# ATTACHMENT A: SCHEDULE OF SURVEY WORKS

# Schedule of Survey Works
# Geotechnical and Environmental Survey

## Geotechnical Survey

A geotechnical sampling and testing programme will be undertaken along the cable route corridors in order to evaluate the nature and mechanical properties of the superficial seabed sediments and inter-tidal sediments.

Approximate locations of the proposed geotechnical sites have been provided in the Foreshore Licence Maps, please refer to Attachment C, however, the exact location of the geotechnical sampling sites within the survey corridors will be determined following the completion of the interpretation of the data from the completed geophysical marine survey (ref FS 006722). Please note that the locations of the proposed geotechnical sites are best estimates and may be subject to change based on the results of the geophysical survey.

### a. Intertidal Survey (HWM to LWM)

#### i) Bore Holes / Trial Pits

**Method:** Depending upon requirement identified from interpretation of the geophysical data, approximately 9 bore holes and/or 9 trial pits will be drilled / dug in order to determine soil conditions in the intertidal zone. The maximum depth below surface for boreholes and trial pits will be up to 20 metres and 3 metres respectively. The trial pits will typically be 3m x 1m in size whilst bore hole will be approximately 10cm in diameter. The trial pits will be backfilled using only native material and the borehole will not be backfilled but instead will re-fill naturally.

The equipment to be used will include the following or similar;

- Bore hole – MI6 Massenza Drilling Rig / Pagani TG 63-200 Penetrometer
- Trial Pit - Backhoe loader, JCB 3CX or 4CX

The Backhoe loader and MI6 Massenza drilling rig are approximately 5.5m x 2.25m and 3m x 1m respectively. Both pieces of equipment would be driven onto beach via public access points. The drilling of boreholes may be complemented at certain locations by the Pagani TG 63-200 penetrometer which is approximately 2.3m x 1.1m and would also be driven onto beach via public access points.

The tidal range at each landfall location shall be used to plan operations in order that the investigations can be undertaken with the most suitable plant and equipment and extend outwards to join and overlap the Shallow Water Survey at approximately 10m water depth.

The intertidal range is considerable and will therefore require careful consideration in terms of deployment and setting-up of the survey. Careful consideration will also have to be given to managing the time available to perform the services. The approximate locations of trial pits and bore holes have been shown on the Foreshore Licence Maps 1 and 2, please refer to Attachment C.

| | | |
|---|---|---|
| **Survey Parameters:** | Spacing: | 100m (nominal) |
| | No.: | 9 boreholes / 9 trial pits |
| | Depth: | 20m / 3m |

### ii) Thermal Resistivity

**Field Testing –** Method: Thermal conductivity testing will be performed on soil samples recovered from the land/intertidal samples at 1m intervals from the surface to 4m below ground level, or otherwise directed. Samples will be tested at the natural moisture content.

**Laboratory testing –** Thermal conductivity tests will be performed on soil samples from surface to 4m below ground level to assess the suitability of the soil for backfilling and landfall trench. At each location it is envisaged 5 tests will be performed.

**Location:** Intertidal component of intertidal and shallow water survey area of Foreshore Licence Area 1 and 2 (as shown on Foreshore Licence Map 1 and 2 in Attachment C).

## b. Shallow Water Survey Area (LWM to 10m LAT)

### i) Vibrocore

**Method:** Vibrocores will be used to understand the sedimentary environment between LWM to 10m LAT. The base case is for 7 vibrocores to be acquired with a distance of 1,000m or so between each sample. This base case will need to be reviewed based on seismic interpretation of soil conditions. The standard vibrocore shall have a 5m depth capability and a 75mm nominal core diameter.

**Survey Parameters:**

| | |
|---|---|
| Interval: | 1,000m |
| Sites: | 7 |
| Depth: | 5m |

### ii) Cone Penetrometer Testing (CPT)

**Method:** CPTs will be used to understand the sedimentary environment between LWM to 10m LAT. The base case is for 7 CPTs to be acquired with a distance of 1,000m or so between each sample. This base case will need to be reviewed based on seismic interpretation of soil conditions. The penetrometer will have a maximum depth penetration of 5m below seabed.

**Survey Parameters:**

| | |
|---|---|
| Interval: | 1,000m |
| Sites: | 7 |
| Depth: | 5m |

**iii) Rock Coring (Optional)**

In the event of a failure to achieve sample recovery using the CPT and/or Vibrocore methodology at the planned shallow water survey locations, a rock corer may be deployed in order to obtain samples of the required length and quality at or in close proximity to the site of any failed sampling.

**Method:** In the shallow water survey area, rock coring may be performed using a drilling rig deployed upon a Jack up barge which would typically have an operating water depth limit of 16m.

**iv) Thermal Resistivity Testing –** Thermal resistance/conductivity testing is required upon soil horizons identified during the geotechnical shallow water survey.

**c. Offshore Survey Area (10m LAT to 12nm Limit)**

**i) Vibrocore**

**Method:** The base case is for vibrocoring to be conducted every 1,500m or so giving a total requirement of 39 vibrocores in Irish waters. This will be confirmed based upon the interpretations of soil conditions from seismic operations conducted during the geophysical survey. The decision to undertake vibrocoring and CPTs at the same or separate locations will also be based on the findings from seismic operations conducted during the geophysical survey.

Soundings will be acquired across the offshore survey area to provide full seabed bathymetric coverage.

**Survey Parameters:**

| | |
|---|---|
| Interval: | 1,500m |
| Sites: | 39 |
| Depth: | 5m |

**ii) Cone Penetrometer Testing (CPT)**

**Method:** The base case is for CPTs to be conducted every 1,500m or so giving a total requirement of 39 CPTs in Irish waters. This will be confirmed based upon the interpretations of soil conditions from seismic operations conducted during the geophysical survey. The decision to undertake vibrocoring and CPTs at the same or separate locations will also be based on the findings from seismic operations conducted during the geophysical survey.

**Survey Parameters:**

| | |
|---|---|
| Interval: | 1,500m |
| Sites: | 39 |
| Depth: | 5m |

**iii) Rock Coring (Option)**

In the event of a failure to achieve sample recovery using the CPT and/or Vibrocore methodology at the planned offshore survey locations, a rock corer may be deployed in order to obtain samples of the required length and quality at or in close proximity to the site of any failed sampling.

**Method:** In the offshore survey area any rock coring may be performed using a compensated drilling rig operating from a dedicated vessel or by way of a seabed drilling rig.

**iv) Thermal Resistivity Testing –** Thermal resistance/conductivity testing is required upon soil horizons identified during the geotechnical offshore survey.

**v) Ground-Truthing**

Should on-site interpretation of the side scan sonar data indicate anomalous areas of seabed that require further qualification, the area shall be ground-truthed. Ground-truthing will be undertaken using still photography, or grab sampling if the former technique doesn't provide a clear image. If required, the number of grab samples is likely to be low and typically involves a sample of 10 litres or less, taken from the seabed.

## Environmental Survey

The environmental survey will be used to map the distribution and extent of marine benthic habitats from the interpretation of the geophysical survey for the cable route corridors. This will comprise a benthic sampling programme and video or still photographs based upon interpretation of the geophysical data. The sampling locations will be determined based on the physical characteristics of the seabed, based on interpretation of the results of the geophysical survey.

Additional sediment samples may be acquired for later chemical analysis to determine the concentration of potential pollutants.

The programme base scope is based upon site intervals given below, although will be dependent upon the diversity of benthic habitats.

### a. Land/Intertidal Survey (HWM to LWM)

**Method:** Beach inspection and survey at each shore in Ireland.

### b. Shallow Water Survey Area (LWM to 10m LAT)

**Method:** Use of grab sampling and still or video camera. Grab samples will be collected as required for aiding side scan sonar interpretation.

**Sampling Sites:** 3

### c. Offshore Survey Area (10m LAT to 12nm Limit)

**Method:** Sampling intervals will be nominally every 15-20km. Use of grab sampling and still or video camera.

**Sampling Sites:** 6