MARESCONNECT INTERCONNECTOR

Maritime Usage Licence for Site Investigations for the MaresConnect Interconnector Reference: MUL240008

Risk Assessment for Annex IV Species

P2578_R6412_Rev0 | 20 June 2024

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DOCUMENT RELEASE FORM

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1. INTRODUCTION

The MaresConnect Interconnector (MaresConnect) is a proposed 750 megawatt (MW) electricity interconnector linking the power markets of Ireland (IE) and Great Britain (GB). 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 2026, with testing and full operation from 2028. MCL is investigating the feasibility of developing the electricity interconnector off the coast of County Dublin, making landfall in one of five potential landfall zones, which include Ardgillan, Balcarrick, Loughshinny, Robswalls and Rush.

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. A Foreshore Licence reference FS007635 has already been granted to MCL for conducting site investigation surveys from Mean High Water (MHW) to the 12 nautical mile (nm) limit.

However, changes in legislation have impacted the scope of this exploration. With the introduction of a new maritime regime in the Republic of Ireland (RoI) on July 17, 2023, it became necessary for applicants to obtain a Maritime Usage Licence (MUL) to conduct surveys beyond the 12nm limit into the Exclusive Economic Zone (EEZ). In response to this, MaresConnect has opted to maintain the existing foreshore licence and apply for a MUL to extend survey activities from the 12nm limit to the EEZ. It should be noted that if MaresConnect are successful in obtaining a MUL, the site investigation and survey activities will align with those conducted in association with Foreshore Licence FS007635 from Mean High Water (MHW) to the 12nm limit.

This MUL application is focused on conducting site investigation surveys to assess various factors, including seabed suitability and stability for routing cables and other electrical infrastructure associated with the interconnector project from the 12nm limit to the EEZ. The surveys and associated works are envisioned as temporary and short-term in nature. Additionally, it is expected that the data collected during these surveys will serve as baseline information for future environmental assessments, should the MaresConnect project progress to the planning and consenting stage. It's important to note that these site investigation surveys and works are independent of any potential future development of the MaresConnect project

The Maritime Usage Licence Area (MULA) is presented in MUL Map 1 (Drawing Reference: P2578M-LOC-001). The MULA covers approximately 332.9km2 (33,296 hectares) and extends from the 12 Nautical Mile (NM) limit of the foreshore, as defined in the Foreshore Acts, out to the Exclusive Economic Zone (EEZ).

1.1 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 favourable conservation status 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 Department of Arts, Heritage and the Gaeltacht (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 reference has been used to determine the content required for this Risk Assessment for Annex IV Species.

1.2 Objective and Scope

The DAHG (2014) guidance considers that certain activities that produce loud noises in areas where Annex IV species could be present, have the potential to result in an injury or disturbance offence unless appropriate mitigation is implemented. The aspects of the proposed site investigations which have the potential to effect Annex IV species are:

1. Increased underwater noise from geophysical survey.
2. Increased underwater noise from the geotechnical survey.
3. Increased underwater noise from survey vessels and equipment associated with other survey activities.
4. Increased collision risk (from presence of vessel(s) and equipment).

Marine species which are Annex IV species and have been considered by the risk assessment are:

1. All cetaceans;
2. Marine turtles (*Caretta caretta, Chelonia mydas, Lepidochelys kempii, Eretmochelys imbricate, Dermochelys coriacea*);
3. European otter (*Lutra lutra*); and
4. Atlantic sturgeon (*Acipenser sturio*).

For the purposes of this assessment, a qualitative approach has been taken using existing literature as this was considered proportionate to the proposed site investigations and their potential to generate underwater sound changes which could affect Annex IV species.

MARITIME USAGE LICENCE MAP 1

LOCATION OVERVIEW

MaresConnect Interconnector MUL Boundary

Drawing No: P2578M-LOC-001	B

Upper Right Corner
Irish Tranverse Mercator
797,852.44 795,993.88

Area: 33296 ha

Lower Left Corner
Irish Tranverse Mercator
709,176.04 716,910.58

Legend

- Maritime Usage Area
- EEZ Boundary
- 12 NM Territorial Sea Limit

N
W E
S

Note: Coordinates listed in
Irish Transverse Mercator
EPSG 2157

Map prepared by:
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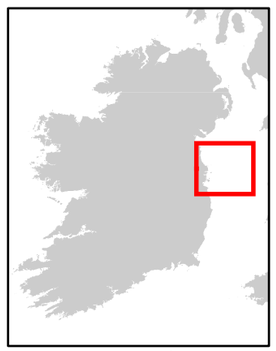

NOTE: Not to be used for Navigation

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2. PROJECT DESCRIPTION

2.1 Overview

The proposed site investigations will involve geophysical, geotechnical, archaeological, environmental (benthic sampling) intertidal, marine mammal and bird surveys. Full details on the scope for site investigation works is provided within the Assessment of Impacts of Maritime Usage (AIMU) report Appendix A (document Ref: P2578_R6411_Rev0).

The main sources of underwater noise are the geophysical and geotechnical surveys, as well as vessel engines/thrusters. The equipment deployed for the other surveys does not generate loud underwater noise and the only noise associated with these surveys are from the machinery (i.e., cranes and winches) used to deploy the equipment. If the vessel is unanchored during these deployments this noise will be masked by the vessels thrusters and engines which are required to hold the vessel on station whilst equipment is deployed.

The exact equipment specifications to be used are not yet confirmed, therefore, the frequency and sound level ranges of each equipment type has been presented to ensure the adequate assessment of species discussed herein.

Indicative sample stations are provided in Figure 2-1 (Drawing Ref: P2578M-LOC-002).

MARITIME USAGE LICENCE MAP 2

LOCATION OVERVIEW

MaresConnect Interconnector MUL Boundary Indicative Sampling Locations

Drawing No: P2578M-LOC-002	B

Upper Right Corner
Irish Tranverse Mercator
797,852.44 795,993.88

Lower Left Corner
Irish Tranverse Mercator
709,176.04 716,910.58

Area: 33296 ha

Legend

- Maritime Usage Area
- EEZ Boundary
- 12 NM Territorial Sea Limit
- Drop-down Camera, Grab and Box Core (5km intervals)
- Vibrocore and CPT (1km interval)

N
W E
S

19 Env Locations

93 Vibrocore and CPT Locations

Note: Coordinates listed in Irish Transverse Mercator EPSG 2157

Map prepared by:
[redacted] MRes Ecosystem-Based Management of Marine Systems, BSc (Hons) Marine Biology

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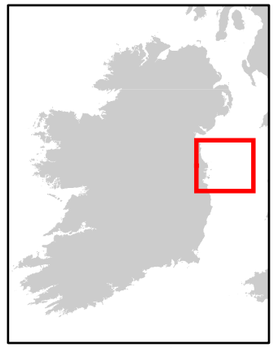

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2.2 Geophysical Survey

2.2.1 Purpose

The purpose of the proposed geophysical surveys is to determine the geophysical characteristics, including stability of the seabed and strata of the MULA. The geophysical surveys will involve:

1. Mapping the seabed and sub-surface to provide site specific information on depth, geohazards and environmental constraints to optimise positioning of cable routeing within the MULA and to enable assessment of cable burial depth;
2. Plan the scope and positioning of the geotechnical sampling programme in the MULA;
3. Identify marine habitat areas where the benthic survey will be undertaken;
4. Identify sensitive marine habitats that may require further ground truthing and need to be avoided during geotechnical, environmental sampling and infrastructure installation; and
5. Provide the geophysical data from which a marine archaeological assessment can be undertaken to inform positioning of geotechnical sample locations and to inform any future consenting process.

2.2.2 Equipment

Indicative equipment for the geophysical surveys, along with its characteristics is set out in Table 2-1.

Table 2-1 Characteristics of Geophysical Survey Equipment

Equipment Type	Purpose	Frequency (kHz)	Source 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).	Typically, 400 for this water depth but systems range from 200 – 500	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)	Typically, 300 – 900 with high resolution models 600/1600	200 – 240	DAHG (2014), BOEM (2019), BEIS (2020), (Jiménez-Arranz et al., 2020) Edgetech (2024)
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, (2024)
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

2.2.3 Survey Points and Spacing

At this time the areas of search for the potential export cable corridors are based on desktop assessments. Until such time as the precise sampling stations are identified, it has been assumed that the geophysical surveys will be conducted across the whole of the MULA.

The swathe width for each piece of equipment will vary depending on water depth. It is anticipated that the width of each swathe will allow for a 50% overlap between each swathe.

2.2.4 Vessel

Geophysical survey vessels are typically between 15m and 60m in length and typically have an endurance of approximately 14 days. These vessels are likely to use a local port for mobilisation and replenishment. Depending on water depths, the survey may be completed using multiple vessels. i.e., a nearshore and offshore vessel.

Continuous underwater noise will be produced by the survey vessel and the use of thrusters for dynamic positioning. Typically, continuous sound will be non-pulsed and can be broadband, narrowband or tonal and will be continuous over a period of 24-hours. For vessels such as those used for geophysical survey the frequency range is 50-300kHz with a sound pressure level (SPL) (RMS) of 160-175 dB re 1 μPa^2 @ 1m (NPWS, 2014).

2.2.5 Duration

The intention is to commence the proposed geophysical survey component of the site investigation activities as soon as feasible following award of a MUL, taking into consideration any proposed mitigation requirements. The survey works will preferably be undertaken in the months feasible from the summer and/or autumn months in 2025 onwards following award of the MUL and subject to weather conditions and vessel availability. However, there is potential for programme slippage and MCL are applying for a Maritime Usage Licence to be valid for a five-year period to provide contingency for any delays.

The geophysical survey is expected to last up to a period of 4-months (including downtime). The benthic sampling programme will coincide with the geophysical survey where possible. However, if this is not possible the benthic sampling programme will be carried out separately.

2.3 Geotechnical Survey

2.3.1 Purpose

The purpose of the proposed geotechnical survey is to evaluate the nature and mechanical properties, including stability, of the seabed sediments within the MULA. Drilling to investigate the stability of soils, including seabed sediments and strata, is exempted from the scope of the EIA Directive 2014/52/EU.

Geotechnical sampling will comprise of the following (numbers include an extra 20% as a conservative estimate):

a. Approximately 93 no. Shallow Vibrocore (VC) Samples and Cone Penetration Tests (CPT) both with a penetration depth up to 6m; and

b. 19 boxcores or Van Veen grabs may be used to characterise shallow soils if the sediment is found to be very soft.

Of these, only VC sampling and borehole drilling will generate significant noise which has potential to affect marine mammals.

2.3.2 Equipment

Indicative equipment for the geotechnical surveys, along with its characteristics is set out in Table 2-2.

Table 2-2 Characteristics of Geotechnical Survey Equipment

Equipment type	Purpose	Frequency (kHz)	Source level SPL (peak) in dB re 1 µPa	Source
Vibrocore	Used to retrieve a soil sample by penetrating the seabed with a tube using a vibration mechanism.	30Hz and 50Hz	Up to 180-190	Chorney et al (2011), BOEM (2017), Reiser (2017)
Cone Penetration Test/Piezocone Penetration (PCPT)	A CPT will be used to test the characteristics of the soil by pushing an instrumented cone into the ground at a constant speed, with continuous measurement of the cone end resistance, the friction along the sleeve of the cone and the pore water pressure.	Unknown N/A	Sound emitted will be below that of the vessel thrusters. No effect	BOEM (2017) NOAA (2017)
Borehole Drilling	Drilling into the seabed to recover samples and to enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil and rock testing.	0.002 - 50	142 - 190	BEIS (2020) DAHG (2014) Erbe and McPherson (2017)

2.3.3 Survey Points and Spacing

At this time the area of search for the interconnector cable corridors are based on desktop assessments. To be judicious it has been assumed that the geotechnical surveys will be conducted across the whole of the MULA. The above indicative sample numbers will be refined, following analysis of the geophysical data and by experienced contractor after contract award.

The exact location, quantity, type, penetration and spacing of the geotechnical samples will be determined following interpretation of geophysical data. The geotechnical sampling will be undertaken within the boundary of the of site and the potential cable routes. Proposed geotechnical sample stations will be communicated to the National Monuments Service (NMS) – Underwater Archaeology Unit (UAU) for approval ahead of works commencing. Proposed locations will be accompanied by an assessment of the geophysical data by a qualified and experienced marine archaeologist.

2.3.4 Vessel

Geotechnical survey vessels are typically between 55m and 90m in length and typically have an endurance of approximately 28 days. Their port of mobilisation will depend on previous work but may be Irish, UK, or another European location.

2.3.5 Duration

The exact timings and duration of the geotechnical survey is yet to be determined. It is likely to be carried out over multiple campaigns to determine site characteristics and cable positioning. Surveys will be undertaken at any time of the year (subject to weather conditions). Campaigns are likely to be within a two to four month period at any time of the year - (subject to weather conditions).

3. EAST COAST IRELAND MARINE SPECIES BASELINE

3.1 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 MULA at least on a seasonal basis. These species are listed in Table 3-1. 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 MULA using the interactive mapper. There were no observed sightings of any species within the boundary of the MULA 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 MULA. Based on this, 264 individual records were submitted to the IWDG. Records were concentrated in Dublin Bay (outside of the MULA). Harbour porpoises are the most frequently recorded species in the vicinity of the MULA (total max observed 1651). Dolphin species were also recorded on various occasions in the vicinity of the MULA.

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 porpoise, 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 were 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).

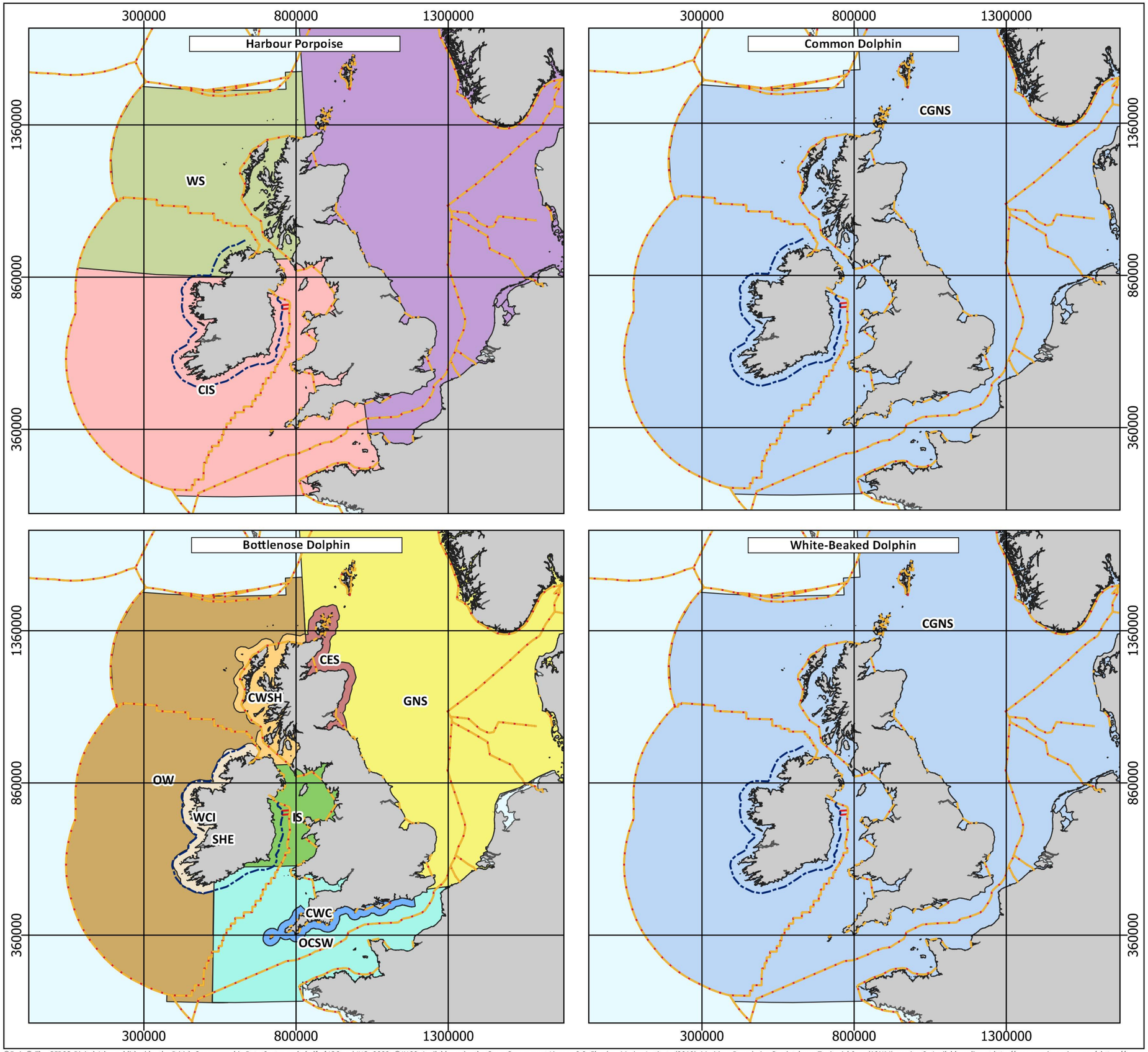
Most cetaceans are wide-ranging, and individuals encountered within the Celtic Sea form part of much larger biological populations whose range extend into adjacent jurisdictions. As a result, management units (MUs) have been outlined for seven of the common regularly occurring species following advice 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 3-1 and 3-2 (Drawing Reference: P2578M-MGU-001 and P2578M-MGU-002). The species relevant to the MULA are listed in Table 3-1.

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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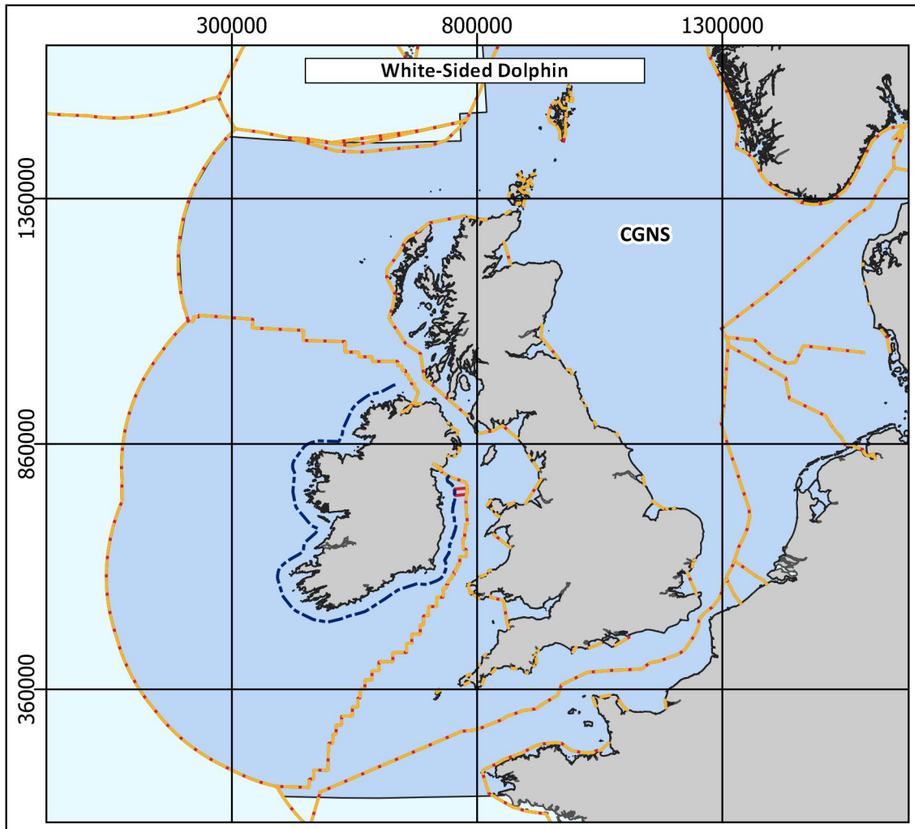

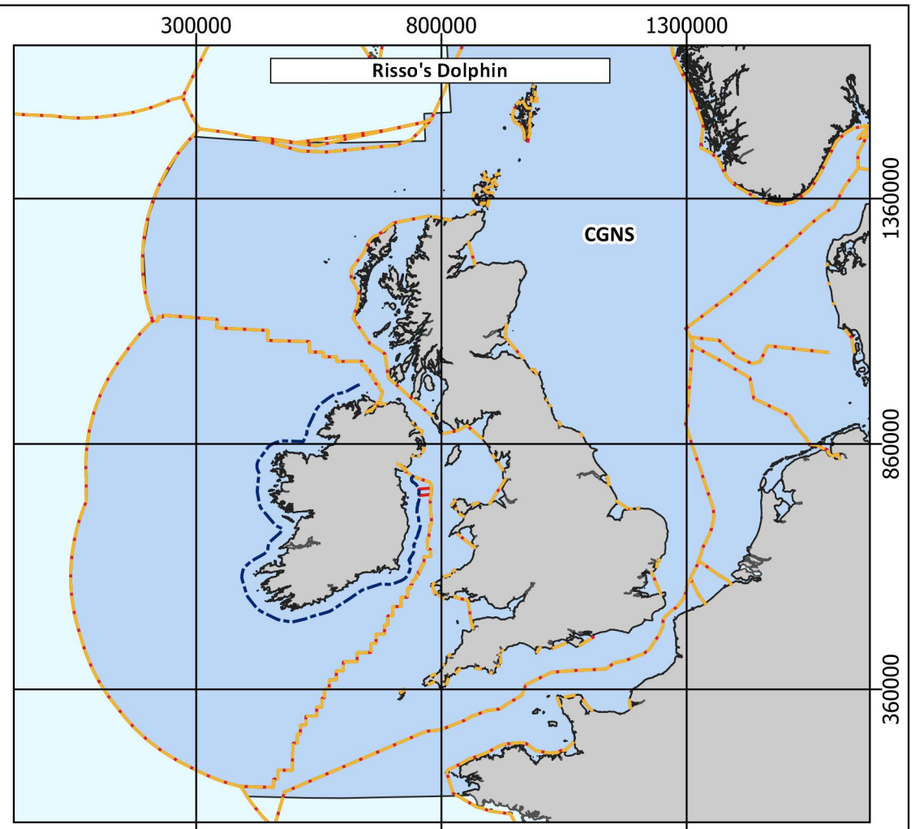

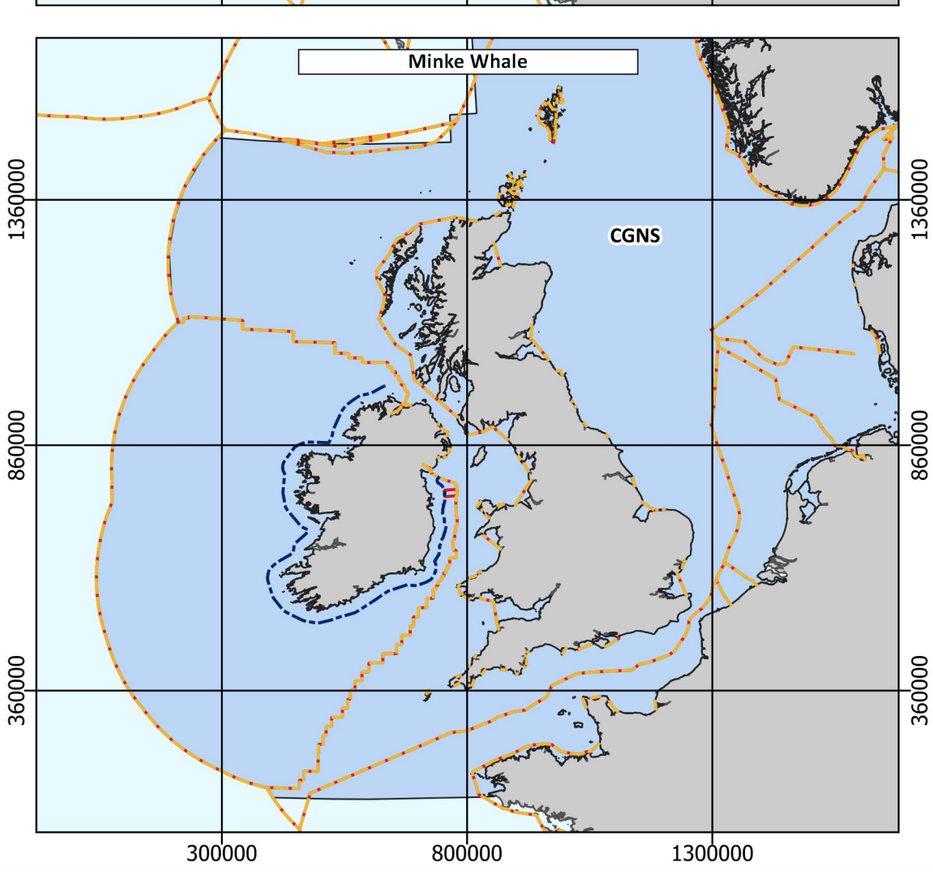

MARESCONNECT INTERCONNECTOR MARITIME USAGE LICENCE

MANAGEMENT UNITS

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

Drawing No: P2578M-MGU-002 | A

N

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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Table 3-1 Sightings and Strandings for Commonly Occurring Cetaceans Within the Foreshore Licence Application 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 suggest a peak in November – December.	No sightings	No data available	N/A	No data available

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

3.1.2 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 MULA, the IWDG recorded 191 sightings (max total seen) of short-beaked common dolphin between 2023 – 2024 with sightings occurring from March to September and peaking in summer on the east coast. Short-beaked common dolphin have been assigned to a single MU, the Celtic & Greater North Seas MU (JNCC, 2015).

3.1.3 Common Bottlenose Dolphin

Common bottlenose dolphin are 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 MULA (IWDG, 2011). In the waters surrounding the MULA, 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 MULA 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 UK waters, which have been designated for the conservation of the species.

3.1.4 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 MULA (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 MULA, the IWDG recorded 1051 sightings (total max seen) between 2023 – 2024. The MULA 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 MULA.

3.1.5 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 MULA, 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.

3.1.6 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 MULA, 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.

3.1.7 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 MULA, 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.

3.2 Common Sturgeon

Common sturgeon (*Acipenser sturio*) migrate 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 are a rare visitor to North European waters, with the National Biodiversity Data Centre 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 MULA.

3.3 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 MULA reports a higher abundance of 2 per 10km. The NBDC has four observations of live occurrences of leatherback turtles within the MULA (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 MULA (NBDC, 2024e). Loggerheads which strand on Irish coasts are usually cold water stunned and are rehabilitated and released to their native habitats (Pierpoint, 2000).

4. RISK ASSESSMENT

4.1 Risk of Injury or Disturbance from Underwater Noise Changes

4.1.1 Receptor Sensitivity

4.1.1.1 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 4-1.

Table 4-1 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 4-2. These reflect the current peer-reviewed published state of scientific knowledge.

Table 4-2 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

4.1.1.2 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.

4.1.2 Assessment

4.1.2.1 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 MULA 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 MULA, 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.

4.1.2.2 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 vessel 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 MULA 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.

4.1.2.3 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.

4.1.2.4 Side Scan Sonar and Sub-bottom Profiler

Side scan sonar 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 side scan sonar 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.

Sub-bottom profiler 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. Sub-bottom profilers 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 side scan sonar and sub-bottom profilers 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) 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 Sub-bottom Profilers. 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 survey 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 MULA 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 5 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.

4.1.2.5 Vibrocore and Borehole Drilling

VCs are used to retrieve soil samples by penetrating the seabed with a tube using a vibration mechanism. A pneumatic or electric vibrahead vibrates the tube, causing the sediment to liquify and facilitating penetration into the sediment. These vibrations emit low levels of noise, with a frequency of up to 1kHz, and a SPL of up to 180 to 190 dB re 1 µPa (BOEM, 2017). Borehole drilling has a wider frequency range up to 50kHz, but similar peak SPLs.

There is limited publicly available data on noise generated by geotechnical boreholes. Underwater noise measurements were recorded from a jack-up barge undertaking geotechnical boreholes in Swansea Bay, Wales. This activity involved a percussion corer used to take soft sediment samples and rotary coring used for hard rock samples. Sediment varied through the site from soft muds to coarse sand. Sediments were typically 20m thick overlying sedimentary mud rock or shale. These conditions are similar to those identified within the MULA and therefore the noise measurements provided below have been used as an analogy.

During soft sediment coring, in the Swansea survey, the highest SPL recorded (at 23m from the JUB) was 107db re 1µPa (peak) at 10Hz. For hard rock drilling the highest SPL was also 107dB re 1µPa (peak) at 10Hz but it was recorded at 7.5m from the JUB (Willis et al. 2010).

Noise measurements during geotechnical site investigations involving shallow core drilling to 16-17m in sand and mudstone, recorded source levels of 142–145 dB re 1 µPa rms @ 1 m (30–2000 Hz) (Erbe and McPherson 2017).

The sound pressure levels recorded for similar type geotechnical activity as the proposed site investigations are below the threshold at which auditory injury would occur in cetaceans. For the same reason, otter will also not be affected.

Evidence reported in Nedwell and Brooker (2008) from a drilling operation with a comparable SPL of 162dB dB re 1 µPa concluded that avoidance ranges for cetaceans were <100m from the activity.

The threshold for disturbance is lower than for injury, but activity will be short in duration at each location (<1 hour for vibrocores, and 12 hours for geotechnical boreholes). Cetaceans are therefore unlikely to be disturbed by noise from the geotechnical survey unless they are in close proximity to the work. This is unlikely given that the presence of the survey vessel will likely lead to small-scale temporary displacement of cetaceans.

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 5 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.

4.1.2.6 Ultra-Short Baseline (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).

4.1.2.7 Cumulative effects

The Assessment of Impact on the Maritime Usage Report (AIMU) document submitted in support of this application (P2578_R6411_AIMU) identifies other projects in the region which could potentially

interact with the proposed site survey investigations. These include potential site survey investigations for other offshore renewable projects which overlap with the MULA.

For the purposes of assessment, it has been assumed that one or more site survey investigations could be undertaken in the same region as the MULA simultaneously or consecutively. The assessment above concluded that the significance of the effect of the proposed site survey investigations on Annex IV species, with the implementation of mitigation measures, is not significant. However, there remains the possibility that if considered alongside other activities occurring within the same region, the proposed site survey investigations could give rise to significant cumulative effects. This potential is discussed below.

Cumulative effects are likely to result where localised disturbance from more than one activity either occurs simultaneously, resulting in a wider zone of disturbance restricting foraging, migratory or breeding behaviour; or consecutively within a restricted area resulting in an extended period of disturbance or the production of a barrier restricting movements.

The intention is to commence the proposed site survey investigation activities as soon as feasible following award of The Maritime Usage Licence, with a staged programme of site survey investigations over the next number of years to capitalise on suitable weather windows over this time period, likely during summer and autumn. At this time, it is not known when the Maritime Usage Licence will be awarded or when the other project's site survey investigations will be conducted. As such, two scenarios were considered by this assessment. Firstly, that the proposed site survey investigations are conducted at the same time as another project, and secondly that they occur consecutively to another project. The first scenario is highly unlikely as data acquisition can be impaired if two or more geophysical surveys occur at the same time in proximity due to equipment interference. It is therefore more likely that site survey investigations would occur consecutively. This would result in an extension of the time period that marine mammals would be disturbed.

4.2 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.

5. 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 sub-bottom profiler, 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, and Section 4.3.2 Drilling.

Where required, a trained marine mammal observer(s) (MMO) 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.

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 Favourable Conservation Status (FCS) of the species likely to be found within the survey area.

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

6. CONCLUSION

This risk assessment of the potential effects of the proposed site survey investigations on Annex IV species (increased underwater noise from the survey equipment and vessels and risk of injury from collision with vessels) concluded that:

- The potential for auditory injury is nil or negligible;
- The potential for physical injury from vessels is nil or negligible;
- The potential for cumulative effects on Annex IV species is nil or negligible; and
- There are no likely effects to fish or marine turtles from the proposed site survey investigations.

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 MULA. 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.

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