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# **Foreshore Licence Application for Site Investigations at Inis Ealga – Clonard and Ballymacoda**

**Schedule of Survey Works - Foreshore License Ref: TBC**

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# 1. SURVEY SCHEDULE

The intention is to commence the proposed site investigation activities as soon as feasible following award of a Foreshore Licence, taking into consideration any proposed mitigation requirements. The survey works will most likely be carried out between the months of April and October, preferably in 2022 following award of the Foreshore Licence and subject to weather conditions and vessel availability.

- Geophysical survey (including Archaeology and Benthic): Spring/Summer 2022 (3 months window nominally Mid-April to Mid-July), in association with the benthic sampling programme.
- Geotechnical: Option for preliminary survey summer in Year 2 or 3 (2-month window nominally August to September) and main survey Spring/Summer in Year 4 (4-month window).
- Wind Resource Monitoring: Start Summer Year 1 for a likely minimum of 12 months and a likely maximum of 36 months.
- Metocean Survey: Current resource monitoring – Start Summer Year 1 for a period of 6 months
- Environmental and Intertidal: Spring/summer Year 2
- Birds & Marine Mammals: Year 2 seasonal

## 2. GEOPHYSICAL SURVEY

**Objective:** The objective of the proposed geophysical survey is to determine the geophysical characteristics of the Foreshore Licence Application Area (FLAA). The geophysical surveys will involve:

- Mapping the water depth to the seabed (bathymetry) within the FLAA.
- Map the seabed and sub-surface to optimise positioning of any moorage/anchoring and cable routing within the FLAA and to enable assessment of cable burial depth.
- Plan the scope and positioning of the geotechnical sampling programme in the FLAA.
- Identify marine habitat areas from which the benthic survey can be undertaken.
- Identify sensitive marine habitats that may need to be avoided during geotechnical and environmental sampling and infrastructure installation.
- Provide the geophysical data from which a marine archaeological assessment can be undertaken.

**Location:** At this time, it is not known where the landfall and potential export cable will be located within the FLAA, therefore, to be judicious it has been assumed in the documents submitted in support of this application for Foreshore Licence that the geophysical surveys will be conducted across the whole of the FLAA. However, it is possible that the geophysical surveys may be restricted to an approximately 500m-wide corridor along each potential export cable route within the FLAA.

**Equipment:** Information is presented below on the indicative equipment for use for the geophysical surveys proposed as part of this application for Foreshore Licence:

**A. Multibeam echosounder (MBES)** - MBES is a remote sensing acoustic device typically attached to a vessels hull. The purpose is to map the water depth to seabed (bathymetry). Potential equipment suppliers include: Kongsberg and Teledyne RESON.

**B. Side scan sonar (SSS)** - The side scan sonar will be a dual frequency hydrographic sonar with a lowest operating frequency of not less than 100 kHz. The higher frequency of the side scan sonar will be between 410 and 500 kHz in line with the Department of Arts, Heritage and Gaeltacht (DAHG) 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters', published in 2014.

**C. Sub-bottom profiler (SBP)** – It is likely that two different systems may be used; a high-resolution profiler that will emphasise the top 3 to 5m of sediment with a resolution of 0.25m or better in a variety of geological conditions; and a system that provides increased penetration between 50m and 100m. Three systems (ponger, boomer and chirper) will be made available so that the most appropriate system can be chosen dependent on the seabed conditions.

**D. Magnetometer survey** - The marine magnetometer will be of the Caesium Vapour type and capable of recording variations in magnetic field strength during survey to an accuracy of  $\pm 0.5nT$ .

**Survey points and spacing:** The swathe width for each piece of equipment will depend on water depth encountered. It is anticipated that the width of each swathe will allow for a 50% overlap between each swathe.

**Vessel:** Geophysical survey vessels are typically between 15m and 60m in length and have an endurance of up to 14 days. These vessels are likely to use a local port for mobilisation and replenishment.

### 3. GEOTECHNICAL SURVEY

**Objective:** The purpose of the proposed geotechnical survey is to evaluate the nature and mechanical properties of the superficial seabed sediments and intertidal sediments within the FLAA.

**Location:** At this time, it is not known where the landfall and potential export cable will be located within the FLAA, therefore, to be judicious it has been assumed in the documents submitted in support of this application for Foreshore Licence that the geotechnical surveys will be conducted across the whole of the FLAA. However, once the geophysical data has been analysed, the geotechnical sampling will be restricted to the potential footprint of the development including export cable corridors.

**Vessel:** Geotechnical survey vessels are typically between 55m and 90m in length and typically have an endurance of up to 28 days. The port of mobilisation will likely depend on the location of the previous work package undertaken by the vessel which may be Irish, UK, or another European location for example.

**Survey points and spacing:** The exact location, quantity, type, and penetration of the geotechnical samples will be determined following interpretation of the data arising from the geophysical survey and depending on the evolving design of the development. Proposed geotechnical sample locations will be communicated to the National Monuments Service – Underwater Archaeology Unit for approval ahead of works commencing. Proposed locations will be accompanied by an assessment of the geophysical data by a qualified and experienced marine archaeologist.

**Equipment:** Information is presented below on the indicative equipment for use for the geotechnical surveys proposed as part of this application for Foreshore Licence:

**a. Approximately 30 no. Vibrocores (VC)**

**Method:** A vibrocore will be used to retrieve a soil sample by the lowering of a sample tube that is vibrated into the seabed.

**Location:** To be determined following review of data arising from geophysical surveys, including archaeology baseline data, but indicative locations are provided in Map 15 below. For assessment purposes, it has been assumed that a vibrocore will be deployed every 1 km along a preferred cable route. As the preferred cable route is not yet known, the indicative locations presented in Map 15 are based on three cable routes under consideration at this early stage.

**Dimensions:** Vibrocores may penetrate up to 6m into the seabed and typically have a diameter of 150mm. Therefore, sample volumes will be approximately 0.12m<sup>3</sup>. For 30 collected samples, the volume of sediment removed will be approximately 3.6m<sup>3</sup>.

**Equipment:** Indicative equipment to be used is a high-performance corer (HPC) or a modular vibrocorer.

**b. Approximately 30 no. Cone Penetration Test (CPT)**

**Method:** A CPT will be used to test the characteristics of the soil by pushing an instrumented cone into the ground at a constant speed, with continuous measurement of the cone end resistance, the friction along the sleeve of the cone, and the pore water pressure.

**Location:** To be determined following review of data arising from geophysical surveys, including archaeology baseline data, but indicative locations are provided in Map 15 below. For assessment purposes, it has been assumed that a CPT will be deployed every 1 km along the preferred cable route. As the preferred cable route is not yet known, the indicative locations presented in Map 15 are based on three cable routes under consideration at this early stage.

**Dimensions:** CPT can achieve penetrations of up to 40m. No sediment will be removed from the seabed.

**Equipment type:** Indicative equipment to be used is a Seacalf seabed CPT system or similar and a deck mounted CPT.

**c. Approximately 2 no. Boreholes**

**Method:** There is potential for approximately two boreholes to be drilled at the chosen cable landfall. A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil testing.

**Equipment:** Boreholes are typically drilled from a jack-up barge (JUB) using a percussion and a rotary corer. The number of legs used by the JUB is dependent on seabed conditions, current strength, and wave action. For this FLAA, four legs is the most likely scenario for the JUB. Each leg typically has a seabed footprint of approximately 2.54m<sup>2</sup>.

**Location:** The exact location of boreholes will not be known until the preferred export cable route and landfall has been identified. At this time, it is assumed that the landfall could anywhere within the FLAA.

**Dimensions:** Each borehole will acquire a core sample of approximately 112mm in diameter, creating a hole (and therefore a seabed footprint) of approximately 143mm in diameter (0.016m<sup>2</sup>). Assuming a borehole depth of approximately 25m (the likely maximum depth), the core sample removed would have a volume of approximately 0.25m<sup>3</sup>. Risings dispersed around the drill site would have a volume of approximately 0.15m<sup>3</sup>. Assuming cuttings will form a simple cone with an 18° slope angle around the drill head, it is estimated that cuttings will cover an area of approximately 1.82m<sup>2</sup>. The borehole will be left to collapse naturally following completion of drilling where the cuttings are likely to fall back down the hole.

The total expected seabed footprint of the geotechnical borehole sampling is shown in Table 1-1 below.

**Table 3-1 Calculated footprint for 2 boreholes**

Activity	Approximate Seabed footprint (m <sup>2</sup> )
Jack-up barge legs (assumes 4 legs deployed)	20.32
Borehole extraction*	0.032
Drill cuttings	3.64
<b>Total</b>	<b>23.96m<sup>2</sup></b>

\*Footprint from borehole extraction is not included within total as it is assumed that it will be within the area of seabed disturbed by drill cuttings

## 4. ENVIRONMENTAL SURVEY

**Objective:** The purpose of the environmental surveys proposed as part of this application for Foreshore Licence is to provide data to inform mapping of the distribution and extent of marine benthic habitats across the FLAA, including within the intertidal area..

**Location:** Environmental sampling will be undertaken within the boundary of the FLAA, along the potential cable export routes. Map 15 below provides a high-level appraisal of potential indicative benthic ecology grab sample locations (shown as a green square in the legend). However, given that these sample locations are indicative, for assessment purposes it is assumed that benthic ecology grab samples could be undertaken anywhere within the FLAA. Similarly, it is assumed for assessment purposes that drop-down video and camera transects could take place anywhere within the FLAA.

**Survey points and spacing:** The exact location and quantity of the benthic ecology grab samples will be determined pending evolution of the constraints mapping which underpins the design of the development. For assessment purposes, calculations are based on three potential export cable route areas under consideration at this early stage. It is assumed that an environmental station will be located every 2km along the preferred cable route or where there is a change in habitat type.

**Equipment:** Environmental survey will indicatively comprise:

### a. Approximately 30 no. Grab stations

**Method:** A grab sampler will be used to retrieve a soil sample of the seabed by the lowering of a mechanical grab. The grab will be launched from a vessel crane or A-frame. It is likely that three grab samples will be taken at each station; two for faunal analysis and one for sediment and chemical analysis.

**Dimensions:** Each grab samples a volume of approximately 0.1m<sup>3</sup>. Grabs are required to obtain a sample greater than 5cm in depth. To achieve this, samples will be repeated for up to three attempts. If three samples are taken at each of 30 stations, then grab sampling will remove approximately 9m<sup>3</sup> of sediment.

**Location:** To be determined pending evolution of the constraints mapping which underpins the design of the development but indicative locations (informed by EMODnet habitat data) are provided in Map 15 below.

**Equipment:** Indicative equipment is Day or Hamon Grab.

### b. Drop-down camera (DDC) and video transects (VT)

**Method:** A minimum of four still photographs will be acquired at each environmental sampling station. Additional photographs or video footage will be acquired along transects to characterise sensitive habitats or features.

**Dimensions:** This technique involves no intrusive seabed sampling.

**Location:** To be determined pending evolution of the constraints mapping which underpins the design of the development but indicative locations (informed by EMODnet habitat data) are provided in Map 15 below.

**Equipment:** Indicative equipment to be used is a SeaSpyder using Canon EOS 100D Digital Still Camera with dedicated strobe and an integrated video system capable of performing full HD recordings.

### c. Intertidal

**Objective:** The aim of the intertidal survey will be to identify and map the extent and distribution of intertidal biotopes.

**Method:** Intertidal floral and faunal surveys at proposed cable landfall locations to include transects, quadrats and core sampling.

**Location:** The exact location of the intertidal survey will not be known until the preferred export cable route and landfall has been identified. For the purpose of assessment, it is assumed that this survey could take place at any landfall area in the FLAA.



## 5. BIRDS & MARINE MAMMAL

**Objective:** To provide data to supplement the 24-month aerial bird and marine mammal survey effort currently underway as required. The aerial bird and marine mammal survey effort underway is currently recording the distribution and abundance of birds, marine mammals and other species observed in the FLAA. Consultation with statutory and non-statutory stakeholders on the scope of the aerial survey effort underway was carried out in Q1 2021. As data from Year 1 of surveys is analysed, further engagement will be undertaken with statutory and non-statutory stakeholders on the scope of Year 2 of surveys. This may result in plans to deploy targeted Passive Acoustic Monitors, Static Acoustic Monitors, or to carry out boat-based bird and marine mammal surveys to supplement data gathered through aerial survey.

**Method:** Boat based bird and marine mammal surveys potentially including towed hydrophonic acoustic array. Potential deployment of Passive Acoustic Monitor(s). Potential deployment of Static Acoustic Monitor(s). Scope to be determined following engagement with statutory and non-statutory stakeholders on Year 2 of survey effort pending results from Year 1 of aerial bird and marine mammal survey effort.

**Location:** Location will depend on the outcome of Year 1 of aerial surveys underway for Bird & Marine Mammals.

## 6. WIND RESOURCE AND METOCEAN SURVEY:

**Objective:** To evaluate wind, wave and tidal conditions within the FLAA.

**Equipment:** Deployment of approximately two acoustic doppler current profilers (ADCP) and approximately two Waverider buoys. The ADCPs will be deployed via a vessel on-board crane and will sit on the seabed. The Waverider buoys are typically yellow in colour and include an amber LED with a programable ODAS flash sequence with three nautical mile visibility.

**Location:** Exact details of the buoy deployment location within the FLAA, associated mooring arrangement and installation vessel will not be available until a contract has been awarded to the deployment provider.

## 7. GENERAL REQUIREMENTS

The survey contractor and vessels will comply with international and national statute. In addition, the following standard environmental procedures/protocols will be followed during the survey campaign, noting this list is not exhaustive:

- 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 offshore waters to be operated in.
- The contractor will take particular care when handling or storing hazardous materials, radiation sources and chemicals.
- Liquid or non-liquid pollutants or waste material will not be dumped, thrown or otherwise disposed of into the sea.
- All refuse and materials shall be kept onboard the vessel and safely disposed of onshore according to the MARPOL convention.
- All substances handled and/or used whilst undertaking the works will be handled, used, stored and documented in accordance with assessments and recommendations of the Control of Substances Hazardous to Health (COSHH) Regulations 1994.
- Where Fuels, Oils and Lubes are required to be stored 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.
- In line with International Cable Protection Committee (ICPC) Recommendations, geotechnical and environmental sampling locations will be positioned a minimum of 250m from third-party assets e.g. pipelines. All asset owners will be contacted prior to survey to determine if proximity agreements are required.
- Commissioners for Irish Lights (CIL) standard navigational safety requirements will be adhered to with regards to positioning, mooring, marking and lighting of all equipment deployed under the Foreshore Licence.



