compared to the overall number of passes, as shown in **Table 13-D** and **Table 13-E.** When looking at proportions, the highest proportion of potentially migratory passes recorded was soprano pipistrelle calls recorded in Wales in 2022 were 0.5:1 calls were potentially migratory; overall, though, this accounts for a total of eight passes, in 2025 there were 11 potentially migratory soprano pipistrelle calls recorded however this was smaller portion (0.20:1) of the overall calls (54). Second to soprano pipistrelle Nathusius' pipistrelle passes had the highest ration of potentially migratory passes again in 2022 when 10 passes put of a total of 39 passes resulted in a potentially migratory ration of 0.26:1. Nathusius' activity was higher in Wales in 2025 with 342 passes overall and 48 potentially migratory passes giving a ratio of 0.14:1. Activity of Nathusius' pipistrelle was also found to have increased in Ireland to 208 passes overall in 2025 compared to 122 passes in 2022 however the ratio of potentially migratory to overall passes remained 0.11:1.

35. The highest numbers of potentially migratory calls recorded as part of the CWP baseline were associated with the more common species; common pipistrelle (migratory BAI of 8.34 in Ireland and 0.91 in Wales in 2022 and 71.28 and 18.7 in 2025 respectively) and Leisler's bats (migratory BAI of 4.13 in Ireland in 2022 and 20.71 in 2025), which have a more stable population and would be less affected by any impact at the population level. Leisler's or *Nyctalus* sp. were the only species recorded at Kish Lighthouse (11.89 km offshore) in spring, with a single Nathusius' pipistrelle and a single common pipistrelle pass detected in autumn. Leisler's bats were not recorded on any of the four CWP Wales detectors, though they were recorded at South Stack lighthouse in 2017 as part of the MISE project (Dyer, 2019). The exact locations bats may depart and land during migration is being much researched.

36. As yet, no material migratory path has been identified, the significance of effect is **slight** and therefore the need for substantiative mitigation, such as curtailment, would not be proportionate and is not recommended. As detailed in the IPPEMP the CWP Project will undertake long term monitoring. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary Mitigation Measures**.

Significance of effect

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 3: Lighting

Impact 3 remains unchanged except for changes to the Magnitude of impact section which are detailed below.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraph 191 which is replaced with paragraph 37 below. This update is to incorporate additional detail on the proposed lighting as detailed in **Appendix 13-B LUX Assessment** and is provided in response to FIR Item 14b (see **FIR Response document**). The below change is not considered to affect the outcome of the assessment or significance of effect.

37. As structures within the CWP Project array site will be marked and lit in accordance with the International Association of Marine Aids to Navigation and Lighthouse Authorities and Civil Aviation Authority requirements, there is potential for impacts associated with lighting. However, best practice measures from BCT and Institution of Lighting Professionals guidance note 08/23 (2023) have been incorporated and the proposed lighting has been reduced. The lighting is as directional and as minimal as possible, with warm temperature lighting chosen and green or cool coloured lighting avoided. This was incorporated as studies have found red lights to be less impactful to nocturnal wildlife, with BCT (2018) highlighting multiple studies where bat activity and abundance does not appear to be affected by red lights, while the species composition and levels of activity was altered in streets lit with white spectrum lighting. The aircraft lighting is red and will be restricted to each turbine around the edge of the array site. The marine navigation lighting chosen is yellow and this will be shield by being below the turbine maintenance platform. The name plate lights are small and directional fitted with hoods to reduce light spill. Therefore, as shown in **Appendix 13-B LUX Assessment**, the 1 LUX contour does not extend further than 40 m from the centre of the WTG columns while the 0.2 LUX contour reaches 65 m from the centre of each WTG column. To minimise light pollution further, the OSSs will be unlit whilst they are unmanned. The lighting of the WTGs and OSSs is a health and safety requirement, as such cannot be avoided or further minimised, however at closest the luminaires will be seven nautical miles from the shore, and as the light spill (increases in LUX levels at sea level) would be restricted to within 65 m of each WTG the effects will be restricted to bats already within the offshore environment. Additionally, as the WTGs will be more than 130 m apart there will be dark corridors between the WTGs enabling light shy species to move through the array site. All species which may migrate through the area are considered light tolerant and will actively forage around white lights (Spoelstra et al., 2017; BCT, 2018) which would theoretically increase the risk of collision with the WTGs, therefore the use of white lights has been limited. In addition, there is the potential for additional bats to be drawn to the WTGs, (as noted in Brabant et al., 2019b; Lagerveld et al., 2014), however no increase in mortality at lit WTGs compared to unlit WTGs has been found (Guest et al., 2022; Cryan and Barclay, 2009).

Significance of effect

This section remains unchanged.

13.10.3 Decommissioning phase

Updates to Impact 1: Disturbance and Impact 2: Lighting sub-sections are detailed below.

Impact 1: Disturbance

Impact 1 remains unchanged except for changes to the Magnitude of impact section which are detailed below.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraph 198 which is replaced by paragraph 38 below. This update accounts for the updated population estimates published since the submission of the EIAR and is made in response to FIR Item 14a (**see FIR Response document**). This updated information is not considered to affect the outcome of the assessment or significance of effect.

38. Decommissioning phase impacts are considered to be short-term and are considered to last no longer than the period of works (to be confirmed at the time though assumed at this stage to be similar to the three-year construction period). Bats are known to roost on structures at sea and given the relatively low level of disturbance during operation it is possible that the incidents would increase over time as bats become habituated to their presence. Brabant, et al., (2019b) included reference to bats roosting on the grate floor of a WTG and another on the foundation of a WTG, though other roosting locations are possible. Current research suggests only individual bats roost on offshore structure at any one time (Petersen et al., 2014; Lagerveld, Jonge Poerink and Geelhoed, 2021). Of the species potentially encountered in the area, Nathusius' pipistrelle has the lowest population in Ireland (estimated to be 4,100–6,900 individuals across Ireland (BC Ireland, 2024)). Where individuals are disturbed, the favourable conservation status of the species would not be at risk as less than one per cent of the population would be affected.

Significance of effect

This section remains unchanged.

Additional mitigation

This section remains unchanged.

Residual effect

This section remains unchanged.

Impact 2: Lighting

Impact 2 remains unchanged except for changes to the Magnitude of impact section which are detailed below.

Receptor sensitivity

This section remains unchanged.

Magnitude of impact

This section remains unchanged except for paragraph 207 which is replaced with paragraph 39. The update accounts for the updated population estimates published since the submission of the EIAR and is made in response to FIR Item 14a (**see FIR Response document**). This updated information is not considered to affect the outcome of the assessment or significance of effect.

39. Decommissioning phase impacts are considered short-term, lasting for the duration of the decommissioning phase before returning the area to the baseline condition with the removal of artificial lighting used during operation, however there would be a short-term increase in vessels while decommissioning as outlined in **Table 13-22**. The vessel route to the array is south of the Dublin Port and therefore already well used by vessels, including at night. As outlined within the Construction Phase Impact: 2, low numbers of potential Daubenton's passes were recorded on the detectors in Ireland, both for the CWP baseline and as part of the Dublin Array OWF dataset and therefore any impacts on the relatively common species (estimated population of 55,000–77,000 individuals in ROI (BC Ireland, 2024)) would be imperceptible from current baseline, particularly if the population continues to increase.

Significance of effect

This section remains unchanged.

13.11 Cumulative impacts

Section 13.11 remains unchanged, however it should be noted that updates to the CEA have been captured within a new, standalone **CEA Report**. The **CEA Report** brings together the CEAs for each EIA topic into a single document. It supersedes the CEAs that were submitted in each EIAR chapter in Volume 4 of the planning application EIAR.

13.12 Transboundary impacts

Section 13.12 remains unchanged.

13.13 Inter-relationships

Section 13.13 remains unchanged.

13.14 Potential monitoring requirements

Section 13.14 remains unchanged however the **IPPEMP** has been updated as requested within FIR Item 14f (see **FIR Response document**).

13.15 Impact assessment summary

Section 13.15 remains unchanged.

13.16 References

Section 13.16 remains unchanged, except for the addition of the references (paragraphs 40-46) included within this **EIAR Addendum.**

40. Bat Conservation Trust, 2025. The National Bat Monitoring Programme Annual Report 2024. Bat Conservation Trust, London. Available at www.bats.org.uk/our-work/national-bat

41. Roche, N. & Langton, S. (2024) Population estimates, trends and background information for six Irish bat species. Article 17 reporting 2018-2023: Supporting document. Unpublished report to National Parks & Wildlife Service.

42. Department of Housing, Local Government and Heritage. (2025a) All-Ireland Nathusius's pipistrelle bat project – Summary of work undertaken in 2024. Project Icarus Ireland: Tracking long-range movements of Leisler's bats *Nyctalus Leisleri* in Ireland).

43. Department of Housing, Local Government and Heritage. (2025b) All-Ireland Nathusius's pipistrelle bat project – Project Icarus Ireland: Tracking long-range movements of Leisler's bats *Nyctalus Leisleri* in Ireland (2025).

44. Hooker, J., Lintott, P., Boughey, K., Worledge, L., Park, K. and Collins, J. (2025) Assessing migration of bat species and interactions with Offshore Wind Farms in British Waters. Natural England Commissioned Report, NECR562. Natural England, York.

45. JNCC (2019) European Community Directive on the Conservation of Natural Habitats and of Wild Faune and Flora (92/43/EEC) - Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018. Supporting documentation for the conservation status assessment for the species: S1331 - Leisler's bat(*Nyctalus leisleri*). Available https://jncc.gov.uk/jncc-assets/Art17/S1331-EN-Habitats-Directive-Art17-2019.pdf Accessed 26/02/2026.

46. Lagerveld S, de Vries P, Harris J, Parsons S, Debusschere E, Hüppop O, Brust V, Schmaljohann H. Migratory movements of bats are shaped by barrier effects, sex-biased timing and the adaptive use of winds. Mov Ecol. 2024 Dec 18;12(1):81. doi: 10.1186/s40462-024-00520-7. PMID: 39696652; PMCID: PMC11657297.