Appendix K Addendum

Management Plans

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

A TETRA TECH COMPANY

JERA NEX BP

Energy for generations

ORIEL WIND FARM PROJECT

Natura Impact Statement Addendum

Appendix K Addendum: Management Plans

MDR1520C
NIS – Appendix K Addendum
A1 C01
December 2025

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ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report - Addendum
Appendix 5-1 Addendum: Construction Environmental Management Plan

MDR1520C
EIAR – Appendix 5-1
Addendum
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December 2025

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Acronyms

Term	Meaning
AIS	Air Insulated Switchgear
BS	British Standard
CBM	Cement Bound Material
CEMP	Construction Environment Management Plan
CIRIA	Construction Industry Research and Information Association
CLO	Community Liaison Officer
CTMP	Construction Traffic Management Plan
DHLGH	Department of Housing, Local Government and Heritage
ECoW	Environmental Clerk of Works
EIAR	Environmental Impact Assessment Report
EIERP	Environmental Incident and Emergency Response Plan
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
HSA	Health and Safety Authority
GGBS	Ground Granulated Blast Furnace Slag
GIS	Gas Insulated Switchgear
GNI	Gas Networks Ireland
GSI	Geological Survey Ireland
HDD	Horizontal Directional Drilling
HWM	High Water Mark
IAPS	Invasive Alien Plant Species
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NMI	National Museum of Ireland
NMS	National Monuments Service
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSL	Noise Sensitive Location
OHL	Overhead Power Line
OSS	Offshore Substation
OWL	Oriel Windfarm Limited
pHNA	Proposed Natural Heritage Area
PPP	Pollution Prevention Plan
PPV	Peak Particle Velocity
RAMS	Risk Assessment Method Statements
RPS	Record of Protected Structures
SEAR	Safety and Environmental Awareness Report
TJB	Transition Joint Bay
TII	Transport Infrastructure Ireland
WMP	Waste Management Plan
WTG	Wind Turbine Generator

1. INTRODUCTION

1.1 Introduction

A planning application for the Oriel Wind Farm Project (hereafter referred to as 'the Project') was submitted to An Coimisiún Pleanála (ACP) (formerly An Bord Pleanála) in May 2024. The Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS), which accompanied the planning application (case reference ABP-319799-24), included a Construction Environmental Management Plan (CEMP) in appendix 5-1: Construction Environmental Management Plan (EIAR volume 2A) and appendix K: Management Plans of the NIS.

This Addendum provides information to supplement the CEMP presented in appendix 5-1 of EIAR (volume 2A) and appendix K (NIS). It has been prepared in response to a Request for Further Information (RFI) from ACP the planning application for the Project.

The 'Schedule-Further Information Request' provided by ACP listed 19 items of further information. The Schedule did not request further information on the CEMP. However, as a result of preparation of the information in response to the RFI, changes have arisen that require an update to the CEMP. These changes are presented in this document.

The section and subsection headings in this Addendum correspond to those used in the EIAR and NIS. The reader is directed to review the information presented in this Addendum alongside the CEMP in the EIAR and the NIS.

An outline Commitments Register (version 1.0A) has been updated as part of this Addendum and is included in Annex A.3. This register requires to be updated (on consent) to ensure a full list of all commitments made in the EIAR and the NIS, commitments made during the consent application process and any relevant planning conditions are included. Responsibilities and relevant documentation for approval will also need to be assigned. Updates made to the Commitments register (version 1.0A) as part of this Addendum have been made in blue text. There are no changes to Annex A.1 or A.2 of the CEMP.

1.2 Scope

There are no changes to appendix 5-1: Construction Environmental Management Plan.

2. PROJECT DESCRIPTION

Chapter 5 Addendum: Project Description (EIAR Volume 2A Addendum) and section 2 of the NIS Addendum provide a description of the changes to the project design (all of which are within the planning application boundary) which arose as a result of addressing the responses to the RFI. The reader is directed to chapter 5 Addendum: Project Description (EIAR Volume 2A Addendum) and section 2 of the NIS for further details.

3. RESPONSIBILITIES; CORRESPONDENCE AND GENERAL COMMUNICATION

3.1 Roles and responsibilities – All

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.2 Roles and responsibilities – Employer

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.3 Roles and responsibilities – Contractor

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.4 Contractor's Environmental Manager

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.5 Environmental Clerk of Works (ECoW)

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.6 Geotechnical engineer

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.7 Community Liaison Officer

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.8 Community Engagement Manager

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.9 Archaeologist (onshore)

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.10 Ecologist

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.11 Correspondence, records and reporting

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.12 Site induction

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.13 Training and toolbox talks

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.14 Environmental audits

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.15 Risk assessment and method statements

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.16 Notice boards

There are no changes to appendix 5-1: Construction Environmental Management Plan.

3.17 Review and change management

There are no changes to appendix 5-1: Construction Environmental Management Plan.

4. COMMUNITY LIAISON

4.1 Community liaison

There are no changes to appendix 5-1: Construction Environmental Management Plan.

4.2 Advance notice of works

There are no changes to appendix 5-1: Construction Environmental Management Plan.

4.3 Enquiries and complaints

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5. GENERAL SITE MANAGEMENT AND POLLUTION PREVENTION

5.1 General site management and pollution prevention

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.1 Responsibility

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.2 Good housekeeping and general pollution prevention measures

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.3 Hours of work

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.4 Site security

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.5 Hoarding and fencing

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.6 Services and lighting

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.7 Energy management

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.8 Temporary construction compounds

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.9 Reinstatement of working areas on completion

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.10 Management of fuels and oils

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.11 Noise and vibration

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.12 Dust

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.13 Surface water management

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.1.14 Accidental spills

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.2 Environmental incident and emergency response

5.2.1 General requirements

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.2.2 Safety and Environmental Awareness Reports (SEAR) and Environmental Auditing

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.2.3 Pollution/spill incident

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.2.4 Emergency access

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.2.5 Extreme weather events and flood risk

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.2.6 Fire and explosion risk

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.3 Climate

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.4 Population and human health

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.5 Biodiversity

In addition to the measures outlined in chapter 19: Onshore Biodiversity (EIAR volume 2C), the following measures will also be implemented at the landfall location where the offshore cable corridor traverses Dunany Point pNHA and CB1 Shingle and gravel bank habitat (as outlined in chapter 19 Addendum: Onshore Biodiversity, EIAR volume 2C Addendum and section 5.2.4 of the NIS Addendum):

- Due to the occurrence of CB1 Shingle and gravel bank habitat within a dynamic and changing coastal environment, a pre-construction habitat survey will be undertaken to identify any future potential for this habitat to correspond with Annex I habitat in the Habitats Directive;
- During construction, a suitably qualified and experienced ecologist will supervise the works within Dunany Point pNHA CB1 Shingle and gravel bank habitat, ensuring that CB1 Shingle and gravel habitat layers including cobble, pebble, gravel and sand required for removal to facilitate the offshore cable corridor, are stored by their respective particle size for later reinstatement; and
- Post-construction, that reprofiling and reinstatement of the affected shingle beach area is completed.

Disturbance measures

In response to RFI 7.Z, clarification regarding the timing of the works within the intertidal area at the landfall location is provided below.

As part of the onshore biodiversity assessment, a number of measures are proposed to reduce disturbance impacts on important ecological features. At the landfall location, this includes measures such as timing of the works to avoid potential impacts on both breeding birds (March to August, inclusive) occurring at the landfall location and wintering birds (October to April, inclusive) occurring within the intertidal environment.

In relation to the timing of works to avoid impacts on breeding birds (March to August, inclusive), vegetation removal at the landfall location (location of transition joint bay and onshore cable route) will only occur prior to the breeding bird season (i.e. September to February). In relation to the timing of works to avoid impacts on wintering birds within the intertidal area, works will not occur during this peak season for intertidal birds (October to April, inclusive).

On this basis, and in line with the high-level indicative construction programme outlined in Figure 5-30 of chapter 5: Project Description (see volume 2A) and Figure 2-30 in the NIS, the works at the landfall location (expected duration of approximately 12 weeks) will occur:

- Within the onshore area (i.e. above the High-Water Mark) of the landfall location at any time of year, provided that vegetation removal has taken place outside of the bird nesting season (i.e. September to February).
- Within the intertidal area at the landfall location between May and September (outside the peak season for intertidal birds).

Surface water measures

There are no changes to appendix 5-1: Construction Environmental Management Plan.

Removal and/or fragmentation measures

In response to RFI 14.E, justification regarding the removal of trees which are clustered proximate to the eastern crossing of the River Dee in addition to locations of bat boxes, is provided below.

As part of the onshore biodiversity assessment presented in chapter 19: Onshore Biodiversity (EIAR volume 2C), a number of measures are proposed to reduce the potential impacts from destruction and/or fragmentation on the important ecological features.

At the eastern crossing of the River Dee (i.e. Drumcar), several trees were identified as having features suitable for roosting bats. Bat trees BT4, BT5 and BT14-18, were identified as having ‘low’ potential to support bat roosting. These trees are located in close proximity to the River Dee and the identified ‘hotspot’ of bat activity, as described in EIAR appendix 19-1: Onshore Biodiversity – Supporting Information (EIAR volume 2C).

To clarify, the identified ‘hotspot’ is associated with the River Dee corridor, not Drumcar woodland where the above trees are located. Additionally, these trees are of ‘low’ bat roosting potential and are proposed for ‘soft’ fell to protect any bats that happen to be roosting within them at the time of felling. Although they may support the wider commuting corridor available to local bat populations, their removal is not considered to effect bat activity or the ‘hotspot’ associated with the River Dee.

Additionally, since submission and during baseline update surveys undertaken in June 2024, it was noted that BT15-18 have fallen due to storm events between May 2023 and June 2024 (see appendix 19-1 Addendum: Onshore Biodiversity – Supporting Information, EIAR volume 2C Addendum).

Invasive alien species measures

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.6 Land and agriculture

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.7 Soil, geology and hydrogeology

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.8 Hydrology and flood risk

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.9 Air quality

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.10 Noise and vibration

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.11 Cultural heritage

In addition to the measures outlined in chapter 26: Cultural Heritage (EIAR volume 2C), the following mitigation measures will be implemented at Dunany.

Construction activities with potential to impact on Areas of Archaeological Potential

AAP1 – Dunany Demesne

Although the onshore cable route options have been adjusted within the planning application boundary (see chapter 5 Addendum: Project Description), the mitigation measures outlined for AAP1 section 26.10.5 of chapter 26: Cultural Heritage (EIAR volume 2C) remain unchanged.

Dunany Demesne (RPS LHS019-009) Southern Boundary

The following additional mitigation measures are required for the southern boundary wall of Dunany Demesne for the sections of wall that will be directly impacted by cable route Options 1 or 2:

- *Pre-construction vegetation clearance, inspection and method statement for demolition and reconstruction*: All vegetation along the required sections of the demesne boundary wall will be removed by hand under the supervision of a licensed archaeologist and in accordance with a method statement prepared by a built-heritage specialist. Clearance will be carried out in a controlled manner to expose the wall fabric without causing damage.

- *Detailed drawn, photographic and condition survey*: Once exposed, a full measured survey of the wall will be carried out, including identification of key features, such as coping stones, changes in construction, and areas of deterioration. Recording of distinctive stones (coping, quoin stones, gate-piers, unusually large or shaped blocks) including a record of construction, mortar type, coping style, bonding pattern and any architectural features; the survey will also include a condition assessment noting areas of collapse, voids, previous repairs and fabric integrity. This record will form the basis for reinstatement.

- *Conservation-led construction method statement*: A method statement will be prepared by a conservation architect, setting out the reconstruction technique, sequencing, materials, mortar specification and workmanship standards.

- *Controlled dismantling of affected sections*: Any section of the wall to be removed will be dismantled by hand under archaeological supervision. All salvageable stone will be retained for reuse during reinstatement under conservation supervision. All original fabric will be retained unless demonstrably unsafe or degraded beyond reuse.

- *Protection, storage and cataloguing of stone*: Recovered stone will be stored on timber pallets or in labelled crates in a secure location within the site. A catalogue of stone type, size and location will be maintained to ensure accurate reconstruction.

- *Reconstruction of the wall using original fabric and techniques*: Following completion of the cable works, the boundary wall will be reconstructed to match its original profile, alignment, coursing, bonding pattern and coping detail. Original stone will be reused wherever possible; any new stone required will match the existing in geology, size, tooling and appearance. Mortar will be mixed to match surviving material in composition and colour.

- *Monitoring during dismantling and reinstatement*: Both demolition and reconstruction phases will be monitored by the project archaeologist and conservation specialist to ensure correct handling of original fabric and fidelity to the pre-construction record.

- *Protection of upstanding sections of the demesne wall*: All upstanding sections of the Dunany Demesne boundary wall outside the impacted sections will be preserved in situ and protected during construction within Dunany Demesne. A robust fence marking a clear no-go buffer (c. 5m from the wall) will be put in place, with no plant or materials allowed inside it. Any activity taking place close to the wall along the laneway on the southern side during the cable installation will be supervised by a licensed archaeologist to ensure there is no accidental impact or disturbance.

5.12 Landscape and seascape

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.13 Traffic and transport

An Addendum to the Construction Traffic Management Plan (CTMP) (appendix 5-9 Addendum in volume 2A Addendum) has been prepared. The CTMP will be updated and implemented by the Contractor to reduce the potential for impacts on traffic and transport during the construction phase.

Please see appendix 5-9 Addendum: Construction Traffic Management Plan for further details.

5.14 Material assets

There are no changes to appendix 5-1: Construction Environmental Management Plan.

5.15 Waste

There are no changes to appendix 5-1: Construction Environmental Management Plan.

References

There are no changes to appendix 5-1: Construction Environmental Management Plan.

A.1 Required contractor's information

There are no changes to appendix 5-1: Construction Environmental Management Plan.

A.2 Environmental Policy

There are no changes to appendix 5-1: Construction Environmental Management Plan.

A.3 Commitments Register

An updated Commitments Register includes additional commitments made in the preparation of the response to the RFI. The changes are shown in blue text.

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation		
No.	**Topic**	**EIAR Chapter**	**Aspect**	**Commitment (please read in conjunction with the EIAR chapter)**	**Related Planning Condition**	**Relevant document for Implementation**	**Responsible Party**
1	Climate	Chapter 17	Materials with reduced environmental impact	Materials with a reduced environmental impact will be incorporated into the construction design through re-use of materials or incorporation of recycled materials in place of conventional building materials. The following materials shall be considered for the construction phase:- •Ground Granulated Blast Furnace Slag (GGBS) & Pulverised Fuel Ash - Used as replacements for Portland cements to increase sustainability and carbon footprint of civil and structural works; and •Steel - The recovery rates associated with using recycled steel are high and research exists which shows that 99% of structural steel arising from demolition sites is recycled or re-used. The carbon emissions emitted during the production of virgin steel can be higher than some other structural materials on a tonne by tonne basis, and recycled steel should be used where possible.	To be updated.	CEMP	Applicant/ Contractor
2	Climate	Chapter 17	Measures to minimise CO2 during construction	The following measures will be implemented by the Contractor to avoid/minimise CO_2 emissions during the construction phase: •Reducing the idle times by providing an efficient material handling plan that minimizes the waiting time for loads and unloads. Reducing idle times could save 10% of total emissions during construction phase; •Turning off vehicular engines when not in use for more than five minutes. This restriction will be enforced strictly unless the idle function is necessary for security or functionality reasons; and •Regular maintenance of plant and equipment. Technical inspection of vehicles to ensure they will perform the most efficiently.	To be updated.	CEMP	Applicant/ Contractor
3	Climate	Chapter 17	Energy management measures during construction	The Contractor will be required to implement energy management measures for the duration of the works such as: •The use of thermostatic controls on all space heating systems in site buildings to maintain optimum comfort at minimum energy use; •The use of sensors on light fittings in all site buildings and low energy lighting systems; •The use of adequately insulated temporary building structures for construction compounds fitted with suitable vents; •The use of low energy equipment and 'power saving' functions on all PCs and monitors in the site offices; •The use of low flow showers and tap fittings; and •The use of solar/thermal power to heat water for the on-site welfare facilities and contamination unit (sinks and showers).	To be updated.	CEMP	Applicant/ Contractor
4	Climate	Chapter 17	Carbon footprint	The Contractor will be required to measure and record all activity data (fuel use, material use, transport, etc.) to allow for the development of a carbon footprint for the construction phase of the Project.	To be updated.	CEMP	Applicant/ Contractor
5	Population and Human Health	Chapter 18	CEMP CTMP	Implement Construction Transport Management Plan (CTMP)	To be updated.	CEMP; CTMP	Applicant/ Contractor
6	Population and Human Health	Chapter 18	CEMP	Training and employment opportunities will be offered through a workforce management plan.	To be updated.	-	Applicant/ Contractor
7	Biodiversity	Chapter 19	EMP	For overall Onshore Biodiversity management a an Ecological Management Plan will be produced and implemented. This will include all measures included in section 5.5 of the CEMP.	To be updated.	CEMP	Applicant/ Contractor
8			Buffer Zone	A 10 m buffer zone from Dunany Point pNHA will be implemented on the landward side within the planning application boundary. The buffer zone will be physically demarked using post and rail/post and rope/bunting, or equivalent, and be signposted to identify an ecological sensitivity. The ecologist will assess and verify the demarcation and signage before works commence. See EIAR appendix 19-1: Onshore Biodiversity – Supporting Information, section 19.4 for specific detailed measures;	To be updated.	CEMP	Applicant/ Contractor
9			Pre-construction surveys	Pre-construction surveys (complete protected and invasive species survey, including breeding bird assessment). See appendix 19-1, section 19.4 for specific detailed measures.	To be updated.	CEMP	Applicant/ Contractor
9A			Pre-construction surveys	Due to the occurrence of CB1 Shingle and gravel bank habitat within a dynamic and changing coastal environment, a pre-construction habitat survey will be undertaken to identify any future potential for this habitat to correspond with Annex I habitat in the Habitats Directive;	To be updated.	CEMP	Applicant/ Contractor
10			Timing of works	Timing of the works at the landfall to avoid the peak season for intertidal birds (October to April, inclusive). Timing of vegetation removal works to avoid the bird nesting season (March to August, inclusive). Avoidance of light spill during night-time hours, and badger buffer zones between 30 m and 150 m depending on works type and season. See appendix 19-1, section 19.4 for specific detailed measures.	To be updated.	CEMP	Applicant/ Contractor
11			Timing of works	Timing of the works to avoid the bird nesting season (March to August, inclusive), replacement of all removed hedgerows, retention of trees with moderate suitability to roosting bats, and soft felling of trees with low suitability for roosting bats. See appendix 19-1, section 19.4 for specific detailed measures.	To be updated.	CEMP	Applicant/ Contractor
12			Timing of works	Timing of the instream works to avoid the IFI recommended 'closed season' (October to May, inclusive), and protection of watercourses from siltation, hydrocarbons and other pollutants using suitably material storage, procedures, buffer zones, and sediments control measures. See appendix 19-1, section 19.4 for specific detailed measures.	To be updated.	CEMP	Applicant/ Contractor
13			During works	During construction, a suitably qualified and experienced ecologist will supervise the works within Dunany Point pNHA CB1 Shingle and gravel bank habitat, ensuring that CB1 Shingle and gravel habitat layers including cobble, pebble, gravel and sand required for removal to facilitate the offshore cable route, are stored by their respective particle size for later reinstatement; and	To be updated.	CEMP	Applicant/ Contractor
14			Post Construction Habitat Reinstatement	Post-construction, it will be ensured that reprofiling and reinstatement of the affected shingle beach area is completed.	To be updated.	CEMP	Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation		
No.	**Topic**	**EIAR Chapter**	**Aspect**	**Commitment (please read in conjunction with the EIAR chapter)**	**Related Planning Condition**	**Relevant document for Implementation**	**Responsible Party**
15	Land and Agriculture	Chapter 20	Access to property	Existing access to property, including homes, agricultural fields and farm facilities will, where practicable, be maintained during construction, otherwise reasonable temporary access will be provided.	To be updated.	CEMP	Applicant/ Contractor
16			Disruption to water supply	Any disruption to water supply will be reinstated immediately by the Contractor or an alternative source supplied until the source is reinstated, unless otherwise agreed with the landowner	To be updated.	CEMP	Applicant/ Contractor
17			Drainage	All drainage likely to be affected or disturbed during the construction phase will be identified and reinstated.	To be updated.	CEMP	Applicant/ Contractor
18			Subsoiling of agricultural lands	All agricultural lands temporarily acquired for the construction will, before return to the landowner, be subsoiled to alleviate compaction and minimise risk of impeded crop growth and will be re-instated to pre-construction conditions unless otherwise agreed with the landowner.	To be updated.	CEMP	Applicant/ Contractor
19	Soil, Geology and Hydrogeology	Chapter 21	Excavated material	Excavated materials will be carefully managed in accordance with industry best practice during construction, to prevent any potential negative impact on the receiving environment and the excess material will be taken directly to an appropriately licenced facility avoiding contact with any open surface water drains. Excavated material will not be left uncovered to avoid run-off of silty water and trial pits will be backfilled at the earliest convenience to avoid leaving stockpiles exposed.	To be updated.	CEMP	Applicant/ Contractor
20			Re-instatement of earthworks	During the earthworks stage of construction, all lands including those temporarily acquired, will be re-instated to pre-construction conditions unless otherwise agreed with the landowner.		CEMP	Applicant/ Contractor
21			Management of topsoil and subsoil	Management of topsoil and subsoil will be managed in accordance with industry best practices. For all trenching along the road, all excavated material will be taken off-site in trucks and disposed of, under licence from the appropriate authority, thus preventing any contaminated run-off to roadside drains during heavy rainfall. In off-road areas where the top 400-500 mm of topsoil will be set aside within the wayleave for later reinstatement, these stockpiles will be stored at least 15 m back from drains and watercourses on level ground with a silt fence inserted at the base.	To be updated.	CEMP	Applicant/ Contractor
22			Imported materials	Imported materials to the site shall be sourced from a reputable supplier to ensure that only clean material is brought to site.	To be updated.	CEMP	Applicant/ Contractor
23			Dewatering all groundwater	Dewatering all groundwater from the trench and joint bays will be managed in line with industry best practices. Groundwater and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Solids-contaminated water will be discharged to a designated percolation area designated by a competent person if the soil is not waterlogged. In the case of heavy contamination, the water will either be removed off-site for disposal in a licensed facility by tank truck or pumped to a portable on-site settlement tank for treatment. These operations will be monitored by a designated competent member of the construction team on a regular basis to ensure that they are working effectively.	To be updated.	CEMP	Applicant/ Contractor
24			Temporary storage of CBM 4	Temporary storage of CBM 4 will be carefully managed. This will be stored on hardstanding areas only where there is no direct drainage to surface waters and where the area has been bunded. Will be applied by using sandbags and geotextile sheeting or silt fencing to contain any solids in run-off.	To be updated.	CEMP	Applicant/ Contractor
25			County Geological Site	The cable route and TJB has been developed to minimise impact on the County Geological Sites along the coast.	To be updated.	CEMP	Applicant/ Contractor
26			Imported crush rock	Imported crushed rock which is imported to the site shall be sourced from a reputable supplier to ensure that only clean material is brought to site.	To be updated.	CEMP	Applicant/ Contractor
27			Drainage	All drainage likely to be affected or disturbed during the construction phase will be identified and reinstated.	To be updated.	CEMP	Applicant/ Contractor
28			Storage and handling of oils, fuels, chemicals and hydraulic fluids	•The storage and handling of oils, fuel, chemicals and hydraulic fluids will be in secure areas within the site compounds and will not occur within a minimum of 10 m from watercourses; •Storage of fuels, chemicals and lubricants at the Contractor's compound must be fenced off and have a lockable gate to prevent unauthorised access or vandalism. •The principal control measures are as outlined in section 5.7 of the CEMP.	To be updated.	CEMP	Applicant/ Contractor
29			GSI Recommendations	The following GSI recommendations are also included within the proposed works: •Access to the site is to be provided for GSI staff during construction to record the exposures of glacial till within the works; and •GSI are to be provided sufficient notification of the commencement of works to allow GSI staff the opportunity to schedule resources to inspect the site.			Applicant/ Contractor
30	Hydrology and Flood Risk	Chapter 22	Reinstatement of steam beds	Following the installation of the cable ducts within watercourse crossings, in the case of an open trench construction method, the stream bed will be reinstated with original or similar material under the supervision of an aquatic ecologist.	To be updated.	CEMP	Applicant/ Contractor
31			Surface water Management	The contractor will be required to implement the following surface water management measures prior to commencing construction and decommissioning works on site, in accordance with Best Practice Guidance for the storage of oil BPGCS005 – Oil Storage Guidelines (Enterprise Ireland, nd), and CIRIA guidance (Report No.113 titled "Control of groundwater for temporary works" (CIRIA, 1986)). The mitigation measures will include and are not limited to those set out in 5.1.13 of the CEMP:	To be updated.	CEMP	Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation		
No.	**Topic**	**EIAR Chapter**	**Aspect**	**Commitment (please read in conjunction with the EIAR chapter)**	**Related Planning Condition**	**Relevant document for Implementation**	**Responsible Party**
32	Air Quality	Chapter 23	Traffic Management Plan	Implement Construction Traffic Management Plan (CTMP)	To be updated.	CEMP, CTMP	Applicant/ Contractor
33			Site roads	•Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only; •Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential); •All vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads; •Wheel will be self-contained systems that do not require discharge of the wastewater to water bodies; •Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary; •Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind; •Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; •All vehicles which present a risk of spillage of materials, while either delivering or removing materials, will be loaded in such a way as to prevent spillage on to the public road; •The Contractor will be required to ensure that all vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum; and •The Contractor will be required to monitor monthly dust deposition levels each month for the duration of construction for comparison with the guideline of 350 mg/m2/day (for non-hazardous dusts). This monitoring should be carried out at a minimum of four locations at sensitive receptors around the Project works. Where dust levels are measured to be above this guideline the mitigation measures in the area will be reviewed as part of the CEMP.	To be updated.	CEMP	Applicant/ Contractor
35	Noise and Vibration	Chapter 25	Competent professional	Contractor to engage a competent acoustician for the duration of construction.	To be updated.	CEMP	Applicant/ Contractor
36			Monthly noise and vibration report	Implement noise control measures as outlined in section 5.1.11 of CEMP.	To be updated.	CEMP	Applicant/ Contractor
37	Cultural Heritage	Chapter 26	Cultural Heritage Sites	The construction team will be made aware of the locations of those upstanding structures that are designated RPS / NIAH sites and the Cultural Heritage sites situated in the immediate vicinity of the onshore cable corridor (Figure 26-4, Appendix 26-1-4, Tables 26-2, 26-3 and 26-5). This will be incorporated into the EMP.	To be updated.	CEMP	Applicant/ Contractor
38			CH6 impacted section	(CH6) A photographic and written record of the impacted section of the rubble stone wall at Drumcar will be made. The impacted section of the wall will be rebuilt using traditional methods and the same materials subject to agreement and any other requirements as may be agreed with the planning authority prior to the commencement of construction	To be updated.	CEMP	Applicant/ Contractor
39			GS2 impacted section	A section of woodland shelterbelt associated with the former Drumcar Demesne (GS2) will be impacted. Replanting to restore any breach in the wooded shelterbelt with similar trees will be undertaken.	To be updated.	CEMP	Applicant/ Contractor
40			Mad chair	The location of the boulder known as the 'Mad Chair of Dunany' on Dunany beach (located outside the planning application boundary at approximately ITM 715647, 791296) will be made known to the construction team;	To be updated.	CEMP	Applicant/ Contractor
41			Dunany Demense wall	An exclusion zone (i.e. where no construction or earthmoving works will take place) of >5 m from the southern walled/hedgerow boundary of Dunany Demesne will be maintained during construction; and	To be updated.	CEMP	Applicant/ Contractor
42			Dunany Demense wall	No works will be carried out that will damage the boundary wall of Dunany Demesne. The proposed permanent access track to TJB (Option 2) will be installed 5 m away from the Dunany Demesne wall to ensure no impact on this feature.	To be updated.	CEMP	Applicant/ Contractor
43			Dunany Demense south boundary wall	The sections of wall that will be impacted will: (i) have vegetation cleared by hand under supervision by a licensed archaeologist. (ii) have a detailed drawn, photographic and condition survey that will inform a conservation-led method statement for reconstruction. (iii) be dismanted and reconstructed by hand under supervision of the licensed project archaeologist	To be updated.	CEMP	Applicant/ Contractor
44			AAP1 – AAP7	See measure for protection in section 5.11 of CEMP	To be updated.	CEMP	Applicant/ Contractor
45	Landscape and Seascape	Chapter 27	Onshore cable route	Replacement hedgerow planting at locations along the onshore cable route; shallow rooting species where required over the onshore cable route to prevent disturbance of the cable by roots.	To be updated.	CEMP	Applicant/ Contractor
46			Onshore cable route	Restoration and repair of gates and fences that have been removed/damaged during the construction works; and	To be updated.	CEMP	Applicant/ Contractor
47	Traffic and Transport	Chapter 28	Traffic management	Implement CTMP	To be updated.	CTMP	Applicant/ Contractor
48			Visibility splays	Implement sightlines In accordance with TII Publication DN-GEO—03060 (TII, 2017) are provided for the substation access and temporary access to the site compounds; and	To be updated.	CTMP	Applicant/ Contractor
49			Traffic management	It is recommended that discussions will be had with St Finian's National School and the St Colmcille National School schools to determine if there is any impact on bus routes/access. The sequencing of the works could be altered to ensure that works take place during school holidays.	To be updated.	CEMP	Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation		
No.	**Topic**	**EIAR Chapter**	**Aspect**	**Commitment (please read in conjunction with the EIAR chapter)**	**Related Planning Condition**	**Relevant document for Implementation**	**Responsible Party**
50	Material Assets	Chapter 29	Disruption to built services	Any disruption to built services will be reinstated as soon as practicable, unless otherwise agreed with the asset owner, and where practicable by the Contractor;	To be updated.	CEMP	Applicant/ Contractor
51			Liaison and planning	· Where required, ducting will be provided to allow for the provision of services (electrical/water) across severed areas unless otherwise agreed with the asset owner and where practicable;	To be updated.	CEMP	Applicant/ Contractor
52			Ducting	· Any disruption to water supply will be reinstated immediately by the Contractor or an alternative source supplied until the source is reinstated, unless otherwise agreed with the landowner or Uisce Éireann as appropriate;	To be updated.	CEMP	Applicant/ Contractor
53			Liaison and planning	· Prior to commencement of construction works the Contractor will be required to engage with all built services providers. The Contractor will continue liaison with providers as required throughout the construction phase;	To be updated.	CEMP	Applicant/ Contractor
54				· Prior to any mechanical excavation taking place, there will be consultation with ESB Networks to establish and verify the exact locations of all underground electricity cables. Gas Networks Ireland (GNI) will also be consulted, and the exact position of the two gas transmission gas pipelines will be verified prior to works commencing; and	To be updated.	CEMP	Applicant/ Contractor
55				· All work being conducted in the vicinity of underground services will be completed in accordance with the current Health and Safety Authority (HSA) 'Code of Practice for Avoiding Danger from Underground Services'. Furthermore, the ESB Code of Practice and HSA guidance, including the 'Code of Practice for Avoiding Danger from Overhead Electricity Lines', regarding exclusion and safe operating distances around electricity infrastructure will be adhered to. Height restriction barriers and equipment will be used to demark electrical infrastructure.	To be updated.	CEMP	Applicant/ Contractor
56	Resource and Waste Management	Chapter 30	Waste management	Any waste and/or coastal litter arising from the construction, operation and maintenance, and decommissioning phases of the Project will be managed in accordance with the current national waste policy. Any waste and/or coastal litter that cannot be prevented or reused will be deposited at an appropriate facility;	To be updated.	CEMP	Applicant/ Contractor
57			Notification of waste or hazardous material	If any unforeseen waste or hazardous material is encountered during the course of the Project, the EPA will be notified, and the material will be deposited at an appropriate waste facility	To be updated.	CEMP	Applicant/ Contractor
58			Waste manager	A Waste Manager will be nominated who will have overall responsibility for the implementation of all waste processes. In conjunction with this, a clear responsibility structure will be introduced in the Project team to ensure difficulties encountered are raised at an appropriate level and acted upon.	To be updated.	CEMP	Applicant/ Contractor
59			Records of waste	Records will be kept on the quantity nature/type and quality of all waste leaving the site.	To be updated.	CEMP	Applicant/ Contractor
60			Waste management	•The management of waste generated by the Project will reflect the waste management hierarchy, with waste prevention and minimisation being the priority succeeded by reuse and recycling. Where there are opportunities for the beneficial reuse and recycling of materials, these will be considered; •Excess material will be made available for reuse off-site. It is anticipated that the available material will be a clean and valuable resource capable of meeting the specifications of a typical Class 1 material. This material can be reused in local projects under development, assuming by-product classification can be achieved. Alternatively, the material can be recovered at quarries in the local area and beyond. The availability of the material and the scheduling of local construction projects will be kept under review as the project develops. If reuse of surplus material is not possible, it will be sent for appropriate recovery. Any site identified for recovery of soil and stone will require the appropriate planning permission and waste authorisation in place to accept the material on-site; •Sustainable practices will be implemented when choosing materials to be used in the construction of the Project, including the use of cement containing high levels of GGBS or recycled steel (see volume 2C, chapter 17: Climate for further detail relating to sustainable materials);	To be updated.	CEMP	Applicant/ Contractor
61			Waste management plan	All Contractors (and their Sub-Contractors) will produce a Waste Management Plan (WMP), providing details of all waste management procedures for their activities and details of expected waste arisings and proposed procedures for waste management. The Contractor's Environmental Manager will be responsible for the compilation of this document which will implement all the measures outlined in section 5.15 of the CEMP.	To be updated.	CEMP	Applicant/ Contractor

ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report - Addendum
Appendix 5-2 Addendum: Environmental Management Plan

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EIAR– Appendix 5-2
Addendum
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Contents

Acronyms

Term	Meaning
ADD	Acoustic Deterrent Device
AEZ	Archaeological Exclusion Zone
CLM	Community Liaison Manager
CV	Curriculum Vitae
ECoW	Environmental Clerk of Works
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
FLO	Fisheries Liaison Officer
HWM	High Water Mark
IEMA	Institute for Environmental Management and Assessment
IFI	Inland Fisheries Ireland
MAC	Maritime Area Consent
MARPOL	International Convention for the Prevention of Pollution from Ships
MMO	Marine Mammal Observer
MPCP	Marine Pollution Contingency Plan
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OFLO	Offshore Fisheries Liaison Officer
OSS	Offshore Substation
OWL	Oriel Wind Limited
PAM	Passive Acoustic Monitoring
RAMS	Risk Assessment Method Statements
SEAR	Safety and Environmental Awareness Report
TII	Transport Infrastructure Ireland
WMP	Waste Management Plan

1 INTRODUCTION

1.1 Purpose

A planning application for the Oriel Wind Farm Project (hereafter referred to as 'the Project') was submitted to An Coimisiún Pleanála (ACP) (formerly An Bord Pleanála) in May 2024. The Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS), which accompanied the planning application (case reference ABP-319799-24), included an Environmental Management Plan (EMP) in appendix 5-2: Environmental Management Plan (EIAR volume 2A) and appendix K: Management Plans (NIS).

This Addendum provides information to supplement the EMP presented in appendix 5-2: EMP (EIAR volume 2A) and appendix K: Management Plans (NIS). It has been prepared in response to a Request for Further Information (RFI) from ACP regarding the planning application for the Project.

The 'Schedule-Further Information Request' provided by ACP listed 19 items of further information. The Schedule did not request further information on the EMP. However, as a result of preparation of the information in response to the RFI, changes have arisen that require an update to the EMP. These changes are presented in this document.

The section and subsection headings in this Addendum correspond to those used in the EIAR and NIS. The reader is directed to review the information presented in this Addendum alongside the EMP in the EIAR and the NIS.

It will be the responsibility of the appointed Contractor to further update the Project's management plans, together with any updates set out in this Addendum, prior to the commencement of the construction phase.

The EMP will form part of the Oriel Offshore Works Contract. The methods and principles contained herein, as well as within referenced legislative instruments and published guidance documents, will be adhered to by the Contractor in developing construction method statements and other plans relating to environmental management as required by the Contract.

This version of the EMP (Version 1.0A) presents minimum environmental management requirements to be adhered to by the Contractor. This EMP will be further developed and updated following receipt of planning consent to incorporate relevant planning conditions and further details on environmental management measures to be applied during the construction phase. The EMP will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect the environment, are implemented.

1.2 Scope

There are no changes to appendix 5-2: Environmental Management Plan.

1.3 Aims and objectives

There are no changes to appendix 5-2: Environmental Management Plan.

1.4 Document structure

There are no changes to appendix 5-2: Environmental Management Plan.

1.5 Other relevant documents

The following relevant documents have been updated in response to the RFI:

- Appendix 5-2 Addendum: Marine Pollution Contingency Plan Addendum, which forms Annex 2 of this document;
- Marine Megafauna Mitigation Plan Addendum (see appendix 5-4); and

- An updated Lighting and Marking Plan (see appendix 5-8 Addendum (EIAR volume 2A Addendum)).

1.6 Description of the Project

There have been no changes to the offshore infrastructure design and therefore there are no changes to appendix 5-2: Environmental Management Plan (EIAR volume 2A).

1.7 Consents

There are no changes to appendix 5-2: Environmental Management Plan.

2 PART I: MANAGEMENT, IMPLEMENTATION AND COMMUNICATION

2.1 Roles and responsibilities

2.1.1 Overview

There are no changes to appendix 5-2: Environmental Management Plan.

2.1.2 Key OWL management roles relating to environmental management

There are no changes to appendix 5-2: Environmental Management Plan.

2.1.3 Contractors and subcontractors

There are no changes to appendix 5-2: Environmental Management Plan.

2.1.4 Supporting environmental roles

There are no changes to appendix 5-2: Environmental Management Plan.

2.1.5 Contact details

There are no changes to appendix 5-2: Environmental Management Plan.

2.2 Communications and reporting

The Applicant will engage with relevant aviation stakeholders (i.e. DAA Dublin Airport, AirNav Ireland and the IAA) in advance of the commencement of offshore construction works, including deployment of the installation vessels with cranes to the site. The Applicant will ensure that sufficient notification of intention to commence crane operations is provided to all relevant stakeholders. Please refer to section 14.8.2 of chapter 14 Addendum: Aviation, Military and Communications (EIAR volume 2B Addendum).

2.3 External communications

There are no changes to appendix 5-2: Environmental Management Plan.

2.3.1 Incident reporting

There are no changes to appendix 5-2: Environmental Management Plan.

2.3.2 Dropped objects

There are no changes to appendix 5-2: Environmental Management Plan.

2.4 Training, auditing and change management

2.4.1 Competence, training and change management

There are no changes to appendix 5-2: Environmental Management Plan.

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2.4.2 Monitoring and audits

There are no changes to appendix 5-2: Environmental Management Plan.

2.4.3 Review and change management

There are no changes to appendix 5-2: Environmental Management Plan.

3 PART II: ENVIRONMENTAL IMPACTS AND CONTROL MEASURES

3.1 Environmental impacts and control measures

An updated commitments register which includes further mitigation arising from further assessments completed in response to the RFI is included in Annex 5 of this EMP.

3.2 Management of key environmental aspects and compliance obligations

3.2.1 Marine species

An updated appendix 5-4 Addendum: Marine Megafauna Mitigation Plan (EIAR volume 2A Addendum and appendix K Addendum of the NIS) and an appendix 5-16: Monitoring Programme (EIAR volume 2A Addendum) will be implemented in addition to requirements set out in appendix 5-2: Environmental Management Plan (EIAR volume 2A) and appendix K of the NIS.

3.2.2 Marine archaeology

There are no changes to appendix 5-2: Environmental Management Plan.

3.2.3 Other marine users

Updates to management and mitigation of potential impacts on other marine users have been made and can be found in appendix 5-8 Addendum: Lighting and Marking Plan (EIAR volume 2A Addendum).

Additional measures have been proposed in appendix 13-2: Safety Justification For Single Line of Orientation (EIAR volume 2B Addendum) and appendix 13-3: Response to Department of Transport (MSO) (EIAR volume 2B Addendum).

3.2.4 Marine pollution prevention and contingency planning

An Addendum to the Marine Pollution Contingency Plan has been made and is included as Annex 2 of this EMP.

3.2.5 Marine invasive non-native species

There are no changes to appendix 5-2: Environmental Management Plan.

3.2.6 Resource and waste management

There are no changes to appendix 5-2: Environmental Management Plan.

4 PART III: ANNEXES

Changes have been made as part of this Addendum to the following Annexes:

- Annex 2: Marine Pollution Contingency Plan (MPCP);
- Annex 5: Commitments Register.

ANNEX 1: ENVIRONMENTAL POLICY

There are no changes to appendix 5-2: Environmental Management Plan.

ANNEX 2: MARINE POLLUTION CONTINGENCY PLAN

An Addendum to the Marine Pollution Contingency Plan has been made and is included as Annex 2 of this EMP.

ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report - Addendum
Annex 2 Addendum: Marine Pollution Contingency Plan (MPCP)

MDR1520C
EIAR – App. 5-2 Addendum:
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Contents

1 INTRODUCTION

This document provides an Addendum to the Marine Pollution Contingency Plan (MPCP) included as annex 2 of appendix 5-2: Environmental Management Plan (EMP) (EIAR volume 2A). It provides information to supplement the pollution response arrangements for the Oriel Wind Farm Project (hereafter referred to as the "Project"). It has been prepared in response to a Request for Further Information (RFI) from An Coimisiún Pleanála (ACP) (formerly An Bord Pleanála) regarding the planning application (case reference 319799) for the Project. There was no specific request for further information regarding the MPCP, however the Applicant has provided this Addendum in light of the publication of new guidance.

1.1 Updated Guidance

The MPCP highlighted in section 1.3 that guidance on navigation risk and emergency response assessment from the Department of Transport was in draft at the time of publication of the EIAR and that the MPCP would comply with the final guidance once published, in particular with regard to Oil/HNS Spill Contingency Plans.

In June 2025, the Department of Transport published a document entitled 'Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI)' (IRCG, 2025a). This guidance aims to address the navigational and emergency response impacts of OREI proposed in Irish waters.

It highlights that the Irish Coast Guard (IRCG) is prescribed under the National Maritime Oil/HNS Spill Contingency Plan 2024 to review and approve Oil/HNS Spill Contingency Plans (OSCPs) and the wider Emergency Response Co-Operation Plans (ERCoPs) for offshore units and for oil handling facilities. Such an agreed OSCP must be in place prior to construction commencing as a condition of development consent.

The Applicant commits to developing an OSCP that complies with the template outlined in Appendix D of Standard Operating Procedure 07-2025 Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response (IRCG, 2025b) and submitting it for review by IRCG prior to construction commencing. Once the OSCP is agreed, the Applicant is committed to implementing it during all phases of the Project. The OSCP will be updated with a new version for the operational and maintenance phase of the Project.

References

Irish Coast Guard (IRCG) (2025a) Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI), Available at: https://www.gov.ie/en/department-of-transport/publications/the-maritime-navigation-safety-emergency-response-guidance-documents-for-offshore-renewable-energy-installations-orei/ [Accessed 15/10/2025].

Irish Coast Guard (IRCG) (2025b) Standard Operating Procedure 07-2025 Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response, Available at: https://www.gov.ie/en/publication/79e5d-national-maritime-oilhns-spill-contingency-plan-nmoscp/ [Accessed 15/10/2025].

ANNEX 3: ENVIRONMENTAL INCIDENT REPORTING PROCEDURE

There are no changes to appendix 5-2: Environmental Management Plan.

ANNEX 4: PROPOSED DROPPED OBJECTS REPORTING FORM

There are no changes to appendix 5-2: Environmental Management Plan.

ANNEX 5: COMMITMENTS REGISTER

An updated commitments register which includes further mitigation arising from further assessments completed in response to the RFI is included in this document. Changes are shown in blue text.

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	**Topic**	**EIAR Chapter/ Other**	**Aspect**	**Commitment**	**Related Planning Condition**	**Project Phase**	**Relevant document for Implementation**	**Responsible Party**
1	Marine Process	Chapter 7	Scour protection	In the absence of scour protection, there is potential for scour pits to develop around foundations. This may result in the release of sediment into the water column and a change to seabed habitat in the vicinity of the foundation. Where required, scour protection will be installed as described in volume 2A, chapter 5: Project Description.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
2			Cables	The cables will be buried below the seabed wherever possible, to a minimum burial depth of 0.5 m and a maximum burial depth of up to 3 m. The appointed contractor will be required prior to the construction phase to submit details on the cable specification and installation methodology. This will include details on the cable laying, including geotechnical data, cable laying techniques and a cable burial risk assessment. Also, in advance of any cable repair, the contractor will be required to submit details on the parameters of the repair or reburial activities and the proposed methodology.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Cable specification and installation methodology	Applicant/ Contractor
3			Cables	The offshore cable will be installed through the intertidal zone using open cut trenching methods. The material will be excavated and reinstated on a layer-by-layer basis to minimise impacts on sediment structure and profile.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
4			EMP MPCP	An Environmental Management Plan (EMP) (see volume 2A, appendix 5-2: Environmental Management Plan & Addendum) will be implemented during the construction, operation and maintenance and decommissioning phases of the Project. The EMP includes Project specific measures and commitments and a Marine Pollution Contingency Plan (MPCP (see volume 2A, appendix 5-2 (Annex 2)). Measures also include designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds within the Project Infrastructure, i.e. WTG and offshore sub-station to ensure that the potential for release of pollutants from construction, operational and maintenance, and decommissioning is minimised. In this manner, accidental release of contaminants from vessels and Project infrastructure will be strictly controlled, thus providing protection for marine life across all phases of the Project development.	To be updated	Construction Operation & Maintenance Decommissioning	EMP, MPCP	Applicant/ Contractor
5			ERCoP	This plan describes the actions to be taken in an emergency during both construction and operation, details the resources available to support those actions, and provides emergency contact details.	To be updated	Construction Operation & Maintenance Decommissioning	ERCoP	Applicant/ Contractor
6			MINNSMP	A Marine Invasive Non-Native Species Management Plan (volume 2A, appendix 5-3 Marine Invasive Non-Native Species Management Plan) will be implemented. The plan outline measures to ensure vessels comply with the International Maritime Organisation (IMO) ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as measures to be adopted in the event that a high alert species is recorded.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	MINNSMP	Applicant/ Contractor
7	Benthic and Intertidal Ecology	Chapter 8	EMP MPCP	An Environmental Management Plan (EMP) (see volume 2A, appendix 5-2: Environmental Management Plan) will be implemented during the construction, operation and maintenance and decommissioning phases of the Project. The EMP includes Project specific measures and commitments and a Marine Pollution Contingency Plan (MPCP (see volume 2A, appendix 5-2 (Annex 2)). Measures also include designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds.	To be updated	Construction Operation & Maintenance Decommissioning	EMP, MPCP	Applicant/ Contractor
8			Pre-Construction Survey	A pre-construction survey will be undertaken within the Project offshore wind farm area and offshore cable corridor to identify any areas of reef habitat (particularly Modiolus beds and S. spinulosa reef habitats). This will include a drop-down video survey to determine the extent, distribution and quality/condition of any reef. Should reef areas be identified during pre-construction surveys, appropriate measures will be agreed with regulatory and nature conservation bodies to avoid direct impact on these features. Where possible, features will be avoided by layout refinement of foundations and cables.	To be updated	Pre-Construction Construction		Applicant/ Contractor
9			MINNSMP	A Marine Invasive Non-Native Species Management Plan (volume 2A, appendix 5-3 Marine Invasive Non-Native Species Management Plan) will be implemented. The plan outline measures to ensure vessels comply with the International Maritime Organisation (IMO) ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as measures to be adopted in the event that a high alert species is recorded.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	MINNSMP	Applicant/ Contractor
10			Re-Instatement of Rock	Reinstatement of rock in the intertidal zone following cable installation. Any cut rock will be placed back on top of the cable to backfill the trench.	To be updated	Construction		Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	**Topic**	**EIAR Chapter/ Other**	**Aspect**	**Commitment**	**Related Planning Condition**	**Project Phase**	**Relevant document for Implementation**	**Responsible Party**
11	Fish and Shellfish	Chapter 9	EMP	An Environmental Management Plan (EMP) (see volume 2A, appendix 5-2: Environmental Management Plan) will be implemented during the construction, operational and maintenance and decommissioning phases of the Project. The EMP includes project specific measures and commitments and a Marine Pollution Contingency Plan (MPCP). Measures also include designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds.	To be updated	Construction Operation & Maintenance Decommissioning	EMP, MPCP	Applicant/ Contractor
12			Cables	The cables will be buried below the seabed wherever possible, to a minimum burial depth of 0.5 m and a maximum burial depth of up to 3 m. The final selected installation method and target burial depth will be defined prior to construction based on a detailed cable burial risk assessment. The appointed contractor will be required prior to the construction phase to submit details on the cable specification and installation methodology. This will include a detailed cable laying plan, including geotechnical data, cable laying techniques and a cable burial risk assessment. In advance of any cable repair, the contractor will prepare details on the able repair methodology repair or reburial activities setting out the parameters of the repair or reburial activities and the proposed methodology.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Cable specification and installation methodology	Applicant/ Contractor
13			Piling Operations	During piling operations, soft starts will be used, following NPWS (2014) guidelines. This will involve the implementation of lower hammer energies (i.e. approximately 10-15% of the maximum hammer energy) at the beginning of the piling sequence before energy input is 'ramped up' (increased) over time to required higher levels (also known as a soft-start). The Applicant commits to implementing phased piling alongside other adjacent offshore wind farms in the western Irish Sea as part of a Piling Strategy. This strategy will be prepared post consent and will set out measures for collaboration with other projects to reduce the potential for an in-combination effect. This will include a stepped strategy which follows the mitigation hierarchy - avoid, reduce, mitigate. Consequently, if phased piling is required a collaborative approach will be explored and information presented to demonstrate how a phased piling approach can contribute to the reduction in underwater sound from piling. Piling activities will be scheduled to avoid piling in the northwest corner of the offshore wind farm area during the key spawning period for herring (i.e. September and October; (ICES., 2013; 1998). Surveys of herring spawning activity will also be undertaken pre, during and post construction which will help to further refine the spawning period and distributions which will inform scheduling of construction operations during the peak herring spawning period.	To be updated	Construction	'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' (NPWS, 2014)	Applicant/ Contractor
14	Marine Mammals and Megafauna (including Subsea Noise)	Chapter 10	EMP MPCP	An Environmental Management Plan (EMP) (see volume 2A, appendix 5-2: Environmental Management Plan & Addendum) will be implemented during the construction, operational and maintenance, and decommissioning phases of the Project. The EMP includes Project mitigation/monitoring measures and commitments and a Marine Pollution Contingency Plan (MPCP) which includes key emergency contact details (e.g. Environmental Protection Agency (EPA)). The EMP includes mitigation such as designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and takes containing hazardous substances, and storage of these substances in impenetrable bunds. In this manner, accidental release of contaminants from vessels will be strictly controlled, thus providing protection for marine life across all phases of the Project.	To be updated	Construction Operation & Maintenance Decommissioning	EMP, MPCP	Applicant/ Contractor
15			MMMP	A Marine Megafauna Mitigation Plan (MMMP) (see volume 2A Addendum, appendix 5-4 Addendum: Marine Megafauna Mitigation Plan) will be implemented prior to construction. This includes the use of the MODIGA system with internal air bubble as a Noise Abatement System. The MMMP sets out the measures to apply in advance of and during piling activity, including the implementation of a mitigation zone, and monitoring by MMOs and Passive Acoustic Monitoring (PAM).	To be updated	Pre-Construction Construction	MMMP	Applicant/ Contractor
16			Piling Operations	During piling operations, soft starts will be used, following NPWS (2014) guidelines. This will involve the implementation of lower hammer energies (i.e. approximately 10-15% of the maximum hammer energy) at the beginning of the piling sequence before energy input is 'ramped up' (increased) over time to required higher levels (also known as a soft-start). The Applicant commits to implementing phased piling alongside other adjacent offshore wind farms in the western Irish Sea as part of a Piling Strategy. This strategy will be prepared post consent and will set out measures for collaboration with other projects to reduce the potential for an in-combination effect. This will include a stepped strategy which follows the mitigation hierarchy - avoid, reduce, mitigate. Consequently, if phased piling is required a collaborative approach will be explored and information presented to demonstrate how a phased piling approach can contribute to the reduction in underwater sound from piling.	To be updated	Construction	MMMP	Applicant/ Contractor
17			Geophysical Surveys	Geophysical surveys undertaken during the operational and maintenance phase will adopt similar measures as for piling operations, including the implementation of an approved MMMP and Vessel Code of Conduct (see volume 2A, appendix 5-4 Addendum: Marine Megafauna Mitigation Plan and volume 2A Addendum, appendix 5-5: Marine Megafauna: Vessel Code of Conduct). Measures include the use of a mitigation zone around operations, within which MMOs and PAM will ensure that no marine megafauna are present in the vicinity of the geophysical survey vessel, and the use of a soft-start to survey operation, where possible.	To be updated	Operation & Maintenance	MMMP, Marine Megafauna: Vessel Code of Conduct	Applicant/ Contractor
18			Marine Megafauna: Vessel Code of Conduct	A Vessel Code of Conduct (see volume 2A, appendix 5-5: Marine Megafauna: Vessel Code of Conduct) will be issued to all Project vessel operators, requiring them to: • Refrain from approaching animals in the water; • Keep vessel speed to a minimum, including near haul-outs; and • Avoid abrupt changes in course or speed should marine mammals approach the vessel to bow-ride. The Marine Megafauna: Vessel Code of Conduct will be adhered to at all times.	To be updated	Pre-Construction Construction	Marine Megafauna: Vessel Code of Conduct	Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	**Topic**	**EIAR Chapter/ Other**	**Aspect**	**Commitment**	**Related Planning Condition**	**Project Phase**	**Relevant document for Implementation**	**Responsible Party**
19			Cables	The cables will be buried below the seabed wherever possible, to a minimum burial depth of 0.5 m and a maximum burial depth of 3 m. The appointed contractor will be required prior to the construction phase to submit details on the cable specification and installation methodology. This will include details on the cable laying, including geotechnical data, cable laying techniques and a cable burial risk assessment. Also, in advance of any cable repair, the contractor will be required to submit details on the parameters of the repair or reburial activities and the proposed methodology.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Cable specification and installation methodology	Applicant/ Contractor
20			ADD	Mitigation will also be applied by use of an Acoustic Deterrent Device (ADD) to minimise impacts arising from injury to marine megafauna from underwater noise during pile-driving by deterring animals to move beyond the predicted injury zone.	To be updated	Construction		Applicant/ Contractor
21	Offshore Ornithology	Chapter 11	EMP	An Environmental Management Plan (EMP) will be implemented during the construction, operational and maintenance, and decommissioning phases of the Project (see volume 2A, appendix 5-2: Environmental Management Plan & Addendum). The EMP includes a plan for minimising disturbance to rafting seabirds from construction vessels. Measures include: • Use of existing navigation approaches to port; avoid over-revving engines to minimise noise; and • Avoidance of rafting seabirds and seaducks en-route between work areas and port, or within the offshore wind farm area and offshore cable corridor, achieved through briefing (e.g. toolbox talks) of vessel crew about the purpose and implications of the vessel management practices.	To be updated	Construction Operation & Maintenance Decommissioning	EMP	Applicant/ Contractor
22			EMP MPCP	The EMP includes a Marine Pollution Contingency Plan (MPCP) which will include key emergency contact details (e.g. Environmental Protection Agency (EPA)). Measures for the MPCP include: • Designated areas for refuelling where spillages can be easily contained; • Storage of chemicals in secure designated areas in line with appropriate regulations and guidelines; and • Double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds.	To be updated	Construction Operation & Maintenance Decommissioning	EMP, MPCP	Applicant/ Contractor
23	Commercial Fisheries	Chapter 12	Notification of Construction, Maintenance and Decommissioning Activities	Notification of construction, maintenance and decommissioning activities, including the nature, timing and location of activities, with details of any associated safety zones and advisory clearance distances, via Notices to Mariners.	To be updated	Construction Operation & Maintenance Decommissioning	FMMS	Applicant/ Contractor
24			Liaison with Fishing Fleets	Ongoing liaison with all fishing fleets (including regular Notice to Mariners).	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	FMMS	Applicant/ Contractor
25			Marine Coordination	Appropriate marine coordination to ensure risks associated with construction, maintenance and decommissioning vessels are minimised.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
26			Guard Vessels	Use of guard vessels, where appropriate.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
27			Aid to Navigation LMP	Implementation of Aids to Navigation (marking and lighting) (including temporary Aids to Navigation on any partially constructed turbines) see volume 2A Addendum, appendix 5-9 Addendum: Updated Lighting and Marking Plan (LMP).	To be updated	Construction Operation & Maintenance	LMP	Applicant/ Contractor
28			Marine Safety Zone	The Applicant will seek to maintain Marine Safety Zones of 500 m in radius around individual structures undergoing installation or decommissioning. Advisory Marine Safety Zones of 500 m will be implemented for incomplete structures at which construction activity may be temporarily paused. During the operational and maintenance phase, the Applicant will also seek to maintain Marine Safety Zones of 500 m in radius around infrastructure undergoing major maintenance (for example a blade replacement). The Applicant will implement an advisory clearance distance of 500 m in radius around cable installation vessels and cable repair vessels.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
29			FMMS	Volume 2A, appendix 5-7: Fisheries Management and Mitigation Strategy will be implemented in consultation with local fishing interests (and other interests as appropriate). The FMMS is prepared in accordance with available good practice guidance and with relevant policy set out in the NMPF (DHLGH, 2021). Current best practice guidance with regard to fisheries liaison management and mitigation in respect of offshore wind farm projects is represented by the Seafood/ORE Engagement in Ireland (DHLGH, 2023) and the UK Fishing Liaison with Offshore Wind and Wet Renewables (FLOWW) Group (FLOWW, 2014; 2015). The FMMS includes: • Details of roles and responsibilities, including Applicant responsibilities and details of the roles of the Fisheries Liaison Officer, and Fisheries Industry Representative; • Details of protocols for communication and information transfer; and • Measures to encourage co-existence and management measures, including those outlined above.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	FMMS	Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	**Topic**	**EIAR Chapter/ Other**	**Aspect**	**Commitment**	**Related Planning Condition**	**Project Phase**	**Relevant document for Implementation**	**Responsible Party**
30	Shipping and Navigation	Chapter 13	Notice to Mariners	Promulgation of information and warnings through Notice to Mariners and other appropriate Maritime Safety Information (MSI) dissemination methods. See also section 2.8.2 in appendix 13-3: Response Department of Transport (MSO) for further mitigaiton measures relating to Notice to Mariners. Throughout the life of the wind farm, regular liaison meetings to be held between project, sub-contractors and local marine stakeholders such as local harbour authorities, pilots, fishermen, and leisure groups such as yacht clubs. Information and warnings concerning any restrictions to navigation, including the imposition of any safety zones to be promulgated by Radio Navigation Warning Signals (NAVAREA 1 or HYDROLANT), Notice to Mariners, Notice to Airmen Publication.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	EMP	Applicant/ Contractor
31			Multi-Channel VHF	The Project to provide continuous watch by multi-channel VHF, including Digital Selective Calling (DSC).	To be updated	Construction Operation & Maintenance Decommissioning	EMP	Applicant/ Contractor
32			Safety Zones	The applicant will seek to maintain advisory marine safety zones of 500 m radius to be implemented around WTGs and other offshore infrastructure undergoing construction/decommissioning or major maintenance activities. A rolling advisory clearance distance of 500 m in radius to be implemented around the cable laying vessel.	To be updated	Construction Operation & Maintenance Decommissioning	EMP	Applicant/ Contractor
33			Aid to Navigation LMP	Marker buoys and/or other AtoN will be deployed on a device-specific basis. AtoN Marking and Lighting Plan to be submitted to IRCG/CIL for approval and implementation prior to construction, as detailed in appendix 13-1: Navigation Risk Assessment. The plan will consider the necessary AtoN requirements (including specification, location and maintenance requirements) for the construction, operation and decommissioning phases of the Project. The AtoN management plan will be agreed prior to commencement of construction and should be developed in conjunction with IALA (2021) G1162 The Marking of Man-Made Offshore Structures. The Applicant proposes revisions to the location of navigational bouys to the north of the Project as outlined in section 2.8.2 of volume 2B Addendum, appendix 13-3: Response to Department of Transport (MSO) Submission.	To be updated	Construction Operation & Maintenance Decommissioning	LMP	Applicant/ Contractor
34			Vessel Traffic Monitoring	Project to undertake vessel traffic monitoring by: AIS, VHF, Closed Circuit Television (CCTV) with all Project-related vessels throughout all phases.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
35			Safety documents	The following safety documents will apply: Emergency Response Co-operation Plan (ERCoP): An ERCoP has been prepared and will be agreed with the IRCG and other key stakeholders as detailed in appendix 13-1: Navigation Risk Assessment prior to construction. The ERCoP (see volume 2A, appendix 5-8: Lighting and Marking Plan) details the emergency response planning requirements for the Project (at all stages) as directed by the IRCG and includes: • Organisational information including roles and responsibilities for emergencies, equipment and facilities and liaison arrangements between the Applicant and IRCG; • Search and Rescue information including role and responsibility of SAR coordinators, IRCG, communication requirements, SAR facilities (primary – e.g. SAR helicopters, secondary e.g. RNLI lifeboats), and medical advice / assistance; • SAR Exercise requirements; • Support Arrangements including shoreside reception arrangements, procedures on informing next of kin, etc. • Additional Information including duties and functions of various participants in SAR operations; • Project specific information (e.g. size, type and configuration of the infrastructure including support and maintenance vessels, details of proposed project activities for all phases, project SAR equipment and emergency response, etc.); and • Emergency Action Card detailing emergency contact details, wind farm summary, WTG specific information, communications, monitoring, shutdown procedures, personal SAR location devices, mass evacuation details – etc. Navigation Safety Management System (NSMS): A NSMS will collate documents for management of navigational safety relevant to the marine activities from multiple sources. This includes documents created by the Project and those in place for third parties such as construction and maintenance contractors. As such the NSMS is not a singular plan but should include documentation related to: • Navigational safety measures during construction phase; • Navigational safety measures during operations and maintenance; • Procedures for Project vessels when at the offshore wind farm area and in port; • Details on promulgation of information; and • Emergency Response procedures (links to ERCoP – see above).	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	ERCoP, LMP	Applicant/ Contractor
36			Guard Vessels	Provision of a guard vessel to monitor third party vessel traffic and intervene with warnings, as necessary. Guard vessels will be used during the construction/decommissioning phases on a 24-hour basis (including the cable laying), and non-standard or major maintenance during the O&M phase, to patrol the offshore wind farm area and offshore cable corridor, monitor the effectiveness of control measures and advise any passing vessels of the works being conducted.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	**Topic**	**EIAR Chapter/ Other**	**Aspect**	**Commitment**	**Related Planning Condition**	**Project Phase**	**Relevant document for Implementation**	**Responsible Party**
37			Cable Burial Risk Assessment	A cable burial risk assessment will be conducted which will ensure cables are adequately buried so as not to become a navigation hazard, based on seabed characteristics and the density and distribution of vessel traffic. Where cable protection is used, this should not exceed a 5% reduction in under keel clearance (UKC). The cable burial risk assessment should be undertaken in line with the Carbon Trust Cable Burial and Risk Assessment Guidance (2015) for commercial shipping, fishing vessels and recreational craft based on: • Baseline vessel traffic analysis: Geospatial temporal/spatial analysis, shipping intensity, vessel type, size and characterisation; • Anchor / gear size / type by vessel usage and map present/future vessel anchorages/anchoring and fishing activity in proximity to the offshore cable corridor (including water depth, bed type ((geology, seabed features, bathymetry, sediments) and relevant MetOcean information); • Probabilistic modelling of anchor drag/likelihood/extent for commercial vessels based on historical incident data, recovery time, penetration, drag speed and holding ground; • Probabilistic modelling of fishing gear drag/likelihood/extent based on fishing gear type, incident data, recovery time, drag speed and holding ground; • Qualitative recreational vessel cable burial risk assessment; and • Based on results of the assessment identify the burial depth requirement for the Project cables.	To be updated	Pre-construction Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
38			Subsea Cables	Subsea cables to be buried to Marine Survey Office agreed depth which provides sufficient protection without compromising UKC.	To be updated	Construction Operation & Maintenance Decommissioning	Cable specification and installation methodology	Applicant/ Contractor
39			IMO Convention compliance	Compliance with IMO Conventions including the International Regulations for Preventing Collisions at Sea (COLREGs) and SOLAS (IMO, 1974).	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
40			FMMS	Production of a Fisheries Management and Mitigation Strategy (FMMS) (volume 2A, appendix 5-7: Fisheries Management and Mitigation Strategy) in line with best practice guidance with regard to fisheries liaison management and mitigation and in consultation with local fishing interests (see chapter 12: Commercial Fisheries).	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	FMMS	Applicant/ Contractor
41			WTG Blade Air Draught Clearance	WTG blade air draught clearance of at least 22 m above High Water Mark (HWM).	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
42			Charting	Charting of offshore structures, inter-array cables and offshore cable and landfall infrastructure on navigation charts. Inform UKHO and the Kingfisher Information Services Cable Awareness (KISCA) accordingly.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
43			Line of Orientation	Agree lines of orientation with IRCG. WTG and OSS layout plan to be agreed with IRCG/CIL prior to construction. Additional measures have been proposed as part of the Safety Justification for Single Line of Orientation (see appendix 13-2, EIAR volume 2B Addendum) such as the installation of cameras on WTG (see section 6).	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
44	Aviation, Military and Communications	Chapter 14	Warning Lights	All significant peripheral structures, to the highest point of the structure, will be fitted with high intensity warning lighting. Specific requirements are listed in IAA ASAM No: 018 (IAA, 2015a).	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
45			LMP	Implementation of a Lighting and Marking Plan (LMP) (see appendix 5-10 in volume 2A of the EIAR) setting out specific requirements in terms of aviation lighting to be installed on the turbines. The LMP will be prepared in consultation with the IAA, DoD and IRCG.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	LMP	Applicant/ Contractor
46			Information on Locations, Heights and Lighting Status of the Wind Turbines	The IAA will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of construction and the maximum heights of any construction equipment to be used, prior to the start of construction, to allow inclusion on Aviation Charts and in the IAA IAIP.	To be updated	Pre-Construction Construction		Applicant/ Contractor
47			Aeronautical Information Circulars	During the operational phase, the Project operator will issue, as necessary, requests to the IAA to submit Aeronautical Information Circulars (AIC) in the event of any failure of aviation lighting. Any light which fails shall be repaired or replaced as soon as is reasonably practicable. An alerting system for light failure will be put in place, such as remote monitoring or other suitable method agreeable to the IAA.	To be updated	Operation & Maintenance		Applicant/ Contractor
48			Aeronautical charts	All structures > 90 m amsl in height will be charted on aeronautical charts and reported to the IAA at least three months prior to construction, for input into the IAA's database of tall structures in Ireland.	To be updated	Pre-Construction		Applicant/ Contractor
49			Consultation of IAA and IRCG on Final Layouts	IAA and IRCG will be consulted on the final layout of the Project to ensure compatibility with SAR helicopter operations in the event of rescue missions within the wind farm.	To be updated	Pre-Construction		Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	**Topic**	**EIAR Chapter/ Other**	**Aspect**	**Commitment**	**Related Planning Condition**	**Project Phase**	**Relevant document for Implementation**	**Responsible Party**
50			Spacing of Blade Tip	A minimum spacing of 500 m will be maintained between blade tip to blade tip of all surface infrastructure (for OSS, this shall be taken as the outermost point of the infrastructure).	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
51			ERCoP	An Emergency Response and Cooperation Plan (ERCoP) will be in place for the operational and maintenance phase of the Project (see appendix 5-8 in volume 2A of the EIAR). The ERCoP details specific marking and lighting of the wind turbines and will consider helicopters undertaking SAR operations when rendering assistance to vessels and persons in the offshore wind farm area.	To be updated	Operation & Maintenance	ERCoP	Applicant/ Contractor
52			Promulgation of Information	Promulgation of information advising on the nature, timings and location of construction and decommissioning activities at the landfall location. Information and notices will be posted at the landfall location.	To be updated	Construction Decommissioning		Applicant/ Contractor
53			Consultation with Department of Defence & others	The Applicant will continue to consult with the DoD to better understand their aviation lighting requirements. The Applicant will engage with relevant aviation stakeholders (i.e. DAA Dublin Airport, AirNav Ireland and the IAA) in advance of the commencement of offshore construction works, including deployment of the installation vessels with cranes to the site. The Applicant will ensure that sufficient notification of intention to commence crane operations is provided to all relevant stakeholders	To be updated	Pre-Construcion Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
54	Marine Archaeology	Chapter 15	Marine Archaeological Consultation	Marine archaeologists to be consulted in the preparation of any pre-construction ROV/diver surveys and, if appropriate, in monitoring/checking of data.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Marine Archaeology Management Plan	Applicant/ Contractor
55			Archaeological Exclusion Zone	The identification and implementation of Archaeological Exclusion Zones (AEZs) around sites identified as having a known important archaeological potential.	To be updated	Pre-Construction Construction	Marine Archaeology Management Plan	Applicant/ Contractor
56			Unconfirmed Archaeological Potential	All anomalies of unconfirmed archaeological potential to be taken into account during final design. If they are likely to be impacted, these anomalies would undergo further archaeological investigation. Should these anomalies prove to be of archaeological importance then future AEZs may be implemented following consultation with NMS.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Marine Archaeology Management Plan	Applicant/ Contractor
57			Protocol for Archaeological Discoveries	Provision of a Marine Archaeological Management Plan (see volume 2A, appendix 5-10: Marine Archaeological Management Plan) including an Outline Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) similar to that set out by The Crown Estate 2014 for guidance on the mitigation of marine archaeology receptors and unexpected archaeological discoveries made during the course of the development.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Marine Archaeology Management Plan	Applicant/ Contractor
58			Marine Archaeological Consultation	Marine archaeologists to be consulted in advance of pre-construction site preparation activities (as included in the project description) and, if appropriate, to carry out watching briefs of such work.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Marine Archaeology Management Plan	Applicant/ Contractor
59			Mitigation of Unavoidable Direct Impacts	Mitigation of unavoidable direct impacts on known sites of archaeological importance. Options include i) preservation by record, ii) stabilisation.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning	Marine Archaeology Management Plan	Applicant/ Contractor
60	Infrastructure and Other Users	Chapter 16	Marine Safety Zone	The Applicant will implement advisory Marine Safety Zones of 500 m in radius around individual structures undergoing installation or decommissioning. Advisory Marine Safety Zones of 50 m will be implemented for incomplete structures at which construction activity may be temporarily paused. During the operational and maintenance phase, the Applicant will also apply for advisory Marine Safety Zones of approximately 500 m in radius around infrastructure undergoing major maintenance (for example a blade replacement).	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
61			Clearance distance	The Applicant will implement an advisory clearance distance of 500 m in radius around cable installation vessels and cable repair vessels.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
62			Notice to Mariners	Notice to Mariners will be issued through the Marine Survey Office in advance of construction and maintenance activities to inform all marine users of the location, time period and safety and navigational requirements for the planned activity.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
63			Promulgation of Information	Promulgation of information advising on the nature, timing and location of activities, including through Notices to Mariners. Information and notices will also be posted at the landfall location. The Applicant will directly issue Notices to Mariners.	To be updated	Pre-Construction Construction Operation & Maintenance Decommissioning		Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	Topic	EIAR Chapter/ Other	Aspect	Commitment	Related Planning Condition	Project Phase	Relevant document for Implementation	Responsible Party
64			Navigational Aids and Marine Charting LMP	Provision of suitable Navigational aids and marine charting, to be agreed with the Commissioner of Irish Lights (CIL). To include charting of all structures associated with the Project on relevant nautical and electronic charts and implementation of a buoyed construction/decommissioning area for the offshore wind farm area during each phase. Lighting and marking to be agreed with CIL via a Lighting and Marking Plan (see volume 2A, appendix 5-9: Lighting and Marking Plan). Requirements align with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 (IALA, 2013).	To be updated	Construction Operation & Maintenance Decommissioning	LMP	Applicant/ Contractor
65			Guard Vessels	The Applicant will use guard vessels during installation and major maintenance activities such as during cable repair activities or during use of jack up vessels.	To be updated	Construction Operation & Maintenance		Applicant/ Contractor
66	Resource and waste management	Chapter 30	EMP	Implementation of the Environmental Management Plan (EMP) (see volume 2A, appendix 5-2: Environmental Management Plan).	To be updated	Construction Operation & Maintenance Decommissioning	EMP	Applicant/ Contractor
67			Management of Waste: Vessels	All vessels will be required to manage waste in accordance with the accepted EU and international standards. These include the Sea Pollution Act, 1991, 1999, 2005 and 2006, the Dumping at Sea Act 1996, the International Convention on the Prevention of Pollution from Ships (MARPOL Convention), the European Communities (Port Reception Facilities for Ship-Generated Waste and Cargo Residues) Regulations 2003 (S.I. No. 117 of 2003), the Sea Pollution (Prevention of Pollution by Garbage from Ships) Regulations 2012 (S.I. No. 372/2012) and Sea Pollution (Prevention of Pollution by Sewage from Ships) (Amendment) Regulations 2012 (S.I. No. 492/2012). Each Port will also have a Port WMP which must be abided by and if waste is taken ashore, the Waste Management Act 1996 (as amended) will apply.	To be updated	Construction Operation & Maintenance Decommissioning		Applicant/ Contractor
68	Seascape, landscape and visual asses	Chapter 27	Turbine Towers and Blades	Turbine towers and blades will be to a uniform colouration. Turbine locations are spaced to reduce visual clutter and avoid overlap with background landscape. Turbines will be of identical rotor diameter.	To be updated	Construction Operation & Maintenance		
69	Bats in the Marine Environment	Chapter 31	Injury and/or Fatality Curtailment - During the First Year of Operation	A set of curtailment criteria will be established based on a combination of conditions (i.e. ideal conditions for bats) to stop or slow down the turbines during peak bat migration periods. These measures will minimise bat barotrauma and collisions. The curtailment will apply when all of the following parameters are met: • Peak bat migration periods; mid-March (e.g. 15 March) to end of May (i.e. 31 May); and mid-August (e.g. 15 August) to October (i.e. 31 October); • Between sunset and sunrise; • Sunset temperatures above 10 °C (Collins, 2023); • Wind speeds of < 5.4 m/s (20 km/hr) (Collins, 2023); • Where rainfall is < 4 mm/hr (i.e. low to moderate rainfall levels) occurring for a duration of longer than 30 minutes; and • When one bat call is acoustically detected within the previous thirty minutes. Bat detectors will be evenly placed across fifteen wind turbines within the offshore wind farm area (one at the lowest blade tip height; and one at the nacelle). It is also considered important, whilst still ensuring bat protection during migration periods, that the curtailment criteria do not cause any unnecessary energy losses. To ensure this, bat echolocation detection measures will be put in place which will limit the curtailment criteria to only those times when bats are detected. Such detection measures may include the application of a Detection and Active Response Curtailment (DARC) system, which aims to reduce wind energy's impact on bats while increasing energy production. The bat echolocation detection system will be agreed with the NPWS. Static detector surveys will be undertaken at the lowest blade tip height above LAT of 27 m and at the nacelle/hub height of 145 to 152 m. Thirty bat detectors will be deployed evenly across fifteen turbines within the offshore wind farm area. The results of the mitigation during the first year of operation will be compiled into a report and submitted to the NPWS for review.	To be updated	Operation & Maintenance		Applicant/ Contractor
70			Injury and/or Fatality Curtailment - During the Second Year of Operation	Upon agreement with the NPWS, an adjustment to the curtailment criteria may be made based on the results of bat migration records during the first year of operation, and static detectors will be re-deployed. The results of the mitigation during the second year of operation will be compiled into a report and submitted to the NPWS for review.	To be updated	Operation & Maintenance		Applicant/ Contractor
71			Injury and/or Fatality Curtailment - During the Third Year of Operation	Upon agreement with the NPWS, static detector survey results from year one and year two will be used as an average to update the curtailment criteria. Acoustic surveys will continue for the third year of operation.	To be updated	Operation & Maintenance		Applicant/ Contractor
72			Injury and/or Fatality Curtailment - Operational Years Thereafter	Acoustic surveys will continue for the remaining duration of the operational lifetime of the Project. The curtailment criteria shall be reviewed and updated, as required.	To be updated	Operation & Maintenance		Applicant/ Contractor

Environmental Management, Mitigation and Monitoring Measures - to be completed post consent					Mechanism for Implementation			
No.	Topic	EIAR Chapter/ Other	Aspect	Commitment	Related Planning Condition	Project Phase	Relevant document for Implementation	Responsible Party
73	Fish and Shellfish	Chapter 9	Voluntary Monitoring and Mitigation	Herring spawning grounds have been identified as a feature of a potential MPA and have been raised by An Bord Pleanála (Now An Coimisiún Pleanála) as a cause for concern. Therefore, due to the overlap with the Fish and Shellfish Ecology Study Area, the Project will consider voluntary monitoring and mitigation/enhancement opportunities. These include: • Baseline, construction and post-construction monitoring of egg/larval activity. Surveys may include either trawl surveys for adult herring (to see if they are spawning) or egg/larvae surveys to detect recent spawning activity. • Potential biodiversity net gain initiatives which could aid herring spawning population, such as oyster beds (shells are used for laying eggs on) within detailed design of cable protection and scour protection.	To be updated	Pre-Construction Construction		OWL/Contractor
74	Offshore Ornithology	Chapter 11	Monitoring	The Project proposes to continue monitoring the population distribution and abundance of the Offshore Ornithology Study Area. This monitoring is proposed to consist of DAS before construction (Year 0) and Years 1, 3, 5 and 15 following construction, following the same scope, methods and analysis of the baseline surveys. This monitoring will allow the conclusions presented within this EIAR to be confirmed. No additional monitoring of a specific receptor is proposed at this stage. The Applicant is willing to discuss any additional monitoring requirements with the regulator.	To be updated	Pre-Construction Construction Operation & Maintenance		OWL/Contractor
75	Commercial Fisheries	Chapter 12	Monitoring	It is recognised that static gear fisheries can be particularly affected by offshore wind development, due to their strong fidelity to specific sites (Roach et al., 2022). Therefore, on a precautionary basis, a study will be undertaken in collaboration with local fishers to monitor the static (pot) fisheries before and after construction of the Project.	To be updated	Pre-Construction Construction		OWL/Contractor
76	Population and Human Health	Chapter 18	Monitoring	The following monitoring is suggested: • Monitoring of the proportion of local people with long-term unemployment, high job instability or low income who enter good quality stable employment with the Project in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups. • Monitoring of the proportion of NEETs taking up, and completing, training opportunities with the Project in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups.	To be updated	Construction Operation & Maintenance Decommissioning		OWL/Contractor
77	Noise and Vibration	Chapter 25	Monitoring	Prior to the commencement of construction, the contractor will set out and agree a schedule of noise monitoring with the planning authority to include the number and locations at which noise monitoring will be carried out, the frequency and duration of the monitoring and the reporting of results.	To be updated	Construction		OWL/Contractor
78	Bats in the Marine Environment	Chapter 31	Monitoring	A competenet and experienced Ecologist will be appointed by the Applicant and will ensure the following monitoring scheme is implemented in full: • At pre-construction stage, bat data will be collected using appropriate vessels to provide information on the usage of the offshore wind farm area by migrating bats during at least one spring migration period and at least one autumn migration period. Two bat detectors will be required per vessel and data will be collected weekly during the peak bat migration periods; • During the operational and maintenance phase, thirty static bat detectors will be deployed evenly across fifteen wind turbines within the offshore wind farm area (one at the lowest blade tip height; and one at the nacelle). These static bat detectors will be required to monitor bats during peak migration periods and monitor the success of mitigation measures; • Bat monitoring will be carried out annually, until Project decommissioning; and • The monitoring scheme and success of mitigation measures will be documented annually into a detailed report and submitted to the NPWS for discussion.	To be updated	Pre-Construction Operation & Maintenance Decommissioning		OWL/Contractor
79	Marine Receptors	Chapter 5	Monitoring	Implementation of Monitoring Programme (see appendix 5-16 in EIAR volume 2A Addendum.	To be updated	Pre-Construction Operation & Maintenance Decommissioning		OWL/Contractor

References

There are no changes to appendix 5-2: Environmental Management Plan.

ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report - Addendum
Appendix 5-4 Addendum: Marine Megafauna Mitigation Plan

MDR1520C
EIAR– Appendix 5-4
Addendum
A1 C01
December 2025

Tables

Figures

Acronyms

Term	Meaning
ADD	Acoustic Deterrent Device
CBRA	Cable Burial Risk Assessment
CTV	Crew Transfer Vessels
DBBC	Double Big Bubble Curtain
ECoW	Environmental Clerk of Works
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic Fields
EPA	Environmental Protection Agency
HWM	High Water Mark
IEF	Important Ecological Features
MEC	Maximum Export Capacity
MMMP	Marine Megafauna Mitigation Plan
MMO	Marine Mammal Observation
MPCP	Marine Protection Contingency Plan
NAS	Noise Abatement Systems
NMPF	National Marine Planning Framework
NMFS	National Marine Fisheries Service (USA Federal agency within NOAA)
NMS	Noise Mitigation Systems
NPWS	National Parks and Wildlife Service
OSS	Offshore Substation
OWL	Oriel Windfarm Limited
PAM	Passive Acoustic Monitoring
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SAM	Static Acoustic Monitoring
SEL	Sound Exposure Level
SPL	Sound Pressure Level
TSS	Temporary Threshold Shift
WTG	Wind Turbine Generator

1 MARINE MEGAFAUNA MITIGATION PLAN

A Marine Megafauna Mitigation Plan (MMMP) for the proposed Oriel Wind Farm Project is included as part of the planning application documents submitted to An Coimisiún Pleanála (ACP) (formerly An Bord Pleanála) in May 2024 (see appendix 5-4 of EIAR volume 2A and appendix K of the NIS). This document provides an updated MMMP for the Project and supersedes the one provided in appendix 5-4 of the EIAR and appendix K of the NIS. The updates have been made to address the updated assessment on marine mammals and megafauna in chapter 10 Addendum: Marine Mammals and Megafauna in volume 2A Addendum and associated appendices (10-4, 10-6, 10-7 and 10-8) and section 5 of the NIS Addendum (and associated appendices C-1 to C-4). The updated assessment was prepared in response to the Request for Further Information (RFI) on marine mammals and megafauna (RFI 9).

1.1 Introduction

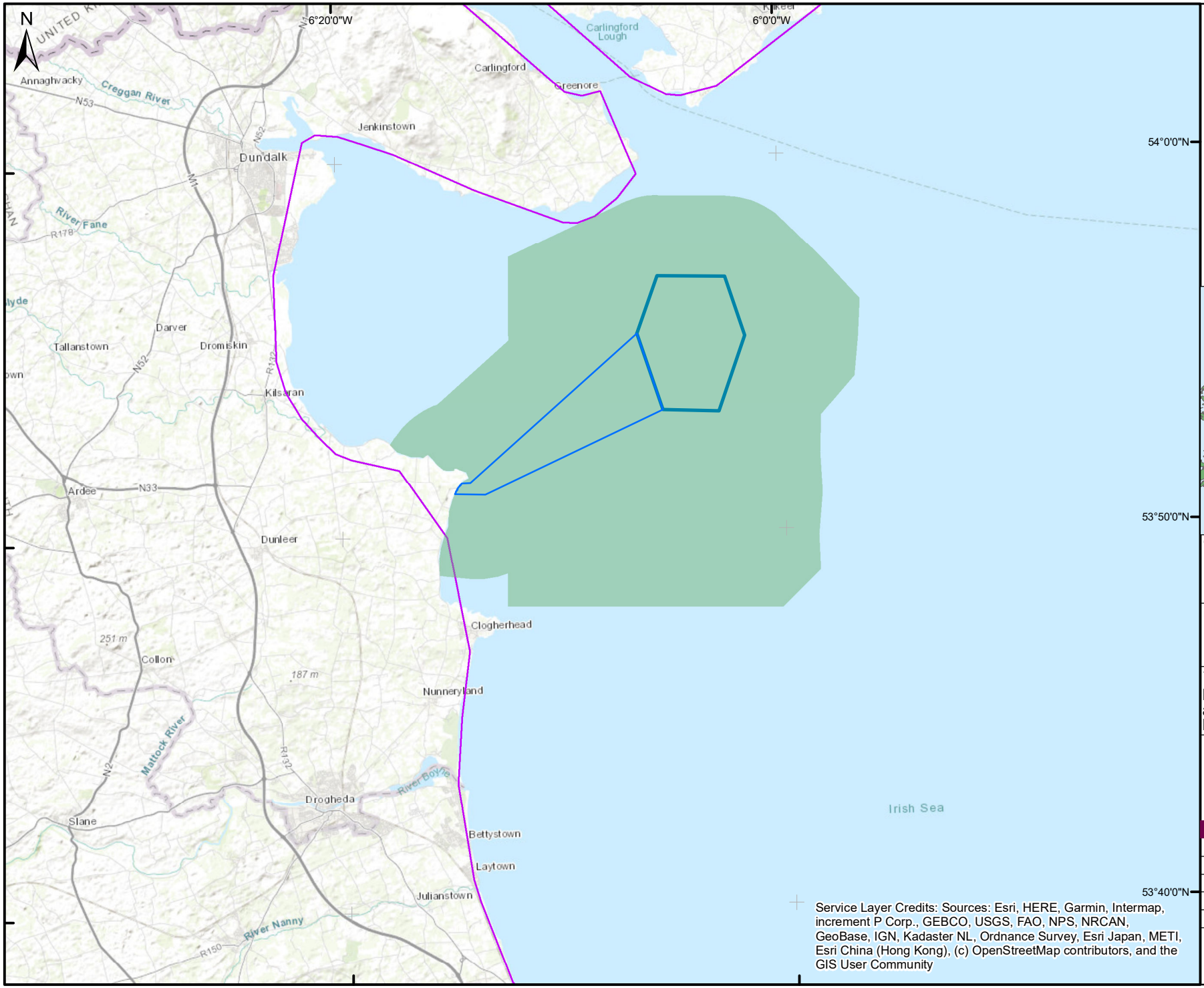
Oriel Windfarm Limited (OWL) (hereafter referred to as “the Applicant”), is promoting the development of the Oriel Wind Farm Project (hereafter referred to as “the Project”).

The Project is an offshore wind farm located in the Irish Sea, off the coast of County Louth (approximately 22 km east of Dundalk town centre and 18 km east of Blackrock) (Figure 1-1). The closest wind turbine will be approximately 6 km from the closest shore on the Cooley Peninsula. The offshore cable corridor extends approximately 11 km southwest from the offshore wind farm area to the landfall south of Dunany Point. The offshore infrastructure of the Project, such as the wind turbines, Offshore Substation (OSS) and inter-array cables, will be located within the offshore wind farm area, which covers approximately 27.7 km^2, being broadly hexagonal in shape with a length of approximately 5.3 km west to east and 6.6 km north to south. The Project will have 25 wind turbine generators (WTGs) and one OSS located within the offshore wind farm area and will have a Maximum Export Capacity (MEC) of 375 MW.

The offshore cable corridor connects the offshore wind farm area with the landfall south of Dunany Point. The offshore cable corridor is contiguous to the High-Water Mark (HWM) at the landfall and to the southwestern boundary of the offshore wind farm area. The offshore cable corridor is approximately 11 km in length and covers an area of approximately 25.3 km^2, indicated in Figure 1-1. The WTGs will be connected to each other by a network of inter-array cables, which will also connect into the OSS. The offshore cable will transfer the electricity from the OSS to shore, where it will connect to the onshore infrastructure.

This Marine Megafauna Mitigation Plan (MMMP) presents a summary of findings as assessed in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) and updated noise modelling presented in the EIAR Addendum and NIS Addendum on the potentially injurious effects of underwater noise during pile-driving and geophysical surveys, on marine mammals and other megafauna (hereafter referred to collectively as ‘marine megafauna’). Pile-driving has the potential to impact marine mammals and megafauna during the construction phase, and geophysical acoustic surveys have the potential to cause an impact during the operational and maintenance phase. This MMMP is informed by the following sections of the EIAR:

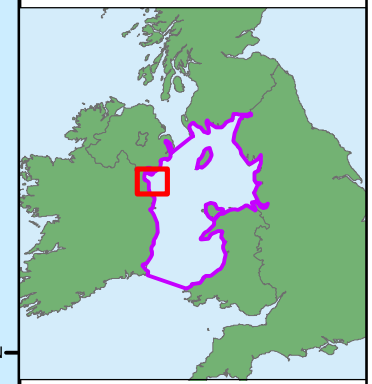
- Volume 2B, chapter 10: Marine Mammals and Megafauna;
- Volume 2B, appendix 10-1: Marine Mammals and Megafauna Technical Report;
- Volume 2B, appendix 10-2: Subsea Noise Technical Report;
- Volume 2B Addendum, chapter 10 Addendum: Marine Mammals and Megafauna;
- Volume 2B Addendum, appendix 10-4: Updated Subsea Noise Modelling Report;
- Volume 2B Addendum, appendix 10-6: NAS Modelling Report;
- Volume 2B Addendum, appendix 10-7: NAS Technical Note - Marine Mammals, Megafauna and Fish; and
- Volume 2B Addendum, appendix 10-8: Comprehensive Review of Relevant Mitigation (Noise Abatement).



Legend

- Offshore Wind Farm Area
- Offshore Cable Corridor
- Marine Mammal and Megafauna Study Area
- Regional Marine Megafauna Study Area

Data Sources: Client.



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-1
Marine Megafauna Study Area and Regional Marine Megafauna Study Area

RPS
A TETRA TECH COMPANY

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
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Issue Details

Drawn By: NA	**Project No.** EOR0822 (MDR1520B)
Checked By: NA	**File Ref:** EOR0822_MAM_T_1350_FINAL
Approved By: AOS	
Scale: 1:250,000 @ A4	**Projection:** ITM (IRENET95)
Date: 28/02/2024	Geographic Co-ordinates: ETRS89

1.2 Purpose of the MMMP

The purpose of this MMMP is to present the means by which the potentially injurious effects of underwater noise resulting from pile-driving activity and geophysical surveys on marine mammals, fish (basking shark) and sea turtles are to be mitigated during the construction and operational and maintenance phases of the Project. Information presented in this MMMP is based on volume 2B, chapter 10: Marine Mammals and Megafauna and chapter 10 Addendum: Marine Mammals and Megafauna, which considers the potential impacts of the Project seaward of the HWM during the construction, operational and maintenance, and decommissioning phases. Only those impacts with the potential to cause auditory injury and for which specific measures have been proposed have been included in this MMMP.

The precautionary injury ranges for marine mammals established in the EIAR are based on the underwater noise modelling for the most sensitive species, the parameters for which are based on the project design parameters for the Project. It should be noted that this plan will be updated and finalised pre-construction following the refinement of the project design and refined marine mammal, fish and sea turtle injury ranges, with mitigation measures updated based on these refined ranges. Also any conditions of permission or updated guidelines or changes in industry best practice will be included. The project design parameters informing the assessment of potential impacts on marine mammals and megafauna as a result of underwater noise during pile-driving and geophysical site investigation surveys is presented in Table 1-1.

Table 1-1: Project design parameters used for the assessment of potential impacts on Marine Mammals and Megafauna.[1]

Potential impact	Phase[1]			Project design parameters	Justification
	C	O	D		
Injury and/or disturbance to marine megafauna from underwater noise during pile-driving	✓	✗	✗	• 26 monopiles (25 x WTGs and 1 x OSS) of 9.6 m diameter; • Absolute maximum hammer energy of 3,500 kJ. • On average, a maximum of 5 hours piling per pile across all WTG locations (no more than 8 hours at selected locations) with one pile expected to be installed in each 24-hour period. • Maximum days piling = 26 days.	The spatial extent of noise impacts is driven by key parameters including monopile diameter and hammer size, as well as associated hammer energy required to pile a monopile of this size (see appendix 10-2: Subsea Noise Technical Report). The minimum number of piles within a 24-hour period is likely to lead to the maximum period (number of piling days) over which piling could occur and the maximum within 24 hours would lead to the longest duration on any one day.
Injury and/or disturbance to marine megafauna from elevated underwater noise during site investigation surveys	✗	✓	✗	Routine geophysical surveys of wind turbine foundations, inter-array cables and offshore cable: • Multibeam echosounder (MBES) expected to be the only method of geophysical survey to be employed; • Survey campaigns estimated to occur once every five years for 40-year lifetime of Project; • Surveys to be conducted using one survey vessel; • Duration of 14 days per survey;	First survey campaign expected to occur in year 5, and final campaign in year 35, equating to seven survey campaigns. Assumes daily vessel trip for every day of each 14-day survey window.

[1] In the EIAR appendix 5-4: Marine Mammal Mitigation Plan, the table titled '*Project design parameters used for the assessment of potential impacts on Marine Mammals and Megafauna'* included all the potential impacts assessed in chapter 10: Marine Mammals and Megafauna. The MMMP is required to manage mitigation for activities that result in an increase in noise only. Therefore, only impacts associated with increases in noise require to be listed in the Project Design Parameters for this plan as outlined in Table 1-1 above.

Potential impact	Phase[1] C O D	Project design parameters	Justification
		• 42-day duration per survey campaign (three surveys per campaign); • 42 vessel round trips per survey campaign; and • Maximum total of 294 survey vessel round trips for lifetime of Project.	

1. C = Construction, O = Operation, D = Decommissioning

In addition to measures included in the Project (designed in and management measures (controls)) and mitigation proposed to reduce the injurious impacts on marine megafauna associated with pile-driving and geophysical surveying, a range of procedures will be applied to reduce other environmental impacts of the Project, including development and adherence to an Environmental Management Plan (EMP), which are summarised in Table 1-2.

Table 1-2: Management plans developed to reduce environmental impacts.

Consents Management Plan	Relevance to MMMP	Where presented
Environmental Management Plan (EMP)	The EMP provides the overarching framework for environmental management during the construction and operational and maintenance phases of the Project. The EMP also sets out the monitoring activities to be completed for the Project, as proposed in the EIAR, including proposed methodologies.	Appendix 5-2 (EIAR volume 2A & volume 2A Addendum)

This MMMP has been prepared in accordance with the following guidance and it is considered that compliance with these will reduce the risk of injury to marine mammals and megafauna to negligible levels:

- National Parks and Wildlife Service (NPWS) (2014) Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters.
- National Marine Fisheries Service (NMFS) (2018) Revision to Technical Guidance for Assessing Effects of Anthropogenic Sound on Marine Mammal Hearing.

1.3 Target species

Marine mammals and megafauna species were characterised based on their abundance and densities at a regional scale (Regional Marine Megafauna Study Area) and local scale (Marine Megafauna Study Area), as detailed in EIAR (see volume 2B, chapter 10: Marine Mammals and Megafauna).

Boat-based visual surveys were conducted between March 2006 and August 2006, and between May 2018 and May 2020 (with the exception of February 2020 to April 2020 owing to COVID-19 restrictions), aerial digital surveys were carried out from April 2020 to September 2020, and Static Acoustic Monitoring (SAM) surveys were conducted between November 2019 and November 2020.

Marine mammals which were sighted regularly in site-specific surveys included minke whale *Balaenoptera acutorostrata* and grey seal *Halichoerus grypus*, and the most common cetacean species in the vicinity of the Project was harbour porpoise *Phocoena phocoena*. Common dolphin *Delphinus delphis* and harbour seal *Phoca vitulina* were sighted occasionally during site surveys, and whilst bottlenose dolphin *Tursiops truncatus* were not sighted during these surveys, a review of published datasets indicates that bottlenose dolphin may also be occasionally present in the area. Other marine mammal species may occur within the area in very low numbers (such as Risso's dolphin *Grampus griseus*, and although not identified as Important Ecological Features (IEF)s, would nonetheless also benefit from the measures set out in this MMMP.

Basking shark migrate through the Celtic Sea and Irish Sea during summer months, and during site-specific surveys, two basking sharks were sighted in the vicinity of the Project. Tagging studies have also shown that basking sharks have migrated through this area in previous years (Doherty *et al.,* 2017). Historical records show that three species of marine turtle are likely to regularly occur in Irish waters including leatherback (or 'leathery') turtle, loggerhead turtle *Caretta caretta* and Kemp's Ridley turtle *Lepidochelys kempii* (King and Berrow, 2009). Of these species, the leatherback turtle is distributed around the coast of Ireland, including the Irish Sea, and accounts for 80% of all sea turtle sightings (King and Berrow, 2009). Only leatherback turtle was identified as an IEF in the assessment, but as above, other species of turtle would benefit from this MMMP.

These species use sound for many aspects of their lives and are sensitive to underwater noise. Pile-driving during the construction phase and geophysical surveys during the operational and maintenance phases has the potential to result in elevated levels of subsea noise that are detectable by marine mammals and megafauna above background levels, which could result in injurious or behavioural effects. A detailed account of the marine mammal and megafauna baseline, and the effects of underwater noise on the marine megafauna species presented in this MMMP, can be found in volume 2B, chapter 10: Marine Mammals and Megafauna.

All of the marine mammal and megafauna species which could potentially be affected by the Project are protected by international legislation and/or are important from a conservation perspective at an international or national context (see volume 2B, chapter 10: Marine Mammals and Megafauna). Therefore, the value of marine megafauna IEFs was designated as either National or International (Table 1-3).

Table 1-3: Marine mammal and megafauna IEFs and their importance within the Marine Megafauna Study Area.

IEF	Value	Justification
Harbour porpoise	International	Annex II species protected under international legislation and designated feature of Rockabill to Dalkey Island SAC, North Channel SAC, North Anglesey Marine/Gogledd Môn Forol SAC and West Wales Marine/Gorllewin Cymru Forol SAC. Regularly sited within the Regional Marine Megafauna Study Area.
Bottlenose dolphin	International	Annex II species protected under international legislation and designated feature of Cardigan Bay/Bae Ceredigion SAC
Short-beaked common dolphin	National	Internationally protected species and Ireland Protected Species regularly sighted in the Regional Marine Megafauna Study Area.
Minke whale	National	Internationally protected species and Ireland Protected Species regularly sighted in the Regional Marine Megafauna Study Area.
Grey seal	International	Annex II species protected under international legislation and designated feature of Lambay Island SAC, Lleyn Peninsula and the Sarnau/Pen Llŷn a`r Sarnau SAC and Pembrokeshire Marine/Sir Benfro Forol SAC and is a qualifying feature of Cardigan Bay/Bae Ceredigion SAC. Regularly recorded in the Regional Marine Megafauna Study Area, with large haul-outs at Carlingford Lough, Clogherhead, the Skerries, Dublin Bay and Lambay Island.
Harbour seal	International	Annex II species protected under international legislation and designated feature of Lambay Island SAC and is a qualifying feature of Murlough SAC. Regularly recorded in the Regional Marine Megafauna Study Area, with large haul-outs at Carlingford Lough, Dundalk Bay, Clogherhead and the Skerries.
Basking shark	National	Internationally protected species/EPS listed on Ireland's Red List of Threatened Species (list No. 11) and UK BAP Species. Recorded migrating through Regional Marine Megafauna Study Area on an annual basis.
Leatherback turtle	National	Internationally protected species, listed on Ireland's Red List of Threatened Species (list No. 5) and UK BAP Species, reported regularly (largely stranded) in the Regional Marine Megafauna Study Area.

1.4 Measures included in the Project

A number of designed-in and management measures (controls) have been proposed as part of the project design process to reduce the potential for impacts on marine mammals and megafauna. These measures are considered standard industry practice for this type of development and, as there is a commitment to their implementation, are considered an inherent part of the design of the Project. Designed-in and management measures (in addition to this MMMP) have therefore been considered in the assessment of impacts presented in volume 2B, chapter 10: Marine Mammals and Megafauna and are summarised in Table 1-4.

The use of additional measures such as Acoustic Deterrent Devices (ADDs) will also be implemented and is further discussed in section 1.6, however these are mitigation measures and are not considered to be a measure included as part of the Project.

Table 1-4: Measures included in the Project, in addition to the MMMP.

Measures included in the Project	Justification
An Environmental Management Plan (EMP) (see volume 2A, appendix 5-2: Environmental Management Plan) will be implemented during the construction, operational and maintenance, and decommissioning phases of the Project. The EMP will include Project mitigation/monitoring measures and commitments and a Marine Pollution Contingency Plan (MPCP) which will include key emergency contact details (e.g. Environmental Protection Agency (EPA)). The EMP will include mitigation such as designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds. In this manner, accidental release of contaminants from vessels will be strictly controlled, thus providing protection for marine life across all phases of the Project.	Measures will be included to ensure that the potential for release of pollutants from construction, operational and maintenance, and decommissioning plant is minimised.
During piling operations, soft starts will be used, following NPWS (2014) guidelines. This will involve the implementation of lower hammer energies (i.e. approximately 10-15% of the maximum hammer energy) at the beginning of the piling sequence before energy input is 'ramped up' (increased) over time to required higher levels (also known as a soft-start).	The soft-start will provide an audible cue to allow marine mammals and megafauna to flee the area before piling at increased hammer energy commences. The soft/slow-start will help to mitigate any potential auditory injury.
A Marine Megafauna Vessel Code of Conduct (see appendix 5-5: Marine Megafauna: Vessel Code of Conduct) will be issued to all Project vessel operators, requiring them to: • Not deliberately approach marine megafauna; • Keep vessel speed to a minimum; and • Avoid abrupt changes in course or speed should marine mammals approach the vessel to bow-ride. The Marine Megafauna Vessel Code of Conduct will be adhered to at all times.	To minimise the potential for collision risk, or potential injury to, marine megafauna.
Drive-drill-drive methodology for monopile installation. Use of MODIGA technology for impact piling.	Despite the assessment of injury and disturbance to marine megafauna from underwater noise during pile driving concluding no significant impact, the Project is committed to the consideration of noise abatement measures for the purpose of reducing sound levels from construction piling. The Project will use a drive-drill methodology for the monopile installation which minimises the impact piling duration (using sacrificial casing) and proposes to use a casing-option known as MODIGA as its noise abatement solution (see appendix 10-8: Comprehensive Review of Relevant Mitigation (Noise Abatement)). See chapter 10

Measures included in the Project	Justification
	Addendum: Marine mammals and megafauna for full details but it is expected that this will result in a noise abatement compared to an unmitigated piling scenario similar to the in-line hammer noise reduction unit (PULSE) technology. Further detail is provided in section 1.5.1 'Piling Technology'.

1.5 Summary of Impacts Requiring Mitigation

1.5.1 Pile-driving

Pile-driving during the construction phase of the Project has the potential to result in elevated levels of subsea noise that are detectable by marine mammals and megafauna above background levels and could result in injurious or behavioural effects on IEFs. A detailed revised underwater noise modelling assessment was carried out to investigate the potential for injurious and behavioural effects on marine mammal, fish and sea turtle IEFs as a result of impulsive sounds from pile-driving (appendix 10-4 Addendum: Updated Subsea Noise Modelling Report). The results of this modelling were drawn upon to provide a comparison with the original underwater noise modelling assessment and to inform the revised marine mammal and megafauna impact assessment (chapter 10 Addendum: Marine Mammals and Megafauna (EIAR volume 2B Addendum).

Auditory injury in marine mammals can occur as either a Permanent Threshold Shift (PTS), where there is no hearing recovery, or as a Temporary Threshold Shift (TTS), where recovery from tissue damage is possible (i.e. reversible injury). Irish guidance recommends that TTS is included as a potential injury risk as this could impair the ability of animals to use natural sounds, with potential consequences to fitness (NPWS, 2014). In basking sharks and sea turtles, injury is assessed as 'mortality and mortal injury' (immediate or delayed death) or 'impairment' (recoverable injury). This dual criteria approach was used to assess the potential for PTS and TTS in marine mammals and 'mortality and mortal injury' and 'impairment' in basking shark and sea turtles.

The most likely response of an animal exposed to noise levels that could induce TTS or impairment is, however, to flee the ensonified area and therefore NPWS (2014) suggests that TTS may also be a behavioural (disturbance) response. It is considered that disturbance can overlap with potential injury ranges, and therefore animals exposed to noise levels with the potential to induce TTS or impairment are likely to simply move away from the area.

Injury from PTS and reversible injury (and disturbance) from TTS were investigated with respect to two metrics over the entire piling sequence from hammer initiation to maximum hammer energy (3,500 kJ) based on one pile being installed within a 24-hour period (see project design parameters in Table 1-1). Peak Sound Pressure Level (SPL_{pk}) was used to determine ranges for instantaneous injury whilst cumulative Sound Exposure Level (SEL_{cum}) was modelled to estimate the injury range from cumulative exposure as an animal flees the area. The SEL_{cum} metric can lead to overestimates in effect ranges which means that subsea noise modelling results in a precautionary assessment due to the conservative assumptions adopted, namely:

- Maximum hammer energy (3,500 kJ) would be reached at all locations;
- Subsea noise would remain impulsive at all distances;
- The soft start procedure does not include short pauses in piling which would reduce the noise exposure that fleeing animals experience;
- Animals would swim away from the noise source at the onset of activity at a constant and conservative swim rate; and
- Time spent at the surface, where sound pressure levels are reduced, was not considered.

Where insufficient data existed to determine a quantitative guideline value (i.e. there are no thresholds for TTS in leatherback turtle), the risk was categorised in relative terms as "high", "moderate" or "low" at three

distances from the source: “near” (i.e. in the tens of metres), “intermediate” (i.e. in the hundreds of metres) or “far” (i.e. in the thousands of metres).

Instantaneous injury ranges (PTS based on the SPL_{pk} metric) were largest for harbour porpoise, with a range of up to 653 m predicted for the first strike following ramp up. At maximum hammer energy the predicted instantaneous PTS injury range is up to 1,638 m for harbour porpoise, however, at this final stage in the piling sequence animals will have moved away from the source and therefore the key focus for instantaneous injury is on the first strike. Modelling of TTS predicted effect ranges of up to 1,051 m (harbour porpoise). For all other species, including leatherback turtle and basking shark the PTS and TTS ranges from exposure to peak pressure were less than the ranges predicted for harbour porpoise.

A summary of PTS/TTS ranges for all IEFs is presented in Table 1-5. Assessment of permanent injury due to cumulative exposure over time (as an animals moves away) applied the SEL_{cum} metric and found that the largest PTS ranges were for minke whale, as a low frequency cetacean, with maximum predicted ranges of up 1,135 m. TTS ranges for all species (with exception of bottlenose dolphin) extended over several kilometres and up to a maximum 21,500 m for minke whale).

The ranges predicted for the SEL_{cum} metric should, however, be interpreted with caution (see bullet list summary above). The TTS threshold is inherently conservative as it represents the onset of a 6 dB hearing shift and has been derived on the basis of “the minimum amount of threshold shift that can be differentiated in most experimental conditions” (NMFS, 2018). Furthermore, the underwater sound model accounts for the SEL_{cum} metric as an equal-energy rule, where exposures of equal-energy are assumed to produce the same sound-induced threshold shift regardless of how the energy is distributed over time. Since for intermittent sound (such as piling) the quiet periods between sound exposures will allow some recovery of hearing compared to continuous sound, the equal-energy rule is likely to overestimate the extent of impact these ranges. Additionally, over ranges of tens of kilometres, such as the range predicted for minke whale, the impulsive sound is likely to undergo transition into non-impulsive sound at distance from the sound source due to a combination of factors (e.g. dispersion of the waveform, multiple reflections from sea surface and seafloor, and molecular absorption of high frequency energy). The empirical evidence suggests that such shifts in impulsivity could occur within 10km from the sound source (Hastie et al., 2019). For this reason, the instantaneous injury metric is considered to represent a more realistic interpretation of predicted injury ranges from the modelling although both were presented following the guidance (NPWS, 2014).

Table 1-5: Summary of marine mammal injury (PTS and TTS) onset acoustic thresholds (NMFS, 2018) and criteria for onset of injury to fish due to impulsive noise (Popper *et al.*, 2014) (N/E = threshold not exceeded). White rows indicate SPL_{pk}, grey rows indicate SEL_{cum}, and blank cells indicate scenarios which were not modelled.

Species	PTS (marine mammals) or Mortality and mortal injury (fish/sea turtles)			TTS (marine mammals) or TTS/Impairment (fish/sea turtles)		
	Threshold	Range (m)		Threshold	Range (m)	
		Soft Start - First Strike	Max Energy		Soft Start - First Strike	Max Energy
Harbour porpoise	202 dB re 1 µPa	653	1,638	196 dB re 1 µPa	1,051	2,638
	155 dB re 1 µPa²s	815	-	140 dB re 1 µPa²s	14,500	-
Bottlenose dolphin	230 dB re 1 µPa	71	177	224 dB re 1 µPa	114	286
	185 dB re 1 µPa²s	N/E	-	170 dB re 1 µPa²s	21	-
Common dolphin	230 dB re 1 µPa	71	177	224 dB re 1 µPa	114	286
	185 dB re 1 µPa²s	N/E	-	170 dB re 1 µPa²s	21	-
Minke whale	219 dB re 1 µPa	169	425	213 dB re 1 µPa	273	684
	183 dB re 1 µPa²s	1,135	-	168 dB re 1 µPa²s	21,500	-
Grey seal	218 dB re 1 µPa	183	460	212 dB re 1 µPa	295	741
	185 dB re 1 µPa²s	11	-	170 dB re 1 µPa²s	5,520	-
Harbour seal	218 dB re 1 µPa	183	179	212 dB re 1 µPa	295	741
	185 dB re 1 µPa²s	11	-	170 dB re 1 µPa²s	5,520	-
Basking shark	>213 dB re 1 µPa	273	684	>213 dB re 1 µPa	273	684
	>219 dB re 1 µPa²s	N/E	-	>186 dB re 1 µPa²s	5,520	-
Leatherback turtle	>207 dB re 1 µPa	172	357	(*Near*) High (*Intermediate*) Low (*Far*) Low		
	210 dB re 1 µPa²s	21	-			

Therefore, even considering the conservative assumptions of the subsea noise modelling that estimated highly precautionary injury ranges, across all species, the maximum range over which permanent injury could occur, using either metric, for most species, was predicted to be less than the standard 1,000 m mitigation zone for pile-driving proposed by NPWS (2014). The exception was for minke whale where the 1,135 m maximum predicted range (SEL_{cum}) slightly exceeded this standard mitigation zone. For TTS, instantaneous (temporary) injury ranges also fell within the 1,000 m mitigation, with the exception of harbour porpoise, where the predicted range at first strike was 1,051 m. TTS from cumulative exposure exceeded the standard 1,000 m mitigation zone for some species (harbour porpoise, minke whale, grey seal and harbour seal) but not in others (bottlenose dolphin, common dolphin, basking shark and leatherback turtle).

Mitigation measures will be applied by use of an ADD to reduce the potential for PTS and TTS, (see Section 1.6). There are a number of ADDs on the market with different sound source characteristics (see McGarry *et al.*, 2022) and a suitable device will be selected based on the key species requiring mitigation for the Project. The selected device will typically be deployed from the piling vessel and activated for a pre-determined duration to allow animals sufficient time to move away from the sound source, whilst also minimising the additional noise introduced into the marine environment.

Revised noise modelling was carried out for the SEL_{cum} metric to determine the potential efficacy of using an ADD to deter marine mammals from the injury zone (see appendix 10-7 Addendum: Noise Abatement System - Technical Report - Marine Mammals, Megafauna and Fish). The modelled scenario included the activation of an ADD for a period of 15 minutes prior to initiation of piling and was compared to the scenario with measures included in the Project only (i.e. initiation + soft start + ramp up) to determine whether deployment of an ADD was of potential benefit to reducing the risk of injury to marine mammals. There is no evidence for the effectiveness of ADDs as a tool to deter basking shark and sea turtle and therefore this was not considered in the modelling for these species.

Results of modelling the use of an ADD suggest that the risk of injury occurring in marine mammal receptors would be reduced. For example, based on the SEL_{cum} metric, ADD use would avoid thresholds for PTS being exceeded in all species as animals are expected to flee beyond the injury zones prior to the start of piling. In particular, minke whale, for which modelled SEL_{cum} injury ranges were greatest (Table 1-5) have been shown to make directed movements and increase their net swim speed at distances of greater than 1,000 m (which coincides with the mitigation zone for pile-driving proposed by NPWS) from an ADD (Boisseau *et al.*, 2021).

The use of an ADD will also reduce the risk of TTS occurring in marine mammals. With an ADD deployed the range at which the SEL_{cum} threshold for TTS would be reduced to 19,500 m for minke whale; 13,000 m for harbour porpoise; 3,890 m for grey seal and harbour seal and for high-frequency cetaceans (bottlenose dolphin and common dolphin) the TTS thresholds would not be exceeded (Table 1-6). Note that the ranges using an ADD were not modelled for basking shark and leatherback turtle, however, it is anticipated that risk of TTS would be reduced in all megafauna species. Although the SEL_{cum} effect ranges are likely to be overestimates, the subsea noise modelling illustrated that the use of an ADD can, nonetheless, reduce the risk of temporary auditory impairment. Furthermore, this assessment was based upon a standard percussive piling sequence, whereas the Oriel Project has now determined that a drive-drill approach using MODIGA technology will be adopted. Further information on this approach is provided below in the section on 'Piling Technology'.

Table 1-6 Changes in range of injury (PTS) and disturbance (TTS) from unmitigated piling (including designed-in and management measures) and mitigated piling (including use of ADD).

Species	Threshold (Weighted) SEL_{cum}	Measures	Range (m)
Harbour porpoise	PTS – 155 dB re 1 μPa^2s	Soft start	815
	TTS - 140 dB re 1 μPa^2s		14,500
	PTS - 155 dB re 1 μPa^2s	Soft start + ADD	N/E
	TTS - 140 dB re 1 μPa^2s		13,000
Bottlenose dolphin	PTS - 185 dB re 1 μPa^2s	Soft start	*N/E*
	TTS - 170 dB re 1 μPa^2s		21
	PTS - 185 dB re 1 μPa^2s	Soft start + ADD	*N/E*
	TTS - 170 dB re 1 μPa^2s		*N/E*
Common dolphin	PTS - 185 dB re 1 μPa^2s	Soft start	*N/E*
	TTS - 170 dB re 1 μPa^2s		21
	PTS - 185 dB re 1 μPa^2s	Soft start + ADD	*N/E*
	TTS - 170 dB re 1 μPa^2s		*N/E*
Minke whale	PTS - 183 dB re 1 μPa^2s	Soft start	1,135
	TTS - 168 dB re 1 μPa^2s		21,500
	PTS - 183 dB re 1 μPa^2s	Soft start + ADD	*N/E*
	TTS - 168 dB re 1 μPa^2s		19,500
Grey seal	PTS - 185 dB re 1 μPa^2s	Soft start	11
	TTS - 170 dB re 1 μPa^2s		5,520
	PTS - 185 dB re 1 μPa^2s	Soft start + ADD	*N/E*
	TTS - 170 dB re 1 μPa^2s		*3,890*
Harbour seal	PTS - 185 dB re 1 μPa^2s	Soft start	11
	TTS - 170 dB re 1 μPa^2s		5,520
	PTS - 185 dB re 1 μPa^2s	Soft start + ADD	*N/E*
	TTS - 170 dB re 1 μPa^2s		*3,890*

It is highlighted that, whilst ADDs deployed for such short durations are unlikely to lead to injury, there may be some trade-off with an increase in disturbance during the period of activation. Depending on the device employed, ADDs may elicit a strong behavioural response and lead to displacement over ranges exceeding

a kilometre or more, and potentially lasting slightly beyond the point at which the ADD has been deactivated. Whilst this is useful for reducing the risk of injury to marine mammals there needs to be a balance to ensure that ADDs do not lead to significant additional disturbance themselves. This can be achieved by optimising both ADD source signals and deployment schedules (Thompson *et al.*, 2020). Since the effect of ADDs on marine mammals is likely to be a short-term disturbance response over a relatively localised area (within a maximum of few kilometres) and animals are likely to quickly recover to baseline levels (within a few hours) the additional risk of disturbance, in the context of the whole piling sequence, is likely to be negligible.

Piling Technology

As mentioned in section 5.5.5 of chapter 5 Addendum: Project Description (EIAR volume 2A Addendum) adoption of the MODIGA technology will provide a designed in measure to reduce the risk of injury to marine mammals and other megafauna by attenuating sound levels.

MODIGA, which is a type of casing technology with an internal air bubble ring, will act as a Noise Abatement System (NAS) by creating a 'barrier' to reduce the sound propagated through the water column. A full review of all noise reduction technology has been provided in appendix 10.8: Comprehensive Review of Relevant Mitigation (Noise Abatement).

The system manufacturer states that the MODIGA - fitted with an internal air bubble ring- can provide underwater noise reduction during piling. The MODIGA will be placed on the seabed into which the sacrificial casing will be lowered. A hammer pile will then be inserted into the MODIGA and the sacrificial casing hammer piled through the unconsolidated sediments before inserting the monopile (see Figure 1-2 and Figure 1-3). The air bubble ring within the MODIGA will actively attenuate noise. It has been demonstrated that air-filled casings can offer a highly effective noise mitigation strategy for marine mammal and fish receptors, reducing received SEL and peak SPL sound levels by several decibels (precise reduction being dependent upon specific configurations (see section 1.3.2 in appendix 10-8). The proposed MODIGA with internal air bubble ring will lower sound transmission due to the acoustic impedance of air by reducing the proportion of vibrational energy from the pile transmitted through the air layer into the surrounding water. It was not possible to model the precise level of reduction of noise levels at this stage as this system will be bespoke to the Project, however, a noise modelling study was undertaken for a range of NAS options to demonstrate the efficacy of applying commercially available NAS technology during piling at the Project (appendix 10-6: NAS Modelling Report). The level of noise abatement resulting from the air bubble ring inside the MODIGA casing will be modelled during the detailed design of the MODIGA system. Conservatively, it is expected that this will result in a noise abatement similar to the in-line hammer noise reduction unit (PULSE) technology.

Whilst the MODIGA with an internal air bubble ring, was used at two offshore wind farms in the Bay of Biscay in France (see appendix 5-11: Supporting Information Demonstrating the Applicant's Experience on Other Offshore Wind Farm Projects (EIAR volume 2A), there was no data available to demonstrate the noise reductions at these projects. For the existing commercially available systems that were modelled for the Project, the results demonstrated a reduction in SEL_{cum} and SPL_{pk} in effect ranges for marine mammal and fish receptors (appendix 10-6: NAS Modelling Report). NAS modelled included: big bubble curtains (BBC), Double big bubble curtains (DBBC) and the in-line hammer PULSE (Piling Under Limited Stress Equivalent) technology. Therefore, taking the theoretical considerations into account and the manufacturer's technical statement, the Project is confident that the MODIGA technology will also provide suitable mitigation for piling.

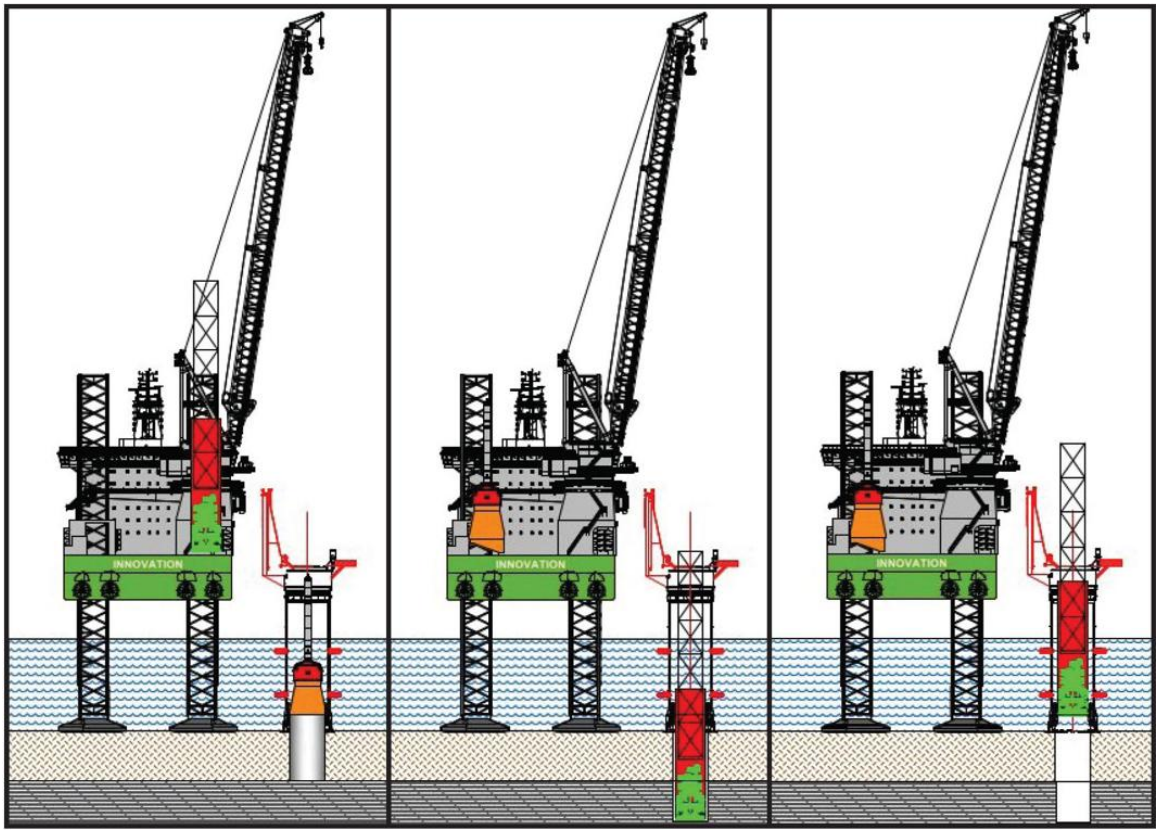

Figure 1-2: Installation of foundations (steps 1-3): 1. Placement of MODIGA and piling of sacrificial casing; 2. Drilling of rock to embedment depth; 3. Removal of drill

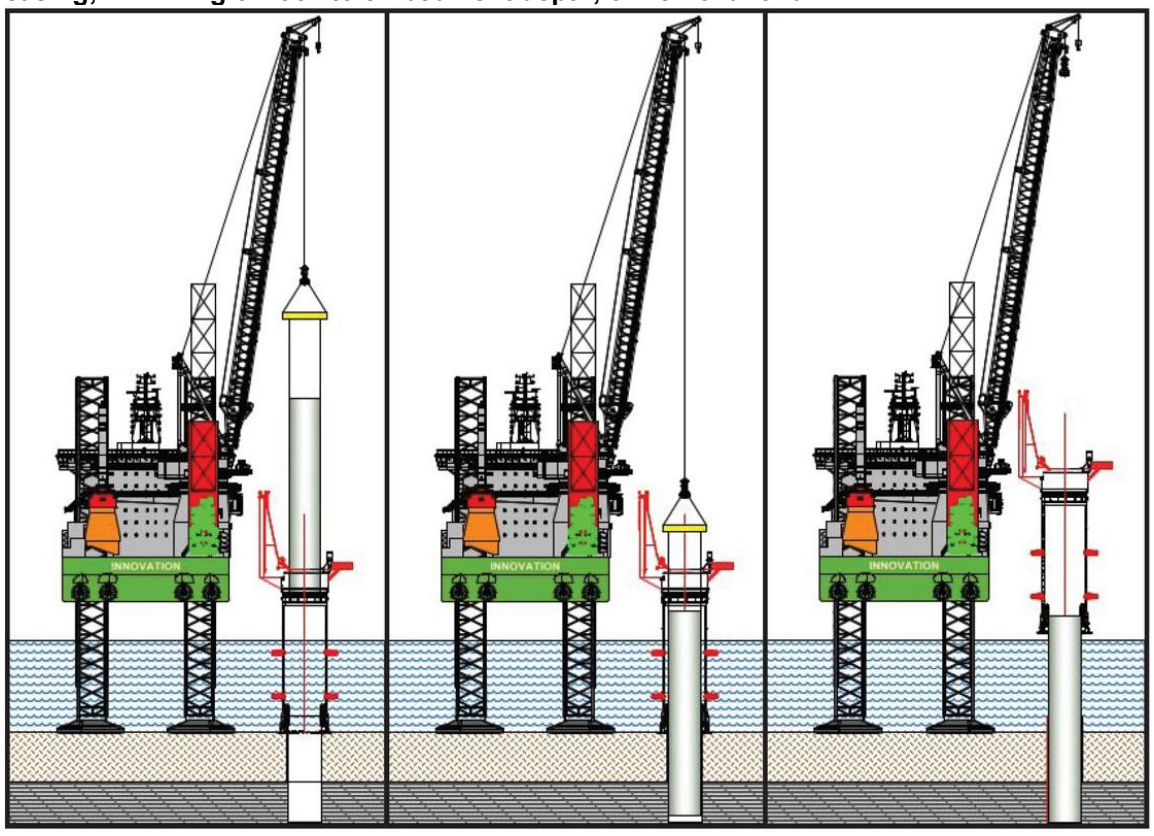

Figure 1-3: Installation of foundations (steps 4-6): 4. Insertion of monopile; 5. Grouting of monopile, 6. Removal of MODIGA.

To demonstrate efficacy of current NAS options, (and in the absence of empirical measurements for the MODIGA with internal air bubble), PTS and TTS during impact piling of monopiles was modelled for scenarios with and without other NAS technology (see appendix 10-6: NAS Modelling Report for full details) with the outputs of ecological noise modelling interpretation on marine mammals (and fish) presented in 10-7 Addendum - NAS Comparison Technical Note - Marine Mammals, Megafauna and Fish. Two mitigation methods were considered against the unmitigated base scenario: PULSE and DBBC (see Table 1-7).

Table 1-7 Summary of modelling scenarios: all modelled at the east of the offshore wind farm area.

Scenario	Description
Unmitigated	Unmitigated scenario of piling of monopile.
PULSE	Mitigated piling with use of in-line hammer noise reduction unit (PULSE) (i.e. using hydraulic pistons positioned between hammer and sleeve, filled with liquid dampening the sound).
DBBC	Mitigated piling with use of DBBC (i.e. compressed air pumped through nozzle hoses laid on the seafloor which builds two large circular curtains of bubbles).

Results of the modelling are presented in Table 1-8 to Table 1-10. Overall modelling for impact piling of monopiles with NAS scenarios results in reduced impact ranges based on instantaneous injury and cumulative exposure. Furthermore, the application of just 15 minutes of ADD resulted in a reduction such that the PTS ranges were not exceeded in any species, and the TTS ranges were considerably reduced across all species, suggesting that different types of NAS can offer suitable mitigation for both permanent and temporary injury (Table 1-9).

Table 1-8 Potential auditory injury (PTS) and TTS ranges for marine mammals from installation of a single pile based on SEL_{cum} metric, without ADD.

Species	Threshold, SEL_{cum} (dB re 1 μPa^2s)	Range (m)		
		Unmitigated	PULSE	DBBC
Minke whale	PTS – 183 dB re 1 μPa^2s	1,135	635	98
	TTS – 168 dB re 1 μPa^2s	21,500	16,500	1,145
Bottlenose dolphin Common dolphin	PTS – 185 dB re 1 μPa^2s	N/E	N/E	N/E
	TTS – 170 dB re 1 μPa^2s	21	19	<curtain
Harbour porpoise	PTS – 155 dB re 1 μPa^2s	815	454	280
	TTS – 140 dB re 1 μPa^2s	14,500	7,720	2,050
Harbour seal Grey seal	PTS – 185 dB re 1 μPa^2s	11	N/E	<curtain
	TTS – 170 dB re 1 μPa^2s	5,520	2,470	<curtain

N/E = threshold not exceeded, < curtain = injury range contained within DBBC.

Table 1-9 Potential auditory injury (PTS) ranges for marine mammals from installation of a single pile based on the SEL_{cum} metric, with 15 minutes ADD.

Species	Threshold, SEL (dB re 1 μPa^2s)	Range (m)		
		Unmitigated	PULSE	DBBC
Minke whale	PTS – 183 dB re 1 μPa^2s	N/E	N/E	N/E
	TTS – 168 dB re 1 μPa^2s	19,500	15,000	<curtain
Bottlenose dolphin Common dolphin	PTS – 185 dB re 1 μPa^2s	N/E	N/E	N/E
	TTS – 170 dB re 1 μPa^2s	N/E	N/E	N/E
Harbour porpoise	PTS – 155 dB re 1 μPa^2s	N/E	N/E	N/E

Species	Threshold, SEL (dB re 1 μPa^{2}s)	Range (m)		
		Unmitigated	PULSE	DBBC
Harbour seal Grey seal	TTS – 140 dB re 1 μPa^{2}s	13,000	6,280	725
	PTS – 185 dB re 1 μPa^{2}s	N/E	N/E	N/E
	TTS – 170 dB re 1 μPa^{2}s	3,890	910	<curtain

N/E = threshold not exceeded, < curtain = injury range contained within DBBC.

Table 1-10 Potential auditory injury (PTS) and TTS ranges for marine mammals from installation of a single pile based on the SPL_{pk} metric, for the first hammer strike and highest energy hammer strike.

Species	Threshold, Lp,0-pk, dB re 1 μPa	Range (m)					
		Unmitigated		PULSE		DBBC	
		First Strike	Max Energy	First Strike	Max Energy	First Strike	Max Energy
Minke whale	PTS – 219 dB re 1 μPa (pk)	169	425	144	285	< curtain	147
	TTS – 213 dB re 1 μPa (pk)	273	684	241	424	106	208
Bottlenose dolphin	PTS – 230 dB re 1 μPa (pk)	71	177	56	120	< curtain	77
Common dolphin	TTS – 224 dB re 1 μPa (pk)	114	286	93	180	< curtain	110
Harbour porpoise	PTS – 202 dB re 1 μPa (pk)	653	1,638	624	804	201	395
	TTS – 196 dB re 1 μPa (pk)	1,051	2,638	1,048	1,178	285	559
Harbour seal Grey seal	PTS – 218 dB re 1 μPa (pk)	183	460	157	307	< curtain	156
	TTS – 212 dB re 1 μPa (pk)	295	741	263	454	112	221

< curtain = injury range contained within DBBC.

1.5.2 Geophysical acoustic surveys

Site investigation surveys to facilitate the inspection of offshore infrastructure foundations, inter-array cables and offshore cable during the operational and maintenance phase of the Project have the potential to cause direct or indirect effects (including injury or disturbance) on marine megafauna IEFs. An underwater noise modelling assessment was carried out to investigate the potential for injurious and behavioural effects as a result of geophysical surveys using the latest criteria (volume 2B, appendix 10-2: Subsea Noise Technical Report), which is drawn upon in the information below.

Underwater noise modelling for geophysical surveys has been undertaken based upon the likely parameters of the equipment expected to be employed. The Kongsberg EM710 MBES unit has been modelled operating at 105 kHz, 231 dB re: 1μPa @ 1 m (rms) (see Table 1-11 below), although this equipment can typically work at a range of signal frequencies, depending on the distance to the seabed and the required resolution. In response to RFI 9.J, Ultra-short Baseline (USBL) positioning systems has been included for the assessment of PTS and TTS.

For sonar-like sources the signal is highly directional, acting like a beam, and is emitted in pulses. Sonar-based sources are considered as continuous (non-impulsive) because they generally comprise a single (or multiple discrete) frequency as opposed to a broadband signal with high kurtosis, high peak pressures and rapid rise times (see volume 2B, appendix 10-2: Subsea Noise Technical Report, wherein a full description of the source sound levels for geophysical survey activities is provided).

Table 1-11: Typical Sonar-based survey equipment parameters used in assessment.

Survey Type	Unit	Frequency (kHz)	Source Level (dB re 1 µPa (rms))	Pulse Rate (s^{-1})	Pulse Width (ms)	Beam Width (degrees)	Swathe Beam Width (degrees)
MBES	Kongsberg EM710	105	231	30	0.2	2	140
USBL	-	14	200	3	100	80	-

Noise modelling was undertaken only for MBES and USBL surveying methods and did not consider non-impulsive sources to be a key potential impact for basking shark and sea turtles. These species were subsequently screened out, and the focus of the assessment was on marine mammal species only. As for the impact of pile-driving, the potential effect upon marine mammals was either auditory injury (PTS or TTS) or behavioural disturbance.

Potential impacts of site investigation surveys depend on the characteristic of the sound source, survey design, frequency bands and water depth. Sonar-based sources have very strong directivity which effectively means that there is only potential for injury when a marine mammal is directly underneath the sound source. Once the animal moves outside of the main beam, there is no potential for injury.

Based on underwater noise modelling presented in volume 2B, appendix 10-2: Subsea Noise Technical Report (for MBES) and appendix 10-6: NAS Modelling Report (for USBL) PTS has the potential to occur out to a maximum of 227 m for harbour porpoise (Table 1-12 and), up to 124 m for dolphin species and up to 12 m for minke whale. and in pinniped species the maximum range for PTS to occur is out to 34 m from the sound source. TTS has the potential to occur out to a maximum of 449 m in harbour porpoise, 1,284 m for dolphin species, and up to 107 m for minke whale. In pinniped species this range is predicted out to 123 m from the sound source.

Table 1-12: PTS and TTS onset thresholds and potential impact ranges for marine mammal species during non-impulsive MBES geophysical site investigation surveys, based on comparison to Southall *et al*. (2019) SEL thresholds.

Species	Hearing group (NMFS, 2018)	Injury type	SEL threshold (dB re 1 μPa^2s)	Impact range (m)
Minke whale	LF	PTS	199	12
		TTS	179	107
Bottlenose dolphin	MF	PTS	198	124
		TTS	178	172
White-beaked common dolphin	MF	PTS	198	124
		TTS	178	172
Harbour porpoise	HF	PTS	173	227
		TTS	153	449
Harbour seal	PCW	PTS	201	34
		TTS	181	123
Grey seal	PCW	PTS	201	34
		TTS	181	123

Table 1-13: Potential impact ranges (m) for marine mammals during USBL, based on the non-impulsive SEL thresholds from Southall *et al.* (2019) (N/E refers to a threshold not exceeded).

Survey type	Effect	Hearing group impact range, m			
		LF	HF	VHF	PCW
USBL	PTS	N/E	N/E	53	N/E
	TTS	18	31	1,284	20

The number of marine mammals with the potential to be injured within the modelled ranges for PTS and TTS presented in Table 1-13 for USBL and was estimated using the most up to date species-specific density estimates. Due to low predicted injury ranges, for all marine mammal species, it is predicted that no more than one animal has the potential to experience PTS or TTS as a result of geophysical site investigation surveys.

Mitigation for injury during geophysical site investigation surveys from a conventional vessel will involve the use of MMOs and PAM to ensure that the risk of injury over the defined mitigation zone is reduced in line with NPWS guidance (NPWS, 2014). A soft start will also be implemented where this is within technical capabilities of the survey equipment.

1.6 Mitigation methods and procedures

The mitigation measures presented below include designed-in and management measures (measures included in the Project) and mitigation measures to reduce the risk of injury to marine mammals as described in volume 2B, chapter 10: Marine Mammals and Megafauna.

1.6.1 Pile-driving

As per the NPWS (2014) guidance, a 30-minute constant effort pre-piling search will be undertaken by at least two accredited and experienced marine mammal observers (MMO) using binoculars and a range finding stick as required and a Passive Acoustic Monitoring (PAM) operator to monitor the specified 1,000 m radial mitigation zone in order to minimise the likelihood of marine mammals being present within this range.

In addition to visual and acoustic monitoring, an ADD will be deployed at the start of the pre-piling search in close proximity to the pile to be installed. The ADD will be activated for a minimum period of 15 minutes to allow animals sufficient time to disperse, while also minimising the additional noise produced by the device and emitted into the marine environment. Visual and acoustic monitoring will continue throughout the ADD deployment to ensure that marine mammals have left the mitigation zone prior to the start of piling.

Pile driving activities will only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible (including in circumstances in which poor visibility prevents the 1,000 m mitigation zone from being visually monitored) the sound-producing activities will be postponed until effective visual monitoring is possible.

After the 30-minute pre-piling search and ADD activation period has elapsed, the piling initiation, soft start and ramp up designed-in measures will commence with hammer initiation at the lowest hammer energy and strike rate (525 kJ). The ADD will be turned off immediately after the piling activity has commenced. The soft start is the gradual, incremental increase of piling power over a minimum of 20 minutes. This allows time for marine mammals or megafauna to move away from the noise source, thereby reducing the risk of exposing animals to noise levels which can cause injury.

The initiation and soft start stages allow for alignment piles and for marine megafauna to leave the area and involve a hammer energy of 525 kJ. The ramp up stage is a progressive increase in hammer energy following the soft start and involves an initial hammer energy of 525 kJ which builds 2,500 kJ over the 9-minute period. The maximum hammer energy proposed for the Project is 3,500 kJ. However, the actual

energy used when piling will be significantly lower for the majority of the time and the driving energy will be raised to 3,500 kJ only when absolutely necessary. A summary of the piling stages and associated strike energies is presented in Table 1-14.

Table 1-14: Piling scenario for monopile installation using a maximum hammer energy of 3,500 kJ.

Stage	Energy (kJ)	SEL per strike (dB re 1 μPa^2s)	SPL_{pk} (dB re 1 µPa)	Duration (mins)	Strike rate (strikes per minute)	Number of strikes
Initiation	525	205	246	1	6	6
Soft start	525	205	246	20	30	600
Ramp up	525 to 2,500	205 - 212	246 - 255	9	30	270
Standard operation	2,500	212	255	150	30	4500
Full power	3,500	213	258	120	30	3600
Total	**-**	**-**	**-**	**300**	**-**	**8,976**

These above activities were included in subsea noise modelling (with the inclusion of an ADD for 15 minutes prior to commencement of any piling activity) in volume 2B, appendix 10-2: Subsea Noise Technical Report and Appendix 10-4 Addendum: Updated Subsea Noise Modelling Report. The ADD itself was assumed to not contribute towards any injury to marine megafauna.

If marine megafauna are detected within the mitigation zone during the pre-piling search of soft-start, piling will not commence or at least the hammer energy should not be further increased until at least 30 minutes after the last visual or acoustic detection of the animal. The MMOs and PAM operative will track any marine megafauna detected and ensure that they have left the mitigation zone before piling commences or the soft start continues. Once the ramp up procedure commences there is no requirement to halt or discontinue the pile-driving if marine mammals are detected within the mitigation zone. Likewise, if marine megafauna are detected in the mitigation zone during piling at full power, there will be no requirement to cease piling. It may also not be possible to stop piling at full power due to engineering restrictions. Figure 1-4 illustrates the sequence of events and lines of communication required to implement the MMMP.

If for any reason there is a break in piling activity for greater than 10 minutes, then the pre-piling search and ADD activation, and a full soft start and ramp up procedure should be repeated before piling recommences.

The designed-in and mitigation measures detailed in this MMMP reduce the risk of auditory injury to an acceptable level in terms of PTS. With mitigation in place, the potential effect of piling (auditory injury) on marine megafauna is considered to be of **imperceptible or slight significance**, which is not significant in EIA terms.

Application of ADDs

The type of Acoustic Deterrent Device (ADD) and device specifications will need to be considered carefully when selecting the final ADD to be used for the Project. The choice of ADD to be used for the Project will include consideration of the optimal acoustic characteristics required to provide protection against injury, balanced against minimising disturbance range, and will be appropriate to the species and risk, in line with the latest available guidance.

Recent ADD guidance from JNCC (Phillips *et al.,* 2025) (updating McGarry *et al.* (2022)) reviews the evidence on the effectiveness of acoustic devices at deterring different marine mammal species, summarising the acoustic characterisation of devices and provides details of impact ranges per species from a broad literature review/technical details provided by manufacturers, which will be a useful tool for supporting the decision-making process.

While careful consideration of active ADD deployment is necessary when designing mitigation strategies to prevent potential habituation or voluntary risk behaviour, there is substantial evidence to demonstrate that ADDs are effective at deterring animals from potential injury zones, and that animals often return to the area

after ADD operation (Voss et al., 2023). Phillips *et al*. (2025) demonstrated there is a wide range of ADDs available with deterrence evidence backed by peer-reviewed studies for different species. For example for harbour porpoise, ADDs with high evidence scores (assessment of confidence in the evidence for an ADD's effectiveness) include the Lofitech seal scarer, SaveWave: SealSalmon Saver, Ace Aquatec: Midfrequency Acoustic Startle Response Device, Ace Aquatec Fauna Guard: Porpoise Module, Gael Force: SeaGuard seal deterrent and Future Oceans: 60 kHz – 120 kHz Netguard Dolphin Pinger (Phillips *et al*., 2025). The primary target species for ADD selection will be harbour porpoise, and therefore it is considered that there are commercially available ADDs that would represent an appropriate ADD for deterring harbour porpoise from the auditory injury zone (i.e. any one of the ADDs listed above).

In finalising the details of this MMMP, the most appropriate device, target species to deter, alongside factors such as the number of ADD's required to cover the risk zone (considering the geographic extent of ensonification) or whether one ADD is sufficient to target multiple species/hearing groups if desired (i.e. if a single device has the capability to deter all the necessary species/hearing groups from the risk zone or whether multiple devices that target different hearing groups are required).

These details will be finalised post-consent, as part of the procurement process based upon the final project design, prior to construction and will be detailed in the final MMMP. The mitigation protocol will align with up to date guidelines and in consultation with appropriate experts and relevant stakeholders. ADD use will be considered carefully, and on a case-by-case basis. ADD will be used as part of a wider suite of mitigation measures as detailed in this MMMP (including soft starts, Marine Mammal Observers (MMO) / Passive Acoustic Monitoring (PAM)).

Any implementation of ADDs (as set out in this MMMP) will align with Recommendation 18 of the Irish Whale and Dolphin Group (IWDG) Policy on Offshore Windfarm Development; specifically, ADDs will be used to reduce the threat of auditory injury from pile driving (where they are known to be effective for the species present). ADD use will not exceed the noise levels of the mitigated activity set out in the MMMP and would be only used prior to commencing those activities.

Marine Mammal Observer

During daylight hours at least two dedicated and qualified Marine Mammal Observer (MMO) will conduct a visual search of the mitigation zone and conduct the pre-start searches from a vessel prior to the start of the piling (see section 1.6 for details). Visual monitoring for marine mammals will be conducted from a suitable platform on the vessel such as the ship's bridge, that allows 360-degree visualisation, and full coverage of the mitigation zone. MMOs must concentrate their efforts on the measures to be taken in advance of and during commencement, breaks in and resumption of the sound-producing activity (NPWS, 2014).

The MMO will be equipped with reticule binoculars and Marine Mammal Reporting forms (NPWS, 2014) and will be capable of determining the extent of the mitigation zone in relation to their viewing platform. A range stick may be used to aid the estimation of distance of the sighting from the survey vessel. The lead MMO should also be equipped with a two-way radio to ensure communication with both the vessel crew and the PAM operator. This is to allow any visual or acoustic detections of marine mammals or megafauna in the mitigation zone and any subsequent delay required to the commencement of piling to be communicated quickly and effectively between all parties. The MMO will be responsible for recording all marine mammal sightings in the appropriate format, along with other environmental data. Together with the PAM Operator, the MMO will be responsible for compiling all the data on marine mammal observations and mitigation activities for reporting to NPWS.

The MMO must be experienced and familiar with the Irish regulatory procedures pertaining to managing risk to marine mammals from underwater sound and must be provided with full details of all licence/consent conditions relevant to the performance of their role in advance of activity commencement, to ensure compliance. The MMO will have the necessary authority (or support by Works Superintendent) to implement the plan and stop works if necessary. The use of distance estimation formula will follow the same approach suggested for distance estimation by the Joint Nature Conservation Committee (JNCC) (JNCC, 2017) (as discussed in Marine Mammal Observer Association (MMOA) (2024)) and will use standard trigonometric equations for calculation.

PAM Operator

PAM will be undertaken during pre-start, ramp-up and pilling activities. A vertical PAM system will be used, as opposed to a towed system as the vessels are likely to use dynamic positioning rather than transiting during the pre-start monitoring phase.

Two dedicated and qualified PAM Operators will be responsible for deployment, maintenance and operation of the PAM hydrophone, including spares. Both PAM Operators will be suitably trained in PAM and the use of PAMGuard, with training having been provided by an appropriate organisation (e.g. Seiche). PAM Operators will also have an appropriate level of field experience (i.e. a minimum of one-year PAM experience on offshore projects).

PAM Operators will be based on the vessel together with the MMO. PAM Operators will be responsible for recording all acoustic marine mammal detections in the appropriate format, and together with the MMO, will be responsible for compiling all the data on marine mammal observations and mitigation activities for reporting to NPWS. The PAM operator should also be equipped with a two-way radio to ensure communication with both the vessel crew and the lead MMO. This is to allow any visual or acoustic detections of marine mammals or megafauna in the mitigation zone and any subsequent delay required to the commencement of piling to be communicated quickly and effectively between all parties.

PAM Operators must be experienced and familiar with the regulatory procedures pertaining to managing risk to marine mammals from underwater sound, and to ensure compliance, must be provided with full details of all licence/consent conditions relevant to the performance of their role in advance of activity commencement. PAM Operators will have the necessary authority (or support by Works Superintendent) to implement the plan and stop works if necessary.

ADD Operator

A trained and dedicated ADD operator will be responsible for ADD maintenance, operation and reporting. The ADD Operator will be responsible for deploying the ADD from the installation vessel, verifying the operation of the ADD before deployment, operating the ADD, ensuring that batteries are fully charged and that spare equipment is available.

The ADD Operator will also record and report to the Works Superintendent/MMO/PAM on all ADD and piling activity so the details of any ADD used (see section 1.6), and any relevant observations on their efficacy can be reported as a part of the Operational/Marine Mammal Observer/Passive Acoustic Monitoring Report (see section 1.8).

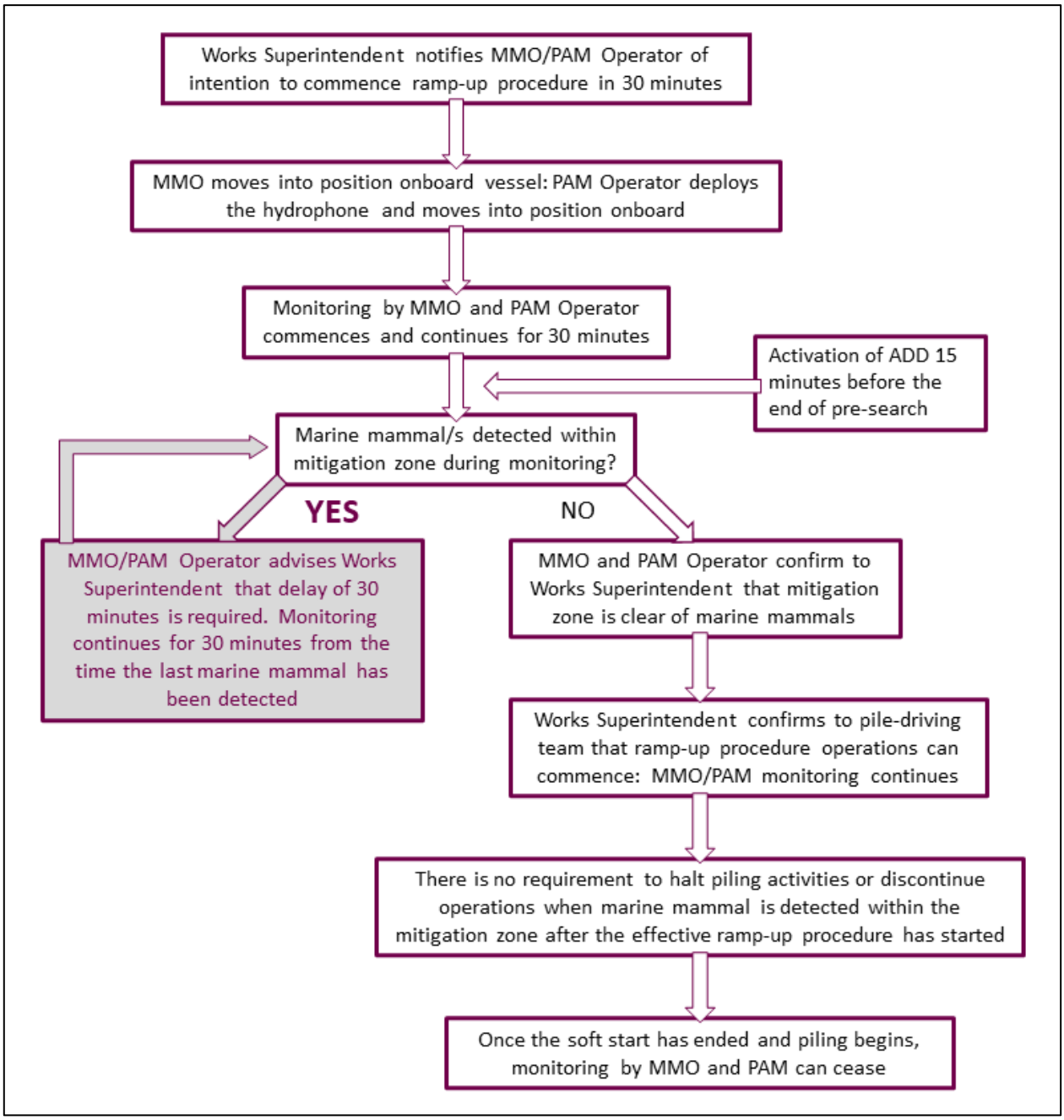

Figure 1-4: Task and communication plan for piling procedures start-up.

1.6.2 Field records during pile-driving

Operations report

As per NPWS guidelines (2014) the Operations report will be provided to NPWS on completion of pile-driving activities as outlined below and must include use of the standard data forms provided in NPWS (2014):

- Details of the Client/Contractor involved in the plan/project;
- Details of the Platform/Vessel type(s) participating in the plan/project;
- Survey reference number supplied by the Regulatory Authority or other statutory body;

- Date and location of the plan/project;
- Latitudes, longitudes or grid references for the area of operations;
- Specifications and acoustic characteristics of all sound-producing equipment used;
- A daily log of how and when the sound-producing equipment was used; and
- Information on any technical problems encountered during pre-start-up procedures or during full scale operation/activity.

Marine Mammal Observer/PAM Report

The Marine Mammal Observer/Passive Acoustic Monitoring Report will include:

- An Executive Summary: a concise text at the beginning of the report highlighting the MMO/PAM work undertaken and summarising in turn:
  - All marine mammal detections made during the piling;
  - All detections made prior to the commencement of the piling activity (pre-search and ramp-up procedures);
  - All operational responses to the presence of animals in the area and the associated outcomes;
  - All occurrences of night-time operation/activity, continuation into poor weather and stoppages;
  - Any and all problems arising during implementation of the prescribed mitigation;
  - Any recommendations based on the project and any marine mammal sightings/behaviour encountered during the piling operations which could benefit future projects; and
  - A concluding statement regarding the operational efficacy of the mitigation measures performed.
- Date and location(s) of the plan/project;
- Name, address and qualifications of the MMO, PAM and ADD operators on the Platform/Vessel;
- Name of any other Platform/Vessel involved in the operation/activity;
- Latitudes, Longitudes or Grid references for the area(s) of operations monitored by the MMO;
- Details of the observation platform used for marine mammal monitoring, including its height above sea level;
- Details of all sound-producing operations/activities undertaken during the period of survey;
- Details of monitoring watches conducted for marine mammals;
- Details of all marine mammal sightings recorded during monitoring watches;
- Details of all marine mammal sightings recorded outside monitoring watches (e.g. incidental observations), including records from additional personnel on board;
- Details of any problems encountered during marine mammal monitoring, start-up procedures or during full scale operation/activity; and
- Details of any instances of non-compliance with NPWS guidelines.

1.6.3 Geophysical acoustic surveys

As per the NPWS (2014) guidance, a constant effort pre-survey search will be undertaken by at least two accredited and experienced MMOs (using binoculars and a range finding stick as required) and a PAM Operator to monitor the specified 500 m radial mitigation zone to minimise the likelihood of marine mammals being present within this range. In waters up to 200 m deep (which includes the offshore array area and offshore cable corridor), the MMO shall conduct pre-start-up visual monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected by the MMO within the mitigation zone.

Sound-producing activities will only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible (including in circumstances in which poor visibility prevents the 500 m mitigation zone from being visually monitored) the sound-producing activities shall be postponed until effective visual monitoring is possible.

An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

This prescribed pre-survey monitoring shall subsequently be followed by a ramp-up procedure (i.e. a soft-start) which should include continued monitoring by the MMO.

In commencing a geophysical acoustic survey operation, the following soft-start procedure must be used, including during any testing of acoustic sources, where the output peak SPL from any source exceeds 170 dB re: 1 µPa @ 1 m:

a. Where it is possible according to the operational parameters of the equipment concerned, the device's acoustic energy output shall commence from a lower energy start-up (i.e. a peak SPL not exceeding 170 dB re 1 µPa @ 1 m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 minutes;

b. This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period; and

c. Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched "on" and "off" in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.

In all cases where a soft-start is employed the delay between the end of the soft-start and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.

Once the soft-start commences, there is no requirement to halt or discontinue the procedure if weather or visibility conditions deteriorate, nor if marine mammals occur within the 500 m radial mitigation zone. Marine mammals present at this point are deemed to have entered the ensonified area willingly.

If there is a break in sound output for a period greater than 30 minutes (e.g. due to equipment failure, shut-down, survey line or station change) then all pre-survey monitoring and a subsequent soft-start procedure (where appropriate) must be undertaken.

For higher output survey operations which have the potential to produce injurious levels of underwater sound (including the MBES methods expected to be employed in geophysical surveying for the Project) as informed by the associated risk assessment, there will be a regulatory requirement to adopt a shorter 5-10 minute break limit after which period all pre-survey monitoring and a subsequent soft-start (where appropriate following pre-survey monitoring) shall recommence as for start-up.

The designed-in and mitigation measures detailed in this MMMP reduce the risk of auditory injury to an acceptable level in terms of PTS. With mitigation in place, the potential effect of geophysical acoustic surveys (auditory injury) on marine megafauna is considered to be of **slight significance**, which is not

significant in EIA terms. Figure 1-5 illustrates the sequence of events and lines of communication required to implement the MMMP.

Marine Mammal Observer

During daylight hours at least two dedicated and qualified MMOs will conduct a visual search of the mitigation zone and conduct the pre-start searches from a vessel prior to the start of surveying (see section 1.6 for details). Visual monitoring for marine mammals will be conducted from a suitable platform on the vessel such as the ship's bridge, that allows 360-degree visualisation, and full coverage of the mitigation zone. MMOs must concentrate their efforts on the measures to be taken in advance of and during commencement, breaks in and resumption of the sound-producing activity (NPWS, 2014).

The MMO will be equipped with reticule binoculars and Marine Mammal Reporting forms and will be capable of determining the extent of the mitigation zone in relation to their viewing platform. A range stick may be used to aid the estimation of distance of the sighting from the survey vessel. The lead MMO should also be equipped with a two-way radio to ensure communication with both the vessel crew and the PAM operator. This is to allow any visual or acoustic detections of marine mammals or megafauna in the mitigation zone and any subsequent delay required to the commencement of surveying to be communicated quickly and effectively between all parties. The MMO will be responsible for recording all marine mammal sightings in the appropriate format, along with other environmental data. Together with the PAM Operator, the MMO will be responsible for compiling all the data on marine mammal observations and mitigation activities for reporting to NPWS.

The MMO must be experienced and familiar with the Irish regulatory procedures pertaining to managing risk to marine mammals from underwater sound and must be provided with full details of all licence/consent conditions relevant to the performance of their role in advance of activity commencement, to ensure compliance. The MMO will have the necessary authority (or support by Works Superintendent) to implement the plan and stop works if necessary.

PAM Operator

PAM will be undertaken during pre-start, ramp-up/soft-start and surveying activities. Two dedicated and qualified PAM Operators will be responsible for deployment, maintenance and operation of the PAM hydrophone, including spares. Both PAM Operators will be suitably trained in PAM and the use of PAMGuard, with training having been provided by an appropriate organisation (e.g. Seiche). PAM Operators will also have an appropriate level of field experience (i.e. a minimum of one-year PAM experience on offshore projects).

PAM Operators will be based on the vessel together with the MMO. PAM Operators will be responsible for recording all acoustic marine mammal detections in the appropriate format, and together with the MMO, will be responsible for compiling all the data on marine mammal observations and mitigation activities for reporting to NPWS. The PAM operator should also be equipped with a two-way radio to ensure communication with both the vessel crew and the lead MMO. This is to allow any visual or acoustic detections of marine mammals or megafauna in the mitigation zone and any subsequent delay required to the commencement of surveying to be communicated quickly and effectively between all parties.

PAM Operators must be experienced and familiar with the Irish regulatory procedures pertaining to managing risk to marine mammals from underwater sound and to ensure compliance must be provided with full details of all licence/consent conditions relevant to the performance of their role in advance of activity commencement. PAM Operators will have the necessary authority (or support by Works Superintendent) to implement the plan and stop works if necessary.

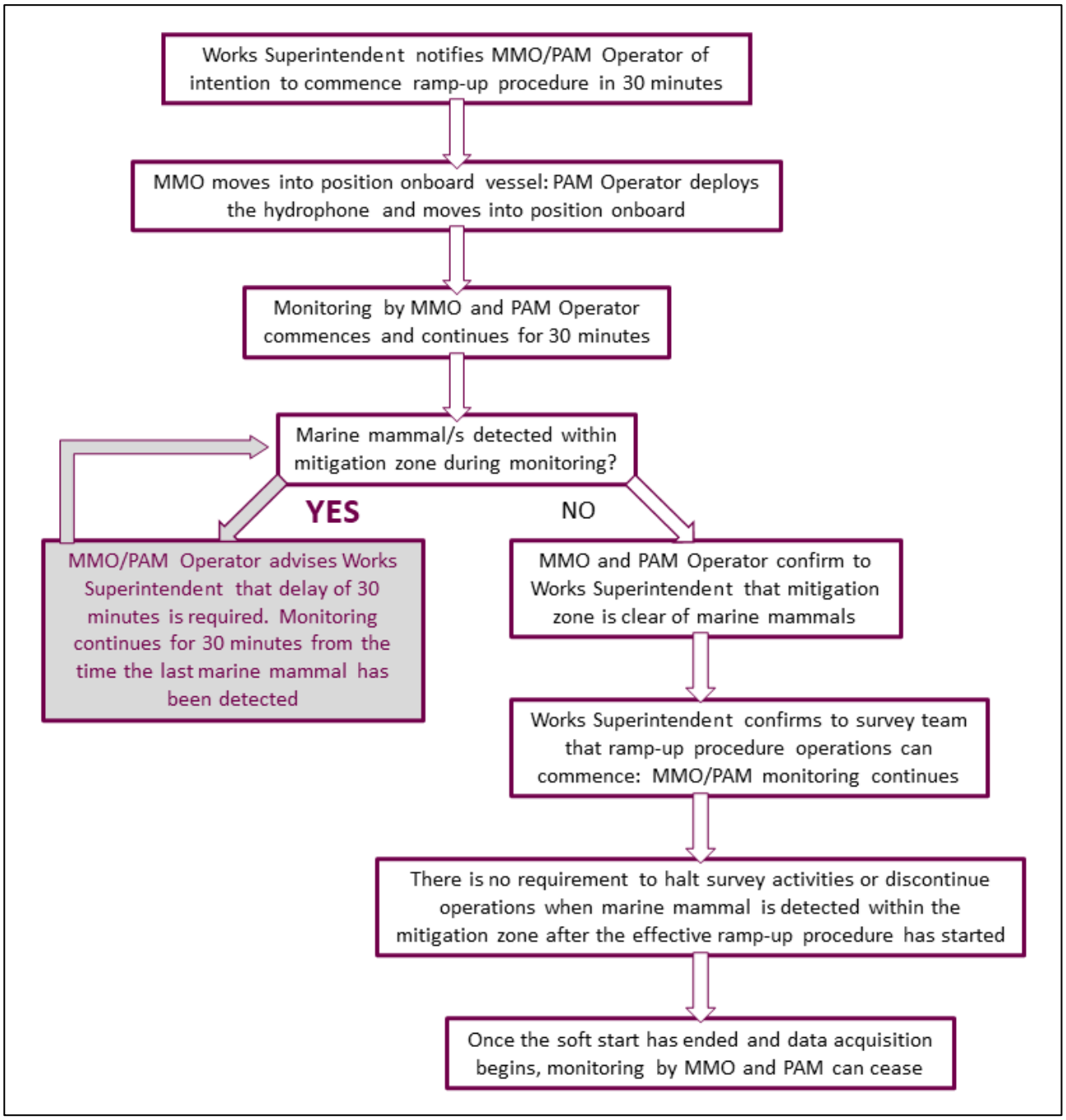

Figure 1-5: Task and communication plan for geophysical survey procedures start-up.

1.6.4 Field records during geophysical acoustic surveying

Operations report

As per NPWS guidelines (2014) the Operations report will be provided to NPWS on completion of geophysical acoustic survey activities as outlined below and must include use of standard NPWS data forms provided in NPWS (2014):

- Details of the Client/Contractor involved in the plan/project;
- Details of the Platform/Vessel type(s) participating in the plan/project;
- The survey reference number supplied by the Regulatory Authority or other statutory body;
- Date and location of the plan/project;
- Latitudes, longitudes or grid references for the area of operations;
- Specifications and acoustic characteristics of all sound-producing equipment used;
- For seismic surveys: number and volume of each airgun used and a calculated total volume of the array;
- A daily log of how and when the sound-producing equipment was used including during ramp-up (soft-start) procedures, where relevant;
- Information on any technical problems encountered during pre-start-up procedures, ramp-up (soft-start) procedures or during full scale operation/activity.

Marine Mammal Observer/PAM Report

The Marine Mammal Observer/Passive Acoustic Monitoring Report will include:

- An Executive Summary: a concise text at the beginning of the report highlighting the MMO work undertaken and summarising in turn:
  - All marine mammal detections made during the survey programme;
  - All detections made prior to the commencement of the operation/activity (e.g. before ramp-up);
  - All operational responses to the presence of animals in the area and the associated outcomes;
  - All occurrences of night-time operation/activity, continuation into poor weather and stoppages;
  - Any and all problems arising during implementation of the prescribed mitigation;
  - Any recommendations based on the project and any marine mammal sightings/behaviour encountered during the survey operations which could benefit future projects; and
  - A concluding statement regarding the operational efficacy of the mitigation measures performed.
- Date and location(s) of the plan/project;
- Name, address and qualifications of the MMO(s) on the Platform/Vessel;
- Name of any other Platform/Vessel involved in the operation/activity;
- Latitudes, longitudes or grid references for the area(s) of operations monitored by the MMO;

- Details of the observation platform used for marine mammal monitoring, including its height above sea level;
- Details of all sound-producing operations/activities undertaken during the period of survey;
- Details of monitoring watches conducted for marine mammals;
- Details of all marine mammal sightings recorded during monitoring watches;
- Details of all marine mammal sightings recorded outside monitoring watches (e.g. incidental observations), including records from additional personnel on board;
- Details of any problems encountered during marine mammal monitoring, start-up procedures, ramp-up (soft-start) procedures or during full scale operation/activity; and
- Details of any instances of non-compliance with NPWS guidelines.

1.7 Roles and responsibilities

1.7.1 Overview

This section sets out the key roles and responsibilities and lines of communications in relation to the MMMP. It identifies each key role involved in the construction phase of the Project and lists responsibilities associated with each role in relation to the MMMP.

1.7.2 Key roles

OWL Project Manager

The Project Manager has responsibility for ensuring that sufficient resources and processes are in place by the contractor and their subcontractors to implement the MMMP. The Project Manager will be responsible for ensuring that contractual obligations are met for contractors in relation to the MMMP, requiring that all construction personnel and contractors assist and support the Environmental Manager for the delivery of the commitments made under this MMMP.

The Project Manager will also ensure that the relevant Package Manager (in this case, the Marine Installation Package Manager) is responsible for:

- Requiring that sufficient resources and processes are in place to deliver/comply with the MMMP;
- Requiring that provision is made for matters relating to the delivery of the MMMP to form part of construction progress meetings and project inductions (e.g. outlining soft start and mitigation procedures as required by the MMMP; see section 1.6);
- Requiring that all construction personnel and contractors assist and support the MMOs and PAM and ADD operators (see below) and the Contractors Environmental Manager in delivering the MMMP and monitoring or auditing compliance with the MMMP;
- Ensuring contractual obligations are met for key contractors and their subcontractors in relation to the MMMP; and
- Reporting to the Project Manager on matters related to the MMMP (see section 1.8).

OWL Environmental Manager and OWL Environmental Clerk of Works

The OWL Environmental Manager is responsible for requiring contractor compliance with the Project consents and environmental legislation. Responsibilities of the OWL Environmental Manager/OWL Environmental Clerk of Works (ECoW) in relation to the MMMP include:

- Quality assurance of this MMMP;
- Providing advice on compliance with the MMMP;
- Monitoring compliance with the MMMP;
- Reporting on compliance with the MMMP to the Department of Housing, Local Government and Heritage (DHLGH);
- Ensuring that the Contractor is providing appropriate training in relation to construction-related environmental measures and consents compliance; and
- Ensuring that the Contractor is also delivering toolbox talks (e.g. outlining soft start and mitigation procedures as required by the MMMP; see section 1.6) as appropriate.

Contractors

Contractors and their subcontractors are responsible for installing the Project infrastructure in compliance with this MMMP, as required by their contract with the Applicant, and for appropriate liaison with the MMOs and PAM and ADD operators (see below) and the Contractors Environmental Manager.

1.8 Reporting

Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority. The Works Superintendent and MMO/PAM Operator tasked with monitoring the implementation of the mitigation plan and with conducting survey effort for marine mammals in accordance with this guidance, will submit a report to the Regulatory Authority within 30 days of completion of the relevant piling and/or geophysical survey activity. This will include a daily log concerning the testing and operation of all relevant sound-producing equipment/activities, including ADDs and a record of all marine mammal detections.

Reporting will be provided in line with the Operations Report and Marine Mammal Observer Report contents outlined in NPWS (2014) and details are provided in NPWS (2014). The reports also provide information on any problems encountered during the survey activity or mitigation procedure (compliance reporting).

References

Boisseau, O., McGarry, T., Stephenson, S., Compton, R., Cucknell, A. C., Ryan, C. and Moscrop, A. (2021). Minke whales *Balaenoptera acutorostrata* avoid a 15 kHz acoustic deterrent device (ADD). Marine Ecology Progress Series, 667, 191-206.

Doherty, P. D., Baxter, J. M., Gell, F. R., Godley, B. J., Graham, R. T., Hall, G., Hall, J., Hawkes, L. A., Henderson, S. M., Johnson, L. and Speedie, C. (2017). Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic. Scientific reports, 7, p.42837.

Hammond, P.S., Macleod, K., Berggren, P., Borchers, D.L., Burt, L., Cañadas, A., Desportes, G., Donovan, G.P., Gilles, A., Gillespie, D. and Gordon, J. (2013). Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. Biological Conservation, 164, pp.107-122.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. and Øien, N. (2017). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. May 2017, 40 pp.

JNCC. (2017). *JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) 2017* [Online]. Available at: https://hub.jncc.gov.uk/assets/e2a46de5-43d4-43f0-b296-c62134397ce4. Accessed on November 2025.

King, G. L., and Berrow, S. D. (2009). Marine turtles in Irish waters. *The Irish Naturalists' Journal*, 30, 1-30.

McGarry, T., De Silva, R., Canning, S., Mendes, S., Prior, A., Stephenson, S. and Wilson, J. (2022). Evidence base for application of Acoustic Deterrent Devices (ADDs) as marine mammal mitigation (Version 4.0) JNCC Report No. 615, October 2022. JNCC, Peterborough. ISSN 0963-8091. Available at: https://hub.jncc.gov.uk/assets/e2d08d7a-998b-4814-a0ae-4edf5d887a02. Accessed April 2023

Marine Mammal Observer Association (MMOA). (2024). *Distance Estimation using Reticular Binoculars* [Online]. Available at: https://mmo-association.org/about-us/news/distance-estimation-using-reticular-binoculars. Accessed on November 2025.

National Marine Fisheries Service (NMFS) (2018). Revision to Technical Guidance for Assessing Effects of Anthropogenic Sound on Marine Mammal Hearing.

National Parks and Wildlife Service (NPWS) (2014). Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Available at: https://www.npws.ie/marine/best-practice-guidelines. Accessed April 2023

Popper, A. N., Hawkins, A. D., Fay, R. R., Mann, D., Bartol, S., Carlson, Th., Coombs, S., Ellison, W. T., Gentry, R., Hal vorsen, M. B., Lokkeborg, S., Rogers, P., Southall, B. L., Zeddies, D. G. and Tavolga, W. N. (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Springer and ASA Press, Cham, Switzerland.

Phillips, B., Roberts, A., Buckland, L., Canning, S., Goulding, A., Mendes, S., Prior, A., De Silva, R., Stephenson, S., Wilson, J. and McGarry, T. (2025). Evidence base for application of Acoustic Deterrent Devices (ADDs) as marine mammal mitigation (Version 5.0). JNCC. Peterborough. Document Number JNCC Report No. 615.

Thompson, P. M., Graham, I. M., Cheney, B., Barton, T. R., Farcas, A. and Merchant, N. D. (2020). Balancing risks of injury and disturbance to marine mammals when pile driving at offshore windfarms. Ecological Solutions and Evidence, 1(2), e12034.

Voss, J., Rose, A., Kosarev, V., Vílela, R., van Opzeeland, I. C. and Diederichs, A. (2023). Response of harbor porpoises (*Phocoena phocoena*) to different types of acoustic harassment devices and subsequent piling during the construction of offshore wind farms. Frontiers in Marine Science, 10. DOI:10.3389/fmars.2023.1128322.