



PLANNING REPORT

in support of

FORESHORE LICENCE APPLICATION

for

Geophysical, Geotechnical, Environmental,

Archaeological and Metocean Survey

of

Dublin Array Offshore Wind Farm & Export Cable Route Corridors

MDM

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1 Contents

1	INTRODUCTION	6
2	SURVEYS	8
	Metocean Survey	9
	Geophysical Survey	9
	Seabed Sampling	9
	Survey Schedule	10
3	SURVEY AREA	12
	Northern Cable Route Corridor	14
	Southern Cable Route Corridor	14
	Existing Pipelines and Cables	14
4	OTHER PROPOSED ACTIVITIES / FORESHORE APPLICATIONS	18
5	FORESHORE MAPPING	19
	Northern Cable Route Corridor	19
	Southern Cable Route Corridor	20
6	PROPOSED MARINE SURVEY	21
	Intertidal Zone Survey	22
	Marine Zone Survey	23
7	SURVEY OPERATIONS AND EQUIPMENT PARAMETERS	25
	Survey Vessels	25
	Buoy mounted metocean equipment	26
	Marine Survey Equipment	27
	Multibeam Echosounder (MBES)	27
	Side Scan Sonar	27
	Marine Magnetometer	28

Sub Bottom Profiler (SBP).....	28
Cone Penetrometer/ Borehole Rig (CPT)	29
Grab Samples.....	29
Vibrocores.....	29
8 METOCEAN EQUIPMENT DEPLOYMENT, MAINTENANCE AND RECOVERY PROCEDURES	
31	
9 MARINE SURVEY PROCEDURES.....	32
10 HEALTH, SAFETY, ENVIRONMENT AND QUALITY (HSEQ).....	32
11 WASTE MANAGEMENT & POLLUTION CONTROL	33
12 NAVIGATIONAL SAFETY CONSIDERATIONS	34
Dublin Port Shipping Movements	34
Ship Separation Zone.....	35
Marinas, Sailing and Recreation	36
RNLI.....	38
Tourism	38
13 FISHING AND AQUACULTURE	38
14 LIAISON & CONSULTATIONS	43
Pre-submission Consultations.	43
Ongoing Project Liaison.	44
15 MITIGATION OF NAVIGATION RISK	46
16 MARINE ARCHAEOLOGY.....	47
17 NATURA 2000 SITES / APPROPRIATE ASSESSMENT	49
Appendices	52
Annex A – Survey Area Co-ordinates.....	52
Annex B – Foreshore Licence Drawings.....	53

Annex C – Equipment Specifications	54
Annex D – Marine Archaeological Assessment Report	55
Annex E – AA Screening and Natura Impact Statement	56

TABLE OF FIGURES

Figure 1. Survey Area	7
Figure 2. Indicative Metocean Equipment Deployment.....	13
Figure 3. Existing subsea infrastructure Northern Cable Route.	16
Figure 4. Existing subsea infrastructure Southern Cable Route.	17
Figure 5. Poolbeg / Shellybanks	19
Figure 6. Shanganagh.....	20
Figure 7. Scheduled Ferry and Shipping Routes at Dublin Port.....	35
Figure 8. Overall Marine traffic patterns over 12 months in Irish Sea from AIS data (Marine Traffic 2017).....	36
Figure 9. Marine Pleasure craft traffic patterns over 12 months in Irish Sea from AIS data (Marine Traffic 2017)	37
Figure 10. Irish Sea fishing intensity (AIS 2017).....	39
Figure 11. Fishing Effort East Coast Ireland. (Atlas of Commercial Fisheries 2 nd Ed., Marine Institute).....	40
Figure 12. Fish Spawning Grounds (Irish Marine Atlas, Marine Institute 2016)	41
Figure 13. Aquaculture zones on East Coast (Irish Marine Atlas, Marine Institute 2016)	42

TABLE OF TABLES

Table 1. Indicative Survey Schedule.....	11
Table 2. Foreshore Licence / Lease Applications	18
Table 3. Acoustic Properties.	30
Table 4. Pre-submission Consultation	44

1 INTRODUCTION

1.1 In January 2006, Kish Offshore Wind Limited and Bray Offshore Wind Limited submitted two Foreshore Lease applications to the Department of Communications, Marine and Natural Resources, pursuant to section 2 of the Foreshore Act 1933, as amended (the Lease Applications).

1.2 The initial project development work was completed by Saorgus Energy Ltd between 2006 and 2018. In March 2018, Saorgus Energy Ltd entered into partnership with innogy (one of Europe's leading energy companies <https://www.innogy.com>) to further progress the development of the Dublin Array project. The next phase of development will be led by innogy Renewables Ireland Limited (innogy) with support from Saorgus Energy.

1.3 This Planning Report provides supplementary information to accompany an application for a Foreshore Licence by innogy for permission to carry out a geophysical survey, associated seabed sampling and deployment of buoy mounted metocean equipment.

1.4 The Foreshore Licence area comprises the current Lease Application Areas, potential export Cable Route Corridors and buffer zones. The Lease Application Areas are in the vicinity of the Kish and Bray banks. The Cable Route Corridors extend from the Lease Application Areas shore-wards to Mean High Water (MHW) at three potential landfall options, one at Poolbeg / Shellybanks and two options at Shanganagh.

1.5 The respective areas are shown in Figure 1 below and Foreshore Licence Map 1 – 7 in Annex B.

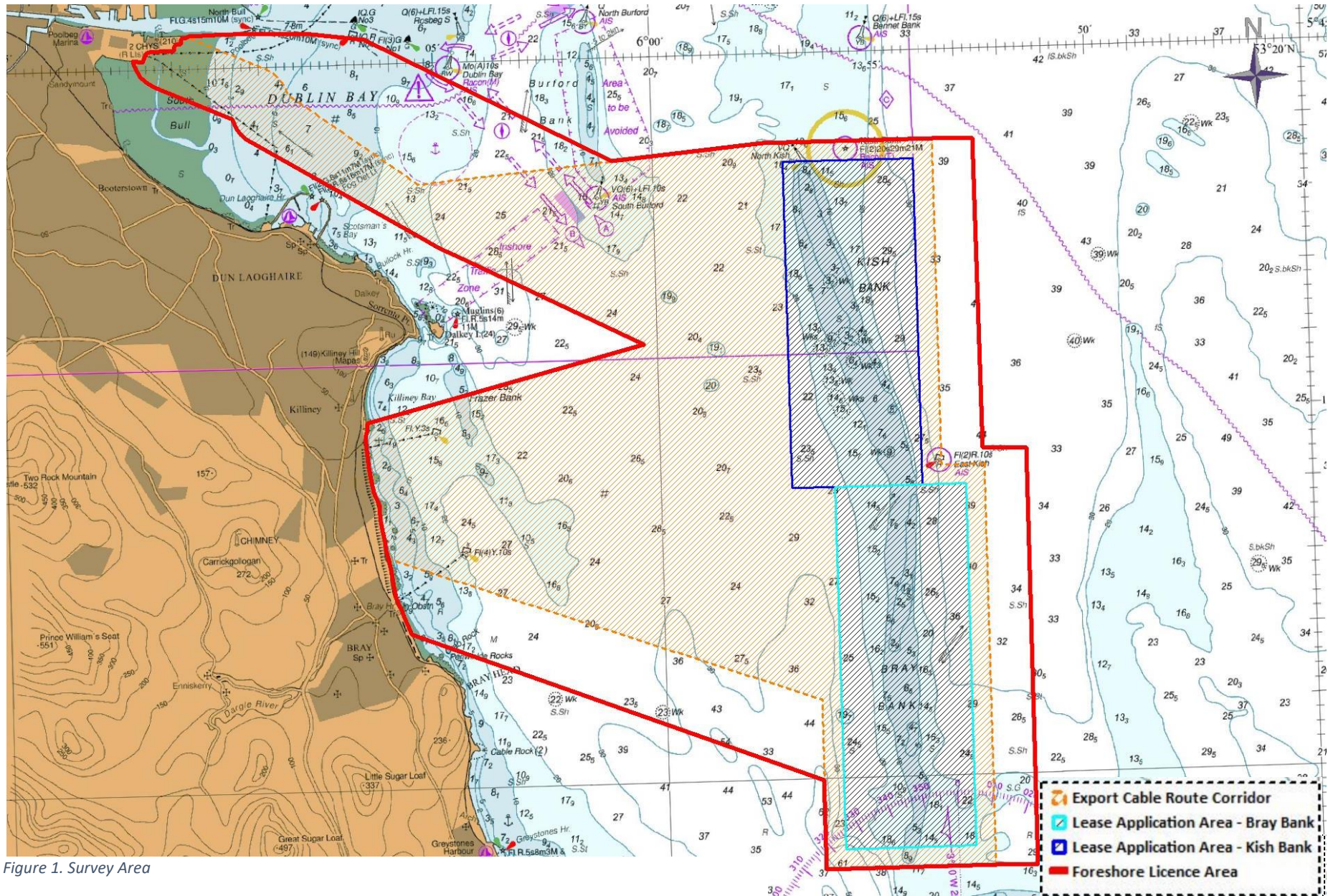


Figure 1. Survey Area

2 SURVEYS

2.1 The current surveys are required to provide; **metocean data** which will provide additional information regarding wind, wave and current characteristics, **geophysical data** which will investigate the nature of the seabed and sub-surface stratigraphy, **geotechnical data** to facilitate the engineering and foundation design for the array, optimising corridor options for subsea export power cables at potential landfalls (in the general area of Shanganagh, County Dublin and Poolbeg/Shellybanks, Dublin City) and to provide additional supplementary information (including archaeological and environmental data) to inform the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) for the proposed Offshore Wind Farm Array development.

2.2 The metocean data to be collected will provide measurement of wind strength and direction to provide greater spatial coverage to supplement the data collected towards the north of the proposed array. In addition a further deployment of wave and current measuring devices will supplement the data collected in 2012.

2.3 The geophysical survey will provide a broad-scale map of ground types and seabed features. The surveys will also include grab sampling to ground-truth the geophysical results and provide benthic samples, vibrocores to investigate the nature of the upper layers of the seabed and intertidal Cone Penetrometer Tests (CPTs) and boreholes at the proposed landfalls to acquire geotechnical and geological data.

2.4 The principal objectives of the surveys are to:

- Produce up to date detailed bathymetric mapping;
- Provide further information concerning the nature of the seabed;
- Obtain supplementary detailed seabed morphology information; and
- Acquire additional shallow and deep geological cross-sections of the array site.

2.5 In addition, the enhanced survey data will determine the presence of any marine archaeological features in the area, i.e. identifying wrecks and anomalies of archaeological potential and sediment layers which may be of archaeological interest.

Metocean Survey

2.6 Metocean monitoring equipment will comprise up to two buoys carrying FLiDAR units for wind measurement. Two wave rider buoys with wave and current measurement devices will also be deployed.

Geophysical Survey

2.7 The geophysical survey will comprise;

- Bathymetric Survey;
- Side Scan Sonar;
- Shallow Reflection Seismic (Sub-bottom Profiling); and
- Marine Magnetometer.

2.8 These geophysical surveys are non-intrusive in that they do not cause any disturbance of the sea-bed and they will comply with the requirements as set out in “Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters” (Department of Arts, Heritage and the Gaeltacht, 2014) and with the general requirements of the Underwater Archaeology Unit of the Department of Culture, Heritage & the Gaeltacht for a geophysical survey for archaeological purposes.

Seabed Sampling

2.9 Sea-bed sampling will include a series of grab samples for benthic analysis to provide input for environmental assessment. Vibrocores will be taken to investigate the seabed geotechnical properties. The grab samples and vibrocores will be taken at various points throughout the survey areas. The sampling/vibrocoreing processes are very much a localised activity and will not result in any significant disturbance of the sea-bed. Grab sampling will be preceded by drop down video at each sampling station, which will be monitored in real time

to confirm that there is no potential for sampling to damage Annex 1 habitats (Habitats Directive).

2.10 A series of Cone Penetrometer Tests (CPTs) and boreholes will be carried out in the intertidal zone at Poolbeg / Shellybanks and Shanganagh to inform design of the export cable landfall requirements. The planned boreholes may be outside the foreshore area (above the Mean High Water mark) but access to the borehole sites may require activity within or access across the foreshore (below the Mean High Water mark). The exact location of the CPT's and boreholes will be finalised following analysis of the non-intrusive geophysical survey data.

Survey Schedule

2.11 The proposed geophysical survey and seabed sampling works will likely be carried out between 1st March and 31st October within the two years following award of the Foreshore Licence. The total duration of these elements of the survey campaign is expected take to be 4 to 5 months and some works may be carried out concurrently where practicable to reduce the time present in the survey area. The metocean monitoring equipment is likely to be deployed during Q3 2020; the equipment will remain on site for a minimum of two years. An indicative schedule is shown below in Table 1, assuming licence determination by June 2020.

2.12 The metocean monitoring equipment is likely to be deployed during Q3 2020; the equipment will remain on site for a minimum of two years.

	Assumption: Licence award June 2020.					
	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20
Geophysical marine survey	Late					
Review of geophysical data		Late	Early			
Benthic grab sampling			Late			
Geotechnical marine survey			Late	Early		
Intertidal survey Poolbeg		Late				
Intertidal survey Shanganagh WWTP						
Intertidal survey Shanganah Park						
Calibration of LiDAR	Late					
Deployment of LiDAR						1
Deployment of Waverider						2
Maintenance and inspection checks to be completed every 6 months during the 2 year monitoring period including						
· Lifting the unit and if required the mooring						
· Inspections						
· Cleaning instrumentation and systems						
· Cleaning biofouling						
· Replacement of easily serviceable parts						
· Replacement of consumables – may include, lubricants, diesel fuel or Methanol and or batteries						
· Data retrieval						
¹ Deployment for minimum of 2 years after calibration ends December 2020						
² Deployment for minimum of 2 years commencing December 2020						

Table 1. Indicative Survey Schedule

3 SURVEY AREA

3.1 The Licence Application Survey Area lies within the 12 nautical mile limit and extends to approximately 25,440 hectares. It includes both the existing Lease Application Areas together with the Export Cable Route Corridors and buffers. See Foreshore Licence Map 1 in Annex B for overview and the Boundary Co-ordinates are listed in tabular format in Annex A.

3.2 The metocean buoys will be deployed within the Lease Application areas. Indicative locations are shown in Figure 2. Prior to deployment for data collection the FLiDAR units will be temporally deployed and calibrated. The calibration area is to the north end of the site, close to the existing wind data collection point on the Kish Lighthouse.

3.3 The geophysical survey will cover the full extent of the Lease Application Area (comprising the Kish Bank and the Bray Bank) with 500m buffer zone and the export cable route corridors, as shown on Figure 1 above.

3.4 The Seabed Sampling Area extends beyond the export cable route corridor and lease application areas to facilitate baseline benthic sampling and it will take place at various locations within the outlined Foreshore Licence Area. (Figure 1 above and Foreshore Licence Map 1 and 2 included in Annex B).

3.5 The Export Cable Route Survey Area is quite extensive and the reason for this is that it covers route corridors comprising;

1. The northern cable route from the array to a landfall centred on the 220kV ESB Substation at Poolbeg/Shellybanks.
2. The southern cable route from the array to two landfall options along a section of coastline in the general Shanganagh area.

The boundaries of these areas are defined by co-ordinates for the vertices and these are presented in Annex A.

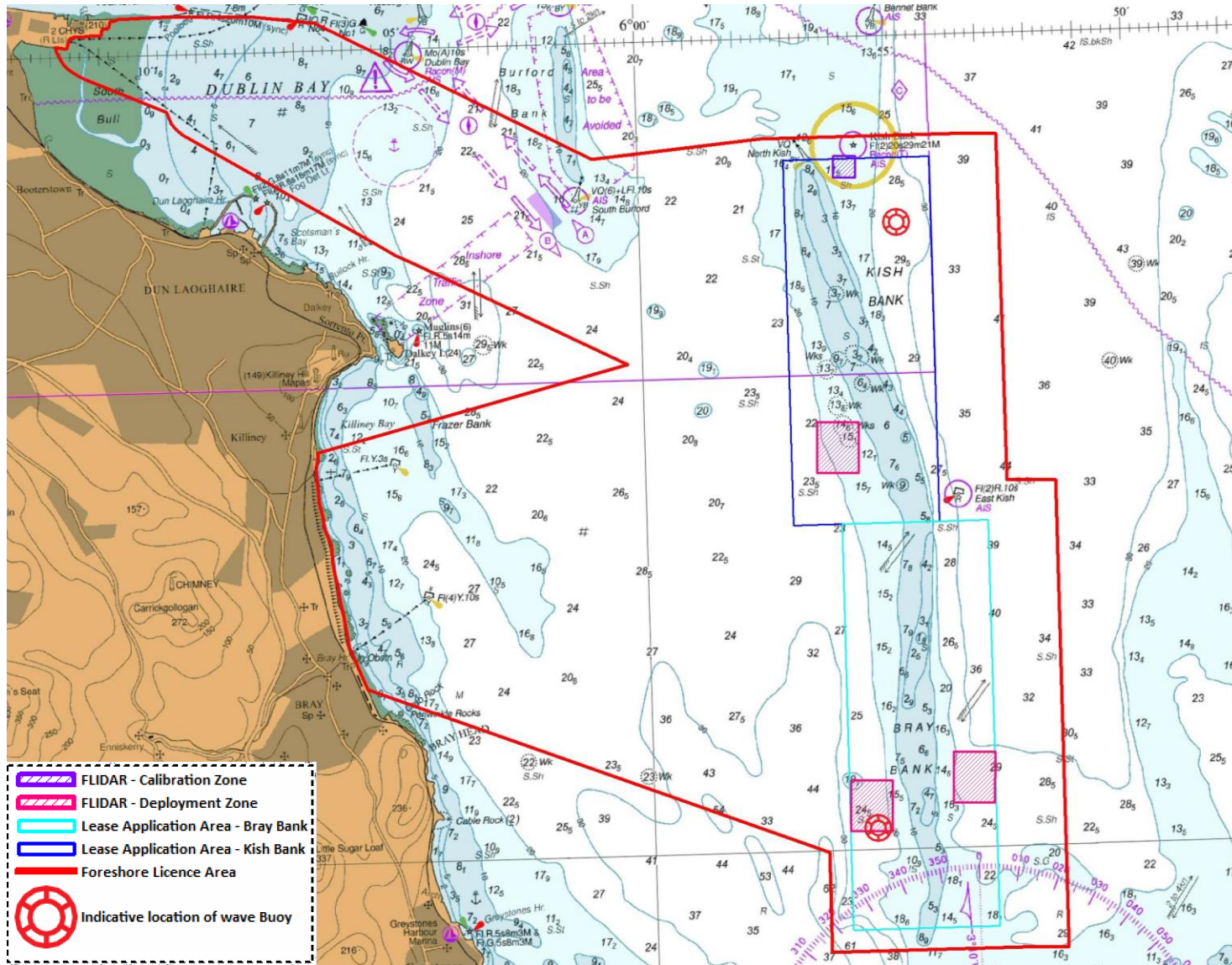


Figure 2. Indicative Metocean Equipment Deployment

Northern Cable Route Corridor

3.6 The proposed survey corridor for the Northern Cable Route extends in a westerly direction from the northern end of the Kish Bank. The route keeps to the south of the Burford Bank and then swings to a north-westerly direction towards Poolbeg. (Fig 5.).

Southern Cable Route Corridor

3.7 The proposed survey corridor for the Southern Cable Route extends almost due east from the Dublin / Wicklow coastline in the general Shanganagh area with two possible landfall options at Shanganagh Cliffs and Shanganagh Park. (Fig 6.).

Existing Pipelines and Cables

3.8 There are no existing sub-sea pipelines or cables within the Kish Bank or the Bray Bank Lease Application Areas nor within the buffer zones.

3.9 In the case of the Northern Cable Route Corridor, the existing subsea infrastructure includes;

1. A sub-sea sewer pipeline from Dun Laoghaire to the Sewage Treatment Works at Poolbeg;
2. A sub-sea sewer pipeline from Poolbeg to Sutton;
3. A sub-sea gas pipeline from Booterstown to Poolbeg; and
4. The ESAT 2 fibre optic cable from Sandymount to Southport (UK).

These are shown in Figure 3

3.10 These infrastructure elements are at the north-western end of the corridor. The Northern Route Corridor crosses the ESAT 2 telecoms cable in shallow water (1m to 5m water depth). Crossing of the remaining infrastructure listed above would be in the intertidal area and close to the shoreline at Poolbeg.

3.11 The location of the three pipelines, being close to the shore and in the intertidal area would be identified by walk-over surveys utilising terrestrial geophysical survey techniques. The location of the ESAT 2 cable would be confirmed by the marine based Geophysical Survey.

3.12 Geotechnical and environmental sampling locations will be positioned a minimum of 100m from the as-found position of these existing cables and buried pipelines or 250m from the as-laid position if the position is not confirmed during the non-intrusive surveys. Third party asset owners will be consulted prior to survey works commencing.

3.13 In the case of the Southern Cable Route Corridor there are three outfalls in the general area of Shanganagh and to the north of Bray. The marine based survey may cover the full extent of the two outfalls at Shanganagh (Primary Long Sea Outfall and Secondary Stormwater Overflow) and the offshore section of the Long Sea Outfall at Bray (Figure 4). The objective is to locate and confirm the position of the outfalls to assist in the design of cable route options and interaction with the existing infrastructure.

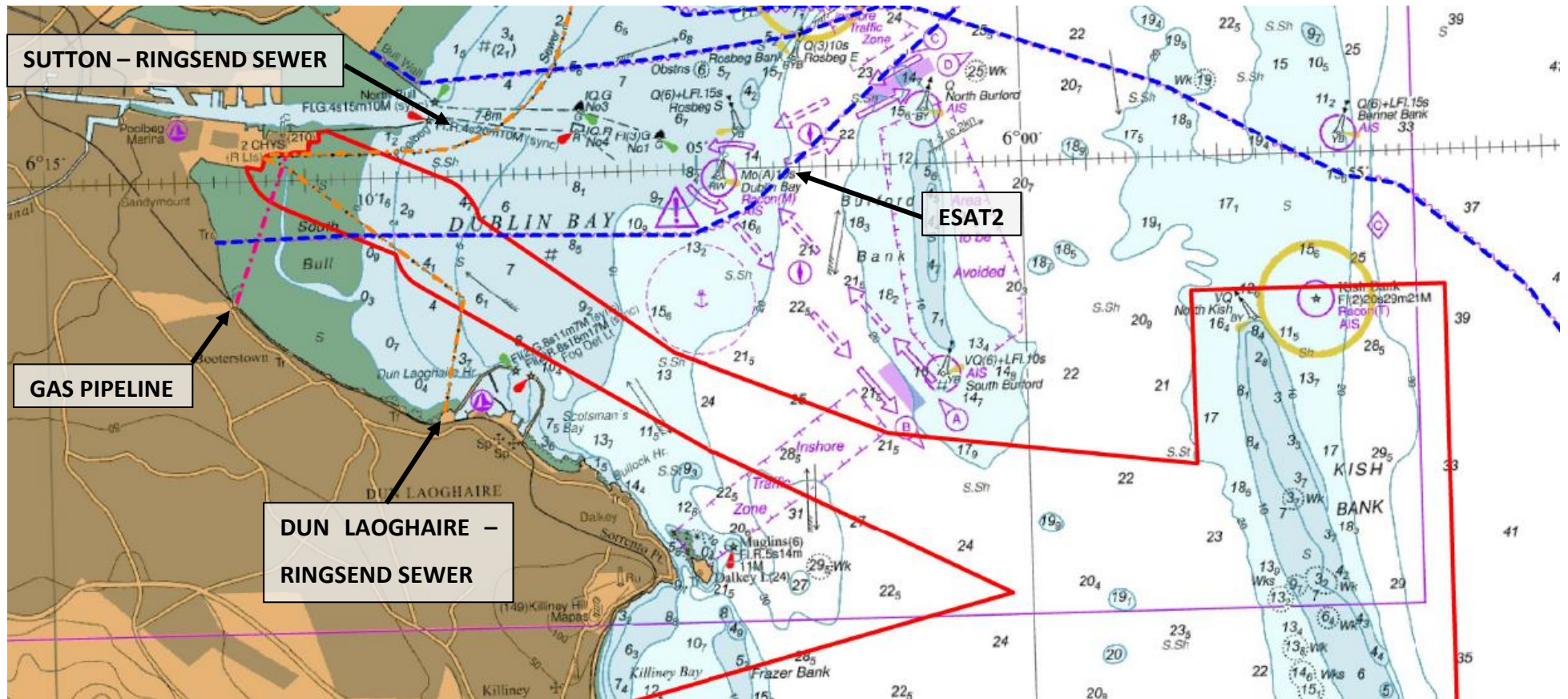


Figure 3. Existing subsea infrastructure Northern Cable Route.

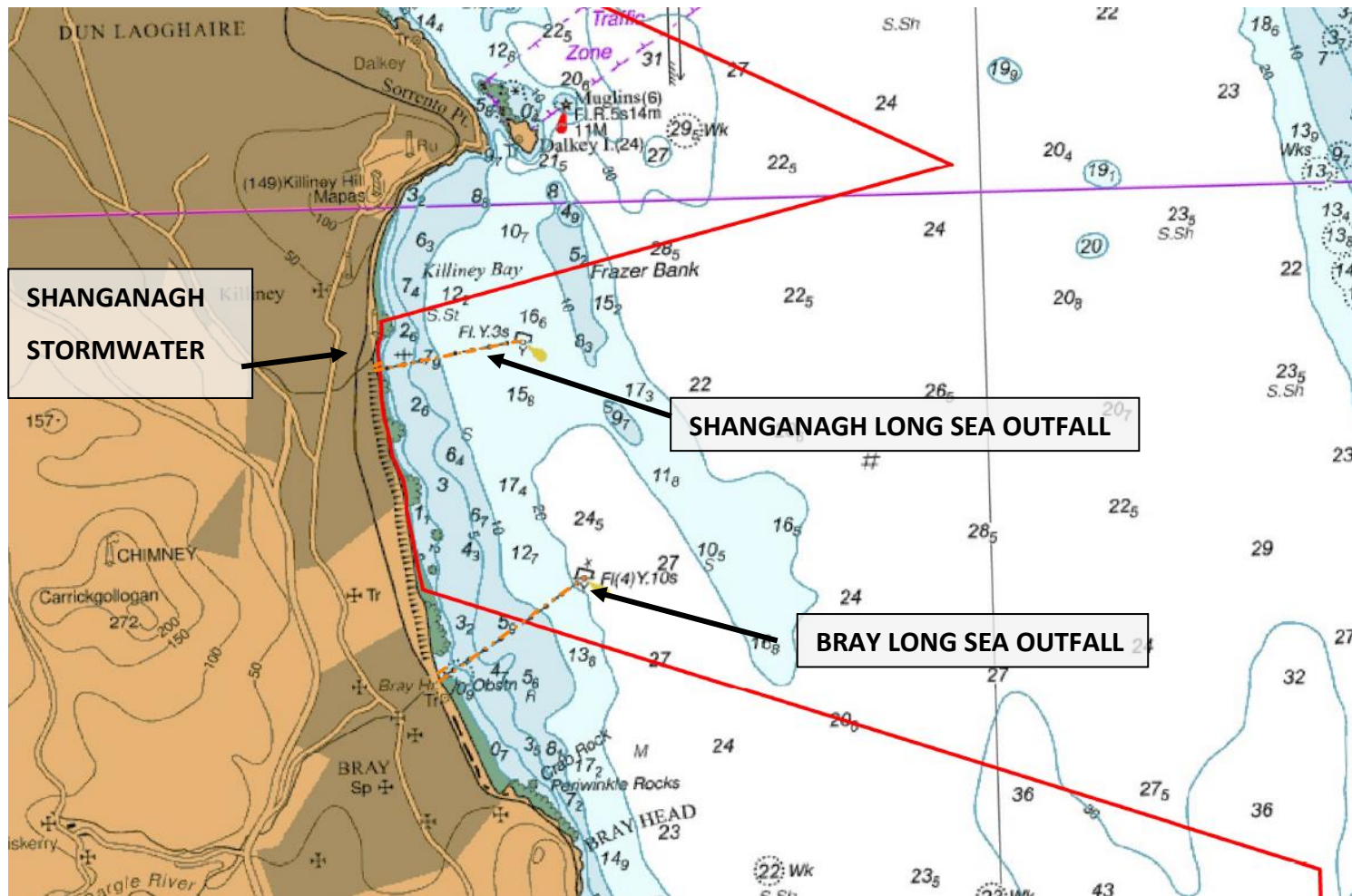


Figure 4. Existing subsea infrastructure Southern Cable Route.

4 OTHER PROPOSED ACTIVITIES / FORESHORE APPLICATIONS

4.1. The Department of Housing, Planning and Local Government website was consulted to identify other Foreshore Lease / Licence Applications adjacent to the survey area and in the general Dublin / Wicklow area (Table 2). Codling Wind Park is located south of the Bray Bank but outside the proposed survey area. The dredging campaigns proposed for Dublin Port (Capital and Maintenance) are outside the survey area. The Corbawn Lane coastal protection works are complete.

Application Reference	Applicant	Description	Location	Application Status	Year
FS006915	Celtix Connect Ltd.	Installation and maintenance of fibre optic cable	Loughshinny, Fingal	Consultation	2019
FS006980	Dublin Port Company	Maintenance Dredging of Dublin Port for 2020 & 2021	Dublin Port, Dublin Bay	Applied	2019
FS006543	Irish Water	Extension of storm water outfall below the MLWS	Scotsman Bay	Consultation	2015
FS005699	Dublin Port Company	Capital Dredging - Alexandra Basin Re-development	Dublin Port, Dublin Bay	Determination	2015
FS006463	Bray Offshore Wind Ltd.	Dublin Array Offshore Wind Farm	Bray Bank	Applied	2009
FS006462	Kish Offshore Wind Ltd.	Dublin Array Offshore Wind Farm	Kish Bank	Applied	2009
FS006241	Codling Wind Park Ltd.	Site Investigation Work - Codling Offshore Wind Park	Codling Bank	Applied	2013
FS006460	Codling Wind Park II Ltd.	1000 MW extension to Codling Offshore Wind Park	Codling Bank	Applied	2009
FS006826	Dun Laoghaire Rathdown County Council	Transport and Placement of Rock Armour Coastal Protection at Corbawn Lane Beach Access	Corbawn Lane, Shankhill	Determination	2018

Table 2. Foreshore Licence / Lease Applications

5 FORESHORE MAPPING

Northern Cable Route Corridor

5.1. The location of the nearshore survey corridor for the Northern Cable Route at the land/sea interface centred on Poolbeg/Shellybanks is shown in Figure 5 and Foreshore Licence Map 4 in Annex B.

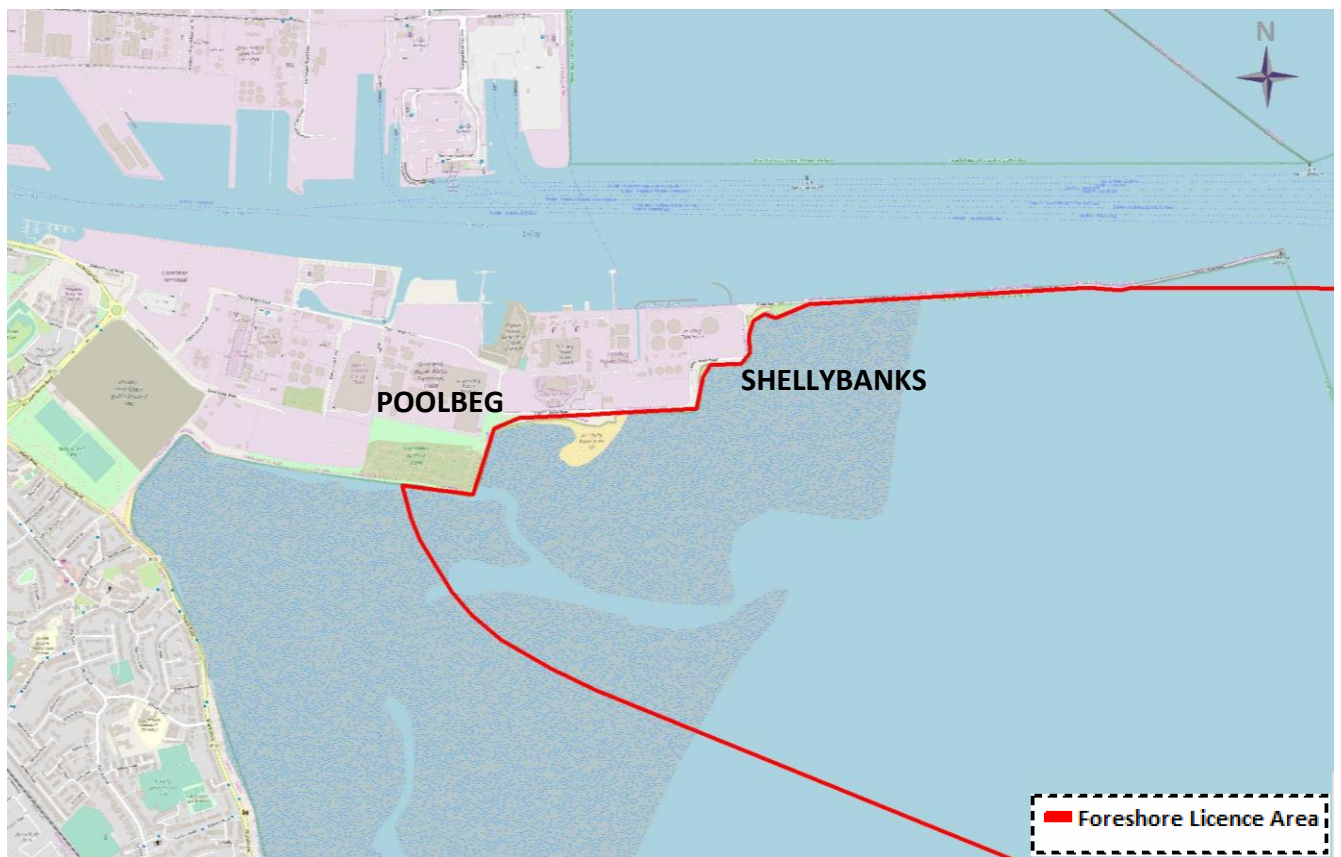


Figure 5. Poolbeg / Shellybanks

Southern Cable Route Corridor

5.2 The location of the nearshore survey corridor for the Southern Cable Route at the land/sea interface centred on Shanganagh is shown in Figure 6. Two landfall options under consideration in this area are Shanganagh Cliffs and Shanganagh Park.



Figure 6. Shanganagh

5.3 The respective Foreshore Licence Maps 5 & 6 for the Shanganagh landfalls are presented on true-to-scale drawings in Annex B.

6 PROPOSED MARINE SURVEY

6.1 The geophysical and geotechnical survey operations may be broken down into separate but overlapping zones, with boundaries generally defined by water depth as specified in the technical requirements outlined below. The surveys will ensure that there are no gaps or un-surveyed areas between the different survey operations. For the marine route survey, the sidescan ranges will be limited to those providing the greatest resolution possible (able to resolve a 0.5m object or better). Bathymetric data collection will, at minimum, comply with the requirements outlined below or with International Hydrographic Office standards (S44).

6.2 The survey zones can generally be described as follows;

Intertidal Zone	<i>High Water Mark to Low Water Mark</i>
Marine Zone Survey	<i>From Low Water Mark extending seaward including the Lease Application Area and 'Buffer Zone'.</i>

6.3 Survey line spacing is to be designed to ensure adequate coverage and overlap of geophysical data capture. A line plan showing the number of survey lines as a function of depth will be provided prior to start of survey operations. Tie-lines will be performed to verify primary survey data.

6.4 For swathe bathymetry, "20% overlap" signifies that adjacent acquisition swathes within the survey corridor overlap by 20%. For side scan sonar (SSS), 100% overlap requires two passes of complete coverage over a given area of sea-floor, with the two passes each ensonifying the sea-floor from opposite directions to ensure targets are adequately imaged.

6.5 Features such as shallow reefs, surge channels, debris fields, archaeological features, ferrous obstructions or anything that could be a hazard to a cable or its installation work will be noted.

6.6 In order to ensure data continuity there will be a 50m overlap of the intertidal and marine survey zones.

Intertidal Zone Survey

6.7 The intertidal zone will comprise a topographic survey which will be undertaken with conventional terrestrial survey techniques and bar probes; a range of terrestrial geophysical techniques such as Ground Penetrating Radar, shallow seismic, electrical resistivity and magnetometer array may be used to determine the minimum depth of sand along the survey corridor and to locate existing infrastructure such as cables and pipelines. Walk-over surveys will also be undertaken to check for marine archaeology features and to determine features of ecological interest. A series of 18 – 24 shallow hand cores, typically 90mm in diameter and up to 500mm in depth will be taken to be analysed for infauna, sediment granulometry and organic carbon content. Activities in the intertidal zone will be co-ordinated to take advantage of the tidal cycle and the safety of survey personnel and equipment will be paramount.

6.8 In the event that the Intertidal Survey does not achieve the requisite overlap with the Marine Survey, an ROV or Diver Swim Survey may be undertaken along export cable route corridors once these are confirmed. In that case, the ROV or Diver Swim Survey will extend seaward from the boundary of the Intertidal Survey to 50 metres beyond the boundary of the Marine Survey. ROV survey is the preferred method and will record water depth, video and geomorphology.

6.9 If a dive survey is required a diver swim rope with 25m gradations will be positioned along the route. Dive lines will be configured to provide representative coverage across each cable route corridor (nominally spaced at 125m).

6.10 Bathymetry will be measured by diver depth gauge at each 25m gradation. Geomorphology will be determined by underwater video along the length of the diver swim rope. The diver video will be undertaken along each line in the survey swathe; divers will use a dive slate or other clearly written method to indicate Kilometre Point (KP) and water depth at the specified gradations along the rope.

6.11 Tie-lines will be nominally spaced at 125m parallel to shore and will verify primary survey data within the Diver Swim area. Bathymetry and seabed composition are to be noted along tie-lines.

6.12 The ROV survey or Diver Swim Survey will be licenced and shall comply with the requirements of the Underwater Archaeology Unit of the Department of Culture, Heritage & the Gaeltacht in accordance with the requirements of Section 3(5) of the National Monuments Act 1987.

6.13 Site investigations in the intertidal zone will also include a borehole at each landfall location, close to the High Water Mark, with a diameter of approximately 10 cm and to a depth of approximately 20 m. In the inter tidal area at both the Shanganagh landfalls and at Poolbeg / Shellybanks, 5 CPTs (approximately 4cm in diameter) are proposed to a depth of approximately 15m, dependent upon rock depth. The indicative locations are within a 10m corridor along the centre line of the cable route, avoiding existing infrastructure. (See Foreshore Maps 4 through 6 in Annex B)

6.14 Access to the foreshore and in particular to the intertidal zone will be required for a tracked borehole / CPT rig and ancillary equipment to carry out the boreholes and CPTs. Existing public access routes at Poolbeg and Shanganagh Cliffs will be utilised to access the coring locations with due consideration for any environmental or other relevant constraints. These will be agreed with the relevant local authority once the survey contractor has been appointed and the equipment specification has been finalised. A landing craft may be required for the CPT / borehole rig to access the foreshore adjacent to Shanganagh Park.

6.15 The ground will be reinstated to previous condition as the investigations at each location are completed. Pre and post investigation site photographs will be taken.

Marine Zone Survey

6.16 The area extending seaward from the Low Water Line will be surveyed using Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer and shallow reflection seismic (sub-bottom profiler) equipment. Sub-bottom profile equipment will be used on a non-interfering basis with other sounding systems. Different sub-bottom profiling

equipment is likely to be required in different areas of the survey area. The sub-bottom profiler equipment used will be able to discern the nature and density of the seabed and will provide both shallow and deep geological cross sections of the Array Lease Application Areas and shallow geological cross sections along the Cable Route Corridors.

6.17 Survey line separation will be sufficient to provide full multibeam data coverage. Spacing will be approximately three times water depth, for example in 20m of water the line spacing would be 60m; the anticipated minimum line separation is 30m; typically line spacing is in region of 75 – 100m. Final line planning will be dependent upon equipment selection.

6.18 Seabed sampling will also be undertaken including grab samples and vibrocores. Vibrocores (typically 80 mm diameter to a depth of approximately 6m) will be collected at 48 locations within the cable route corridors and across the lease application area (See Foreshore Licence Map 3 in Annex B for indicative locations). On recovery, vibrocore samples will be cut into 1 m lengths, labelled, capped and stored vertically prior to processing. The vibrocorer will likely be deployed from the geophysical survey vessel or a suitable alternative vessel.

6.19 A benthic survey is also proposed which will include grab sampling across the Seabed Sampling Area using a Van Veen or Day Grab type sampler. See Foreshore Licence Map 2 in Annex B for indicative sampling locations.

7 SURVEY OPERATIONS AND EQUIPMENT PARAMETERS

Survey Vessels

7.1 A buoy laying tender or multi-CAT will be used for the deployment of metocean equipment. A minimum usable deck space of 50 feet with a low freeboard and a deck-mounted towing winch or elevator crane with lifting capacity of up to 20 tonnes will be required.

7.2 The marine survey works will consist of a dedicated marine spread which will be suitable for the scope of work required, the water depth and the anticipated seabed conditions of the survey area. The exact equipment to be used will be confirmed following a tender process to procure the marine survey contractor.

7.3 All vessels will be fit for purpose and will possess all relevant classification certificates and will conform to the following minimum requirements as appropriate:

- Compliance with Safety of Life at Sea (SOLAS), International Maritime Organization (IMO) and national requirements for operating within Irish territorial waters.
- Station-keeping and sea keeping capabilities required to carry out the proposed survey operations safely;
- Sufficient qualified staff to allow the survey operations to be carried out efficiently, (typically 24 hour continuous for offshore survey, 12 hour for nearshore survey); and
- Appropriate accommodation and crew welfare facilities.

7.4 The multi purpose anchor handling tug boat, the André-B is indicative of the type of vessel required for the deployment of buoy-mounted metocean equipment.

7.5 The Fugro Pioneer may be taken as an indicative example of a marine survey vessel and the datasheet for this vessel is included in Annex C. A smaller vessel may also be used where the water depth is too shallow for the larger offshore vessel. Drop down video and grab samples may require a smaller environmental survey vessel (minimum 15m) with good station keeping capability.

Buoy mounted metocean equipment

7.6 Up to two FLiDAR units will be deployed on site. The exact details of the FLiDAR buoy and mooring arrangement will be confirmed following a competitive tender process. The ZXlidar 300m, Fraunhofer IWES, Fugro SEAWATCH and FLiDAR WindSentinel are illustrative of the type of equipment (data sheets are provided in Annex C).

7.7 The FLiDAR units may include additional meteorological and oceanographic sensors along with control and data systems, water intrusion sensors and camera.

7.8 The physical attributes of the FLiDAR will depend upon the option that is selected. The diameter will be in the region of 1 – 3 m and will weigh approximately 1,700kg. The keel will be between 2 – 3 m.

7.9 FLiDAR units may carry up to 4 No. 100 Ah lead acid batteries, or a lesser number if gel batteries are utilised. Larger units may have capacity for up to 1,000 litres of diesel or 60 litres of methanol to provide back-up to solar power.

7.10 The exact details of two Waverider buoys will also be determined after contract award. The Datawell Directional Waverider 4 is a typical example capable of measuring wave height, direction, surface current and water temperature.

7.11 The Waverider buoys are smaller than the FLiDAR units, typically with diameter less than 1m and weighing approximately 200 kg. Equipment is solar powered with back up provided by lead acid batteries. No other fuel is required.

7.12 The metocean units will be mounted on buoy which will be moored to the seabed with a u-mooring or single point mooring. The exact specification of the mooring arrangement is equipment specific and will be determined once a contractor has been appointed and has reviewed the seabed characteristics, water depth, wave, tide and current profile.

7.13 A typical mooring will comprise between 1 and 4 mooring lines which will be approximately three times the water depth. Lines are connected to a clump weight designed specifically for the conditions of the site. The clump weight is anticipated to have a dry weight of approximately 3 tonnes, and a footprint of approximately 2m diameter.

Marine Survey Equipment

7.14 It is envisaged that the geophysical data acquisition will involve the following techniques:

- Multibeam Echosounder (MBES) system for detailed bathymetric mapping;
- Side Scan Sonar for detailed seabed morphology and seafloor mapping;
- Marine Magnetometer for detecting geomorphological anomalies and ferrous Obstructions;
- Shallow Reflection Seismic Sub-bottom Profiling (SBP), to identify and characterise the subsurface stratigraphy.

Multibeam Echosounder (MBES)

7.15 A Multibeam Echosounder (MBES) uses acoustic technology to provide detailed bathymetric mapping of the seabed. The MBES is typically hull or pole mounted on the survey vessel and is used in conjunction with a Global Navigation Satellite System (GNSS) aided inertial positioning and orientation system, specifically designed for geo-referencing and motion compensation in hydrographic surveying. The Reson T50R may be taken as an indicative example and a datasheet for this MBES is included in Annex C.

Side Scan Sonar

7.16 Side Scan Sonar (SSS) uses acoustic technology to image the surface of the seabed for the detection of objects or structures. The SSS is typically towed astern of the survey vessel and used in conjunction with high accuracy GNSS positioning. To obtain those images it digitises a sound pulse sent out from two transducers mounted on each side of the SSS towfish. Images are based on the amount of reflected sound energy and presented on a time basis resulting in a continuous, highly detailed image of the bottom. Seabed sediment classification can also be interpreted from the side scan data according to the intensity of the acoustic return. The Klein 3000 may be taken as an indicative example and datasheet for this SSS is included in Annex C.

Marine Magnetometer

7.17 Marine magnetometers detect ferrous objects and are used to locate and identify ferrous objects on or buried in the seabed. The device precisely measures the Earth's magnetic field and detects any anomalies, which represent ferrous objects such as lost anchors, abandoned fishing gear, shipwrecks and buried pipelines or cables. The magnetometer is typically towed behind a survey vessel. The G-882 Marine Magnetometer may be taken as an indicative example and a datasheet for this device is included in Annex C.

Sub Bottom Profiler (SBP)

7.18 Sub Bottom Profiling (SBP) will be required throughout the cable route corridor and lease application areas with different sub-bottom profiling equipment likely to be required in each area. Sub Bottom Profiling 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.

7.19 Across the cable corridors shallow investigation will be sufficient, which is usually achieved with a hull mounted pinger operating in single channel mode. In the lease application areas acquisition of information to greater depths is needed for foundation design and site layout options. Ultra high resolution multi-channel seismic technology such as a sparker or boomer system would likely be used. Penetration depths of 100m can be achieved by a sparker in single-channel mode; the maximum anticipated penetration depth of piled foundation options at the site are approximately 60m and therefore single channel operation is likely sufficient. Alternatively a boomer operating in multi-channel mode would provide a penetration to 60 m and may be considered.

7.20 The Knudsen Pinger Sub Bottom Profiler may be taken as an indicative example of a pinger system and the Applied Acoustics S-Boom Sub Bottom Profiler may be taken as an

indicative example of a Boomer system and the datasheets for these are also included in Annex C.

Cone Penetrometer/ Borehole Rig (CPT)

7.21 Intrusive tests such as the CPTs and boreholes will be conducted using equipment incorporated into tracked vehicles. The Lankelma UK8 Tracked Rig may be taken as an indicative example of a suitable tracked rig and the datasheet is included in Annex C.

Grab Samples

7.22 Samples will be taken using a Hamon or Van Veen grab (0.1 – 0.2 m²) with a stainless steel bucket. Sample depth may be up to 20 cm depending on seabed type. The grab will be deployed and retrieved by winch. In deep or fast-moving water additional weights may be required to ensure the grab operates successfully. The specification for a Van Veen grab is included in Annex C.

Vibrocores

7.23 Vibrocoreing is a method of rapidly retrieving continuous, undisturbed core samples from unconsolidated and semi-consolidated sediments. These vibrocore rigs work by attaching the vibrocore head to the core barrel and inducing high frequency vibrations in the core liner. The sediment in immediate contact of the core barrel forms a 'liquefied' boundary layer by the vibration mechanics enabling the core barrel to penetrate the sediment strata. A core catcher is attached to the end of the barrel which holds the sediment inside the barrel when withdrawn from the sediments.

7.24 The Vibrocore barrel would typically have a diameter of up to 150 mm with an inner sample diameter of up to 100 mm and can typically penetrate up to 6 metres into the seabed, depending on the rig configuration used and the seabed sediment lithologies. Each core would have a sediment sample volume of approximately 0.05 m³.

7.25 The Ocean Scientific International Ltd (OSIL) High Power Vibrocorer may be taken as an indicative example of a suitable Vibrocore Rig and the datasheet is included in Annex C.

7.1. Typical acoustic properties of geophysical survey equipment are outlined in Table 3 below.

Survey technique	Range of Operating frequency (kHz)	Estimated sound level at 1m over frequency band 10 Hz to 10kHz Sound Pressure Level (dB re1 μ Pa _{Peak})
Side-scan sonar (SSS)	300-500 (low) 500-900 (high)	228
Multi Beam Echo Sounder (MBES)	190 -420	200 - 235
Magnetometer	passive	passive
Single Beam Echo Sounder	200	200
Sub Bottom Profiler (pinger)	2-200	200 - 225
Sub Bottom Profiler (boomer)	5	200 - 225
UHR seismic (sparker source)	4	200 - 225
Air Gun	0.03 – 0.6(air pressure: 120 - 150 bar)	< 220

Table 3. Acoustic Properties.

8 METOCEAN EQUIPMENT DEPLOYMENT, MAINTENANCE AND RECOVERY PROCEDURES

8.1 The metocean measuring units will be pre-assembled at the quayside and subsequently may be craned to the water and towed to the deployment site or craned to the vessel and transferred to site onboard the vessel. In either case, the mooring and sinkers are craned to the vessel and are transported to the deployment site on the deck of the deployment vessel.

8.2 On arrival at the deployment site the vessel will use dynamic positioning to maintain location. The mooring system is first deployed with mooring chain and clump weight being lowered from the vessel by winch or crane. A temporary buoy may be attached to the mooring on deployment before subsequently being replaced by the metocean equipment.

8.3 Marking, lighting and other navigational safety requirements will be agreed with the Department of Transport, Tourism and Support, Marine Survey Office prior to deployment and will be compliant with International Association of Aids to Navigation (IALA) requirements.

8.4 Navigation safety features typically include:

- Unit colour – RAL 1023 Yellow
- Radar reflector
- Marine lantern
- Redundant GPS Location
- Drift alarm
- Automatic Identification System (AIS)

8.5 Dependent upon the choice of equipment, maintenance visits at 6 or 12 monthly intervals may be required for data recovery, cleaning of sensors and replacement of consumables.

8.6 A vessel winch or crane will be used to recover the unit and all or some of the mooring, dependent upon the final design of the equipment deployed. Once transferred to shore and lifted to the quayside data will be retrieved, sensors will be serviced and consumables replaced. The units will also be cleaned to remove any biofouling and the mooring system will be inspected and maintained.

8.7 The units and moorings will then be returned to site following the deployment process described above.

8.8 For each deployment and recovery operation the vessel is expected to be on station for between 4 and 8 hours

8.9 At the end of the required deployment the units and all mooring components will be recovered and returned to shore for re-use.

9 MARINE SURVEY PROCEDURES

9.1 The marine survey will be carried out in compliance with the Department of Arts, Heritage and the Gaeltacht (2014) "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters". The marine survey will also comply with the general requirements of the Underwater Archaeology Unit for a geophysical survey for archaeological purposes, and with any Survey Control Measures prescribed in the Natura Impact Statement (attached as Annex E).

9.2 The duration of noise-generating surveys will be reduced to the minimum necessary to collect results of sufficient quality.

9.3 Details of the survey vessel(s) and of the survey equipment to be used will be made available prior to commencement of the survey. The data to be provided will include;

- Name of vessel
- Name of master
- Contact details for the vessel
- Details of geophysical equipment spread

10 HEALTH, SAFETY, ENVIRONMENT AND QUALITY (HSEQ)

10.1 A project specific HSEQ plan shall be prepared prior to starting the survey works and will be integrated with Innogy's Health and Safety Protocols. innogy will appoint a competent PSDP and PSCS for the project under the requirements of the Safety, Health and Welfare at Work

(Construction) Regulations 2013 (updated). The role of PSDP is to oversee the coordination of the design work & design changes during the project, identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project and work to eliminate the hazards or reduce the risks where possible. The PSDP must then communicate necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the project safety and health plan. The role of PSCS is to manage and co-ordinate health and safety matters during the survey operations phase and prepare the project health and safety plan.

11 WASTE MANAGEMENT & POLLUTION CONTROL

11.1 The survey vessels will operate under international standards according to the MARPOL (maritime pollution) Convention with respect to wastewater and food waste discharges. All refuse and waste materials will be kept onboard the vessel and safely disposed of onshore in a suitable licensed waste facility.

11.2 Particular care will be taken when handling or storing hazardous materials, radiation sources or chemicals. These will be stored, handled, used and documented in accordance with accepted guidelines, assessments and recommendations of the Control of Substances Hazardous to Health (COSHH) Regulations 1994. Spill kits shall be available on board all vessels.

11.3 All machinery or vehicles on the intertidal foreshore area will be fuelled on the hard standing surface of a car park or road and at least 10m from a drain or gully. Spill kits will be available on site where machinery is operating and any fluid leaks or spills will be cleaned up immediately. Staff welfare facilities such as a mobile welfare unit may also need to be provided on site. All waste from the borehole drilling operations will be removed from site by a permitted waste contractor and disposed of in a suitable licenced/permited waste facility.

12 NAVIGATIONAL SAFETY CONSIDERATIONS

12.1 There are a number of ports on the east coast of Ireland but, insofar as the overall survey area comprises the Kish Bank / Bray Bank and an area of Dublin Bay inshore of these banks, the key centre is Dublin Port.

Dublin Port Shipping Movements

12.2 Dublin Port caters for freight, passenger and cruise liners. In 2017 Dublin Port processed 36,400,000 tonnes of freight together with 1.846 million passengers and 127 cruise ships. The total number of ship arrivals was 7,802

12.3 Scheduled shipping and ferry routes in and out of Dublin Port are largely to the east coast of the UK and south through the Irish Sea to continental Europe with the main routes being;

ICG: Dublin – Holyhead, Dublin – Cherbourg

Seatruck: Dublin – Liverpool, Dublin – Heysham

P+O: Dublin – Liverpool

Cobel Fret: Dublin – Rotterdam, Dublin – Zeebrugge

Stena: Dublin – Holyhead

Isle of Man Steampacket: Dublin – Douglas

12.4 The main scheduled shipping routes are illustrated in Figure 7. Most shipping and ferry routes from Dublin Port pass to the north of the Kish Bank and are clear of the survey areas.

12.5 There are also Lo-Lo container services out of Dublin Port and these include;

- Samskip - Rotterdam, Zeebrugge
- BG – Antwerp, Belfast, Liverpool, Rotterdam
- Euron – Rouen, Southampton, Antwerp, Rotterdam
- CMA – Le Havre

Ship Separation Zone

12.6 There is a designated ship separation zone along the west side of the Burford Bank and vessels which avail of that route (between the Kish / Bray banks and the coastline) traverse the survey area on a north south axis as shown in Figure 7 below.

12.7 There is also a designated ship anchorage zone north east of Dun Laoghaire and west of the Burford Bank which is noted and will be taken into account during survey operations.

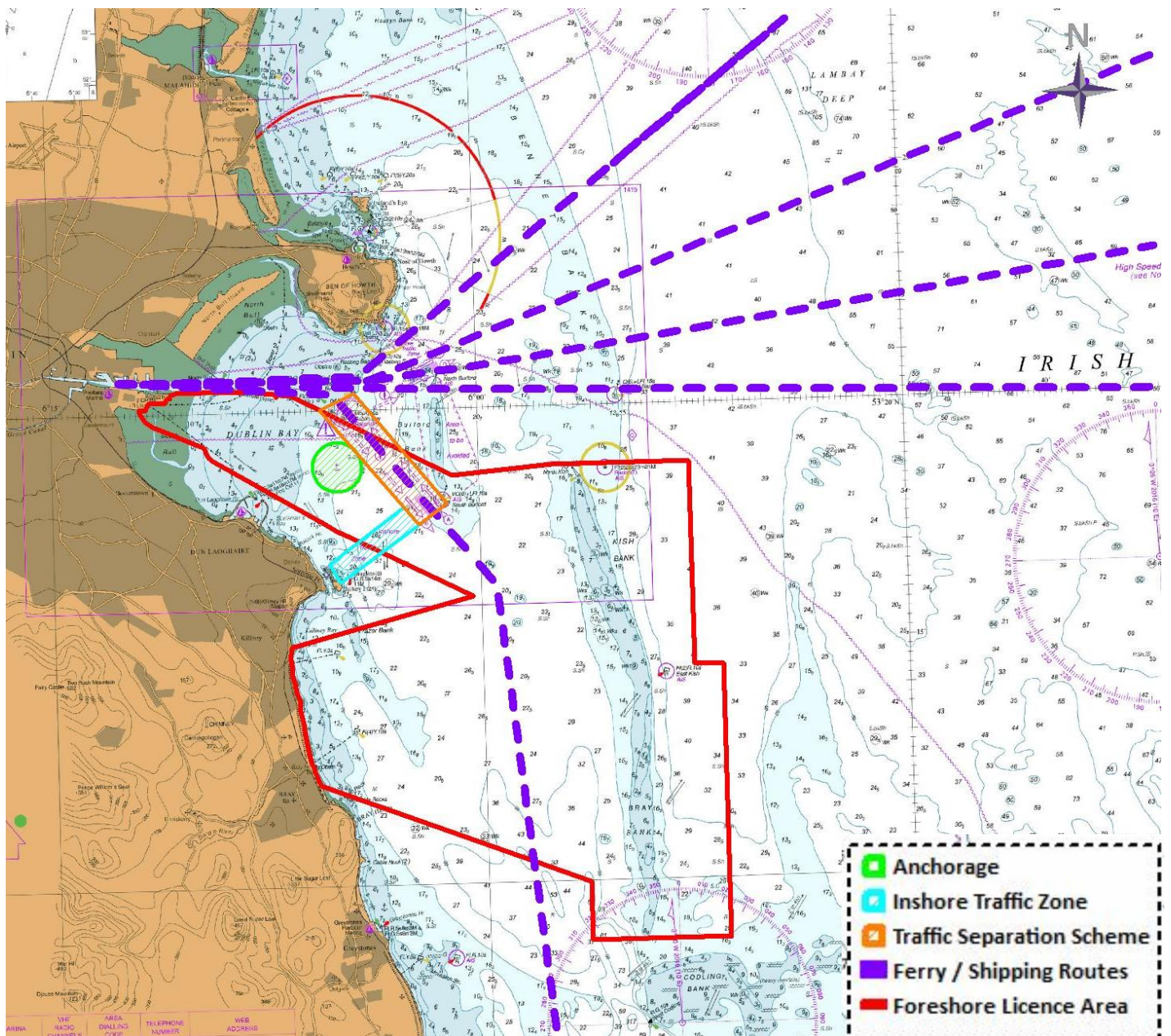


Figure 7. Scheduled Ferry and Shipping Routes at Dublin Port.

12.8 The overall pattern of vessel movements from AIS records is shown in Figure 8 and again it can be seen that most marine traffic is to the north of the Kish Bank. The main shipping feature insofar as the survey area is concerned is the north - south coaster traffic, which comprises mainly local bulk commodities and fuel transport, and container traffic to Continental European ports.

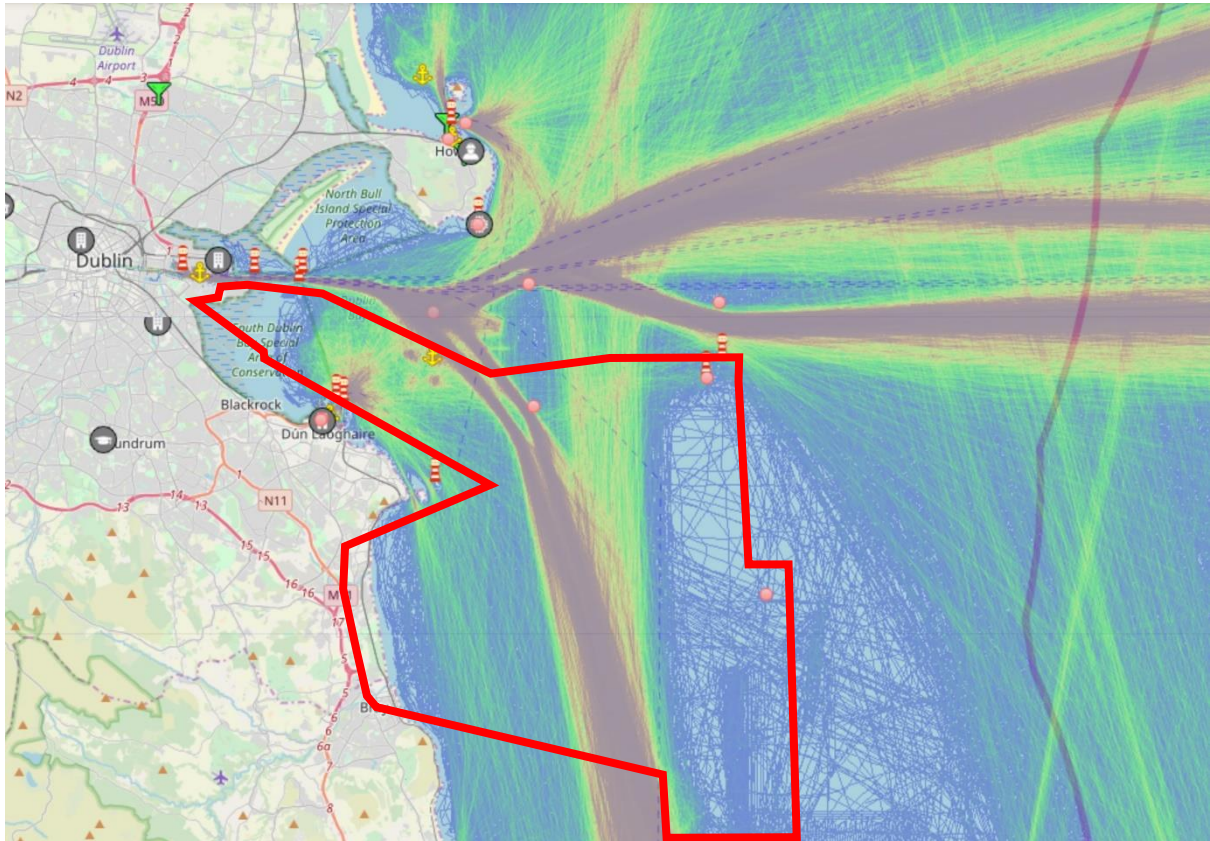


Figure 8. Overall Marine traffic patterns over 12 months in Irish Sea from AIS data (Marine Traffic 2017)

Marinas, Sailing and Recreation

12.9 There are marinas at Dun Laoghaire (820 berths), in the River Liffey at Poolbeg (100 berths), Greystones Harbour (250 berths) and approximately 100 moorings at Bray Harbour.

12.10 There are four waterfront yacht clubs located in Dun Laoghaire (The Royal St. George; the National; the Royal Irish and the Dún Laoghaire Motor Yacht Club) and two umbrella clubs, the Royal Alfred Yacht Club, and the Dublin Bay Sailing Club. The Irish National Sailing School and Irish Youth Sailing School are also based in Dun Laoghaire. Poolbeg Yacht and Boat Club operates from Poolbeg Marina.

12.11 The yacht clubs at Dun Laoghaire and Poolbeg have a comprehensive sailing programme throughout the period from the end of April to early October with evening sailing on weekdays and with large fleets racing at weekends. The sailing clubs at Bray and Greystones also organise a schedule of races across the sailing season.

12.12 Other marine leisure clubs and groups active in the area include rowing clubs (Greystones Rowing Club, St Michaels Rowing Club, Stella Maris Rowing Club, Dalkey Rowing Club, Bray Rowing Club), various sea scouts groups, (18th Wicklow - Greystones Harbour Sea Scouts, 39th Dublin - 8 Port Dun Laoghaire Sea Scouts, 5th Dublin - 1 Port Ringsend Sea Scouts, 41st Dublin - 3 Port Dalkey Sea Scouts, 5th Wicklow - Bray Sea Scouts), sea angling, swimming, kayaking, diving and sub aqua clubs. An outline of the pattern of pleasure craft movements from AIS records is shown in Figure 9.

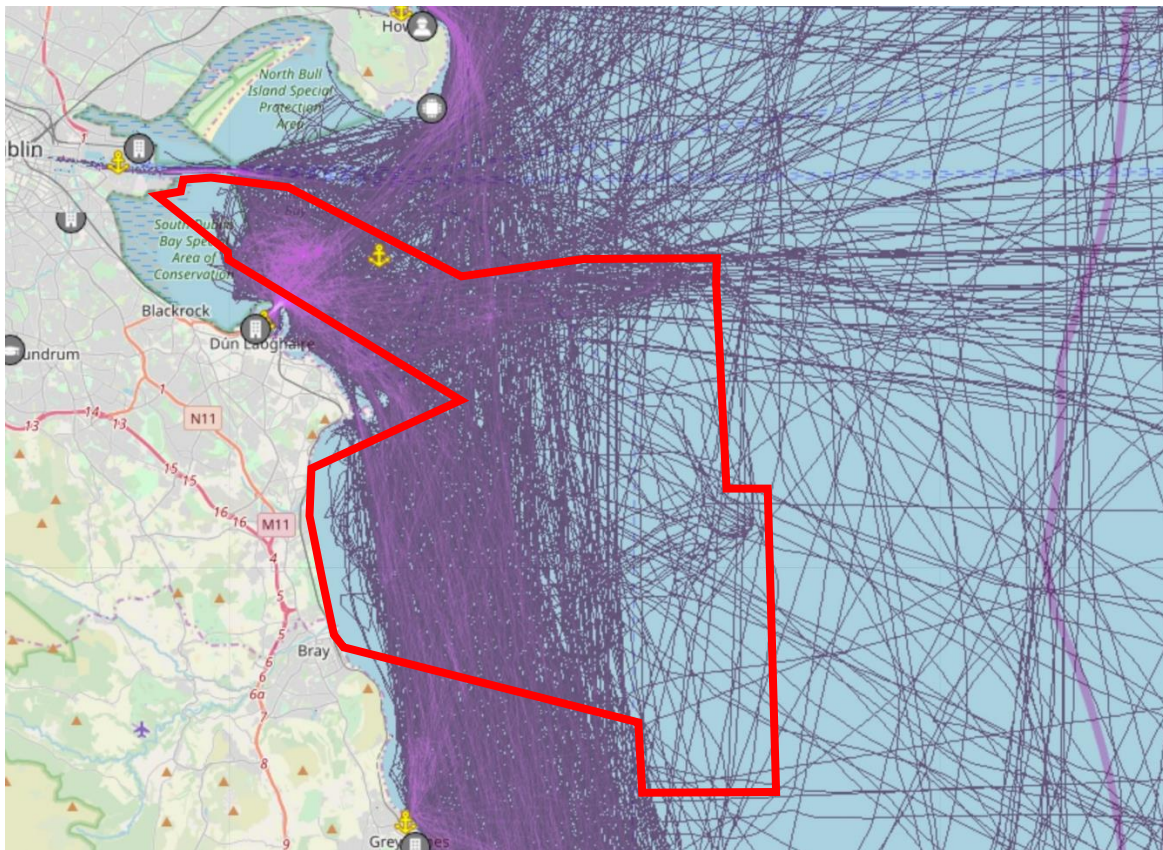


Figure 9. Marine Pleasure craft traffic patterns over 12 months in Irish Sea from AIS data (Marine Traffic 2017)

RNLI

12.13 The nearest RNLI Station is in Dun Laoghaire harbour with both a D Class lifeboat (for inshore operations) and a Trent Class lifeboat (for all weather, offshore operations) based there.

Tourism

12.14 Between March and September, Dublin Bay Cruises currently offer several sightseeing tours of Dublin Bay daily, with the MV St Bridget operating between Dun Laoghaire, Dalkey Island, Howth and Dublin City. Other tourism related activities offered in Dublin Bay include sea kayaking tours, stand up paddle boarding and kitesurfing.

13 FISHING AND AQUACULTURE

13.1 The main trawl fishing activity occurs offshore, east of the Kish and Bray Banks and north of Lambay Island in the deeper waters of the Irish Sea as displayed in Figure 11. Within the proposed Foreshore Licence area, there is inshore potting activity closer to shore and on the Kish and Bray Banks, generally in water depths greater than 8 – 10 m with smaller local potting boats mainly targeting crustaceans such as velvet crab, brown crab, lobster and whelks. The intensity of fishing activity is shown below on Figure 10.

13.2 The Foreshore Licence area includes parts of spawning grounds of several commercially important fish species – namely Whiting, Cod and Haddock (Figure 12).



Figure 10. Irish Sea fishing intensity (AIS 2017)

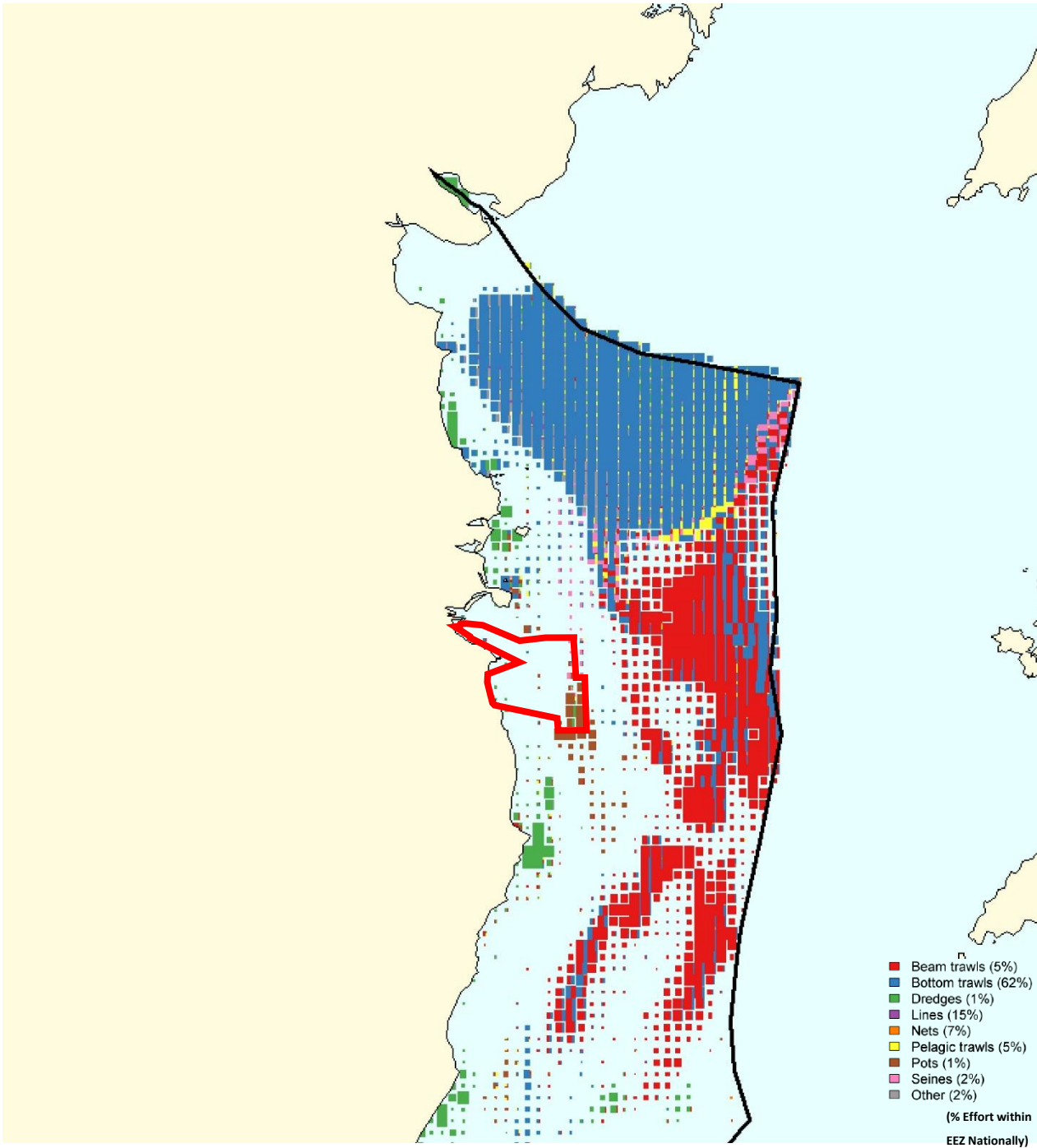


Figure 11. Fishing Effort East Coast Ireland. (Atlas of Commercial Fisheries 2nd Ed., Marine Institute)

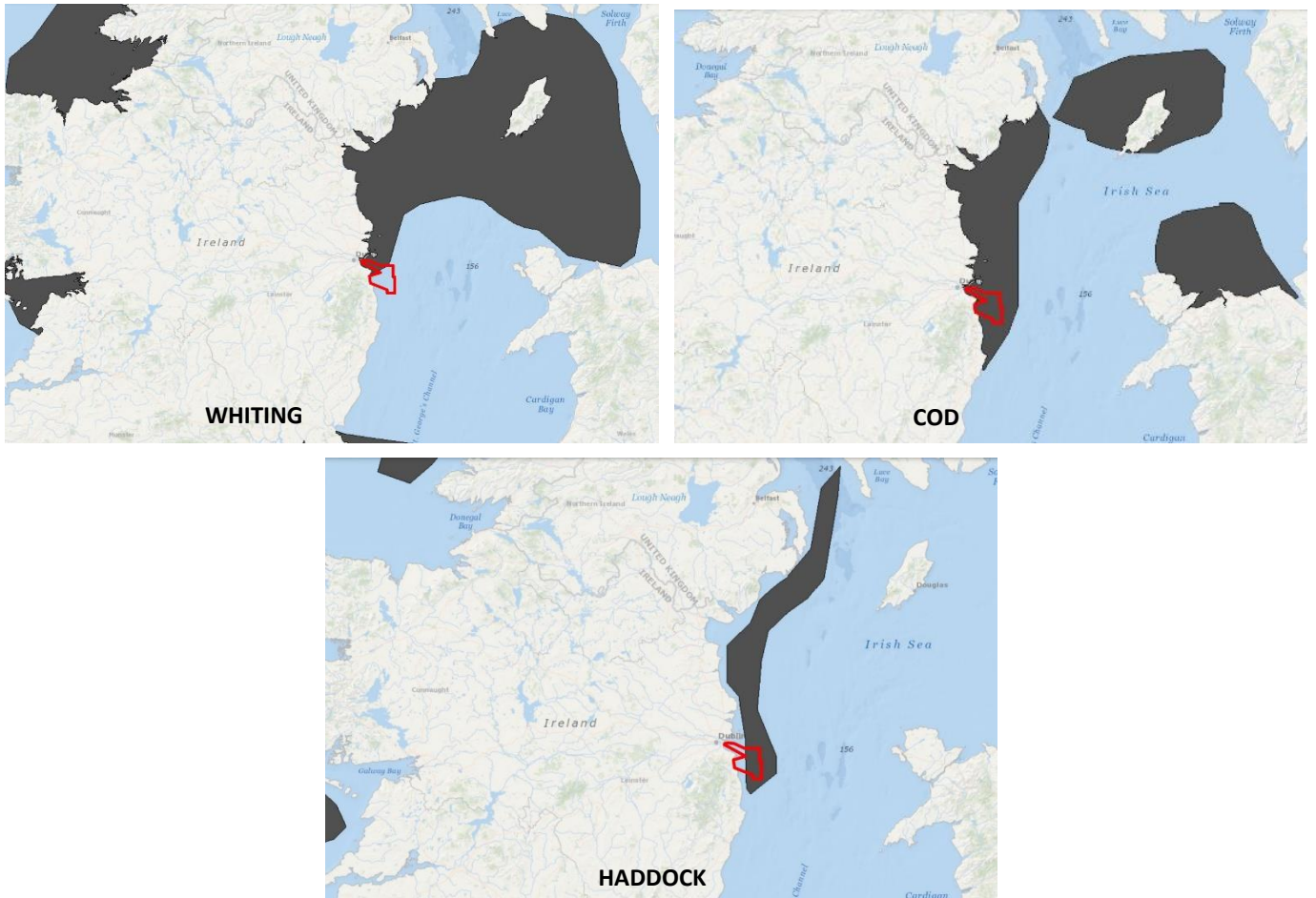


Figure 12. Fish Spawning Grounds (Irish Marine Atlas, Marine Institute 2016)

13.3 Aquaculture on the East Coast of Ireland is limited by the geography of the coastline with little in the way of sheltered locations suitable for establishment of commercial aquaculture sites.

13.4 The nearest designated aquaculture zones are at Carlingford Lough and Wexford Harbour (Figure 13). There is also currently a Foreshore and Aquaculture Licence application (ref:T32/27) lodged for the establishment of a mussel seed farm off Arklow Head, approx. 45km south of the Bray Bank.



Figure 13. Aquaculture zones on East Coast (Irish Marine Atlas, Marine Institute 2016)

14 LIAISON & CONSULTATIONS

Pre-submission Consultations.

Organisations	Date of meeting	Attended by	Matters discussed
Dublin Port Company, MDM and Innogy	10 th Sept 2018	Capt. Michael McKenna, Cathal Cronin, Cormac Kennedy.	Introduction to Dublin Array Offshore Wind Farm Project.
DTTAS Marine Survey Office and Innogy	24 th April 2019	Capt Declan Black	Scope and planned timings of Licence applications. Requirements for discussion regarding marking and lighting requirements for fixed monitoring equipment.
DCHG Underwater Archaeology Unit and Geomara	20 th Feb 2019	Karl Brady	Archaeological assessment for proposed Licence application: Presentation of archaeological information; Impact assessment of grab sampling to be clear and concise with potential impacts mitigated; Grab sampling locations and quantities to be specified within the report.
DCHG Underwater Archaeology Unit and Innogy	09 th May 2019	Karl Brady	Any works with an associated archaeological element (i.e. surveys) require a separate licence issued by the Minister for Culture, Heritage and the Gaeltacht under Section 3 (5) of the Act.

DCHG National Parks & Wildlife Service and Innogy	09 th May 2019	Ferdia Marnell; David Tierney; David Lyons	Discussion of sampling strategy of planned survey in terms of replication of previous sampling locations undertaken in the area and supplementation with additional sites. Licence Applications should be clear regarding mitigations that would be employed.
DPHLG, MDM and Innogy	03 rd July 2019	Jeannine Dunne; Edwin Mooney	Pre-application meeting – review of pre-application submission and discussion of scope of licence applications.
Dublin Port Operations	17 th July 2019	Capt. Michael McKenna	Scope and planned timings of Licence applications.

Table 4. Pre-submission Consultation

Ongoing Project Liaison.

Fisheries Liaison

14.1 A Fisheries Liaison Officer (FLO) has been appointed by the project to facilitate communication between the developers and the fishing community.

14.2 A Fisheries Liaison Working Group (FLWG) will be set up with a membership representative of the wider fishing community. The FLWG will be a key communication route and will be supplemented by on-going communication with individual operators and industry groups.

14.3 The FLO will communicate the details of the planned survey activities, metocean deployment techniques and locations and programme to commercial fisheries stakeholders well in advance of works commencing to enable meaningful engagement and minimise disruption to all parties.

14.4 The FLO and innogy's development team will work with individuals to obtain their co-operation to ensure that survey activities can be completed safely and without damage to fishing gear, survey equipment or vessels.

National Parks & Wildlife Service

14.5 It is proposed to appoint a suitably qualified and experienced Marine Mammal Observer to be on board the survey vessel during the marine survey.

Irish Coast Guard

14.6 It is proposed to liaise with the Irish Coast Guard to arrange appropriate radio / nav-text broadcast warnings to advise shipping approaching the survey area.

Marine Survey Office

14.7 The lighting requirements of the fixed metocean equipment will be discussed and agreed with the Marine Survey Office. Charting requirements will also be agreed and relevant information provided to the necessary body in appropriate timescales for inclusion on navigational charts.

Dublin Port

14.8 A liaison / communication link will be established with the Harbour Master at Dublin Port prior to commencement of survey operations and this will remain in place throughout the survey until it has been completed.

Marinas and Yacht Clubs

14.9 Liaison will be established with the operators of both marinas and with the yacht clubs at Poolbeg and Dun Laoghaire prior to the start of marine survey operations. Liaison will be established directly with The National Yacht Club, the Royal St. George Yacht Club, The Royal Irish Yacht Club, The Dublin Motor Yacht Club and the Poolbeg Yacht Boat Club. Location details of fixed monitoring equipment will also be communicated.

General Public

14.10 Activities on the foreshore by the general public will be minimally affected during survey and sampling operations. For safety and security, a temporary perimeter may be set up around each CPT or borehole location using heras type fencing or similar for the duration of the sampling at that location. The rig will be clearly signposted informing the general public of the work in progress while limiting access to the site. Any restrictions on the beach will be limited in duration and disturbance to recreational users will be temporary.

15 MITIGATION OF NAVIGATION RISK

15.1 Key points relating to mitigation of Navigational Risk associated with the marine survey and deployment of metocean buoys are as follows:

- Arrangements will be made for the publication of a formal Marine Notice through the Department of Transport, Tourism and Sport and the notice will provide vessel and contact details together with a general description of operations and approximate dates of marine survey commencement and completion, deployment timing and location of fixed monitoring equipment.
- During the survey operations and deployment and recovery of fixed monitoring equipment, other vessels will be requested to maintain a safe distance from survey vessels due to the restricted manoeuvrability and the layback of survey equipment towed behind the survey vessels.
- Survey Vessel speed will be of the order of 4 knots.
- Lights, shapes and other internationally recognised identification or warning signals will be displayed on survey vessels.
- The vessels will comply fully with all requirements of the International Regulations for Preventing Collisions at Sea.
- The Dublin Port Harbour Master will be informed of the Plan of Work and of the planned start and estimated completion dates for the operation. Regular updates shall be provided.
- Statutory approval for deployment of metocean equipment will be obtained from Commissioners of Irish Lights and charting and lighting requirements agreed with DTTAS Marine Survey Office.

16 MARINE ARCHAEOLOGY

16.1 A Marine Archaeological Assessment of the proposed survey was carried out by Geomara to analyse the potential impacts on cultural heritage within and adjacent to the proposed foreshore licence survey area. The full Marine Archaeological Assessment report is included in Annex D.

16.2 In summary, the assessment concluded that *“There are 110 known wreck sites within the proposed survey areas or within close proximity to the survey area. Furthermore, the report confirmed the presence of a submerged forest at Bray Harbour which extends northward along the coastline up to Shanganagh Cemetery. None of the wreck sites or the submerged forest will be impacted upon during the proposed bathymetric and geophysical survey.”*

“The sea-bed sampling will consist of a series of grab samples, vibrocores, intertidal Cone Penetrometer Tests (CPTs) and boreholes. The sampling process is a localised activity and will not result in any significant disturbance of the sea-bed or archaeological materials or deposits. The sampling will be taken at various points and locations within the foreshore survey licence area. The assessment outlines impact mitigation measures for the associated seabed sampling.”

“The deployment of metocean monitoring equipment is a localised activity and will not result in any significant disturbance of the sea-bed or archaeological materials or deposits. The buoys will be moored at various locations within the lease application area. The assessment outlines impact mitigation measures for the deployment of the monitoring buoys.”

16.3 The Marine Archaeological Assessment has made a series of recommendations (subject to the approval of the Department of Culture, Heritage and the Gaeltacht) which will be implemented in full on behalf of innogy; which include;

1. *The Surveys shall be licensed under the National Monuments Act 1930 – 2004.*
2. *Prior to any sampling taking place the results of the geophysical and bathymetric surveys shall be reviewed by a suitably qualified archaeologist in order to examine the sampling location for any previously unrecorded cultural heritage seabed features.*

3. *The sample locations will also be cross referenced with all of the cultural heritage sites identified in the Marine Archaeological Assessment Report in order to avoid all such locations. A 100m exclusion zone shall be applied.*
4. *Archaeological analysis of the whole geophysical and bathymetric survey datasets will be undertaken to both confirm the locations of the wreck sites within the survey corridor and also to identify any potential unrecorded seabed and sub seabed maritime archaeological features.*
5. *Prior to deployment of the metocean monitoring equipment, the results of the geophysical and bathymetric survey at those locations shall be reviewed by a suitably qualified archaeologist in order to examine the deployment location for any previously unrecorded cultural heritage seabed features. A 100m exclusion zone shall apply.*
6. *Should the proposed survey and subsequent sampling campaign be subject to further revision, details of these revisions shall be forwarded to the project archaeologist for assessment.*
7. *On completion of the survey and sampling a report will be produced summarising all archaeological aspects of the project and submitted to DCHG and the National Museum of Ireland.*
8. *It is recommended that all sites of cultural heritage interest included in that report should be avoided by any future seabed interventions.*
9. *The video from the ROV survey or diver swim survey, if undertaken, will be assessed by a suitably qualified archaeologist.*

17 NATURA 2000 SITES / APPROPRIATE ASSESSMENT

17.1 An Appropriate Assessment Screening and Natura Impact Statement (NIS) has been prepared by Altamar Ltd. to determine the impact, if any, of the proposed project individually or in combination with other plans or projects, on NATURA 2000 sites and their conservation objectives.

17.2 The NIS involved the examination, analysis and evaluation of all relevant information including, a description of the proposed project, its survey methodology, the environment in which the project will be placed, Natura 2000 sites within 15km, sites within 250km designated for cetaceans and has applied the precautionary principle in the preparation of the conclusion. The full AA Screening and Natura Impact Statement is included in Annex E.

17.3 In summary, the assessment concluded that *“...there will be no adverse effects on the integrity of any Natura 2000 sites following the implementation of the mitigation measures outlined. The implementation of standard mitigation measures including the measures outlined, including onsite monitoring, the presence of an MMO, will be sufficient to prevent adverse effects on the integrity of Natura 2000 sites”*

“The assessment of environmental factors within the survey area was critical to the timing of the project and mitigation of impacts on species of conservation importance. The primary conservation interest of the conservation sites in Dublin Bay is over-wintering birds. The surveys within South Dublin Bay and River Tolka SPA should be carried out outside overwintering season (September to March inclusive) after all over-wintering birds have left and prior to the arrival of species for the overwintering season.”

“The proposed survey sites are within a popular coastal areas which will have increased activity during summer months. As a result the presence of additional personnel on the shore during summer would not be thought to cause a significant additional disturbance. However, the presence of machinery and drilling generated noise could cause a localised disturbance to bird populations.”

17.4 The NIS has made a series of commitments (subject to the approval of the Department of Culture, Heritage and the Gaeltacht) which will be implemented in full on behalf of innogy;

“In order to minimise disturbance of the intertidal habitat and species the following mitigation measures would be carried out:

- 1. An ecologist would be onsite to minimise disturbance and ensure site integrity is maintained. If roosting birds are present on the shore, the survey should be postponed until the birds depart, without provocation.*
- 2. Drift lines in close proximity to the proposed route would contain the highest proportion of potential food source for bird species. If present, these should be avoided by machinery and personnel.*
- 3. Noise generated from machinery could cause a disturbance. An ecologist should be present during drilling within Natura 2000 sites to monitor works.*
- 4. Any temporary access arrangements or structures that are put in place to allow machinery access to the beach area should be prepared in consultation with an ecologist and the site should be fully reinstated post works.”*

“Reinstatement of the intertidal habitat should be carried out to pre-survey conditions. Any concerns in relation to works or resulting reinstatement of the habitat to pre-construction conditions will be raised with NPWS by the project ecologist prior to the departure of survey personnel from the site..”

“...the following mitigation measures would be enforced during the subtidal surveys:

- 1. A MMO will be onboard the vessel at all times during geophysical surveys to enforce mitigation measures. Depart of Culture, Heritage and the Gaeltacht (2014) “Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters” will be applied to ensure noise introduced into the marine environment have minimum effect as anticipated in this assessment.*

2. *If calves are noted within the exclusion zone during the calving period from May to August, additional mitigation beyond the standard MMO guidance shall take the form of providing additional time for the calves to leave the exclusion zone. Based on the current general guidance (DAHG, 2014) “Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.” If calves have been spotted in the monitored zone the sound-producing activity shall not commence until at least 45 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO*
3. *Under no circumstance should seals hauled out in the area be disturbed such that they enter the water. This is unlikely, as this area is not recognised as a haul out area. A MMO will be onboard the vessel at all times during geophysical surveys to enforce mitigation measures.*
4. *In order to ensure the integrity of Annex habitats and additional habitats and species of conservation importance are retained in the vicinity of the planned project a marine ecologist will be onsite during all intertidal works including the final making good of site, including back filling, beach manhole completion and removal of machinery. The ecologist will also ensure that birds of conservation importance roosting on the shore are not disturbed during the survey activities.*
5. *Grab sampling will be preceded by drop down video at each sampling station, which will be monitored in real time to confirm that there is no potential for sampling to damage Annex 1 habitats (Habitats Directive).*

Appendices

Annex A – Survey Area Co-ordinates

Annex B – Foreshore Licence Drawings

Annex C – Equipment Specifications

Annex D – Marine Archaeological Assessment Report

Annex E – AA Screening and Natura Impact Statement