



NPWS

An tSeirbhís Páirceanna
Náisiúnta agus Fiadhúlra
National Parks and Wildlife
Service

Application for Derogation Under Regulation 54 & 54A of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended

Revision 2.0 – July 2025

- This form can be used by any individual or Company applying for a derogation under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (“the Regulations”) or any individual applying on behalf of the Minister for Housing, Local Government and Heritage under Regulation 54(A) of the Regulations.
- Note this application form is not for Domestic Dwelling Derogations (bats within private homes) which can be found here > ([3D Application Form](#))
- Please ensure that you answer questions fully in order to avoid delays and/or your application being rejected on the basis that it does not contain sufficient information and detail for the application to be considered further.
- Please read and familiarise yourself with the [NPWS Guidance on Applications for Regulation 54 Derogations for Annex IV species: Guidance for Applicants](#)
- Please read and familiarise yourself with the [European Commission's Guidance document on the strict protection of animal species of Community interest under the Habitats Directive](#)
- Please also note that the responses to these questions are supplementary to the documentation required for the NPWS to be in a position to consider your application. A complete application should include both the application form and an associated report. Failure to supply either will result in your application being returned and/or refused.
- In circumstances in which a derogation is given on foot of this application, the Applicant is responsible for ensuring compliance with the conditions of any such derogation, even though they may employ another person to act on their behalf. To carry out any activity without, or not in accordance with, a derogation granted under regulation 54 or 54A of the Regulations constitutes a criminal offence, subject to prosecution.
- If you experience any problems filling in this form, please contact the Wildlife Licensing Unit: reg54derogations@npws.gov.ie
- Please note – applications, associated reports and derogations will be published on the NPWS website and/or the Department's Open Data website.
- Where any applicant is applying for a derogation to carry out surveys, please ensure to list all qualified ecologists and trainees under their supervision. See section 1(c) of Part A.

Part A: The Applicant - Personal Details

These questions relate to the person responsible for any proposed works and who will be the **Applicant**. If this application is being submitted on behalf of a third party, please also complete Part B below.

1. (a) Name of Applicant

Title (Mr/Mrs/Miss/Ms/Dr)	Forename(s)	Surname
Mr	Kaj	Christiansen
(b) Company Name, if applicable	Sure Partners Ltd	
(c) Address Line 1	SSE Renewables	
Address Line 2	Red Oak South, South County Business Park	
Town	Dublin 18	
County	Dublin	
Eircode	D18 W688	
(d) Contact number	+353 873987668	
(e) Email address	kaj.christiansen@sse.com	
(f) Address where works are to be carried out if different from (b) above.		
Address Line 1	On and around the Arklow Bank - refer to Figure 1 in the Annex IV Risk Assessment.	
Address Line 2		
Town		
County		
Eircode		

Details of Person Submitting Application on Behalf of Applicant/Derogation Holder

Information relating to the person (e.g. ecologist) responsible for submitting the application on behalf of the applicant should be entered below:

1. (b) Name of Person/Ecologist

Title (Mr/Mrs/Miss/Ms/Dr)	Forename(s)	Surname
	Marc	Walshe
(b) Company Name	SSE Renewables	
Address Line 1	Red Oak South, South County Business Park	
Address Line 2	Dublin 18	
Town	Dublin	
County	Dublin	
Eircode	D18 W688	
(c) Contact number	+353 868527709	
(d) Email address	Marc.walshe@sse.com	

(e) Relationship to Applicant	Employee
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For Survey Derogations Only

1. (c) Please Indicate the Names to Appear on the Derogation Along with the Position Held e.g. Supervisor/Trainee

Forename(s)	Surname	Supervisor or Trainee

Part B: Species covered by the Derogation

1. **Species of Animal:** Please indicate which species is/are the subject of the application:

- | | |
|-------------------|-------------------------------------|
| • Bat | ☐ |
| • Otter | ☐ |
| • Kerry Slug | ☐ |
| • Natterjack Toad | ☐ |
| • Dolphin | ☒ |
| • Whale | ☒ |
| • Turtle | ☐ |
| • Porpoise | ☒ |

2. Please detail the exact species (scientific name): | Harbour porpoise (*Phocoena phocoena*), minke whales (*Balaenoptera acutorostrata*), bottlenose dolphin (*Tursiops truncatus*), Risso's dolphin (*Grampus griseus*), and common dolphins (*Delphinus delphis*) |

3. Please provide the maximum number of individuals affected* | Refer to Table 2-5 in the attached Annex IV Risk Assessment which supports this application. |

4. Please provide the maximum number of breeding or resting sites affected* | Nil |

5. Please provide the maximum number of eggs to be taken* | Nil |

6. Please provide the maximum number of eggs to be destroyed* | Nil |

*If no figures can be provided for the maximum number of individuals, breeding sites, resting places and eggs to be covered by the derogation please provide reasons why.

A derogation licence is not being sought for damage or destruction to breeding sites, resting places or eggs. It is also extremely difficult to predict the number of animals that may be disturbed by foundation piling during construction as cetaceans are highly mobile species. As such, a precautionary approach has been taken in relation to the Annex IV Risk Assessment, Environmental Impact Assessment Report and Appropriate Assessment documentation for the Proposed Development.

Table 2-5 of the Annex IV Risk Assessment identifies the predicted impacts of disturbance from piling with implementation of the extended ramp up mitigation that has been committed to by the Applicant. Based on the highest density estimates for harbour porpoise, 3.05% of the MU population may be disturbed from each piling event, equivalent to up to 1,908 individuals. Level B harassment thresholds were used to assess disturbance, for bottlenose dolphin, common dolphin, Risso's dolphin and minke whale. Based on the maximum density estimate for bottlenose dolphin, 259 individuals may be disturbed from each piling event. This equates to 3.12% of the most robust reference population estimate. For common dolphin, Risso's dolphin and minke whale, less than 1% may be disturbed from each piling event, equivalent to 30, 35 and 50 individuals, respectively.

These numbers correspond to the maximum representative number of animals that may be disturbed. They have not been quantitatively reduced to account for some Factored In measures (specifically avoidance and deterrent-based measures), as it is extremely difficult

to predict the number of animals that may be disturbed by the piling activity after the application of these measures.

7. Species of Plant: Please indicate which species is/are the subject of the application:

- Killarney Fern ☐
- Slender Naiad ☐
- Marsh Saxifrage ☐

8. If you previously received a derogation for any species of animal or plant, please state derogation number and confirm that you have made a return to NPWS on the numbers actually affected by that derogation.

DER-CETACEAN-2024 – 127, DER-CETACEAN-2023 – 58, DER-CETACEAN-2023 – 33 and DER-CETACEAN-2022 – 148.

The Applicant confirms that the numbers affected has been returned to the NPWS for all derogations.

9. Proposed Dates for Activities: Please indicate the timeframe that you propose to carry out the activities. Dates set by NPWS may differ from dates proposed here. *A derogation will only be issued with a start and end date within a calendar year.*

Start Date:	2028 - This license is required, subject to planning permission being granted, An Coimisiún Pleanála case reference 319864.
End Date:	2030

Part C: Nature of the Derogation.

1. Please tick which prohibition(s) the application for a derogation relates to:

Regulation 51	
Deliberately capture or kill any specimen of the relevant species in the wild	☐
Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration	☒
Deliberately take or destroy eggs of the relevant species in the wild	☐
Damage or destroy a breeding or resting place of such an animal, or	☐
Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of the relevant species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.	☐
Regulation 52	
Deliberately pick, collect, cut, uproot or destroy any specimen of these species in the wild, or	☐
Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 13(1)(b) of the Habitats Directive.	☐

Further information should be provided in the format set out in Part E: Template for Supporting Information

Part D: Derogation Tests

Note: The following summary information must be provided by the applicant in all cases, and will be used to determine if a derogation can be provided. Further information must be provided in the format set out in Part E: Template for Supporting Information

Test 1: Reason for the Derogation

1. Please tick which reason(s) below explains how this application qualifies under Regulation 54(2)(a-e) or Regulation 54A(2)(a-e) of the European Communities (Birds and Natural Habitats) Regulations: Please provide a summary of how the application meets the 3 conditions required to provide a derogation. Note that in all cases additional information must be provided (see Part E).

a.	In the interests of protecting wild flora and fauna and conserving natural habitats (proceed to 1a)	☐
b.	To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property (proceed to 1b)	☐
c.	In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment (proceed to 1c)	☒
d.	For the purpose of research and education, of re-populating and re-introducing these species and for the breeding operations necessary for these purposes, including artificial propagation of plants (proceed to 1d)	☐
e.	To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule (proceed to 1e)	☐

1a. In the interests of protecting wild flora and fauna and conserving natural habitats:

- i) Please state the wild flora, fauna or habitats that require protection and /or conservation.

n/a

- ii) Please summarise how the interests of protection and conservation of the species/habitat concerned justify affecting another species under strict protection.

n/a

1b) To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property:

- i) Please summarise the nature of the potential damage, why it is considered “serious” and how this outweighs the conservation interest of the species under strict protection.

n/a

- 1c)** In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment:

- i) Where the reason is for public health and public safety, summarise the evidence provided to support this reason (e.g. documentary evidence of the risk from a chartered structural engineer, tree surgeon, Garda Síochána, qualified health professional etc.)

n/a

- ii) Where the reason is for “other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment”, summarise the nature of the public interest and how this outweighs the conservation interest of the species under strict protection.

As detailed in Section 3.2 of the Annex IV Risk Assessment, the ‘other reasons of overriding public interest of a social or economic nature and beneficial consequences of primary importance for the environment’ are associated with the contribution of the Proposed Development to the decarbonisation of Irish energy and to legal and policy obligations in relation to carbon targets, climate mitigation and offshore renewables.

The Proposed Development, once constructed will represent a critical proportion of the State’s renewable energy capacity and contribute towards achieving the Government of Ireland’s target of deploying at least 5 gigawatts (GW) of offshore wind by 2030 by producing 800 megawatts of renewable energy on an annual basis. As presented in Section 3.2.4 of the Annex IV Risk Assessment, the annual carbon savings attributable to the Proposed Development is estimated to be equivalent to 1.65 – 2.15% of the projected national emissions in 2030 and between 16.2 – 23.6% of projected emissions that are required for the energy industries in 2030.

The Applicant considers that the benefit delivered by the Proposed Development to decarbonisation, security of supply and contribution towards achieving the national climate obligation demonstrates imperative reasons of overriding public interest.

- 1d)** For the purpose of research and education, of re-populating and re-introducing these species and for the breeding operations necessary for these purposes, including artificial propagation of plants:

- i) Please summarise the objective(s) of the proposed activities making reference to those listed above and how the the purpose of such activities overrides the interests of strict protection of the species. ¹

n/a

- 1e)** To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule

- i) Please clearly state the objective of the activity and verify that this reason is being chosen as the objective of the activity does not match reasons a-d listed above.

n/a

- ii) Please summarise how the activity will result in the taking or keeping of limited numbers of specimens of the species, how it will be applied on a selective basis and to a limited extent, and how it will be done under strictly supervised conditions.

n/a

Test 2: Absence of Alternative solutions

- 2.** Please summarise the alternative solutions that have been considered and why these solutions are deemed unsatisfactory. This must include the option of the “do-nothing” alternative and evidence should be objective and robust. Note that in all cases further information must be provided in the format set out in Part E: Template for Supporting Information.

Alternative Solution	Reasons for “Unsatisfactory”
Do Nothing (Refer to Section 3.3.2 of the Annex IV Risk Assessment for further detail)	This would result in the Proposed Development not proceeding and delivery of renewable energy capacity would not be achieved.

¹ Note that this reason may be appropriate for when research involves surveys that may cause disturbance of species under strict protection. But the sole purpose of the surveys should be for research and education or the other reasons listed above under 1d.

Alternative Foundation Types - i.e. Jackets and gravity bases. (Refer to Section 3.3.4 of the Annex IV Risk Assessment for further detail)	Jackets – These are not suitable for the site-specific conditions on Arklow bank and have higher economic and carbon costs (relative to monopiles). Additionally, they would also have greater potential for environmental impacts such as habitat loss and disturbance as they require larger areas of seabed preparation relative to monopiles. Gravity bases – These are not suitable for the site-specific conditions on Arklow bank, are less established in the market and would have a higher carbon cost (relative to monopiles). Additionally, they would also have greater potential for environmental impacts such as habitat loss and disturbance as they require larger areas of seabed preparation relative to monopiles.
Alternative Monopile Installation Techniques (i.e. vibro hammering and drilling) (Refer to Section 3.3.5 of the Annex IV Risk Assessment for further detail)	Vibro hammering – This method cannot be used due to the ground conditions (i.e. presence of gravel and glacial tills would prevent the vibro hammer reaching the necessary target depth). Drilling – This method cannot be used in isolation at the site due to the ground conditions (i.e. thick layer of overburden would prevent the drill reaching the target depth). Even if using either method, vibro hammering or drilling is not a viable substitute which would negate the need for the impact piling at the Proposed Development due to the target depths that are required for the piles and ground conditions that have been identified at the site.

* Please insert additional rows above if needed

Test 3: Impact of a Derogation on Conservation Status

3. Please summarise the possible impacts on the population of the species that is subject to this application, taking into account all the mitigation and/or compensation measures that are to be undertaken. Evidence that such mitigation has been successful elsewhere should be provided where relevant. Mitigation measures being relied upon must ensure that the derogation will not be detrimental to the maintenance of the populations of the species to which the Habitats Directive

relates at a favourable conservation status in their natural range. Note that in all cases further information must be provided in the format set out in Part E: Template for Supporting Information.

As detailed in Section 3.4 of the Annex IV Risk Assessment, the disturbance from the foundation piling activity will not be detrimental to the maintenance of FCS for the populations of the species in their natural range to which the Habitat Directive relates to (i.e. Annex IV cetacean species).

All cetacean species, apart from harbour porpoise are assessed as having an overall Favourable Conservation Status in Irish waters under the Article 17 reporting from the NPWS, with harbour porpoise assessed as inadequate due to uncertainty in the population. For all species, the lowest level at which the population for the species has been defined has been used in the assessment and there are no defined local populations for any species that overlap with the Proposed Development. The precautionary estimates have been outlined and it has been concluded that:

- Disturbance from foundation piling activity will not affect the maintenance of the species on a long-term basis as a viable component of its natural habitat, as no changes to the population size or trajectory over a generational scale have been predicted.
- Disturbance from foundation piling activity will not reduce nor is likely to reduce the natural range of the species for the foreseeable future, as any change in distribution is predicted to be temporary, and would affect up to a medium proportion of the population ($\leq 3.12\%$) which is not enough to affect the population trajectory.
- Disturbance from foundation piling activity will not affect the maintenance of a sufficiently large habitat to maintain the populations on a long-term basis, as any effects are temporary and not enough to affect the population trajectory.

Part E: Template for Supporting Information

This application form should provide a summary of the evidence that the applicant has provided. In all cases, it is necessary to provide separate supporting information so that the assessment of the application can be undertaken in a robust and comprehensive manner. Applicants should refer to guidance provided by the NPWS and the European Commission whilst preparing this application form and the supporting information.

It is essential that supporting information is prepared in a consistent manner using the template below so that NPWS officials assessing the application can locate the relevant evidence to determine if the three Tests can be met. Failure to provide sufficient evidence will result in the application being refused.

The structure of the Supporting Information should be as follows:

- 1) Table of Contents
- 2) Introduction
 - a. Objective of the proposed works (for example, as part of construction of a national road, repair of roofing, undertaking surveys etc.)
 - b. Name, qualifications and relevant experience of scientific staff, including trainees, (e.g. ecologist) involved in the preparation of the application and those responsible for carrying out the proposed activity.
 - c. If this application is for the carrying out of surveys that may cause disturbance, qualifications of all involved must be provided and trainees must be clearly identified.
- 3) Background to proposed activity including location, ownership, type of and need for the proposed activity, planning history, policy context, zoning in relevant Development plan (or equivalent), etc.
- 4) Full details of proposed activity to be covered by the derogation (including a site plan). The site may be inspected by an NPWS representative, so the details given should clearly reflect the extent of the project. This information will be used to compare site conditions with the Method Statement.
- 5) Ecological Survey and site assessment (Not required for applications to carry out surveys)
 - a. Pre-existing information on species at location and environs.
 - b. Status of the species in the local/regional area (relevant to the consideration of the impact on the population at the relevant geographic scale (Test 3))
 - c. Objective(s) of survey
 - d. Description of Surveys Area
 - e. Survey methodology (including evidence as to how the methodology represents best practice and is appropriate to the Objective). Methodology should include survey maps, details of timing, climate, equipment used and identify any uncertainties or difficulties encountered.
 - f. Survey results including raw data, any processed or aggregated data, and negative results as appropriate. Photographs and maps must be provided where site-specific features are referred.
 - g. Population size class assessment.
- 6) Evidence to support the Derogation Tests
 - a. Test 1 - Reason for Derogation:
 - i. There should be a clear explanation as to why a specific reason(s) has been selected in the application form.

- ii. Applicants are advised to read the guidance published by the NPWS '[Guidance on Applications for Regulation 54 Derogations for Annex IV species: Guidance for Applicants](#)' with specific reference to Section 3.1.
 - b. Test 2 - Absence of Alternative Solutions
 - i. Applicants must list the alternatives to the proposed activity that have been considered, including the do-nothing alternatives in a clear and objective manner. A basic requirement is that these alternatives should be compared in terms of their impact on the species subject to strict protection. It should be clear to NPWS officials as to why the chosen approach has been selected.
 - ii. Applicants are advised to read the guidance published by '[Guidance on Applications for Regulation 54 Derogations for Annex IV species: Guidance for Applicants](#)' with specific reference to Section 3.2.
 - c. Test 3 - Impact of a derogation on Conservation Status
 - i. Applicants should include details of the population at the appropriate geographic scale and an evaluation of how the proposed activity will affect the conservation status both before and after mitigation measures have been applied.
 - ii. Full and detailed descriptions of proposed mitigation measures that are relevant to the potential impact on the target species. Evidence that such mitigation has been successful elsewhere should be provided, where available.
 - iii. Applicants are advised to read the guidance published '[Guidance on Applications for Regulation 54 Derogations for Annex IV species: Guidance for Applicants](#)' with specific reference to Section 3.3.
- 7) Monitoring the impacts of the derogations
- a. Applicants must include details of how they propose to verify whether the derogations have been implemented correctly and whether they achieved their objective, using scientifically based evidence, and, if necessary, how the applicant will take corrective measures where required.
 - b. Applicants should provide details of proposed reports to be submitted to the NPWS including the results of monitoring.
 - c. Applicants are advised to read the guidance published by the European Commission "[Guidance document on the strict protection of animal species of Community interest under the Habitats Directive](#)" with specific reference to Section 3.4.

Part F. Declaration

I declare that all of the foregoing particulars are, to the best of my knowledge and belief, true and correct. I understand that the deliberate killing, injuring, capturing or disturbing of protected species, or damage or destruction of their breeding sites or resting places or the deliberate taking or destroying of eggs is an offence without a derogation and that it is a legal requirement to comply with the conditions of any derogation I may be granted following this application. I understand that NPWS may visit to check compliance with a derogation.

Please note that under Regulation 5 of the European Communities (Birds and Natural Habitats) Regulations 2011-2021 an authorised officer may enter and inspect any land or premises for the purposes of performing any of their functions under these Regulations or for obtaining any information which they may require for such purposes.

**Signed for and on behalf of
Sure Partners Limited**

Kaj Christiansen

Date 8 April 2026

Name in BLOCK LETTERS

Kaj Christiansen

PRIVACY STATEMENT

See Privacy Statement at www.npws.ie/licences

npws.ie

Department of Housing, Local Government and Heritage



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage



Arklow Bank Wind Park 2

Annex IV Risk Assessment

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Abbreviations

Abbreviation	Term
ABWP1	Arklow Bank Wind Park 1
ABWP2	Arklow Bank Wind Park 2
ADD	Acoustic Deterrent Device
C	Central
CI	Confidence Interval
CPT	Cone Penetration Test
CSIP	Cetacean Strandings Investigation Programme
CV	Coefficient of Variation
DAHG	Department of Arts, Heritage, and the Gaeltacht
DAS	Digital Aerial Survey
dB	decibel (sound pressure)
DHLGH	Department of Housing, Local Government and Heritage
EDR	Effective Deterrence Range
EEZ	Economic Exclusion Zone
EIAR	Environmental Impact Assessment Report
EMF	Electro-Magnetic Fields
EMP	Environmental Management Plan
EPA	Environment Protection Agency
EU	European Union
FCS	Favourable Conservation Status
FHG	Functional Hearing Group

Abbreviation	Term
HF	high frequency
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
Hz	hertz (frequency)
IAMMWG	Inter-Agency Marine Mammal Working Group
IUCN	International Union for Conservation of Nature
IWDG	Irish Whale and Dolphin Group
JNCC	Joint Nature Conservation Committee
kHz	kilohertz (frequency)
km	kilometre (distance)
km ²	kilometre squared (area)
LF	low frequency
m	metre (distance)
MARA	Maritime Area Regulatory Authority
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	multibeam echosounder
MMMP	Marine Mammal Mitigation Plan
MMMZ	marine mammal mitigation zone
MMO	Marine Mammal Observer
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan

Abbreviation	Term
MU	management unit
MW	Megawatt
NBDC	National Biodiversity Data Centre
NMFS	National Marine Fisheries Service
N-OSP	North Offshore Substation Platform
NPWS	National Parks and Wildlife Service
NW	Northwest
O&M	Operational and Maintenance
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PAM	Passive Acoustic Monitoring
PCW	Phocid Carnivore in water
PTS	Permanent Threshold Shift
RFI	Request for Further Information
rms	Root mean squared
Rol	Republic of Ireland
SAC	Special Area of Conservation
SBP	Sub-bottom Profiler
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SEL	Sound Exposure Level
SMRU	Sea Mammal Research Unit

Abbreviation	Term
SNCB	Statutory Nature Conservation Body
S-OSP	South Offshore Substation Platform
SPL	Sound Pressure Level
SSS	Side Scan Sonar
SW	Southwest
TTS	Temporary Threshold Shift
UHRs	Ultra-High Resolution Seismic
UK	United Kingdom
US	United States (of America)
UXO	unexploded ordnance
VHF	very high frequency
VMP	Vessel Management Plan
WTG	Wind Turbine Generator
ZoI	Zone of Influence

Definitions

Term	Definition
Annex IV Risk Assessment	Information provided to the competent authority to inform a risk assessment for Annex IV species under Article 12 of the Habitats Directive (Council Directive 92/43/EEC)
Arklow Bank Wind Park 1	Arklow Bank Wind Park 1 consists of seven wind turbines, offshore export cable and inter-array cables. Arklow Bank Wind Park 1 has a capacity of 25.2 Megawatt (MW). Arklow Bank Wind Park 1 was constructed in 2003/04 and is owned and operated by Arklow Energy Limited. It remains the first and only operational offshore windfarm in Ireland.
Arklow Bank Wind Park 2	Arklow Bank Wind Park 2 (ABWP2) is a proposed offshore wind farm (OWF) in the Irish Sea, situated on and around Arklow Bank, approximately 6-15 km to the east of Arklow in County Wicklow.
Array Area	The Array Area is the area within which the Wind Turbine Generators (WTGs), the Offshore Substation Platforms (OSPs), and associated cables (export, inter- array and interconnector cabling) and foundations will be installed. The ABWP2 array area is illustrated on Figure 1.
Cable Corridor and Working Area	The Cable Corridor and Working Area is the area within which export, inter-array and interconnector cabling will be installed. This area will also facilitate vessel jacking operations associated with installation of WTG structures and associated foundations within the Array Area.
Cetacean	The order Cetacea includes whales, dolphins and porpoises and is collectively known as cetaceans.
Environmental Impact Assessment Report (EIAR)	An Environmental Impact Assessment Report (EIAR) is a report of the effects, if any, which the proposed project, if carried out, would have on the environment. It is prepared by the developer to inform the Environmental Impact Assessment process.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Transposed into Irish Law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).
Maritime Area Regulatory Authority (MARA)	MARA is a body under the aegis of the Department of Housing, Local Government and Heritage, whose functions are set out in the Maritime Area Planning Act 2021. MARA are responsible for managing the existing foreshore consent portfolio and processing Maritime Usage Licences and Maritime Area Consents.
National Parks and Wildlife Service (NPWS)	The National Parks and Wildlife Service (NPWS) manages the Irish State's nature conservation responsibilities. As well as managing the national parks, the activities of the NPWS include the designation and protection of Natural Heritage Areas, Special Areas of Conservation and Special Protection Areas.
Proposed Activities	All of the site investigations and baseline surveys the subject of the Maritime Usage Licence Application (EIAR Volume II, Chapter 4: Description of Development).

Term	Definition
Proposed Development	Equivalent to Arklow Bank Wind Park 2 (ABWP2)
Receptor	Environmental component that may be affected, adversely or beneficially, by an impact.
Special Area of Conservation (SAC)	Areas of protected habitats and species as defined in the Habitats Directive.
Species	A group of interbreeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions; most species are made up of subspecies or populations.
Zone of Influence (Zoi)	Spatial extent of potential impacts resulting from a project or activity.

1 Introduction

1.1 Report structure

The structure of this document is:

- Section 1: Introduction to this document, covering the Proposed Development background, the purpose of this Risk Assessment in view of the legislation, and relevant guidance that has been used.
- Section 2: Risk assessment which identifies potential impacts to Annex IV species arising from the Proposed Activities and the significance of these impacts.
- Section 3 Legal tests to demonstrate that the proposed activities are entitled to a derogation licence under the Habitats Directive.
- Annex A Proposed activities screened into the Annex IV Risk Assessment.
- Annex B Baseline characterisation of Annex IV species.
- Annex C Marine Mammal Mitigation Plan.
- Annex D Underwater Noise Assessment.

1.2 Background

Arklow Bank Wind Park 2 (ABWP2), hereafter referred to as the “Proposed Development”, is a proposed offshore wind farm (OWF) situated on and around Arklow Bank in the Irish Sea off the coast of Ireland, approximately 6-15 km to the east of Arklow in County (Co.) Wicklow (Figure 1). The total footprint of the Proposed Development is 139.4 km² and is contained entirely within Ireland’s National Marine Planning Framework Area and Irish Exclusive Economic Zone (EEZ). Further details of the Proposed Development are provided in the Environmental Impact Assessment Report (EIAR) Volume II, Chapter 1: Introduction (Revised March 2026).

The offshore infrastructure of the Proposed Development comprises two main spatial components (Figure 1):

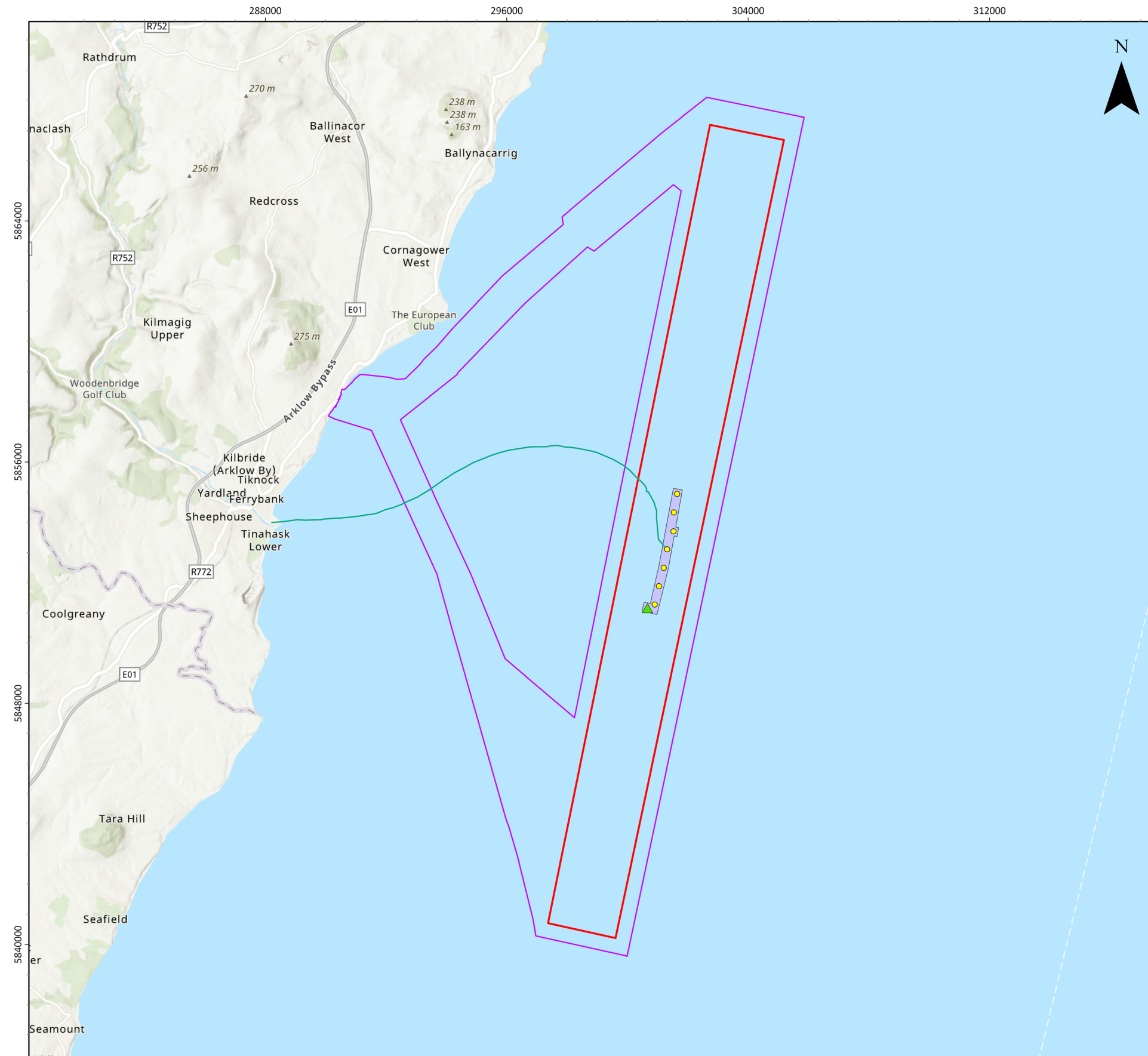
- Array Area: Hosts the primary wind farm infrastructure, including wind turbine generators (WTGs), offshore substations (OSPs), and associated foundations, and cables. Cabling includes inter-array links between turbines, interconnectors between OSPs, and export cables to shore; and
- Cable Corridor and Working Area: Supports installation of export and interconnector cables and associated construction activities, including vessel movements, connecting the Array Area to landfall.

Consent has been sought for the Proposed Development to be constructed in accordance with one of two discrete Project Design Options. Each Project Design Option includes two OSPs and associated cabling systems and either 53 WTGs (Project Design Option 1) or 47 WTGs (Project Design Option 2). Both Project Design Options have been fully considered in this assessment.

The planning application for the Proposed Development was submitted to An Bord Pleanála, now known as An Coimisiún Pleanála (ACP) in June 2024 in accordance with Section 291 of the Planning and Development Act 2000, as amended. Subsequently, a Request for Further Information (RFI) was issued on 10th April 2025 in respect of the Section 291 Planning Application (under ACP Case Ref. 319864-24). In providing the response to the matters raised in the RFI, revised documentation is being submitted in March 2026 and will be made available via the case file and associated webpage (<https://www.pleanala.ie/en-ie/case/319864>) and via the planning application website (<https://www.arklowbank2offshoreplanning.ie/>), subject to any further statutory consultation that ACP may prescribe. This application for a derogation licence will precede the submission of

the RFI response, therefore the Applicant will inform the National Parks and Wildlife Service once the RFI response has been submitted to ACP and thus, the associated documents have been published.

An existing wind farm, Arklow Bank Wind Park 1 (ABWP1), is also located on Arklow Bank and comprises seven WTGs, offshore export cable and inter-array cables, with a capacity of 25.2 Megawatt (MW) and was constructed in 2003-2004 (Figure 1). ABWP1 has reached the end of its operational life, therefore, the owner and operator of the ABWP1, Arklow Energy Limited, has commenced pre-application consultation (Case Reference OC27.321635) with the appropriate local authorities (Maritime Area Regulatory Authority (MARA) and An Coimisiún Pleanála (ACP) (previously An Bord Pleanála)) to agree on the details of the decommissioning and removal works of ABWP1.

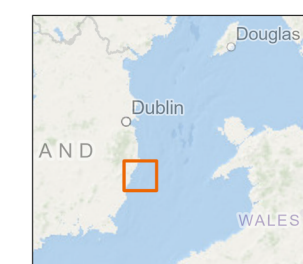


Arklow Bank Wind Park 2

Location Map

Legend

- ABWP2 Array Area
- ABWP2 Cable Corridor and Working Area
- ABWP1 WTGs
- ▲ ABWP1 Existing Met Mast
- ABWP1 Existing Export Cable
- ABWP1 Array Area



Notes

Esri, Intermap, NASA, NGA, USGS, OceanWise, Esri, GEBCO, Garmin, NaturalVue, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/ NASA, USGS, Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS. Contains Ordnance Survey data © Crown copyright and database rights (2022). OS OpenData.

Coordinate System:
ETRS 1989 UTM Zone 30N

0 3 5 km

0 1 2 nm

Scale: 1:125,000 @ A3 Date: 21/02/2025 Drawn By: GB Checked By: DN Approved By: CMc

Suites B2 & C2
Higher Mill
Higher Mill Lane
Buckfastleigh
Devon
TQ11 0EN
www.gobeconsultants.com
+44 (0)1626 323890

Figure 1: The Proposed Development

1.3 Purpose of this Risk Assessment

A number of activities will be required during the pre-construction, construction, operational and maintenance (O&M), and decommissioning phases of the Proposed Development. These “Proposed Activities”, as described in Section 2.1 and further in Annex A, could interact with cetacean species that may be present in the vicinity of the Proposed Development.

All species of cetacean are listed under the Annex IV of the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (as amended) (hereafter “the Habitats Directive”), which covers animal and plant species of community interest in need of strict protection. These species are protected wherever they occur throughout their natural range, including the waters of Ireland. The Habitats Directive has been transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended (hereafter referred to as “the Habitat Regulations”).

Under Regulation 51(2) of the Habitats Regulations, it is an offence, except in accordance with a derogation licence granted by the Minister under Regulation 54, to:

- a) Deliberately capture or kill any specimen of these species in the wild;
- b) Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration;
- c) Deliberately take or destroy eggs of those species from the wild;
- d) Damage, or destruction of a breeding site or resting place of such an animal; or
- e) Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of these species taken from the wild, other than those taken legally in accordance with Article 12(2) of the Habitats Directive.

These are referred to collectively as ‘Regulation 51 Impacts’ throughout this assessment.

Under Regulation 54 any person may apply to the Minister for the Department of Housing, Local Government and Heritage (DHLGH) for a derogation licence from complying with the requirements of the provisions of Regulation 51.

The purpose of this Annex IV Risk Assessment is to determine whether there is a need for a derogation licence in respect of potential Regulation 51 Impacts on Annex IV species arising as a result of the Proposed Development. Where a requirement for a derogation licence has been identified, information to demonstrate that the criteria for the grant of such a licence set out in Regulation 54 have been met.

1.4 Relevant Guidance

This Annex IV Risk Assessment has been produced in accordance with the following relevant guidance:

- European Union (EU) Commission Guidance on the Strict Protection of Animal Species of Community Interest under the Habitats Directive (European Commission, 2021);
- Guidance on the strict protection of certain animal species under the Habitats Directive in Ireland (National Park and Wildlife Service (NPWS), 2021);
- Guidance on Applications for Regulation 54 Derogations for Annex IV Species (NPWS, 2025);
- Guidance to manage the risk to marine mammals from man-made sound sources in Irish Waters (Department of Arts, Heritage, and the Gaeltacht (DAHG); 2014); and
- EU Commission’s Guidance document on clarification of the concepts of: Alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence (European Commission 2007a).

The DAHG guidance (2014) has been used to inform the risk assessment of anthropogenic acoustic impacts on relevant cetacean species presented in this report. The guidance has been used to identify sound sources which may be introduced into the marine environment by specific human activities and which may give rise to detrimental impacts on protected marine mammal populations or individuals. It has also been used to give a structured approach to the assessment of risk and informed decision making with respect to those activities. The DAHG (2014) guidance specifies the need to consider the likely impact of a project, and whether the project is likely to have a significant effect on a species, hence this risk assessment has drawn upon the Volume II, Chapter 11: Marine Mammals (Revised March 2026) where these have been assessed. The DAHG (2014) guidance has also been used to inform the identification of practical measures to avoid, prevent and/or reduce risk which must be considered to minimise the potential effects of sound sources on the natural ecology of marine mammal species. The mitigation measures committed to by the Applicant have been included within Annex C. This risk assessment evaluates whether residual effects from acoustic impacts remain after the application of the committed mitigation measures, and whether any further measures are required to avoid impacts prohibited under Regulation 51.

The European Commission (2021) guidance provides the following detail on the interpretation of 'deliberate killing'. In section (2-34), it states the following: "On the basis of the approach taken by the Court in cases C-103/00 and C-221/04, 'deliberate' actions are to be understood as actions carried out by a person who is aware that these actions will lead to capturing or killing a species listed in Annex IV, or consciously accepts the possibility of such an offence. the provision applies not only to a person who fully intends to capture or kill a specimen of a protected species but also to a person who is sufficiently informed and aware of the consequences his or her action will most likely have and nevertheless still performs the action, which leads to the capturing or killing of specimens". This guidance on deliberate killing has been used in this assessment. To note, this meaning of 'deliberate' has also been used in the context of 'deliberate disturbance', as per the guidance which says in section (2-41): "The disturbance also has to be 'deliberate' in order to fall within the scope of Article 12(1)(b)".

The European Commission (2021) guidance also highlights that "Neither Article 12 nor Article 1 of the Habitats Directive contains a definition of the term 'disturbance'". The guidance provides the following text on defining deliberate disturbance: "It is clear that any activity that deliberately disturbs a species to the extent that it may affect its chances of survival, breeding success or reproductive ability, or leads to a reduction in the occupied area or the relocation or displacement of the species, should be regarded as a 'disturbance' under the terms of Article 12." This clarification on what constitutes "deliberate disturbance" has been used in this assessment.

The Applicant considers that injury to a marine mammal can also affect its chances of survival, breeding success or reproductive ability. Accordingly, the Applicant has considered injury under the umbrella of disturbance, and assessed the potential for injury alongside other forms of disturbance (e.g. behavioural responses).

2 Risk Assessment

2.1 The Proposed Activities

The Proposed Activities comprise the main types of works during the Proposed Development that may interact with the marine environment. The Proposed Activities are presented in Table 2-1, alongside the equipment that may be used or the nature of the works. The indicative timing and duration of these Proposed Activities are based on the construction programme presented in the EIAR Volume II, Chapter 4: Description of the Development (Revised March 2026), with operational activities occurring subsequently over the lifetime of the Proposed Development.

Annex Table A provides a detailed description of each Proposed Activity. A complete list of all activities, including the Proposed Activities, associated with the Proposed Development is available to view in EIAR Volume II, Chapter 4: Description of Development (Revised March 2026).

An initial analysis has been undertaken in Table 2-1 to determine the potential for a Regulation 51 Impact to Annex IV species under the Habitats Regulations. The outcome of this evaluation informs which activities are carried forward into the detailed Annex IV risk assessment, and which can be screened out at this stage.

It has been determined that there is no plausible pathway of a Regulation 51 Impact under parts (c) to (e) and no risk of 'deliberate capture' under part (a) of Regulation 51(2) of the Habitats Regulations for all Proposed Activities.

The rationale for screening out Regulation 51 Impacts (c) to (e) is:

(c) Deliberately take or destroy eggs of those species from the wild:

- The Annex IV cetacean species present in the area and considered to be at risk from the Proposed Activities do not produce eggs, and accordingly there is no pathway for this impact to arise, and therefore no requirement for a derogation licence on this basis.

(d) Damage, or destruction of a breeding site or resting place of such an animal:

- The Proposed Activities will not destroy or damage a breeding site or resting place of an Annex IV species. There is an absence of information on the breeding site and resting places of cetaceans, therefore it is assumed that breeding and resting may occur wherever the species occur. As such, the presence of breeding site or resting places within the vicinity of the Proposed Development cannot be excluded. The breeding site or resting place of cetaceans comprise the water column within which they reside. The Proposed Activities will not physically destroy or damage any elements of the water column, in that the water column will remain intact and able to support cetaceans in their breeding and resting behaviours. Accordingly, there is no pathway for this impact to arise, and therefore no requirement for a derogation licence on this basis.

(e) Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of these species taken from the wild, other than those taken legally in accordance with Article 12(2) of the Habitats Directive:

- The Proposed Activities will not involve keeping, transport, sale, exchange or trade of specimens. Accordingly, there is no pathway for this impact to arise, and therefore no requirement for a derogation licence on this basis.

The rationale for screening out the risk of 'deliberate capture' under part (a) of Regulation 51(2) of the Habitats Regulations is because the Proposed Activities do not involve any action intended to trap, handle, or pursue Annex IV species, nor do they create conditions in which capture could reasonably occur. Annex IV cetacean species present in the area are highly mobile and capable of avoiding vessels and equipment, and the nature of the works does not generate confined spaces, entrapment zones, or structures that could result in capture. Consequently, there is no plausible pathway for deliberate capture to occur. Accordingly there is no pathway for these impacts to arise, and therefore no requirement for a derogation licence on this basis.

There is the potential for the Proposed Activities to give rise to mortality and disturbance, prohibited under parts (a) and (b) of the Habitats Regulations, which required further consideration.

Table 2-1: Description of the Proposed Activities and the potential for a Regulation 51 Impact to occur.

Project phase	Proposed Activities	Equipment used and/or nature of the works	Potential for a Regulation 51 Impact				
			(a)	(b)	(c)	(d)	(e)
Pre-construction and Construction	Confirmatory surveys (Geophysical)	Multibeam echosounder (MBES), side scan sonar (SSS), magnetometer, sub-bottom profiler (SBP), seismic refraction/reflection (2D/3D ultra-high resolution seismic (UHRS)) and ultra-short baseline (USBL) acoustic positioning system.	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Confirmatory surveys (Geotechnical)	Boreholes, cone penetration test (CPT), vibrocore, and grab samples.	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Other pre-construction surveys	Metocean, environmental, corrosion, sediment dynamics, post installation/as built remotely operated vehicle (ROV) surveys.	No ^(a)	No ^(b)	No ^(c)	No ^(d)	No ^(e)
	Foundation installation	Monopile installation of WTG and OSPs using piling, drilling, and drive-drill-drive techniques.	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Dredging, trenching and cable installation	Seabed lowering and feature clearance, trenching for cable installation and reburial, scour protection works, and cable crossing.	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Infrastructure preparation and installation activities	Seabed preparation, cable protection, scour protection, grouting, cable crossing.	No ^(a)	No ^(b)	No ^(c)	No ^(d)	No ^(e)
	Vessels	Use of jack up vessels, dynamically positioned vessels, heavy lift vessels, support vessels, survey operation vessels and daughter craft, cable repair vessels, excavators, rock dumpers or dredger, guard vessels, crew transfer vessels, helicopters	Yes ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Surveys	Geophysical, metocean, environmental, corrosion, sediment dynamics, post installation	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)

Project phase	Proposed Activities	Equipment used and/or nature of the works	Potential for a Regulation 51 Impact				
			(a)	(b)	(c)	(d)	(e)
Operation and Maintenance (O&M)		inspections using surveys vessel(s) or unmanned surface vehicles.					
	Infrastructure maintenance and repairs	Routine inspections, repairs and replacements of navigation equipment, removal of marine growth and guano, replacement of corrosion protection anodes, painting, replacement or modifications of ancillary structures and J-tubes, and scour protection maintenance.	No ^(a)	No ^(b)	No ^(c)	No ^(d)	No ^(e)
	Maintenance dredging, and cable works	Scour protection repair, foundation and cable maintenance, and cable reburial.	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Vessels	Use of jack up vessels, dynamically positioned vessels, survey operation vessels and daughter craft, cable repair vessels, excavators, rock dumpers or dredger, guard vessels, crew transfer vessels, helicopters	Yes ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Operational turbines	Rotation of WTG blades during the operational lifetime.	No ^(a)	No ^(b)	No ^(c)	No ^(d)	No ^(e)
Decommissioning	Foundation and OSPs	Removal of WTG and OSP monopile foundations (cut 2 m below seabed level), dismantling and removal of WTG components and OSP topsides.	No ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)
	Cables	Scour protection, inter-array, interconnector, and offshore export cables with cable protection to be left <i>in situ</i> .	No ^(a)	No ^(b)	No ^(c)	No ^(d)	No ^(e)
	Vessels	Assumed similar to that of construction, including jack up vessels, dynamically positioned vessels, heavy lift vessels, support vessels, survey operation vessels and daughter craft, cable repair vessels,	Yes ^(a)	Yes ^(b)	No ^(c)	No ^(d)	No ^(e)

Project phase	Proposed Activities	Equipment used and/or nature of the works	Potential for a Regulation 51 Impact				
			(a)	(b)	(c)	(d)	(e)
		excavators, rock dumpers or dredger, guard vessels, crew transfer vessels, helicopters					
N/A	Unexploded ordnance (UXO) Clearance	Clearance of UXO, if required, including use of vessels and appropriate seabed operations.	No ^{9f)}	No ^{9f)}	No ^{9f)}	No ^{9f)}	No ^{9f)}
No^(a): The Proposed Activity does not introduce noise at a level or vessels that could lead to mortality in cetaceans, therefore no pathway for this impact exists. Yes^(a): The Proposed Activity may result in mortality of cetaceans through very high levels of underwater noise or collision with vessels; therefore a pathway for this impact exists and requires further assessment. No^(b): The Proposed Activity does not introduce noise or the presence of infrastructure that could disturb cetaceans, therefore no pathway for this impact exists. Yes^(b): The Proposed Activity may introduce noise, vessel presence, accidental pollution or EMF that could disturb cetaceans in the vicinity of the activity. Therefore, a pathway for this impact exists and requires further assessment. No^(c): The relevant cetacean species do not lay eggs so there is no possibility of taking or destruction of eggs, therefore no pathway for this impact exists. No^(d): The Proposed Activities will not damage or alter the water column in any way that would affect its ability to support a breeding site or resting place of cetaceans, therefore no pathway for this impact exists. No^(e): The Proposed Activities will not involve the keeping, transport, sale, exchange, or trade of specimens, therefore no pathway for this impact exists. No^{9f)}: UXO clearance is not required at this time on the basis of current knowledge, therefore no pathway for this impact exists.							

Further analysis has been undertaken of the pathways from the Proposed Activities that could lead to an impact under Regulation 51(2)(a) and (b). The analysis has been informed by the Volume II, Chapter 11: Marine Mammals (Revised March 2026), which identified direct and indirect effects from the Proposed Activities that have potential to lead to a mortality or disturbance effect on marine mammals.

The risk of killing an Annex IV species can arise through vessel collision or accidental pollution associated with vessel activity. There is no risk of killing an Annex IV species through a change in electromagnetic fields. Furthermore, most noise sources associated with the Proposed Activities produce noise at levels below those that can lead to death. The risk of death from noise sources is limited to very loud noise sources consisting of explosions (JNCC, 2025a) and some sonar systems. Therefore, only the noise from UXO clearance can lead to a risk of killing an Annex IV species and that is not required on the basis of current knowledge.

The risk of disturbance to an Annex IV species can occur from several Proposed Activities and associated impact pathways. The main pathway for disturbance is from anthropogenic underwater noise. For the purpose of this risk assessment, disturbance has been interpreted as covering several impact pathways from underwater noise: PTS (also referred to as auditory injury), TTS, and behavioural disturbance. Disturbance may also arise from Proposed Activities which do not produce noise, through EMF and accidental pollution.

2.2 Annex IV species

All species of cetacean are Annex IV species and are afforded strict protection under the Habitats Regulations. These species have therefore been considered within this Annex IV Risk Assessment where they may occur within the vicinity of the Proposed Development and have the potential to interact with the Proposed Activities.

A detailed environmental baseline characterisation of the relevant Annex IV cetacean species (including their distribution, occurrence, and ecological context provided by established data sources) is provided in Annex B. The key information relevant to this Risk Assessment is summarised below.

Twenty-five species of cetacean have been recorded in Irish waters (Berrow *et al.*, 2010; Irish Whale and Dolphin Group (IWDG), 2025; National Biodiversity Data Centre (NBDC) 2023; Rogan *et al.*, 2018). However, the cetacean species that may be at plausible risk of disturbance or mortality are those identified as commonly recorded within the vicinity of the Proposed Development based on the comprehensive desk-based review and site-specific survey data presented within the Volume III, Appendix 11.2, Marine Mammal Technical Report (Revised March 2026). These are harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), short-beaked common dolphin (*Delphinus delphis*; hereafter referred to as common dolphin), Risso's dolphin (*Grampus griseus*) and minke whale (*Balaenoptera acutorostrata*).

These five species may be present in the vicinity of the Proposed Activities and therefore may be exposed to effects from the Proposed Activities. All five species may use the area around the Proposed Activities for migration or their natural movements. It is assumed that all species may use the area for breeding or rearing, with the exception of minke whale which do not breed in Irish waters.

2.3 Assessment of Deliberate Killing of any specimen in the wild

2.3.1 Vessel collision

Vessel strikes are a known cause of mortality in marine mammals, either through instant death or secondary to injuries caused (Laist *et al.*, 2001). However, there is currently a lack of information on the frequency of occurrence of vessel collisions with marine mammals in RoI waters, and there is little evidence from marine

mammals stranded in Ireland to suggest that vessel collisions is an important cause of marine mammal mortality. In the UK, the Cetacean Strandings Investigation Programme (CSIP) documents the annual number of reported strandings and the cause of death for those individuals examined at post-mortem. Data provided by CSIP suggests that very few strandings have been attributed to vessel collisions, therefore, while there is evidence that mortality from vessel collisions can and does occur, it is not considered to be a significant cause of death to cetaceans in RoI and UK waters.

Whilst a broad range of vessel types have been involved in collisions with marine mammals (Laist *et al.*, 2001), larger vessels travelling at 7 ms⁻¹ or faster are those most likely to cause death or serious injury to marine mammals (Laist *et al.*, 2001). The majority of vessels used during the Proposed Activities are likely to be large vessels that will either be travelling considerably slower than 7ms⁻¹ or will be stationary for significant periods of time. Similarly, during the O&M phase a proportion of these vessels will be stationary or slow moving throughout O&M activities for significant periods of time. Therefore, the actual increase in vessel traffic moving within the Proposed Development and to/from port will occur over short periods of time. Smaller vessels (i.e. tug/anchor handlers, guard vessels, survey vessels, and crew transfer vessels) may travel at higher speeds, however they are able to move to avoid marine mammals (when detected), due to better manoeuvrability compared to larger vessels (Schoeman *et al.*, 2020).

In addition, mitigation measures which the Applicant has committed to implementing and which are described in detail in Volume II, Chapter 11: Marine Mammals (Revised March 2026), including the VMP and environmental VMP, will ensure that vessel traffic will move along predictable routes, which is known to be a key aspect in minimising the potential risks imposed by vessel traffic (Lusseau, 2003; 2006; Nowacek *et al.*, 2001). The VMP also sets out a Code of Conduct to minimise interactions with marine mammals and define how vessels should behave in the presence of them. It is also likely that the noise emissions from vessels involved in the Proposed Activities will deter animals from the immediate vicinity of the vessel where collision could occur.

Consequently, it is not expected that the vessel increase associated with the Proposed Activities will increase the risk of mortality due to vessel collision. Notwithstanding taking a precautionary approach, the killing of marine mammals is not a foreseeable event or an expected consequence from the use of vessels for the Proposed Development. Therefore, there is no risk of deliberate killing of any specimen of Annex IV cetacean species in the wild, and a derogation licence is not required.

2.3.2 Accidental pollution

Cetaceans can be affected by pollution or marine litter that can lead to death of individuals (Helm *et al.*, 2015). There is the potential for an accidental release of pollutants to occur from vessels and equipment associated with the Proposed Development, which could have the potential to result in mortality to cetaceans. Pollutants may include diesel fuel, bentonite (from drilling activities), lubricants, grease and oils and anti-fouling biocides.

All vessels undertaking Proposed Activities will adhere to MARPOL (International Convention for the Prevention of Pollution from Ships) requirements, which provide an international standard for the safe management and operation of ships for pollution prevention (as detailed in Volume II, Chapter 11: Marine Mammals (Revised March 2026), Section 11.7.3, Table 11.15). This will ensure adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol. Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices (as listed in Volume II, Chapter 11: Marine Mammals (Revised March 2026), Section 11.7.3, Table 11.15) will be adhered to always. In addition, the Environmental Management Plan (EMP) includes measures and commitments made within the EIAR and a Marine Pollution Contingency Plan (MPCP). The mitigation measures within the EMP will include storage of chemicals in secure designated areas on vessels in line with appropriate regulations and guidelines, and double skinning of any tanks and pipes containing hazardous substances.

All chemicals used will be subject to a chemical risk assessment to ensure risks are understood and minimised. The EMP will also include a MPCP which will contain key emergency contact details and response procedures in the event of a spill to ensure minimal impact. Following these procedures will also reduce the magnitude of any spill. Adherence to the factored-in measures, including the EMP and MPCP, and good working practices will significantly reduce the likelihood of an accidental pollution incident occurring, and the magnitude of its impact.

Consequently, it is not expected that an accidental pollution event from the Proposed Activities will occur. If an accidental pollution event does occur, the magnitude of the impact will be limited through the implementation of effective management measures. Notwithstanding taking a precautionary approach, the killing of marine mammals is not a foreseeable event or an expected consequence from accidental pollution from the use of vessels or equipment for the Proposed Development. Therefore, there is no risk of deliberate killing of any specimen of Annex IV cetacean species in the wild, and a derogation licence is not required.

2.4 Assessment of Deliberate Disturbance to these species

2.4.1 Changes in Electromagnetic Fields

The conduction of electricity through subsea power cables has the potential to emit a localised electromagnetic field (EMF) which could potentially affect the sensory mechanisms of marine mammal species (CMACS, 2003; Copping, 2018; Normandeau *et al.*, 2011). The effects of EMF on marine mammals are not well understood and, more broadly, there has been a lack of studies investigating the effects of EMFs on the behaviour of magneto- and electrosensitive animals. There is evidence to suggest that some species of cetacean may be able to detect variations in magnetic fields, therefore it is plausible that they are magneto-sensitive (Normandeau *et al.*, 2011). Kirschvink *et al.* (1986) suggested that species that were sensitive to changes in the Earth's magnetic field and that are likely to be present within the Proposed Development include harbour porpoise, Risso's dolphin, and common dolphin. However, the majority of these have had a theoretical evidence base, coming to differing conclusions regarding species' sensitivity to changes in electric and magnetic fields (Normandeau *et al.*, 2011). Furthermore, there has been no observation of behavioural responses by these cetacean species to EMF reported in the literature (Normandeau *et al.*, 2011).

Although, theoretically, there is the potential for some very localised behavioural effects, no evidence exists at present that marine mammal species within this assessment are magneto- or electro- sensitive. As a result, any potential behavioural responses would be unforeseen due to lack of evidence. In turn, given an absence of evidence for sensitivity, and the limited scale of any potential impact, there is no risk of any individual-level or population-level impacts from EMF. Therefore, there is no risk of deliberate disturbance of Annex IV cetacean species, and a derogation licence is not required.

2.4.2 Accidental pollution

As outlined in Section 2.3.2, the likelihood of an accidental pollution event is extremely low. The Applicant has integrated mitigation measures to effectively prevent accidental pollution (as detailed in Volume II, Chapter 11: Marine Mammals (Revised March 2026), Section 11.7.3, Table 11.15). These mitigation measures will ensure that the risk of accidental pollution is very low, and in turn any potential behavioural responses would be unforeseen, with no risk of any population-level impacts. Therefore, there is no risk of deliberate disturbance of Annex IV cetacean species, and a derogation licence is not required.

2.4.3 Underwater noise

Analysis of Proposed Activities

Each Proposed Activity was analysed to determine whether it would generate underwater noise at levels capable of causing disturbance of Annex IV species.

This analysis identified that a number of the Proposed Activities would either not generate underwater noise, or produce only low-level underwater noise that are not at levels capable of causing disturbance, or would only lead to a disturbance effect within the footprint of the disturbance effect of the vessel from which it would occur. These Proposed Activities have therefore been screened out of further consideration in the assessment of deliberate disturbance to Annex IV cetacean species (Table 2-2).

Table 2-2: Justification of Proposed Activities that have been screened out of further consideration of deliberate disturbance to Annex IV cetaceans.

Proposed Activities screened out of the assessment	Justification
Pre-construction and Construction – Other pre-construction surveys (Metocean, environmental, corrosion, sediment dynamics, post installation/as built remotely operated vehicle (ROV) surveys)	These surveys will not use equipment that actively emits underwater noise, nor will the equipment interact with the environment in such a way that produces noise to the level that could cause an auditory impact. Therefore, there is no risk of an auditory impact from the survey equipment. The risk of an auditory impact from the vessels associated with the confirmatory surveys (other) will be assessed under the overarching Vessels activity group.
Pre-construction and Construction – Infrastructure preparation and installation activities	These activities will not use equipment that actively emits underwater noise. Whilst some activities interact with the environment in a way that produces noise, it is expected that any area of elevated noise would be within the footprint of the noise from the vessel activity. Therefore, any impact from these activities would be included within the impact from vessel activity and would not act additively. The risk of an auditory impact from the vessels associated with the other construction activities will be assessed under the overarching Vessels activity group. Therefore, the risk of auditory impact from the other pre-construction and construction activities has therefore been screened out of the risk assessment.
O&M - Surveys (other than geophysical), infrastructure maintenance and repairs	These activities will not use equipment that actively emits underwater noise, nor will the activities interact with the environment in such a way that produces noise to the level that could cause an auditory impact. Therefore, there is no risk of an auditory impact from the activity. The risk of an auditory impact from the vessels associated with the Operation and Maintenance – Other activities will be assessed under the overarching Vessels activity group.
UXO clearance	There is no UXO identified within the site and therefore UXO clearance is not required on the basis of current knowledge. Therefore, this activity has not been included in this assessment.

Subsequently, the activities that have been screened in for detailed assessment are: geophysical surveys, geotechnical surveys, vessel noise, dredging and trenching, and foundation installation.

The details of the methodology used to assess the distances over which disturbance could occur, and the number of animals potentially disturbed, is provided in Annex D.

Consideration of mitigation in the context of “deliberate” disturbance

Where potential impacts on Annex IV species could affect Favourable Conservation Status (FCS), the interpretation of “deliberately” under part b) of Regulation 51 of the Habitats Regulations is considered in light of relevant case law and guidance.

This includes the consideration of the Court of Justice of the European Union (CJEU) cases C-103/00 and C-221/04, which clarifies the meaning of “deliberate” in relation to capture, killing, or disturbance of strictly protected species. The European Commission guidance considers this caselaw and advises that *“‘deliberate’ actions are to be understood as actions by a person or body who knows that their action will most likely lead to an offence against a species, but intends this offence or, at least, consciously accepts the foreseeable results of his action”* (European Commission, 2021).

In respect of renewable energy projects such as the proposed development, European Commission guidance advises that *“It is important to stress reliance on derogations may not be needed in the first place. The incidental killing or disturbance of individual specimens is not an obstacle to the development of renewable energy projects whenever such projects integrate mitigation measures to effectively prevent as much as possible killing or disturbance. Therefore, in these cases the incidental killing or disturbance of individual specimens of protected species should not be considered deliberate and hence would not fall under Article 12(1) of the Habitats Directive”* (European Commission, 2022).

This is established under EU Directive 2023/2413 for the promotion of energy from renewable sources (hereafter referred to as RED III). This provides in Article 16b(2) that *“Where a renewable energy project has adopted necessary mitigation measures, any killing or disturbance of the species protected under Article 12(1) of Directive 92/43/EEC and Article 5 of Directive 2009/147/EC shall not be considered to be deliberate.”*

The Applicant has committed to a number of designed-in measures and management measures (or controls) which have been factored into the Proposed Development. These ‘Factored In Measures’ are outlined in Table 11.15 of EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026), with reference to the corresponding appendices where measures are contained listed therein, and apply across the Proposed Development. The key Factored In Measures committed to by the Applicant that are relevant to this Annex IV Risk Assessment is the implementation of a MMMP (further details are outlined in Annex C) and Environmental VMP.

Geophysical and geotechnical surveys

Through the MMMP, the Applicant will implement mitigation measures for geophysical and geotechnical surveys that are fully aligned with the measures listed within the DAHG (2014) Guidance to manage the risk to marine mammals from man-made sound sources in Irish Waters (see Annex C.1 for further details). Therefore, all the necessary mitigation measures to avoid a disturbance effect have been implemented by the Applicant for geophysical and geotechnical surveys. As such, any incidental disturbance of individual specimens despite these mitigation measures would not be considered deliberate under Article 12(1) of the Habitats Directive (European Commission, 2022; RED III). Therefore, there is no risk of deliberate disturbance of Annex IV cetacean species, and a derogation licence is not required for these activities.

Vessel activity

The eVMP (Volume III, Appendix 25.10: Environmental Vessel Management Plan) will reduce the risk of vessel disturbance through underwater noise by controlling the speed and movement of vessels, resulting in slower moving vessels that produce less noise, and travelling more predictable routes which are less likely to cause disturbance (Lusseau 2003; 2006; Nowacek *et al.*, 2001). Therefore, the necessary mitigation measures to avoid a disturbance effect have been implemented by the Applicant for vessels. As such, any incidental disturbance of individual specimens despite these mitigation measures would not be

considered deliberate under Article 12(1) of the Habitats Directive (European Commission, 2022; RED III). Notwithstanding taking a precautionary approach, there is no risk of deliberate disturbance of Annex IV cetacean species, and a derogation licence is not required for this activity.

Decommissioning activities

The exact nature, sequence and timing of decommissioning activities is unknown at this stage as decommissioning would not occur until the end of the operational lifetime. Table 2-1 identifies the works which will be required during decommissioning activities, specifically the use of vessels, and removal of foundations and OSPs which may cause potential Regulation 51 Impacts.

With regards to vessel activities, the implementation of necessary mitigation measures during all phases including the decommissioning activities would result in no deliberate disturbance under Article 12(1) of the Habitats Directive (European Commission, 2022; RED III).

The decommissioning activities will comprise the removal of WTG and OSP monopile foundations (cut 2 m below seabed level). Whilst the exact method that will be used for this is unknown, some of the methods available can produce noise. The noise typically produced by monopile removal techniques (e.g. water-jet or abrasive cutting) is continuous noise, which is less impactful to marine mammals than impulsive noise such as that produced during foundation installation. Measured noise levels during decommissioning (Hinzmann *et al.*, 2017) demonstrated that the noise produced was below the levels that could cause auditory injury (PTS) in all marine mammal hearing groups. The measured noise level at 10 m from the decommissioning activities (175 dB re 1 µPa at 10 m distance, based on SEL₀₅) is similar to the noise levels produced by other construction activities such as dredging and trenching, as presented in Volume III, Appendix 11.1 Underwater Noise Assessment (Revised March 2026). Therefore, the noise from decommissioning activities can be considered as having potential to cause similar impacts to cetaceans those from dredging and trenching activities. Accordingly, the assessment of impacts from dredging and trenching in Section 2.4.5 can be considered as a suitable proxy for the assessment of impacts from decommissioning activities. The result of that assessment was that no derogation licence was required for dredging and trenching, therefore this conclusion is considered to apply to decommissioning activities also on the basis of available information. Accordingly, there is no risk of deliberate disturbance of Annex IV cetacean species, and a derogation licence is not required for this activity. It is acknowledged that there is uncertainty in this assessment and that an updated risk assessment will be carried out prior to the undertaking of decommissioning activities.

Foundation installation

Through the MMMP, the Applicant will also implement mitigation measures for foundation installation. The mitigation measures will mitigate for the risk of auditory injury to marine mammals, by using avoidance and deterrent-based measures to ensure marine mammals remain outside of the area of injury or the 'mitigation zone'. These measures comprise the use of an extended ramp up mitigation scenario, an Acoustic Deterrent Device (ADD), and monitoring (visual or acoustic) of the mitigation zone. See Annex C.2 for further details on the mitigation measures for foundation installation. It is acknowledged that the MMMP proposes some measures, specifically Passive Acoustic Monitoring (PAM) and ADDs, which are deviations from the advice outlined in DAHG (2014). However, both PAM and ADDs have been significantly developed since the publication of the DAHG (2014) guidance, and are now included in industry-standard mitigation guidance documents published by government agencies (such as by JNCC in the UK; JNCC, 2023; JNCC, 2025a). As a result, both PAM and ADDs are implemented as industry standards during foundation installation in other regions such as the UK. Therefore, the Applicant considers that these are appropriate measures for the Proposed Development based on professional judgement.

Despite the mitigation measures committed to, foundation installation has the potential to induce disturbance in cetaceans beyond the area where mitigation measures will be applied to reduce the risk of

injury. Therefore, deliberate disturbance has not been excluded and an assessment of the risk of deliberate disturbance has been undertaken for foundation installation.

2.4.4 Foundation installation

Foundation installation activities such as monopile piling or drilling, or a combination of both (drive-drill-drive) leads to elevations in underwater noise and vibration, which can in turn lead to impacts to marine mammals.

Underwater noise modelling for WTG and OSP foundation impact piling (see Annex D for more detail) was undertaken at five representative locations covering the extents of the Proposed Development. The locations were chosen to give the greatest geographical spread to maximise the potential impact ranges to the north and the south of the site. The modelled piling parameters are:

- 11 m monopile foundations at the North (N), Central (C) and Southwest (SW) WTG locations, installed with a maximum blow energy of 3,500 kJ; and
- 14 m monopile foundations at the North OSP (N-OSP) and South OSP (S-OSP) locations, installed with a maximum blow energy of 3,500 kJ.

All modelling results are presented for the extended ramp-up mitigation scenario, which has been committed to by the Applicant.

PTS (auditory injury) and TTS

The instantaneous and cumulative (over 24 hours) PTS and TTS-onset impact ranges have been determined using underwater noise modelling of the thresholds presented by Southall *et al.* (2019) (Annex Table H). The calculated PTS- and TTS-onset impact ranges represent the minimum starting distances from the piling location for animals to escape and prevent them from receiving a dose higher than the threshold. Further information on the modelling approach and the methods used to calculate PTS and TTS-onset impact ranges is provided in Annex D and EIAR Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026).

The number of individuals that may be affected by PTS was quantified by multiplying the impact-onset area by the density estimates for each species. This has been presented as an absolute number and as a proportion of the reference population. The animal density per km² taken forward within this assessment follows the approach used within the EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026). Of note is two density estimates are presented for bottlenose dolphins (Table 2-3 and Table 2-5) to reflect the substantial regional variation observed across survey years and areas. Including both values provides important context, as bottlenose dolphin densities can differ drastically, which in turn influences how abundance estimates are interpreted.

Following the approach taken in EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026), no assessment of the number of animals is given for TTS-onset because there are no thresholds to determine a biologically significant effect from TTS-onset. However, TTS ranges have been presented as they may result in disturbance in marine mammals.

Table 2-3: PTS-onset from pile driving at the all locations based on the extended ramp-up mitigation scenario

Species	Piling Location	Density ¹ (animals/km ²)	Area (km ²)	Maximum range (m)	Number animals ²	% of reference population
Instantaneous PTS-onset (unweighted SPL_{peak})						
Harbour porpoise	N WTG	0.38	1.0	580	<1	<0.01
	C WTG		1.3	680		
	SW WTG		0.9	580		
	N-OSP		0.8	520		
	S-OSP		0.4	380		
Bottlenose dolphin	WTG (N, C and SW) OSP (N and S)	0.0201	<0.01	<50	<1	<0.01
		0.2352	<0.01	<50	<1	<0.01
Risso's dolphin		0.031	<0.01	<50	<1	<0.01

¹ The density presented for each marine mammal receptor represents the highest available density estimate, outlined in Annex B, to provide the worst-case scenario results.

² *The predicted number of individuals that could be within the area of PTS-onset (both instantaneous and cumulative) from pile driving is fewer than one animal for all species assessed, when multiplying the density estimate by the area of PTS-onset. However, this does not take into account the avoidance and deterrent-based mitigation measures committed to by the Applicant. The maximum PTS-onset ranges for all species falls within the 1,000 m R_{safe} distance, which will be fully mitigated through the use of an ADD, alongside monitoring (visual or acoustic) to confirm deterrence of all animals beyond the 1,000 m R_{safe} distance. Therefore, the extended ramp-up mitigation and other mitigation measures will ensure that all marine mammals are displaced from the area where PTS could occur, consequently no animals are expected to experience PTS.

Species	Piling Location	Density ¹ (animals/km ²)	Area (km ²)	Maximum range (m)	Number animals ²	of % of reference population
Common dolphin		0.0272	<0.01	<50	<1	<0.01
Minke whale	WTG (N and SW) OSP (N and S)	0.045	<0.01	50	<1	<0.01
	C WTG		<0.01	60		
Cumulative PTS-onset (weighted SEL_{cum})						
Harbour porpoise	WTG (N, C and SW) OSP (N and S)	0.38	<0.01	<50	<1	<0.01
Bottlenose dolphin	WTG (N, C and SW) OSP (N and S)	0.2352	<0.01	<50	<1	<0.01
		0.0201	<0.01	<50	<1	<0.01
Risso's dolphin		0.031	<0.01	<50	<1	<0.01
Common dolphin		0.0272	<0.01	<50	<1	<0.01
Minke whale	N WTG	0.045	0.04	170	<1	<0.01
	C WTG		0.58	870		
	SW WTG		0.08	330		
	N-OSP		0.02	120		

Species	Piling Location	Density ¹ (animals/km ²)	Area (km ²)	Maximum range (m)	Number animals ²	of % of reference population
	S-OSP		<0.01	70		

Table 2-4: TTS-onset from pile driving at WTG and OSP locations based on the extended ramp-up mitigation scenario

Species			Impact	Piling location			
				N-WTG	C-WTG	SW-WTG	N-OSP
Instantaneous TTS-onset (unweighted SPL_{peak})							
Harbour porpoise (VHF cetacean)	Area (km ²)		4.9	5.8	4.6	3.8	1.7
	Maximum range (m)		1,400	1,600	1,400	1,200	880
Bottlenose dolphin, Risso's dolphin, common dolphin (HF cetacean)	Area (km ²)		<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum range (m)		<50	<50	<50	<50	<50
Minke whale (LF cetacean)	Area (km ²)		0.05	0.06	0.04	0.04	0.02
	Maximum range (m)		120	140	120	110	80
Cumulative TTS-Onset (weighted SEL_{cum})							
Harbour porpoise (VHF cetacean)	Area (km ²)		690	1,100	1,100	570	670
	Maximum range (m)		25,000	30,000	29,000	24,000	24,000
Bottlenose dolphin, Risso's dolphin, common dolphin (HF cetacean)	Area (km ²)		<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum range (m)		<50	<50	<50	<50	<50
Minke whale (LF cetacean)	Area (km ²)		2,100	3,200	2,900	1,600	1,100
	Maximum range (m)		44,000	51,000	50,000	41,000	33,000

The impact ranges for marine mammals from foundation installation are some of the largest predicted across the Proposed Activities. As presented in Table 2-3, this impact is calculated to occur in less than one individual prior to mitigation, which equates to a very small proportion of the population affected (<0.01%). However, with the implementation of the mitigation measures outlined in Annex C.2, which involves the establishment of an R_{safe} of 1000 m, in practice there will be no cetaceans exposed to noise that could induce PTS-onset. The impact ranges for TTS, particularly cumulative TTS, are notably higher than for PTS, which would lead to a greater number of animals being exposed to noise at levels that could induce TTS-onset.

For full details on PTS and TTS-onset impact ranges from pile driving for each marine mammal species at each of proposed locations see EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026).

Behavioural responses

Behavioural responses to underwater noise can vary greatly, both within and between species. A species-specific approach has been taken to determine the range over which behavioural responses may occur, using approaches available in the published literature.

A species-specific dose-response approach was used for this assessment of disturbance to harbour porpoise from underwater noise during pile driving. In the absence of species-specific dose-response data for dolphins or minke whales, and given that the application of the harbour porpoise dose-response curve (Graham *et al.*, 2017) is considered over precautionary when considering observed responses of other cetacean species (e.g. Fernandez-Betelu *et al.*, 2021; Kastelein *et al.*, 2006; Stone *et al.*, 2017), the US National Marine Fisheries Service (NMFS) Level B harassment thresholds for strong disturbance have been used for dolphins and minke whales in this assessment. It should be noted that Level B distances are not species specific. The maximum distances for Level B harassment are:

- 22,000 m for the installation of an 11 m monopile at the N WTG location.
- 26,000 m for the installation of an 11 m monopile at the C WTG location.
- 24,000 m for the installation of an 11 m monopile at the SW WTG location.

The number of individuals of each marine mammal species predicted to experience behavioural disturbance as a result of pile driving is presented in Table 2-5, alongside the proportion of the respective reference population. The predictions for each of the modelling locations are presented separately. Disturbance from concurrent piling for the Proposed Development has not been assessed as piling will be limited to one installation per day. The animal density per km² taken forward within this assessment follows the approach used within EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026).

To note, the use of the Level B harassment threshold to determine disturbance distance is likely over-precautionary. JNCC (2025b) have published Effective Deterrent Ranges (EDRs) for harbour porpoise from noise-producing activities including piling. EDRs provide an empirically-derived estimate of the spatial extent over which the bulk of the disturbance response by harbour porpoises will occur, though they do not correspond to complete avoidance and may overestimate the distances at which effects are consistently observed (JNCC, 2025b; JNCC, 2020). For monopile installation without noise abatement systems, reported EDRs vary, with most studies indicating ranges of 15–20 km, with a weighted average of 17.4 km based on 14 studies (Brown *et al.*, 2025). A recent study included in the Brown *et al.* (2025) review was from Moray West, which observed an EDR of 9.4 km, highlighting that the 20 km EDR recommended by JNCC is precautionary. To note, the approach taken by JNCC (2025b) to calculating EDRs is precautionary as they represent the maximum disturbance response typically recorded at the start of the piling campaign. The disturbance distance of harbour porpoise is predicted to decrease over the duration of the piling campaign, as evidence by Graham *et al.* (2019).

Table 2-5: Predicted impact of disturbance to marine mammals from pile driving using dose-response curves (orange) and Level B harassment thresholds (blue) with the extended ramp up mitigation scenario; # = number of animals disturbed; % = the percentage of the reference population

Species	Density	Impact	Piling Location				
			N WTG 11 m	C WTG 11 m	SW WTG 11 m	N-OSP 11 m	S-OSP 11 m
Harbour porpoise	0.38	#	1,456	1,908	1,753	1,270	1,109
		%	2.33	3.05	2.80	2.03	1.77
Common dolphin	0.0272	#	21	30	30	18	16
		%	0.02	0.03	0.03	0.02	0.02
Bottlenose dolphin	0.0201	#	16	23	23	14	12
		%	5.46	7.85	7.85	4.78	4.10
	0.2352	#	179	259	259	153	132
		%	61.09	88.40	88.40	52.22	45.05
		%*	2.15	3.12	3.12	1.84	1.59
Risso's dolphin	0.031	#	24	35	35	21	18
		%	0.20	0.29	0.29	0.17	0.15
Minke whale	0.045	#	35	50	50	30	26

Species	Density	Impact	Piling Location				
			N WTG	C WTG	SW WTG	N-OSP	S-OSP
			11 m	11 m	11 m	11 m	11 m
		%	0.17	0.25	0.25	0.15	0.13

Source: SCANS-IV density estimates / SCANS-III density estimates / ObSERVE estimates used in calculations from Gilles *et al.* (2023), Hammond *et al.* (2021) and Rogan *et al.* (2018)

*Secondary bottlenose dolphin reference abundance from SCANS-IV (Gilles *et al.*, 2023), provides estimates from Block CS-D at 8,326 rather than 293 from MU populations in IAMMWG (2023) to provide more realistic populations relevant to the Proposed Activities

In addition, population modelling (Volume III, Appendix 11.3: Phase 1 Irish Offshore Windfarms: Cumulative iPCoD Modelling) was conducted to determine whether the level of disturbance from foundation installation (specifically pile-driving) is expected to result in population-level impacts. Modelling was conducted under the original ramp-up mitigation scenario, which doesn't have an extended ramp up and has a higher maximum energy of 6000 kJ. The results of the population modelling showed that there is no significant effect of disturbance from pile driving at the Proposed Development to the populations of harbour porpoise, bottlenose dolphin, and minke whale (the species for which iPCoD modelling is possible to undertake). For harbour porpoise, the impacted population is predicted to continue at a stable trajectory never falling below 99.89% as compared to the mean un-impacted population. For bottlenose dolphin, the mean impacted population size initially decreases very slightly as compared to the mean un-impacted population size in response to piling. However, shortly after piling the impacted population continues on the same, stable trajectory never falling below 98.09% of the mean un-impacted population size. Furthermore, for minke whale, impacted population is predicted to continue at a stable trajectory at exactly the same size as the un-impacted population. It is highlighted that the population modelling was undertaken at the time of submission (June 2024) and so is based on Project Design Option parameters that have since been refined down further. However, it was not considered necessary to update the iPCoD modelling because the revised piling parameters remain within the overall range assessed in the iPCoD modelling. The original iPCoD outputs remain valid for the purposes of assessment and are considered precautionary, as they are based on a scenario that reflects equal or greater impact potential than the revised design (Volume III, Appendix 11.3: Phase 1 Irish Offshore Windfarms: Cumulative iPCoD Modelling).

Risk of deliberate disturbance

The disturbance effect to Annex IV species that may arise during foundation installation activities are unlikely to affect changes of survival, breeding success or reproductive ability, in view of European Commission (2021) guidance. However, they will likely lead to a reduction in the occupied area or the relocation or displacement of the species (the other consideration outlined in European Commission (2021)), albeit on a temporary basis.

The potential for foundation installation to affect changes of survival, breeding success or reproductive ability, can be informed by the population modelling undertaken for the Proposed Activities, using iPCoD. The population modelling predicted that the minke whale population remained at 100% and on a stable trajectory under both the impacted and un-impacted scenarios, demonstrating that no change to the population will occur from foundation installation. The harbour porpoise population under the impacted scenario remained at 99.9% of the unimpacted population, and on a stable trajectory, also demonstrating a lack of population-level effects. For bottlenose dolphin, iPCoD modelling predicted that the population would continue at a stable trajectory at 98.58-98.72% of the size of the un-impacted population. Therefore, the Applicant concludes that the foundation installation will not affect changes of survival, breeding success or reproductive ability to the extent that it leads to a change to the species' population. To note, iPCoD modelling is based on the original maximum piling parameters at the time of submission which have since been revised down. However, the original iPCoD outputs remain valid for the purposes of assessment and are considered precautionary, as they are based on a scenario that reflects equal or greater impact potential than the revised design.

Based on Level B harassment thresholds, behavioural responses from foundation installation may be observed up to 26 km from the piling location. These responses are expected to be short term (i.e. disturbance only occurs on the day when piling occurs, with no "residual" disturbance), reversible/recoverable, and diminish with time during the foundation installation campaign. However, the disturbance effect will occur on a frequent basis, as piling will occur on a minimum of 55 days and the maximum representative scenario (Project Design Option 1), for up to 4 hours on each day. This may lead to repeated disturbance of Annex IV cetaceans that could lead to impacts on individual specimens.

Therefore, it would still constitute a reduction in the occupied area or the relocation or displacement of the species. Cetaceans are highly mobile and wide-ranging, therefore the most appropriate level to consider impacts against is the regional population, in the absence of defined local populations. The percentage of the reference population that could show a response is less than 1% for common dolphin, Risso's dolphin and minke whales. Between 1 and 7.85% of the harbour porpoise and bottlenose dolphin reference populations may show a behavioural response, which is higher compared to the other species. The iPCoD modelling shows that impacts at the population-level are not significant, with a maximum change of <2% in the bottlenose dolphin population, 0.11% in the harbour porpoise population, and no change in the minke whale population.

The Applicant has committed to implementing marine mammal mitigation measures during foundation installation (as detailed within Annex C.2). These include the implementation of a marine mammal mitigation zone, monitoring using marine mammal observers during daylight hours, and ramp-up procedures, that adhere to DAHG (2014) guidelines. In addition, the Applicant is committed to using passive acoustic monitoring (PAM) prior to the start-up of piling at night-time and poor visibility, and the use of an Acoustic Deterrent Device (ADD) prior to all foundation installation. The ADD duration will be sufficient to deter marine mammals outside of the predicted PTS-onset zones, therefore there is negligible residual risk of PTS in Annex IV species. Therefore, no further additional measures are required to avoid impacts. Whilst the use of an ADD and other mitigation measures (ramp-up, marine mammal monitoring) will also reduce the risk of animals being within the area closest to the foundation location where TTS or behavioural responses would be strongest, there is still a residual risk that animals could experience TTS or behavioural disturbance.

The mitigation measures outlined in Annex C.2 are primarily aimed at reducing the risk of injury. It is the Applicant's view that injury should be considered a subset of disturbance under the Habitats Directive, therefore mitigation to reduce the risk of injury is beneficial in reducing this specific form of disturbance. However, mitigation measures aimed at reducing the risk of injury, may not reduce the risk of behavioural responses. It is also noted that the ADD measure proposed will actively deter marine mammals from the area of injury, which may add to the overall disturbance effect.

Therefore, the Applicant cannot exclude the risk of deliberate disturbance during foundation installation and a derogation licence is required.

2.4.5 Dredging and trenching

As part of seabed preparation for construction, seabed lowering and feature clearance may be required by dredging. Additional dredging activities may be required during the operation and maintenance phase for scour protection repair and maintenance of WTG and OSP foundations, as well as maintenance of inter-array cables, interconnector cables and offshore export cables. Trenching will be required during the cable installation.

The source levels for dredging and trenching are presented in Table 2-6. Full details of the underwater noise modelling methodology, assumptions, and resulting impact ranges for dredging (backhoe), dredging (suction) and trenching are detailed in Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026). Source levels for TSHD are presented in McQueen *et al.*, (2020).

Table 2-6: Estimated source levels for dredging and trenching

Activity	SPLpk (dB re 1µPa @ 1 m)
Dredging (backhoe)	165
Dredging (suction)	186
TSHD	186
Trenching	172

PTS (auditory injury) and TTS

Dredging and trenching produce a continuous and non-impulsive noise which is generally considered very unlikely to result in PTS in marine mammals (Todd *et al.*, 2015; Southall *et al.*, 2019). The main energy of dredging and trenching, is listed as being below 1 kHz (Todd *et al.*, 2015). This is within the estimated peak sensitivity range of minke whales (LF cetacean) but out of the peak hearing ranges of harbour porpoise (VHF cetaceans) and dolphin (HF cetaceans).

To quantify the impact of underwater noise resulting from dredging and trenching on marine mammals with regard to PTS and TTS, the cumulative (over 24 hours) PTS and TTS-onset impact ranges have been determined using the thresholds presented by Southall *et al.* (2019) Table 2-7. Further information on the modelling approach and the methods used to calculate PTS and TTS-onset impact ranges is provided in EIAR Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026). The predicted ranges are presented in Table 2-7. Given that all ranges are <1 km, and many are <50 m, the likelihood of cetaceans being within these distances is very low.

Table 2-7: Weighted LE_{p,24h,wtd} impact ranges for marine mammals using the Southall *et al.* (2019) non-impulsive criteria for the dredging and trenching assuming a fleeing receptor.

Activity	PTS (Non-impulsive)				TTS (Non-impulsive)			
	LF (199 dB)	HF (198 dB)	VHF (173 dB)	PCW (201 dB)	LF (179 dB)	HF (178 dB)	VHF (153 dB)	PCW (181 dB)
Dredging (backhoe)	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m
Dredging (suction)	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	250 m	< 50 m
Trenching	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	< 50 m	820 m	< 50 m

Although PTS is a permanent auditory effect, exposure to noise levels capable of inducing TTS is more likely to elicit behavioural avoidance rather than injury (Southall *et al.*, 2007). Evidence from other studies demonstrates that harbour porpoises exposed to similar continuous noise sources typically move away from the source, thereby leaving the zone where PTS onset could occur (Hermannsen *et al.*, 2015). In addition, vessel presence itself is expected to act as a deterrent, further reducing the likelihood of animals remaining in the immediate vicinity at the onset of construction activities (Benhemma-Le Gall *et al.*, 2023).

Behavioural disturbance

Studies have confirmed that underwater noise from dredging activities can cause displacement and disturbance to marine mammals (Culloch *et al.*, 2016; Pirotta *et al.*, 2013). However, it is difficult to determine the disturbance response from dredging activities in isolation from the disturbance from vessel presence required for the activity (Todd *et al.*, 2015). There are no equivalent studies on trenching, therefore dredging is used as a proxy to inform the combined assessment of disturbance from dredging and trenching.

Dredging activities have been shown to cause harbour porpoise displacement within a radius of 5 km around the dredging location (Verboom, 2014). Diederichs *et al.* (2010) noted there was short term avoidance (around 3 hours) at distances of up to 600 m from a TSHD, but no significant long-term impacts. Modelling potential impacts of dredging of a port expansion predicted a disturbance range of 400 m, with a more conservative approach predicting avoidance of harbour porpoise up to 5 km (McQueen *et al.* 2020). Whilst there are studies indicating a variety of responses (or lack of responses) by other cetacean species to dredging (e.g. Pirotta *et al.*, 2013; Marley *et al.*, 2017; Culloch *et al.*, 2016), no disturbance distances are provided in these studies. Therefore, the 5 km displacement distance for harbour porpoise has been used for all cetacean species, which is precautionary given the overall high sensitivity of harbour porpoise to underwater noise. The spatial scale over which disturbance effects may arise is small i.e. a maximum of 5 km, equating to an area of approximately 78.5 km². The maximum number of Annex IV individuals that may be within this area are presented in Table 2-8.

Table 2-8: Predicted impact of disturbance to marine mammals from dredging and trenching assuming a 5 km radius

Species	Density ¹ (animals/km ²)	Area (km ²)	Number of animals	% of reference population
Harbour porpoise	0.38	78.5	30	0.05
Bottlenose dolphin	0.0201	78.5	2	0.5
	0.2352	78.5	19	0.23 ³
Risso's dolphin	0.031	78.5	3	0.02
Common dolphin	0.0272	78.5	3	<0.01
Minke whale	0.045	78.5	4	0.02

It is highlighted that the scale of disturbance from dredging and trenching will be very similar to the disturbance predicted around vessels (i.e. 4 km for harbour porpoise; Benhemma-Le Gall *et al.*, 2022).

Risk of deliberate disturbance

The disturbance effect to Annex IV species that may arise during dredging and trenching activities would not affect changes of survival, breeding success or reproductive ability, nor lead to a reduction in the

³ Secondary bottlenose dolphin reference abundance from SCANS-IV (Gilles *et al.*, 2023), provides estimates from Block CS-D at 8,326 rather than 293 from MU populations in IAMMWG (2023) to provide more realistic populations relevant to the Proposed Activities.

occupied area or the relocation or displacement of the species, in view of European Commission (2021) guidance.

The proportion of animals temporarily affected is significantly lower than the proportion disturbed through foundation installation, comprising ~1.5% of the number of animals disturbed from foundation installation (e.g. 30 harbour porpoise compared to 1,908 harbour porpoise under the original maximum piling parameters). As per the iPCoD modelling results for foundation installation, the disturbance effect was not sufficient to result in any changes at the population level for harbour porpoise, minke whale and bottlenose dolphin, and that all these species continued at a stable or increasing population trajectory, same as the un-impacted population. Therefore, not leading to a change in survival, breeding success or reproductive ability of the species. This conclusion is applicable to dredging and trenching where the numbers impacted are significantly lower than that from foundation installation. Furthermore, any disturbance would be highly localised and temporary, in that it would be restricted to the duration of the activity (e.g. dredging or trenching) and fully recoverable afterwards. It is also highlighted that dredging and trenching are mobile activities and therefore any impact in an occupied area would be temporally limited to a shorter duration than that of the overall dredging or trenching activity. Therefore, the effect from dredging and trenching on Annex IV species would not meet the definition of deliberate disturbance outlined in the European Commission (2021) guidance.

2.5 Conclusion

The risk assessment identified five Annex IV cetacean species that may be within the vicinity of the Proposed Development: harbour porpoise, bottlenose dolphin, Risso's dolphin, common dolphin, and minke whale.

This assessment concludes that no deliberate killing under Regulation 51(2)(a) will result from the Proposed Activities. Taking into account the mitigation committed to by the Proposed Development, the Applicant considers that any killing of Annex IV species that may occur as a result of vessel collision or accidental pollution would not constitute "deliberate" killing, in view of the Commission's Guidance based on CJEU cases C-103/00 and C-221/04, and the EC Guidance to Member States on good practices to speed up permit-granting procedures for renewable energy projects and on facilitating Power Purchase Agreements SWD (2022) 149.

The assessment concludes that there is potential for deliberate disturbance under Regulation 51(2)(b) from foundation installation associated with the Proposed Development. This conclusion is reached for foundation installation only, as there is a residual risk of disturbance (in the form of TTS or behavioural responses), despite the application of mitigation measures that have been committed to. The Applicant considers that they have taken reasonable steps to effectively reduce disturbance through these mitigation measures. It is highlighted that behavioural responses that may occur as a result of foundation installation will not affect changes in survival, breeding success or reproductive ability to the extent that it leads to a change at the population level. However, reduction in the occupied area or the relocation or displacement of the species from foundation installation may occur, albeit on a temporary basis. Therefore, a derogation licence is required to be sought specifically for deliberate disturbance from foundation installation.

The assessment concludes that the only activity which will result in deliberate disturbance under Regulation 51(2)(b) is foundation installation. The following Proposed Activities will not result in deliberate disturbance: geophysical survey, geotechnical survey, vessel noise, dredging and trenching, EMF, and accidental pollution. This conclusion is reached on the basis of negligible risk of disturbance from these activities, and/or the implementation of the necessary mitigation measures to reduce disturbance thereby resulting in no deliberate disturbance, where applicable.

There is considered to be no risk of a disturbance offence from other pathways associated with the Proposed Development. In addition, there is considered to be no risk of any other offence under Regulation 51(2) (Parts a, c-e). Therefore, a derogation licence is not required for these activities or offences.

3 Legal Tests

3.1 Overview

Regulation 54 transposes Article 16 of the Habitats Directive and sets out that a derogation licence may be granted in accordance with Regulation 54 which provides as follows:

“(1) Any person may apply to the Minister, or the Minister or Ministers of Government with responsibilities for fish species referred to in Part 2 of the First Schedule, for a derogation licence from complying with the requirements of the provisions of Regulations 51, 52 and 53.

(2) Where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range, the Minister, or the Minister or Ministers of Government with responsibilities for fish species referred to in the Fourth Schedule, may grant such a derogation licence to one or more persons, where it is—

(a) in the interests of protecting wild fauna and flora and conserving natural habitats,

(b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property,

(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment,

(d) for the purpose of research and education, of repopulating and re-introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants, or

(e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule.”

The three legal tests that need to be met in order to obtain the derogation licence are therefore as follows:

- Test 1: Reason for the Derogation (refer to Section 3.2 for further detail);
- Test 2: Absence of Alternatives (refer to Section 3.3 for further detail);
- Test 3: Impact of a derogation on Conservation Status (refer to Section 3.4 for further detail).

The information that has been provided will assist the NPWS and the Minister, with their determination as to whether the three tests can be met in relation to the derogation that is being sought under Regulation 54 of the Habitats Regulations.

3.2 Test 1 – Imperative Reasons of Overriding Public Interest

3.2.1 Introduction

Where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in

their natural range, a derogation licence can only be granted if it meets a specific purpose. Namely, one of the following purposes:

- “a) In the interests of protecting wild fauna and flora and conserving natural habitats;*
- b) To prevent serious damage, in particular crops, livestock, forests, fisheries and water and other types of property;*
- c) In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment;*
- d) For the purpose of research and education, of repopulating and re-introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants; or*
- e) To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule.”*

The reason for proceeding with the derogation that is being sought pursuant to Regulation 54 of the Habitats Regulations, is that the Proposed Development is considered to be: ‘In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment’.

This is in accordance with Article 16f of Directive (EU) 2023/2413 which states that:

“By 21 February 2024, until climate neutrality is achieved, Member States shall ensure that, in the permit-granting procedure, the planning, construction and operation of renewable energy plants, the connection of such plants to the grid, the related grid itself, and storage assets are presumed as being in the overriding public interest and serving public health and safety when balancing legal interests in individual cases for the purposes of Article 6(4) and Article 16(1), point (c), of Directive 92/43/EEC, Article 4(7) of Directive 2000/60/EC and Article 9(1), point (a), of Directive 2009/147/EC. Member States may, in duly justified and specific circumstances, restrict the application of this Article to certain parts of their territory, to certain types of technology or to projects with certain technical characteristics in accordance with the priorities set out in their integrated national energy and climate plans submitted pursuant to Articles 3 and 14 of Regulation (EU) 2018/1999. Member States shall inform the Commission of such restrictions, together with the reasons therefor.”

This section explains the need and benefits of the Proposed Development in terms of its contribution to the decarbonisation of Irish energy to achieve a climate neutral economy, and also in helping to achieve the relevant obligations in relation to carbon, climate mitigation and specifically offshore renewables. There is a compelling and urgent need for renewable energy development in Ireland and this information explains the scale of that need and why the important contribution that will be made by the Proposed Development should be given very substantial weight in decision making for the derogation that is being sought. The Proposed Development, once constructed, will represent a critical proportion of the State’s renewable energy capacity, and it will contribute to achieving the Government of Ireland’s target of at least 5GW of offshore wind target by 2030. Indeed, it will produce approximately 800 MW of renewable energy.

The Applicant concludes that the benefit delivered by the Proposed Development to decarbonisation, security of supply and contribution towards achieving the national climate obligations should be considered as demonstrating imperative reasons of overriding public interest and thus support of granting of the derogation that is required for the Proposed Development.

3.2.2 Legislative Obligations

Renewable Energy Directive

Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652, also referred to as RED III states the following in Article 16f:

“By 21 February 2024, until climate neutrality is achieved, Member States shall ensure that, in the permit-granting procedure, the planning, construction and operation of renewable energy plants, the connection of such plants to the grid, the related grid itself, and storage assets are presumed as being in the overriding public interest and serving public health and safety when balancing legal interests in individual cases for the purposes of Article 6(4) and Article 16(1), point (c), of Directive 92/43/EEC, Article 4(7) of Directive 2000/60/EC and Article 9(1), point (a), of Directive 2009/147/EC. Member States may, in duly justified and specific circumstances, restrict the application of this Article to certain parts of their territory, to certain types of technology or to projects with certain technical characteristics in accordance with the priorities set out in their integrated national energy and climate plans submitted pursuant to Articles 3 and 14 of Regulation (EU) 2018/1999. Member States shall inform the Commission of such restrictions, together with the reasons therefor.”

Further, Recital 44 of REDIII states:

“For the purposes of the relevant Union environmental law, in the necessary case-by-case assessments to ascertain whether a renewable energy plant, the connection of that plant to the grid, the related grid itself or storage assets are of overriding public interest in a particular case, Member States should presume those renewable energy plants and their related infrastructure to be of overriding public interest and serving public health and safety, except where there is clear evidence that those projects have significant adverse effects on the environment which cannot be mitigated or compensated for, or where Member States decide to restrict the application of that presumption in duly justified and specific circumstances, such as reasons related to national defence. Considering such renewable energy plants to be of overriding public interest and serving public health and safety would allow such projects to benefit from a simplified assessment.”

Additionally, the EC Guidance (2022) states that:

“In order to facilitate the use of existing flexibilities in EU environmental legislation, Member States should clarify in their national legislation that the planning, construction and operation of plants for the production of energy from renewable sources, their connection to the grid and the related grid itself are presumed as being in the overriding public interest and in the interest of public safety, in view of the legislative proposal amending and strengthening the provisions of Directive (EU) 2018/2001 related to administrative procedures. As such, they should qualify for the most favourable procedure available in their planning and permit-granting procedures”

Climate Action and Low Carbon Development (amendment) Act 2021

In July 2021, Ireland enacted the Climate Action and Low Carbon Development (Amendment) Act. The Act binds Ireland to achieve net zero emissions by 2050 and commits to achieving 51% reduction in GHG emissions by 2030.

It also provides for a governance framework including a new system of sectoral emissions ceilings and carbon budgets. The electricity sector needs to achieve a 75% reduction in emissions by 2030 in comparison to 2018 levels. The sectoral emissions ceiling for the electricity sector in 2030 is 3 MtCO_{2eq}.

This is the most ambitious sectoral carbon budget. It is critical that large-scale offshore wind projects are facilitated if Ireland is to meet this target.

The critical elements of Ireland's national climate change law are:

- A national climate objective to pursue and achieve no later than 2050 the transition to a climate resilient, biodiversity-rich, environmentally sustainable, and climate-neutral economy.
- The Climate Change Advisory Council has a critical role in assessing and advising on how Ireland is making the transition as described above and this includes proposing 5-yearly carbon budgets.
- The Government must adopt carbon budgets that are consistent with the Paris agreement and other international obligations.
- The first two five-year carbon budgets (2021–2025 and 2026–2030) proposed by the Climate Change Advisory Council should equate to a total reduction of 51% over the period to 2030, relative to a baseline of 2018.
- The Government will determine, following consultation, how to apply the carbon budget across the relevant sectors, and what each sector will contribute in a given five-year period
- Actions for each sector will be detailed in the Climate Action Plan which must be updated annually.

Under section 15(1) a relevant body is required to, in so far as practicable, perform its functions in a manner consistent with, (a) the most recent approved climate action plan, (b) the most recent approved national long term climate action strategy, (c) the most recent approved national adaptation framework and approved sectoral adaptation plans, (d) the furtherance of the national climate objective, and (e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.

The total emissions allowed under each budget is set out below, as well as the average annual reduction for each 5-year period:

- 2021 – 2026: 295 Mt CO_{2eq}. This represents an average reduction in emissions of 4.8% per annum for the first budget period;
- 2026 – 2030: 200 Mt CO_{2eq}. This represents an average reduction in emissions of 8.3% per annum for the second budget period;
- 2031 – 2035 (provisional): 151 Mt CO_{2eq}. This represents an average reduction in emissions of 3.5% per annum for the third provisional budget.
- 2031-2035 (proposed): 160 Mt CO_{2eq}. This represents an average reduction in emissions of 6.3% per annum for the fourth proposed budget.
- 2036 – 2040 (proposed): 120 Mt CO_{2eq}. This represents an average reduction in emissions of 6.3% per annum for the fourth proposed budget.

Specifically, the electricity sector has an emissions ceiling of 40 Mt CO_{2eq} between 2021 and 2025 and this is one of only three sectors, projected to achieve the target for the first carbon budget period via a projected 70% decrease in emissions by 2030 on 2018 levels. The emissions ceiling for 2026-2030 is 20 Mt CO_{2eq} with the Climate Change Advisory Council proposing further carbon budgets as follows (Climate Change Advisory Council, 2024):

- Carbon Budget 3 (CB3: 2031-2035) of 160 Mt CO_{2eq};
- Provisional Carbon Budget 4 (CB4: 2036-2040) of 120 Mt CO_{2eq}.

Urgent implementation of all climate plans and policies, in addition to further new measures, are needed for Ireland to meet the 51% emissions reduction target and put Ireland on track for net zero by 2050. It has been estimated that the State could face a compliance cost of between €8 - 26 billion if it fails to achieve reductions in carbon emissions (Irish Fiscal Advisory Council and Climate Change Advisory Council, 2025).

Delivery of the Proposed Development would make a positive contribution in reducing the state's possible liability in this regard.

It is noted that electricity generated from renewable energy has been identified (EPA, 2025b) as the largest contributor to potential GHG emissions reductions by 2030 with a projected reduction in emissions of 11.76Mt CO_{2eq}.

Planning and Development Act 2000, as amended

The Planning and Development Act 2000, as amended, (PDA 2000) provides in the context of appropriate assessment under the Habitats Directive that:

"177AA(10) Proposed development that is the planning, construction and operation of a renewable energy plant, any works necessary for the connection of such a plant to the grid, and any related grid or storage assets, is presumed to be in the overriding public interest and serving public health and safety when balancing legal interests in the individual case." While Section 177AA of the PDA 2000 applies to appropriate assessments being carried out under the Article 6 of the Habitats Directive rather than the derogation licence process under Article 16 of the Habitats Directive, it is instructive that the legislation explicitly confirms that renewable energy projects should be presumed to be in the overriding public interest.

3.2.3 Policy Drivers

International

2030 EU Climate and Energy Framework

The 2030 EU Climate and Energy Framework provides a framework for climate and energy policies in Europe. It was agreed by EU leaders in 2018. This framework seeks a 40% reduction in EU GHG emissions from 1990 levels and a greater contribution from renewable energy. This Framework aligns with the relevant obligations as outlined in REDIII and previously described.

The EU Governance of the Energy Union and Climate Action Regulation 2018/1999 sets the overall framework for the achievement of the EU climate and energy 2030 targets.

Ireland has prepared a National Energy and Climate Plan (NECP) 2021 to 2030 (as detailed below in Sections 0 - 0) to meet the requirements of the EU Governance of the Energy Union and Climate Action Regulation 2018/1999.

European Green Deal and Fit for 55

The European Green Deal (European Commission (EC)) was agreed in 2021 and is the EU growth strategy to transform Europe to a climate-neutral, fair and prosperous society with a modern resource efficient and competitive economy. It aims for no net emissions of greenhouse gases by 2050 with economic growth decoupled from resource use.

To achieve climate neutrality as per Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), the EU has committed to increasing the greenhouse gas emission reductions targets for 2030 to at least 55%. A key route to achieving this will be the development of an energy sector based significantly on renewable resources. The "Fit for 55" package of EU reforms puts in place new initiatives with the aim of ensuring that EU policies are in line with these new climate goals.

REPowerEU

In response to the global energy market disruption caused by the Russian invasion of Ukraine in 2022, the EC published the REPowerEU Plan (EC, 2022). The Plan is aimed at ending the EU's dependence on Russian fossil fuels, tackling the climate crisis, and bringing about energy savings, diversifying energy supplies and accelerating the roll out of renewable energy. The Plan recognises the need to scale up and speed up the roll out of renewable energy projects. The Plan increases the headline 2030 EU renewable energy target to 42.5% with future ambition to reach 45%.

Paris Agreement

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties including Ireland at the UN Climate Change Conference (COP21) in Paris, France, on 12th December 2015. It entered into force on 4th November 2016. Its overarching goal is to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels.”

Nationally Determined Contributions (NDCs) are at the heart of the Paris Agreement and the achievement of its long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement [Article 4, Para 2] requires each Party to prepare, communicate, and maintain successive NDCs that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

National

Project Ireland 2040 - National Planning Framework

Project Ireland 2040 - National Planning Framework (NPF), published in July 2018 (Department of Housing, Planning and Local Government and Department of Public Expenditure and Reform, 2018), is the primary articulation of spatial, planning and land use policy in Ireland. The purpose of the framework is to guide the sustainable growth of the country over the next 20+ years. The framework aims to direct new development toward areas of existing settlement, rather than allowing the continual expansion and sprawl of cities and towns.

In April 2025, the Government adopted the First Revision to the National Planning Framework (Department of Housing, Local Government and Heritage, 2025). The National Planning Framework is the Government's high level strategic plan for shaping the future growth and development of Ireland to the year 2040 with the revised NPF providing the basis for the review and updating of regional strategies and local authority development plans.

Similar to the previous NPF published in July 2018, the first revision to the NPF contains a specific section on renewable energy. The following National Policy Objectives are included:

“Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a climate neutral economy by 2050”.
National Policy Objective 70.

“Support the development and upgrading of the national electricity grid infrastructure, including supporting the delivery of renewable electricity generating development”. National Policy Objective 71.

National Development Plan 2018 - 2027

The National Development Plan 2018 to 2027 (NDP) (Department of Public Expenditure and Reform, 2018), updated in 2025 (Department of Public Expenditure and Reform and Digitalisation, 2025), identifies strategic priorities for public capital investment in order to underpin the implementation of the NPF. It is a

strategic priority of the NDP to have a new Renewable Electricity Support Scheme to support up to 4,500 Megawatt (MW) (i.e. 4.5 Gigawatt (GW)) of additional renewable electricity by 2030 (though it is worth noting that Ireland's onshore (4 GW), offshore (5 GW) and solar (8 GW) targets far exceed this target).

National Strategic Outcome 8 of the NDP is to transition to a low-carbon and climate-resilient society. To achieve this, the NDP recognises that Ireland's ambition must go further than a focus on achieving compliance with international commitments and recognises the importance of achieving a low-carbon, climate-resilient and environmentally sustainable economy and society.

Marine Planning Policy Statement (MPPS)

Ireland's first Marine Planning Policy Statement was published in November 2019.

The MPPS was introduced on a non-statutory basis at the time and described the existing components of Ireland's marine planning system, outlining the vision for the future development of Ireland's marine planning system. The plan also set out the overarching policies and principles expected of statutory bodies with responsibilities in or impacting on the maritime area.

The MPPS recognises that the 'construction of wind turbines and associated development' is one of many development types within the foreshore development management. One of the overarching principles and high-level priorities outlined in the MPPS is as follows:

"Marine planning will facilitate Ireland's transition to a low carbon and climate resilient economy. Marine planning should ensure that developments in the marine environment consider as a matter of course ways to reduce the emission of greenhouse gases and also that they have due regard to the impacts of a changing climate. Marine planning should also support the realisation of relevant measures contained in the Government Plan to Tackle Climate Breakdown."

National Marine Planning Framework

The National Marine Planning Framework (NMPF) was published in July 2021 (Department of Housing, Planning and Local Government, 2021). It contains overarching marine planning policies that are applicable to all proposals within Ireland's extensive maritime area. The NMPF serves as a parallel to the National Planning Framework, as it sets out the Government's long-term planning objectives and priorities for the management of our seas over a 20-year time frame.

The main driver for the NMPF is the European Maritime Spatial Planning Directive. Public bodies are legally obliged to secure the objectives of the NMPF.

Section 13 of the NMPF relates to Offshore Renewable Energy and includes 11 planning policies, the following of which support the Proposed Development:

- ORE Policy 1 - Proposals that assist the State in meeting the Government's offshore renewable energy targets, including the target of achieving 5GW of capacity in offshore wind by 2030 and proposals that maximise the long-term shift from use of fossil fuels to renewable electricity energy, in line with decarbonisation targets, should be supported.
- ORE Policy 2 - Proposals must be consistent with national policy, including the OREDP and its successor. Relevant Projects designated pursuant to the Transition Protocol⁴ and those

⁴ The Transition Protocol, published alongside the General Scheme of the MPDM (as the Maritime Area Planning Act 2021 was then titled) in January 2020, provides guidance to the sector regarding the treatment of certain offshore wind projects ("Relevant Projects") in the context of the Maritime Area Planning Act 2021. The Protocol governs the approach for these projects and enables them to transition to the regime that was developed under the Maritime Area Planning (MAP) Act. ABWP2 was included as a Relevant Project under the Transition Protocol.

Projects that can objectively enable delivery on the Government's 2030 targets will be prioritised for assessment under the new consenting regime.

Climate Action Plan 2025

The Climate Action Plan 2025 (CAP25) is Ireland's most recent Climate Action Plan prepared under the Climate Act. It is integral to the National Development Plan 2021-2030 and sets out how Ireland can accelerate the actions required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development.

Ireland's statutory climate objective remains 51% reduction in emissions by 2030 (relative to the 2018 Levels) and climate neutrality by no later than 2050 in accordance with the Climate Act. CAP25 forms part of the annual programme of measures required to deliver Ireland's carbon budgets and sectoral emission ceilings.

CAP25 was approved in April 2025 and represents the third prepared under the 2021 Act. It builds on the actions set out in previous plans including CAP23 and CAP24 and focuses on accelerating delivery in advance of Ireland's second carbon budget period (2026-2030). CAP25 is accompanied by a detailed Annex of Actions which assigns delivery responsibilities and timelines across all sectors to support compliance with Ireland's carbon budgets.

CAP25 continues to identify the electricity sector as central to emissions reduction and recognises the critical role of renewable energy, including offshore renewable energy, in decarbonising the electricity system and supporting wider economy-wide electrification. The plan confirms the continued role of the Offshore Wind Delivery Taskforce, established in CAP23, to oversee and coordinate the system-wide actions required to develop offshore wind generation in Ireland.

Chapter 11 of CAP25 sets out actions and milestones for renewable electricity generation across solar, onshore and offshore wind. It maintains the Government's objective of delivering at least 5GW of offshore wind capacity by 2030, alongside the overall target of supplying 80% of electricity demand from renewable sources by 2030, supported by continued expansion of renewable generation, reinforcement of the electricity grid, and delivery of offshore transmission and network infrastructure.

CAP25 reiterates that Ireland has a substantial offshore renewable energy resource, with offshore renewable energy identified as a key enabler of Ireland's, long term decarbonisation objectives and energy security, emphasising CAP24's offshore renewable opportunity estimate of 37GW. The Department of the Environment, Climate and Communications (DECC) commit to updating the plan every 12 months in a manner that is underpinned by consultation with key stakeholders.

Ireland's National Energy and Climate Plan 2021-2030

Ireland's National Energy and Climate Plan (NECP) pledges to increase electricity generated from renewable sources to 70%, of which there will be at least 3.5GW of offshore renewable energy. This has been revised upwards since the adoption of the plan in 2020 to 5 GW of offshore renewable energy. The NECP also supports the target of a 30% reduction in non-ETS greenhouse gas emissions by 2030 (from 2005 levels).

The NECP recognises that Ireland has one of the best offshore renewable energy resources in the world with a sea area of 900,000 square kilometres. Achieving the goals to decarbonise electricity will require significant investment, to build out relevant infrastructures and to expand capacity to integrate new renewable technologies such as offshore wind energy.

The NECP includes the assumption that the deployment of offshore wind capacity will grow from 2025 onwards, in line with assumptions from Ireland's 2019 Climate Action Plan, highlighting an urgent impetus to develop offshore wind energy to meet its climate targets.

Other relevant national policy documents

Other relevant policy documents are presented in Table 3-1.

Table 3-1: Other relevant policy documents

Policy Document	Year published	Comments
National Policy		
Offshore Renewable Energy Development Plan I (ORED P I) (Department of Communications, Climate Action and Environment, 2014)	2014	Ireland's first Offshore Renewable Energy Development Plan (ORED P) provided a framework for the sustainable development of Ireland's ORE resources, setting out key principles, policy actions and enablers for delivery of Ireland's significant potential in this area. The ORED P I is currently guiding the State's policy approach to achieving 5GW of ORE by 2030, mostly through fixed-bottom wind turbines in relatively shallow waters of up to 70 metres off the east and southeast coasts.
Ireland's Transition to a Low Carbon Energy Future 2015-2030 (The Energy White Paper) (Department of Communications, Energy and Natural Resources, 2015)	2015	The Energy White Paper sets out a framework to guide policy up to 2030. It sets out a framework for transforming Ireland's fossil fuel-based energy sector into a clean, low carbon system by 2050. It recognises that Ireland's seas offer significant potential for offshore wind.
Offshore Renewable Energy Development Plan I (ORED P I), Interim Review (Department of Communications, Climate Action and Environment, 2018)	2018	ORED P I identifies the opportunity for the sustainable development of Ireland's abundant offshore renewable energy resources. It sets out the clear principles, policy actions and enablers for the delivery of Ireland's potential in offshore renewable energy. Action 10 of the ORED P I recommends the support of early mover projects to stimulate the supply chain and act as a clear signal that Ireland is open for business.
South Coast Designated Maritime Area Plan (DMAP) (Department of Climate, Energy and the Environment, 2024)	2024	The South Coast DMAP is Ireland's first statutory DMAP identifying specific offshore areas off the south coast for future offshore wind development. It creates a plan-led framework to support renewable energy deployment in the Celtic Sea.
Shaping our Electricity Future (Version 1.1) (EirGrid Group, 2022)	2022	Shaping our Electricity Future presents a Roadmap of how Ireland can make the electricity grid ready so that 80% of Ireland's and Northern Ireland's electricity can come from renewable sources by 2030.
Future Framework for Offshore Renewable Energy 2025 Review (Department of Communications, Climate Action and Environment, 2025)	2025	The Future Framework 2025 Review, published in May 2025 captures ORE sectoral progress since 2024. The report provides a detailed progress update on each of the 29 actions under the Future Framework as well as an updated action plan for the coming year. Action 9 is of direct relevance to the Proposed Development and an ongoing commitment from the 2024 policy statement: Continue to support the consenting process for ORE projects including support of necessary environmental procedures.
Regional Policy		

Policy Document	Year published	Comments
Regional Spatial and Economic Strategy - Eastern Midlands Regional Assembly	2019	The Eastern and Midland Regional Assembly Regional Spatial and Economic Strategy a strategic plan and investment framework to shape the future development of the region, including County Wicklow, to 2031 and beyond. The Strategy sets out 16 Regional Strategic Outcomes including: • Regional Strategic Outcome 9: Support the Transition to Low Carbon and Clean Energy. Pursue climate mitigation in line with global and national targets and harness the potential for a more distributed renewables-focussed energy system to support the transition to a low carbon economy by 2050. The Strategy identifies regional assets, opportunities and pressures and provides appropriate policy responses in the form of Regional Policy Objectives (RPOs) including • RPO 6.22: EMRA support the preparation of the Marine Spatial Plan (MSP) to ensure alignment, and consistency between land use and ocean based planning, and to ensure co-ordination which supports the protection of the marine environment and the growth of the Marine economy. • RPO 7.7: To reduce harmful emissions and achieve and maintain good air quality for all urban and rural areas in the Region and to work with Local authorities and the relevant agencies to support local data collection in the development of air quality monitoring and to inform a regional air quality and greenhouse gas emissions inventory. • RPO 7.36: Planning policy at local authority level shall reflect and adhere to the principles and planning guidance set out in Department of Housing, Planning and Local Government publications relating to 'Wind Energy Development' and the DCCAE Code of Practice for Wind Energy Development in Ireland on Guidelines for Community Engagement and any other relevant guidance which may be issued in relation to sustainable energy provisions. • RPO 10.24: Support the sustainable development of Ireland's offshore renewable energy resources in accordance with the Department of Communications, Energy and Natural Resources 'Offshore Renewable Energy Development Plan' and any successor thereof including any associated domestic and international grid connection enhancements.
Southern Regional Assembly Regional Spatial and Economic Strategy	2020	The Southern Regional Assembly Regional Spatial and Economic Strategy provides a long-term, strategic development framework for the future physical, economic and social development of the Southern Region including County Wexford. The Strategy comprises 11 Statements of the Strategy, which include: • 5 - A Strong Economy: Building a competitive, innovative and productive economy • 8 - Low Carbon, Climate Resilient and Sustainable Society: Safeguarding and enhancing our environment through sustainable development, prioritising action on climate change across the Region, driving the transition to a low carbon and climate resilient society. The Strategy also notes the NPF's 10 National Strategic Outcomes (NSOs) including 'NSO 8 - the Transition to Sustainable Energy' which '...requires harnessing the considerable on-shore

Policy Document	Year published	Comments
		and offshore energy sources and the roll-out of the National Smart Grid Plan'. The following Regional Policy Objectives are also of relevance: • RPO 56 - Low Carbon Economy: The SRSES recognises the urgency to transition to a low carbon future and it is therefore an objective to accelerate the transition towards low carbon economy and circular economy through mechanisms such as the Climate Action Competitive Fund. It is an objective to develop enterprises that create and employ green technologies. Local authorities should ensure that the development of green industry and technologies incorporates careful consideration of potential environmental impacts at project level including the capacity of receiving environment and existing infrastructure to serve new industries.' • RPO 76 - Marine Economy: 'It is an objective to ensure alignment, and consistency between land use and ocean-based planning, and to ensure co-ordination, which supports the protection of the marine environment and the growth of the marine economy.' • RPO 85 - Renewable Offshore Energy: To promote regional cooperation in terms of offshore renewable energy development, environmental monitoring and awareness of the benefits of realising the Region's offshore energy potential. Initiatives arising from this objective shall be subject to robust feasibility and site selection, which includes explicit consideration of likely significant effects on European Sites and potential for adverse effects on the integrity of European sites in advance of any development. • RPO 87 - Low Carbon Energy Future: The RSES is a committed to the implementation of the Government's policy under Ireland's Transition to a Low Carbon Energy Future 2015-30 and Climate Action Plan 2019. It is an objective to promote change across business, public and residential sectors to achieve reduced GHG emissions in accordance with current and future national targets, improve energy efficiency and increase the use of renewable energy sources across the key sectors of electricity supply, heating, transport and agriculture. • RPO 95 - Sustainable Renewable Energy Generation: It is an objective to support implementation of the National Renewable Energy Action Plan (NREAP), and the Offshore Renewable Energy Plan and the implementation of mitigation measures outlined in their respective SEA and AA and leverage the Region as a leader and innovator in sustainable renewable energy generation. • RPO 99 - Renewable Wind Energy: It is an objective to support the sustainable development of renewable wind energy (on shore and offshore) at appropriate locations and related grid infrastructure in the Region in compliance with national Wind Energy Guidelines. • RPO 219 New Energy Infrastructure: It is an objective to support the sustainable reinforcement and provision of new energy infrastructure by infrastructure providers (subject to appropriate environmental assessment and the planning process) to ensure the energy needs of future population and economic expansion within designated growth areas

Policy Document	Year published	Comments
		and across the Region can be delivered in a sustainable and timely manner and that capacity is available at local and regional scale to meet future needs. • RPO 222 Electricity Infrastructure: It is an objective to support the development of a safe, secure and reliable supply of electricity and to support and facilitate the development of enhanced electricity networks and facilitate new transmission infrastructure projects that might be brought forward in the lifetime of this plan under EirGrid's (2017) Grid Development Strategy (subject to appropriate environmental assessment and the planning process) to serve the existing and future needs of the Region and strengthen all-island energy infrastructure and interconnection capacity.
Local Policy		
Wicklow County Development Plan 2022 - 2028	2022	The County Development Plan sets out the overall strategy for the planning and sustainable development of the County for the plan period and beyond. The plan relates to the whole functional area of Wicklow County Council. There are five municipal districts, of which Arklow is one. The Wicklow County Development Plan 2022 - 2028 includes the following objectives of relevance: • SC07: Climate Resilience & the Transition to a Low Carbon Economy: Support the transition to low carbon clean energy by facilitating renewable energy use and generation at appropriate locations and supporting the development of offshore renewable energy enabling infrastructure especially at ports and harbours. Facilitate the sustainable management of waste including the circular economy. Restrict development in areas that are at risk of flooding and protect the natural landscape and biodiversity. • CPO 9.21: To encourage and facilitate the 'circular economy' and the development of 'green' industries, including industries relating to renewable energy and energy-efficient technologies, material / waste recycling and conservation. • CPO 16.01: To support and facilitate to the highest degree possible the development of alternative and renewable sources of energy, particularly in the generation of electricity / heating and for use as transport fuel. • CPO 19.3: To support the development of the Marine Economy / Blue Economy sector, particularly in the renewable energy, shipping and fishing / aquaculture sectors. To support the work of the Wicklow Maritime Business Development Group and the implementation of strategies and projects related to enhancing the marine economy.
Wicklow County Council Climate Action Plan 2024 - 2029	2024	The Wicklow Climate Action Plan sets out commitments to address climate change in line with statutory obligations, guided by the Climate Act 2021 and the National Climate Action Plan 2023. The overarching goal of the Plan is to transition to a climate-resilient, biodiverse,

Policy Document	Year published	Comments
		sustainable, and carbon-neutral County by 2050. The plan aligns with the national climate objective, which targets a climate-neutral economy by 2050.
Wicklow County Council Climate Change Adaptation Strategy	2019	This strategy demonstrates that Wicklow County Council is fully committed to tackling climate change to contribute to national and regional climate action objectives. The Strategy identifies that: <i>“Wicklow has a growing renewable energy sector with wind energy production both onshore and offshore... Plans to extend the offshore capacity will result in County Wicklow being an important contributor into the national grid. The electricity supply network servicing the county and crossing the county is also a key asset.”</i>
Wicklow Local Economic and Community Plan 2024 - 2029		The Wicklow Local Economic and Community Plan (LECP) 2024–2029 is a six year plan containing objectives and actions to promote and support economic development and local and community development in County Wicklow. The plan includes a number of High Level Goals and associated objectives including: • HLG1 – Climate Action: Objective 1.5: Support the development of renewable energy opportunities, with the outcome for Wicklow to be: A county that explores all opportunities to lead in the development and provision of renewable energy, especially offshore wind energy. • HLG2 - Enterprise, Innovation and Creativity: Objective 2.5: Support the development of the circular economy and community wealth building, outcome: New models of economic development that are innovative and sustainable in the county and to reduce the local and global environmental impact of our consumption and production. • HLG2 - Enterprise, Innovation and Creativity: Objective 2.6: Capitalise on natural resources such as the maritime economy ensuring nature-based solutions, outcome: A vibrant and sustainable marine economy that is environmentally innovative The two-year implementation plan contains key actions under each of the HLG above which are of relevance to the Proposed Development: • HLG1 – Climate action – Objective 1.5: – 1.4.1: Support the development of off-shore wind energy especially through the provision of infrastructure – 1.4.2: Maximise opportunities for investment, jobs, supply chain and skills development from offshore renewable energy • HLG2 – Enterprise, Innovation and Creativity – Objective 2.5:

Policy Document	Year published	Comments
		– 2.5.1: Explore opportunities to develop port infrastructure to support the offshore renewable energy sector – 2.5.4: Encourage local supply chain opportunities for the marine sector – Objective 2.6: • 2.6.5: Develop a Renewable Energy Training Facility at Wicklow County Campus in partnership with KWETB
Arklow and Environs Local Area Plan 2018 -2024	2018	The Arklow and Environs Local Area Plan 2018 to 2024 acknowledges the benefits that the maritime sector, including offshore renewable energy, brings to the area and acknowledges that Wicklow County Council support the identification and realisation of economic opportunities within this sector.
Draft Arklow Local Planning Framework 2025 / Proposed Variation No. 5 Wicklow County Development Plan 2022 - 2028	2025	The draft Arklow Local Planning Framework (LPF) 2025 / Variation No. 5 to the County Development Plan 2022 – 2028 opened for consultation in October 2025. Of particular relevance is the following: • Economic Development and Employment Strategy seeks: <i>“To support a shift towards low carbon and climate change resilient economic and enterprise activity, reducing energy dependence, promoting the sustainable use of resources and leading in the Smart Green Economy in particular noting Arklow’s designation as Co. Wicklow’s first decarbonisation zone.”</i> • Service Infrastructure Strategy for Arklow seeks to: <i>“To promote energy efficiency and the development of renewable energy projects;”</i> The 2025 Draft Arklow Local Planning Framework Variation No.5, further supports the opportunity presented by the Proposed Development, noting that: <i>“There is a particular opportunity for Arklow to build on the renewable energy sector with the planned development of Arklow Bank Phase 2 and the designation of Arklow as County Wicklow’s first decarbonisation zone”.</i>
Wexford County Development Plan 2022-2028	2022	The County Development Plan 2022-2028 sets out the overall strategy for the proper planning and sustainable development of County Wexford for the plan period and beyond. The Plan seeks to protect, mitigate and adapt to the impacts of climate change and notes that: <i>“Climate action is integrated into every chapter and strategy in the plan. Each chapter includes a sub-section outlining how the spatial strategy and objectives of that chapter have been climate proofed and/or will contribute to mitigation and adaptation to climate change”.</i> The Wexford County Development Plan 2022 - 2028 includes the following objectives of relevance: • CA01: To ensure that the spatial planning of County Wexford provides for a county that is resilient to climate change, encourages development along existing transport corridors,

Policy Document	Year published	Comments
		enables the decarbonisation of the county's economy and reduces the county's carbon footprint in support of national targets for climate mitigation and adaptation objectives as well as targets for greenhouse gas emissions reductions. • CA04: To implement the Energy Strategy contained in Volume 10 of the Wexford County Development Plan to facilitate the transition to a low carbon county. • CZM11: To support the sustainable growth and development of the maritime area and the maritime economy in accordance with the objectives of this chapter and the relevant objectives in Chapter 6 Economic Development Strategy, Chapter 8 Transportation Strategy, Chapter 9 Infrastructure Strategy, Chapter 11 Landscape and Green Infrastructure, Chapter 13 Heritage and Conservation and Volume 10 Energy Strategy as referred to in Table 12-1 and subject to compliance with the Habitats Directive and the proper planning and sustainable development of the area. • CZM14: To support development in the coastal zone and maritime area that will facilitate a transition to a low carbon economy such as carbon capture and storage and renewable energy developments including offshore tidal and wind energy subject to compliance with Objective CZM46 and the proper planning and sustainable development of these areas. • CZM51: To support, within the context of the Offshore Renewable Energy Development Plan (OREDPA) and its successors, the development of Ireland's offshore renewable energy potential, including domestic and international grid connectivity enhancements subject to compliance with the objectives of this County Development Plan, the protection of the scenic amenity and coastal views associated with coastal areas and the marine area which are crucial to the tourism industry, the protection of the amenity, livelihood and cultural well-being of coastal communities, the protection of coastal features, habitats and species and compliance with the Habitats Directive and normal. • ES24: To support the development of offshore renewable energy in accordance with the Offshore Renewable Energy Development Plan (Department of Communications, Energy and Natural Resources, 2014), the Climate Action Plan 2019 and any Maritime Spatial Plan that is adopted for Ireland.
Wexford County Council Climate Action Plan 2024-2029	2024	The Wexford County Council Climate Action Plan 2024-2029 sets out how Wexford County Council will be responsible for enhancing climate resilience, increasing energy efficiency, and reducing greenhouse gas emissions, across the County. The mission statement is: <i>"to transition County Wexford to a Climate Resilient, Biodiversity Rich, Environmentally Sustainable and Climate Neutral Economy."</i> With respect to offshore wind energy projects the Plan states: <i>"The offshore wind industry offers strong commercial possibilities for the port [Rosslare] and county in general. It will also provide much needed infrastructure to enable Ireland to reach its renewable energy targets into the future. (Local Economic and Community Plan 2023 -2029)."</i>

3.2.4 Consideration of the Proposed Development that is seeking Derogation

Alignment with legislation and policy

Ireland's decarbonisation and climate action targets are necessary in the fight against climate change. Urgent action is required to meet Ireland's targets and offshore wind is a critical part of Ireland's strategy to achieve these targets as presented in Sections 3.2.2 and 3.2.3

In December 2022, the Applicant obtained a Maritime Area Consent (MAC) (Ref 2022-MAC-002) for the construction and operation of an offshore windfarm and associated infrastructure (including decommissioning and other works) on and around Arklow Bank in the Irish Sea. As such, the Proposed Development is only one of a limited number of offshore wind energy projects that has secured a Maritime Area Consent.

Additionally, consents for the Onshore Grid Infrastructure (Planning Reference 310090) and Operational Maintenance Facility (Planning Reference 211316) have been granted 26 May 2022 and 20 July 2022, respectively. Planning application has been sought, with an application made to An Bord Pleanála in June 2024 and response to the request for information submitted to ACP in March 2026.

The Proposed Development is the most advanced offshore wind project in development in Ireland currently, having secured planning permission for the onshore grid infrastructure for connecting to Ireland's transmission system, and an operations and maintenance facility in Arklow.

The Proposed Development is therefore well placed to contribute in a substantial and necessary way to Ireland's 2030 climate targets. Subject to planning permission, the Proposed Development will deliver 800MW of offshore renewable energy expected to begin exporting to the Irish grid from 2030. As such, the Proposed Development will provide a significant contribution to the offshore wind sector in Ireland, to support both the 2030 Irish decarbonisation targets and commitments, as well as Ireland's energy security of supply.

Carbon savings Attributable to the Proposed Development

To demonstrate that the Proposed Development is clearly in the overriding public interest, its contribution to carbon savings and national targets is presented. The Proposed Development has an anticipated maximum generating capacity of 800MW, however due to a variety of factors, the maximum generating capacity will not apply all the time (which is referred to as the 'load factor'). The Proposed Development will generate 3,153.6 GWh of renewable energy annually when a 45% load factor is assumed (Department of Climate, Energy and Environment, 2023) irrespective of which Project Design Option is selected. A number of scenarios have been used to estimate potential carbon savings attributable to the Proposed Development:

Using the latest data from the EPA (EPA 2025a) for emissions intensity of power generation (i.e. 254 g CO₂/kWh in 2023), this would equate to the annual displacement of 801,104 tCO_{2eq} or a cumulative displacement of 29,637,533 tCO_{2eq} from the Proposed Development between 2030 and 2066. This scenario represents the most recent published carbon load of electricity (EPA, 2025a).

Using the latest EPA projections for emissions intensity of power generation (i.e. 226 g CO₂/kWh in 2024), this would equate to the annual displacement of 712,714 tCO_{2eq} or a cumulative displacement of 26,370,403 tCO_{2eq} between 2030 and 2066 from the Proposed Development. This scenario considers the most recent projected carbon load of electricity (EPA, 2025c).

The annual carbon displacement or carbon savings attributable to the Proposed Development have been compared against the latest GHG emissions for 2023 (EPA, 2025a) and the projected annual emissions in

2030 (EPA, 2025c) in Table 3-2. As illustrated in Table 3-2, the annual carbon savings attributable to the Proposed Development is estimated to be equivalent to 1.65 - 2.15% of the projected national emissions in 2030 and 16.2 - 23.6% of the projected emissions that are required for the energy industries in 2030. As such, the annual carbon displaced indirectly and these savings in GHG emissions would be attributable to the Proposed Development.

Table 3-2: Comparison of Annual Emissions in 2023 and 2030 and Estimated Carbon Savings

Parameter	Annual emissions (tCO _{2eq})	% Attributable to Proposed Development (Scenario 1)	% Attributable to Proposed Development (Scenario 2)
Actual emissions in 2023 - Sourced from EPA, 2025a			
National emissions (exc LULUCF)	54,934,000	1.46%	1.30%
National emissions (inc LULUCF)	58,829,000	1.36%	1.21%
Sectoral emissions - Energy Industries	7,860,000	10.19%	9.07%
Projected annual emission allocation in 2030 - Sourced from EPA, 2025c			
National – With Existing Measures	43,200,000	1.85%	1.65%
National – With Additional Measures	37,300,000	2.15%	1.91%
Sectoral - With Existing Measures	4,400,000	18.20%	16.20%
Sectoral – With Additional Measures	3,400,000	23.56%	20.96%

The annual displacement attributable to the Proposed Development is estimated as 712,714 tCO_{2eq} and 801,104 tCO_{2eq}. The estimated cumulative displacement of between 26,370,403 tCO_{2eq} and 29,637,533 tCO_{2eq} during 2030 and 2066 is considered to be of a large contributor to achieving the national climate obligations that are required.

Case Law – Coolglass Judgment

The relevance of national climate obligations to decision-making has recently been clarified by the Irish Supreme Court in the Coolglass Wind Farm judgment (Coolglass Wind Farm Limited v An Coimisiún Pleanála [2026] IESC 5). The Court confirmed that under the Climate Action and Low Carbon Development Act 2015, as amended that public bodies are required to perform their functions in a manner consistent with the State's statutory climate objectives and the approved Climate Action Plan (CAP25).

The judgment confirms that the provision applies to the functions of all relevant bodies, and obliges such bodies to exercise those functions consistently with the climate objectives so far as practicable. This is to ensure that decisions and actions of such bodies are all aligned with the climate objectives.

Conclusion

The Applicant considers that the benefit delivered by the Proposed Development to decarbonisation, security of supply and contribution towards achieving the national climate obligations demonstrates imperative reasons of overriding public interest and so the presumption of overriding public interest under Article 16f of Directive (EU) 2023/2413, is not rebutted. As such, the Applicant considers that the evidence

herein demonstrates that 'Test 1' has been met as the derogation licence is required for one of the permitted reasons under Regulation 54(2) of the Habitats Regulations.

3.3 Test 2 - No Satisfactory Alternative

3.3.1 Introduction

The evidence as to whether satisfactory alternatives exist to the activities that require derogation that is being sought pursuant to Regulation 54 of the Habitats Regulations is presented herein.

This section explains the range of alternative solutions considered taking account of the best relevant scientific and technical evidence available, including a comparison of alternative solutions and justification as to why the alternatives are not satisfactory.

Specifically, this evidence demonstrates why the activities that require derogation are the only satisfactory solution to resolve the problem facing the Proposed Development in accordance with the requirements of paragraph 3-55 of the EC Guidance which states:

"Only when it is sufficiently demonstrated that potential alternatives are not satisfactory, either because they are not able to solve the specific problem or are technically unfeasible, and when the other conditions are also met, can the use of the derogation be justified. However, if a measure is partially satisfactory even if it does not sufficiently address the problem, but it can still reduce or mitigate the problem, it should be implemented first."

The EC Guidance also provides the following interpretation of a satisfactory alternative in paragraph 3-56:

"The process to ascertain whether another alternative is unsatisfactory should be based on a well-documented assessment of all possible available options, including in terms of their effectiveness, based on the best available facts and data. The assessment of alternatives must be balanced in light of the overall objective of maintaining or restoring the favourable conservation status of the species of Community interest concerned (it must therefore take into account the conservation status, the impact of additional incidental or illegal removal of specimens and prospects of the population concerned). The assessment may also take into account proportionality in terms of cost. However, economic cost cannot be the sole determining factor when analysing alternative solutions. In particular, satisfactory alternative solutions cannot be rejected from the outset on the grounds that they would cost too much."

The term "satisfactory alternative" in Article 16(1) has been considered in Case C-601/22 Umweltverband WWF Österreich, the CJEU stated that the

S79 "...provision requires the Member States to provide a clear and sufficient statement of reasons as to the absence of a satisfactory alternative by means of which the objectives relied upon in support of a derogation could be achieved. Accordingly, it is for the competent national authorities to establish, taking account in particular of the best relevant scientific and technical evidence and in the light of the circumstances of the specific situation in question, that there is no satisfactory alternative that can achieve the objective pursued (judgment of 10 October 2019, Luonnonsuojeluyhdistys Tapiola, C-674/17, EU:C:2019:851, paragraphs 49 and 51)

S80, " The condition that there be no other satisfactory solution for the purpose of justifying the grant of a derogation under Article 16(1) of the Habitats Directive is therefore a specific expression of the principle of proportionality..."

S86 "...Article 16(1) of the Habitats Directive must be interpreted as meaning that, in the context of determining whether there is a 'satisfactory alternative' within the meaning of that provision, the competent national authorities are required to assess, on the basis of the best available scientific

and technical knowledge, the other possible solutions, taking account, in particular, of their economic implications, without those implications being decisive, and balancing them with the general objective of maintaining or restoring the animal species concerned at a favourable conservation status". In relation to what is sought to be achieved through the derogation, the Advocate General set out the following test in the case of *Luonnonsuojeluyhdistys Tapiola Pohjois-Savo – Kainuury v Risto Mustonen* (C-674/17) (EU:C:2019:394), a Member State must:

"identify clearly and precisely in the derogation decision the objectives being pursued by means of the derogation, establish that the derogation is capable of achieving those objectives and demonstrate that there is no alternative means of achieving them."

Separately, Regulation EU 2022/2577 laying down a framework to accelerate the deployment of renewable energy, as amended by Council Regulation (EU) 2024/223 of 22 December 2023, provides as follows:

"Article 3a(1) - When assessing whether there are no satisfactory alternative solutions to a project for a plant or installation for the production of energy from renewable sources and its connection to the grid for the purposes of Articles 6(4) and 16(1) of Directive 92/43/EEC, Article 4(7) of Directive 2000/60/EC and Article 9(1) of Directive 2009/147/EC, this condition may be considered as being fulfilled if there are no satisfactory alternative solutions capable of achieving the same objective of the project in question, notably in terms of development of the same renewable energy capacity through the same energy technology within the same or similar timeframe and without resulting in significantly higher costs."

Although this temporary Regulation has since expired, it remains a useful indication of the European Council's interpretation of 'satisfactory alternatives' for the purpose of Article 16(1) of the Habitats Directive.

The alternative solutions to constructing/installing the required foundations to support the wind turbine generators and offshore substation platforms that are required as part of the Proposed Development have been considered. The alternative solutions that have been considered include different foundation types and different methods of installing the required foundation type (i.e. monopiles). The reasoning as to why these solutions are not technically feasible to support the construction of the Proposed Development have been evidenced in Section 3.3.4. As such, the Applicant considers that the alternatives are deemed unsatisfactory based on objective, robust evidence as documented herein.

Specifically, this presentation of the reasons and evidence should assist the competent authority, the National Parks and Wildlife Service, to understand why the activities are the only solution and thus required as part of the construction of the Proposed Development. The absence of alternatives therefore supports the need for the derogation that is being sought under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011-2021, as amended.

3.3.2 Do Nothing Scenario

The 'do nothing' scenario would involve not installing the foundations required for the Proposed Development. This would ultimately result in the Proposed Development not proceeding as there would be no satisfactory approach to facilitating the construction of the offshore infrastructure that is necessary to deliver the offshore wind farm and associated renewable energy.

The 'do nothing' scenario is therefore not a satisfactory alternative because the objective of delivering renewable energy capacity would not be achieved.

3.3.3 Evolution of Alternatives

Alternatives have been identified and assessed at many stages during the evolution of the project, from project concept to identifying site locations, site layouts, suitable technologies and procedures, with a view to avoiding, preventing and reducing effects on the environment, including Annex IV species. Consequently,

the Proposed Development to which this derogation licence relates is already, implicitly, the preferred alternative from the perspective of Annex IV species.

Indeed, the Proposed Development incorporates a range of project design features, avoidance and prevention measures, and additional mitigation measures, as referred to in Annex C, which are specifically for the purpose of avoiding, preventing or reducing likely significant effects on the environment, significant adverse effects on European Sites and potential impacts on Annex IV species. The measures are identified throughout the EIAR chapters, and specifically with regards to cetaceans (to which this derogation licence pertains), in Volume II, Chapter: 11 Marine Mammal (Revised March 2026) and Volume III, Appendix 25.2 Marine Mammal Mitigation Plan (Revised March 2026).

The Applicant is satisfied that the Proposed Development is suitably optimised and that there is no satisfactory alternative to the derogation licence, having regard to the objective of the project and objective of this derogation licence which is to facilitate the construction/installation of the required foundations and thereby enable the delivery of offshore renewable energy capacity.

3.3.4 Alternative Foundation Types

Three different types of foundations were initially considered for the Proposed Development to support the WTGs and OSPs. These consisted of;

- Monopiles;
- Piled jackets; and
- Gravity bases.

Due to the location and associated water depths present at the Proposed Development no other alternative foundation options are considered technically feasible.

Monopile foundations typically consist of a single hollow steel tube installed at depth into the seabed. Transition pieces are fitted over the monopile and secured via bolts or grout. The transition piece may include boat landing features, ladders, a crane, and other ancillary components as well as a flange for connection to the turbine tower. Monopiles are installed into the seabed by either piling or drilling techniques, or a combination of both (drive-drill-drive), depending on seabed conditions. Typically, monopiles will be piled into the seabed using a hydraulic hammer until any hard ground is encountered, with drilling techniques deployed to install the remaining length of pile, if required. If necessary, the monopile is then grouted in place where the annulus between the rock and pile is filled with inert grout. Grout is pumped into the monopile from a vessel, with the process carefully controlled and monitored to ensure minimal spillage to the marine environment.

Jacket foundations comprise a steel lattice structure, with tubular steel members and welded joints, secured to the seabed by hollow steel pin piles. Jacket piles can be installed into the seabed using either piling, drilling techniques, a combination of both (drive-drill-drive). Alternatively, jackets can be anchored to the seabed using suction buckets. The method by which jackets are anchored to the seabed is dependent on seabed conditions. As for monopiles, piles will be driven into the seabed using a hydraulic hammer until any hard ground is encountered, at which point the drive-drill-drive technique would be deployed to install the remaining length of pile, if required. In the drilling scenario, the jacket piles would be grouted in place where the annulus between the caisson, rock and pile is filled with inert grout. It is possible for the pin piles to be installed in advance of installation of the jacket structure. If this is the case, a piling template will be placed onto the seabed to guide the installation, and the jacket structure is then welded to the piles. Alternatively, the pin piles can be installed after the jacket structure has been lowered to the seabed, through the jacket legs or pile sleeves attached to the jacket leg.

Gravity base foundations are heavy concrete, or steel and concrete structures, sometimes including additional ballast, that sit on the seabed to support the turbine tower. Gravity bases vary in shape, but are

significantly wider at the base (at seabed level) to provide support and stability to the structure. They then generally taper to a smaller width at or below seabed level. A gravity base does not require piling or drilling to remain in place.

During the development of the Project Design Options, gravity base and jacket foundations were excluded from further consideration for the following reasons:

- Gravity Bases:
 - Gravity base foundations are not widely used in the offshore wind industry and are therefore the least proven technology;
 - There is a less-established supply chain for gravity base foundations, which could potentially increase development costs and execution risk. Installation methods can constrain the supply chain in terms of transportation and installation vessels, fabrication yards and marshalling ports;
 - Gravity bases, which simply rest on the seabed, are not considered to be technically feasible at the Proposed Development due to the high levels of bed level change associated with the Arklow Bank in the Array Area.;
 - Gravity base have a higher cost to fabricate and install;
 - Gravity bases have a higher carbon footprint associated with construction and installation than monopile foundations;
 - For all of the above reasons gravity bases are typically only used where monopile or jacket foundations are not technically feasible due to shallow bedrock or other unfavourable ground related conditions.
- Jackets:
 - Jackets which employ suction buckets would not be technically feasible at site due to the dynamic nature of the seabed. Jackets which rely on piles would require impact hammering of the piles themselves or of the caisson required to hold back superficial deposits above bedrock (see 3.3.5 for further detail on monopile installation techniques which are also applicable to jacket piles).
 - Jacket foundations have a higher cost to fabricate and install;
 - Jacket foundations require bespoke fabrication which takes a considerable amount of time and manpower to fabricate;
 - Jackets have a higher carbon footprint associated with construction and installation than monopile foundations;
 - For all of the above reasons jackets are only considered for use in deeper waters in which, for the given application, monopiles are not technically feasible. Given the moderate water depth of the Proposed Development's deepest foundation it is not necessary to use jacket foundations.

From an environmental perspective, gravity base and jacket foundations are less preferred compared to monopile foundations because:

- Gravity base foundations can have significantly greater physical dimensions, leading to a greater obstruction to flow in the water column and associated potential impacts on physical processes such as waves, currents and sediment transport;
- Gravity base foundations rely on shallow waters, which means they are more susceptible to seabed mobility than other foundation types. Consequently, if technically feasible, considerable levels of scour and seabed mobility protection are required to prevent against structural damage of the foundation, leading to a greater seabed footprint; and

- Gravity base and jacket foundations require large areas of seabed preparation, which would result in larger quantities of scour protection and higher potential for environmental impacts such as habitat loss and habitat disturbance;
- The methodologies to install gravity base foundations require a large footprint; and
- Jacket foundations take up a considerable amount of deck space so a limited quantity can be shipped by barge or installation vessel at one time thereby prolonging installation timeframes and therefore potential impacts during construction.
- Jacket foundations with driven piles (3-4 piles per jacket) would require multiple impact hammering events per location when compared to a single impact hammering event for a monopile foundation.
- Due to their increased weights and more complex fabrication processes, both jackets and gravity bases have higher carbon footprints on a like-for-like basis than monopiles.

Jacket foundations would not negate the need for a derogation license as percussive piling would still be required. Whilst utilising gravity base foundations may negate the need for a derogation, for the technical reasons outlined above this foundation option is not considered a suitable alternative for the Proposed Development.

Due to the reasoning above monopile foundations were chosen to support the WTGs and the OSPs and is considered the only technically feasible foundation option for the Proposed Development.

3.3.5 Alternative Monopile Installation Techniques

Overview of methods

Following on from the decision to proceed with monopile foundations, three different methods of monopile installation were considered for the Proposed Development:

- Piling using a hydraulic impact hammer;
- Vibro hammering; and
- Drilling.

Due to the chosen foundation option (monopile) and ground conditions present across the Proposed Development no other alternative monopile installation techniques are considered technically feasible.

Piling using a hydraulic impact hammer

This comprises driving the piles into the seabed using a hydraulic impact hammer. Once in place, the piles rely on the frictional, stiffness and end bearing properties of the soil they are in contact with for support. It is noted that various factors influence the time and number of hammer strikes required to achieve the required penetration depth, including the type and size of hammer, pile size, and soil properties of the seabed.

Piling using a hydraulic impact hammer requires the following sequence of activities:

- 1) When piling a monopile using a hydraulic impact hammer, the monopile is lowered to seabed level using a crane and kept in position using a pile gripper.
- 2) The hydraulic impact hammer is then positioned onto the monopile and the monopile is driven to target depth.
- 3) Although a hammer energy of 3,500 kJ is considered as the maximum for the purposes of assessment, the actual energy used when piling will be significantly lower for the majority of the time and locations. The hammer energy is only raised to that maximum value when/if absolutely necessary (i.e. pile is failing to progress satisfactorily at lower energies).

- 4) In all cases piling will commence with a lower prescribed soft-start hammer energy during a 40-60 minute soft start. This is followed by a period where the hammer energy applied is that required for optimum pile advancement to target depth.

Vibro Hammering

Vibro hammering requires the following sequence of activities:

- As the name suggests a vibro-hammer imparts vibration on the pile and immediate surrounding soil.
- This vibration locally decreases soil resistance thereby allowing the monopile to penetrate through the soil. Vibrohammers are only effective in suitable soil conditions and have limited effect in high strength soils.

Given the fact ground conditions at the Proposed Development comprise gravels and glacial till, vibro hammers could not be used to install the monopiles to target depth as the monopiles would stop penetrating before target depth is reached even at maximum vibro hammer energy. Therefore vibro hammers are not a viable substitute which would negate the use of impact piling at the Proposed Development.

Drilling

This comprises drilling rather than hammering a pile into the seabed to reach its target depth beneath the seabed. This can require either drive-drill-drive (DDD) or drilling and grouting techniques to drill the pile into the seabed as follows:

- DDD involves driving the monopile until it hits first refusal (i.e. rate of monopile advancement is below pre-determined threshold) or target depth. If refusal has occurred above the required installation depth a decision is taken to deploy an under-reaming drill, which would be lowered down through the monopile. The drill would initially drill out the soil plug within the monopile. The drill continues to drill beyond monopile toe depth scrabbling away the underlying rocks / dense material layer(s) which are causing excessive resistance to pile driving. When the drill has reached the predetermined target depth it is recovered through the monopile. The impact hammer is redeployed on top of the monopile and driving resumes until the monopile is driven to target penetration depth. This DDD cycle may occur more than once as required.
- The drilling and grouting technique requires a large caisson (outer pile) to be pre-installed above the rock layer in order to hold back superficial deposits. This caisson would be installed into the seabed to a depth where its toe was at top of bedrock level using a hydraulic impact hammer. The drill drills through the caisson and into the underlying rock to target depth forming a rock socket under the caisson. The drill is then recovered and the monopile (inner pile) is installed into the socket formed by the caisson and drilled out rock. The annulus between the monopile and caisson/rock is filled with structural grout to allow load transfer from the monopile into the surrounding soil/rock.

Drilling and grouting would require the following sequence of activities in the context of the Proposed Development:

1. The caisson is installed into the seabed until its toe is at bedrock level. The installation method for the caisson would be the same as that described in Annex A for pile installation by impact hammering.
2. The drilling process begins after the drilling machine has been lowered into the top of the caisson. There it is fixed at drilling level with the help of a locking system to keep the drilling machine in its vertical position.

3. The drilling process begins with the activation of the slurry circuit needed to transport the excavated/loosened soil from within the caisson to the surface. At the same time, the cutting wheel starts to rotate. All supply lines as well as data cables and the discharge line are permanently connected to the machine.
4. When the drilling cutters reach the toe of the caisson they proceed to drill into bedrock to the required installation depth.
5. When the final depth is reached, the overcutters are folded in and the locking system is disengaged.
6. The monopile foundation is then lowered into the hole in the seabed formed by the hollowed out caisson and the drilled out bedrock below it.
7. The annulus between the MP and caisson/rock is filled with structural grout to allow load transfer from the monopile into the surrounding soil/rock.

Drilling is only employed where the monopile's required target depth for operational design purposes dictates all or some of the foundation needs to penetrate into bedrock. Where there is a thick layer of overburden above bedrock, such as at the Proposed Development, drilling, using either the DDD or drilled and grouted technique would require pile/caisson driving using an impact hammer/vibro hammer as part of the installation process. An impact hammer rather than a vibro hammer would need to be used for this purpose at the Proposed Development. Therefore, drilling is not a viable substitute which would negate the use of impact piling at the Proposed Development.

Consideration of alternative of installation techniques

A comparison of the technical considerations associated with each installation technique is presented in Table 3-3. Specific consideration has been given to the ability of each installation technique to support the key objective which is the installation of the monopile foundation for the wind turbine generators and offshore substation platforms which are fundamental components that are required as part of the Proposed Development.

The technical consideration of each installation technique and its suitability reflects the latest industry knowledge on the availability and maturity of each method. Additionally, consideration of the suitability for the known ground conditions reflects the extensive baseline data that has been gathered through site surveys undertaken offshore to support the Proposed Development.

Table 3-3: Comparison of technical considerations for monopile installation

Monopile Installation Technique	Technical Considerations		Satisfactory Installation Technique
	Availability and Maturity of Technology	Suitability to ABWP2 Ground Conditions	
Piling	Established technology with piling spreads available for foundation diameters and weights being considered for the Proposed Development	Suitable for ABWP2 ground conditions.	Yes
Vibro Hammering	Technology not yet available for Proposed Development's proposed foundation diameters and weights being considered.	Due to potential shallow bedrock and presence of boulders technology unlikely to be suitable for all ground conditions across the Proposed Development.	No
Drilling	- Technology not yet available for Proposed Development's proposed foundation diameters being considered (up to 14m). - The lack of knowledge of the remaining soil capacity left from the relief drilling or underreaming, such as uncertainty in axial/lateral capacity of the disturbed rock layers, brings risks for pile design. - Does not negate level of impact hammering for the Proposed Development.	If drilling spreads become available for 11-14m diameter monopiles it could be suitable ABWP2 ground conditions.	No

In summary installing the foundations using a vibro hammer or using a drill would not negate the need for a derogation license as percussive piling would still be required.

3.3.6 Conclusion

The do-nothing scenario as well as the alternative foundation types and installation techniques have been considered during the development of ABWP2. The alternative foundation types such as gravity bases and jackets and different monopile installation techniques do not sufficiently address the problem of installing the foundations of type that is necessary based on the ground conditions at the Proposed Development. Due to the conditions of the site and project requirements, the final design concluded with a piled monopile foundation for WTGs and OSPs as the best and only option for the site.

The Applicant considers that the alternatives have been adequately considered in a clear and objective manner but would ultimately not allow for the constructing/installing the required foundations to support the wind turbine generators and offshore substation platforms that are required as part of the Proposed Development. As such, the Applicant considers that the evidence herein sufficiently meets Test 2 and supports the granting of the derogation that is required for the Proposed Development.

3.4 Test 3 - Maintenance of populations at Favourable Conservation Status

Favourable Conservation Status (FCS) is a central objective of the Habitats Directive and underpins the strict protection provisions outlined in Regulation 51(2) afforded to Annex IV species. It reflects the long-term viability of the species within its natural range and provides the benchmark against which potential impacts from human activities are assessed. Under the Habitats Directive, a species is considered to be at FCS when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable element of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The NPWS (2025a) guidance clarifies that FCS should be assessed at an appropriate ecological scale, meaning that it is not just that the individual animals are present, but whether populations continue to function as viable units within healthy ecosystems; thus taking account of natural variability in population size, habitat quality, and species distribution.

3.4.1 Assessment in relation to Favourable Conservation Status

The following sections address each of the above parameters and demonstrate how the Proposed Activities which are the subject of this derogation licence application, for which the risk of disturbance could not be excluded, and any derogation licence itself if granted, will not alter or deteriorate the conservation status of the relevant Annex IV species.

This assessment has undertaken a two-step approach, in accordance with paragraph 3-62 of the EC guidance (2021):

“Implementation of this provision should include a two-step assessment: firstly, to assess the conservation status of the specific populations of a species in its natural range within the Member State concerned (and possibly beyond national boundaries if the populations are shared with neighbouring countries) and, secondly, an evaluation of the impact of the derogation on the conservation status of the specific population or populations concerned.”

Conservation status in species’ natural range within the Member State

All cetacean species, apart from harbour porpoise, are assessed as having an overall Favourable Conservation Status in Irish waters under the Article 17 reporting (NPWS, 2025b). Common dolphin, bottlenose dolphin, Risso’s dolphin and minke whale were all assessed as having a favourable range, population, habitat for the species, and future prospects (NPWS, 2025b). Harbour porpoise are assessed as having an inadequate conservation status, due to uncertainty in the population, however the range and habitat for the species remain favourable (NPWS, 2025b).

Due to the proximity of the UK to the Proposed Development, there is a need to consider the conservation status in UK waters as populations are likely to be shared across national boundaries. A conservation status assessment within UK waters concluded a favourable conservation status for common dolphin (JNCC *et al.*, 2026a), bottlenose dolphin (JNCC *et al.*, 2026b), and Risso’s dolphin (JNCC *et al.*, 2026c). However, assessments for harbour porpoise (JNCC *et al.*, 2026d) and minke whale (JNCC *et al.*, 2026e) concluded an unfavourable–inadequate conservation status within UK waters.

Impact of the derogation on the conservation status

In accordance with the EC Guidance (2021) paragraph, the impact of the specific derogation has been considered “at a lower level than the biogeographic region”. For minke whale, common dolphin and Risso’s dolphin the assessment has been undertaken at the MU-level, which is UK-wide, and therefore smaller than the entire biogeographic region across the EU. For harbour porpoise, the assessment has been undertaken at the MU-level, which encompasses the Celtic and Irish Seas, and is therefore smaller than the entire biogeographic region across the EU. For bottlenose dolphin, the assessment has been undertaken at the MU-level, which encompasses the Irish Sea, and is therefore smaller than the entire biogeographic region across the EU. For all of these species, this is lowest level at which a population for the species has been defined, for the purpose of undertaking an assessment or applying management (IAMMWG, 2023). Furthermore, there are no defined local populations for any of these species that overlap with the Proposed Development.

Foundation installation

A dose response approach has been used to calculate the likely number of animals within the disturbance area from piling activity, as presented in Table 2-5 of the assessment and Table 11.27 in Volume II, Chapter 11: Marine Mammals (Revised March 2026). Based on the highest density estimates for harbour porpoise, 3.05% of the MU population may be disturbed from each piling event, equivalent to up to 1,908 individuals. Level B harassment thresholds were used to assess disturbance, for bottlenose dolphin, common dolphin, Risso’s dolphin and minke whale. Based on the maximum density estimate for bottlenose dolphin, 259 individuals may be disturbed from each piling event. This equates to 3.12% of the most robust reference population estimate. For common dolphin, Risso’s dolphin and minke whale, less than 1% may be disturbed from each piling event, equivalent to 30, 35 and 50 individuals, respectively.

These numbers correspond to the maximum representative number of animals that may be disturbed. They have not been quantitatively reduced to account for some Factored In measures (specifically avoidance and deterrent-based measures), as it is extremely difficult to predict the number of animals that may be disturbed by the piling activity after the application of these measures. As stated in the Volume II, Chapter 11: Marine Mammals (Revised March 2026), there are uncertainties relating to the ability to predict the exposure of animals to underwater noise, as well as in predicting the response to that exposure. Furthermore, given the high spatial and temporal variation in marine mammal abundance and distribution in any particular area of the sea, it is difficult to predict how many animals may be present within the range of noise impacts (and so could experience disturbance).

Based on the maximum representative number of animals that may be disturbed, the overall residual magnitude is assessed as Low (for harbour porpoise, common dolphin, Risso’s dolphin and minke whale) to Medium (for bottlenose dolphin). A Low magnitude reflects that a behavioural effect is anticipated in a low/small proportion of the population. Using the worst-case density estimate and maximum effect range, a maximum of 3.05% of the harbour porpoise MU population, 0.03% of the common dolphin MU population, 0.29% of the bottlenose dolphin population and 0.25% of the minke whale MU population is expected to experience disturbance per piling day. The consequence of the effect is determined to be low and so unlikely to cause any long-term or population effect. For harbour porpoise and minke whale, this was specifically demonstrated through additional population modelling using iPCoD. A Medium magnitude was concluded for bottlenose dolphin, however the percentage of the most robust reference population estimate is only marginally higher than that for harbour porpoise, which had a Low magnitude. Similar to harbour porpoise, the consequence of the effect is determined to be low and so unlikely to cause any long-term or population effect for bottlenose dolphin, which was also demonstrated through iPCoD modelling.

It is highlighted that for the purpose of the EIAR the population is defined as the relevant MU, which is a subset of the population in their natural range delineated for management purposes. In contrast, the FCS test, for the purpose of this derogation licence application, refers to the populations in their natural range.

The natural range of the relevant cetacean species to this licence application (harbour porpoise, bottlenose dolphin, minke whale, Risso's dolphin and common dolphin) is significantly greater than their respective MUs. Therefore, applying the conclusion of the EIAR to the derogation licence application adopts a highly precautionary approach.

Behavioural displacement and disturbance from foundation piling activity is determined to have Slight adverse impact significance, which is not significant in EIA terms. This determination takes into account the Factored In measures and additional mitigation measures where possible. In particular, foundation piling activity will be undertaken in accordance with the piling MMMP. Further, no ecologically significant adverse residual effects have been predicted in respect to Annex IV cetacean species.

It can therefore be concluded that:

- Disturbance from foundation piling activity will not affect the maintenance of the species on a long-term basis as a viable component of its natural habitat, as no changes to the population size or trajectory over a generational scale have been predicted.
- Disturbance from foundation piling activity will not reduce nor is likely to reduce the natural range of the species for the foreseeable future, as any change in distribution is predicted to be temporary, and would affect up to a medium proportion of the population ($\leq 3.12\%$) which is not enough to affect the population trajectory.
- Disturbance from foundation piling activity will not affect the maintenance of a sufficiently large habitat to maintain the populations on a long-term basis, as any effects are temporary and not enough to affect the population trajectory.

As a result, the derogation licence with regards to disturbance from the foundation piling activity will not be detrimental to the maintenance of FCS for the populations of the species in their natural range to which the Habitat Directive relates to (i.e. Annex IV cetacean species). In accordance with EC Guidance (2021) (Section 3.2.3.b), the net result of the derogation is neutral for the species' conservation status.

3.5 Conclusion

In conclusion, the Applicant confirms that the three legal tests have been met and that a derogation licence can be granted by the NPWS and the Minister.

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Annex A Proposed Activities screened into the Annex IV Risk Assessment

Annex Table A: Proposed Activities screened into the Annex IV Risk Assessment (PC = Pre-construction; C = Construction; O = Operational, D = Decommissioning).

Activity	Source	Description	Location	Phase
Geotechnical Surveys	Boreholes	A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string and potentially stabilised using a seabed frame if required. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil testing such as downhole CPTs. Downhole geophysical tools will be used post completion of the borehole for further data collection.	To be deployed at WTG Substructure, Inter Array and Export Cable and Jack-Up locations across the Proposed Development	PC
	CPTs	CPTs are a method for measuring the soils strength and stiffness parameters using a rod-shaped tool whose end has the shape of a cone with a known apex angle (e.g. 60 degrees) which is pushed at a constant speed into the soil. CPTs can be performed in seabed mode, down-hole mode or as a seismic CPT.	To be deployed at WTG Substructure, Inter Array and Export Cable and Jack-Up locations across the Proposed Development	PC
	Vibrocore	Vibrocore is a method of collecting un-consolidated seabed samples. A vibrocorer is lowered onto the seabed, position and depth are noted, after which the vibrocore process is started. Upon refusal or at target depth, the stop condition is recorded and the vibrocorer is recovered on deck where the recovery rate is measured.	To be deployed at Inter Array and Export Cable locations across the Proposed Development	PC
	Grab Samples	Benthic grab sampling will be carried out by lowering a lightweight sampling device from the vessel, either by crane or handheld device depending on requirements. Upon returning grab samples to the deck, material will be sieved, examined and logged and then stored in a suitable medium in a sealed container for a comprehensive laboratory analysis on land.	To be deployed at Inter Array and Export Cable locations across the Proposed Development	PC

Activity	Source	Description	Location	Phase
Geophysical Surveys	SBPs (Pinger/Chirp/Boomer/Sparker)	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments. This device will have a primary and secondary frequency range of 0.5 – 15 kiloHertz (kHz) and source levels of up to 245 dB re 1 μ Pa at 1 m (root mean square (rms)). It would be used in both nearshore and offshore areas. The boomer, with sound source levels in the range of 208-215 dB re 1 μ Pa at 1 m (rms), would be used in the nearshore shallower areas; while the sparker system, with source levels in the range of 204-219 dB re 1 μ Pa at 1 m (rms), would be used in offshore areas.	Proposed Development	PC, O
	MBES	MBES is a system for collecting detailed topographical data of the seabed. The MBES will be hull mounted. The equipment will operate within a frequency range of 200 – 700 kHz and with sound source levels in the range of typically 213 – 225 dB re 1 μ Pa at 1 m (rms).	Proposed Development	PC, O
	Magnetometer	A magnetometer is a passive device that is towed behind a survey vessel. It is used to identify magnetic anomalies and hazard mapping for metal obstructions, shipwrecks and UXO on the surface and in the shallow subsurface. The magnetometer does not emit any sound waves into the marine environment.	Proposed Development	PC, O
	SSS	SSS surveys are used to determine sediment characteristics and seabed features and provides detailed imagery of the seabed. SSS is typically towed behind the vessel on an armoured tow cable. However, some models may be pole mounted on the side of the vessel. This device will have a potential operating frequency range of approximately 100 - 900 kHz in the offshore area with and 540 - 850 kHz in the shallower nearshore area with sound source levels of up to 210 dB re 1 μ Pa at 1 m (rms).	Proposed Development	PC, O
	Seismic Refraction/Reflection (2D/3D UHRS)	A seismic source is used to carry out a seismic survey which can be described as a chamber of compressed air that is released rapidly into the surrounding water to create an acoustic pulse. An air gun is the most commonly used source because	Proposed Development	PC, O

Activity	Source	Description	Location	Phase
		the pulses are predictable, repeatable and controllable, and it uses compressed air which is cheap and readily available. The seismic source system will have an expected operating frequency range of approximately 0.001-1 kHz with sound source levels of up to 224 dB re 1 µPa at 1 m (Peak Sound Pressure Level (SPL _{peak}) and 214 dB re 1 µPa at 1 m (rms)		
	USBL	USBL systems are acoustic positioning systems used to track the location of subsea equipment relative to a surface vessel. The system operates by transmitting short acoustic pulses between a transceiver mounted on the vessel and a transponder attached to subsea equipment. USBL systems typically operate at high frequencies and low power levels relative to other acoustic survey sources.	Proposed Development	PC, C, O
Metocean	Floating LiDAR	Floating LiDAR buoys will be deployed to measure the wind resource within the Array Area. Deployment of these buoys will include anchor points on the seabed.	Array Area	PC
	Acoustic Doppler Current Profiler (ADCP)	ADCPs will be used to examine wave and current conditions. This equipment is installed on the seabed and anchored with a suitable mooring structure. It is generally a short-term deployment used to gather seasonal data (e.g. winter storm data) however may be deployed for longer.	Array Area	PC
	Wave Buoy	Wave rider buoys may be deployed to measure wave heights within the Array Area. They will be moored to the seabed by a suitably sized mooring structure.	Array Area	PC
Environmental	Benthic Ecology (subtidal benthic survey)	This survey is designed to confirm the predicted benthic communities and habitats at the site. Subtidal sample locations may be subject to drop down video (DDV) in advance of sampling.	Proposed Development	PC
	Cetacean Porpoise Detectors (CPOD) / Sound Traps	Marine mammal acoustic monitoring will be undertaken using CPODs (click detectors). If used, the CPODs will be deployed on the seabed. Sound Trap hydrophones may be deployed alongside the CPODs for periods throughout the site survey campaign.	Proposed Development	PC

Activity	Source	Description	Location	Phase
	Habitat Surveys (<i>Sabellaria</i> and Mussel Beds)	The data from the confirmatory Geophysical Surveys will be assessed by a benthic ecologist to identify potential habitat locations and inform the transect locations for DDV surveys if required.	Proposed Development	PC
Corrosion	Microbial Induced Corrosion Frames	Microbial Induced Corrosion Frames are metal frames used to measure the rate of deterioration of a metal by corrosion processes that occurs directly or indirectly because of the metabolic activity of microorganisms in cold water systems. This type of corrosion results in severe pitting of metals, leading to rapid failures. The type of bacteria that cause this type of corrosion are anaerobic, they can only thrive in oxygen-deprived regions under deposit (Ibraheem, 2011). The outcome of this monitoring will feed into the turbine and OSP foundation design and allow suitable protection measures to be employed to prevent microbial induced corrosion of the turbine infrastructure.	Array Area	PC
Sediment Dynamics	Benthic Flume and Benthic Lander	Benthic flumes and benthic landers are marine instruments which collect measurements on sediment transport processes and parameters directly in the sea. Benthic flumes collect information on entrainment-deposition parameters and the sediment transport rate coefficients which can be fed into the sediment transport model to improve the parameterisation of these variables within the model. Benthic landers are intermediate scale seabed frames equipped with sensors such as ADCP's, single point current meters, turbidity sensors and marine altimeters to measure seabed sediment transport. They provide an open area beneath an upper frame in which sensors are suspended and provide improved measures specifically of near bed hydrodynamic and sedimentary processes.	Proposed Development	PC
ROV surveys	MBES, General Visual Inspections (GVI), Non – Invasive Visual Inspections, Cable Depth of Lowering Surveys	Using a ROV(s) to carry out post installation / as built / O&M surveys for export / inter-array cables / interconnector cables, these could include: MBES, general non-invasive visual inspections and cable depth of lowering surveys with pipeline/cable tracking equipment. These systems monitor or induce magnetic fields in the cable which are then used to determine cable position and vertical displacement.	Proposed Development	O

Activity	Source	Description	Location	Phase
		These may take place at cable crossings, substructure base inspections, cathodic protection systems and any planned/remedial rock dumping that may take place.		
Dredging, trenching and cable installation	Cable laying	The total lengths, burial depths and routing of inter array, export and interconnector cabling required will depend upon the final WTG and OSP locations (within the WTG and OSP limits of deviation) as well as site constraints such as wrecks, sensitive habitats and difficult ground conditions such as stiff clays and shallow rock.	Proposed Development	C
	Dredging	Seabed lowering/features clearance will involve removal of material from seabed features (such as sandwaves or megaripples) by techniques such as dredging, mass flow excavation, water injection dredging or utilisation of pre-lay route clearance ploughs. Additional dredging activities may be required during the operation and maintenance phase for scour protection repair and maintenance of WTG and OSP foundations, as well as maintenance of inter-array cables, interconnector cables and offshore export cables.	Proposed Development	C, O
	Trenching	Trenching will be required during the offshore cable installation; it is expected that the majority of the cable route will be buried via the use of jet trenching	Proposed Development	C
Infrastructure preparation and installation activities	Seabed preparation	Seabed preparation activities will be required in advance of installation activities, and in advance of jack-up vessel placement, to reposition any boulders/debris and to clear seabed features from the seabed. This will include boulder clearance, seabed lowering/feature clearance followed by a pre-lay grapnel run.	Proposed Development	C
	Scour protection	Scour protection will be installed around the foundations to prevent the development of scour holes and may include the use of: concrete mattresses, rock, artificial fronds, rockbags or geotextile sand containers.	Proposed Development	C

Activity	Source	Description	Location	Phase
	Cable protection	Cable protection will be used where sufficient burial depth within the seabed is not achieved during installation, due to difficult ground conditions being encountered, and at cable crossings.	Proposed Development	C
Foundation installation	Monopile Installation	Monopiles (WTGs and OSPs) will be installed into the seabed by either piling or drilling techniques, or a combination of both (drive-drill-drive), depending on seabed conditions. Piling the monopiles using a hydraulic impact hammer is the basecase method for monopile installation. Hydraulic impact hammering may in some instances be fully replaced or complimented by use of a vibro-hammer. As the name suggests a vibro-hammer imparts vibration on the pile and immediate surrounding soil. Vibrohammers are only effective in suitable soil conditions and have limited effect in high strength soils. A hammer energy of 3,500 kJ is considered as the maximum for the purposes of assessment, however the actual energy used when piling will be significantly lower for the majority of the time and locations. The maximum the blow energy imparted on the pile by the hammer has been calculated at 246.9 dB re1μPa at 1 m (SPLpeak) for monopile foundations.	Array Area	C
	Drive-drill-drive	Monopiles may be installed using drive-drill-drive techniques depending on seabed conditions. Potential for drill arisings which may benter the water column dumped at sea. The drill would initially drill out the soil plug within the monopile. The drill continues to drill beyond monopile toe depth scrabbling away the underlying rocks/ dense material layer(s) which are causing excessive resistance to pile driving. When the drill has reached the predetermined target depth it is recovered thr ough the monopile. The impact hammer is redeployed on top of the monopile and driving resumes until the monopile is driven to target penetration depth.	Array Area	C
Vessels	All vessel types	A range of vessels will be utilised across the Proposed Development across pre-construction surveys, infrastructure installation, and routine maintenance activities. Example of vessel types include:	Proposed Development	PC, C, O, D

Activity	Source	Description	Location	Phase
		• Smaller jack-up vessels suitable for shallower water depths of the Array Area, nearshore confirmatory surveys at shallower waters near Landfall and ports; and • Larger vessels suitable for Array Area and Cable Corridor and Working Area. Source noise levels for vessels depend on the vessel size and speed as well as propeller design and other factors. There can be considerable variation in noise magnitude and character between vessels even within the same class.		
Operational turbines	Turbines	Operation of WTGs involves the rotation of turbine blades and associated mechanical components throughout the lifetime of the Proposed Development. Blade rotation speed varies depending on wind conditions and turbine design parameters, including cut-in wind speed, rated wind speed, and maximum rotational speed. Operational noise generated during turbine operation is primarily associated with vibration transmitted through the turbine structure into the seabed and water column, and is generally continuous and low-level compared to construction activities.	Array Area	O

Annex B Baseline Characterisation

Annex B.1 Data Sources

Information on Annex IV species' distribution and abundance within the vicinity of the Proposed Development was collated through a detailed review of existing studies and datasets. The desk study sources used within this risk assessment were identified within the EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026) and are summarised in Annex Table B.

Annex Table B: Summary of key desktop reports and data resources for Annex IV cetacean species

Title	Source	Year	Author
Irish cetacean review	Irish Whale and Dolphin Group (IWDG)	2000-2009	Berrow <i>et al.</i> (2010)
Atlas of marine mammals in Irish offshore waters	IWDG	2005-2011	Wall <i>et al.</i> (2013)
Marine mammal surveys	NPWS and IWDG	2008-2011	Berrow <i>et al.</i> (2008; 2013)
Inshore surveys for cetaceans	IWDG	2011	Berrow <i>et al.</i> (2011)
Small cetacean abundance in the North Sea (SCANS) III	Sea Mammal Research Unit (SMRU)	2016	Hammond <i>et al.</i> (2017; 2021)
Modelled density surfaces of cetaceans in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys	SMRU	2016	Lacey <i>et al.</i> (2022)
'ObSERVE' programme aerial data	Department of Communications, Climate Action and Environment and NPWS	2015-2017	Rogan <i>et al.</i> (2018)
Modelled distributions and abundance of cetaceans of Wales and surrounding waters	Natural Resources Wales	1990-2020	Evans and Waggitt (2023)
SCANS-IV surveys	University of Veterinary Medicine Hanover	2022	Gilles <i>et al.</i> (2023) Gilles <i>et al.</i> (2025)
Management Units (MUs) for cetaceans	Joint Nature Conservation Committee (JNCC)	2023	IAMMWG (2023)
Site-specific surveys			
Boat-based visual surveys	Coveney Wildlife Consulting Ltd; Fulmar Ecological Services; Cork Ecology	2000 to 2009	(Cork Ecology, 2010; 2009; 2007; Fulmar Ecological Services, 2006; Coveney Wildlife Consulting Ltd., 2005; 2004; 2003; 2002)

Title	Source	Year	Author
Digital aerial surveys (DAS)	HiDef Aerial Surveying Limited	2018 to 2020	HiDef, 2020a, b
		2023 to 2025	GoBe Consultants (see Volume III, Appendix 11.2 Marine Mammals Technical Report RFI 2025 (Final))
Site investigation surveys	IWDG; Geosolutions Ltd	2019 to 2023	IWDG (2019) and Gavin & Doherty Geosolutions Ltd 2020; 2023a, b
	Mizen XOcean	2024	Mizen Archaeology, 2024; XOcean, 2024

Site specific surveys

Site-specific surveys were commissioned to support the marine mammal baseline for the Arklow Bank Wind Park 1 (ABWP1) planning application. These were boat-based visual surveys (2000 - 2009) and a Passive Acoustic Monitoring (PAM) campaign (2002). Additional surveys, in the form of DAS, were undertaken from 2018 - 2020, 2023 - 2024 and in 2025, to gather more recent data as part of site characterisation for the Proposed Development EIAR. All of these are reported below.

The site-specific surveys for ABWP1 include historical boat-based visual surveys undertaken between June 2000 and June 2009, and PAM data were also obtained to the northwest of the ABWP1 wind turbines. These acoustic data were collected for a total of 25 days during August and September 2002. Historical data has been considered as it is informative to trends in occurrence and distribution, although does not hold substantial weight in informing the baseline characterisation.

DAS data (March 2018 to February 2020 and April 2020; August 2023 to June 2024; and February 2025 to July 2025) are available to inform the baseline for this Risk Assessment (Table 11.5). During the 2018 to 2020 surveys an additional survey was conducted in April 2020 to account for a missed survey in April 2019. Across the 2018 to 2020 surveys, all calendar months were surveyed twice to capture seasonal seabird and marine mammal species presence across the Marine Mammal Study Area. Each calendar month was surveyed at least one more time through the further surveys in 2023 to 2025. Most surveys covered the Marine Mammal Study Area, however the surveys from May 2025 onwards include an extension of the existing buffer area to a 10 km buffer, thereby covering the Extended Marine Mammal Survey Area. However, it should be noted that the existing buffer applied in the Marine Mammal Study Area extends landwards to the coast and therefore exceeds the industry standard of a 4 km buffer, which is advised in guidance provided by Statutory Nature Conservation Bodies (SNCBs) in English and Scottish waters (SNCBs, 2022; NatureScot, 2023).

SCANS Surveys

The 'Small Cetaceans in European Atlantic waters and the North Sea' or SCANS surveys (Hammond *et al.*, 2021; Lacey *et al.*, 2022; Gilles *et al.*, 2023; Gilles *et al.*, 2025) are robust large-scale aerial and vessel-based surveys which provide estimates of cetacean abundance and distribution across the European Atlantic using aerial and boat-based surveys. These surveys were carried out during the summer months in 1994 (SCANS-I), 2005/07 (SCANS-II), 2016 (SCANS III; Hammond *et al.*, 2017; 2021; Lacey *et al.*, 2022), and the most recent survey, SCANS-IV, was completed in 2022 (Gilles *et al.*, 2023; 2025).

The Marine Mammal Study Area sits within SCANS-IV block CS-D and SCANS-III block E, both of which were surveyed by air. Although these blocks are commonly used, they have no biological significance; rather, they are logistical considerations with respect to carrying out the surveys. Nonetheless, for each block, a density estimate is calculated for those cetacean species that have been recorded in sufficient numbers, which can be used to give a broadscale density estimate relating to the Marine Mammal Study Area and the surrounding area.

ObSERVE Programme

The ObSERVE programme consists of aerial surveys to investigate the occurrence, distribution and abundance of key marine species in Irish waters, with a focus on marine mammals. Surveys were conducted in the summers of 2015 and 2016 and the winters of 2015-2016 and 2016-2017 in offshore waters around Ireland (Rogan *et al.*, 2018). The Proposed Development is located within ObSERVE Stratum 5.

It is noted that data from the ObSERVE 2 surveys have been published since the authoring of the EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026). In order to maintain consistency between the EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026), the ObSERVE 2 survey data have not been used in this risk assessment.

Cetacean Management units

The cetacean management unit (MU) boundaries are based on the best understanding of the structure of biological populations and ecological differentiation within such populations, also considering political boundaries and the management of human activities rather than distinct cetacean populations. An MU may be smaller than what is believed to be a 'population' to reflect spatial differences in human activities and their management (Inter-Agency Marine Mammal Working Group (IAMMWG), 2023).

For some species, these MUs can cover large areas, as is the case for minke whale, which has an MU comprising the Celtic Sea and Greater North Sea. Alternatively, MUs can be broken down into smaller areas, such as for harbour porpoise, which reflects the much higher density of this species in Irish and UK waters.

Annex B.2 Study Areas

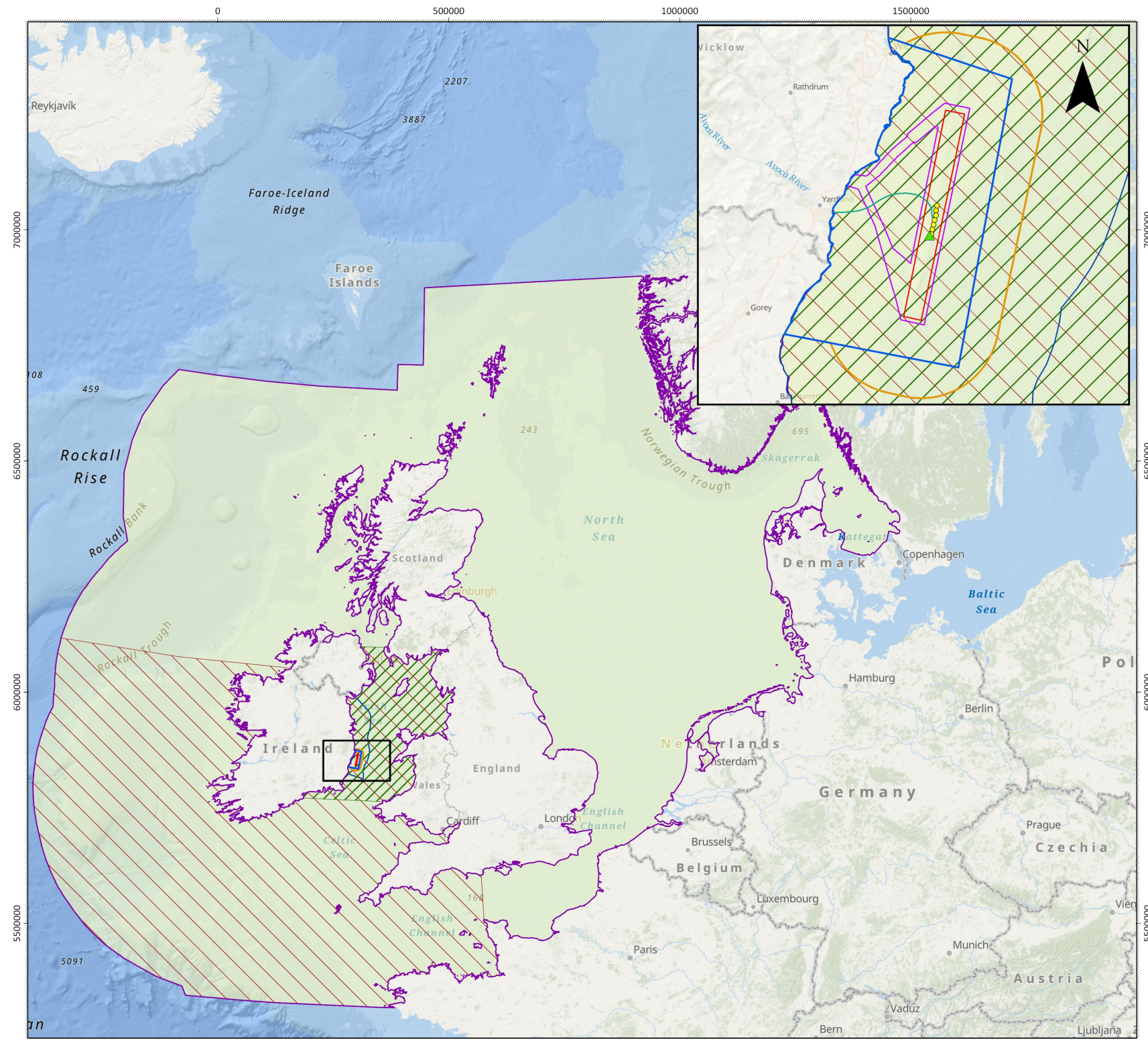
Marine mammals are highly mobile and differ in their foraging distances and seasonal distribution based on their ecology and behaviour; therefore, for the purposes of this Annex IV cetacean species baseline characterisation, three marine mammal study areas were defined:

- **Marine Mammal Study Area** (Annex Figure A): This area encompasses the Array Area, and Cable Corridor and Working Area of the Proposed Development, plus a 4-kilometre (km) corridor. The 4 km corridor extends around the Array Area, covering the area west of the Array Area towards the coast. This combined area is covered by the site-specific DAS conducted in 2018-2020 and 2023-2024;
- **Extended Marine Mammal Study Area** (Annex Figure A): This area encompasses the Array Area, and Cable Corridor and Working Area of the Proposed Development, plus an extended 10 km buffer zone extending around the Array Area and covering west of the Array Area to the coast. This combined area is covered by the site-specific DAS conducted May 2025 – July 2025;
- **Marine Mammal MU Study Area** (Annex Figure A): The baseline characterisation considers marine mammal ecology, behaviour, abundance, and distribution within the appropriate species

MU for cetaceans (IAMMWG, 2023). The marine mammal MU Study Area will enable consideration of the scale of movement and population structure for each species.

The Proposed Development is located within the following MUs for each species:

- Harbour porpoise (*Phocoena phocoena*) – Celtic and Irish Seas MU;
- Bottlenose dolphin (*Tursiops truncatus*) – Irish Sea MU;
- Risso's dolphin (*Grampus griseus*) – Celtic and Greater North Seas MU;
- Common dolphin (*Delphinus delphis*) – Celtic and Greater North Seas MU;
- Minke whale (*Balaenoptera acutorostrata*) – Celtic and Greater North Seas MU

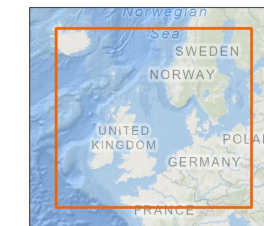


Arklow Bank Wind Park 2

Location of Marine Mammal Study Area and Marine Mammal Management Unit Study Area

Legend

- ABWP2 Array Area
- ABWP2 Cable Corridor and Working Area
- ABWP1 WTGs
- ABWP1 Existing Met Mast
- ABWP1 Existing Export Cable
- ABWP1 Lease Area
- Marine Mammal Study Area
- Extended Marine Mammal Study Area
- Marine Mammal Management Unit Study Area
- East Region MU
- Irish Sea MU
- Celtic & Irish Seas MU
- Celtic & Greater North Seas MU



Notes

Sources: Esri, TomTom, Garmin, GEBCO, National Geographic, NOAA, and the GIS User Community, GSI, OceanWise, Esri, Garmin, NaturalVue, 5, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, GEBCO, Garmin, NaturalVue. Contains Ordnance Survey data © Crown copyright and database rights (2022). OS OpenData.

Coordinate System:
ETRS 1989 UTM Zone 30N

0 150 300 km

0 75 150 nm

Scale

1:8,000,000 @ A3

Date

27/03/2026

Drawn By

GB

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Annex Figure A: Location of the Marine Mammal Study Area and Marine Mammal Management Unit Study Area

Annex B.3 Designated Sites

Some Annex IV cetacean species are also listed on Annex II of the Habitats Directive, resulting in their protection through the designation of protected sites known as Special Areas of Conservation (SACs). These species are harbour porpoise and bottlenose dolphin. There are a number of designated sites for these species within the wider Irish Sea region such as the Marine Mammal MU Study Area, as detailed in the species-specific accounts. Harbour porpoise and bottlenose dolphin are highly mobile and tend to range outside the sites designated to protect them. There is therefore potential for these species that are features of designated sites, and Annex IV species, to be present within the Proposed Development.

The designated sites and relevant qualifying interests for Annex IV cetaceans considered are presented in Annex Table C.

Annex Table C: Designated sites and relevant qualifying interests for the Annex IV cetaceans considered

Designated site	Distance to Array Area (km)	Distance to Cable Corridor and Working Area (km)	Qualifying Interests
Blackwater Bank SAC	19.70	19.13	Harbour porpoise
Rockabill to Dalkey Island SAC	36.57	35.66	Harbour porpoise
Codling Fault Zone SAC	44.86	43.90	Harbour porpoise
West Wales Marine / Gorllewin Cymru Forol SAC	50.38	49.75	Harbour porpoise
Carnsore Point SAC	50.62	50.08	Harbour porpoise
North Anglesey Marine / Gogledd Môn Forol SAC	62.61	61.61	Harbour porpoise
Lambay Island SAC	62.80	61.89	Harbour porpoise
Lleyn Peninsula and the Sarnau / Pen Llŷn a'r Sarnau SAC	71.91	71.35	Bottlenose dolphin
Cardigan Bay/ Bae Ceredigion SAC	82.73	82.05	Bottlenose dolphin
Hook Head SAC	112.62	112.61	Harbour porpoise Bottlenose dolphin
North Channel SAC	143.22	142.32	Harbour porpoise
Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC	214.68	216.09	Harbour porpoise

Annex B.4 Species-specific accounts

A review of the data available in Annex Table B (with further details outlined in the Volume III, Appendix 11.2, Marine Mammal Technical Report (Revised March 2026)) has confirmed the likely presence of the following Annex IV cetacean species in the vicinity of the Proposed Development:

- Harbour porpoise;
- Bottlenose dolphin;
- Risso's dolphin;
- Common dolphin; and
- Minke whale

Therefore, these species have been considered within the Annex IV Risk Assessment.

The reference populations for these cetacean species and their relevant MU has been identified by the IAMMWG (2023). The most robust and relevant density estimates within each MU were determined for each species with a justification of density estimates used included in the species accounts below. Density estimates and reference population size for the relevant cetacean species are presented in Annex Table D. These values provide a measure to quantify the scale of effect of given impacts within the risk assessment. Where possible, site-specific estimates from the DAS are provided for a species, where this was not possible, the reason for this is outlined in the relevant species-specific sections below.

Where appropriate, density estimates derived from site-specific DAS have been used, however it is important to note that the site-specific density estimates are not representative of animal densities across the wider scale for large-scale impacts such as disturbance from piling. For these large-scale impacts, alternative density estimates from regional surveys were also used to determine the number of animals potentially impacted, alongside the density estimates from the DAS.

Annex Table D: Marine mammal density (animals/km²) and population estimates

Species	Density (animals/km ²)	Density source	Reference population	Reference population estimate	Reference population source
Harbour porpoise	0.38	Site-specific DAS (2018-2020)	Celtic and Irish Seas MU	62,517	IAMMWG (2023)
	0.2803	Gilles <i>et al.</i> (2023)			
	Grid-cell specific	Derived from SCANS-IV density surfaces (Gilles <i>et al.</i> , 2025)			
Bottlenose dolphin	0.0201	Rogan <i>et al.</i> (2018)	Irish Sea MU	293; 8,326	IAMMWG (2023); SCANS-IV Block CS-D (Gilles <i>et al.</i> , 2023)
	0.2352	Gilles <i>et al.</i> (2023)			
	Grid-cell specific	Derived from SCANS-IV density surfaces (Gilles <i>et al.</i> , 2025)			
Risso's dolphin	0.031	Hammond <i>et al.</i> (2021)	Celtic and Greater North Seas MU	12,262	IAMMWG (2023)
Common dolphin	0.0272	Gilles <i>et al.</i> (2023)	Celtic and Greater North Sea MU	102,656	IAMMWG (2023)
	Grid-cell specific	Derived from SCANS-IV density surfaces (Gilles <i>et al.</i> , 2025)			
Minke whale	0.045	Rogan <i>et al.</i> (2018a)	Celtic and Greater North Seas MU	20,118	IAMMWG (2023)
	0.017	Hammond <i>et al.</i> (2021)			
	Grid-cell specific	Derived from SCANS-IV density surfaces (Gilles <i>et al.</i> , 2025)			

Harbour porpoise

Ecology

Harbour porpoise have a varied diet, largely consisting of whiting (*Merlangius merlangus*), herring (*Clupea harengus*), and small cod (*Trisopterus* spp) (Hernandez-Milian *et al.*, 2011). Their high metabolic rate requires them to eat up to 10% of their body weight in food per day (Booth, 2019). Harbour porpoises give birth to one calf every year between May and August (with peaks in June and July), and mating occurs between April and September, with a gestation period of 10 - 11 months (Blanchet *et al.*, 2008).

Distribution and occurrence

Harbour porpoise are the most widespread and frequently recorded species off the east coast of the Republic of Ireland, sighted throughout the year with an increased presence in July and August (Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.* 2018a). The ObSERVE data from the aerial surveys highlighted the importance of the Irish Sea for harbour porpoise in the context of the waters around Ireland, as sightings were frequently recorded along the east coast of Ireland, particularly during the summer months (Rogan *et al.*, 2018a). Records from the NBDC further supports this pattern (NBDC, 2023). These peaks tend to coincide with key life-history periods. Modelled density outputs indicated eastern Ireland, particularly the coastal area from Co. Dublin south to Co. Waterford, is likely to be an important area for harbour porpoise (Evans and Waggitt, 2023).

Acoustic records for harbour porpoise in Dublin Bay found that porpoises were detected on all days and within most one-hour periods (81% of possible hours had porpoise detections) over a 46-day recording period (Berrow *et al.*, 2008). The mean porpoise positive minutes (PPM) per hour in Dublin Bay were on average 14.7 with peaks in August (15.6) and September (13.5) and lower values in July (8.9).

Acoustic monitoring of harbour porpoise conducted for ABWP1 in August 2002 found that harbour porpoises were present on 16 out of the 25 deployment days giving an estimated 64% occupancy in this area. Compared to inshore waters to the north in Dublin Bay, the occurrence of harbour porpoise at Arklow Bank is lower.

Harbour porpoises were recorded in all years during the historic site-specific boat-based surveys (Cork Ecology, 2009, 2008 and 2007; Coveney Wildlife Consulting Ltd., 2005). Sightings were noted throughout the 'Bank' and 'Box' survey areas during the surveys, and there were also sightings further inshore along the cable route.

The site-specific DAS also found that harbour porpoises were distributed throughout the Marine Mammal Study Area and Extended Marine Mammal Study Area, including the area between the Array Area and the coast (HiDef, 2020a) and the Array Area and 2 km buffer.

Sightings were noted in most survey months. In addition, harbour porpoise were the most abundant species recorded during the geophysical survey campaigns of the Proposed Development in 2019 and 2020 with a total of 24 sightings recorded in 2019 and a total of 51 sightings recorded in 2020 (IWDG, 2019; Gavin & Doherty Geosolutions Ltd, 2020). They were also recorded during the geotechnical survey campaign of the Proposed Development in 2023, with one sighting of three individuals (Gavin & Doherty Geosolutions Ltd, 2023b). There was also an additional harbour porpoise sighted during the hydrographic and seismic operations in 2024 (Mizen Archaeology, 2024). These data suggest that harbour porpoises occur regularly throughout the study areas.

Density/abundance

Harbour porpoises were the most frequently recorded marine mammal species during site-specific DAS. The highest mean corrected density estimate was from the 2018-2020 DAS, and comprised 0.38 animals/km². Site-specific DAS confirmed the presence of harbour porpoise within the Study Area year-round, although abundance and density was higher in summer months (HiDef, 2020a; Volume III, Appendix 11.2 Marine Mammals Technical Report (Revised March 2026)), which has been confirmed by several other studies in this region (Berrow *et al.*, 2008; Rogan *et al.*, 2018). The most recent large-scale surveys conducted were Small Cetacean Abundance in the North Sea IV (SCANS-IV) in 2022 which estimate an abundance of 9,773 animals and a density of 0.2803 animals/km² within block CS-D which encompasses the Irish Sea (Gilles *et al.*, 2023).

Seasonality

During the ObSERVE surveys, adult harbour porpoises were sighted with calves in many coastal areas around Ireland, including within the western Irish Sea (Rogan *et al.*, 2018a). Berrow *et al.* (2011) estimated that, of all individuals recorded, the proportion of calves recorded in inshore waters of the Irish Sea during July and August was 6%, which was similar to previous surveys in the same area (Berrow *et al.*, 2008). Therefore, inshore waters may be important as nursery habitats during summer months.

During the historic site-specific boat-based surveys, raw data showed that harbour porpoises were recorded in higher numbers during summer and autumn compared to the rest of the year (Cork Ecology, 2009, 2008 and 2007; Coveney Wildlife Consulting Ltd., 2005). These data suggest that harbour porpoise could be moving into inshore waters during the breeding season (summer) and mother-and-calf pairs may inhabit inshore waters during late summer and early autumn when calves are very young.

Similarly, the 2018 - 2020 site-specific DAS data found that the highest counts of harbour porpoises were recorded during the August surveys in 2018 and July surveys in 2019, therefore supporting the findings from the historic site-specific boat-based surveys.

For the 2023 - 2024 site-specific DAS, seasonal comparisons indicated higher abundance and densities during the summer months (April - September; mean: 121 individuals, mean: 0.18 animals per km²), compared to the winter months (October - March; mean: 91 individuals, 0.13 animals per km²). This seasonal pattern is consistent with the previous site-specific DAS. It is also consistent with known seasonal patterns of occurrence for small cetaceans in Irish waters, where summer conditions support higher presence and potential prey availability.

Conservation status

Harbour porpoise currently have an 'inadequate' conservation status in Ireland under Article 17 of the European Union (EU) Habitats Directive (NPWS, 2025). They are listed as Least Concern on the International Union for Conservation of Nature (IUCN) Red List. The current conservation status and short-term trends for harbour porpoise within UK waters is unfavourable-inadequate (JNCC *et al.*, 2026a).

As an Annex II species of the Habitats Directive, the designation of SACs is required as a component of their conservation. There are 36 SACs designated for harbour porpoise within the Marine Mammal MU Study Area, the closest of which is Blackwater Bank SAC, 19.8 km from the Array Area, followed by Lambay Island SAC, which is 62.9 km from the Array Area.

Bottlenose dolphin

ECOLOGY

Two different ecotypes of bottlenose dolphin occur commonly across Irish and UK waters: coastal ecotype and offshore ecotype (Berrow *et al.*, 2013; Wall *et al.*, 2013; Hague *et al.*, 2020). The coastal ecotype makes up resident populations in the Shannon Estuary, Republic of Ireland (Rogan *et al.*, 2018b), Cardigan Bay, Wales, and the Moray Firth, East Scotland year-round (Hague *et al.*, 2020). They have a varied diet consisting of whiting, blue whiting (*Micromesistius poutassou*), pollock (*Pollachius*), saithe (*Pollachius virens*), haddock (*Melanogrammus aeglefinus*), poor cod, European hake (*Merluccius merluccius*), horse mackerel (*Trachurus trachurus*), flatfish (*Pleuronectiformes*), pelagic squid (*Loligo spp.*), and octopus (*Octopus spp.*) (Hernandez-Milian *et al.*, 2011; 2015). Female bottlenose dolphins reach sexual maturity from six to 13 years old (Robinson *et al.*, 2017) and males from their tenth year (Harrison and Ridgway, 1971). Peak season for births in the Irish Sea is observed between May and November (Berrow *et al.*, 2010). The gestation period lasts for 12 months and females' average calving intervals are around three to five years (Harrison and Ridgway, 1971; Robinson *et al.*, 2017).

Distribution and occurrence

In Ireland, there are thought to be at least three distinct populations of bottlenose dolphin, as determined by genetic studies (Mirimin *et al.*, 2011). One of these populations is highly mobile and the same individuals have been recorded off all Irish coasts (O'Brien *et al.*, 2009). Comparison of images within bottlenose dolphin photographic identification (hereafter 'photo-ID') catalogues confirmed movement of individuals through prospective corridors linking designated SACs in the Moray Firth, Cardigan Bay and Shannon Estuary (Robinson *et al.*, 2012). There is increasing evidence (from sightings and genetic analysis) to suggest that an offshore ecotype of bottlenose dolphin exists in Irish waters (Mirimin *et al.*, 2011; Berrow *et al.*, 2013). Due to dedicated studies on coastal populations of bottlenose dolphin, there is greater knowledge on the coastal ecotype than the offshore ecotype (Hague *et al.*, 2020). Most coastal sightings around Ireland fall within 10 km from shore (O'Brien *et al.*, 2010; Robinson *et al.*, 2012). Although they have been observed throughout Irish waters year-round, their presence is much less pronounced in the western Irish Sea (Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2018a).

During the ObSERVE aerial surveys, bottlenose dolphins were the most frequently sighted cetacean species in Irish EEZ waters, with more than twice as many sightings during winter compared to summer (Rogan *et al.*, 2018a). Bottlenose dolphins were recorded in oceanic, neritic and coastal waters, however, there were very few sightings in the western Irish Sea (stratum 5) compared to other regions within the Irish EEZ. This suggests that the west and southwest of Ireland are likely to be more important in terms of the distribution of this species. This is supported by findings of the historic site-specific boat-based surveys, as no bottlenose dolphin were recorded. Bottlenose dolphins were recorded once (November 2019) during the 2018 - 2020 site-specific DAS. No bottlenose dolphins were recorded during the 2023 - 2024 or 2025 site-specific DAS. Seasonal differences in distribution suggest that bottlenose dolphins disperse into the Irish Sea during the winter, between October and March (Rogan *et al.*, 2018a). There was one sighting of bottlenose dolphin during the hydrographic and seismic operations in 2024 (Mizen Archaeology, 2024).

Density/abundance

Bottlenose dolphins are widespread and abundant in Irish waters (Berrow *et al.*, 2010; Wall *et al.*, 2013). One group of bottlenose dolphins were recorded during the site-specific DAS, confirming their presence within the Marine Mammal Study Area (HiDef, 2020a; Volume III, Appendix 11.2 Marine Mammals Technical Report (Revised March 2026)). However, it was not possible to provide an abundance and/or density estimate for bottlenose dolphin from the site-specific DAS due to the low number of sightings across the survey period (only one sighting, in the 2018-2020 DAS; no further sightings in the 2023-2025 DAS;

Volume III, Appendix 11.2 Marine Mammals Technical Report (Revised March 2026)). Recent large-scale surveys include ObSERVE and SCANS-IV which have provided contrasting abundance and density estimates, with the ObSERVE surveys providing an abundance of 223 animals and a density estimate of 0.0201 animals/km² within stratum 5 (Rogan *et al.*, 2018) and SCANS-IV providing an estimated abundance of 8,199 animals and a density of 0.2352 animals/km² within block CS-D (Gilles *et al.*, 2023).

Seasonality

The seasonal distribution of bottlenose dolphin in Irish waters based on the ObSERVE aerial survey data suggests that this species moves inshore, into shallow coastal waters during warmer months, and into offshore, deeper waters during the winter months (Rogan *et al.*, 2018a). However, this pattern could be as a result of both the coastal and offshore ecotypes using these areas.

Conservation status

Bottlenose dolphins currently have a 'favourable' conservation status in Ireland under Article 17 of the EU Habitats Directive (NPWS, 2025). They are listed as Least Concern by the IUCN Red List. Bottlenose dolphins are classified as a Priority Species under the UK Post-2010 Biodiversity Framework. The current conservation status and short-term trends for bottlenose dolphin within UK waters are also favourable (JNCC *et al.*, 2026b).

As bottlenose dolphins are also listed under Annex II of the EU Habitats Directive, SACs must be assigned to aid in the protection of this species. There are four SACs designated for bottlenose dolphin within the Marine Mammal MU Study Area, the closest of which is Llyn Peninsula and the Sarnau / Pen Llŷn a'r Sarnau SAC, 73.3 km from the Array Area, followed by Cardigan Bay / Bae Ceredigion SAC, which is 82.7 km from the Array Area, both of which are in UK waters.

Risso's dolphin

ECOLOGY

Risso's dolphins predate on cephalopods, primarily squid and octopus (MacLeod *et al.*, 2014). Life history information is relatively limited for Risso's dolphins, but sexual maturity is thought to be reached at 8 to 10 years old for females and 10 to 12 years old for males (Baird, 2009). The gestation period is estimated at 13 to 14 months with a calving interval of 2.4 years. The calving season is unknown for Irish and UK waters, but the presence of young calves in some groups observed during cetacean surveys indicates that calving does occur in Irish waters (Wall *et al.*, 2013).

Distribution and occurrence

Risso's dolphin is frequently recorded in Irish waters, in all seasons, and in a variety of habitats. Around the coast of Ireland, sightings of this species are recorded in inshore waters but most are recorded in deeper waters over the continental shelf and slope (Rogan *et al.*, 2018a). In Irish waters, Risso's dolphin commonly occur in groups of between one and ten individuals (Rogan *et al.*, 2018a) which may benefit cooperative hunting through repeated associations between individuals, with some individuals staying together for long periods of time (Hartman *et al.*, 2008; Felce, 2013).

Within the Irish Sea, Risso's dolphin is the most commonly recorded dolphin species and there is an indication that presence in the Irish Sea has increased, which is likely a result of the increase in populations of several species of cephalopod (a key prey species, see Section 6.2.3.1) in the British Isles, attributed to climate change (Berrow *et al.*, 2010; Van der Kooij *et al.*, 2016). Coastal sightings are typical for this region, with the coastal waters off Wicklow and Wexford accounting for 41% of all inshore sightings of this species

(Berrow *et al.*, 2010). Modelled density outputs also indicate the coastal waters off Wexford, in southeast Ireland contain high densities of Risso's dolphins, as compared to elsewhere in the Irish Sea (Evans and Waggitt, 2023). Calves are often recorded closer to the coast suggesting that calving occurs within the warmer inshore waters. In addition, repeated sightings of the same individuals suggest some degree of site fidelity may occur. For example, photo-ID studies of Risso's dolphins from the eastern Irish Sea showed indications of residency of identified individuals to a particular region (Felce, 2013). It is thought that coastal sightings in the western Irish Sea are likely to represent a frequently sighted community often sighted near the Saltee Islands off County Wexford (Rogan *et al.*, 2018a).

Small numbers of Risso's dolphin, ranging from one to eight individuals, were recorded during the site-specific historic boat-based surveys although none were identified during the site-specific DAS (noting, however, that a number of marine mammals could only be identified as 'cetacean species').

Density/abundance

Risso's dolphin were not recorded during site-specific DAS (HiDef, 2020a; Volume III, Appendix 11.2 Marine Mammals Technical Report (Revised March 2026)), although six sightings of between one and eight individuals have been previously recorded during historic site-specific boat-based surveys carried out from 2000 to 2008 (Cork Ecology, 2007; 2009; 2010; Coveney Wildlife Consulting Ltd, 2003; 2004; 2005; Fulmar Ecological Services, 2006), confirming their presence within the Study Area. Sightings of Risso's dolphins have also been recorded during the recent ObSERVE and SCANS-IV surveys of the wider area (Gilles *et al.*, 2023; Rogan *et al.*, 2018). However, only one individual was recorded in stratum 5 during the ObSERVE surveys (Rogan *et al.*, 2018). SCANS-IV estimated an abundance of 75 animals and a density of 0.0022 animals/km² in block CS-D which is lower than estimates from the previous SCANS-III survey which estimated an abundance of 1,090 animals and a density of 0.031 animals/km² in block E (Hammond *et al.*, 2021).

Seasonality

There is reported seasonality in the patterns of occurrence of Risso's dolphin, with animals being sighted more frequently further offshore in continental shelf waters during winter months (October - May) (Reid *et al.*, 2003). This is corroborated by sighting records for Irish waters where Risso's dolphin have been reported around the coast of Ireland in all months of the year, although peak sightings occur between May and July suggesting a late spring inshore movement (Berrow *et al.*, 2010). Reid *et al.* (2003) reports that in the Irish Sea (in offshore waters) most sighting records were between July and September, and near-shore records off southwest Ireland were obtained primarily between May and August.

During the historic site-specific boat-based surveys, all sightings of Risso's dolphin were during the months of May, June, and July supporting the evidence above, that this species more commonly occurs inshore in the Irish Sea during the spring/summer months (Cork Ecology, 2009; Coveney Wildlife Consulting Ltd., 2003).

Conservation status

Risso's dolphin currently have a 'favourable' conservation status in Ireland under Article 17 of the EU Habitats Directive, with a stable population trend (NPWS, 2025b). In 2018, Risso's dolphins were updated from Data Deficient to Least Concern on the IUCN Red List. The current conservation status and short-term trends for Risso's dolphin within UK waters is also favourable (JNCC *et al.*, 2026c). As Risso's dolphin is not an Annex II species under the Habitats Directive, there are no SACs for Risso's dolphin within either study area. A Marine Protected Area (MPA) has been designated in North-east Lewis, Scotland due to the high numbers of Risso's dolphins that occur in these waters year-round. Consequently, it has been suggested that this MPA provides essential foraging grounds, as well as being important for breeding,

nursing, and raising young (NatureScot, 2020a). The MPA does not overlap with the Marine Mammal Study Area but is within the MU Study Area.

Short-Beaked common dolphin

ECOLOGY

Short-beaked common dolphin (hereafter 'common dolphin') prey on a variety of fish and cephalopod species including poor cod, goby (*Caragobius urolepis*), blue whiting, whiting, cephalopods (*Cephalopoda*), Atlantic herring, European sprat (*Sprattus sprattus*), and haddock (Brophy *et al.*, 2009). Recordings from bycaught individuals in the North East (NE) Atlantic show that the average age at sexual maturity was 8.2 years for females and 11.9 years for males (Murphy *et al.*, 2005; Murphy *et al.*, 2009; Murphy *et al.*, 2021). Considering common dolphins are reported to live up to 30 years in the Northeast Atlantic and have an extended calving interval period of approximately four years, it is thought females could have up to four to five calves throughout their lifetime (Murphy *et al.*, 2009).

Distribution and occurrence

Common dolphins are found throughout the Atlantic seaboard of Europe, in the Western Channel and Irish Sea and often travels in large groups. This species commonly inhabits continental shelf waters and occurs along the shelf edge and in deep water, and is the second most frequently reported cetacean, after harbour porpoise, within Irish waters (Berrow *et al.*, 2010). Common dolphin may occur in both inshore and offshore waters in the western Irish Sea, although the distribution of this species is primarily around the coast of southern and western Ireland (Berrow *et al.*, 2010). Modelled density outputs suggest that densities of common dolphin in the Irish Sea are higher in central regions further from shore (Evans and Waggitt, 2023).

There was one individual common dolphin recorded during the historic site-specific boat-based surveys, in 2002 - 2003 (Coveney Wildlife Consulting Ltd., 2003). There was one sighting of common dolphin in 2024 during the hydrographic and seismic operations (Mizen Archaeology, 2024).

Within the Marine Mammal Study Area, during the 2018 - 2020 site-specific DAS, common dolphins were observed on two occasions: a group of three animals in November 2019 and a group of 18 animals in January 2020 (HiDef, 2020a).

During the 2023 - 2024 site-specific DAS, common dolphins were observed on six occasions in the Marine Mammal Study Area; including two occasions in the Array Area and 2 km buffer, with a total of 32 animals recorded across the survey period. During the 2025 site-specific DAS, common dolphins were observed on only one occasion: a group of 26 animals in the Extended Marine Mammal Study Area in June 2025.

In addition, a small number of unidentified cetaceans were reported which may have been common dolphin. Due to limited number of common dolphin sightings during the 2018 - 2020 and 2025 site-specific DAS, mean abundance and density are not presented.

Density/abundance

Common dolphins were recorded during the site-specific DAS, confirming their presence within the Marine Mammal Study Area (HiDef, 2020a; Volume III, Appendix 11.2: Marine Mammals Technical Report (Revised March 2026)). No density estimate could be calculated for common dolphin from the 2018-2020 DAS, however a mean density estimate of 0.03 animals/km² was calculated from 2023-2024 DAS. SCANS-IV estimated an abundance of 949 animals and a density of 0.0272 animals/km² in block CS-D (Gilles *et al.*, 2023).

Seasonality

The IWDG cetaceans sighting review reports that records from ferries show a notable increase in numbers in the southern Irish Sea in the autumn and a peak in inshore records during the month of August (Berrow *et al.*, 2010), and suggests that there may be an eastward movement along the south coast during autumn and winter.

For the 2023-2024 site-specific DAS, seasonal comparisons indicated higher abundance, and density estimates during the winter months (October - March; mean: 39 individuals, 0.06 animals per km²), compared to the summer months (April - September; mean: four individuals, 0.01 animals per km²).

While previous studies (Berrow *et al.*, 2010) reported a peak in inshore sightings along the south coast of Ireland in August, the observed peak in March indicate that this seasonal pattern was not reflected for the 2023-2024 site-specific DAS.

Conservation status

Common dolphins currently have a 'favourable' conservation status in Ireland under Article 17 of the EU Habitats Directive with a stable population trend (NPWS, 2025b). They are classed as Least Concern on the IUCN Red List. The current conservation status and short-term trends for common dolphin within UK waters is also favourable (JNCC *et al.*, 2026d). As common dolphin is not an Annex II species under the Habitats Directive, there are no SACs for common dolphin within either Study Area. There are also no other MPA designations for common dolphin within either Study Area.

Minke whale

ECOLOGY

Minke whales are the most abundant baleen whale within Irish and UK waters and are most commonly sighted in shallow, shelf habitat over the summer months, which are important foraging habitats. Key prey species for minke whales include sandeel (*Ammodytes*), herring, sprat, mackerel (*Scomber scombrus*), and poor cod (*Trisopterus minutus*). Some individuals remain in coastal waters year-round; however, most migrate south during winter months to temperate offshore waters for breeding grounds. Individuals from the Northeast Atlantic population of minke whale are thought to reach sexual maturity between three-to-six years old, but some can take up to 13 years to reach physical maturity (Olsen and Sunde, 2002). The gestation period lasts for 10 months, and the calving interval lasts at least one-to-two years (Christiansen *et al.*, 2014).

Distribution and occurrence

Minke whale mostly inhabit continental shelf waters, occurring in depths of less than 200 m and can often be seen close to land. In Irish waters, the minke whale is widely distributed but is most commonly seen along the south coast and in localised patches in the central Irish Sea (Reid *et al.*, 2003; Rogan *et al.*, 2018a), with modelled density outputs indicating a similar pattern in distribution (Evans and Waggitt, 2023). There is a distinct seasonal distribution of minke whale with animals moving inshore during the summer months and offshore during winter. A review of all cetacean sighting and stranding records made by the IWDG through ISCOPE suggest that minke whale may also be occasionally present within the Marine Mammal Study Area (Berrow *et al.*, 2010). Most records from the NBDC for the western Irish Sea also show sightings off the coast of Dublin and to the north, and also off southeast Wexford (NBDC, 2023).

Minke whale was the second most frequently recorded species (after harbour porpoise) during inshore boat-based surveys of the Irish Sea (Berrow *et al.*, 2011). Observations of minke whale were made in

Dublin Bay and waters to the north. There were no observations of minke whale in the survey area within which the Proposed Development is located (Berrow *et al.*, 2011).

During the historic site-specific boat-based surveys, minke whale was observed to the west of the ABWP1 (i.e. inshore) in Year 4 (Coveney Wildlife Consulting Ltd., 2004). There was one additional sighting of minke whale in 2024 during the hydrographic and seismic operations (Mizen Archaeology, 2024).

No minke whales were recorded during the 2018 - 2020 or 2023 - 2024 site-specific DAS. There was one minke whale recorded (July 2025) in the Extended Marine Mammal Study Area during the 2025 site-specific DAS.

Density/abundance

Minke whales were not recorded during the 2018-2020 or 2023-2024 site-specific DAS (HiDef, 2020a) however, a single individual was recorded in the Marine Mammal Study Area, but outside of the Array Area and 2km buffer, on one occasion during the 2025 site-specific DAS in July 2025. Sightings have also been recorded during the recent ObSERVE and SCANS-IV surveys, which cover the wider area (Gilles *et al.*, 2023; Rogan *et al.*, 2018). Furthermore, the ObSERVE surveys confirmed a higher presence of minke whale during the spring and summer months, whilst the species is expected to be largely absent in autumn and winter due to offshore movements during these months (Rogan *et al.*, 2018). The ObSERVE surveys estimated an abundance of 495 animals and a density of 0.045 animals/km² in stratum 5 (Rogan *et al.*, 2018). SCANS-IV estimated an abundance of 477 animals and a density of 0.0137 animals/km² in block CS-D, which is lower than estimates from the previous SCANS-III survey which estimated an abundance of 603 animals and a density of 0.017 animals/km² in block E (Hammond *et al.*, 2021).

Seasonality

Little is known about the seasonal movements of minke whales in the Atlantic although data for tagged individuals in the western Atlantic suggests southward movement from feeding areas in Iceland in the autumn months (Reid *et al.*, 2003). There is a distinct seasonal distribution of minke whale with animals moving inshore during the summer months and offshore during winter.

In UK waters, most sightings have been made between May and September. During July and September, feeding aggregations can be observed in inshore areas (Reid *et al.*, 2003). The IWDG cetacean sightings review found that the number of sightings around Irish waters started to increase in April and May, peaking in August, and tapering off in late autumn and early winter (Berrow *et al.*, 2010). This pattern is also reflected in the Irish Sea where animals appear in the eastern Irish Sea from April to June (Berrow *et al.*, 2010). The coastal distribution in summer months and lower or lack of coastal sightings in winter suggests a seasonal offshore to inshore movement. Data from the ObSERVE aerial surveys of Irish waters found a high use of coastal waters during the summer months, particularly in the southwest of Ireland and Irish Sea and the predicted distribution suggests that the Irish Sea appeared to be unsuitable for minke whale in winter (Rogan *et al.*, 2018a).

Conservation status

Minke whale currently have a 'favourable' conservation status in Ireland under Article 17 EU Habitats Directive, with a stable population trend (NPWS, 2025b). They are listed as Least Concern on the IUCN Red List. The current conservation status for minke whale within UK waters is unfavourable-inadequate (JNCC *et al.*, 2026e). As minke whale is not an Annex II species under the Habitats Directive, there are no SACs for minke whale within either study area. There are two MPAs in Scotland that have minke whale as a feature: Sea of the Hebrides MPA, and Southern Trench MPA. Habitat modelling suggests that there are above-average densities of minke whale in the waters of both MPAs (NatureScot, 2020b; NatureScot,

2020c). The MPAs do not overlap with the Marine Mammal Study Area but are both within the MU Study Area.

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Annex C Marine Mammal Mitigation Plan

The primary aim of the MMMP is to detail measures which are committed to by the Developer to reduce the risk of a PTS in hearing, referred to as an auditory injury, of marine mammals. The MMMP is intended to reduce the risk of auditory injury to a negligible level. This MMMP has been developed in consideration of the 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' provided by the Department of Arts, Heritage and the Gaeltacht (DAHG, 2014).

The following information details the mitigation measures committed to by the Applicant in relation to activities relevant to this Annex IV Risk Assessment, which include confirmatory geophysical and geotechnical surveys and impact hammer pile driving. For the full MMMP details see Volume III, Appendix 25.2: Marine Mammal Mitigation Plan.

Annex C.1 Geophysical and Geotechnical Survey Mitigation Methodology

Introduction

The MMMP is focused on minimising risk of instantaneous PTS or disturbance, primarily from the sparker and seismic equipment, and other geophysical sources.

Geotechnical survey sound sources (e.g. CPT activities) are excluded from the requirements, as the predicted injury ranges from geotechnical sources are highly localised (maximum of 62 m for harbour porpoise; less than 5 m for other marine mammal species; Volume II, Chapter 11: Marine Mammals (Revised March 2026)). There is negligible likelihood of a marine mammal being present within these highly localised areas for sufficient duration to accumulate an auditory injury. Furthermore, geotechnical sources are not recommended for mitigation in DAHG (2014) or by JNCC.

The Factored In Measures (see Volume II, Chapter 11: Marine Mammals (Revised March 2026)) includes the implementation of a project-specific mitigation protocol during the geophysical and geotechnical surveys to minimise the risk of PTS, as presented herein. The mitigation measures outlined for geophysical and geotechnical surveys are compliant with the measures outlined in the DAHG (2014) guidance.

Mitigation zone

The mitigation zone is dependent on the specification/type of equipment and impact range of injury for the most sensitive marine mammal. Based on the assessment, the maximum range for instantaneous injury (PTS onset) is 22 m and 517 m for cumulative PTS onset. The Subsea Noise Assessment (Seiche Ltd, 2022) indicates that instantaneous injury could occur within more restricted impact ranges than the advised distance of 1,000 m mitigation zone in the absence of a site specific assessment as stated within DAHG (2014) guidance. Consequently, the Proposed Development will use a mitigation zone of 500 m from the sound source where the following equipment are used: TI sleeve, sparker, seismic CPT, MBES, SSS, SBP and USBL. Although this mitigation zone is less than the maximum cumulative impact range, it is considered appropriate as it is greater than the maximum instantaneous injury impact range. This means that any animal out with the 500 m mitigation zone will be able to flee the area to not be exposed to the injurious noise levels across the period of operations. This will also reduce the dose of noise received cumulatively, as the modelling considers an animal starting at source; therefore, where the proposed mitigation is applied an animal will be at least 500 m from source at the point it starts to accumulate the dose (i.e. is subjected to the noise).

Depending on daylength, one or two trained and dedicated (personnel with no other role onboard the vessel) Marine Mammal Observers (MMOs) will be present on board the vessel throughout the survey. Two

MMOs will be required if operations occur over a time period greater than 12 hours. The MMO will carry out dedicated watches for marine animals during survey operations during daylight hours.

The MMOs monitor the area with the naked eye and 10 x 50, 7 x 50 or 7 x 30 reticule binoculars checking for visual cues such as feeding seabirds, splashes, blows and sea surface disturbance. When marine mammals are observed, the distance and bearing to the sighting will be recorded along with the species identification, time of sighting, vessel position and other data required for the completion of the sighting form. Species identification can be aided, by photographic records of sightings, taken using digital cameras or reference to a field guide (e.g. Shirihai *et al.*, 2006).

Observations are carried out from the same vessels as the operations. Observation points should provide unobstructed 360-degree views of the mitigation zone, preferably from the bridge wings.

Distances to sightings are estimated using reticule binoculars or range finder sticks and by reference to the known distances of, for example, acoustic gear. The JNCC guide on making a rangefinder stick will be used (JNCC, n.d.) as well as the Marine Mammal Observer Association (MMOA)'s guide to distance estimation using reticular binoculars (MMOA, 2024).

Information on operations (e.g. survey type, start/end of sound output, vessel location, time of day and any mitigation actions), survey effort (including the vessel's location and weather conditions) and sightings will be recorded using standardised data forms (DAHG, 2014). Communication with survey and the MMOs are maintained by handheld VHF radio with the surveyors in the instrument room informing the MMO of all planned activities and any change in source activity.

Pre-watch monitoring

Pre-watch monitoring by MMOs will be carried out for 30 minutes prior to the start of any testing or survey operations. The watch is carried out visually using the naked eye and reticule binoculars (10 x 50, 7 x 50 or 7 x 30).

Delay of operations

The start of the acoustic equipment will be delayed if marine mammals are detected within the MMMZ during the pre-watch, allowing the animals time to move away from the acoustic source. The start of the source will be delayed for at least 30 minutes following the last sighting within the MMMZ.

Soft start

Sound-producing activities will only commence during daylight hours where effective visual monitoring can be achieved.

Survey equipment with a source SPL above 170 dB re 1µPa shall commence from a lower energy start-up (e.g. a single seismic device/airgun or electric discharge, starting from the lowest sound energy level possible and incrementally adding more until the full complement is achieved) and increase gradually over a period of 40 minutes. After the 40 minutes of ramp-up is concluded, there is no requirement to halt activities even if visibility worsens or if marine mammals enter the MMMZ.

Where MBES, SSS, SBP and/or USBL equipment are used, where the operational parameters of the equipment allow, start-up energy will commence from the lowest possible energy and thereafter increase incrementally to operational power over a period of 20 minutes. If the equipment is unable to change the energy levels, the survey team will switch the equipment on and off over the period of 20 minutes, where the portion of time that the equipment is switch on increases gradually. After the 20 minutes of ramp-up is concluded, there is no requirement to halt activities even if visibility worsens or if marine mammals enter the MMMZ.

Line Changes

For line changes taking longer than 40 minutes, the source will be stopped, then a pre-watch of 30 minutes followed by a soft-start will be required to resume operations.

Breaks in Operations

For any breaks in operation of the equipment of between 5 and 10 minutes the MMOs will undertake dedicated monitoring to check no marine mammals are present within the mitigation zone prior to the source restarting.

If a marine mammal is sighted within the mitigation zone during a break in operation, the equipment will recommence firing with a full soft start once the mitigation zone has been clear for 30 minutes from the last sighting.

For any breaks in operations of more than 10 minutes the equipment will only recommence following a full 30 minutes of dedicated pre-start monitoring and a soft start. If the MMO has been monitoring prior to and throughout the break, this time contributes to the pre-start monitoring time. The source is only started once the mitigation zone is clear of marine mammals for 30 minutes.

For any breaks in operation of more than 30 minutes the equipment will recommence operation following 30 minutes of dedicated pre-start monitoring and a soft start. If the MMO has been monitoring during the break this time contributes to the pre-start monitoring time.

Should marine mammals be sighted within the mitigation zone during this period the start of the equipment will be delayed for at least 30 minutes from the last sighting within the mitigation zone.

Data Collection and Recording Forms

The MMOs will compile data throughout the survey into three main data sheets: 1) Effort, 2) Operations, and 3) Sightings, in line with Appendix 6 of the 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' (DAHG, 2014).

Communication

A pre-survey kick-off meeting is recommended to confirm the marine mammal mitigation requirements and further meetings on board the vessel, between the vessel surveyors and engineers, and the MMOs to agree on mitigation procedures as set out in the MMMP and consent.

All communication to follow the agreed protocol. Notice for commencement of the pre-line search is to be given to the MMOs by VHF radio, at least one hour before any source operation. All soft starts and tests to be cleared with the MMOs prior to source activation. In the case of a mitigation action, the MMOs would communicate with the surveyors directly, who would then advise all parties.

Annex C.2 Impact Hammer Piling Mitigation Methodology

Introduction

To minimise the risk of any auditory injury to marine mammals from underwater noise during pile driving, the Developer will implement a number of Factored In Measures consisting of:

- Marine mammal monitoring of a 1,000 m MMMZ prior to piling;
- Marine Mammal Observers during daylight hours, passive acoustic monitoring (PAM) during the hours of darkness/poor visibility;
- Ramp-up (including soft-start) procedure; and

- Pre-piling deployment of ADD.

Details of each of the mitigation measures listed above, are provided in their relevant sections below. The mitigation measures listed above will also be implemented for all drilling activities.

Furthermore, additional mitigation has been committed to as part of piling for the WTGs and OSPs. Under this extended ramp up mitigation scenario, the start of the ramp up (soft start) will commence at 400 kJ and the ramp-up duration will be extended. This will be implemented in order to comply with an r_{safe} of 1,000 m, in line with the Danish standard.

Mitigation Zone

The mitigation zone is defined as the maximum potential instantaneous PTS-onset impact range. The Developer will update the noise modelling, if required, prior to construction. The DAHG (2014) guidance recommends a mitigation zone of 1,000 m for piling, which is greater than the largest impact range for instantaneous PTS-onset predicted for the Proposed Development (i.e. 680 m). Therefore, following a precautionary approach, the Proposed Development will use a 1,000 m mitigation zone, which is compliant with the DAHG (2014) guidance.

Marine Mammal Observers (MMOS)

The DAHG (2014) guidance recommends a pre-piling search of a minimum period of 30 minutes (in waters less than 200 m) for monopiles. Therefore, a 30-minute pre-piling search will be implemented for the Proposed Development, to ensure compliance with the DAHG (2014) guidance on this measure. This pre-piling search will be conducted by a trained, experienced and dedicated MMO, who will be stationed on the piling vessel at an appropriate elevation that provides a 360 ° view of their surroundings. A trained and experienced MMO requires an individual to have passed a Joint Nature Conservation Committee (JNCC) MMO training course, or equivalent, and hold a minimum of six weeks marine mammal survey experience at sea over a period of 3-years in European waters. Required equipment to perform MMO duties includes either reticule binoculars or range stick, to enable range estimation from the observation platform to the sighted individual, and a VHF radio to enable effective communication to the operations and vessel crew. Distances to sightings are estimated using reticule binoculars or range finder sticks. The JNCC guide on making a rangefinder stick will be used (JNCC, n.d.) as well as the Marine Mammal Observer Association (MMAOA)'s guide to distance estimation using reticular binoculars (MMAOA, 2024).

Passive Acoustic Monitoring (PAM – see 0) can support visual observation in poor weather conditions or visibility (<1 km). This monitoring method has been used routinely since 2002 under jurisdictions following JNCC mitigation guidelines (JNCC, 2023). PAM will be used as a form of mitigation under hours of darkness when an MMO cannot visually observe, and during poor weather conditions or visibility as required. This will be necessary if there is a break greater than 10 minutes during darkness or if piling activities commence during darkness, otherwise the operations would need to wait until daylight. The PAM operator will follow the same data forms and communications procedure as the MMO.

The MMO will record all periods of marine mammal observations, including the start and end times of their visual effort, details of the operations, environmental conditions (sea state, weather, visibility, etc.) and any sightings of marine mammals around the piling vessel, using standardised data forms (Appendix 6 in DAHG (2014) guidance).

If a marine mammal or sea turtle is detected within the mitigation zone during the pre-piling search, the soft-start procedure will be delayed until it has been observed, assessed and confirmed that the individual(s) has vacated the MMMZ, and there have been no detections for at least 30 minutes. This is compliant with the DAHG (2014) guidance. If a marine mammal is detected within the mitigation zone during the soft-start, piling will halt if safe to do so. Alternatively, hammer power does not increase until the animal has vacated

the mitigation zone. If a marine mammal is detected within the mitigation zone during full power, pile-driving may continue and the MMO/PAM Operator will continue to note marine mammal presence and observations of animal behaviour, where possible.

MMO limitations include a reduced chance of detecting low profile marine mammals, such as harbour porpoise, in a Beaufort sea state greater than two (Gunnlaugsson *et al.*, 1988, as referenced in Teilmann, 2003). Larger cetaceans (i.e. dolphins and whales) can generally be sighted at and under a sea state four (Smith *et al.*, 2020). As sightings are often quick encounters, there is little time for the MMO to capture the individual on camera which makes it difficult, if not impossible, to confirm or review a detection at a later stage. The height of the vantage point used for observation is a principal factor in determining how far an MMO can see. So long as the MMO has good environmental/weather conditions (i.e. visibility, sea state and swell), an MMO that is 1.65 m tall stationed on a platform 5 m from the water's surface could see up to 1,320 m, a platform height of 10 m would increase this viewing distance up to 2,320 m (as calculated through typical trigonometry methods as used by MMOs e.g. distance (m) = ((observation height (m)) x 1000/no. of mils in the binocular reticule).

Passive Acoustic Monitoring (PAM)

While the DAHG (2014) guidance states that *“the use of PAM in Ireland is broadly encouraged as a helpful and beneficial tool for detecting and monitoring certain cetacean species, the Department does not believe it is sufficiently developed to be regarded as the primary or sole monitoring approach for risk-management purposes,”* it is highlighted that this guidance has not been reviewed since 2014. Since 2014, several regulators and Statutory Nature Conservation Bodies have issued guidance recommending the use of PAM for mitigation purposes, reflecting the advances in PAM, technological reliability, and detection algorithms.

For example, the IWDG (2020) advises that seabed surveys should apply standard mitigation practices and incorporate the use of PAM in periods of poor visibility or darkness to *“allow detection of cetaceans in poor visibility during the hours of darkness and for detecting animals underwater where source levels are often highest.”* Similarly, multiple iterations of JNCC guidance (2017, 2023, 2025) recommend that PAM should be used when visual observations by a MMO are not feasible, such as during darkness, fog, glare, or heavy sea states. It is also highlighted that the DCCAE (2018) guidance recommends the use of PAM for pre-construction and post-construction monitoring of marine mammals.

PAM is viewed as a complementary method to aid MMOs in low visibility (e.g. fog or heavy precipitation) and a supplementary method in periods of darkness. Projects that follow JNCC guidelines have used PAM as part of their mitigation measures routinely since 2002 (JNCC, 2023). PAM equipment includes a hydrophone array (which is placed over the side of the pile-driving vessel; multiple hydrophones within an array enables the PAM operator to gain a better understanding of bearing and distance to a vocalisation), deck cable, data acquisition units (DAQs) and computer/laptop set up with acoustic analysis software such as PAMGuard (Gillespie *et al.*, 2008). PAMGuard is an open-source software (www.pamguard.org) which has become the industry standard for monitoring, recording and analysing marine mammal vocalisations. As the platform is used by academics and industry scientists, the programming is constantly being updated to allow the integration of a range of additional plug-in modules. These additional modules can be set up to assist in species identification (e.g. detectors and classifiers), improve localisation features (e.g. maps and mapping, and localisers), improve data recording and annotation, for example.

The Developer commits to implementing PAM as it is the best available method of monitoring during low visibility and hours of darkness. In addition, the Developer will also deploy an ADD prior to commencing operations to encourage individuals to move out of the mitigation zone. The use of the ADD as part of the mitigation measures further reduces any risk to marine mammals where PAM may not detect individuals, for example, if they do not vocalise during the pre-watch period.

Alternate monitoring approaches during low visibility

To complement the use of PAM under low visibility conditions (e.g. fog, heavy rain, or darkness), the Applicant will consider the use of complementary detection technologies to operate alongside PAM and enhance monitoring of the mitigation zone during the periods of low visibility. The Applicant will commit to using these alternate monitoring approaches if required.

Infrared imaging systems and night-vision devices are increasingly used internationally to support marine mammal monitoring when traditional visual detection using MMOs is limited. Their use is well-established within Protected Species Observer programmes in the United States, where several offshore projects along the East Coast have integrated night-vision technologies into standard survey operations (e.g., Alpine Ocean Seismic Survey Inc., 2017; Smultea Environmental Sciences, 2018; Ørsted, 2025). These technologies have been used to observe marine mammals during nighttime operations.

Thermal-detection systems are another option for complementary monitoring to PAM. Whilst the technology is still in development, recent advances in sensor quality and detection range indicate strong potential for the technology to support future monitoring, particularly in low-light environments, and demonstrate increased survey effectiveness when thermal and acoustic approaches are combined (Heather *et al.*, 2020; APTIM Federal Services *et al.*, 2025). While system performance varies, the literature consistently emphasises that technology selection should be tailored to project-specific environmental conditions and monitoring objectives.

Infrared and thermal-imaging systems are limited insofar as detections typically allow only broad-scale identification rather than species-level classification (Smith *et al.*, 2020). However, species identification is not required for the purpose of mitigation specifically; the same mitigating actions would be implemented irrespective of the specific species. Furthermore, these tools would be supplementary to PAM in detecting marine mammals during low visibility conditions. The addition of PAM would increase the potential for species-level classification, if required.

Furthermore, relevant international regulatory frameworks recognise the value of these technologies. For instance, licences issued under the U.S. Marine Mammal Protection Act state that “*during surveys conducted at night, night-vision equipment and infrared technology shall be used in addition to PAM*”. Multiple projects have since demonstrated the efficacy of these tools, providing an evidence base for their continued integration in conditions where visual monitoring alone is not an option.

Pre-Piling Deployment of ADDs

The Developer will use an ADD to ensure that there are no marine mammals in the MMMZ, prior to the commencement of piling.

The typical ADD used for mitigation is a Lofitech AS Seal Scarer, but other alternatives are also available (McGarry *et al.*, 2022). MARA and National Parks and Wildlife Service (NPWS) will be informed of the intended ADD use prior to commencing any piling. The Lofitech AS seal scarer has been used for marine mammal mitigation purposes at a range of European OWF projects during the construction phase, including the C-Power Thornton Bank OWF in Belgium (Haelters *et al.*, 2012), and the Horns Rev II, Nysted and Dan Tysk OWFs in Denmark (Carstensen *et al.*, 2006, Brandt *et al.*, 2009, Brandt *et al.*, 2011, Brandt *et al.*, 2013, Brandt *et al.*, 2016). Within the UK, Lofitech AS seal scarer has been used as mitigation for Dudgeon OWF (Vattenfall, 2017) Beatrice OWF and Race Bank OWF (Seagreen Wind Energy Ltd, 2020).

PAM studies have shown that the Lofitech AS Seal Scarer deters harbour porpoises to a range of 7 km (Graham *et al.*, 2023). Minke whales have been observed to flee to distances greater than 5 km (maximum tracking range noted within the study; Boisseau *et al.*, 2021; McGarry *et al.*, 2017). In the minke whale study, the deterrence effect continued after the ADD was deactivated with the animals continuing to swim away from the ADD location out to up to 5 km (at which point tracking was halted). This suggests that an

ADD would deter minke whales further if activated for longer than the duration used in the study (which was 15 minutes; McGarry *et al.*, 2017).

Based on this evidence, the Applicant considers that the ranges suitable for ADD effectiveness are 5 km for minke whale (McGarry *et al.*, 2017) and 7.5 km for harbour porpoise (Brandt *et al.*, 2013). As dolphins are less acoustically sensitive than harbour porpoise and minke whale, it is assumed that dolphin species would also be deterred to a minimum of 1 km through the use of an ADD. Since 1 km represents the minimum displacement distance for marine mammals using ADDs, this range has been adopted as the r_{safe} distance.

It is proposed that during pile-driving activities, one ADD will be deployed from the deck of the piling vessel with enough cable length to allow the transducer to be positioned under the hull. The control unit and power supply will be set up in a suitable, safe position on deck where it can be secured to the vessel and located in an area of easy access for the MMO to deploy and operate during pre-watch. The MMO will be responsible for the coordination of the deployment, maintenance, operation, and recording/reporting of the ADD activity. During nighttime operations, the PAM operator cannot be responsible for the deployment and operation of the ADD whilst monitoring the PAM computers; therefore, during mobilisation the MMO will train a member of the crew that will be positioned on night shift on deployment and retrieval of the ADD and demonstrate how to switch the ADD on and off. This crew member will be given a VHF to allow communication with the PAM operator during operations to ensure the procedures and protocols are followed correctly.

Following JNCC guidelines, a 30-minute visual search will be undertaken prior to ADD activation to ensure that there are no marine mammals within the 100 m of the ADD. If an animal is detected during the visual search, activation of the ADD will be delayed until the animal has moved away.

The approach to calculating an appropriate ADD duration has been based on the predicted PTS-onset ranges presented in the underwater noise modelling (Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026)). The proposed ADD duration is calculated based on the time it would take a marine mammal to flee beyond the distance of PTS-onset, using both the SPL_{peak} and SEL_{cum} metrics. The underwater noise modelling assumes an average swim speed of 1.5 ms^{-1} for harbour porpoise and dolphins, and 3.25 ms^{-1} for minke whale to determine the cumulative PTS-onset range; these have also been used to calculate fleeing distance during ADD activation (Annex Table E). The swim speeds used for bottlenose dolphin are considered conservative (other citations note greater swim speeds: e.g. bottlenose dolphin: 1.52 ms^{-1} ; (Bailey and Thompson, 2010).

Annex Table E: Modelled PTS onset ranges for SPL_{peak} and SEL_{cum} thresholds based on Southall *et al.* (2019) and the duration an active ADD would be required to ensure marine mammals are outwith their respective impact ranges

Relevant species	Species threshold	PTS onset	Swim speed (ms ⁻¹)	Max PTS onset range (m)+	ADD duration (minutes)
Minke whale	LF cetacean (219 dB SPL_{peak})		3.25	60	<1
	LF cetacean (183 dB SEL_{cum})		3.25	870	5
Dolphins (e.g. bottlenose dolphin)	HF cetacean (230 dB SPL_{peak})		1.5	<50	<1

	HF cetacean (185 dB SELcum)	1.5	<50	<1
Harbour porpoise	VHF cetacean (202 dB SPLpeak)	1.5	680	8
	VHF cetacean (155 dB SELcum)	1.5	<50	<1

* based on a starting distance of 0 m from the pile

ADD duration summary

The ADD durations presented in Annex Table E would ensure that the risk of injury from piling is reduced to negligible (by allowing all animals time to swim out of any potential PTS onset ranges, prior to the first hammer strike). The ADD duration would need to be a minimum of 8 minutes in order to ensure that the risk of injury from piling is reduced to negligible (by allowing all animals time to swim out of any potential PTS-onset ranges, prior to the first hammer strike). To ensure that an r_{safe} distance of 1,000 m is achieved for all species, an ADD duration of 15 minutes will be implemented. The ADD has been proven to displace marine mammal species to distances beyond the maximum injury range, therefore there is negligible risk of injury. This conclusion of negligible risk is further contributed to by the monitoring (by MMO or PAM Operator) of the mitigation zone prior to the start of piling.

As presented in Annex Table F, the period of ADD activation will allow minke whale to reach 2.9 km, and other marine mammal species to reach 1.4 km, prior to pile driving commencing. The piling sequence will then commence with a ramp up (including soft-start) while it is expected that marine mammals will continue moving away from the sound source. Annex Table F estimates the distances that could potentially be reached by the receptors if the estimated swim speed was maintained and individuals swam continuously and directly away from the ADD for the entire duration of ADD activation, followed by the modelled soft-start procedure at the start of the ramp up. The specified soft start and ramp up procedure is based on a conservative assessment and is not reflective of the actual change in energy for all piles; however, it can be interpreted as an upper limit on the allowable energy at any time during the piling event.

Annex Table F: Estimated distances reached by receptor species if the recommended ADD activation, soft-start and ramp-up procedure is implemented consecutively

Species	Swim speed (ms ⁻¹)	Total distance reached after 15 minutes activation	distance after 15 ADD	Total distance reached after additional 60 minutes of ramp up (soft-start)
Minke whale	3.25	2.9 km		14.6 km
Bottlenose dolphin, harbour porpoise, Risso's dolphin, common dolphin	1.5	1.4 km		6.8 km

The proposed ADD duration, combined with the MMO/PAM pre-piling watch (or PAM), present the best available pre-piling mitigation measures to reduce the risk of injury by as much as reasonably practicable. These measures increase the probability that marine mammals are outside of the PTS onset range, prior

to the start of piling. These mitigation measures will be implemented in conjunction with measures focussed on the piling activity itself (e.g. soft-start procedure).

It should be noted that the calculations of the required duration for the ADD deployment assumes that the animals are present adjacent to the vessel when the ADD is activated. As noted above, recent studies of impacts from construction at offshore wind farms showed that the presence of vessels alone (prior to the start of any piling activity) contributed to deterrence of harbour porpoises from a very close range (Graham *et al.*, 2019) and therefore it is likely that the mammals will be much further away than the minimum distances identified above. Less is known regarding minke whale response to vessels where some studies have recorded little behavioural response to vessels alone (Bland *et al.*, 2023), but individuals have been observed to show aversion to sonar activity (Durbach, *et al.*, 2021). The proposed ADD durations are considered to provide a conservative time period for animals to vacate the impacted area whilst not adding excessive noise into the marine environment.

Soft-Start Procedure

Following the pre-piling procedures (as identified above, ADD activation and MMO/PAM pre-piling watch), piling will always begin with a ramp-up that commences with a soft-start procedure (as shown in Annex Table G). The specified ramp up is based on a conservative assessment and is not reflective of the actual change in energy for all piles; however, it can be interpreted as an upper limit on the allowable energy at any time during the piling event. The ramp-up will start at a lower energy and thereafter build up gradually over a period of no less than 120 minutes before reaching necessary maximum output. The application of this ramp-up to all piling is therefore compliant with the DAHG (2014) guidance.

The extended ramp-up mitigation scenario will implement a soft-start that will comprise a maximum scenario of 30 minutes slow strike rate of one blow every 10 seconds up to 400 kJ (11.4% of the maximum hammer energy modelled) followed by 30 minutes of 15 blows per minute at 400 kJ. Once the proposed 60 minutes of soft-start (increasing blow rate at low hammer energy) is complete, the hammer energy will increase over time as a ramp up to the required hammer energy required to reach penetration depth.

Annex Table G: Summary of the soft start and ramp up scenario used for the monopile foundation modelling at the WTG and OSP locations. Source: Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026).

	400 kJ	400 kJ	800 kJ	1,550 kJ	2,275 kJ	3,500 kJ
Number of strikes	18	450	600	600	600	3,600
Duration	30 min	30 min	20 min	20 min	20 min	120 mins
Strike rate	0.6 blow/min	15 blow/min	30 blow/min			
5,868 strikes, 4 hours duration						

Breaks in Piling Procedure

Standard DAHG (2014) guidance for breaks in piling activity (high output pile driving) will be followed should they occur. If there is a break in piling operations for a period of greater than 10 minutes, then a pre-piling search and ramp-up (including soft-start procedure) will be repeated prior to piling recommencing, if it is possible to do so. If a watch of the mitigation zone has been continued, the MMO/PAM operator will confirm

the presence or absence of marine mammals and it may be possible to commence the soft-start immediately. If there has been no watch, then a pre-piling search will need to be undertaken prior to soft-start commencing.

Under some circumstances, it may not be possible to recommence piling with a soft-start procedure due to technicalities such as ground conditions and equipment limitations. In this case the ADD will be deployed for 20 minutes prior to re-commencing piling, following pre-piling search. This will align to DAHG guidance which advises where ramp-up is not possible, alternatives will be implemented whereby the underwater output of acoustic energy is introduced in a consistent, sequential and gradual manner over a period of 20-40 minutes prior to commencement of the full necessary output.

Where possible (i.e. if vessel remains on site), MMO/PAM operator maintain watch throughout any break in piling activities to ensure that no marine mammals are present within the 1,000 m radius.

Delays in the commencement of piling

There is a risk of animals moving into the mitigation zone when there is no piling activity nor ADD activation. If ADDs are activated for their permitted duration and piling is not ready to commence, the ADD will be switched off. This is to avoid unnecessary noise entering the marine environment. The ADD will not be switched on until the ADD operator is notified that piling is ready to commence and the Developer will follow the procedure as set out in this MMMP (i.e. MMO/PAM pre-watch, ADD activation and soft-start).

Communications

The MMO, PAM operator and ADD operator will be appointed either directly or indirectly by the Developer. A communications protocol will be developed between the MMO/ADD operator, the PAM operator and ADD operator (a trained crew member on night shift) and the construction manager and/or appropriate crew members (e.g. hammer operators and Operations Manager). The below section details the personnel, organisations, and responsibilities for the MMMP:

The Developer's Environmental Manager

Overall responsibility for compliance with all environmental monitoring, mitigation and reporting requirements on the Proposed Development. Will ensure that the MMO, PAM/ADD operator, nominated Client Representative for construction activities and installation personnel have received all relevant information, and will consult with them before making decisions affecting the MMMP.

MMO and PAM operator(s)

Responsible for advising on, monitoring and recording compliance with this MMMP. Liaises with the nominated Client Representative for construction activities, and Offshore Construction Contractor as appropriate. PAM and MMO responsibilities cannot be shared by one person. The PAM operator is responsible for the PAM equipment (verification and calibration prior to use) in accordance with the MMMP, co-ordination of deployment, maintenance, operation, and recording/reporting.

ADD operator(s)

Responsible for the provision of equipment (verification and calibration prior to use) in accordance with the MMMP, co-ordination of deployment, maintenance, operation and recording/reporting. The ADD operator can work a dual role as the MMO; however, the ADD and PAM operator cannot be the same person. If ADD operation is required during darkness, a crew member on night shift will be trained by the MMO/ADD operator during mobilisation.

Nominated Client Representative for construction activities (the Developer)

Takes offshore responsibility that the requirements of this MMMP are met, responsible for ensuring adequate communication and liaison between MMO/PAM operator and installation personnel as required. The Client Representative (and/or MMO/PAM operator) has the responsibility to delay piling activities if necessary to do so.

Offshore Construction Contractor

Responsible for informing MMO/PAM operator about scheduled piling activity and communication as per protocol. Responsible for providing pile driving records to MMO/PAM operator and Client representative. The communications protocol and flow charts will include but not be limited to procedures:

- To notify the MMO to begin 30-minute pre-watch prior to soft-start commencing;
- For the MMO/PAM operator to give the nominated Offshore Construction Contractor the green light for construction activities and that deployment of ADD and activation for the required time has been successful;
- The nominated Client Representative or Offshore Construction Contractor to notify the MMO/PAM operator that there has been a delay in the onset of the soft-start; and that the MMO/ADD operator should turn off the ADD;
- For the MMO/PAM operator to notify nominated Offshore Construction Contractor or Client Representative for construction activities that a marine mammal has been detected within the mitigation zone and that the soft-start will need to be delayed;
- The client to notify MARA that the piling operations have been successfully completed.

Reporting

A record of piling operations, MMO/PAM survey effort and sightings will be maintained during piling. These reports include:

- An outline of the marine mammal monitoring methodology and procedures employed;
- A record of all piling operations detailing dates, additional mitigation measures, soft-start duration, piling duration, hammer energy during soft-start and full-power, and any operational issues;
- A record of survey effort including the duration of the MMO/PAM operator's watch, environmental conditions, a description of any marine mammal sightings, passive acoustic recordings and any actions taken. A record of any incidental sightings will also be made during the pre-piling watch or operations;
- Details of any problems encountered during the piling process including any instances of non-compliance with the marine licence; and
- Any recommendations for amendment of the protocol.

Reports will be collated and provided to MARA for information once the works are complete, alongside a summary report of the numbers of marine mammals recorded (visually or acoustically) and any mitigation required during construction. The report will also discuss the protocols followed, and put forward any recommendations based on project experience, that could benefit future OWF construction projects.

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Annex D Underwater Noise Assessment Approach

Annex D.1 Approach to PTS and TTS-onset

The modelling of impact piling has been undertaken using the INSPIRE underwater noise model, developed by Subacoustech Environmental Ltd. The INSPIRE model (currently version 5.2) is a semi-empirical underwater noise propagation model based around a combination of numerical modelling (a combined geometric and energy flow/hysteresis loss method) and actual measured data. It is designed to calculate the propagation of noise in shallow (i.e., less than 100 m), mixed water; typical of the conditions around Ireland and the UK and well suited for use in the Irish Sea. The model has been tuned for accuracy using over 80 datasets of underwater noise propagation from monitoring around offshore piling activities. Full details of the INSPIRE model are presented in EIAR Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026).

The PTS-onset thresholds used to assess the potential for auditory injury to marine mammals during pile driving are those presented in Southall *et al.* (2019) for impulsive noise (Annex Table H). The TTS-onset thresholds are also presented (Annex Table H), whereby TTS is not regarded as injury given its temporary nature and any impacts relating to the effects of TTS are considered to be captured in the quantitative assessment of disturbance.

Impulsive sound sources, such as pile driving, have high peak sound pressure, short duration, fast rise-time, and broad frequency content at source.

Both instantaneous Sound Pressure Level (SPL_{peak}) and cumulative Sound Exposure Level (SEL_{cum}) PTS and TTS-onset thresholds have been presented by Southall *et al.* (2019) (Annex Table H) and are used within this assessment.

Southall *et al.* (2019) propose the SPL_{peak} being either unweighted or flat weighted across the entire frequency band of a Functional Hearing Group (FHG) because the direct mechanical damage to the auditory system that is associated with high peak sound pressures is not frequency dependent and is therefore restricted to the audible frequency range of a species. Unweighted SPL_{peak} values are therefore included in this assessment for instantaneous PTS and TTS (Annex Table H).

The SEL_{cum} thresholds considers the SEL received by an animal and the duration of exposure, accounting for the accumulated exposure over a 24-hour period. Southall *et al.* (2019) recommends the application of SEL_{cum} for the individual activity alone (i.e., not for multiple activities occurring within the same area or over the same time). To inform this impact assessment, sound modelling has considered the SEL_{cum} over a piling event. It is important to note that the physiological damage that sound energy can cause is mainly restricted to energy occurring in the frequency range of a species' hearing range. Therefore, for the SEL_{cum} , sound has been weighted based on species group specific weighting curves presented in Southall *et al.* (2019).

Annex Table H: PTS and TTS-onset thresholds for impulsive noise (Southall *et al.*, 2019)

Species	FHG	Cumulative PTS (SEL _{cum} dB re 1 μPa ² s weighted)	Instantaneous PTS (SPL _{peak} dB re 1 μPa unweighted)	Cumulative TTS (SEL _{cum} dB re 1 μPa ² s weighted)	Instantaneous TTS (SPL _{peak} dB re 1 μPa unweighted)
Harbour porpoise	VHF cetacean	155	202	140	196
Dolphin species (bottlenose dolphin, Risso's dolphin, common dolphin)	HF cetacean	185	230	170	224
Minke whale	LF cetacean	183	219	168	213

To quantify the impact of underwater noise on marine mammals with regard to PTS and TTS, the instantaneous (SPL_{peak}) and cumulative (SEL_{cum}, over 24 hours) PTS and TTS-onset impact ranges (the area around the piling location within which the noise levels exceed the PTS or TTS-onset thresholds for the relevant FHG) are determined using the recent thresholds presented by Southall *et al.* (2019). Further information on the modelling approach and the methods used to calculate PTS and TTS-onset impact ranges is provided in Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026).

The noise modelling assessment by Subacoustech Environmental Ltd in EIAR Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026) assumed that when exposed to high levels of noise, minke whale will swim away from the noise source at a constant swim speed of 3.25 ms⁻¹ (Blix and Folkow, 1995) and for all other species, animals were assumed to flee at a constant speed of 1.5 ms⁻¹, based on reported sustainable long-term swimming speeds for harbour porpoise (Otani *et al.*, 2000).

The ranges that indicate TTS-onset were modelled and are presented in this impact assessment for both Project Design Options. The current set of TTS-onset thresholds presented by Southall *et al.* (2019) (Annex Table H) define a TTS-onset as the exposure required to produce a 6 dB shift in the hearing threshold. However, data upon which these thresholds are based for TTS-onset in marine mammals from impulsive noise, such as pile driving, is extremely limited. It has been necessary to determine exposure functions for TTS in order to estimate the levels at which the onset of PTS could occur, as experiments inducing PTS in animals is considered unethical. Predicted exposures of 40 dB of TTS are considered to result in PTS onset (Southall *et al.*, 2007). For the purposes of developing these thresholds, TTS was considered to be “the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject’s normal hearing ability”, and which “is typically the minimum amount of threshold shift that can be differentiated in most experimental conditions” (Southall *et al.*, 2007). Thus, using a threshold for the onset of TTS would typically result in overestimates of potential ranges at which ecologically significant effects could occur. Furthermore, as TTS-onset is defined primarily as a means of predicting PTS-onset, there is currently no threshold for TTS-onset that would indicate a biologically significant amount of TTS.

The number of individuals that may be affected by PTS relative to the reference population was quantified by multiplying the onset impact ranges by the density estimates for each species and calculating the proportion of the reference population.

Annex D.2 Behavioural disturbance

Dose-response functions

A species-specific dose-response approach was used for the assessment of disturbance to marine mammals from underwater noise during pile driving. This approach was based on current best practice methodology to provide evidence-based estimates rather than the fixed behavioural threshold approach.

The application of a dose-response function is used to quantify the probability of a response from an animal to a stressor or stimulus, which will vary according to the dose of stressor or stimulus received by the animal (Dunlop *et al.*, 2017). Therefore, it is based on the assumption that not all animals in an impact zone will respond, unlike traditional methods of threshold assessment.

For the purpose of this assessment, the dose is the received single-strike SEL_{ss} which is considered to be best practice for this type of assessment (Southall *et al.*, 2021). SEL_{ss} contours at 5 dB intervals generated by noise modelling (see Volume III, Appendix 11.1: Underwater Noise Assessment (Revised March 2026)) were overlain on species density surfaces to quantify the number of animals receiving each SEL_{ss}, and subsequently the number of animals likely to be disturbed based on the dose-response curve.

This impact assessment for cetaceans uses the dose-response curve that was developed by Graham *et al.* (2017a) for harbour porpoise using data collected during the first six weeks of piling during Phase 1 of the Beatrice offshore windfarm.

Following the development of this dose-response curve, additional data from the remaining piling events have been processed and showed that the responses of harbour porpoises to piling noise diminishes over the construction period (Graham *et al.*, 2019). Therefore, the use of the dose-response curve from the initial piling event in this assessment can be considered conservative.

In the absence of species-specific dose-response data for dolphins or minke whales, this dose-response curve has been adopted for all cetaceans, however it is considered that the application of the porpoise dose-response curve to other cetacean species is highly over-precautionary. This is because harbour porpoises are highly responsive to anthropogenic disturbance, with multiple studies showing response via avoidance and/or reduced vocalisation to various anthropogenic noise sources (Benhemma-Le Gall *et al.*, 2021; Brandt *et al.*, 2013; Brandt *et al.*, 2018; Thompson *et al.*, 2013; Thompson *et al.*, 2020; Sarnocińska *et al.*, 2020). Other cetacean species, including bottlenose dolphin and common dolphin, have shown less of a response to underwater noise in comparison to harbour porpoise (Fernandez-Betelu *et al.*, 2021; Kastelein *et al.*, 2006; Stone *et al.*, 2017).

Level B harassment – Fixed noise thresholds

In the absence of specific-specific empirical data for dolphin species and minke whale and given that the application of the harbour porpoise dose-response curve (Graham *et al.*, 2017b) is highly over-precautionary, the numbers of animals predicted to experience behavioural disturbance using the United States (US) National Marine Fisheries Service (NMFS) Level B harassment thresholds for strong disturbance (NMFS, 2005) are presented alongside the dose-response assessment methodology to provide context on the potential extent of disturbance.

In the US, under the 1994 Amendments to the Marine Mammal Protection Act, Level B harassment is defined as having the potential to disturb a marine mammal or marine mammal stock in the wild, by causing disruption of behavioural patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but which does not have the potential to injure a marine mammal or marine mammal stock in the wild (NMFS, 2005).

The threshold predicts that Level B harassment will occur when an animal is exposed to received sound levels above 160 dB re 1 μ Pa (rms) from non-explosive impulsive sound sources, such as seismic airguns, impact pile driving, or intermittent sound sources, such as non-tactical sonar or scientific (Guan and Brookens, 2021; NMFS, 2023). The threshold is based on studies of grey whale (also low-frequency cetaceans) responses to playback signals from air guns above 160 dB re 1 μ Pa (rms), which showed that the animal's exhibited an avoidance response (Malme *et al.*, 1984). Beyond the 160 dB re 1 μ Pa (rms) threshold, the behavioural responses are likely to become less severe, for example, minor changes in speed, direction and/or dive profile, modification of vocal behaviour and minor changes in respiratory rate (Southall *et al.*, 2007). However, it is important to note that marine mammal responses to disturbance will, depend on the individual and the context. For example, previous experience and acclimatisation will affect whether an individual exhibits an aversive response to noise, particularly in a historically noisy area.

Further information on the assumptions surrounding underwater noise, including the subsea noise model, PTS-onset and TTS-onset are detailed within the EIAR Volume II, Chapter 11: Marine Mammals (Revised March 2026).

Annex D.3 References

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