MARESCONNECT

Derogation Licence

Supporting Information Report

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Intertek Metoc
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Derogation Licence

Supporting Information Report

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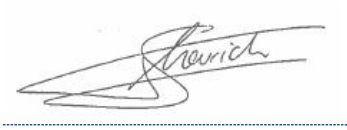	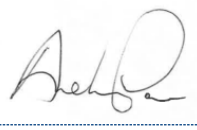
Stephane Theurich	Andrew Page

Rev No	Date	Reason	Author	Checker	Authoriser
Rev 0	09/12/2024	Initial Issue	AC	ESL	APA

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GLOSSARY

BEIS
The UK Department for Business, Energy & Industrial Strategy

DAHG
Department of Arts, Heritage and the Gaeltacht

DECC
Department of Environment, Climate and Communications

DESNZ
Department for Energy Security and Net Zero

DHLGH
Department of Housing, Local Government and Heritage

EENL
Etchea Energy Nominees Limited

EEZ
Exclusive Economic Zone

EPS
European Protected Species

EU
European Union

FCS
Favourable Conservation Status

FL
Foreshore Licence

Foresight
Foresight Group Holdings Limited

GB
Great Britain

Ha
Hectares

HF
High Frequency

HWM
High-Water Mark

Hz
Hertz

ICES
International Council for the Exploration of the Sea

Intertek
Intertek Metoc

IUCN
International Union for Conservation of Nature

IWDG
Irish Whale and Dolphin Group

Khz
Kilohertz

kHz
Kilohertz

LF
Low Frequency

M
Meters

MARA
Maritime Area Regulatory Authority

MaresConnect
MaresConnect Interconnector

MaresConnect Limited
MaresConnect Ltd

MBES
Multibeam Echosounder

MCL
MaresConnect Limited

MMO
Marine Mammal Observer

MU
Management Units

MUL
Maritime Usage Licence

MW
MegaWatt

NBDC
National Biodiversity Data Centre

NM
Nautical Mile

NMS
National Monuments Service

NPWS
National Parks & Wildlife Service

PCW
Phocid carnivores in water

PTS
Permanent threshold shift

ROI
Republic of Ireland

SAC
Special Area of Conservation

SBP
Sub-bottom Profiler

SEL
Sound Exposure Level

SMRU
Sea Mammals Research Unit (UK)

SPA
Special Protection Area

SPL
Sound Pressure Level

SSS
Side Scan Sonar

TTS
Temporary threshold shift

UAU
Underwater Archaeology Unit

UK
United Kingdom

USBL
Ultra-short baseline

VHF
Very High Frequency

1. INTRODUCTION

The MaresConnect Interconnector (MaresConnect) is a proposed 750-megawatt (MW) electricity interconnector connecting the Great Britain (GB) and Republic of Ireland (ROI) electricity transmission networks. It is being developed by MaresConnect Limited (MCL), a special purpose vehicle incorporated in Ireland and joint owned by Foresight Group Holdings Limited (Foresight) and Etchea Energy Nominees Limited (EENL). The construction of the interconnector is scheduled to commence in 2027, with testing and full operation from 2029.

MCL is currently exploring the potential for an electricity interconnector off the coast of County Dublin, with consideration given to five potential landfall zones: Ardgillan, Balcarrick, Loughshiny, Robswalls, and Rush. MCL intend to undertake site investigation surveys from the High-Water Mark (HWM) to Ireland's Exclusive Economic Zone (EEZ) boundary in order to inform the location and design of the proposed electricity interconnector, site investigation surveys will be undertaken by a third-party survey contractor.

MCL have commissioned Intertek, Metoc (Intertek) to prepare this report in support of an application for a derogation licence under Regulation 54 to carry out site investigation activities to determine the suitability of the site for the proposed interconnector.

This document forms part of the derogation licence application submitted under Regulation 54 to the National Parks and Wildlife Service (NPWS). It provides supporting information for a risk assessment of European Protected Species in accordance with Article 12 of the Habitats Directive (92/43/EEC).

The purpose of this report is to aid the application process by supplying the competent authorities with the necessary details to evaluate the potential impact of the project on Annex IV species. It also assesses how the project may affect the maintenance of these species at a Favourable Conservation Status (FCS) within their natural range.

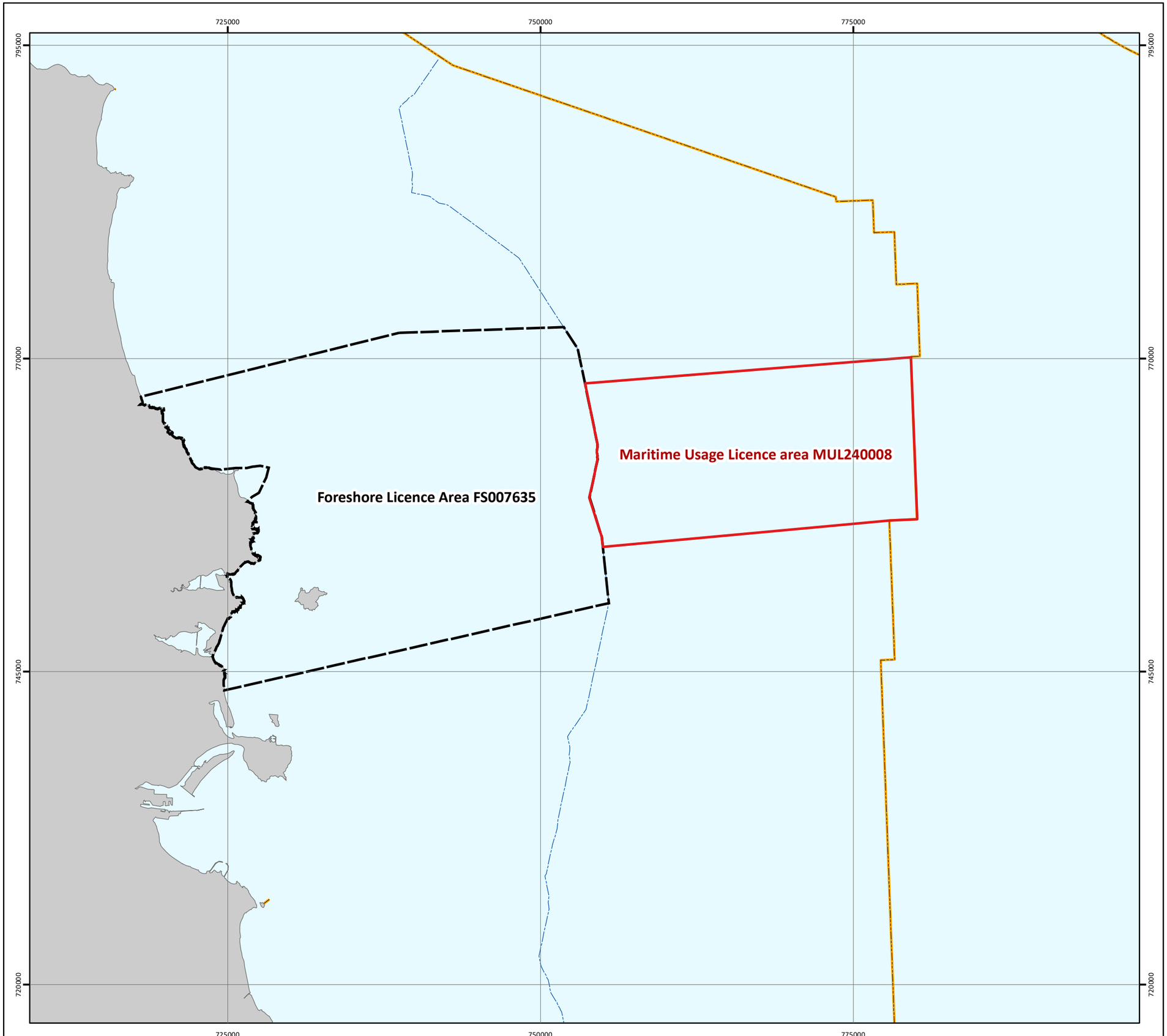
1.1 Derogation Licence Application Area

The proposed survey area is located on the east coast of Co. Dublin and extends out to Ireland's EEZ boundary, this is geographic area of approximately 106,366.6 hectares (Ha) in total. Due to the change of regime in Maritime Law in Ireland during MCL's application for Foreshore Licence, MCL have a foreshore licence (FL) (ref: FS007635) in place and an application for a Maritime Usage Licence (MUL) (ref: MUL240008) is currently being review by Maritime Area Regulatory Authority (MARA). The Derogation Licence application area covers both the FL and MUL areas. The proposed survey area site is outlined in Figure 1-1 (Drawing Number: P2578M-LOC-005) below.

MARESCONNECT INTERCONNECTOR DEROGATION LICENCE

LOCATION OVERVIEW
FLA and MUL

Drawing No: P2578M-LOC-005 | **A**



Legend

- Maritime Usage Area
- Foreshore Licence Area

Administrative Boundaries

- 12nm Territorial Sea Limit
- EEZ Boundary

N
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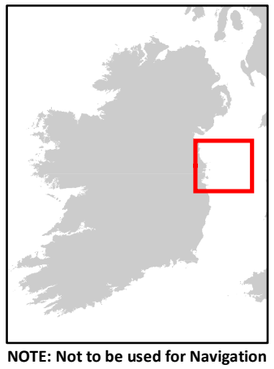

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Created By	Lewis Castle
Reviewed By	Emma Langley
Approved By	Aodhfin Coyle

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1.2 Site Investigation Activities

The intention is to commence the proposed site investigation activities as soon as feasible following award of the necessary survey consents, taking into consideration any proposed mitigation requirements. The site investigation activities will preferably be undertaken in the months feasible from February 2025 onwards subject to weather conditions and vessel availability.

The objective of the site investigation surveys is to determine detailed site conditions including seafloor geology and environmental characteristics. The exact technical specifications of the equipment to be used will not be known until the survey contract has been awarded, however a summary is provided in the Method of Survey Works document (Reference: P2578_R6014_Rev0) which can be accessed here.

The site investigation activities that will be undertaken include:

- Geophysical survey;
- Geotechnical survey; and
- Environmental survey.

The planned geophysical survey program adopts a multidisciplinary approach designed to collect comprehensive data using tools such as a . This data will enhance the understanding of the site's existing geophysical and environmental characteristics. The geophysical survey process is non-intrusive, meaning the equipment will not physically interact with the seafloor at any stage.

For this risk assessment, typical acoustic properties of the equipment are provided. The acoustic frequencies outlined below are representative of those commonly used in surveys designed to gather suitable data for offshore renewables projects.

1.3 Geophysical Survey

The geophysical acquisition methodologies will comprise Multibeam Echosounder (MBES), Side Scan Sonar (SSS), magnetometry and Sub Bottom Profiler (SBP) surveys. The objectives of the proposed geophysical survey are to:

- Map the seabed and sub-surface to assist in optimising the routing of interconnector cable within the Derogation licence area and to enable assessment of cable burial depth;
- Plan the scope and positioning of the geotechnical sampling programme in the Derogation licence area;
- Identify marine habitat areas from which the benthic survey can be undertaken;
- Identify sensitive marine habitats which will need to be avoided during geotechnical and environmental sampling and cable installation; and
- Provide the geophysical data from which a marine archaeological assessment can be undertaken as part of the consenting process.

To meet these objectives, the geophysical survey will undertake the following tasks:

- Measure intertidal topography and seabed bathymetry, surface morphology and identify the nature of the seabed sediments - in particular the height, length and slopes of sand waves (through use of the MBES and SSS);
- Identify the distribution and thickness of superficial sediments and rock head where possible (through use of the SBP);
- Identify the distribution of subsea geological features such as areas of exposed bedrock (through use of the MBES and SSS); and

- Identify the location, extent and nature of any impediments to cable installation and laying or burial of the cables such as wrecks, debris on seafloor, rock outcrop, other cables, pipelines etc. (through use of the magnetometer, MBES and SSS).

The interpretation of the geophysical survey for cable routing forms the basis of the scope of work for geotechnical and benthic surveys. The bathymetric, SSS and SBP systems proposed are characterised by a limited acoustic footprint with the directional, high-frequency, short-duration output attenuated within a few hundred metres of the survey vessel. Proposed geophysical sampling of cable routes via the Device Detection Permit will be communicated to the National Monuments Service (NMS) – Underwater Archaeology Unit (UAU) for approval ahead of works commencing.

It is Good Industry Practice for geophysical surveys in Irish waters to follow the Department of Arts, Heritage and the Gaeltacht (DAHG) "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters" (2014). Section 4.3.4(ii) is applicable to the type of geophysical survey proposed and will be implemented by the survey contractor. This includes the following procedures:

▪ Sound-producing activities shall only commence during daylight hours where effective visual monitoring by the Marine Mammal Observer (MMO) is possible. Agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

- Survey activities must not commence if marine mammals are detected within a 500 meters (m) radius of the sound source.
- In waters up to 200 m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within 500m radius by the MMO.
- A ramp-up procedure (i.e. soft start) will be used:
  - a. Where it is possible according to the operational parameters of the equipment concerned, the device's acoustic energy output shall commence from a lower energy start-up (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 minutes.
  - b. This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.
  - c. Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched "on" and "off" in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.
- Once the ramp-up procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 500m radial distance of the sound source.
- If there is a break in sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line or station change) then all pre-start monitoring, and a subsequent ramp-up procedure must be undertaken.

1.3.1 Location and survey spacing

The area of search (determining location of Derogation licence boundary) for the possible development of the interconnector cable corridors are based on desktop assessments. Following a

precautionary approach and to be judicious, it has been assumed that the geophysical surveys will be conducted across the whole of the Derogation licence area. The swathe width for each piece of equipment will depend on the water depth encountered. It is anticipated that the width of each swathe will allow for a 50% overlap between each swathe.

1.3.2 Equipment

Specific equipment to be used during the geophysical survey have not yet been specified to date as the contractor has not been appointed. Examples of industry standard equipment for the purpose of geophysical and geotechnical survey have been used in this assessment. Frequencies and decibels used to obtain the data will be within similar ranges for all equipment used.

Table 1-1 Equipment Proposed for the Geophysical Site Investigation Activities

Equipment type	Purpose	Frequency kilo hertz (Khz)(min-max)	Source level Sound Pressure Level (SPL) (peak) in dB re 1 µPa@1m	Source
Multibeam Echosounder (MBES)	A remote sensing acoustic device typically attached to a vessel's hull. The purpose is to map the water depth to seabed (bathymetry).	Systems range from 200 – 700 Typically, 400 for this water depth	210 – 245	Danson (2005), Hopkins (2007), Genesis (2011), Lurton and DeReutier (2011), BEIS (2020), (Jiménez-Arranz et al., 2020)
Side Scan Sonar (SSS)	Typically towed at an altitude or 10-15m, sends and receives dual frequency acoustic pulses to detect objects (pipelines, shipwrecks etc) and enable classification of surficial marine geology (sediment type, outcrops, bedforms)	100 – 900 with high resolution models 600/1600	200 – 240	DAHG (2014), BOEM (2019), BEIS (2020), (Jiménez-Arranz et al., 2020) Edgetech (2022)
Sub-Bottom Profiler (SBP)	Typically hull mounted or towed at the surface, sends short pulses to the seafloor, and are used to image geological layers and sediment thicknesses beneath the seabed. Types of SBP systems include Pingers, Boomers, Sparkers and Chirp, which have different frequencies.	Overall: 0.5 – 40 Pingers: 2.5 – 7 Boomers: 0.3 – 6 Sparker: 0.3 – 5kHz Chirp: 3-40	196 – 247	Danson (2005), King (2013), BOEM (2016), BEIS (2020), (Jiménez-Arranz et al., 2020), Innomar, (2022)
Magnetometer/ Gradiometer	Passive equipment which detects ferromagnetic anomalies in the seafloor such as pipelines, cables, debris, and unexploded ordnance	No sound emitted	No sound emitted	N/A
Ultra-short baseline (USBL)	A USBL system has a hull mounted transducer with a transceiver attached to survey equipment. It uses low frequency acoustic sound to verify subsea positioning.	19-34	184-202	Jiménez-Arranz et al., 2020

1.4 Guidance

Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) provides a strict protection regime for species listed in Annex IV of the Directive, across their entire natural range within the EU, both within and outside of European protected sites.

The requirements of the Habitats Directive are transposed into Irish statute through the Habitats Regulations. With regard to Annex IV species (listed in Part 1 of the first schedule of the Regulations), it is an offence under Section 51(2) of the Regulations 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 destroy 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 in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.

Derogation licences may be granted by the Minister for Housing, Local Government and Heritage which would allow an otherwise illegal activity to go ahead in a controlled manner provided that:

1. there is no satisfactory alternative; and
2. the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a FCS in their natural range.

Favourable conservation status (of a species) is defined in the Habitats Regulations as the conservation status of a species when:

a. population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;

b. the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and

c. there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The DAHG “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” published in 2014, was provided as official guidelines and codes of practice under Regulation 71 of the Habitats Regulations. This Guidance has been used to determine the content required for this Risk Assessment for Annex IV Species.

1.4.1 Determining the Need for a Derogation Licence

The aim of the European Protected Species (EPS) Risk Assessment is to evaluate whether, even with the mitigation measures , there remains a possibility that the site investigation activities could intentionally harm or unintentionally disturb cetaceans or other protected species. The decision on whether a derogation licence under Regulation 54 of the Birds and Habitats Regulations 2011 is required will be made by the DHLGH, based on the findings of this assessment.

The determination of whether a derogation licence is necessary will involve the regulators applying the following three tests:

1. Verifying if the licence application aligns with one of the purposes specified in the Regulations.

2. Establishing that there are no viable alternatives to the proposed activity that would eliminate the risk of an offence.
3. Ensuring that granting the licence will not jeopardise the maintenance of the species' populations at a FCS.

Once the proposed activity has undergone a risk assessment and the above tests have been applied, the regulator may decide to refuse the licence, grant the licence without requiring mitigation, or approve the licence subject to conditions, restrictions, or specified mitigation measures.

1.4.2 Test 1

As outlined in Section 10 of the Application for Derogation Licence Under the European Communities (Birds and Natural Habitats) Regulations 2011 – 2021, this Application Qualifies under Regulation 54(2)(C) of the European Communities (Birds and Natural Habitats) Regulations:

"*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*"

Intertek's assessment determined thatthe site investigation activities will not significantly affect the FCS of any of the EPS populations and therefore a derogation licence is not required . Information on this is outlined in the following sections below.

However, MaresConnects' application for a derogation license is under Regulation 54(2)(c) of the European Communities (Birds and Natural Habitats) Regulations. This is due to the proposed geophysical surveys for the MaresConnect project being conducted in the interest of imperative reasons of overriding public interest, including socio-economic benefits and beneficial environmental consequences.

Interconnectors play a pivotal role in ensuring energy security, promoting renewable energy integration, and facilitating Ireland's transition to a low-carbon economy. National Policy Statement Electricity Interconnection July 2023, released by the Department of the Environment, Climate and Communications (DECC), underscores the strategic importance of electricity interconnectors in achieving Ireland's renewable energy targets under the Climate Action Plan 2023 and supporting broader European Union (EU) objectives under the European Green Deal.

This site investigation phase is essential for determining the feasibility and optimal routing of the interconnector, which will contribute to the diversification of energy sources, reduction of reliance on fossil fuels, and delivery of significant socio-economic benefits. The surveys have been designed with stringent mitigation measures to minimise impacts on qualifying interests, including harbour porpoises. As such, this application aligns with national energy and climate policies while ensuring compliance with conservation obligations.

1.4.3 Test 2

In planning the proposed geophysical surveys for the MaresConnect site investigation, a comprehensive assessment of alternatives was conducted to identify options that would eliminate the risk of an offence to the protected species within the various Special Area of Conservation (SACs), particularly harbour porpoises.

Routing Alternatives:
Alternative routes for the interconnector that avoid passing through SAC's were evaluated during the preliminary stages of project planning. However, these routes were deemed unfeasible due to various technical, logistical, and environmental constraints, such as excessive cable lengths, unsuitable seabed conditions, and potential impacts on other environmentally sensitive areas. Avoiding SACs would

significantly compromise the project's efficiency and viability, leading to disproportionate socio-economic and environmental costs.

Survey Methodology Alternatives:
The survey methodologies proposed represent the best available techniques that minimise potential risks to marine species while ensuring the collection of essential data for safe and effective interconnector design. Non-intrusive methodologies, such as desktop studies or remote sensing, were considered. However, these approaches alone are insufficient to gather the high-resolution geophysical and geotechnical data required for evaluating seabed conditions and ensuring the interconnector's safety, longevity and performance.

Project Alternatives:
The option of not proceeding with the interconnector altogether would forgo the substantial socio-economic and environmental benefits of the project, as outlined in Ireland's Electricity Interconnection Policy Statement 2023 and the Climate Action Plan 2023. This would undermine national and EU commitments to renewable energy integration, energy security, and emission reductions.

Given these considerations, the proposed activity represents the only viable approach to achieving the project objectives while adhering to national energy and climate priorities. The risk to protected species is being rigorously mitigated through adherence to established guidelines, such as the NPWS Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters, other proposed mitigation measures which are outlined in Section 4.

1.4.4 Test 3

The third and final test of the application for a Derogation Licence is to ensure that granting the licence will not jeopardise the maintenance of the species' populations at a FCS. Sections 2, 3 and 4 of this Report outline how the proposed surveys do not jeopardise the maintenance of the species populations at FCS.

2. EAST COAST IRELAND MARINE SPECIES BASELINE

2.1 Cetaceans

Of the 25 species of cetacean recorded in Irish waters, approximately five of these have been recorded off the east coast and may be present in the Derogation licence area at least on a seasonal basis. These species are listed in Table 2-1. The most commonly sighted species are short-beaked common dolphin (*Delphinus delphis*), common bottlenose dolphin (*Tursiops truncates*) and harbour porpoise (*Phocoena phocoena*), with other species rare or occasional visitors. It is unlikely that deep water species such as the sperm whale (*Physeter macrocephalus*) and long-fined pilot whale (*Globicephala melas)* will be present (Reid *et al.* 2003).

The Irish Whale and Dolphin Group (IWDG) website (http://www.iwdg.ie/) was used to determine the number of whales and dolphin sightings within the Derogation licence area using the interactive mapper. There were no observed sightings of any species within the boundary of the Derogation licence area between the period of 28th April 2023 and 26th April 2024, however, this is unlikely to be considered representative of the number of individuals potentially in the area as the observations are submitted by members of the public and are therefore more common in coastal areas than offshore areas. As a result, species observed in the surrounding area have been used to identify species likely to be present in the Derogation licence area. Based on this, 264 individual records were submitted to the IWDG. Records were concentrated in the Dublin Bay area. Harbour porpoises are the most frequently recorded species in the vicinity of the Derogation licence area (total maximum observed 1651). Dolphin species were also recorded on various occasions in the vicinity of the Derogation licence area.

In the neritic waters off Dundalk to Waterford on Ireland's east coast, sightings data from aerial surveys conducted between 2015-2017 for the ObSERVE programme recorded several groups of porpoises, ranging from one to five individuals, in both the summer and winter months (Rogan *et al.*, 2018). A group of bottlenose dolphins, ranging from one to five individuals, was also observed in the area during winter of 2016, as well as two groups of Risso's dolphins during the summer, with one group ranging between one and five individuals and the other between six and twenty. Multiple groups of minke whale, ranging from one to five individuals, were also sighted within the region during the summer of 2015 and 2016 (Rogan *et al.*, 2018). Harbour porpoise was recorded with the highest frequency indicating that the neritic waters off Ireland's east coast is of greater importance to these species (Rogan *et al.*, 2018).

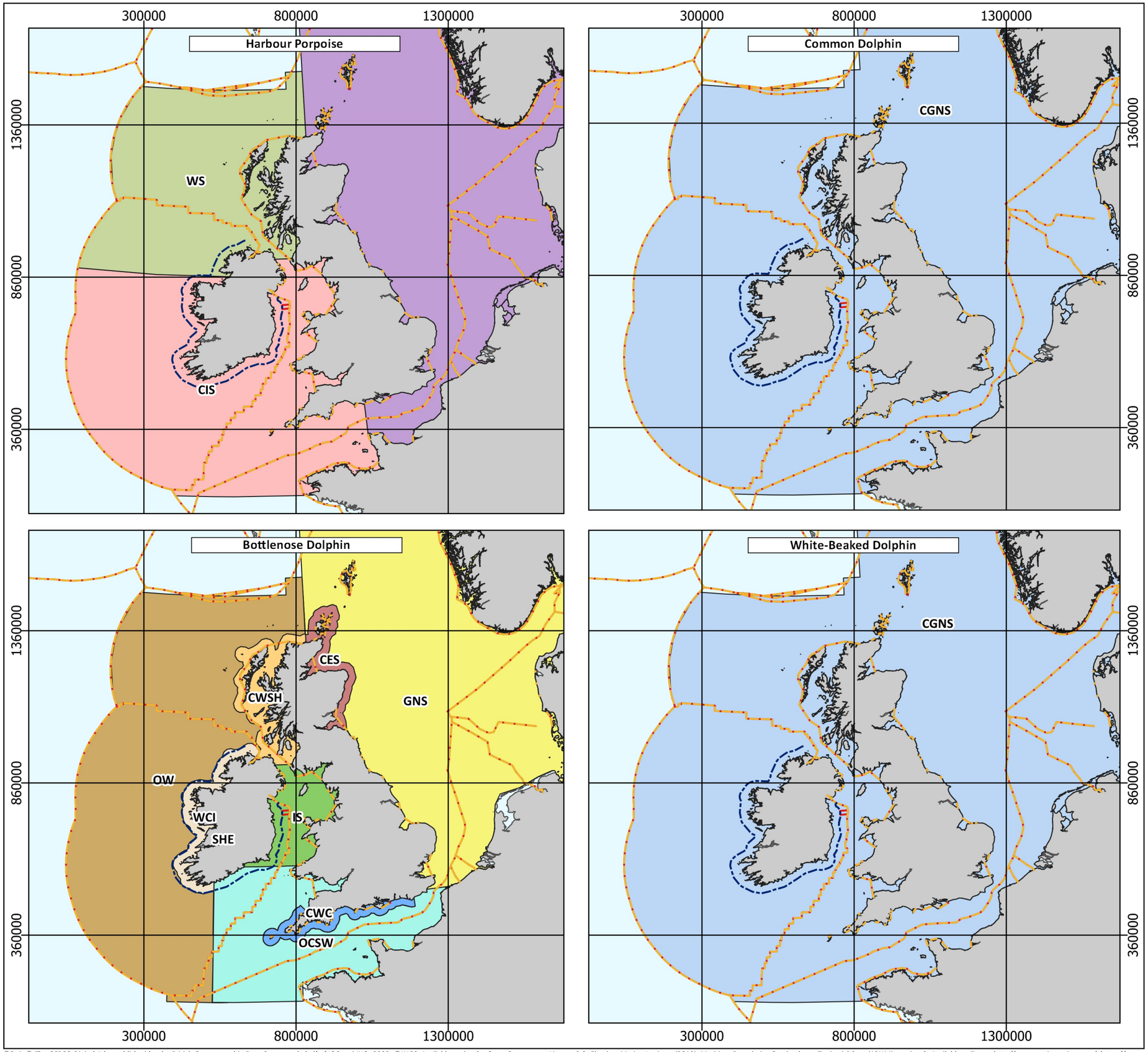
Most cetaceans are wide-ranging, and individuals encountered within the Celtic Sea form part of much larger biological populations whose range extend into adjacent jurisdictions. As a result, management units (MUs) have been outlined for seven of the common regularly occurring species following advice from the Sea Mammals Research Unit (SMRU) (DECC 2016) and the International Council for the Exploration of the Sea (ICES). These provide an indication of the spatial scales at which impacts of anthropogenic activities should be taken into consideration. The relevant MUs are shown in Figure 2-1 and 2-2 (Drawing Reference: P2578M-MGU-001 and P2578M-MGU-002). The species relevant to the Derogation licence area are listed in Table 2-1.

MARESCONNECT INTERCONNECTOR MARITIME USAGE LICENCE

MANAGEMENT UNITS

Management Unit of Cetaceans in UK and Irish Waters (Sheet 1 of 2)

Drawing No: P2578M-MGU-001 | A



Legend

- Maritime Usage Area

Adminstrative Boundaries

- 12nm Territorial Sea Limit
- EEZ

Management Unit Defined by the Inter-Agency Marine Mammal Working Group (IAMMWG)

- Coastal East Scotlnd (CES)
- Celtic Greater North Seas (CGNS)
- Celtic Irish Seas (CIS)
- Coastal West Channel (CWC)
- Coastal West Scotland Hebrides (CWSH)
- Greater North Sea (GNS)
- Irish Sea (IS)
- Offshore Channel, Celic Sea and South West England (OCSW)
- Offshore Channel, Celic Sea and South West England (OCSW)
- Offshore Waters (OW)
- West Coast of Ireland (WCI)
- West Coast of Ireland (WCI)

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Reviewed By	Emma Langley
Approved By	Aodfhin Coyle

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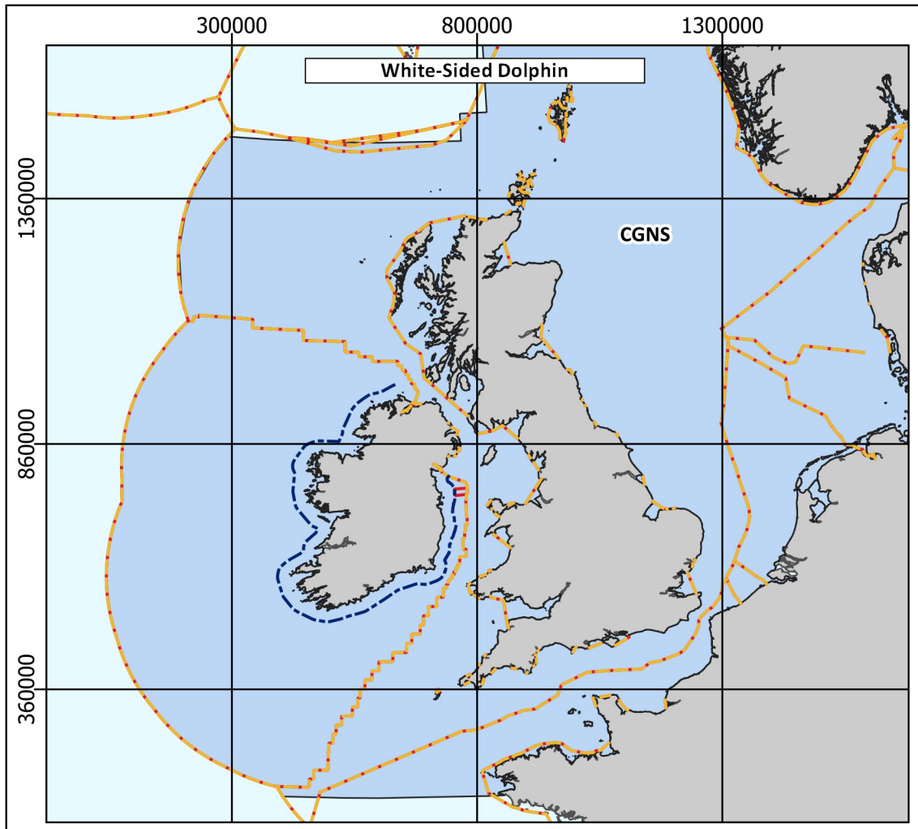

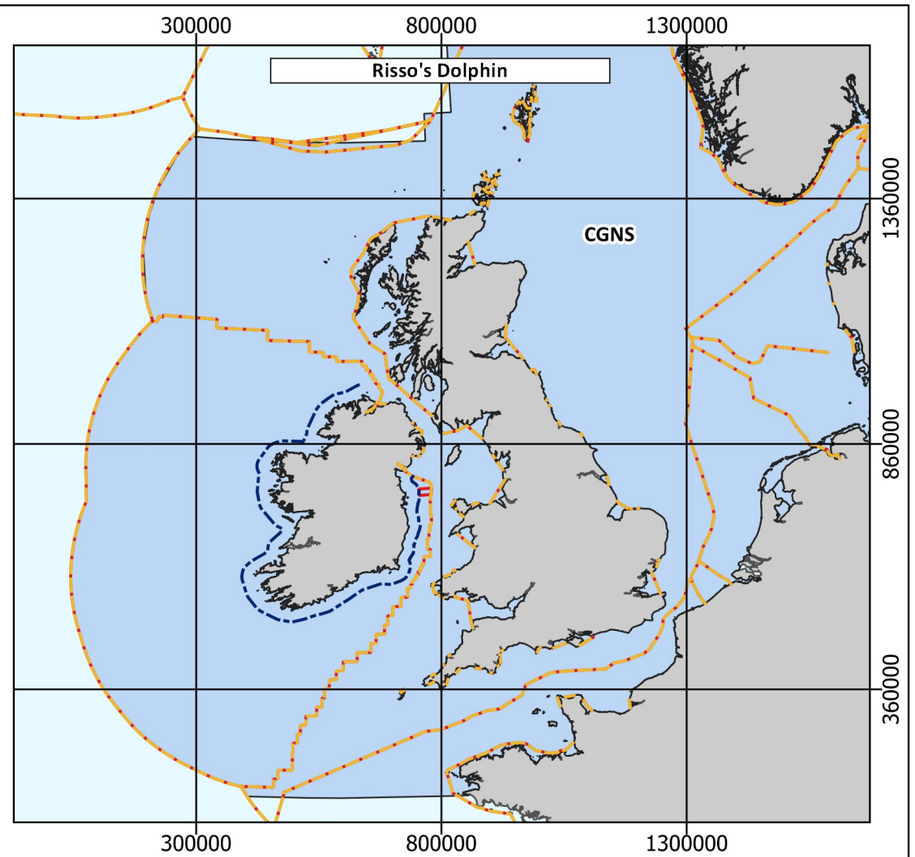

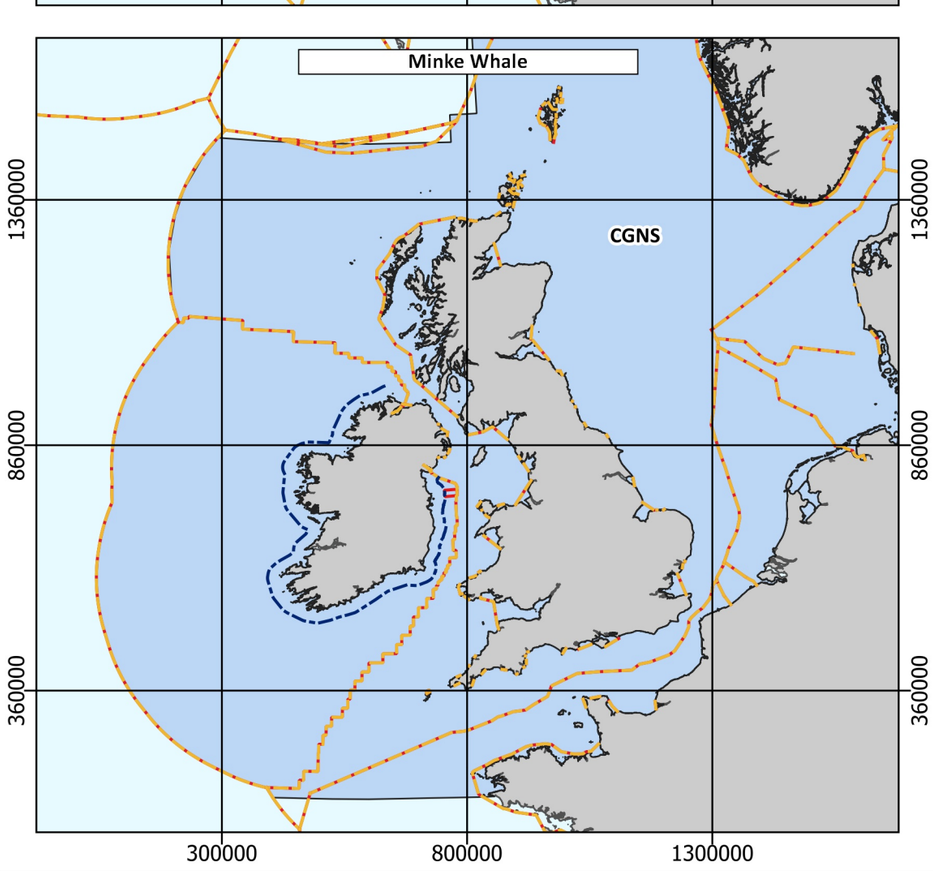

MARESCONNECT INTERCONNECTOR MARITIME USAGE LICENCE

MANAGEMENT UNITS

Management Unit of Cetaceans in UK and Irish Waters (Sheet 2 of 2)

Drawing No: P2578M-MGU-002 | A

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Legend

- Maritime Usage Area

Adminstrative Boundaries

- 12nm Territorial Sea Limit
- EEZ

Management Unit Defined by the Inter-Agency Marine Mammal Working Group (IAMMWG)

- Coastal East Scotlnd (CES)
- Celtic Greater North Seas (CGNS)
- Celtic Irish Seas (CIS)
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Created By	Lewis Castle
Reviewed By	Emma Langley
Approved By	Aodhfin Coyle

0 200 400 600 800 km

Table 2-1 Sightings and Strandings for Commonly Occurring Cetaceans within the DEROGATION Licence Area and Surrounding Waters

Species	Frequency of sightings*	IWDG sightings (approx.) (Apr 2023 –Apr 2024)**	Estimation of density within MU (animals/km²) ***	Applicable MU****	Abundance of animals in MU****
Toothed whales (odontocetes)					
Harbour porpoise (*Phocoena phocoena*)	Common from June through the autumn/winter. Peak period in August.	1051 sightings; All year, Jan – Jan (includes recordings of "dolphins species possibly harbour porpoise") Largest Pod sighting max 50 individuals. Recorded in August 2023	0.094 – 0.157	Celtic and Irish Seas	62,517
Short-beaked common dolphin (*Delphinus delphis*)	Peak period is spring and summer and winter peak on the south coast associated with prey items.	191 sightings; March – September (Including recordings of "common or striped dolphin") Largest Pod sighting max 45 individuals. Recorded in October 2023	0.038 – 0.115	Celtic & Greater North Seas	102,656
Bottlenose dolphin (*Tursiops truncatus*)	Common year round but most frequent in summer.	No sightings	0	Irish Sea	293
Risso's dolphin (*Grampus griseus*)	Peak period in April - Sept	No sightings	0.003 – 0.018	Celtic & Greater North Seas	12,262
White-beaked dolphin (*Lagenorhynchus albirostris*	Irregular in Irish Sea. More regular in late summer – autumn.	No sightings	0.018 – 0.044	Celtic & Greater North Seas	43,951
Long-finned pilot whale (*Globicephala melas*)	Most frequent between April and September	No sightings	No data available	N/A	No data available
Killer whale (*Orcinus orca*)	Occasional sightings in Irish Sea waters.	No sightings	No data available	N/A	No data available
Baleen whales (mysticetes)					
Minke whale (*Balaenoptera acutorostrata)*	Peak period July and August	No sightings	0.009 – 0.018	Celtic & Greater North Seas	20,118
Humpback whale (*Megaptera novaeangliae*)	Occasional sightings in Irish Sea waters.	No sightings	No data available	N/A	No data available
Fin whale (*Balaenoptera physalus*)	Unclear, contradictory evidence with sightings during summer months, and acoustic monitoring data	No sightings	No data available	N/A	No data available

Species	Frequency of sightings*	IWDG sightings (approx.) (Apr 2023 –Apr 2024)**	Estimation of density within MU (animals/km^2) ***	Applicable MU****	Abundance of animals in MU****
	suggest a peak in November – December.				

Sources: * Marine Institute (2021), Reid *et al*. (2003) ** IWDG (2021); *** Calculated by dividing animal abundance in MU**** by MU area; and **** JNCC 2022, 2023.

2.1.2 Short-beaked Common Dolphin

Short-beaked common dolphin are sighted off all coasts of Ireland and are permanent residents within Irish waters with abundance and strandings being more frequent on the south and south-west coast (ORCA Ireland, 2024d). Sightings increase from April to September as they move inshore due to increased prey distribution and availability (Wall *et al.,* 2013; ORCA Ireland, 2024d). In the east North Atlantic, mating and calving occurs between May and September (ORCA Ireland, 2024d).

Within the waters surrounding the Derogation licence area, the IWDG recorded 191 sightings (maximum total seen) of short-beaked common dolphin between 2023 and 2024 with sightings occurring from March to September and peaking in summer on the east coast. Short-beaked common dolphin has been assigned to a single MU, the Celtic & Greater North Seas MU (JNCC, 2015).

2.1.3 Common Bottlenose Dolphin

Common bottlenose dolphin is also frequently sighted off the coast of Ireland and are a permanent resident within Irish waters, being recorded all year round. There are three genetically distinct populations of common bottlenose dolphin in Ireland. These populations include an offshore group, a coastal transient group and a resident group within the Shannon Estuary on the west of Ireland (ORCA Ireland, 2024a; Berrow *et al.*, 2010; Ryan, Rogan and Cross, 2011). Along the east coast common bottlenose dolphins are usually seen during early summer months with a high level of activity recorded around the Derogation licence area (IWDG, 2011). In the waters surrounding the Derogation licence area, the IWDG recorded no sightings of common bottlenose dolphin between 2023-2024.

The breeding period for common bottlenose dolphin is not fixed, with the season varying from region to region. Males are active throughout the year and females reproducing at certain times of the year but most frequently during summer months (ORCA Ireland, 2024a). In British waters frequent reproduction months have been observed between May and November: therefore, it can be inferred a similar breeding season occurs in Irish waters(Harris and Yalden, 2008; NBDC, 2024b; Seawatch Foundation, 2022).

The Derogation licence area lies within the Irish Sea MU for bottlenose dolphin (JNCC, 2022). This MU incorporates the Cardigan Bay/Bae Ceredigion SAC and Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC, both situated in United Kingdom (UK) waters, which have been designated for the conservation of the species.

2.1.4 Harbour Porpoise

Harbour porpoises are listed as native to Ireland in the 2008 International Union for Conservation of Nature (IUCN) Global Red List and are commonly sighted off all coasts of Ireland but are most abundant along the east coast. They are most common from June through the Autumn with low numbers recorded for the remainder of the year (ORCA Ireland, 2024b). Boat based surveys conducted by IWDG off the coast of Co. Dublin recorded the highest counts anywhere in Ireland, between Howth Head and Dalkey, corresponding with the inshore area close to the Derogation licence area a (IWDG, 2024b). A decrease in encounter rates between March and June from regular observation sights such as Howth Head suggests they move offshore between March and June (NBDC, 2024b). This is likely to be the location of their offshore calving/breeding grounds as encounter rates increase again in June when calves are first recorded (Wall *et al*., 2013; NBDC, 2024c).

Within the waters surrounding the Derogation licence area, the IWDG recorded 1051 sightings (total maximum seen) between 2023 – 2024. The Derogation licence area is within the Celtic and Irish Sea MU for harbour porpoise. Within this MU, there are seven SACs which list the species as a Qualifying Interest. In Irish waters these are: Blasket Islands SAC, Rockabill to Dalkey Island SAC and the Roaringwater Bay and Islands SAC; and in UK waters: the Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC, West Wales Marine / Gorllewin Cymru Forol SAC; North Anglesey Marine/ Gogledd

Môn Forol SAC and North Channel SAC (JNCC 2015). As harbour porpoise are highly mobile species, animals from these sites may be visitors to the Derogation licence area.

2.1.5 Minke Whale

Minke whale distribution around the Irish coast is mainly inshore (<200m) with most observations taking place on the south and west coast between May and October (Berrow *et al*., 2018). The migration of minke whales within Irish waters shows a pattern of inshore migration during the summer and autumn. High abundance of minke whales have been observed off the east coast in spring with peaks thought to occur due to the presence of large concentrations of pelagic schooling fish (ORCA Ireland, 2024c). Additionally, an inshore migration from September to October on the west of Ireland near Loop Head, Co. Clare has also been reported (NBDC, 2024c).

Minke whales' mate between January and May and the calving period is between December and January. During these months there have been no recordings of Minke Whale in Irish waters as it is thought they migrate south to give birth (IWDG, 2015; NBDC, 2024c).

Within the Derogation licence area, the IWDG recorded no sightings between 2023 – 2024. The population is part of the Celtic & Greater North Seas MU (JNCC, 2022). There are no European protected sites for this species in Irish waters.

2.1.6 Humpback Whale

Humpback whale observations have been recorded around the Irish coast, however, less frequently in the Irish Sea. The IWDG have recorded 109 individuals in Irish waters, in an ongoing photo-identification study occurring from (1999-2020) (IWDG, 2024c). A majority of Humpback whales in Irish waters are sighted from the south and southwest coast, and more rarely from the east coast. Sightings peak in November and are low during the summer months (Berrow *et al*., 2010). Breeding does not occur within Irish waters but around the West Indies during winter months for this population (Stevick, Oien and Mattila, 1998). Records around the Irish coast, show a much lower number in late spring indicating some non-breeding individuals remaining over the winter (Berrow *et al*., 2010; IWDG, 2020). The sightings trends increase in late November which is assumed to be because the species are migrating with their prey (herring and sprat) as they follow the easterly movement spawning events of both prey species (Berrow *et al*., 2010). Additionally, acoustic records have highlighted humpbacks off the west coast of Ireland, suggesting a deep water migration corridor along the continental shelf (Berrow *et al.*, 2010).

Within the Derogation licence area, the IWDG recorded no sightings between 2023 – 2024. The population is not part of a MU and there are no European protected sites for this species in Irish waters.

2.1.7 Fin Whale

The fin whale population in Irish waters has been observed mostly along the south coast from summer through to early winter. An IWDG photo identification study off the south coast of Ireland has identified 62 individual fin whales with 18% re-sighted in following years indicating the area is an important site for the species (IWDG, 2024a). The observation period of fin whale starts in May with a distinct migration pattern observed. The encounter rate between August and January suggests the fin whales do not follow the typical trend of north-south migration in Irish waters, but rather migrate between inshore and offshore (Berrow *et al*., 2010; IWDG, 2024a). April is the only month where no data has been recorded for fin whale, which could be due to calving occurring from December to April in the North East Atlantic.(Berrow *et al*., 2010; IWDG, 2024a).

Within the Derogation licence area, the IWDG recorded no sightings between 2023 – 2024. The population is not part of a MU and there are no European protected sites for this species in Irish waters.

2.2 Common Sturgeon

Common sturgeon (*Acipenser sturio*) migrates along the Atlantic coast of Europe from the Bay of Biscay to the Bristol Channel and North Sea. Based on the small population size, sturgeon is a rare visitor to North European waters, with the National Biodiversity Data Centre (NBDC) only having seven records of sightings within Irish waters since 1960, with the most recent sighting recorded for 1983. It is extremely unlikely that common sturgeon will be present within the Derogation licence area.

2.3 Chelonians

There are few recordings of sea turtle species in Ireland. Of the seven sea turtle species, leatherbacks (*Dermochelys coriacea*) are most common in Ireland, recorded annually in Irish waters as they forage widely for jellyfish in temperate waters visiting Irelands coast in summer and autumn.

A study of leatherback relationships with jellyfish aggregations in Irish and Welsh waters was conducted by Houghton *et al.* in 2006 who reported from a historical dataset from the TURTLE Database; between 1950-2005 there were 143 individuals observed between the Irish and Welsh waters (Houghton *et al*., 2006). The seasonality of the sightings was between July and September (number of individuals sighted: 125). Biodiversity Ireland highlights the distribution of leatherback records around the coast of Ireland but with low numbers. Leatherback turtles have been observed on the east coast of Ireland predominantly with one record per 10km. However, a sighting north of the Derogation licence area reports a higher abundance of 2 per 10km. The NBDC has four observations of live occurrences of leatherback turtles within the Derogation licence area (NBDC, 2024d). However, as highlighted by Pierpoint (2000) a lack of inclusivity in the TURTLE database means it is likely that the Ireland stranding, and live observations are underrepresented.

Loggerhead turtle (*Caretta caretta*) have also been recorded in Irish waters and the National Biodiversity centre reports 97 cases in total, with seven occurring in 2023 (NBDC, 2024e). However, whilst leatherback turtles come to UK and Irish waters looking for jellyfish, loggerhead turtles are transported into the area by currents from the Caribbean or North Atlantic (The Guardian 2020). A 2020 study conducted by Botterell *et al.* highlighted that the loggerhead observations in UK and Irish waters tend to be juveniles. The reason for the warm water juveniles to be encountered in Irish waters is due to being carried north from their usual grounds by currents or stormy weather (Mallinson, 1991; Pierpoint, 2000). There have been two recorded strandings of Loggerheads in vicinity to the Derogation licence area (NBDC, 2024e). Loggerheads which strand on Irish coasts are usually cold water stunned and are rehabilitated and released to their native habitats (Pierpoint, 2000).

3. RISK ASSESSMENT

3.1 Risk of Injury or Disturbance from Underwater Noise Changes

3.1.1 Receptor Sensitivity

3.1.1.1 Cetaceans and Otter

Cetaceans have evolved to use sound as an important aid in navigation, communication, and hunting (Richardson *et al*., 1995).

High intensity or prolonged noise can cause temporary or permanent changes to animals' hearing. Where the threshold of hearing is temporarily altered, it is considered a temporary threshold shift (TTS), and the animal is expected to recover. If there is permanent aural damage (permanent threshold shift (PTS)) where the animal does not recover, social isolation and a restricted ability to locate food may occur (Southall *et al*., 2007).

Behavioural disturbance from underwater sound sources is more difficult to assess than injury and is dependent upon many factors related to the circumstances of the exposure. An animal's ability to detect sound depends on its hearing sensitivity and the magnitude of the sound compared to the background. In simple terms, for a sound to be detected it must be louder than background and above the animal's hearing sensitivity at the relevant sound frequency. The direction of the sound is also important. Cetacean are considered to have generalised hearing ranges. Minke whale hear in the range between 7Hz to 35kHz (low frequency (LF) cetacean). Dolphin and toothed whales hear in the range between 150Hz to 160kHz (high frequency (HF) cetacean). Harbour porpoise have hearing within the range 275Hz to 160kHz (very high frequency (VHF) cetacean) (Southall *et al*., 2019).

Introduced sound may cause behavioural responses in animals, such as individuals moving away from the sound source and remaining at a distance until the activities have passed. There may also be changes in foraging, migratory or breeding behaviours; all factors that can affect the local distribution or abundance of a species. Introduced sound may also cause masking or disruption of the animal's own signals, whether used for communication, foraging or other purposes. This may in turn affect foraging and reproductive opportunities. Behavioural disturbance to a marine mammal is, hereafter, considered as the disruption of natural behavioural patterns, for example: feeding, migration, breeding and nursing.

The hearing range of Eurasian otters is from around 200Hz to 32kHz, with lowest thresholds round 4kHz (Voigt *et al*., 2019). Otter hearing is primarily adapted to air and is not underwater specialised, with lower sensitivity than in other amphibious marine carnivores such as seals and sea lions (Ghoul and Reichmuth, 2016). A study observing hearing in sea otters (*Enhydra lutris*) reported the otters aerial hearing at >22 kHz and low frequency at <2 kHz with reduced under-water hearing at frequencies below 1 kHz (Ghoul and Reichmuth 2016).

Southall *et al* (2019) separated marine mammals into auditory groups based on their functional hearing sensitivity. The generalised hearing ranges of these groups are provided by NMFS (2018) as summarised in Table 3-1.

Table 3-1 Marine Mammal Groups based on Auditory Bandwidth

Group (based on auditory bandwidth)	Species observed within and in proximity to the Foreshore Licence Application Area	Auditory range
Low-frequency cetaceans (LF)	Minke whale, Humpback whale, Fin whale	7Hz – 35kHz
High frequency cetaceans (HF)	Short-beaked common dolphin, Common bottlenose dolphin, White-beaked dolphin, Long-finned pilot whale, Northern bottlenose whale	150Hz – 160kHz
Very high frequency cetaceans (VHF)	Harbour porpoise	275Hz – 86kHz
Phocid carnivores in water (PCW)	European otter and seals	60Hz – 39kHz

The thresholds for the onset of PTS and TTS, as published in Southall *et al.* (2019) are provided in Table 3-2. These reflect the current peer-reviewed published state of scientific knowledge.

Table 3-2 Injury Thresholds for Marine Mammals from Impulsive (SPL, Unweighted) and Continuous (Sound Exposure Level (SEL), Weighted) Sound

Auditory group	Impulsive noise		Continuous noise	
	SPL (unweighted) – dB re 1 µPa (peak)		SEL (24 hr, weighted) - dB re 1 µPa-2s	
	PTS onset	TTS onset	PTS onset	TTS onset
LF	219	213	199	179
HF	230	224	198	178
VHF	202	196	173	153
PCW	232	226	219	199

3.1.1.2 Marine Turtles

Sea turtles are known to be able to detect (Ridgway *et al.,* 1969; Bartol *et al.,* 1999; Bartol & Ketten, 2006) and respond to acoustic stimuli (Lavender *et al*., 2014; Martin *et al.,* 2012; O'Hara & Wilcox, 1990, DeRuitter & Doukara, 2012), which they may use for navigation, prey location, predator avoidance as well as general environmental awareness (Piniak et al., 2016). Sea turtles have adapted their hearing for use underwater. It is likely that their body serves as a receptor while the turtle is underwater (Lenhardt, 1983).

Electrophysiological and behavioural studies have demonstrated that sea turtles are able to detect low-frequency sounds both underwater and in air (Piniak *et al*., 2016). Sea turtles respond to aerial sounds between 50 - 2000Hz and vibrational stimuli between 30- 700 Hz, with maximum sensitivity values recorded between 300 - 500Hz for both sounds (Ridgway *et al.,* 1969). Leatherback turtles respond to underwater noise stimuli between 50- 1200 Hz, with a maximum sensitivity between 100 - 400 Hz (Piniak *et al*., 2012).

Overall, the biological significance of hearing in sea turtles remains poorly understood, but as low-frequency sound is most prevalent and travels the farthest in the marine environment, there may be some advantage to sea turtles in specializing in low-frequency sound detection. It is, therefore,

believed that acoustic sound may provide important environmental cues for sea turtles (Piniak *et al*., 2016).

Data and discussions provided in Popper *et al*. (2014) indicate that the sensitivities applicable to fish are also applicable to sea turtles. This paper presented an impairment threshold of 210dB RMS re 1 µPa in relation to geophysical survey, with a recoverable injury threshold of 170 dB re 1 µPa RMS for exposure of 48 hours, and a TTS threshold of 158 dB re 1 µPa RMS for exposure of 12 hours for continuous sound.

3.1.2 Assessment

3.1.2.1 Overview

Marine Mammals

Background levels of sound will influence how marine species react to the temporary introduction of sound from the survey campaign. Navigation and approach channels will already experience elevated levels of anthropogenic sound in addition to natural ambient sound levels. Parts of the Derogation licence area may experience higher levels of marine traffic associated transiting through the Irish Sea, however the marine traffic is generally reduced in comparison to levels seen close to ports and harbours. Most research has described changes in behaviour or damage (or not) to hearing in marine mammals due to underwater sound. In extreme cases, physical injury has also been reported due to underwater sound, but this effect has not been found associated with the proposed site survey investigations herein, and therefore, has not been considered further in the assessment.

Marine Turtles

Few data exist on the effects of geophysical survey on marine turtles. It is possible that exposure to seismic airguns would cause mortal injury if marine turtles were very close to the source. Behavioural responses in caged animals include rising to the surface and altered swimming patterns (Popper *et al*. 2014). As marine turtles detect sound at less than 1kHz, any effect will be in response to low frequency activities such as the boomer if used on the lowest operating frequency and the geotechnical sampling. Popper at al. (2014) class the relative risk of mortal injury or recoverable injury from low and mid-frequency sonar to turtles as low, and from seismic survey as high near to the source and low in the intermediate to far field. There is no information available for geotechnical sampling. As an analogy the threshold for injury for turtles from pile driving is 207dB peak (Popper *et al*. 2014). SPL from the geotechnical survey will not exceed this threshold. Due to the rarity of marine turtles, including leatherback turtles, in the Derogation licence area and the discussion above, it is highly unlikely that marine turtles will experience any injurious or disturbance effects from the proposed site investigations.

Otter

Chanin (2003) acknowledges unpublished observations which indicate that otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity. These observations suggest that otters are reasonably flexible in their behaviour and do not necessarily avoid ‘disturbance’ in terms of noise (or proximity to human activity).

The threshold for auditory injury in otter is similar to high frequency cetaceans. As physical injury to cetaceans is not considered further (as described above), otter have also not been considered further.

3.1.2.2 Vessel Movements

For vessels such as those used for surveys the frequency range is 50-300Hz with a SPL (RMS) of 160-175 dB re 1 μPa^2 @ 1m (NPWS, 2014). The estimated sound levels exceed the thresholds for the onset of a temporary threshold shift, indicating that there is the potential for temporary auditory injury in cetaceans. However, the likelihood of potential injury has been assessed as low and limited to discrete

windows during the proposed site investigations and only in close vicinity (<10m) to the works. It is assumed that all marine mammals will move away at a speed of 1.5m/s (Otani *et al*. 2000, Lepper *et al.* 2012) from a sound source level. This is considered conservative as there is data (McGarry *et al.* 2017, Kastelein *et al*. 2019, van Beest *et al.* 2018) to suggest that animals will, at least initially, move away at much higher speeds (e.g., harbour porpoise at 1.9m/s, Kastelein *et al.* 2019). During the proposed site investigations, the survey vessel will be operating at lower speeds, therefore, it is expected that any individuals in proximity to the survey vessel will be able to move away from the area affected to avoid injurious noise levels. However, the action of moving away from a sound level is a behavioural response. Whether this can be considered disturbance relates to whether the animal(s) is significantly affected by the response e.g., whether the sound will lead to a change in the animals' condition. Immediately following either the vessels transit through the area or the proposed site investigations overall, individuals will be able to return to the area.

There are no published guidelines available on disturbance thresholds due to the complexity and variability of the responses of cetaceans to anthropogenic disturbance. For the purposes of this assessment, the threshold for behavioural disturbance is 120dB re 1 µPa-2s (RMS), which is calculated to be the sound isopleth above which, migrating *Mysticeti* have shown behavioural responses (Gomez *et al.* 2016, BOEM 2017, NMFS 2018). The likelihood of disturbance from continuous noise will depend on the types of vessels and cumulative effect of several vessels operating in the area. Hatch *et al.,* (2008) recorded typical 120 dB re 1 µPa isopleth of between 370m -627m for research vessel sources, although it should be noted that real time sound modelling of more modern vessels has recorded much lower distances.

The proposed site investigations should be considered in the context of the existing baseline sound environment. Shipping density within the Derogation licence area is generally moderate, at approximately 2-5 vessel hours (per km^2) within the main boundary (EMODnet, 2022). However, there are low to moderate levels of fishing vessels and a low but consistent level cargo vessels transiting through the Irish Sea, suggesting that marine mammals in the area will be habituated to higher levels of underwater sound. The change in underwater sound caused by the addition of the survey vessels for the proposed site investigations will not be noticeable above natural and anthropogenic noise in the region.

3.1.2.3 MBES

MBES are widely used in the marine environment to measure water depth by emitting rapid pulses of sound towards the seabed and measuring the sound reflected (BEIS 2020). Sound frequencies emitted, in water depths of less than 200m, are typically between 300 - 400kHz (Danson 2005, Hopkins 2007, Lurton and DeReutier 2011). The MBES equipment which will be used in the surveys has a minimum frequency of 200 kHz. Sound source levels have been reported ranging from 210 – 245dB re 1µPa-m (Genesis 2011, Lurton and DeReutier 2011). Evidence has shown that MBES operating at greater than 200kHz do not cause behavioural responses in harbour porpoise (Dyndo *et al.* 2015). This is because the frequency range falls outside the hearing thresholds of cetaceans and the sound attenuates more swiftly than lower frequencies and operate at a lower power (JNCC 2017). The MBES survey will have a minimum frequency of 200kHz and will, therefore, not cause injurious or disturbance effects to cetacean. For the same reason, otter will also not be affected.

3.1.2.4 SSS and SBP

SSS systems typically operate at relatively high frequencies (between 300 - 900kHz) with the higher frequencies (above 1600kHz) being outside the hearing thresholds of cetaceans and other marine mammals (Genesis 2011, JNCC 2010). Maximum source levels for side scan sonar can be up to 200-240 dB re 1 µPa (peak SPL) (SCAR 2002). Little evidence of potential effects to marine mammals from SSS exists. The relatively high frequencies at which side scan sonar operates will attenuate more swiftly than lower frequencies with sound levels reducing rapidly from the source.

SBP systems are used to produce images of the seabed. The resolution and type of images required determines which system is required. Pingers operate on a range of single frequencies between 3.5 kHz and 7 kHz. Boomers have a broader frequency between 500 Hz to 5 kHz and sparkers can generate lower frequencies for maximum penetration in the seabed. CHIRP systems are modern systems designed to replace pingers and boomers. Chirp systems operate around a central frequency but alternate through a range of frequencies between 3 kHz to 40 kHz. SBP's produce sound source levels between 196 and 225 dB re 1 µPa - 1m (rms SPL) which are therefore audible to some marine mammals, particularly harbour porpoise (Danson 2005; King 2013; BOEM 2016).

Most sound energy generated by SSS and SBP will be directed towards the seabed and the pulse duration is very short with the survey constantly moving. Lower frequencies generated by sub-bottom profilers are within the hearing range of cetaceans, therefore this type of equipment could have localised, temporary effects on behaviour. The UK Department for Business, Energy & Industrial Strategy (BEIS) now known as Department for Energy Security and Net Zero (DESNZ) undertook noise modelling as part of a review of consented offshore wind farms in the Southern North Sea SAC (designated to conserve harbour porpoise) which was based on the maximum source levels and bandwidths obtained from a range of SBP. The results of the noise modelling demonstrated that for harbour porpoise in particular, the onset of PTS could arise from between 17m and 23m from source and potential behavioural effects within 2.4km and 2.5km (BEIS 2020). This was a worst-case scenario based on the use of a Chirper with a peak SPL of 267 dB re 1 µPa-m.

The zone of ensonification based on the above survey methods are within proximity to the source, therefore cetaceans would need to be present in close proximity to the survey vessel and remain within the localised zone of ensonification for an extended period of time to experience injurious effects. Research has shown that cetaceans can swim away from a sound source level at a speed of 1.5m/s (Otani *et al.* 2000, Lepper *et al.* 2012). This is considered conservative as there is research to suggest that animals will move away at much higher speeds e.g., harbour porpoise at 1.9m/s (McGarry *et al*. 2017, van Beest *et al*. 2018; Kastelein *et al*. 2019), at least initially. During the proposed site survey investigations, the survey vessel will be operating at lower speeds, therefore, it is expected that any individuals in proximity of the survey vessel will be able to move outside of the zone of ensonification to avoid injurious noise levels.

There are no published guidelines on disturbance thresholds due to the complexity and variability of the responses of marine mammals to anthropogenic disturbance. The UK JNCC have established an effective deterrent range (EDR) of 5km for geophysical surveys (JNCC 2020). The EDR represents the limit range at which disturbance effects have been detected (for example avoidance behaviour), specifically for harbour porpoise (Crocker & Fratantonio 2016, Crocker *et al.* 2019). On this basis, there is the potential for the proposed site survey investigations to induce a disturbance response in marine mammals, in particular very high and high frequency cetacean species.

Evidence suggests that avoidance behaviour will be temporary, with individuals returning to the area affected once the sound has ceased (Bowles *et al.* 1994; Morton and Symonds 2002; Stone and Tasker 2006; Gailey *et al*. 2007; Stone *et al*. 2017). It is important to note that the proposed site investigations are temporary, being undertaken intermittently over the course of up to five months. Therefore, any individuals that are disturbed will be able to return to the Derogation licence area as soon as the survey activity has ceased. However, as best practice, certain mitigation can be adopted into the design of the proposed site survey investigations to reduce the potential for a significant effect on cetaceans. This project specific mitigation is set out in Section 4 below. Implementation of the project specific mitigation, combined with the localised zone of influence and temporary nature of the proposed site survey investigations, will mean that disturbance effects to cetaceans will be temporary and not significant.

3.1.2.5 USBL System

An ultra-short baseline (USBL) system will be used to position geophysical, geotechnical and environmental equipment. These are generally low frequency 19-34 kHz and operate at a peak sound level below 202 dB re 1 µPa which is the PTS level for the most sensitive cetacean, the harbour porpoise, for which the frequency is outside of the auditory band of this group. Within the auditory band of USBL systems are low frequency cetaceans which have a PTS of 219 dB re 1 µPa and TTS of 213 dB re 1 µPa (Table 4-2). The sound levels emitted from these devices are not considered to cause harm to EPS and are therefore not considered for requirement of mitigation under DAHG (2014).

3.2 Risk of Injury from Collision

There is the risk that animals could collide with survey vessels. Shipping collision is a recognised cause of marine mammal mortality worldwide, the key factor influencing the injury or mortality caused by collisions is the ship size and its travelling speed. A review of vessel collisions with marine animals undertaken by Schoeman *et al* (2020) identified that the most important influences on severity of any potential impact are vessel size and speed, with small vessels being more likely to cause injury. Reduction of speeds to less than 10 knots was observed to reduce risk of lethal injury to marine animals by 50% (Vancerlaan and Taggart, 2007 within Schoeman *et al*, 2020). Several organisations recommend reduction of vessel speeds to less than 10-13 knots to reduce the risk of collision with marine mammals, basking shark and other marine species (e.g., Federal Register, 2008; JNCC, 2021; Ports of Auckland, 2015).

Vessels undertaking the surveys will be either stationary or travelling at a standard survey speed of approximately 5-7km/h, equivalent to approximately 2.7-3.8 knots, which is significantly slower than speeds associated with high marine mammal collision risk. Additionally, the collision risk is lower than that posed by commercial shipping activity which typically operates at 14 knots. Therefore, risk of injury to Annex IV species from collision is very low, and the significance of any effects will be imperceptible.

4. PROJECT MITIGATION

The main mitigation measures in reducing environmental impacts from geophysical survey operations is to minimise the amount of sound produced. Therefore, proposed equipment will be used at the lowest practicable power levels and equipment will only be fired when necessary. For the SBP, where applicable, soft start procedures will be implemented.

To minimise potential impacts on EPS, the contractor for the proposed site survey investigations will follow the DAHG 'Guidance to Manage the Risk to Marine Mammals from Man-made sound sources in Irish Waters' (DAHG 2014); specifically, Section 4.3.4 Geophysical Acoustic Surveys.

Adherence to Foreshore licence (Reference: FS007635) conditions during geophysical surveys:

- Condition 9: Strict adherence to Guidance to Manage the Risk to Marine Mammals from Man-made sound sources in Irish Waters (DAHG 2014) during the geophysical and drilling surveys
  - A qualified Marine Mammal Observer (MMO) will be appointed to monitor for marine mammals and to log all relevant events using the relevant date forms in the DAHG guidance.
  - ii: The MMO will be located at a suitable vantage point, providing good all-round visibility.
  - iii: Geophysical and drilling operations will only commence in daylight hours.
  - iv: Delays to the commencement of the site investigations will be recommended should any species be detected within the relevant monitored zone.
  - v: An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break. It shall only proceed on positive confirmation with the MMO.
  - vi: The MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by MMO.
  - vii: Procedures for drilling operations including prescribed Pre-Start Monitoring and breaks in sound output as outlined in section 4.3.2 of the DAHG 2014 guidance shall be strictly adhered to.
  - viii: In the case of geophysical surveys the prescribed Pre-Start Monitoring shall subsequently be followed by Ramp-Up Procedure which should include continued monitoring by the MMO. The process laid out in Sections 4.3.4(i) and 4.3.4(ii) of the DAHG 2014 guidance shall be strictly adhered to.
  - ix: An MMO report to be submitted to the Licensor's Marine Advisor (Environment) within 30 days of completion of any geophysical and drilling survey activity.
- Condition 10: Survey vessels will stay at least 900m away from known seal haul-out locations during the period May to December to minimise disturbance to breeding season.

Qualified MMO (s will search the sea surface for the presence of marine mammals within 500m of the survey site ensuring no individuals are present prior to the commencement of any survey operations. Observations of Chelonians will also be recorded. The use of Passive Acoustic Monitoring (PAM) on the offshore vessel is proposed as a complimentary mitigation measure for the survey works undertaken in the hours of darkness.

The project survey vessels will be moving at a maximum speed of approximately 5 knots during surveys to allow Annex IV species to move away from the vessel should they be disturbed by the vessel presence or noise emissions. During transit times, the survey vessels will be travelling at speeds

greater than 5 knots. However, these movements are not considered to deviate from normal vessel traffic in the Derogation Licence Application Area. Should an Annex IV species be found to be in the direct path of a survey vessel, during or outside of survey times, the survey vessel will slow down or, if possible, alter course to avoid collision.

By adhering to the mitigation measures detailed above, any disturbance effects on marine EPS in the area will be kept to a minimum and should not impact on the FCS of the species likely to be found within the survey area.

MCL will co-ordinate with any developers that are granted a FL or MUL within the region on the timing of site survey investigations to minimise cumulative impacts.

5. CONCLUSION

The risk assessment of the potential effects of the proposed site survey investigations on Annex IV species presented in this report concluded that:

- The potential for auditory injury is nil or negligible;
- The potential for physical injury from vessels is nil or negligible;
- There are no likely effects to marine turtles from the proposed site survey activities.

Temporary behavioural impacts (disturbance) to cetaceans will not be extensive, severe or biologically significant, given the transient and short-term nature of the activities. It is highly unlikely that disturbance would negatively impact upon the FCS of any species which may be present in the Derogation licence area The activities are temporary and transitory and set within a region where shipping noise is common, suggesting animals will exhibit a degree of habituation.

Implementation of best practice industry standard mitigation in the form of implementation of the DAHG 'Guidance to Manage the Risk to Marine Mammals from Man-made sound sources in Irish Waters' (DAHG 2014); in particular Section 4.3.4 Geophysical Acoustic Surveys and Section 4.3.2 Drilling, will reduce the risk of deliberate injury and disturbance to cetaceans to negligible levels.

With the findings of the EPS Risk Assessment in mind and the implementation of best practice industry standard mitigation, Intertek has concluded that the proposed geophysical survey activities will not require a derogation licence under Regulation 54 of the Birds and Habitats Regulations 2011.

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