# ATTACHMENT 4.4
# RISK ASSESSMENT FOR ANNEX IV SPECIES

## Oriel Wind Farm Project

Oriel Windfarm Limited

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# 1.0 Introduction

## 1.1 Project Background

The Oriel Wind Farm Project is a proposed offshore wind farm in the Irish Sea, off the coast of County Louth (approximately 22 km east of Dundalk town centre and 18 km east of Blackrock). The Project will have a maximum export capacity (MEC) of 375 MW and will consist of 25 offshore wind turbine generators (WTGs). The closest wind turbine will be approximately 6 km from the closest shore on the Cooley Peninsula. The offshore cable corridor extends approximately 11 km southwest from the offshore wind farm area to a landfall location south of Dunany Point. From the landfall, the underground onshore cable will connect the offshore wind farm to an onshore substation, located at Stickillin, east of Ardee, which will then connect to the existing National Electricity Grid at this point. The onshore cable route is approximately 20.1 km length and is predominantly routed along public roads. Oriel Windfarm Ltd (hereafter referred to as “the Applicant”) was granted a Maritime Area Consent (MAC) in December 2022 (Ref. MAC No. 2002-MAC 001).

This Maritime Usage Licence Application (MULA) is required to undertake site investigations (hereafter referred to as the SI works), within the Maritime Usage Licence (MUL)Area (defined as the Maritime Area Consent (MAC) boundary below the high-water mark (HWM), plus a 4 km buffer around the offshore wind farm area, see Figure 1-1). In May 2019 the Applicant obtained a Foreshore Licence (reference no. FS006840) for initial surveys in the offshore wind farm area and offshore cable corridor. Under this Foreshore Licence the Applicant undertook both intertidal and offshore surveys which informed the commencement of engineering design of the wind farm. The Applicant later obtained Foreshore Licence (reference no. FS007383) in May 2023 for further SI works in the offshore wind farm area and cable corridor. Under this Foreshore Licence the Applicant undertook geotechnical, geophysical, ecological and metocean surveys in support of the overall Oriel Wind Farm Project. The Applicant now intends to undertake further SI works within the offshore wind farm area and the export cable corridor to investigate the stability of the soil (seabed sediments) for the design of foundations and the detailed routeing of the inter array and export cables. These SI works, which are discussed in more detail in Section 2.0 below, are therefore required to support the detailed wind farm design.

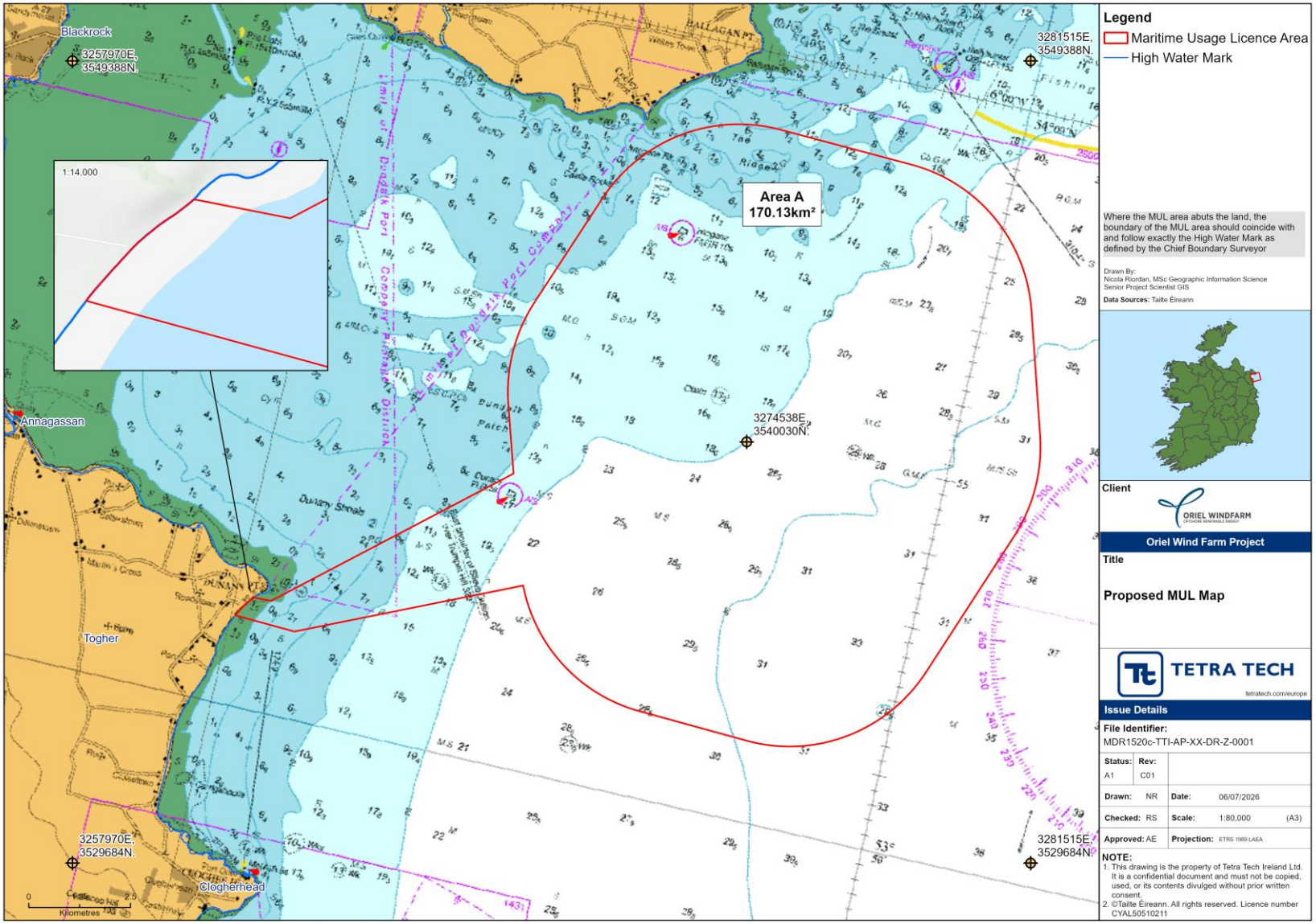


Figure 1-1 Proposed MUL Map

## 1.2 Purpose of this Report

This report has been prepared by Tetra Tech, on behalf of the Applicant, to provide supporting information to accompany an application for a MUL from the Maritime Area Regulatory Authority (MARA). This Risk Assessment for Annex IV Species report provides the required level of detail to inform MARA's own assessment of risks to Annex IV species from the SI works.

## 1.3 Statement of Authority

The technical competence of the authors is outlined below:

**Aoife Edgely** is an Associate Marine Scientist in the Environmental Services Business Unit at Tetra Tech. She has over 15 years' experience in the marine science field and is a Chartered Environmentalist and a Full Member of the Institute of Environmental Sciences. Aoife holds an honours degree in Environmental Science from Trinity College Dublin and a Master's in Marine Environmental Protection from Bangor University, Wales. Aoife has delivered the environmental assessments for a wide range of marine and coastal projects, including environmental impact assessment, appropriate assessment and Annex IV species reports.

**Rachael Shaw** is a Project Scientist in the Environmental Services Business Unit at Tetra Tech. She holds a Bachelor's Degree in Marine Science from the University of Galway and Master's Degree in Climate Change and Managing the Marine Environment from Heriot-Watt University Edinburgh. She has five years' experience working in consultancy, assisting on a wide range of projects from offshore renewable energy projects to flood relief schemes, including marine and terrestrial surveys. She is a full member with Institute of Environmental Sciences (IES).

**Róisín Murphy** is a Scientist in the Environmental Services Business Unit at Tetra Tech. She holds an honours degree in Zoology (B.Sc.) and Master's degree in Marine Biology, both from University College Cork. She has two years' experience as a Project Manager at Cork Nature Network, responsible for marine and river surveys, and has one years' experience in marine licensing and environmental assessments at Tetra Tech. She is a qualifying member with IES.

# 2.0 Project Description

## 2.1.1 Overview

The proposed SI works are detailed in Table 2.1 below. The purpose of these SI works is to provide a reliable basis for detailed design of the Project. The aim of the SI works is to acquire data to a high quality and specification for the site as summarised below and described in the following sections.

The Applicant is seeking a MUL for a period of five years from the date of the granting of the licence.

The proposed SI works will build on the existing detailed knowledge of the site which was gained under previous SI works under foreshore licences (FS006840, awarded 10th May 2019 for two years and FS007383, awarded 17th May 2023 for three years). The proposed activities within the MUL Area are planned to take place across phases. Geophysical and geotechnical surveys and investigations will be sequential with the results of the geophysical campaign and previous geophysical data used to inform the geotechnical campaign. The remaining surveys and investigations (e.g., environmental, metocean etc.) can take place at any time during the operational period of the MUL.

It should be noted that the geophysical and geotechnical campaigns may be further sub-divided depending on the availability of suitable vessels and equipment and the location of the surveys, e.g. intertidal, nearshore and offshore areas. Therefore, geophysical and geotechnical investigations in some areas may be completed in advance of geophysical and geotechnical activities in other areas.

Environmental surveys will be undertaken within the MUL Area to provide further information on the baseline conditions. Depending on the specific requirements of these surveys and logistics, they may be undertaken simultaneously with and/or independently from the geophysical and geotechnical campaigns.

Proposed SI locations are provided in Appendix A. These proposed locations are subject to refinement based on the results of the geophysical and environmental surveys, informed by previous and current survey campaigns, e.g. avoidance of a potentially sensitive habitat. Similarly, a location may be moved due to the presence of obstructions/refusals at individual locations, i.e. where a physical object, e.g. a subsurface boulder, prevents the borehole, CPT, etc., from reaching its target depth. In such circumstances, the borehole will be moved to another nearby location away from the obstruction and drilled again to the target depth.

Following the assessment of the results of the SI works, it may be necessary to undertake further SI works in particular areas within the MUL Area, e.g., along routes for the export cable corridor and approaches to the landfall. The proposed SI works, including the quantities detailed and assessed in this MULA, include contingencies to cover any follow up investigations that may be undertaken at refined locations.

An overview of SI works is presented below in Table 2.1, followed by a more detailed breakdown of the proposed survey elements.

Table 2.1 Overview of Proposed SI Activities

| Survey Type | Survey Elements (indicative equipment) | Indicative Equipment (where applicable) | Maximum Quantity (where relevant) |
|---|---|---|---|
| Marine Geophysical Surveys<br>(undertaken from survey vessel) | Multi beam echosounder (MBES) | Kongsberg EM series, Kongsberg Geoswath series, R2 Sonic series & Reson Teledyne Seabat series | N/A |
| | Side scan sonar (SSS) | Edgetech FS-4200 series, C-Max CM2 series and Klein System 3900-5000 | |

| Survey Type | Survey Elements (indicative equipment) | Indicative Equipment (where applicable) | Maximum Quantity (where relevant) |
|---|---|---|---|
| | Sub-bottom profiler (SBP) - parametric | Innomar smart, quattro (QBM) sixpack (HBM), Innomar SES 2000 compact light, Innomar standard quattro (DBM) sixpack (DBM), Innomar medium 100 | |
| | SBP – Chirper/Pinger | Kongsberg Geopulse, Edgetech 424/512, Knudsen 3202, Klein K-Chirp | |
| | 2D/3D Ultra-high-resolution seismic (UHRS) | Suitable Sparker / Boomer up to 1000 joules. | |
| | Magnetometer | G-882 Marine Magnetometer | |
| | Ultra short baseline (USBL) positioning system | Edgetech BATS, ORE offshore trackpoint, Sonardyne Fusion/Ranger/Scout, IxBlue GAPS, Kongberg HiPAP | |
| Intertidal Geophysical (land-based below HWM) | Seismic Refraction | Geophone Arrays:<br>• Geosense 4.5 Hz Geophones;<br>• Mark Products L-28LB Geophone;<br>• Geospace GS-11D Geophone; or similar<br>Digital Seismographs<br>• Geometrics Geode Seismograph,<br>• Seistronix RAS-24;<br>• ABEM Terraloc Pro; or similar | N/A |
| | Ground Penetrating Radar (GPR) | IDS GeoRadar Stream DP GPR System<br>Leica DS2000 GPR System; or similar. | |
| Marine Geotechnical Surveys<br>(undertaken from survey vessel(s)/jack-up barge (JUB)) | Vibrocore/gravity coring | Drill rig and JUB/drilling vessel | 41 |
| | Rotary core boreholes | Geobor-S | 78 |
| | Cone penetration testing (CPT) and standard penetration testing (SPT) at borehole locations | Push sampler/rotary core, hammer sampler | 60 |

| Survey Type | Survey Elements (indicative equipment) | Indicative Equipment (where applicable) | Maximum Quantity (where relevant) |
|---|---|---|---|
| Intertidal Geotechnical surveys (land-based below HWM) | Trial pit/borehole | Bobcat, backhoe or excavator<br>Drill rig and JUB / drilling vessel | 6 boreholes (max. depth 10m)<br>12 trial pits (max. depth 5m, 2m$^2$ in plan) |
| Environmental Surveys (undertaken from survey vessel(s)) | Marine mammal static acoustic monitoring (SAM) | CPODs/FPODs<br>(incl. heavy weight mooring blocks of c. 250kg, clump chain and rope with either an acoustic release mechanism and benthic buoy or a robust mooring with a surface marker buoy). | 12 |
| | Water quality samples | Sondes (incl. surface or seabed buoy)<br>Niskin bottle | 12 |
| | Grab sampling | Mini Hammond grab or Van Veen grab (0.1m$^2$) | 60 |
| | Fish and shellfish surveys | Sondes (incl. surface or seabed buoy)<br>Potting and trawl survey | 6<br>12 locations |
| Intertidal Environmental Surveys | Quadrat and dig over surveys | Refer to section 2.1.7.3 | 12 |
| Metocean Survey (deployed by vessel and moored to seabed) | Metocean buoy | Refer to section 2.1.8.1 | 1 (for 12-month period) |
| | Acoustic doppler current profiler (ADCP) | Refer to section 2.1.8.2 | 8 |

## 2.1.2 Estimated Project Schedule

The Applicant proposes a SI works schedule that will be phased over a five-year period. The intention is to begin SI works as soon as feasible following license award, with a phased programme of investigations, capitalising on suitable weather windows and vessel availability over this time period. This phased approach will progress the overall development towards detailed design stage. The exact survey schedule is dependent on the availability of the supply chain and therefore exact timelines for the surveys cannot be determined in advance of securing a MUL.

The exact dates for the surveys are to be determined pending the appointment of survey contractors but based on the estimated scope of works to be conducted the likely timeframe for each project phase has been estimated in Table 2.2 below. Contingencies have been built into the quantities to allow for future SI works within the MUL five-year period as more information becomes available. The estimated timeframes are subject to change based on variables such as weather conditions, unforeseen seabed conditions, unforeseen obstructions, vessel availability etc.

Geophysical site-specific surveys were conducted for the Oriel Wind Farm Project in 2019 and 2022 and information is available to inform geotechnical investigations. Geophysical surveys are also proposed under this MUL.

Mobilisation location will be dependent on the survey contractor, who may choose to mobilise from their home port, port of previous job or local port. The local port options for mobilisation, for example, could include Dundalk Port or Dublin Port depending on vessel size and marine traffic restrictions.

The SI survey works will be carried out on a 24-hour and 7 days per week basis, subject to sea state and tidal conditions, except for environmental surveys, which are expected to take place during daylight hours.

Table 2.2 Estimated Project Schedule

| | Year 1 (2027) | | | | Year 2 (2028) | | | | Year 3 (2029) | | | | Year 4 (2030) | | | | Year 5 (2031) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Geotechnical (Marine and Intertidal) | | | | | | | | | | | | | | | | | | | | |
| Geophysical (Marine and Intertidal) | | | | | | | | | | | | | | | | | | | | |
| Marine and Intertidal Environmental Surveys | | | | | | | | | | | | | | | | | | | | |
| Metocean | | | | | | | | | | | | | | | | | | | | |

## 2.1.3 Marine Geophysical Survey

The purpose of the geophysical survey is to characterise the seabed and sub-surface geology and geotechnical parameters within the survey area in order to supplement the information gathered in the 2019 and 2022 site-specific geophysical surveys and previous INFOMAR surveys of the site. This additional data will be used to better understand the surface and sub-surface structure and stratigraphy, including seabed sedimentation, morphology and mobility and sub-surface stratigraphy and geohazards. This will support the wind farm design, inter-array and offshore cable corridor and determine the design and installation methodology.

The objectives of the geophysical survey are to:

- Produce detailed bathymetric mapping;
- Obtain detailed seabed features, morphology and sediment;
- Obtain detailed sub-surface structure and stratigraphy;
- Acquire both shallow and deep geological cross-sections of the wind farm site; and
- Support cable design and installation including cable routing.

The geophysical survey will include bathymetric, side scan sonar, magnetometry and seismic sounding of the proposed site. Details of the exact survey equipment will be made available prior to commencement of the works; however, it is envisaged that the geophysical data acquisition will involve the following acoustic-based techniques:

- Multi beam echosounder (MBES) system for detailed bathymetric mapping;

- Side scan sonar (SSS) for detailed seabed sediment and morphological mapping;
- Magnetometer for detecting geomorphological anomalies and ferrous objects;
- Sub-bottom profiling (SBP), both single and multi-sourcings, to identify and characterise the layers of sediment/rock underneath the seafloor along the cable route corridors;
- Ultra-high-resolution seismic (UHRS) to identify and characterise the layers of sediment/rock underneath the seafloor within the windfarm site; and
- Intertidal geophysical surveys including seismic, electrical resistivity and electromagnetic methods.

An ultra-short baseline (USBL) positioning system will be utilised where required to monitor the position of towed equipment. The USBL system consists of a multi-element transducer mounted on the hull of the vessel and a transponder attached to the towed equipment (e.g. side-scan sonar). Triangulation is achieved using acoustic signals transmitted and detected at regular intervals from which bearing, depth and distance can be calculated. The USBL is coincident with towfish surveys (e.g. SSS, magnetometer).

USBL equipment is widely used by offshore commercial and research vessels where positional accuracy of towed survey equipment is critical. The emitted pulses will be short pulse width ‘pings’, approximately in the range of 20-35kHz and with a source level of up to ~200dB re 1µPa @1m (peak).

The geophysical survey will comprise transects with a total length of circa 84 km and a line spacing distance from tens of metres up to 1km between each transect. The seismic source will detect the geological strata to a depth of 40 m below the seabed (bsb).

A suitably qualified archaeologist will review the geophysical survey outputs for anomalies. The findings will be compiled and presented in an archaeological assessment report. Where deemed necessary by the project archaeologist and as agreed with the National Monuments Service (NMS), an archaeologist/ geoarchaeologist may be required to be present during geotechnical investigations, to take samples for archaeological inspection. Samples will be removed from the investigation location, properly stored and transported from site for more detailed assessment and appraisal.

#### 2.1.3.1 Multibeam Echosounder Survey

The MBES system will be used to provide detailed bathymetric mapping throughout the survey area. An MBES is a type of sonar (acoustic surveying) used in seabed mapping wherein acoustic waves are used to indicate depth-to-seabed. The device is typically affixed to a vessel’s hull or towed in its wake. The process is non-intrusive, and the device will not make contact with the seabed at any point. The Norbit Winghead B51S is an indicative example of a MBES system to be used in the completion of these works. The equipment will operate at a nominal frequency of 400kHz.

Side-scan Sonar Survey

The side scan sonar will be used to achieve detailed seabed morphology and seafloor mapping of the survey area. The survey is carried out using a sonar device attached to a vessel that emits fan-shaped pulses down towards the sea floor across a wide-angle perpendicular to the path of the sensor through the water. The intensity of the acoustic reflections from the seafloor of this fan shaped beam is recorded in a series of cross-track slices.

When stitched together along the direction of motion, these slices form an image of the sea bottom within the swath (coverage width) of the beam. The equipment will operate within a frequency range of 100-500kHZ with source levels at 235dB Lpk re 1µPa at 1 metre range. The Edgetech FS-4200 series, Klein System 3900 or similar is an indicative example.

#### 2.1.3.2 Magnetometer Survey

A magnetometer detects ferrous objects and as such is used to locate and identify ferrous objects on or buried in the seabed within the range of the magnetometer. The device precisely measures the earth’s magnetic field and detects any anomalies, which represent ferrous objects such as lost anchors, sunken ships and buried

pipes. The magnetometer is typically towed behind a survey vessel or affixed to a vessel's hull. The process is non-intrusive, and the device will not make any physical contact with the seabed at any point. The G-882 Marine Magnetometer is an indicative example.

#### 2.1.3.3 Sub-Bottom Profiling Survey

This device uses reflection seismology to give a 2D image of the sub-seabed geology. It is typically towed behind the vessel during survey works or affixed to the vessel's hull. The process is non-intrusive, and the device will not make any physical contact with the seabed at any point.

The Innomar SES-2000 Quattro Parametric SBP is an indicative example of a parametric type SBP while a Kongsberg Geopulse or Edgetech 424 is an indicative example of a chirper/pinger type SBP. The shallow SBP system will be used within the cable route corridor and will have the following general specifications:

- A vertical resolution better than 0.2 metres; and
- Penetration of at least 5 metres.

The profiler will be supplied with the following recorders and peripheral processing equipment:

- Fire control unit;
- Time varied gain;
- Swell filter; and
- Bandpass or Time Varying Filters (TVF).

#### 2.1.3.4 Ultra-high Resolution Seismic (UHRS)

Commonly used variants of this technology are known as "Sparkers" and "Boomers". It will have the following characteristics as a minimum:

- Repeatable source;
- Main output at frequencies between 1kHz and 5kHz;
- Broadband width in excess of 2.5kHz at -10dB;
- Vertical resolution better than 0.5 metres;
- Penetration of at least 50 metres; and
- Variable energy levels 100-1000 joules.

One or more hydrophone streamers will be supplied. The streamer will be neutrally buoyant or controlled, well maintained and free of air bubbles. The hydrophone will have a response appropriate to the source used but will generally have a flat response between 500Hz and 10kHz. The streamer will have at least 100 channels and be at least 100m long. A tail buoy with a radar reflector will be used to mark the streamer.

The survey may be conducted in either a 2D (single streamer) or 3D (dual streamer) format.

### 2.1.4 Intertidal Geophysical Survey

Conventional land-based geophysical surveys will be undertaken below the HWM. These surveys will include seismic refraction and ground penetrating radar (GPR). Those elements of the land-based survey that occur within the MUL Area are activities included in this MULA. This MULA does not include any land-based works which will take place outside of the maritime area.

Where required, prior to intrusive surveys in the intertidal zone, a suitably qualified archaeologist will undertake a walkover inspection of the intertidal area at low tide, during daylight hours. The inspection will include the use of handheld metal-detectors, photographic survey and drone survey, where applicable. Investigations involving handheld metal-detectors will include a series of transects at 10 m intervals across the

accessible intertidal area. Where deemed necessary by the project archaeologist, and as agreed through consultation with the National Monuments Service, an archaeologist/ geoarchaeologist may be required to be present at the location of geotechnical investigations, to take samples for archaeological inspection. Samples may be removed from the investigation location, properly stored and transported from site for more detailed assessment and appraisal.

#### 2.1.4.1 Seismic Refraction

The seismic refraction method utilises the refraction of seismic waves as they pass through various rock or soil layers to analyse underground geological conditions and structures.

Seismic refraction profiles will be conducted using onshore survey tools during low tide in the intertidal zone. A sound source (typically a sledgehammer striking a metal plate) will generate compressional wave energy. These refracted waves will be captured by a series of geophones and logged on a digital seismograph. The locations and elevations of the geophones will be documented using GPS technology.

**Indicative Equipment:**

- Geophone Arrays:
  - Geosense 4.5 Hz Geophones;
  - Mark Products L-28LB Geophone;
  - Geospace GS-11D Geophone; or similar.
- Digital Seismographs:
  - Geometrics Geode Seismograph,
  - Seistronix RAS-24;
  - ABEM Terraloc Pro; or similar.

#### 2.1.4.2 Ground Penetrating Radar

GPR utilises the reflection of electromagnetic waves as they are returned by rock or soil layers to analyse underground geological conditions and structures.

GPR will be completed during low tide in the intertidal zone. A GPR trolley will be pushed over the area to be scanned and the results analysed by a technician to determine subsurface characteristics. Indicative equipment such as the IDS GeoRadar Stream DP GPR System, Leica DS2000 GPR System or similar will be utilised.

### 2.1.5 Marine Geotechnical Surveys

The purpose of the geotechnical survey is to provide relevant information about the stability of the soil to a depth below which possible existence of weak formations will not influence the safety or performance of the wind turbine and its support structure.

The geotechnical survey will include 26 no. deep investigation locations (boreholes) and 41 no. shallow investigation locations (vibrocores).

#### 2.1.5.1 Rotary Core Boreholes

Deep investigations will be carried out at 26 proposed structure locations (25 wind turbine locations and one offshore substation location). Each deep investigation location may require up to 3 drilled boreholes with a target depth of 40 m below the seabed. Thus, up to 78 geotechnical boreholes may be drilled. See Appendix A for proposed borehole location.

The equipment used to drill the boreholes will follow the ISO and API technical specifications for drilling equipment and at a minimum will have:

- A heave motion compensator system on board (seabed frame and/or drill string) with a minimum heave compensation of 1.5m;
- Capability of mud production to different densities (when mud production is required for the works). The mud shall be water or bio-degradable organic polymer.

A detailed description of the soil types, and the in situ geotechnical properties determined for the boreholes will be recorded in the boring log to characterise the strata.

Coring and sampling will be done in general accordance with EN ISO22475-1 Geotechnical Investigation and Testing. Rotary coring equipment, such as Geobor-S is expected to be utilised.

In situ testing will include the option of either down-hole wireline piezocone penetration testing (PCPT) associated to PS logging or down-hole wireline seismic cone penetration testing (SCPT) over full length of borehole.

The boreholes are to be advanced by alternating PCPT/SCPT and push/core sampling; requirements will depend on the material type encountered. Within a granular deposit, the boreholes are to be advanced by alternating PCPT/SCPT and push sample. Where the sample recovery is poor using the push sampler, a hammer sampler will be used instead. Blow counts measured during hammer sampling will be recorded and presented on the Borehole Logs.

Within the cohesive deposits, the boreholes are to be advanced by PCPT/SCPT followed by two push samples (repeat cycle). Rotary coring may be used instead of push sampling in suitable materials, in which case the CPT and cores will be alternated.

The samples/cores will be recovered in liners or in Shelby tubes for all soil types and the appropriate technique will be selected to minimise soil disturbance and maximize recovery.

SCPT tests will be executed at a minimum of four of the locations, which will be confirmed in consultation with geophysical survey results. Two seismic measurements will be carried out during each SCPT stroke at a depth interval of 1m; the envisaged volume is 40-60 SCPT tests in total.

#### 2.1.5.2 Standard Penetration Tests (SPTs)

The SI works will include Standard Penetration Tests (SPTs) using a 50mm split spoon sampler and occasional jacking operations to deploy, stabilise, or demobilise the drill barge and associated equipment. Both SPTs and jacking of barge piles generate noise and low-frequency vibration including hammer impacts during SPTs and hydraulic jacking or driving systems used to set or adjust the position of the JUB.

#### 2.1.5.3 Vibrocore/ Gravity Core Investigations

The inter-array cable routes and offshore cable corridor will be surveyed with up to 41 vibrocores/gravity cores within the inter-array area and offshore cable corridor. The cores will be carried out along the line of the cable routes, which are still to be defined. See Appendix A for proposed vibrocore/gravity core locations.

Vibrocoring will be performed where cohesionless soil is expected. The rig will be fitted with a PVC liner, core catcher and cutting shoe. The vibrocorer will be lowered onto the seabed, position and depth will be noted, after which the vibrocoring process will start. Upon refusal or at the target depth, the stop condition will be recorded and the vibrocorer will be recovered on deck where the recovery rate will be measured. If required, a core catcher will be used to prevent the sample dropping out of the PVC liner.

All cores will be examined and tested offshore before any sealing of the sample. Soil found in the vibrocoring shoe will be stored in a bag.

Gravity coring (wireline self-weight penetration sampler) will be performed where cohesive soil is expected. The rig will be equipped with a PVC liner. The gravity corer will be lowered on the seabed and penetrates in the seabed under its own weight. Upon refusal or at target depth, the gravity core will be recovered on deck where the recovery rate will be measured.

All cores will be examined and tested offshore before any sealing of samples.

## 2.1.6 Intertidal Geotechnical Survey

### 2.1.6.1 Trial Pit/ Borehole investigation

Trial pits will be excavated across intertidal locations (below the HWM) along the proposed offshore cable corridor. Trial pits will be excavated, logged, backfilled and reinstated during a single tidal cycle. Excavated material will be temporarily stored and replaced following the sequence in which it was removed. Subject to access and anticipated ground conditions trial pits will be excavated manually or using a mechanical backhoe. Existing land access routes to investigation locations will be used to the extent practicable.

Up to 12 no. trial pit investigation locations are proposed in the intertidal area. Trial pits will be excavated to a depth of up to 5 m and will be 2 $m^2$ in plan. Up to 6 boreholes will be drilled in the intertidal area using a drilling rig with a target depth of up to 10m. All excavated locations to be backfilled immediately on completion of the investigation. Cores and CPTs may be taken from the boreholes or trial pits.

## 2.1.7 Environmental Surveys

The purpose of the environmental surveys is to update the baseline data collected from earlier environmental surveys and to ensure that the environmental data for the Project remains up to date. The proposed surveys are set out in the following sections.

### 2.1.7.1 CPODs

It is proposed to deploy up to twelve (12) FPOD or CPOD devices for static acoustic monitoring (SAM) of cetaceans. The devices will provide acoustic assessment of the presence/absence and species types of cetaceans (whales and dolphins) to i) allow for the recording species difficult to detect visually such as harbour porpoise, ii) provide data on other factors such as diel and tidal presence at the site and iii) to create a dataset with which to determine any effects of future construction or operation of a windfarm at a resolution which is relevant to managers.

A FPOD or CPOD is a self-contained computer and hydrophone in a sealed sonde approximately 1m in length. The FPOD or CPOD can log the times and duration of click trains which resemble the echo-location clicks produced by porpoises and dolphins. SAM is independent of weather conditions once deployed and thus ensures high quality data is collected. Data collection will be at a small spatial scale (typical detection distances of 250m (porpoises) to 800m (dolphins)). Each FPOD or CPOD will have a robust, heavy weight mooring blocks of c. 250kg, clump chain and rope with either an acoustic release mechanism and benthic buoy or a robust mooring with a surface marker buoy. Batteries will be replaced and data downloaded every 3/4 months. Deployment and servicing will be undertaken from a survey vessel.

### 2.1.7.2 Water Quality Sampling and Monitoring

It is proposed to sample water quality at different depths and locations throughout the offshore wind farm area. A Niskin bottle (or similar) will be used to obtain a sufficient sample of water at the surface (< 1m depth) and a second sample just above the seabed (~1m) for the subsequent chemical analysis. This will be lowered and retrieved from a survey vessel.

It is proposed to deploy up to 12 sondes for water quality monitoring through the water column – these will be used to monitor a range of parameters including turbidity, salinity, temperature, pH, dissolved oxygen and electrical conductivity. Sondes will be either suspended from a surface marker buoy or a benthic buoy with acoustic release at a range of depths dependent on survey requirements. Each buoy will have a robust mooring on the seabed similar to the CPOD mooring described above.

### 2.1.7.3 Subtidal and Intertidal Sampling

Subtidal surveys will comprise drop down video (DDV) and/or remote operated vehicle (ROV) inspection and the taking of grab samples as required in order to identify benthic habitats and sediment characteristics. DDV/ROV activity will be passive and non-intrusive and will not interact with the seabed.

At locations determined suitable for grab sampling effort by the DDV analysis or geophysical data review, a 0.1 $m^2$ Day grab, mini-Hamon or Van Veen grab will be deployed from a suitable vessel to collect sediment samples. Each sample will be 1-5kg in mass. Up to 60 grab samples will be collected within the offshore wind farm area and along the offshore cable corridor.

A walkover transect survey will be undertaken. Quadrat sampling and manual digging will be undertaken by hand at 12 locations in the intertidal zone to collect sediment samples. Samples will be analysed to determine the benthic faunal community present and sediment geochemistry.

#### 2.1.7.4 Fish and Shellfish Surveys

Up to 6 sondes will be deployed for the tracking of fish or shellfish within the wind farm and export cable corridor. Similar to the CPODs and water quality sondes, these sondes for the tracking of fish or shellfish will be attached to a robust mooring with either a benthic buoy and acoustic release and/or a surface marker buoy.

A potting survey and trawl survey will be conducted. Surveys will be designed to undertake investigative sampling. Indicatively it may include twelve locations for potting and trawl surveys within the proposed offshore wind farm area and/or along the proposed offshore cable corridor. The surveys may be conducted over several weeks.

### 2.1.8 Metocean Survey

The purpose of the metocean survey is to obtain site specific atmospheric, wave and wind data over a minimum period of 12 months. All metocean survey works will occur at one location within the marine survey area. The location will be determined following the appointment of a contractor.

#### 2.1.8.1 Floating LiDAR

The data will be collected via a floating weather station, which will include a wave rider and a wind measurement LiDAR current profiler. The wave rider will be used to collect wave height and current data across the site, while the LiDAR system will be used to measure the wind characteristics within the site. This equipment will be mounted on specifically designed floating buoys which are moored to the seabed using an anchor chain and clump weights. All equipment including the moorings will be removed following completion of the survey.

#### 2.1.8.2 Acoustic Doppler Current Profilers

Up to eight Acoustic Doppler Current Profilers (ADCPs) will be moored to the seabed using an anchor chain and clump weights at varying heights above the seabed. These will be periodically recovered by either acoustic release systems or surface buoys. All equipment including the moorings will be removed following completion of the survey.

An ADCP is a hydroacoustic current meter similar to a sonar, used to measure water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column. ADCP units containing both wave and current sensors, and turbidity and total suspended solids sensors will be deployed for no less than one continuous year with a maximum deployment period of up to 36 months at each location (servicing is anticipated every 12 weeks in order to replace ADCP batteries).

### 2.1.9 Survey Vessels

The proposed marine survey works will be carried out by dedicated marine vessels, suitable for the scope of the work required, the water depth and the anticipated conditions of the survey area and the transit routes. The exact equipment to be used will be confirmed following a tender process to procure the site investigation contractor.

Separate survey vessels will be used for each activity and are outlined in the following sections. A larger vessel or jack-up barge (JUB) will be required to complete the offshore geotechnical works with smaller

vessels for the geophysical, metocean and ecological surveys. A smaller Rigid Hulled Inflatable Boat (RHIB) type vessel may be used for works in shallow waters. Unmanned survey vessels (USVs) may be used for geophysical surveys across the site. USVs will be fully licenced to operate in Irish waters. Up to three vessels may be required to operate concurrently in the MUL area under coordinated simultaneous operations (SIMOPS). This will allow for flexibility to conduct proposed geotechnical and geophysical works within the MUL Area to ensure that the Applicant can act on available weather windows and sub-contractor availability. Land based drilling and excavators will be used for the investigations and surveys within the intertidal zone. The types of vessels proposed to be employed are described in the sections below.

These vessels will be comparable and of a similar size to those typically used in the industry for carrying out similar technical work and will possess all relevant classification certificates.

The vessels will conform to the following minimum requirements as appropriate:

1. Station-keeping and sea keeping capabilities required by the specified work at the proposed time of year; the appointed contractor may provide supplemental tug assistance if such assistance benefits the operation;
2. Endurance (e.g. fuel, water, stores, etc.) to undertake the required survey works;
3. Staffing to allow all planned work to be carried out as a continuous operation (on a 24 hour per day basis for the offshore activities and on a 12 hour per day basis for the inshore activities);
4. Equipment and spares with necessary tools for all specified works;
5. Appropriate accommodation and messing facilities on board; and
6. Adequate soil laboratory testing facility, as required.

The vessels used for the offshore surveys will be sound and capable of remaining safely at sea for a minimum of 30 days under weather conditions typically encountered in the MUL Area at the time of year that the operations are to take place. The appointed contractor will be responsible for all shipboard systems and equipment calibration and re-calibration, including spares. For every 30 days of operations the vessels will accrue at least one day of maintenance time.

Vessels will have breadth and draft of suitable proportions to provide adequate stability for the duration of the intended operation. The vessels will be capable of passage speeds in excess of 10 knots and extended survey operations at speeds 4 knots or less.

In addition to AIS-A and Active Radar Enhancing Systems, the manned vessels will have the following communications equipment as a minimum:

- Multi-channel VHF and HF radio capable of working at all marine frequencies and with a dual watch facility;
- Mobile phone;
- Hand-held radios;
- Frame and winch for the deployment of equipment and sensors, sized for the required equipment/sensors loads and pulling force. The winch speed and size must be compatible with planned surveys;
- Gyro-compass;
- SATCOM (satellite communication) facilities (phone/fax and e-mail); and
- Two independent Differential Global Positioning Systems (DGPS), a primary and secondary system (DGPS has a greater degree of accuracy than GPS).

All drilling survey vessels and marine support vessels will conform to the relevant ISO (International Organization for Standardization) and API (American Petroleum Institute) technical specifications for drilling equipment.

#### 2.1.9.1 Offshore Vessels

The survey vessels used for offshore works will be either a JUB and/or a Dynamic Positioning (DP) vessel configuration.

JUBs utilise a fixed anchoring system in order to maintain the required position within the site. The vessel consists of a self-elevating platform and several “legs”, which are deployed to the ocean floor mooring the vessel in place.

The survey works are carried out from the self-elevating platform, which is raised above the water’s surface. If used, the JUB will meet with the following minimum requirements:

- The vessel will have at least four mooring points;
- The self-elevating platform must be permanently manned (i.e. off-shift personnel to stay onboard even if the accommodation is not a permanent equipment of the JUB);
- The platform must be provided with a class certificate verifying the provision of adequate safety equipment for the type of vessel and the number of on-board personnel; and
- The platform should be certified in compliance with the MODU Code and the BWEA guideline.

DP vessels maintain station through thruster and propeller systems which use satellite DGPS signals, allowing the vessels to be positioned over any point on the seabed and maintain position without employing a fixed anchoring system. Using thrusters or propellers, a DP vessel can maintain position within a 2m to 0.5m window depending on the sea state/weather conditions and available power. The vessel may also transit under DP control along a given pre-determined path.

If used, a DP vessel will meet the following minimum requirements:

- The vessel must be fully equipped with a Class II DP system as a minimum; and
- Two DP certified operators with the necessary experience must be members of the crew.

The offshore works will be carried out on a 24-hour shift basis, with personnel working two 12-hour shifts. This will allow the works to be continuous. If the survey works are delayed through weather constraints or other matters, then a second vessel may be used to ensure that the works are completed within the required time period. Full assessment of all SIMOPS will be carried out if a second vessel is used.

#### 2.1.9.2 Nearshore Vessel

The smaller, nearshore vessel e.g., rib, will be used in locations where the water depth is too shallow for the larger, offshore vessel to carry out the works. This vessel does not need to have a dynamic positioning system, however, must have full DGPS capability. The vessel is usually held on station by joy-stick control and will deploy an anchor to assist in maintaining station (depending on sea state and weather conditions). The smaller vessel will use similar equipment to the larger vessel to carry out the required survey works.

#### 2.1.9.3 Unmanned Survey Vessels

An unmanned surface vessel (USV) may be used. The vessel would not carry any surveyors on board and would be controlled from the land. The USV would be escorted out to the survey area with a manned vessel and a pre-watch MMO survey completed prior to commencement of the survey.

#### 2.1.9.4 Survey Navigation

All navigation equipment and instrumentation will be calibrated and used correctly. Calibration and/or verification will be repeated in the event of any equipment malfunction, which may nullify earlier calibrations and/or verifications.

Qualified surveyors will be used to operate the navigation and positioning equipment continuously throughout the survey while maintaining a continuous log of all navigation activities throughout the survey.

Sufficient survey and positioning spares and consumables will be provided to enable the survey to be completed without any degradation of navigation and positioning quality and effectiveness and without the need to return to port to acquire additional equipment.

## 2.1.10 General Requirements

#### 2.1.10.1 Quality Assurance

The marine survey Contractor will:

- Operate Quality and Environmental Management Systems (EMS) based on and conforming to ISO9001:2008;
- Provide a Quality Management Plan (QMP) to Oriel for all the marine operations; and
- Provide operational procedures to Oriel for all the marine operations.

#### 2.1.10.2 Operating Permits

The marine survey Contractor will obtain and comply with all necessary marine operational permits including routine and customary vessel/crew/equipment clearances from Customs Agencies, Port Authorities, Marine Survey Office (MSO), etc.

#### 2.1.10.3 Health and Safety

Health, Safety and Environmental protection will be given foremost consideration in the execution of the work and will be promoted in a proactive and highly visible manner throughout the workforce. The marine survey Contractor will operate International Safety Management (ISM) and Health Environmental and Safety (HES) systems based on legislation relevant to the proposed activities. The marine survey Contractor will have an overall Health, Safety, Security and Environmental (HSSE) plan for each stage of all marine operations. The plan will cover all parties and operations.

The Applicant’s Health and Safety Protocols will be followed by both survey and ship's crew. Care will be taken to maintain contact with fishing vessels operating within the area of operations. The Applicant will not knowingly damage or interfere with the property of any fishers while carrying out SI activities. The contractor will ensure notifications of the intended work and timelines are posted in the relevant press well ahead of schedule and a fisheries liaison officer (FLO) will be employed.

All vessels will operate under a certificated Safety Management System (SMS) that provides policies, procedures, and a framework for continuous improvement to ensure the safety of personnel onboard.

#### 2.1.10.4 PSDP/ PSCS

The appointed contractor will designate a competent Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) under the relevant legislation. Method Statements and Risk Assessments will be prepared prior to any works commencing.

#### 2.1.10.5 Environmental Protocols

The Applicant will implement a number of industry standard environmental protocols to address potential environmental impacts during the survey works.

Environmental factors will be taken into account in all decisions during the survey campaign. Environmental efforts will be preventative and where required as a condition of permitting, the Contractor will form and comply with the obligations of an appropriate Environmental Management Plan (EMP) and those conditions of the MUL relating to environmental protection, if granted

All vessels will comply with the latest International Maritime Organization (IMO) and Safety of Life at Sea (SOLAS) and environmental requirements for their classification and with any national requirement of the territorial or continental / EEZ waters to be operated in. All vessels will be operated and comply with the requirements of the Marine Co-ordination Management System operated by the Applicant for all its offshore wind farm project sites. This system includes the vetting and tracking of all vessels and personnel working offshore.

The appointed contractor will take particular care when handling or storing hazardous materials, radiation sources and chemicals. All storage and handling must be carried out in accordance with the Dangerous Substances Act (1972) and supporting regulations, appropriate safety precautions must be taken, and safety clothing must be worn as necessary. Liquid or non-liquid pollutants or waste material will not be dumped, thrown or otherwise disposed of into the sea. All refuse and materials will be kept onboard the vessel and safely disposed of onshore according to the MARPOL (International Convention for the Prevention of Pollution from Ships) convention. All substances handled and/or used whilst undertaking the works will be handled, used, stored and documented in compliance with the Dangerous Substances Act 1972 as amended and relevant supporting Regulations. The works will also be carried out in accordance with assessments and recommendations of international best practice including the UK Control of Substances Hazardous to Health (COSHH) Regulations 1994. Where Fuels, Oils and Lubes are required to be stowed on boats, suitable containers will be used and stowed to allow ventilation and safe dissipation of any accidental leaked gas and retention of any leaked liquid. No liquid will be discharged into the water at any stage of the work on site. No smoking will be permitted in the vicinity of fuel in storage or when in use.

All geophysical survey works that involve the use of acoustic instrumentation will follow the *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* (2014) (as outlined in Section 6.1.2 of Attachment 4.3 - Natura Impact Statement (Report ref: MDR1520C-TTI-00-XX-RP-Z-0004)). Although published in 2014, this guidance remains relevant in Ireland and is listed by NPWS as best-practice guidance[1] and it provides the mitigation framework used in underwater-noise risk assessments in Ireland to date. This makes it directly applicable to the SI works, particularly geophysical and geotechnical surveys. Furthermore, the risk minimisation measures proposed in this guidance remain appropriate today as these measures continue to be recommended as mitigation by marine mammal experts.

Measures to be implemented include but are not limited to:

- A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms;
- Pre-start monitoring: If marine mammal species are detected within 500m distance of the sound source, seismic survey shall not commence;
- Periods of peak sensitivity to survey operations for marine mammals will be avoided where possible; and
- Ramp-up Procedures will be used - a controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.

#### 2.1.10.6 Access and Egress Arrangements

All offshore works will be carried out from a vessel or JUB. The offshore survey vessel may mobilise directly to site from its base or from a suitable port in the Irish Sea close to the site.

[1] Underwater sound guidance_Jan 2014.pdf accessed July 2026

Access to the intertidal zone may be made from the landward side down an existing lane (Legg Lane) at the southern boundary of Dunany Demesne as shown on Figure 2-1.

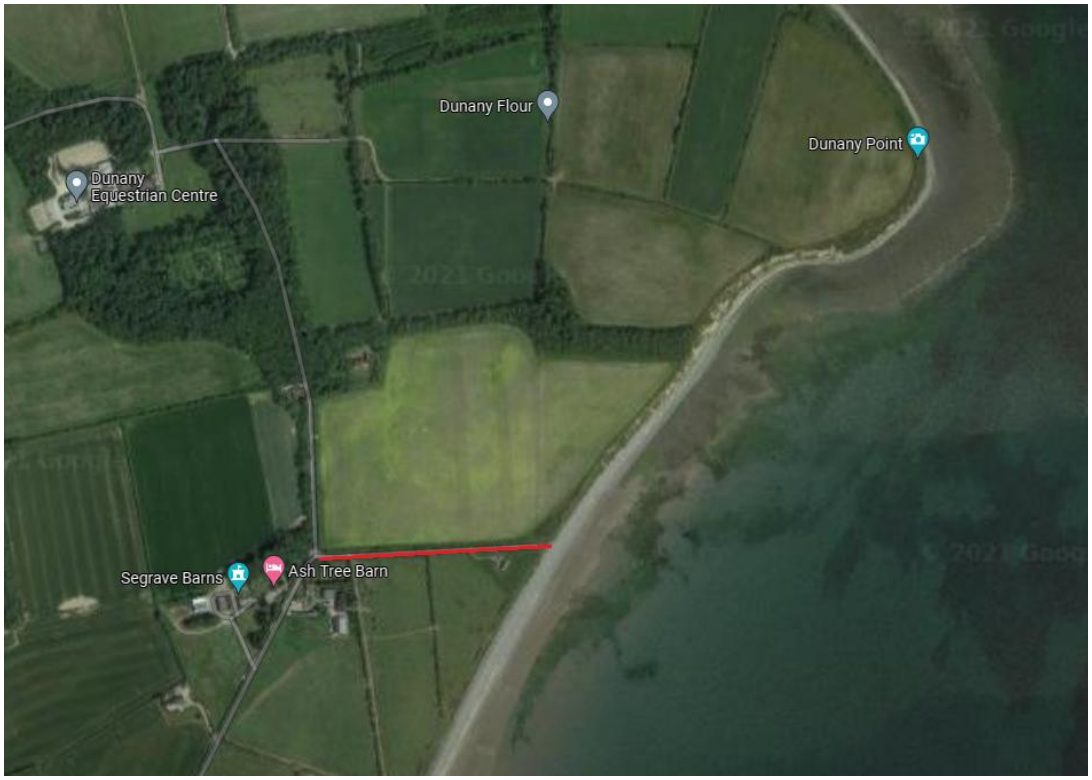


Figure 2-1 Intertidal zone access via Legg Lane

# 3.0 Risk Assessment for Annex IV Species

## 3.1 Legislative Context

Under Article 12 and 13 of the Habitats Directive, Member States must establish systems of strict protection for animal and plant species which are particularly threatened, and which are listed on Annex IV of the Directive. Article 16 provides for derogations from these legal protections under certain, specific, circumstances. Article 12, 13 and 16 of the Habitats Directive are transposed into Irish law by Regulations 51, 52 and 54 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (the 2011 Regulations).

Annex IV species are afforded strict protection throughout their range, both inside and outside of designated protected areas. Under Article 51 of the 2011 Regulations, it is an offence to:

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

This protection only applies to the species listed above in their “natural range” in Ireland.

The granting of another statutory consent (e.g., planning permission; foreshore licence; Maritime Usage Licence) does not remove the obligation to obtain a derogation licence where there is a risk identified to Annex IV species. As such, an application for derogation may have to be made to the Minister for Housing, Local Government & Heritage via the National Parks and Wildlife Service (NPWS) under Regulation 54, in addition to an application for development consent. If satisfied that an application meets the criteria for derogation, the Minister may grant a derogation licence, which may be subject to such conditions, restrictions, limitations, and requirements as the Minister considers appropriate, and these will be specified in the licence.

## 3.2 Interpretation of the ‘Disturbance’ Offence

The disturbance offence refers to disturbance which is likely to be detrimental to the strictly protected species or affect their local abundance or distribution (NPWS, 2021). Such disturbance could therefore be likely to increase the risk of a negative impact to a population of a protected species at Favourable Conservation Status (FCS) in their natural range.

The term “disturbance” is not defined in Article 1 or Article 12 of the Habitats Directive. It is clear, however, that activities that disturb a species to the extent that it could affect its chances of survival, breeding success or reproductive ability, or lead to a reduction in the occupied area or the relocation or displacement of the species, should be regarded as a ‘disturbance’ under the terms of Article 12 (European Commission Guidance document on the strict protection of animals species of community interest under the Habitats Directive 92/43/EEC’, 2021) (the EC guidance).

The EC guidance also states that a case-by-case approach is required and that *“the competent authorities will have to reflect carefully on the level of disturbance that is to be considered harmful, taking into account the specific characteristics of the species concerned and the situation”*. The guidance goes on to state *“sporadic disturbances without any likely negative impact on the individual animal or local population…should not be considered as disturbance under Article 12”*. Thus, where disturbance is not in breach of Article 12 because it

is considered not likely to have a negative impact on the individual animal or local population, we have referred to it as “sporadic” for the purpose of this assessment.

Regarding the offences listed above in relation to the ‘deliberate’ nature of actions, the EC Guidance offers the following definition:

*“The term ‘deliberate’ is interpreted by the CJEU [Court of Justice of the European Union] as going beyond ‘direct intention’. ‘Deliberate’ actions are to be understood actions by a person or body who knows that their action will most likely lead to an offence against a species, but intends his offence or, at least, consciously accepts the foreseeable results of his action”.*

Therefore, anyone engaging in activities that they should reasonably have known could cause injury and/or disturbance as defined in the 2011 Regulations could be committing an offence.

This risk assessment has assumed that the proposed activities described herein can be considered to be ‘deliberate’ actions and therefore the risk to protected species has been assessed in each case. In light of the findings, and subject to standard industry mitigation to reduce the risks, most activities have been determined to result in a “sporadic” disturbance i.e. disturbance which is not in breach of Article 12 because it is considered not likely to have a negative impact on the individual animal or local population and therefore do not require a derogation licence.

## 3.3 Guidance and Methodology

This risk assessment for Annex IV marine species has had regard to the following guidance:

- NPWS (2025a) Applications for Regulation 54 Derogations for Annex IV species – Guidance for Applicants. Department of Housing, Local Government and Heritage.
- European Commission (2021) Guidance document on the strict protection of species of community interest under the Habitats Directive. C. (2021) 7301 final. Brussels.
- Mullen, E., Marnell, F. & Nelson, B. (2021) Strict Protection of Animal Species: Guidance for Public authorities on the Application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority NPWS Guidance Series, No. 2. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- NPWS (2021) Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland. National Parks and Wildlife Service Guidance Series, No. 1. Department of Housing. Local Government and Heritage
- Department of Arts, Heritage and the Gaeltacht (DAHG, 2014) Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters.

This risk assessment for Annex IV species follows the methodology structure outlined in Mullen et al (2021) and NPWS (2021), as follows:

- Stage 1: Use existing information to determine the probability of the protected species being present in the area affected by the works.
- Stage 2: Ecological survey, if required.
- Stage 3: Examination of impacts and mitigation measures and satisfactory alternatives (if required).

For each of the relevant Annex IV species identified below, an impact assessment will be made following Stages 1 to 3 above. Should the examination of impacts conclude that the SI works will not conform with the strict protections afforded to any Annex IV species, and there is no satisfactory alternative to proceeding with the works, then the decision-making process must move to Stage 4: Application for Regulation 54 Derogation Licence.

## 3.4 Relevant Annex IV Species

The SI works will be undertaken across the MUL Area as shown in Appendix A.

The Habitats Directive lists species of community interest 'in need of strict protection' within Annex IV. This list was reviewed and all species/species groups with the potential to occur within the MUL Area were considered further. Of the animal and plant species on Annex IV known to occur in Ireland, the following species were identified as having the potential to occur within the MUL Area of the proposed SI works:

- All bat species;
- Otter;
- All cetacean species; and
- All turtle species.

Other Annex IV species found in Ireland, namely the natterjack toad and the Kerry slug, do not occur in the marine environment and have not been recorded within the SI works MUL Area by the National Biodiversity Data Centre (NBDC). Therefore, these Annex IV species are not considered in this assessment.

## 3.5 Stage 1: Use existing information to determine the probability of the protected species being present in the area affected by the works.

### 3.5.1 Desk Study

In order to assess the probability of the above species/species groups being present in the MUL Area or the zone of impacts of SI works, a desk study was undertaken, in addition to application of professional judgement and knowledge of the geographical area.

The following sources were consulted during the desk study in July 2026:

- Irish Whale and Dolphin Group Sightings Log https://iwdg.ie/browsers/sightings.php/;
- Distribution records for Annex IV species held online by the NBDC https://biodiversityireland.ie/;
- NPWS (2025b) The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished Report, National Parks and Wildlife Service. Department of Culture, Heritage and the Gaeltacht, Dublin; and,
- Evidence base associated with Oriel Wind Farm Planning Application (ACP ref: OA15.319799) submitted on 24/05/2024 and subsequent information submitted as part of ACP RFI on 15/01/2026.

### 3.5.2 Bat Species

All native bat species in Ireland receive the same level of strict protection. The presence or otherwise of bats is typically relevant only to onshore activities; although bats are known to forage, commute and migrate over water and along coastlines (Alcalde et al., 2021; BCI, 2026, Hooker et al., 2025), they will not interact with underwater SI works. Interaction between bats and the proposed SI works, although unlikely, is still possible due to the potential for disturbance caused by the lighting and noise from SI works within the Irish Sea. According to the NBDC (2026a, 2026b, 2026c, 2026d, 2026e, 2026f and 2026h) there have been numerous recordings of bat species within 10 km of the MUL Area.

Onshore bat activity surveys undertaken by the Applicant between 2019 and 2023 identified a "hotspot" of bat activity at Dunany Point (<500 m from the MUL Area) where four species (common pipistrelle (*Pipistrellus*

*pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), Leisler's bat (*Nyctalus leisleri*), and unidentified *Myotis* species) and 360 bat passes were recorded in total over the entire survey period. It was noted that while there was no bat activity at the intertidal portion of the MUL Area, two bat species were recorded in the vicinity of this location (common pipistrelle and soprano pipistrelle). The closest bat activity to the intertidal area of the MUL Area during these surveys was 160 m inland of the HWM (RPS, 2024a).

Vessel based acoustic detector surveys were undertaken between May and August 2022 off Clogherhead to the immediate south and east of the MUL Area. A small portion of the vessel transects passed into the easternmost portion of the MUL Area during these surveys. No offshore bat activity was recorded for the duration of the surveys. The only recorded acoustic bat activity comprised commuting and foraging calls of Leisler's bats in and around Dún Laoghaire harbour while the vessel was anchored, 60 km south of the MUL Area (RPS, 2024b).

In response to a Request for Further Information by An Coimisiún Pleanála (ACP), the Applicant undertook boat-based and coastal headland acoustic bat surveys in 2024 to determine the level of offshore bat migration activity within the Oriel Wind Farm Project Planning Application boundary. Similar to the results of the 2019 to 2023 surveys, autumn and spring boat based acoustic surveys returned no records of offshore bat activity during the survey periods. The only recorded bat activity occurred in Skerries harbour while the survey vessel was idle. Similar to the surveys undertaken in 2022, only Leisler's bats were recorded at this time. It is noted that Leisler's bat may utilise coastal habitats for foraging and/or commuting (RPS, 2025a). Coastal headland acoustic surveys during autumn and spring bat migration periods were undertaken at Templetown Beach (3 km from the MUL Area) and Dunany Point (<500 m from the MUL Area). A total of seven bat species were recorded during these surveys across the two locations (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), Leisler's bat, brown long-eared bat (*Plecotus auritus*), Daubenton's bat (*Myotis daubentoniid*) and Natterer's bat (*Myotis nattereri))* as well as one unidentified *Pipistrellus* species and on unidentified *Myotis* species. It should be noted that the 2024 offshore acoustic vessel surveys coincided with some of these headland surveys and did not record any offshore bat activity for the same period. Thus, there is no clear evidence indicating the movement of bats out to sea for foraging, migrating and/or commuting between headlands from these surveys (RPS, 2025a).

Eight of the nine regularly occurring bat species in Ireland occur within or adjacent to the MUL Area (all species apart from the lesser horseshoe bat (*Rhinolophus hipposideros*)). While many papers have been published on potential interactions between bat migration and offshore wind farms in the UK (Hooker et al., 2025), no such papers have been published in Ireland. However, considering that the UK is home to all nine species of bat native to Ireland (Bat Conservation Trust, 2026), and with evidence of some of these bat species migrating over marine waters (Ahlén,1997; Alcalde et al., 2021;), there is potential for marine migration of Irish bat species within the MUL Area.

### 3.5.3 Cetacean Species

Twenty-seven species of cetacean have been recorded in the waters around Ireland (NBDC, 2026j). In order to establish the probability of cetacean species being present, this section of the report has been informed primarily by previous site-specific surveys undertaken as part of the Oriel Wind Farm Project EIAR (RPS, 2024c), data available from the Irish Whale and Dolphin Group (IWDG) and the ObSERVE programme (2021-2023).

In order to inform the Oriel EIAR, site-specific surveys were undertaken within the Marine Megafauna Study Area (a region similar to the MUL Area proposed in this MULA), in accordance with the methodology as discussed with NPWS in June 2020. These surveys included boat-based observer surveys, aerial surveys and Static Acoustic Monitoring (SAM) surveys. In addition, the IWDG (2026a) hold records of 402 cetacean sightings in the Irish Sea (between Down and Wexford) for the period of July 2025 to July 2026.

The most common species recorded (by the original SI surveys informing the EIAR and based on IWDG records) were:

- Harbour porpoise (*Phocoena phocoena*)

- Common dolphin (*Delphinus delphis*)
- Bottlenose dolphin (*Tursiops truncates*)
- Minke whale (*Balaenoptera acutorostrata*)

Phase II of the Irish ObSERVE programme (2021-2023) was conducted to investigate the occurrence, distribution and abundance of key marine species in Irelands offshore and coastal regions. These aerial surveys included four offshore areas and coastal waters. The MUL Area is within the coastal survey stratum 5 (Irish Sea). Common dolphin was the most sighted cetacean species across all survey seasons but were infrequently recorded in the Irish Sea as they showed a preference for continental shelf waters (Giralt Paradell et al., 2024). Bottlenose dolphin was recorded throughout the survey area with a preference for the continental shelf waters to the south and west of Ireland and only sporadically observed in the Irish Sea, however, distribution maps noted the Irish Sea as an area of importance despite the lower sightings recorded (Giralt Paradell et al., 2024). Harbour porpoise was the second most frequently sighted cetacean species throughout the Phase II ObSERVE survey programme, and was primarily observed in the Irish Sea, with most sightings being of individuals. The predicted distribution of harbour porpoise in summer highlighted the northern section of stratum 5 as an area of importance while lower densities are expected throughout winter in the Irish Sea (Giralt Paradell et al., 2024). Minke whale was the most common sighted mysticete species during the Phase II ObSERVE surveys. Minke whales are a neritic species, typically favouring continental shelf waters with a potentially southward redistribution in Irish waters (Giralt Paradell et al., 2024).

Management Unit (MU) boundaries, defined by the IAMMWG (2015, 2022), refer to geographical areas in which the animals of a particular cetacean species are found, to which management of human activities is applied. These geographical areas are delineated based on the best scientific knowledge of the population structure of the species while taking into account jurisdictional boundaries or divisions which are already used for manging human activities (IAMMWG, 2023).

The following sections provide more detail on the most commonly recorded cetacean species within and around the MUL Area.

#### 3.5.3.1 Harbour porpoise

Harbour porpoise is widespread around the Irish coast (Wall et al., 2013). The Celtic and Irish Seas (CIS) MU is recognised for the management of harbour porpoise in the Celtic and Irish Seas (IAMMWG, 2022). Abundance of harbour porpoise in the CIS MU is estimated at 62,517 animals (IAMMWG, 2022). According to Giralt Paradell et al. (2024), mean group sizes of harbour porpoise were notably higher during winter, and the greatest abundance and density estimates were for the Irish Sea (stratum 5) for all seasons. A number of harbour porpoise calves were recorded during the Phase II ObSERVE survey, with a majority of sightings (4 out of 7) within the Irish Sea. According to (Giralt Paradell et al., 2024), the data recorded from stratum 5 (Irish Sea) during the summer 2021 and 2022 survey suggests that harbour porpoise occurs along the east coast of Ireland in densities of between 0.150 to 0.968 animals per $km^2$, in winter 2022 in stratum 5 harbour porpoise occurred in densities of 0.413 animals per $km^2$. A report by O'Brien and Berrow (2016) in the Irish Sea estimated a harbour porpoise density of 1.55±0.17 per $km^2$ within Rockabill to Dalkey Island SAC and a population of 424±46 individuals overall, with 95% confidence interval (CI) of 335-536.

According to IWDG (2026a) there has been 265 sightings of harbour porpoise within the Irish Sea between July 2025 and July 2026. None were recorded within the MUL Area, with the nearest sighting comprising six animals recorded at Clogher Head, Louth in July 2025, approximately 6 km south of the MUL Area.

In the Oriel Wind Farm Project EIAR – Chapter 10: Marine Mammals and Megafauna (RPS, 2024c), density estimates for marine megafauna (animal/$km^2$) were provided, based on modelled estimates from SI surveys (where possible) and other secondary resources. Harbour porpoise was estimated to occur at densities of 0.280 to 1.33 individuals/ $km^2$ within the Marine Megafauna Study Area within this report.

Potential threats to harbour porpoise include underwater noise, entanglement in fishing gear, shipping traffic, and coastal development including offshore renewable energy and other forms of human disturbance (ORCA,

2026a). The most recent Article 17 conservation assessment for harbour porpoise in Ireland deemed the species as being in unfavourable / inadequate conservation status (NPWS, 2025b).

#### 3.5.3.2 Common dolphin

Common dolphin is present all year round in Irish waters and is the most frequently observed and stranded species, particularly along the west and south coast of Ireland (IWDG, 2026b). Common dolphins have been assigned to a single MU, the Celtic & Greater North Seas MU with an abundance estimate of 102,656 animals (IAMMWG, 2022). Densities appear to be highest during autumn and summer off the south and southwest coasts, with high densities in the spring and autumn in the south of the Irish Sea. According to Giralt Paradell et al. (2024), common dolphins showed interannual variability with more sightings during the summer of 2021 than in 2022, mean group sizes were also larger in the summer (7.2) compared to winter (6.7). High densities of common dolphin were found off the south and southwest of Ireland, displaying a preference for continental shelf waters. The species is more rarely sighted in the Irish Sea (Giralt Paradell et al., 2024). According to (Giralt Paradell et al., 2024), the data recorded from stratum 5 (Irish Sea) during the summer 2022 and winter 2022 survey suggests that common dolphin occurs along the east coast of Ireland in densities of between 0.020 to 0.066 animals per $km^2$, no common dolphins were recorded in summer 2021.

According to IWDG (2026a) there has been 47 sightings of common dolphin within the Irish Sea between July 2025 and July 2026. There were no records within the MUL Area, with the nearest sighting comprising a pod of twelve individuals in Dundrum Bay, Co. Down in July 2025, approximately 25 km northeast of the MUL Area.

In the Oriel Wind Farm Project EIAR – Chapter 10: Marine Mammals and Megafauna (RPS, 2024c), density estimates for marine megafauna (animal/$km^2$) were provided, based on modelled estimates from SI surveys (where possible) and other secondary resources. Common dolphin was estimated to occur at densities of 0.027 individuals/ $km^2$ within the Marine Megafauna Study Area within this report.

Common dolphins face threats such as underwater noise, interactions with fisheries through bycatch, ship strikes, chemical and plastic pollution (ORCA, 2026b). The most recent Article 17 conservation assessment for common dolphin in Ireland deemed the species as being in favourable conservation status (NPWS, 2025b).

#### 3.5.3.3 Bottlenose dolphin

Bottlenose dolphin is found in both inshore and offshore waters and has been recorded all around the Irish coast. This species can also be found in much deeper waters off the continental shelf (NPWS, 2025b). Three distinct populations have been identified in Irish waters including an offshore group, a coastal transient group and a smaller resident population in the Shannon Estuary, Co. Clare. None of these groups are located within the Irish Sea and according to Giralt Paradell et al. (2024), bottlenose dolphins were very infrequently and sporadically recorded in the Irish Sea during the surveys. Bottlenose dolphins were only recorded during the summer 2022 surveys in stratum 5 where they occurred in densities of 0.111 animals per $km^2$ (Giralt Paradell et al., 2024). Bottlenose dolphins have been assigned to the Irish Sea MU, with an estimated abundance of 293 animals (IAMMWG, 2022).

The IWDG (2026a) holds records of 41 sightings of bottlenose dolphins within the Irish Sea between July 2025 and July 2026. No bottlenose dolphins were recorded within the MUL Area, and the closest IWDG sighting comprised four individuals northeast of Clogher Head in December 2025, approximately 6 km south the MUL Area.

In the Oriel Wind Farm Project EIAR – Chapter 10: Marine Mammals and Megafauna (RPS, 2024c), density estimates for marine megafauna (animal/$km^2$) were provided, based on modelled estimates from SI surveys (where possible) and other secondary resources. Bottlenose dolphin was estimated to occur at densities of 0.046 to 0.235 individuals/ $km^2$ within the Marine Megafauna Study Area within this report.

Bottlenose dolphins are exposed to several threats as they utilise coastal areas. These threats include underwater noise, interactions with fishing gear, habitat destruction and degradation (ORCA, 2026c). The

most recent Article 17 conservation assessment for bottlenose dolphin in Ireland deemed the species as being in favourable conservation status (NPWS, 2025b).

#### 3.5.3.4 Minke Whale

Minke whale is the most abundant of all baleen whales in Irish waters and can been seen throughout the year along the entire Irish coastline although most sightings are recorded from the south and west coasts between May and October. According to Giralt Paradell et al., (2024), minke whales were the most frequently sighted baleen whale, however, most sightings were in continental shelf waters of <200m depth, with a higher abundance during the summer. According to Giralt Paradell et al., (2024), the data recorded from stratum 5 (Irish Sea) during the summer 2021 and 2022 survey suggests that minke whale occurs along the east coast of Ireland in densities of 0.018 animals per $km^2$, no minke whales were recorded in winter 2022. Density distribution map highlights higher densities of minke whales along the south coast of Ireland, particularly in West Cork waters (Giralt Paradell et al., 2024).

According to the IWDG (2026a), there have been six sightings of minke whale in the Irish Sea between July 2025 and July 2026. None of these were recorded within the MUL Area. The closest record comprised of one animal approximately 1 km off the coast of Malahide, Co. Dublin, in June 2026, approximately 45 km south of the MUL Area.

In the Oriel Wind Farm Project EIAR – Chapter 10: Marine Mammals and Megafauna (RPS, 2024c), density estimates for marine megafauna (animal/$km^2$) were provided, based on modelled estimates from SI surveys (where possible) and other secondary resources. Minke whale was estimated to occur at densities of 0.14 to 0.26 individuals/ $km^2$ within the Marine Megafauna Study Area within this report.

Minke whale have been assigned to the Celtic & Greater North Seas MU, with abundance estimates of 20,118 animals (IAMMWG, 2022). The primary threats to minke whale include entanglement in fishing gear and bioaccumulation of contaminants in minke whale blubber (ORCA, 2026d) The most recent Article 17 conservation assessment for minke whale in Ireland deemed the species as being in favourable conservation status (NPWS, 2025b).

### 3.5.4 Otter

Otter (*Lutra lutra*) occurs throughout Ireland, including along east coast, with populations found along rivers, lakes, and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover (NPWS, 2025c). They have diverse habitat preferences: lakes, canals, riverine (streams up to major river systems) marshland and estuaries. Otters are a mobile species and maintain territories. In lowland rivers and fish-rich lakes otters only need to maintain small territories (up to 6 km), but along smaller river systems and in upland areas where prey may be less abundant, otter territories can stretch to 20 km (Mullen et al., 2021). Female territories range between 7.5 ± 1.5 km for riverine and 6.5 ± 1.0 km for coastal environments, whereas male territories are approximately 13.2 ± 5.3 km along rivers but with a high degree of variability (Reid et al., 2013). In general, otters exploit a narrow strip of habitat, about 10 m wide at the aquatic-terrestrial interface (Mullen et al., 2021). Eurasian otters have been observed foraging as far as 80 m from shorelines (NPWS, 2009).

Otters are opportunistic predators with a broad and varied diet. In coastal areas fish, crabs and molluscs are eaten (NPWS, 2025b).

A desk-based study utilising records from NBDC (2026i) indicated that otters have been sighted in the last 10 years adjacent to the MUL Area. One live otter sighting was recorded in 2018 in the sea off Clogherhead, 7km south of the MUL Area (NBDC, 2026i). Otter surveys were carried out in 2019, 2021, 2022, 2023 and 2025 as part of the wider Oriel Wind Farm Project. These surveys mainly focused on watercourses, drainage ditches and wetland habitats above the HWM but provide an indication of otter activity within the area. Otter evidence was only recorded in 2021 and 2025 where in 2021, a single sighting of otter was noted 100 m north of the N33 River Dee crossing, 12 km inland from the MUL Area (RPS, 2024a). In 2025, four otter spraints were found on boulders, immediately downstream of the N33 bridge crossing (same location as 2021 i.e. 12 km

inland from the MUL Area), downstream of the Drumcar Bridge in the River Dee (9 km inland from the MUL Area), downstream of the Newhall 06 stream (7 km inland from the MUL Area) and downstream of the Salterstown stream (1 km south of the MUL Area) (RPS, 2025b). It is therefore reasonable to conclude that otters, although rare, may be present within the adjacent areas of the MUL Area.

Impacts to otters can occur as a result of permanent loss of breeding or resting sites, habitat loss, disturbance/displacement and injury or mortality. The main threats to otter in Ireland include pollution, habitat disturbance and accidental deaths, e.g., road traffic (NPWS, 2025b). The most recent Article 17 conservation assessment for otters in Ireland deemed the species as being in favourable conservation status (NPWS, 2025b).

### 3.5.5 Turtle Species

Five Annex IV species of turtle are known to occur in Ireland: leatherback turtle (*Dermochelys coriacea*), Kemp's Ridley turtle (*Lepidochelys kempii*), loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*). This section has been informed by data from the NBDC.

Leatherback turtle has been reported on a number of occasions around the Irish coastline and in the Irish Sea, most recently in 2025. Between 2000 and 2026, 312 observations of leatherback turtles were recorded in Irish waters. Leatherbacks are known to have an 'atypical migration pattern', as while they must return to tropical waters to breed and reach preferred nesting grounds, they are known to spend the summer months in productive temperate waters, like Ireland's, feeding on jellyfish and sea squirts (Doyle, 2007). During the 2020 site-specific aerial surveys one leatherback turtle was recorded within the Project boundaries. Aerial surveys conducted between 2003 to 2006 estimated a leatherback turtle density of 0.06 animals per 100 $km^2$ in all Irish waters, including the western Irish Sea (unpublished data; reported in Doyle *et al.,* 2008).

No other turtle species has been recorded within MUL Area. There have been no records of loggerhead turtles within or adjacent to the MUL Area. The closest record was a stranded live individual in 2021 at Rush Beach, Co. Dublin, 30 km south of the MUL boundary (NBDC, 2026l). There have been no records of Kemp's Ridley turtle within or adjacent to the MUL Area, with the closest sighting being a record of a dead individual at Howth Head Co. Dublin in 1968 (NBDC, 2026m). There have been two records of green turtle in Ireland, both occurring on the west coast. In 2024 there was a live stranding on Quilty Beach, Co. Clare and in 2007 there was a live stranding recorded in Dingle Bay, Co. Kerry (NBDC, 2026n). There has only been one recorded hawksbill turtle in Ireland, identified in Cork Harbour in 1983 (NBDC, 2026o).

As stated above, only one leatherback turtle was recorded within the MUL Area in 2020, no other turtle species were recorded within the MUL Area. One loggerhead turtle was recorded 30 km from the MUL Area in 2021 at Rush Beach Co. Dublin, one Kemps Ridley turtle was recorded in 1968 over 50 km south of the MUL Area in 1968 at Howth Co. Dublin, two green turtles were recorded on the west coast of Ireland and one hawksbill turtle in Cork Harbour in 1983. Therefore, as only leatherback turtle was identified within the project boundaries and all other turtle species are over 30 km from the MUL Area and not recorded in the last five years, leatherback turtle is the only species that will be considered further in the risk assessment.

### 3.5.6 Stage 1 Conclusion

As it is likely that bats, cetaceans, otter and turtles occur within the MUL Area, the assessment will proceed to Stage 2 Ecological Survey, if required.

## 3.6 Stage 2: Ecological Survey

The methodology outlined in Mullen et al (2021) and NPWS (2021) recommends Stage 2 of the assessment requires an ecological survey to be carried out by an ecologist who is competent in relation to the species to be surveyed. While surveys were not undertaken to inform this Annex IV Risk Assessment, site-specific surveys were undertaken to support the Oriel Wind Farm Project planning application. This survey data was supplemented with up-to-date ecological desktop information. The results of surveys and the desktop

information have been used to inform the baseline (See Stage 1 above) and to establish whether Annex IV species are likely to be present.

As Annex IV species are likely to be present, the process moves to Stage 3.

## 3.7 Stage 3: Examination of Impacts and Satisfactory Alternatives

As Stages 1 and 2 above have determined that bats, cetaceans, otter and turtles have the potential to be present within the MUL Area, the likely impacts of the SI works need to be examined to see if those impacts can be avoided, through the design of the SI works.

### 3.7.1 Bat Species

The proposed SI works, including access/egress will not result in any direct or indirect interaction with any structure or feature which could be used by roosting bats. Therefore, there is no likelihood of the SI works resulting in any bats being captured or killed and disturbed during periods of breeding, rearing or hibernation. No breeding site or resting place of such animals will be damaged or destroyed during the SI works.

Bats will not interact with underwater SI works. The SI works within the MUL Area may be carried out day or night. Any artificial lighting, if used, will be localised to either the vessel (or JUB) at the sampling locations within the MUL Area or within the intertidal zone. Given the limited extent of artificial lighting and the lack of evidence of bat activity within the MUL Area, there is no likelihood of any significant disturbance or displacement of foraging, commuting, or migrating bats.

The proposed SI works conform with the strict protection afforded to bats under Article 12 of the Habitats Directive, and therefore, it is considered that no derogation is required.

### 3.7.2 Cetacean Species

With respect to cetaceans, the potential routes to impacts from the SI works are as follows:

- Underwater noise generated during the geophysical and geotechnical surveys resulting in injury and/or disturbance; and
- Collision risk with survey vessels.

#### 3.7.2.1 Underwater Noise

An underwater (subsea) noise assessment was carried out using indicative noise sources for the marine SI works. The assessment and results are presented in the accompanying Subsea Noise Technical Report (Report ref: MDR1520C-TTI-00-XX-RP-Z-0003).

When assessing the potential impact of underwater noise sources on the marine environment a range of variables such as source level, frequency, duration, and directivity were considered. Increasing the distance from the sound source usually results in attenuation with distance. The factors that affect the way noise propagates underwater include water column depth, pressure, temperature gradients, salinity, as well as water surface and seabed type and thickness. When sound encounters the seabed the amount of noise/sound reflected back depends on the composition of the seabed, i.e., mud or other soft sediment will reflect less than rock. The sediment types within the MUL Area reported by INFOMAR are “sand” and “coarse sediment” closer to shore, and “coarse sediment”, “rock” and “sand” further offshore (INFOMAR, 2026).

The active acoustic instruments, such as those proposed for this survey, operate by emitting extremely short pulses and are highly directional with narrow beams (Ruppell et al., 2022). Many of the sources used for this survey, such as side-scan sonar and sub-bottom profilers (SBP) operate at high frequency and attenuate quickly as they spread from the source.

Cetacean species can be split into functional hearing groupings, according to their frequency-specific hearing sensitivity (Southall et al., 2019). Minke, fin and humpback whales are considered low frequency cetaceans

(LF), common and bottlenose dolphin are considered high frequency cetaceans (HF), harbour porpoise a very high frequency cetacean (VHF) and otters are included as Other Marine Carnivores in Water (OCW). See Table 3.1 below for a list of species contained within each functional hearing group.

Table 3.1 Functional Hearing Groups for Marine Mammal Species

| NMFS (2024) Hearing Group Name | Species Included in Group |
|---|---|
| Low-frequency cetaceans (LF) | Baleen whales (minke, fin and humpback whale). |
| High-frequency cetaceans (HF) | Most toothed whales and dolphins (bottlenose and common dolphin, killer, and pilot whales). |
| Very high-frequency cetaceans (VHF) | Certain toothed whales and porpoises (harbour porpoise). |
| Other marine carnivores in water (OCW) | Includes sea lions, walrus, otters. |
| Phocid carnivores in water (PCW) | Earless seals (including harbour and grey seal). |

### 3.7.2.2 Underwater Noise Assessment Methodology

The DAHG "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters" 2014 (Department of Arts, Heritage and the Gaeltacht (DAHG), 2014) contains the following statement:

*"It is therefore considered that anthropogenic sound sources with the potential to induce Temporary Threshold Shift (TTS) in a receiving marine mammal contain the potential for both (a) disturbance, and (b) injury to the animal."*

This states that TTS constitutes an injury and should thus be the main assessment criteria[2]. However, the guidance goes on to specify the use of thresholds from a 2007 publication (Southall et al., 2007) which has since been superseded (Southall, et al., 2019; National Oceanic and Atmospheric Administration, 2024) and no longer represents best available science, nor reflects best practice internationally. Thus, the following excerpt from the guidance is relevant:

*"The document will be subject to periodic review to allow its efficacy to be reassessed, to consider new scientific findings and incorporate further developments in best practice."*

As there has been no such update to date, but the guidance clearly states its intention to consider new scientific findings, we have applied the latest guidance (NMFS, 2024) reflecting the current best available method for assessing impact from noise on marine mammals. This means that it is auditory injury "AUD INJ" (previously "PTS") that is the criteria for injury, not "TTS".

Auditory impacts in cetaceans can be defined as AUD INJ leading to non-reversible auditory injury, or as a TTS in hearing sensitivity, which can have negative effects on the ability to use natural sounds (e.g., to communicate, navigate, locate prey) for a period of minutes, hours, or days. With increasing distance from the sound source, where it is audible to the animal, the effect is expected to diminish through identifiable stages (i.e., AUD INJ or TTS in hearing, avoidance, masking, reduced vocalisation) to a point where no significant

[2] Injury being the qualifying limit in the Irish Wildlife Ac 1976, section 23, 5c:

https://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/print#sec23

response occurs. Factors such as local propagation and individual hearing ability can influence the actual effect (DAHG, 2014).

A summary of the equipment to be used in the SI Works is presented in Table 2.1 in this report and in Table 4.1 of the accompanying Subsea Noise Technical Report.

Should the noise levels from sources provided in the accompanying Subsea Noise Technical Report exceed the thresholds set out for hearing groups (see Table 3.2), there is the potential for underwater noise generated during the geophysical and geotechnical surveys to result in injury and/or disturbance to Annex IV cetacean species in the vicinity of the SI works.

Both the criteria for impulsive and non-impulsive sound are relevant given the nature of the sound sources used during the SI Works. The relevant AUD INJ and TTS criteria proposed by NMFS (2024) are summarised in Table 3.2 which addresses peak pressure levels (Lp) and sound exposure levels (SEL).

Table 3.2 AUD INJ and TTS thresholds for cetaceans (NMFS, 2024)

| Hearing Group | Parameter | Impulsive [dB] | | Non-impulsive [dB] | |
|---|---|---|---|---|---|
| | | AUD INJ | TTS | AUD INJ | TTS |
| Low frequency (LF) cetaceans | $L_{pk}$, (unweighted) | 222 | 216 | Low frequency (LF) cetaceans | $L_{pk}$, (unweighted) |
| | SEL, (weighted) | 183 | 168 | 197 | SEL, (weighted) |
| High frequency (HF) cetaceans | $L_{pk}$, (unweighted) | 230 | 224 | High frequency (HF) cetaceans | $L_{pk}$, (unweighted) |
| | SEL, (weighted) | 193 | 178 | 201 | SEL, (weighted) |
| Very high frequency (VHF) cetaceans | $L_{pk}$, (unweighted) | 202 | 196 | Very high frequency (VHF) cetaceans | $L_{pk}$, (unweighted) |
| | SEL, (weighted) | 159 | 144 | 181 | SEL, (weighted) |

#### 3.7.2.3 Underwater Noise Results

As is standard practise (See Section 2.1.10.5), the DAHG (2014) “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” will be followed during the geophysical and geotechnical surveys. The guidance refers to “ramp-up procedures” or “soft starts”, “*whereby sound energy input to the marine environment is gradually or incrementally increased from levels unlikely to cause significant behavioural impact on marine mammals to the full output necessary for completion of the activity”.* This will ensure that initial noise emissions are at a level below that where permanent injury can occur, allowing time for marine mammals to move outside the area of ensonification before noise levels reach a level where they may cause injury.

To assess the impacts of the geophysical and geotechnical surveys four scenarios were modelled. Each scenario assumed that all sound sources were active including the vessel, as a ‘worst-case scenario’. An appropriate soft-start was incorporated into the modelling, following DAHG (2014) guidance (20 minutes for geophysical sound sources, 40 minutes for sparker/boomer). These scenarios are as follows:

1. Geophysical survey (MBES, SSS, parametric SBP), USV.

2. Geophysical survey (MBES, SSS, USBL, sparker, boomer), large vessel with parametric SBP.
3. Geophysical survey (MBES, SSS, USBL, sparker, boomer), large vessel with chirper/pinger SBP.
4. Geotechnical survey (rotary core boreholes and vibrocoring, SPT, USBL).

The results have been summarised below to present each modelled scenario with the inclusion of an appropriate soft start, with respect to injury and/or disturbance to each relevant cetacean hearing group.

**Geophysical survey, USV (MBES, SSS, parametric SBP) – 20-minute soft start**

- LF group (minke, fin and humpback whale), both auditory injury and TTS could occur within <10 m of the sound source, while behavioural disturbance could occur within 290 m of the sound source;
- HF group (bottlenose/common dolphin), auditory injury could occur within <10 m of the sound source, TTS could occur out to 42 m of the sound source and behavioural disturbance could occur within 1,400 m of the sound source; and
- VHF group (harbour porpoise), auditory injury could occur within 90 m of the sound source, TTS range could occur within 510 m of the sound source and behavioural disturbance could occur within 1,800 m of the sound source.

**Geophysical survey, large vessel (MBES, SSS, USBL, sparker, boomer, parametric SBP) – 40-minute soft start**

- LF group (minke, fin and humpback whale), auditory injury could occur within <10 m of the sound source and TTS could occur within 460 m of the sound source;
- HF group (bottlenose/common dolphin), auditory injury could occur within <10 m of the sound source and TTS could occur within 130 m of the sound source;
- VHF group (harbour porpoise), auditory injury could occur within 650 m of the sound source and TTS could occur within 2.9 km of the sound source; and
- For all hearing groups, behavioural disturbance could occur within 20 km of the sound source.

**Geophysical survey, large vessel (MBES, SSS, USBL, sparker, boomer, chirper/pinger SBP) – 40-minute soft start**

- LF group (minke, fin and humpback whale), auditory injury could occur within <10 m of the sound source and TTS could occur within 470 m of the sound source;
- HF group (bottlenose/common dolphin), auditory injury could occur within <10 m of the sound source and TTS could occur within 98 m of the sound source;
- VHF group (harbour porpoise), auditory injury could occur within 650 m of the sound source and TTS could occur within 3km of the sound source; and
- For all hearing groups, behavioural disturbance could occur within 20 km of the sound source.

**Geotechnical survey (rotary core boreholes, vibrocoring, SPT, USBL) – soft start not applicable**

- LF group (minke, fin and humpback whale), auditory injury could occur within <10 m of the sound source and TTS could occur within 420 m of the sound source;
- HF group (bottlenose/common dolphin), auditory injury could occur within <10 m of the sound source and TTS could occur within 95 m of the sound source;
- VHF group (harbour porpoise), auditory injury could occur within 40 m of the sound source and TTS could occur within 3.3 km of the sound source;
- For all hearing groups, behavioural disturbance could occur within > 20,000 m of the sound source.

### 3.7.2.4 Consideration of individual animals and population-level effects

The maximum numbers of cetaceans potentially affected within the modelled ranges for auditory injury and TTS are presented in Table 3.3 for geophysical survey (including sparker/boomer) and Table 3.4 for geotechnical survey. Estimates of abundance within associated Management Units have been used to present these values as a proportion of the population.

For the maximum geophysical survey scenario (inclusive of sparker/boomer), less than a single individual of bottlenose dolphin, common dolphin and minke whale is likely to experience auditory injury as a result of the SI works (inclusive of soft-start). For harbour porpoise, when the highest density estimate is considered, <2 individual animals are likely to experience auditory injury as a result of the SI works. However, to put this into context, this equates to just 0.00282% of the MU population and does not take further mitigation in the form of pre-start monitoring into account.

For geotechnical survey, for all species, less than a single individual is likely to experience auditory injury as a result of the SI works. This equates to <0.00001 of each MU population.

Table 3.3 Number of individual cetaceans and % of population potentially affected by auditory injury from geophysical survey (including sparker/boomer)

| Species (Hearing Gorup) | Density estimate (animals/km$^2$) | Management Unit (MU) Population | Impact Range (m) | Area of sea within zone of injury (km$^2$) | No. of animals within zone of injury | Proportion of MU population (%) |
|---|---|---|---|---|---|---|
| Harbour porpoise (VHF) | 0.28[a] – 1.33[b] | 62,517 | 650 | 1.3273 | 0.37165 – 1.76534 | 0.000594 – 0.00282 |
| Bottlenose dolphin (HF) | 0.046[c] – 0.235[a] | 293<br>8,326* | <10 | 0.0003 | 0.00001<br>0.00007 | 0.000005<br>0.00003 |
| Common dolphin (HF) | 0.027[a] | 102,656 | <10 | 0.0003 | 0.000008 | 0.00000001 |
| Minke whale (LF) | 0.014[a] – 0.26[b] | 20,118 | <10 | 0.0003 | 0.000004 – 0.00008 | 0.00000002 – 0.0000004 |

* Density generated using SCANS-IV data has been compared against a reference population estimated by summing the abundance within the Irish Sea SCANS-IV blocks

a SCANS IV Block CS-D (western Irish Sea) data collected summer 2022 (Gilles et al., 2023).
b Mean monthly maximum density recorded during Oriel Wind Farm Project site-specific boat-based surveys (2018 - 2020).
c SCANS-III Block E (western Irish Sea) density surfaces estimates for the offshore wind farm area and offshore cable corridor (Lacey et al., 2022).

Table 3.4 Number of individual cetaceans and % of population potentially affected by auditory injury from geotechnical survey

| Species (Hearing Gorup) | Density estimate (animals/km$^2$) | MU Population | Impact Range (m) | Area of sea within zone of injury (km$^2$) | No. of animals within zone of injury | Proportion of MU population (%) |
|---|---|---|---|---|---|---|
| Harbour porpoise (VHF) | 0.28 – 1.33 | 62,517 | 40 | 0.0050 | 0.001407 – 0.00669 | 0.000002 – 0.00001 |
| Bottlenose dolphin (HF) | 0.046 – 0.235 | 293 8,326* | <10 | 0.0003 | 0.00001 – 0.00007 | 0.000005 – 0.00003 |
| Common dolphin (HF) | 0.027 | 102,656 | <10 | 0.0003 | 0.000008 | 0.00000001 |
| Minke whale (LF) | 0.014 – 0.26 | 20,118 | <10 | 0.0003 | 0.000004 – 0.00008 | 0.00000002 – 0.0000004 |

* Density generated using SCANS-IV data has been compared against a reference population estimated by summing the abundance within the Irish Sea SCANS-IV blocks

a SCANS IV Block CS-D (western Irish Sea) data collected summer 2022 (Gilles et al., 2023).
b Mean monthly maximum density recorded during Oriel Wind Farm Project site-specific boat-based surveys (2018 - 2020).
c SCANS-III Block E (western Irish Sea) density surfaces estimates for the offshore wind farm area and offshore cable corridor (Lacey et al., 2022).

#### 3.7.2.5 Auditory Injury

In summary, the modelled assessment concludes that there is a potential risk of inducing auditory injury (AUD INJ) within a maximum of <10 m of the sound source to the LF and HF groups during the geophysical surveys, and within a maximum of 650 m from the sound source in the VHF group.

For geotechnical surveys, the modelled assessment concludes that there is a potential risk of inducing AUD INJ within a maximum of < 10 m of the sound source in both the LF and HF groups and within a maximum of 40 m of the sound source in the VHF group.

**Proposed Mitigation**

In addition to the implementation of a soft-start for geophysical and sparker/boomer sources, in line with DAHG (2014), as outlined above, pre-start monitoring will be undertaken for all cetaceans. This will allow any mammals observed within the monitored zone (500 m for geophysical and geotechnical surveys and 1,000 m for sparker/boomer surveys) to exit the zone of impact before soft start is commenced.

As part of the standard application of DAHG (2014) guidance, a qualified and experienced MMO will be appointed during geophysical and geotechnical surveys. The MMO will search for marine mammals (and otter) within the monitored zone, which is a 500 m or 1,000 m radial distance of the sound source intended for use. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals (or otters) detected within the monitored zone by the MMO. In commencing sound producing activities using the equipment listed above, a soft-start procedure (i.e. 20 or 40 minute soft-start depending on the activity) must be used. Once the soft-start 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 500 m/1,000 m radial distance, of the sound source. Breaks in sound output and line turns must be addressed as outlined in DAHG (2014).

Given the impact ranges modelled for auditory injury, the above mitigation will ensure avoidance of injury to marine mammal species.

#### 3.7.2.6 Temporary Threshold Shift

In summary, the modelled assessment concludes that the geophysical surveys have the potential to cause TTS within a maximum of 470 m to the LF group, 130 m to HF group, and 3 km within the VHF group.

The geotechnical surveys have the potential to cause TTS within a maximum of 420 m of the sound source in the LF group, a maximum of 95 m of the sound source in the HF groups and within a maximum of 3 km of the sound source in the VHF group.

The Subsea Noise Report which is included with this MULA provides a detailed explanation of the TTS threshold, however, it is worth noting that the DAHG (2014) guidance's reliance on Southall et al. (2007) TTS thresholds mean that for most scenarios, the impact ranges are comparable to the AUD INJ threshold from the NMFS (2024) guidance. Where DAHG (2014) is more conservative, it is often the result of including noise at frequencies where the relevant species group is not very sensitive (the weightings from Southall et al. (2007) were very broad, "letting in" a lot of energy not audible to the animal). The Southall et al. (2007) thresholds and weightings were based on very little evidence compared to the NMFS (2024) weightings).

TTS onset ranges can often seem large and the following should be kept in mind:

1. TTS onset thresholds are often exceeded by ambient conditions: TTS onset ranges are based on the cumulative received noise, strictly specified by the guidance to be over a 24-hour period- this means that very low received levels can exceed the TTS onset threshold, and that animals routinely have this threshold exceeded during "normal" life, with noise from other marine mammals and anthropogenic noise. For e.g. the harbour porpoise noise as low as c. 120 dB over a few hours can exceed the TTS onset threshold.
2. The TTS onset thresholds assumed no auditory recovery: Where the TTS onset threshold is exceeded, normal hearing will return in a matter of minutes to hours depending on the amount of TTS that was induced and the amount of noise in the environment. Thus, while the guidance states to accumulate noise for 24 hours, the animals can recover fully from TTS multiple times during this time period, with breaks in the noisy activity, "acoustic shade" provided by the environment (sandbars, other animals, variation in sound level with depth).

Therefore, on the basis of the noise modelling carried out, the DAHG (2014) and NMFS (2024) weightings, and taking account of the TTS onset range detail outlined above, the SI works will not give rise lasting adverse effects likely to be detrimental to cetaceans or affect their local abundance or distribution to cetaceans due to TTS.

#### 3.7.2.7 Behavioural Disturbance

In summary, the modelled assessment concludes that the proposed geophysical and geotechnical surveys have the potential to induce behavioural disturbance within a maximum of 20 km for all hearing groups. For all marine mammals, risk ranges for behavioural disturbance were modelled applying the criterion strictly (unweighted for marine mammal hearing frequency), providing overly precautionary results. This means that, while risk ranges appear large in some instances (within > 20 km for the geotechnical and geophysical surveys) the main energy will often be outside of the hearing range of the receiving marine mammal.

In the JNCC (2025) guidance document for assessing noise disturbance against the conservation objectives of harbour porpoise SACs, where the findings were based on evidence gathered through monitoring and research through Brown et al., (2025) and Majewska et al., (2025). It was advised that fixed distances should be applied to assess behavioural disturbance, based on empirical evidence. For geophysical surveys, the JNCC's 'effective deterrence range' is 3 km. Therefore, a Cumulative Effects Spatial Scope (CESS) of 3 km from the boundary of the MUL Area was applied. While the JNCC document focuses on harbour porpoise, this is precautionary for all other marine mammal hearing groups, as harbour porpoise is considered to be the most sensitive.

As outlined in Section 3.2, the term “disturbance” in the context of Article 12 clearly refers to non-sporadic disturbance which is likely to be detrimental to the strictly protected species or affect their local abundance or distribution. Behavioural disturbance, as assessed here, relates to sporadic disturbance, including avoidance and changes in behaviour, will be temporary and short term in duration, with rapid recovery once the survey vessel has left the area. No adverse effects to cetaceans due to behavioural disturbance are predicted.

#### 3.7.2.8 Risk of Collision

Vessel strikes are a known cause of mortality in marine mammals (Laist et al., 2001). Non-lethal collisions have also been documented (Laist et al., 2001; Van Waerebeek et al., 2007). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result in individuals becoming vulnerable to secondary infections or predation.

It has been calculated that a maximum of three vessels (an offshore survey vessel/JUB, nearshore vessel/rib and a USV) could be operating at any one time within the MUL Area. For the geophysical SI works, the vessels will be travelling in a predefined trajectory. It is considered that this will allow animals to predict the movement of the vessels and therefore avoid collisions. It is likely that the other survey vessels (i.e. benthic survey and/or geotechnical survey vessel) will be stationary for extended periods throughout their operations which will reduce the potential for collision with these vessels. The typical speed of the survey vessel while on survey will be 4 knots but may reach a maximum of 10 knots while transiting to and from the survey locations.

Regular levels of vessel traffic is observed within the MUL Area, with mainly cargo vessels and fishing vessels traversing the MUL Area to access commercial and fishing ports nearby i.e. Warrenpoint Port in Co. Down, Kilkeel Harbour Co. Down, Greenore Port Co. Louth, Dundalk Port, Co. Louth, Port Oriel Co. Louth and Drogheda Port Co. Louth (Ireland’s Marine Atlas, 2026). To support the planning application for the overall Oriel Wind Farm Project, a shipping and navigation impact assessment was undertaken as part of the EIAR. This determined that the MUL Area is used primarily by fishing vessels, with some cargo vessel routes passing through the eastern and northeastern region of the MUL Area. A notably greater density of vessels was observed during summer in contrast to winter. This indicates a potential seasonal variation in vessel density within the MUL Area (RPS, 2024d). It is, therefore, reasonable to assume that marine mammals in the area are exposed to vessel traffic on a somewhat regular basis and may exhibit some habituation.

It can be excluded on the basis of objective evidence that there is potential for collision risk with cetacean species by the SI works. Therefore, it is considered the proposed SI works do not present a collision risk and thereby conform with the system of strict protection of cetaceans under Article 12 of the Habitats Directive and therefore, it is considered that no derogation is required.

#### 3.7.2.9 Summary of Examination of Impacts and Satisfactory Alternatives for Cetaceans

The above impact assessment sets out that while underwater noise has the potential to affect cetaceans as a result of the SI works, injury will be mitigated through adherence with DAHG (2014), specifically through the application of pre-start monitoring by a qualified and experienced MMO during geophysical and geotechnical surveys. The MMO will search for cetaceans within an appropriate monitored zone and sound-producing activity will not commence until at least 30 minutes have elapsed with no cetaceans detected. The monitored zone will cover 500m for geophysical and geotechnical surveys, and 1,000m for seismic surveys. These monitored zones will cover the modelled auditory injury zones in full and as sound producing activity with the potential to injure cetaceans will not occur outside of the monitored zones, the risk of auditory injury is mitigated. While impact ranges for TTS and behavioural disturbance are larger, the TTS onset thresholds, consider cumulative received noise over a 24-hour period which is unrealistic, they do not take ambient conditions into account and assume no auditory recovery. In reality normal hearing will return within a matter of minutes to hours. Behavioural disturbance relates to avoidance and changes in behaviour, will be temporary and short term in duration, with rapid recovery once the survey vessel has left the area. No adverse effects to cetaceans due to behavioural disturbance are predicted. Disturbance in the context of Article 12

clearly refers to non-sporadic disturbance which is likely to be detrimental to the strictly protected species or affect their local abundance or distribution.

Cetaceans are highly mobile and can range over large distances. Whilst some species may breed and calve within the Irish Sea during certain months, there are no key breeding sites known within the vicinity of the MUL Area. Furthermore, the SI works would occur as intermittent disturbance events over a duration of the licence period. In terms of cetacean species, the respective percentages of relevant MU reference populations are considered to be extremely low (see Section 3.7.2.4 above). Therefore, any risk from disturbance is unlikely to be detrimental to the maintenance of the populations of the species concerned at FCS in their natural range. In conclusion, there will be no impact to the maintenance of the populations of the species concerned at a FCS in their natural range therefore an Annex IV species derogation licence (to disturb) for the proposed survey works is not required.

It is therefore considered that the implementation of appropriate mitigation measures represents a satisfactory alternative by applying the processes outlined in DAHG (2014) to protect cetacean species. By applying this satisfactory alternative, there will be no loss, injury or non-sporadic disturbance to cetacean populations. The SI works are therefore compliant with Regulations 51 and 52 with respect to cetacean species and it is considered that no derogation is required.

### 3.7.3 Otter

Desk-based and site-specific survey data show that otter activity is rare within the areas adjacent to the MUL, however, it is possible that otters may be present in the intertidal zone and foraging in the nearshore marine area (within 80 m of the shore) during the SI works.

The intertidal geophysical surveys will involve a small team of surveyors walking along the beach or intertidal zone (below the HWM) using non-intrusive hand-held equipment or GPR. During these non-intrusive surveys, and access for same, no above-water noise, vibration or light will be emitted beyond baseline levels. Similarly, environmental and archaeological monitoring (if required) will be limited to a small team of surveyors with no noise-producing equipment. While relatively remote, Dunany Beach experiences regular recreational activity including walkers, dog walkers, horse riding and cockle picking (RPS, 2025d). The above surveys will not provide additional disturbance to otters that may utilise the coastline beyond the existing baseline of disturbing activities.

It is considered highly unlikely that intrusive sampling works will interact with otter holts or couches as these are not likely to be present in the intertidal zone/on beaches where sampling will take place. Intertidal geotechnical surveys (excavation of trial pits/boreholes) will produce airborne noise and vibration which could disturb otters utilising the intertidal zone. However, this airborne noise disturbance will be temporary and limited in extent, given the limited scope for intertidal geotechnical sampling (12 trial pits and 6 boreholes). In the unlikely event that an otter is utilising Dunany Beach, temporary displacement will not affect the favourable conservation status of the species.

As otter tend to forage within 80 m of the shoreline (NPWS, 2009), any potential effects are likely to be associated with survey activity at the intertidal area of the MUL Area, rather than activity further offshore, however, there is, in theory, potential for interaction between foraging otters and underwater noise generated during the SI works. For otters foraging in the marine environment, this has the potential to result in injury and/or disturbance. While there are no published underwater noise injury criteria for Eurasian otter, Southall et al. (2019) has provided injury criteria for the ‘Other marine carnivores in water (OCW)’ hearing group, which includes sea otters. The OCW criteria is extended to Eurasian otter in the current assessment in the absence of more suitable criteria. The underwater noise assessment, presented in the accompanying Subsea Noise Technical Report, undertaken to inform this Annex IV Risk Assessment has concluded the following with respect to injury and/or disturbance to OCW.

To assess the impacts of the geophysical and geotechnical surveys four scenarios were modelled. Each scenario assumed that all sound sources were active including the vessel, as a ‘worst-case scenario’. An

appropriate soft-start was incorporated into the modelling, following DAHG (2014) guidance (20 minutes for geophysical sound sources, 40 minutes for sparker/boomer). These scenarios are as follows:

1. Geophysical survey (MBES, SSS, parametric SBP), USV.
2. Geophysical survey (MBES, SSS, USBL, sparker, boomer), large vessel with parametric SBP.
3. Geophysical survey (MBES, SSS, USBL, sparker, boomer), large vessel with chirper/pinger SBP.
4. Geotechnical survey (rotary core boreholes and vibrocoring, SPT, USBL).

**Geophysical survey, USV (MBES, SSS, parametric SBP) – 20-minute soft start**

- The geophysical surveys under this scenario have the potential to cause auditory injury and TTS to otter within <10 m of the sound source, and behavioural disturbance within 420 m of the sound source.

**Geophysical survey, large vessel (MBES, SSS, USBL, sparker, boomer, parametric SBP) – 40-minute soft start**

- The geophysical surveys under this scenario have the potential to cause auditory injury to otter within <10 m of the sound source, TTS within 360 m of the sound source and behavioural disturbance within 16 km of the sound source.

**Geophysical survey, large vessel (MBES, SSS, USBL, sparker, boomer, chirper/pinger SBP) – 40-minute soft start**

- The geophysical surveys under this scenario have the potential to cause auditory injury to otter within <10 m of the sound source, TTS within 360 m of the sound source and behavioural disturbance within 16 km of the sound source.

**Geotechnical survey (rotary core boreholes, vibrocoring, SPT, USBL) – soft start not applicable**

- The geotechnical surveys have the potential to cause auditory injury to otter within <10 m of the sound source, TTS within 130 m of the sound source and behavioural disturbance within 16 km of the sound source.

For all modelled scenarios, the distance within which otter could experience auditory injury is limited to <10 m. It is likely that, in addition to this much reduced risk range, the physical presence of a survey vessel or JUB will cause otters to avoid the immediate vicinity of the surveys, and therefore, they will not come within 10 m of the sound source. TTS could occur within 360 m of the larger geophysical surveys under both scenarios and within 130 m of the geotechnical survey. Any interaction between otters and geophysical and geotechnical surveys will be within 80 m of the landfall location.

**Proposed Mitigation**

In addition to the implementation of a soft-start for geophysical and sparker/boomer sources, in line with DAHG (2014), as outlined above, as a precautionary measure it is proposed to include foraging otters in the pre-start monitoring to be undertaken for marine mammals. This will allow any otters observed within the monitored zone (500 m for geophysical and geotechnical surveys and 1,000 m for sparker/boomer surveys) to exit the zone of impact before soft start is commenced.

As part of the standard application of DAHG (2014) guidance, a qualified and experienced MMO will be appointed during geophysical and geotechnical surveys. The MMO will search for marine mammals (and otter) within the monitored zone, which is a 500 m or 1,000 m radial distance of the sound source intended for use. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals (or otters) detected within the monitored zone by the MMO. In commencing sound producing activities using the equipment listed above, a soft-start procedure (i.e. 20 or 40 minute soft-start depending on the activity) must be used. Once the soft-start 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 500 m/1,000 m radial distance, of the sound source. Breaks in sound output and line turns must be addressed as outlined in DAHG (2014).

In summary, it is unlikely that otter will be present during the marine surveys, given the results of desk-based and site-specific studies. However, it remains possible that otter may forage within 80 m of the shore and may potentially interact with underwater noise produced by the surveys. The impact range for auditory injury is very low (<10 m) and the impact range for TTS is within 380 m, which can be fully mitigated by including otters in the pre-start monitoring. Behavioural disturbance is difficult to model; however, it is expected that the presence of the proposed vessel will act as a visual deterrent, and disturbance will be temporary and brief considering the narrow band of marine foraging habitat available to otters within the MUL Area. It is concluded that there will be no killing, deliberate non-sporadic disturbance or displacement of breeding, resting or commuting otters due to the proposed SI works in the MUL Area and therefore, the SI works are compliant with Regulations 51 and 52 and it is considered that no derogation is required.

### 3.7.4 Turtle Species

Data on turtle hearing is limited; however, turtles are adapted to detect sound in water and are known to detect sound at less than 1,000 Hz (Popper et al., 2014). The majority of the survey equipment proposed (excluding vessels, all SBP's incl. boomer and sparker, vibrocoring and SPT), to be used operates across higher frequency ranges (see Subsea Noise Technical Report) and therefore outside of the hearing range of turtles. Based on the desk-based study carried out, injury and disturbance to turtles due to noise impacts is unlikely given the lack of turtle occurrence within the MUL Area. Due to the lack of evidence of turtles occurring regularly within the MUL Area, the limited scale and duration of the survey activities, it is concluded that there will be no significant disturbance, injury, or death of turtle species as a result of the SI works. There will be no deterioration or destruction of breeding sites or resting places. Therefore, in view of the current evidence base, therefore, the SI works are compliant with Regulations 51 and 52 and it is considered that no derogation is required with respect to turtles.

# 4.0 Conclusion

The proposed SI works will not:

- Deliberately capture or kill any specimen of Annex IV species in the wild,
- Deliberately take or destroy eggs of these species in the wild,
- Damage or destroy a breeding or resting place of such an animal, or
- Keep, transport, sell, exchange offer for sale or offer for exchange any specimen of these species taken in the wild.

The potential for deliberate disturbance to Annex IV species was considered in detail in this risk assessment, and the following conclusions have been reached.

There is no likelihood of significant disturbance of bat species due to the low likelihood of bats being present during the SI works and the low likelihood of interaction with the survey activities.

There is potential for disturbance to cetacean species as a result of auditory injury from underwater noise impacts, however, when considered in the context of regional populations, the risk is unlikely to be detrimental to the maintenance of the species concerned within their known range. Furthermore, the Applicant commits to implementing appropriate mitigation measures as outlined in DAHG (2014), which provides a satisfactory alternative. By implementing pre-start monitoring, an MMO will ensure that cetaceans are not present in the area within which injury could occur before sound-producing activity commences. Temporary threshold shift and behavioural disturbance have been modelled to show precautionary risk ranges; however, these effects will be temporary and represent sporadic disturbance, i.e. disturbance which is not detrimental to cetaceans and does not affect their local abundance or distribution.

On a precautionary basis, otter will be included in the pre-start monitoring to ensure that no individuals are present prior to ramping up sound producing activity. This will ensure that there will be no non-sporadic disturbance which is detrimental or affecting their local abundance or distribution.

Due to the lack of evidence of turtles occurring regularly within the MUL Area, the limited scale and duration of the survey activities, it is concluded that there will be no significant disturbance, injury, or death of turtle species as a result of the SI works.

The conservation status of Annex IV species will not be impacted by the proposed SI works. The habitat available to Annex IV species will also continue to be sufficiently large to maintain their populations on a long-term basis.

It is concluded that the proposed SI works comply with the system of strict protections afforded by Article 12 of the Habitats Directive and Regulations 51 and 52 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, and that a derogation is not required.

This applies to the following Annex IV species:

- All bat species;
- Otter;
- All cetacean species; and
- All turtle species.

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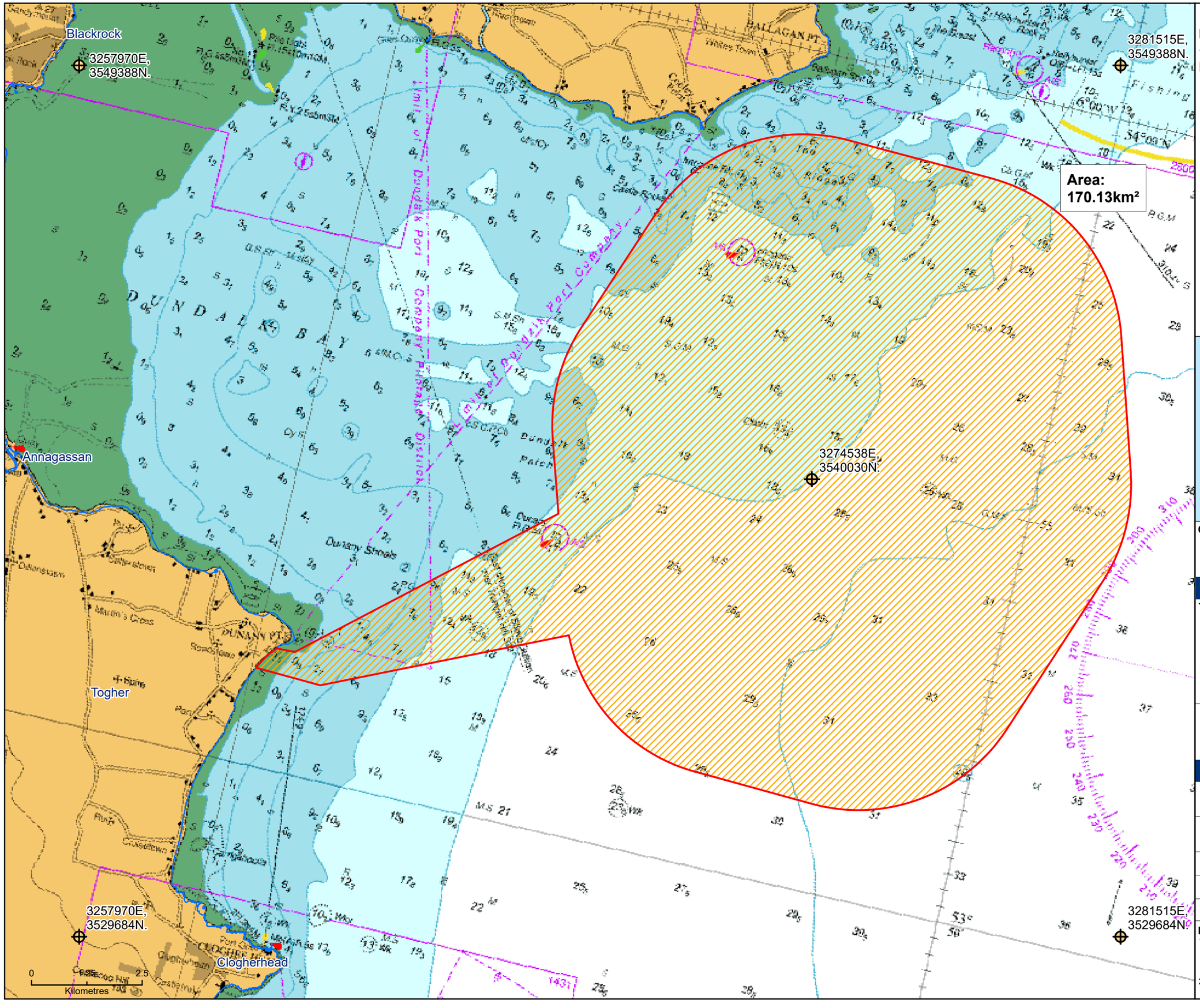
# Appendix A Drawings

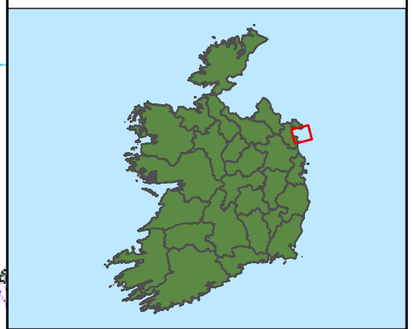



**Legend**

- Maritime Usage Licence Area
- High Water Mark
- Proposed Geophysical Survey Location

Drawn By:
Nicola Riordan, MSc Geographic Information Science
Senior Project Scientist GIS

**Data Sources:** Tailte Éireann



**Client**

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

**Oriel Wind Farm Project**

**Title**

# Proposed geophysical survey location

TETRA TECH
tetratech.com/europe

**Issue Details**

**File Identifier:**
MDR1520c-TTI-AP-XX-DR-Z-0002

| Status: | Rev: | | |
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| A1 | C01 | | |
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| **Checked:** RS | | **Scale:** | 1:80,000 (A3) |
| **Approved:** AE | | **Projection:** | ETRS 1989 LAEA |

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2. 

Blackrock

3257970E,
3549388N.

3281515E,
3549388N.

Annagassan

Togher

Clogherhead

3257970E,
3529684N.

3281515E,
3529684N.

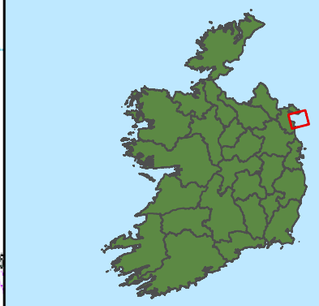
0 1.25 2.5
Kilometres

## Legend

- Maritime Usage Licence Area
- High Water Mark
- Vibrocore/gravity coring
- Rotary core boreholes (3 replicates taken at each location)


Drawn By:
Nicola Riordan, MSc Geographic Information Science
Senior Project Scientist GIS


**Data Sources:** Tailte Éireann



**Client**

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

**Oriel Wind Farm Project**

**Title**

# Proposed marine geotechnical survey locations rotary core boreholes and vibrocores

TETRA TECH
tetratech.com/europe

**Issue Details**

**File Identifier:**
MDR1520c-TTI-AP-XX-DR-Z-0004

| Status: | Rev: | | |
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| **Approved:** | AE | **Projection:** | ETRS 1989 LAEA |

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Clogherhead

3257970E,
3529684N.

3281515E,
3529684N.

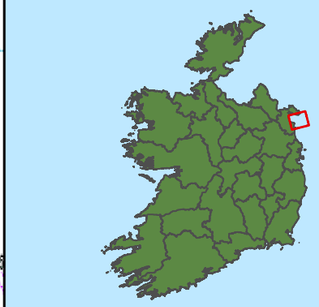
0 1.25 2.5
Kilometres

## Legend

- Maritime Usage Licence Area
- High Water Mark
- CPT and SPT


Drawn By:
Nicola Riordan, MSc Geographic Information Science
Senior Project Scientist GIS


**Data Sources:** Tailte Éireann



**Client**

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

**Oriel Wind Farm Project**

**Title**

# Proposed marine geotechnical survey locations- CPT and SPT

TETRA TECH
tetratech.com/europe

**Issue Details**

**File Identifier:**
MDR1520c-TTI-AP-XX-DR-Z-0006

| Status: | Rev: | | |
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| **Approved:** AE | | **Projection:** | ETRS 1989 LAEA |

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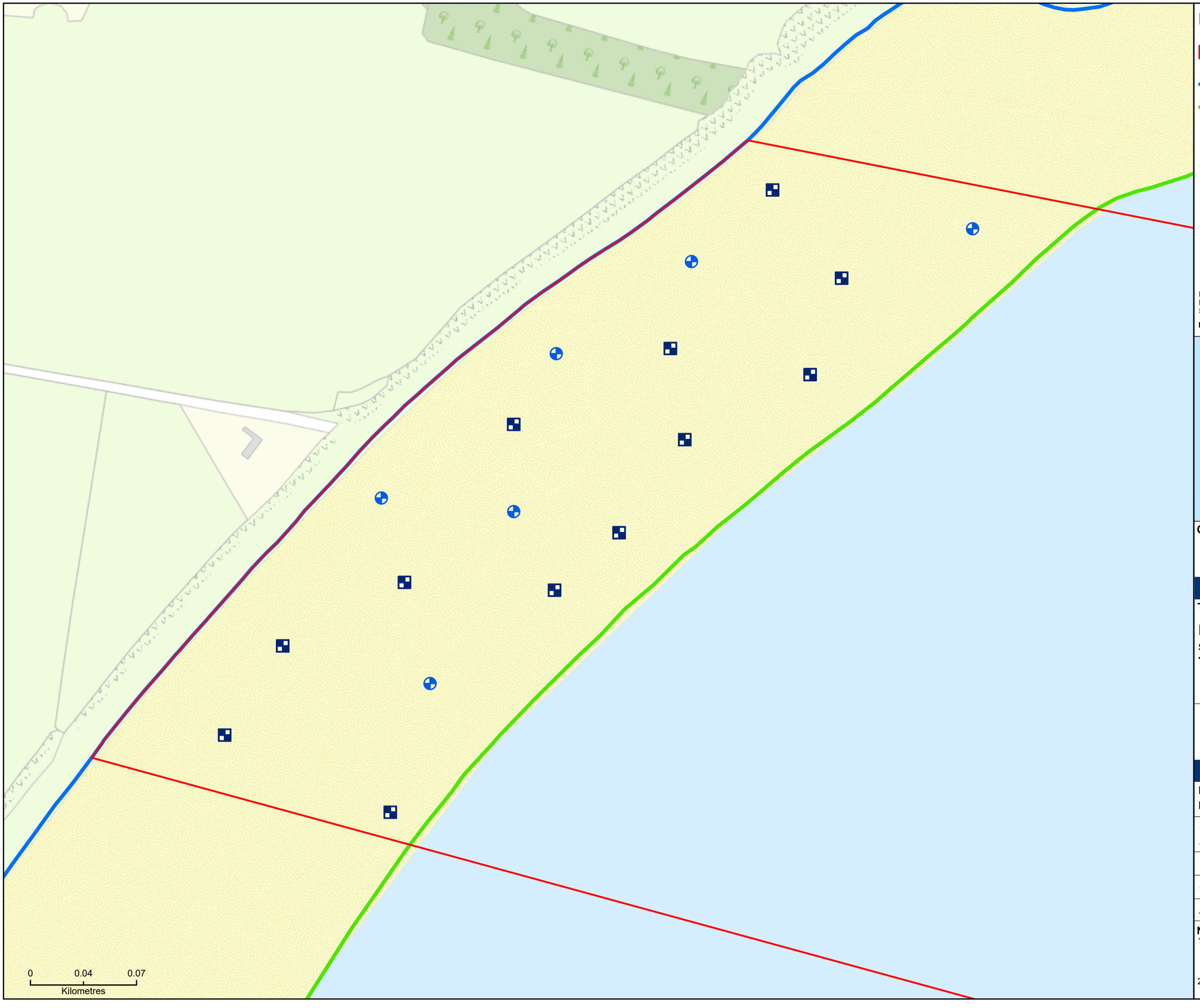
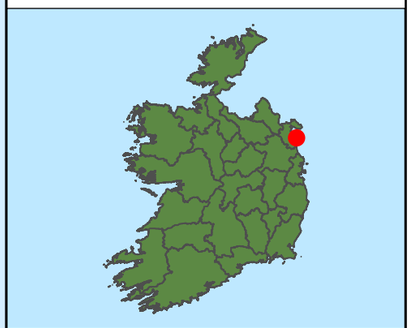



## Legend

- Maritime Usage Licence Area
- High Water Mark
- Low Water Mark
- Borehole
- Trial Pit

Drawn By:
Nicola Riordan, MSc Geographic Information Science
Senior Project Scientist GIS

**Data Sources:** Tailte Éireann



**Client**

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**Oriel Wind Farm Project**

**Title**

# Proposed intertidal geotechnical survey locations- Trial pit and boreholes

TETRA TECH
tetratech.com/europe

**Issue Details**

**File Identifier:**
MDR1520c-TTI-AP-XX-DR-Z-0007

| Status: | Rev: | | |
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| **Drawn:** NR | | **Date:** | 06/07/2026 |
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3281515E,
3549388N.

Annagassan

Togher

Clogherhead

3257970E,
3529684N.

3281515E,
3529684N.

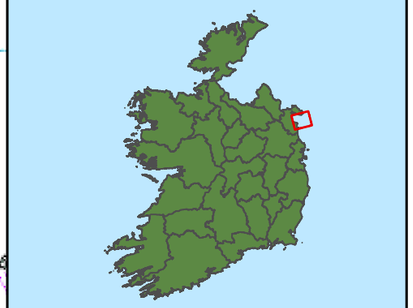
0 1.25 2.5
Kilometres

## Legend

- Maritime Usage Licence Area
- High Water Mark
- Benthic Sample Locations
- CPODS
- Water Quality Sonde Locations
- Water Quality and Fish and Shellfish Sonde Locations


Drawn By:
Nicola Riordan, MSc Geographic Information Science
Senior Project Scientist GIS


**Data Sources:** Tailte Éireann



**Client**

ORIEL WINDFARM
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**Oriel Wind Farm Project**

**Title**

# Proposed environmental survey locations

TETRA TECH
tetratech.com/europe

**Issue Details**

**File Identifier:**
MDR1520c-TTI-AP-XX-DR-Z-0008

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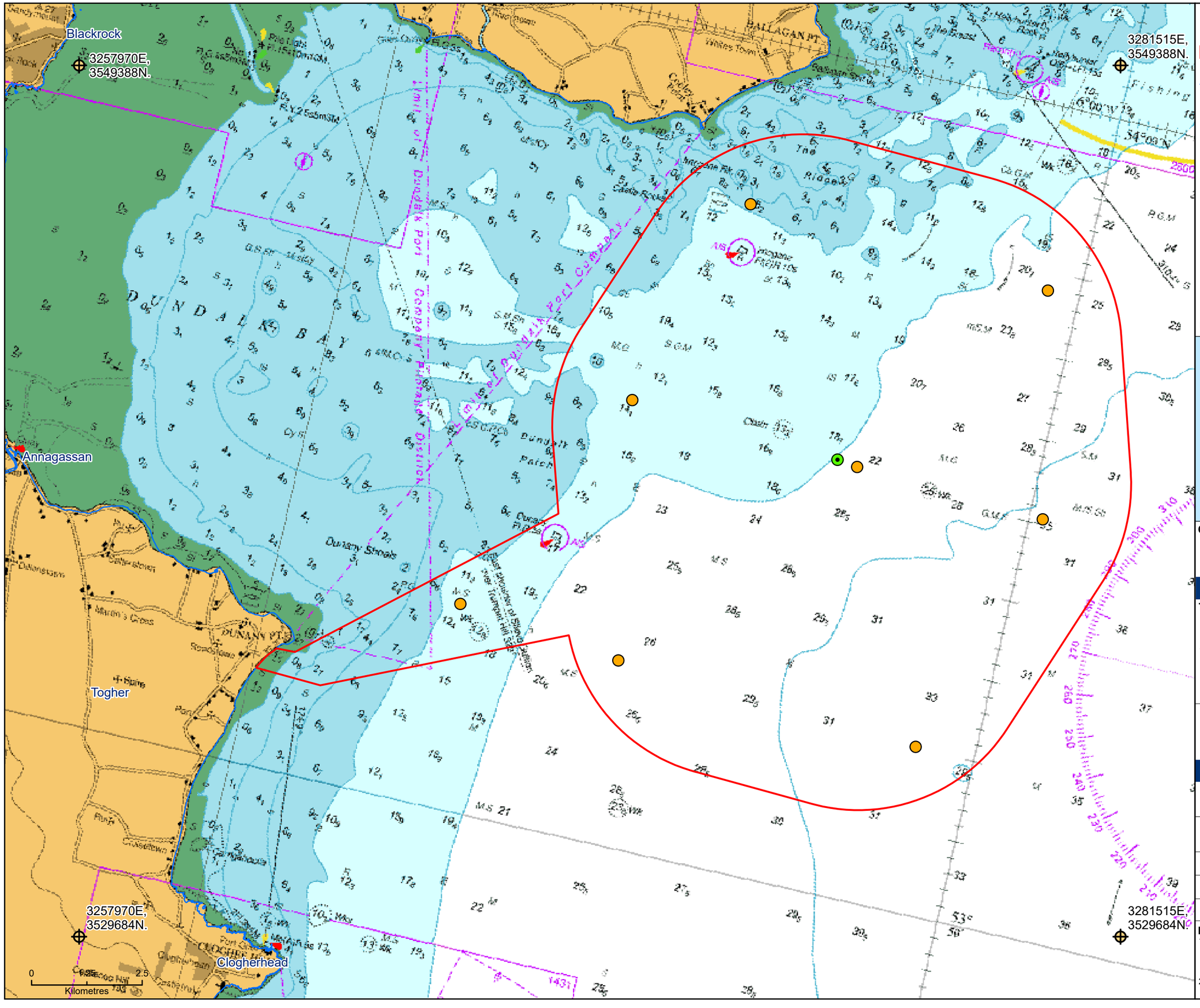
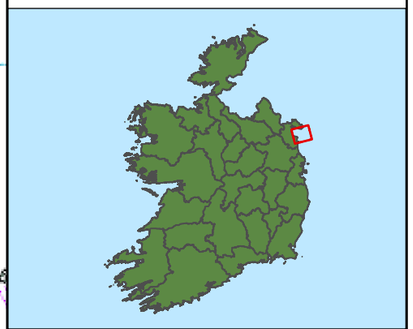



## Legend

- Maritime Usage Licence Area
- High Water Mark
- ADCPs
- Metocean buoy


Drawn By:
Nicola Riordan, MSc Geographic Information Science
Senior Project Scientist GIS


**Data Sources:** Tailte Éireann



**Client**

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

**Oriel Wind Farm Project**

**Title**

# Proposed metocean survey locations- Metocean Buoy and ADCP

TETRA TECH
tetratech.com/europe

**Issue Details**

**File Identifier:**
MDR1520c-TTI-AP-XX-DR-Z-0012

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