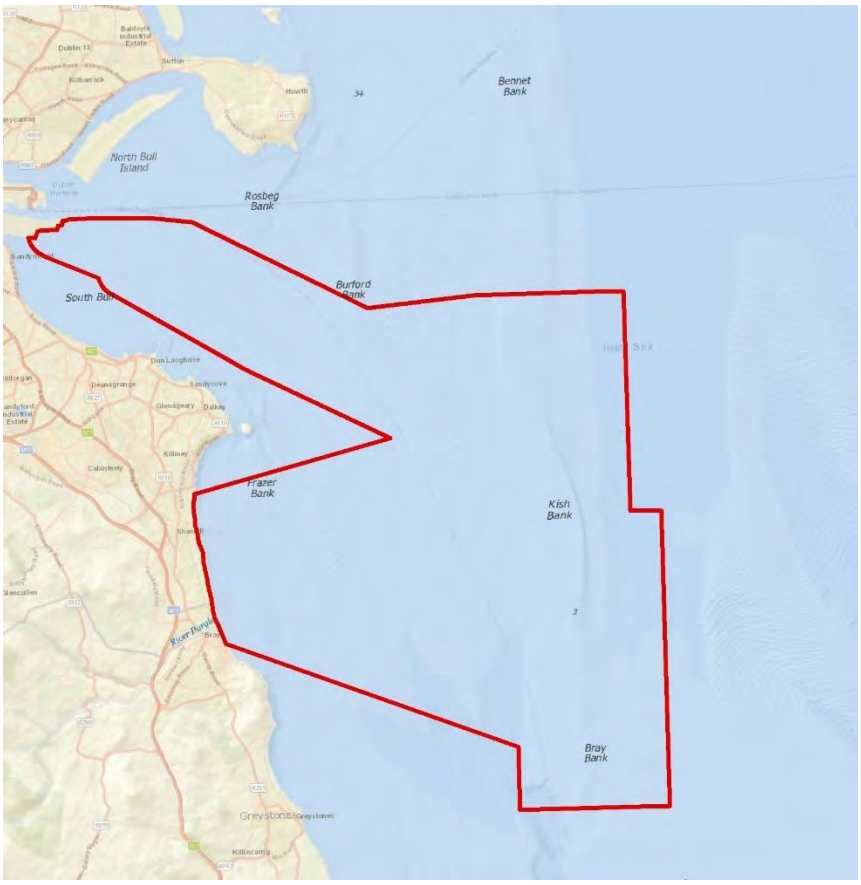
ALTEMAR

Marine & Environmental Consultancy

Appropriate Assessment Screening & Natura Impact Statement - Information for a Stage 1 (AA Screening) and Stage 2 (Natura Impact Statement) AA for the Foreshore Licence for Site Investigation of Dublin Array site and cable corridors and Metocean Data Collection.



19TH SEPTEMBER 2019

Prepared by: ***Altemar Ltd.***
On behalf of: ***innogy Renewables Ireland Limited***

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow. 00-353-1-2010713. info@altemar.ie
Directors: Bryan Deegan and Sara Corcoran
Company No.427560 VAT No. 9649832U
www.altemar.ie

Document Control Sheet			
Client	Innogy Renewables Ireland Limited		
Project	Appropriate Assessment Screening & Natura Impact Statement - Information for a Stage 1 (AA Screening) and Stage 2 (Natura Impact Statement) AA for the Foreshore Licence for Site Investigation of Dublin Array site and cable corridors and collection of Metocean Data.		
Report	Appropriate Assessment Screening & Natura Impact Statement		
Date	19th September 2019		
Project No:		Document Reference: AANIS_DA_0119	
Version	Author	Reviewed	Date
Draft 01	Bryan Deegan	Sara Corcoran / Paul Kelly / Kevin Whyte	26th August 2019
Draft 02	Bryan Deegan	Paul Kelly / Gillian Moore / Kevin Whyte	16th August 2019
FINAL	Bryan Deegan		19th September 2019

CONTENTS

1. INTRODUCTION

An Appropriate Assessment is an assessment of the potential effects of a proposed project or plan, on its own, or in combination with other plans or projects, on one or more NATURA 2000 sites (Special Areas of Conservation (SAC) or Special Protection Areas (SPA)).

The following Appropriate Assessment Screening and Natura Impact Statement has been prepared by **Altemar Ltd.** at the request of innogy Renewables Ireland Limited (innogy) and relates to an application for a Foreshore Licence for a geophysical survey and associated seabed sampling for the Dublin Array renewable energy project. The proposed survey covers;

1. The proposed Lease Application Area, comprising the Kish Bank and the Bray Bank incorporating a 500m buffer zone, and
2. Cable Route Survey Area
3. Seabed Sampling Area

The purpose of this report is 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.

BACKGROUND TO ALTEMAR LTD.

Since its inception in 2001, Altemar has been delivering ecological and environmental services to a broad range of clients. Operational areas include residential, infrastructural, renewable, oil & gas, private industry, local authorities, EC projects and State/semi-State Departments. Bryan Deegan is the managing director of Altemar. Bryan is an environmental scientist, marine biologist and marine mammal observer with 25 years' experience working in Irish terrestrial and aquatic environments, providing services to the State, Semi-State and industry. Bryan is the former Environmental Director of Natural Hydro Energy (Renewables Company). Bryan Deegan (MCIEEM) holds a MSc in Environmental Science, BSc (Hons.) in Applied Marine Biology, NCEA National Diploma in Applied Aquatic Science and a NCEA National Certificate in Science (Aquaculture). Bryan Deegan carried out all elements of this Appropriate Assessment Screening and Natura Impact Statement.

2. BACKGROUND TO THE APPROPRIATE ASSESSMENT

The Habitats Directive 92/43/EEC (together with the Birds Directive (2009/1477/EC)) forms the cornerstone of Europe's nature conservation policy. The Directive protects over 1000 animals and plant species and over 200 "habitat types" which are of European importance. In the Directive, Articles 3 to 9 provide the legislative means to protect habitats and species of European Community interest through the establishment and conservation of an EU-wide network of conservation sites (NATURA, 2000). These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Birds Directive), Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect NATURA 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment:

"Any plan or project not directly connected with or necessary to the management of the [NATURA 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the component national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

As outlined in the EC guidance document on Article 6(4) (January 2007)[1]:

"Appropriate assessments of the implications of the plan or project for the site concerned must precede its approval and take into account the cumulative effects which result from the combination of that plan or project with other plans or projects in view of the site's conservation objectives. This implies that all aspects of the plan or project which can, either individually or in combination with other plans or projects, affect those objectives must be identified in the light of the best scientific knowledge in the field.

Assessment procedures of plans or projects likely to affect NATURA 2000 sites should guarantee full consideration of all elements contributing to the site integrity and to the overall coherence of the network, both in the definition of the baseline conditions and in the stages leading to identification of potential impacts, mitigation measures and residual impacts. These determine what has to be compensated, both in quality and quantity. Regardless of whether the provisions of Article 6(3) are delivered following existing environmental impact assessment procedures or other specific methods, it must be ensured that:

- *Article 6(3) assessment results allow full traceability of the decisions eventually made, including the selection of alternatives and any imperative reasons of overriding public interest.*
- *The assessment should include all elements contributing to the site's integrity and to the overall coherence of the network as defined in the site's conservation objectives and Standard Data Form, and be based on best available scientific knowledge in the field. The information required should be updated and could include the following issues:*
    - *Structure and function, and the respective role of the site's ecological assets;*
    - *Area, representativity and conservation status of the priority and nonpriority habitats in the site;*
    - *Population size, degree of isolation, ecotype, genetic pool, age class structure, and conservation status of species under Annex II of the Habitats Directive or Annex I of the Birds Directive present in the site;*
    - *Role of the site within the biographical region and in the coherence of the NATURA 2000 network; and,*

[1] European Commission. (2007).Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission;

- *Any other ecological assets and functions identified in the site.*

- *It should include a comprehensive identification of all the potential impacts of the plan or project likely to be significant on the site, taking into account cumulative impacts and other impacts likely to arise as a result of the combined action of the plan or project under assessment and other plans or projects.*
- *The assessment under Article 6(3) applies the best available techniques and methods, to estimate the extent of the effects of the plan or project on the biological integrity of the site(s) likely to be damaged.*
- *The assessment provides for the incorporation of the most effective mitigation measures into the plan or project concerned, in order to avoid, reduce or even cancel the negative impacts on the site.*
- *The characterisation of the biological integrity and the impact assessment should be based on the best possible indicators specific to the NATURA 2000 assets which must also be useful to monitor the plan or project implementation."*

3. STAGES OF THE APPROPRIATE ASSESSMENT

This Appropriate Assessment screening was undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC, 2001), Part XAB of the Planning and Development Act 2000, as amended, in addition to the February 2010 publication from the Department of Environment, Heritage and Local Government; 'Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities', the European Communities (Birds and Natural Habitats) Regulations 2011 the November 2018 EU guidance on Managing Natura 2000.

In order to comply with the above Guidelines and legislation, the Appropriate Assessment process must be structured as follows:

1) Screening stage:
    - Description of the proposed project or plan;
    - Identification of NATURA 2000 sites potentially affected;
    - Identification and description of individual in combination effects likely to result from the proposed project;
    - Assessment of the likely significance of the effects identified above (in the absence of mitigation measures intended to avoid or reduce the harmful effects of the proposed development on European sites). Exclusion of sites where it can be objectively concluded that there will be no likely significant effects; and,
    - Conclusions.
2) Appropriate Assessment (Natura Impact Statement):
    - Description of the NATURA 2000 sites that will be considered further;
    - Identification and description of potential adverse effects on the conservation objectives of these sites likely to occur from the project or plan; and,
    - Mitigation Measures that will be implemented to avoid, reduce or remedy any such potential adverse effects
    - Assessment as to whether, following the implementation of the proposed mitigation measures intended to avoid or reduce the harmful effects of the proposed development on European sites, in accordance with the judgment of the CJEU in case C-323/17, given that the Court has observed in cases C-387/15 and C-388/15 (Orleans and Others), that Article 6 of the Habitats Directive does not contain any reference to the concept of mitigation

measures, making provision for conservation measures, preventive measures and compensatory measures in Articles 6(1), 6(2) and 6(4), respectively it can be concluded, beyond all reasonable scientific doubt, that there will be no adverse impact on the integrity of the relevant European Site in light of its conservation objectives

- Conclusions.

3) Alternative Solutions

If mitigation intended to avoid or reduce the harmful effects of the proposed development on European sites is possible that enables a risk to be avoided fully, then, subject to other necessary approvals, the project or plan may proceed. If mitigation measures are insufficient, or are not actually practicable and achievable to avoid the risk entirely, then, in the light of a negative assessment, the plan or project may not proceed. A wider search for alternative solutions may need to be considered – Stage 3. [2]

4) Imperative Reasons of Overriding Public Interest (IROPI)/Derogation. (: Stage 4 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a NATURA 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. The extra protection measures for Annex I priority habitats come into effect when making the IROPI case.

[2] (DoEHLG, 2009) Appropriate Assessment of Plans and projects in Ireland: Guidance for planning authorities.

4. SCREENING STAGE ASSESSMENT

MANAGEMENT OF THE SITE

The plan or project is not directly connected with, or necessary to, the management of NATURA 2000 sites.

DESCRIPTION OF THE PROPOSED PROJECT

INTRODUCTION-BACKGROUND TO THE DUBLIN ARRAY PROJECT

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).

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 with support from Saorgus Energy..

This AA Screening and Natura Impact Statement is being submitted as part of 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.

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, and export Cable Route Corridors extending from the Lease Application Areas extending shore-wards to Mean High Water (MHW) at three potential landfall options, one at Poolbeg / Shellybanks and two options at Shanganagh.

The respective areas are shown in Figure 1.

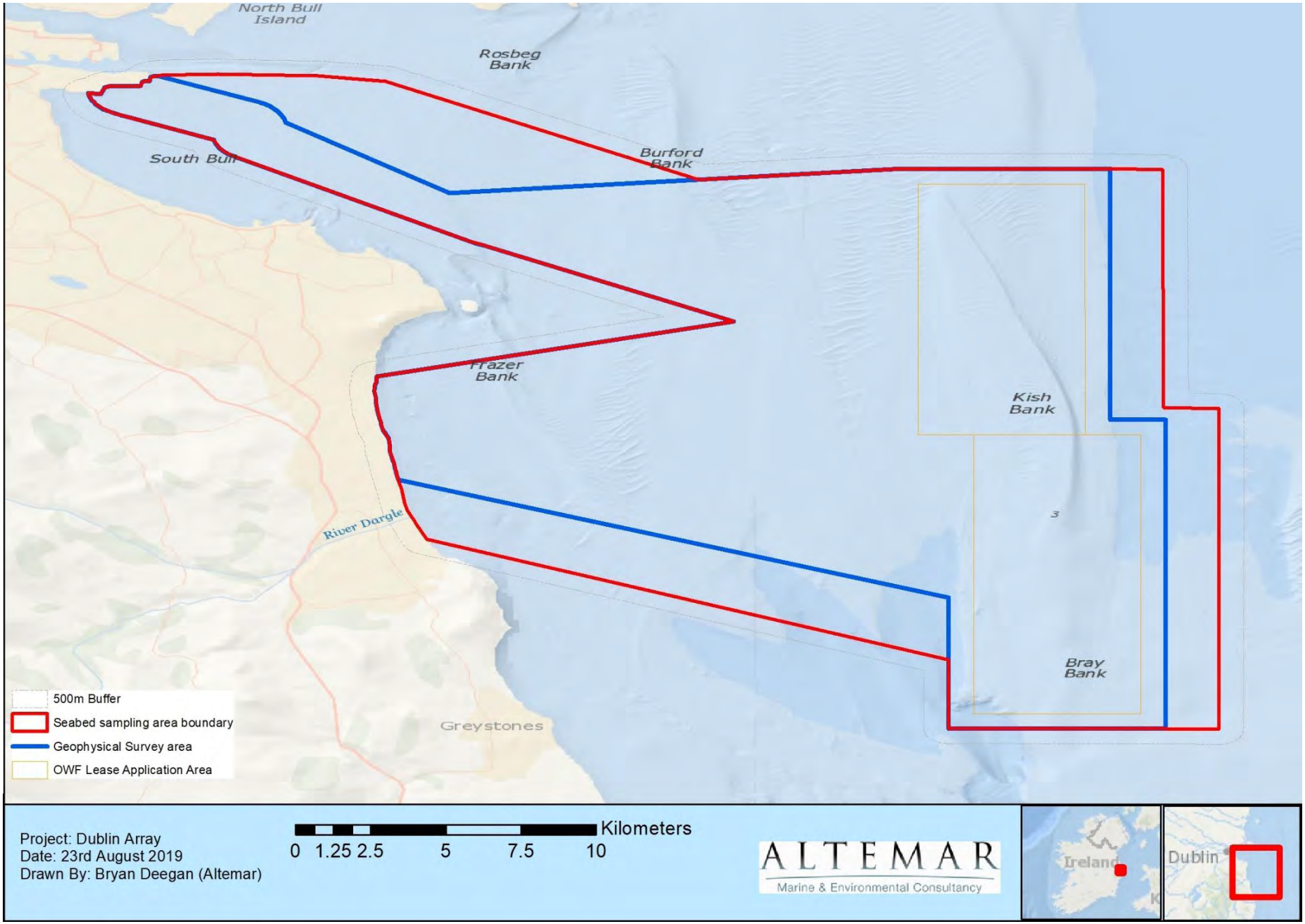


Figure 1. Proposed Survey Area.

SURVEYS

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 to inform the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) for the Offshore Wind Farm Array development.

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.

The proposed surveys are also required to provide geophysical data which will investigate the nature of the seabed, sub-surface stratigraphy and geotechnical data to facilitate the engineering and foundation design for the array.

Surveys are also required for subsea export power cables having potential landfalls in the general area of Shanganagh and Poolbeg / Shellybanks.

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 (CPT's) and boreholes at the proposed landfalls to acquire geotechnical and geological data.

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.

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.

The subject matter of this application includes

i. Deployment of metocean monitoring equipment comprising
   - up to two buoys carrying LiDAR units for wind measurement; and
   - two wave rider buoys with wave and current measurement devices.

ii. A Geophysical Survey which will comprise;
   - Bathymetric Survey;
   - Side Scan Sonar;
   - Shallow Reflection Seismic (Sub-bottom Profiling); and

- Marine Magnetometer

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 of DAHG (2014) "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters" 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.

iii. Geotechnical and environmental sampling

- Grab sampling for benthic analysis
- Vibrocores
- Cone Penetration Tests
- Boreholes

Sea-bed sampling will include a series of grab samples for benthic analysis to provide input for environmental assessment. Vibocores 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/vibrocoring processes are very much a localised activity and will not result in any significant disturbance of the sea-bed.

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

The proposed geophysical survey and seabed sampling works will likely be carried out between 1st March and 31st October and will commence within 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 five years. An indicative schedule is shown below assuming licence determination by June 2020.

	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 suvey			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						

SURVEY AREA

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 (Figure 1)

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.

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.

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.

Northern Cable Route Corridor

The proposed survey corridor (Figure 2) 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.

Southern Cable Route Corridor

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. Multibeam and backscatter data for the proposed site from the Infomar project is seen in Figure 3 and Figure 4 respectively.

The metocean buoys will be deployed within the Lease Application areas. Prior to deployment for data collection the LiDAR 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.

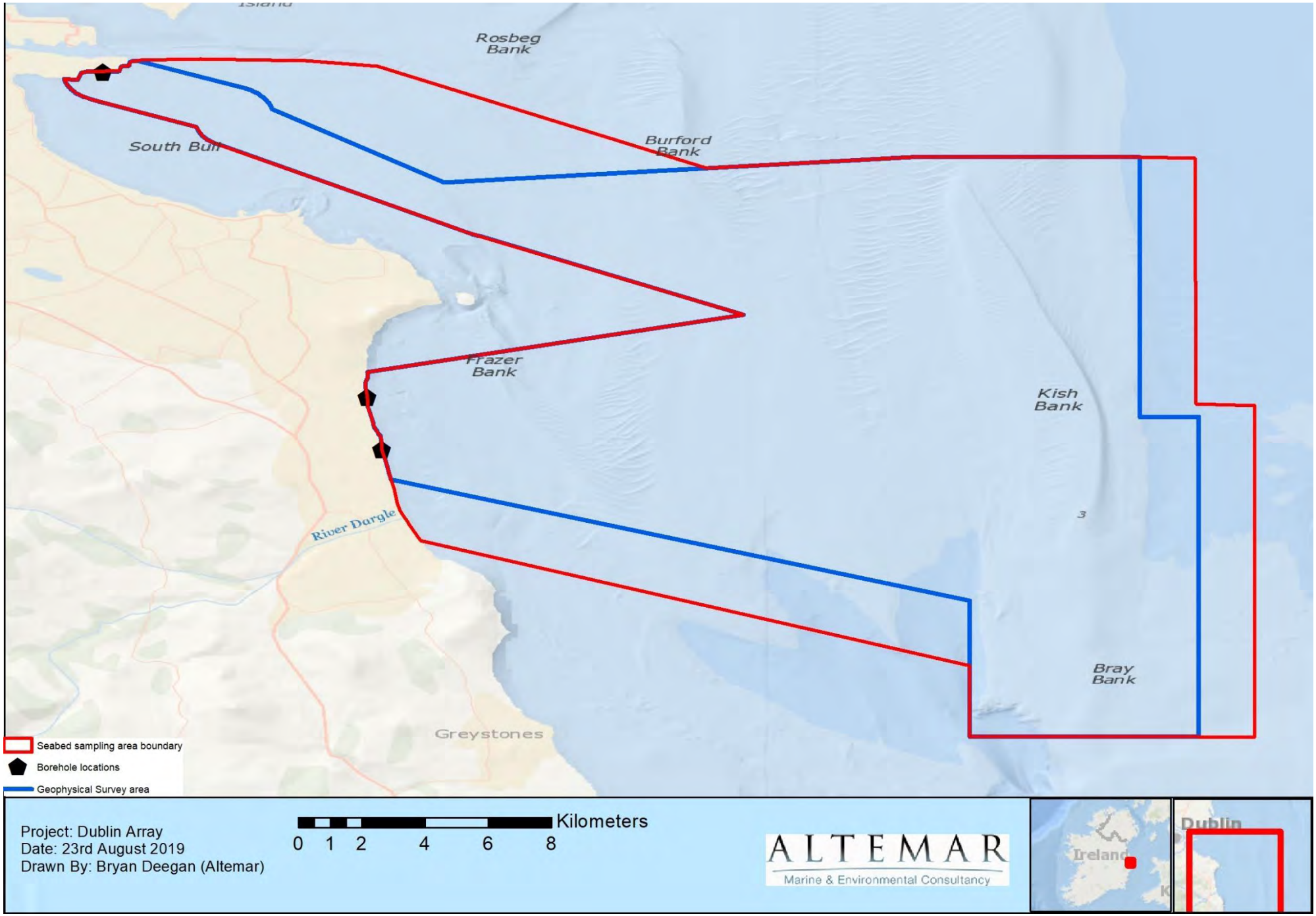


Figure 2. Geophysical Survey Area Boundary (Blue) and Seabed sampling area (red). (Some overlapping of the boundaries does occur).

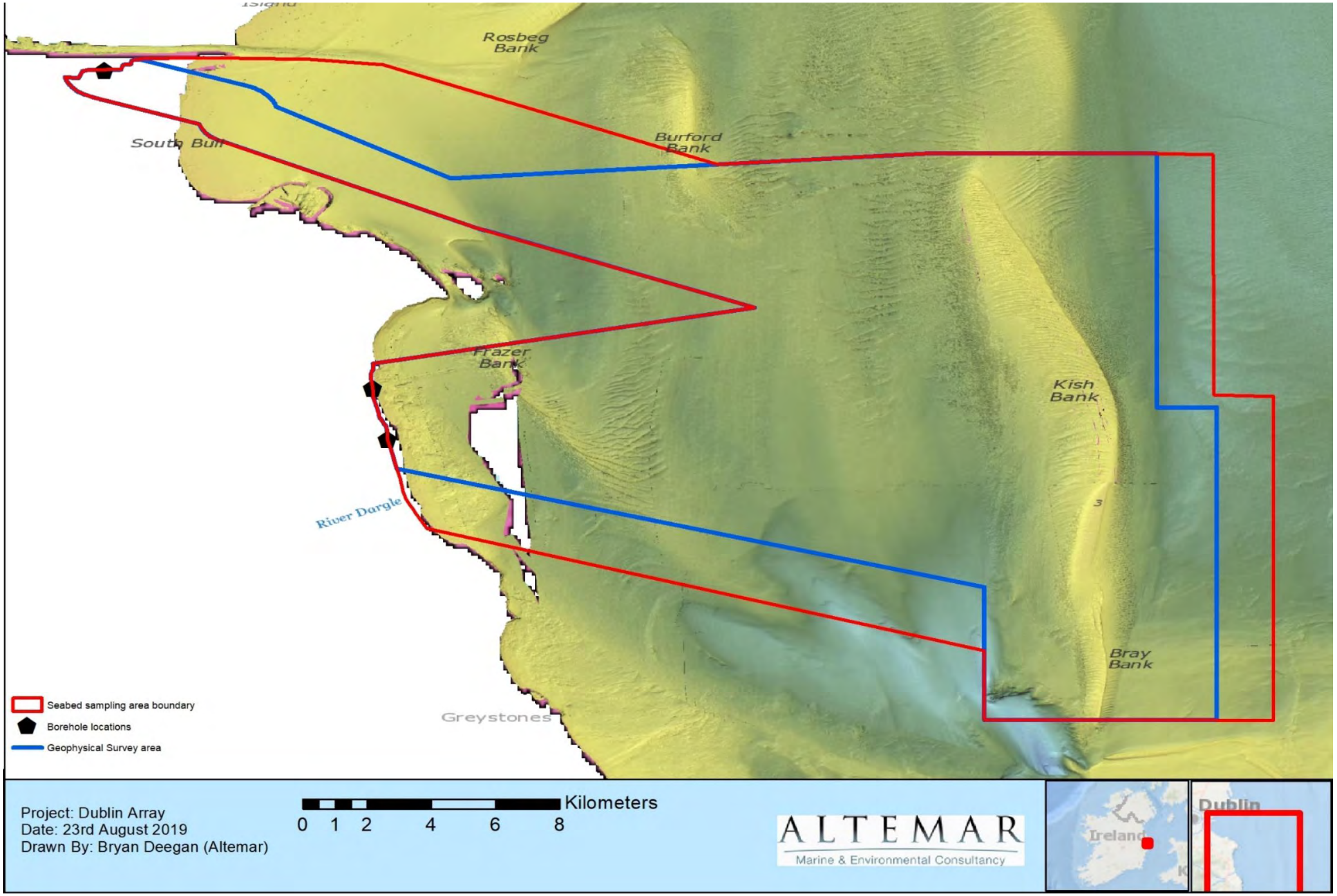


Figure 3. Multibeam Data of the proposed survey site (Infomar WMS)

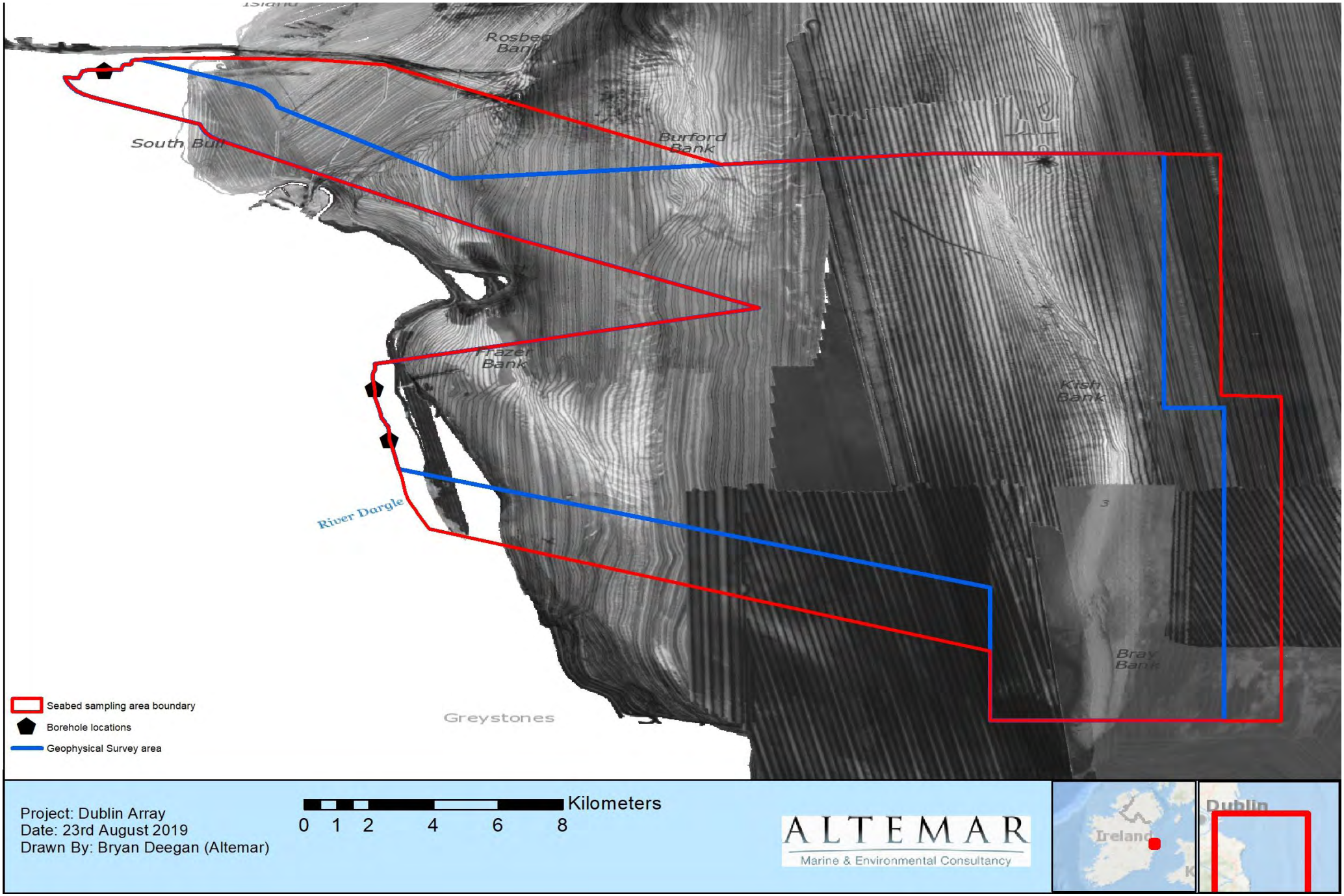


Figure 4. Backscatter Data of the proposed survey site (Infomar WMS)

FORESHORE MAPPING

NORTHERN CABLE ROUTE CORRIDOR

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.

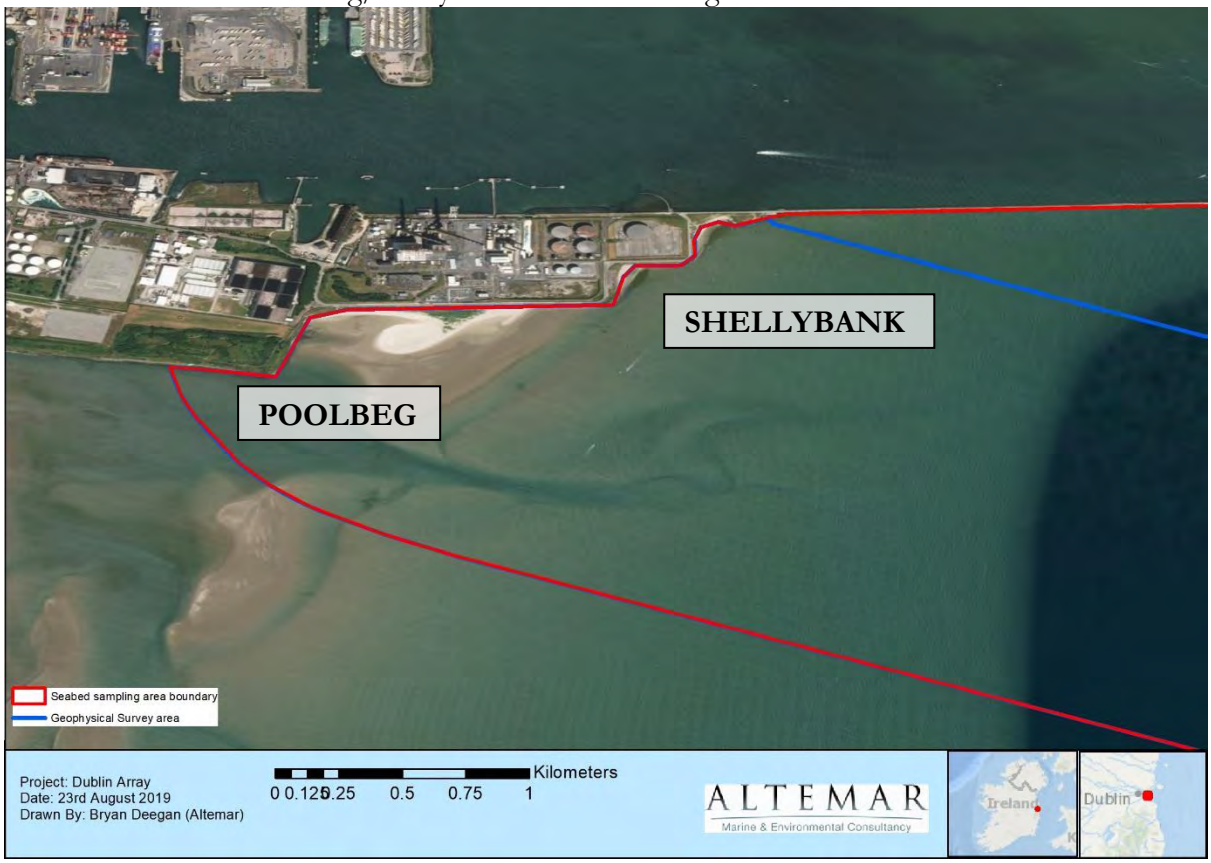


Figure 5. Poolbeg nearshore survey area.

SOUTHERN CABLE ROUTE CORRIDOR

The location of the nearshore survey corridor for the Southern Cable Route at the land/sea interface centred on Shanganagh is shown in Figure 7.

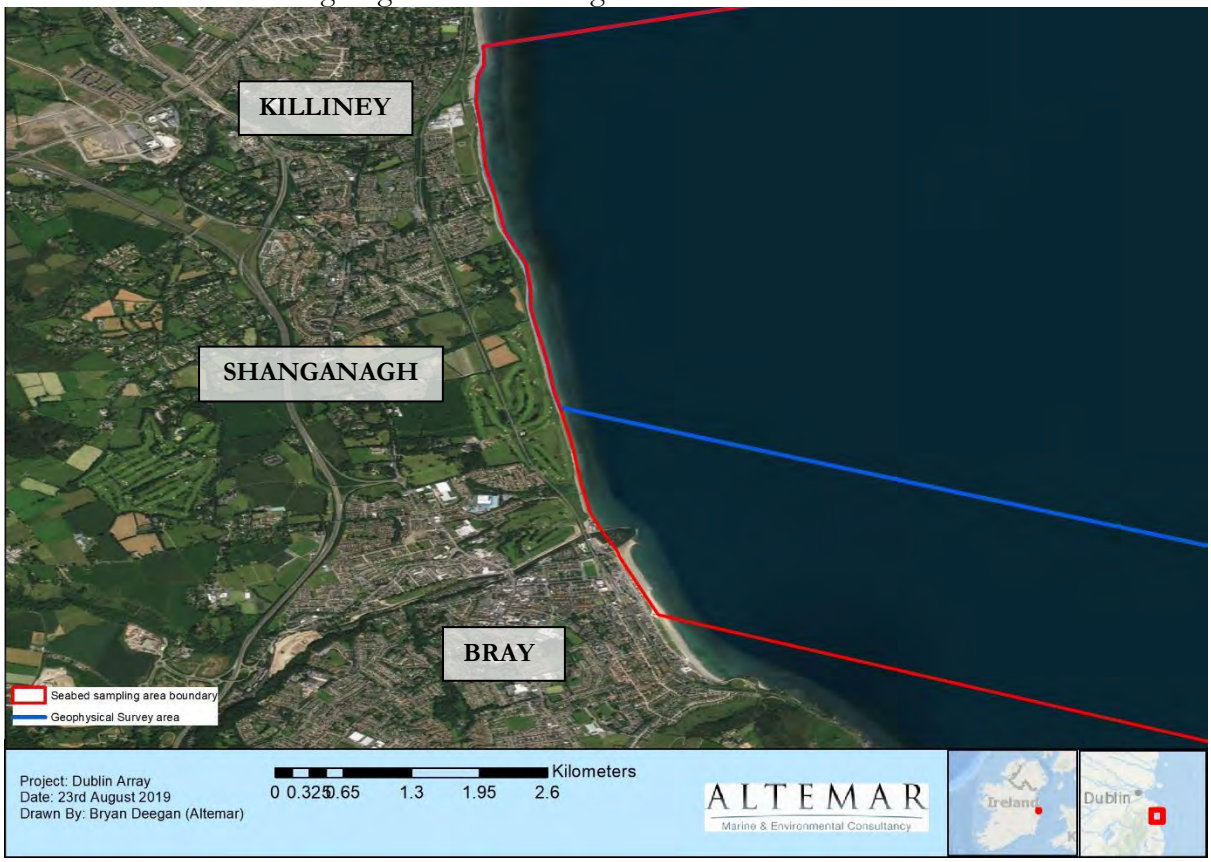


Figure 6. Shanganagh nearshore survey area.

PROPOSED MARINE SURVEY

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). The survey zones can generally be described as follows;

- Intertidal Zone High Water Mark to Low Water Mark
- Marine Zone Survey From LWM to the Lease Application Area and 'Buffer Zone'.

Survey line spacing is to be designed to ensure adequate coverage and overlap of geophysical data capture. A line plan showing 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.

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.

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

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

INTERTIDAL ZONE SURVEY

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.

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.

If 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).

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.

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.

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.

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)

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 CPT's. 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.

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.

The proximity of each of the intertidal sampling stations to Natura 2000 sites are seen in figures 7-10.

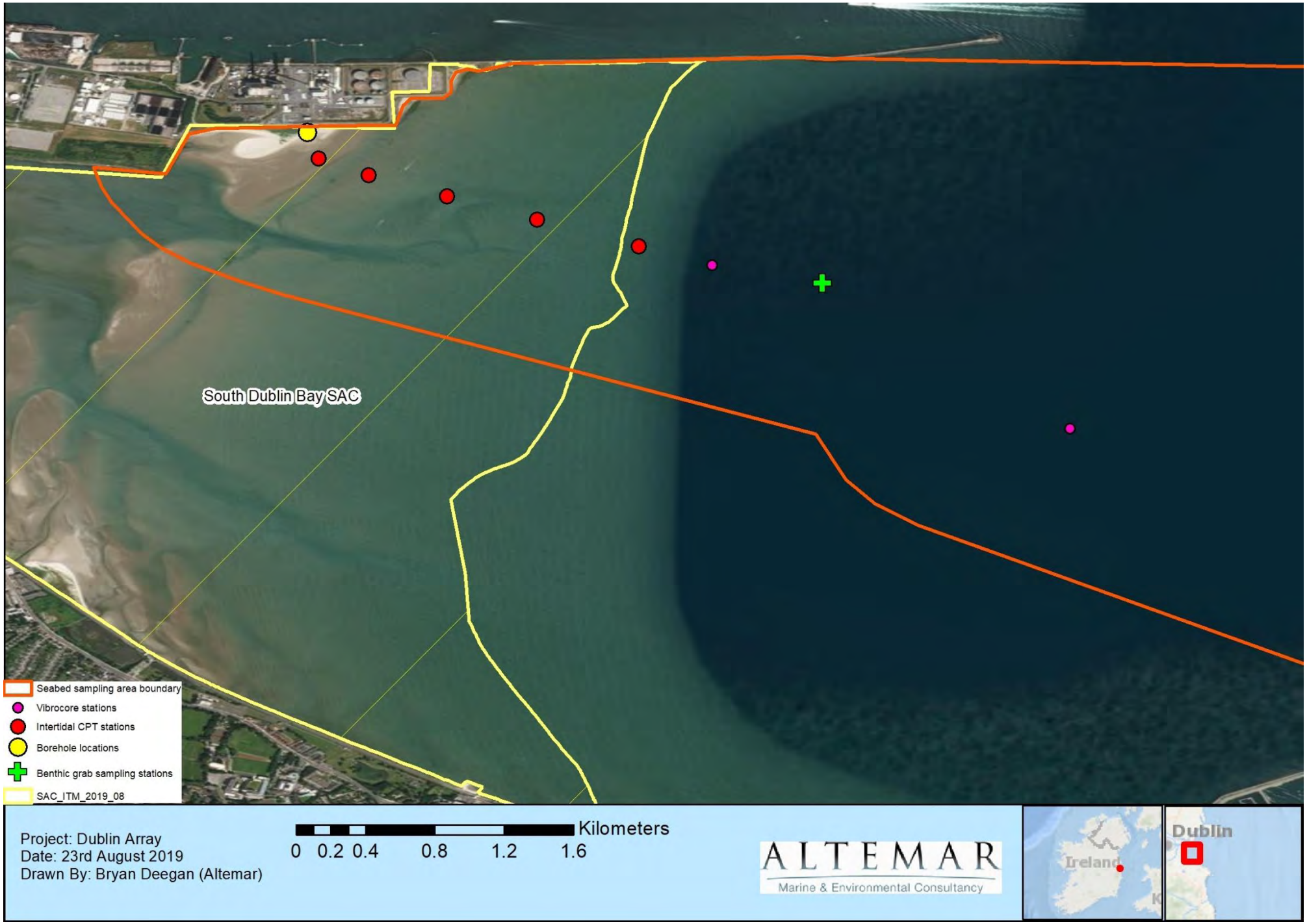


Figure 7. Location of intertidal and subtidal sampling in the vicinity of South Dublin Bay SAC.

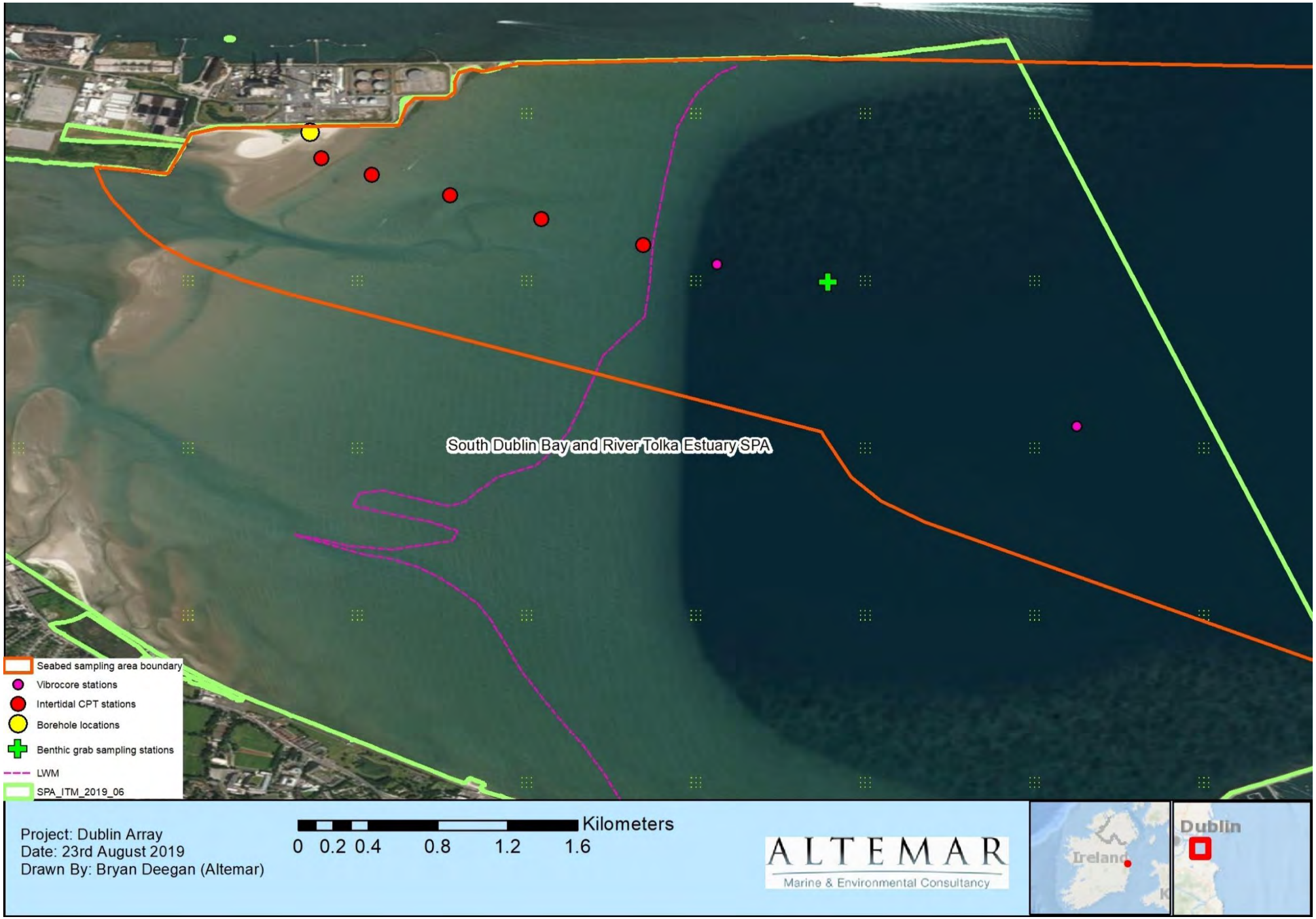


Figure 8. Location of intertidal and subtidal sampling in the vicinity of South Dublin Bay and River Tolka SPA.

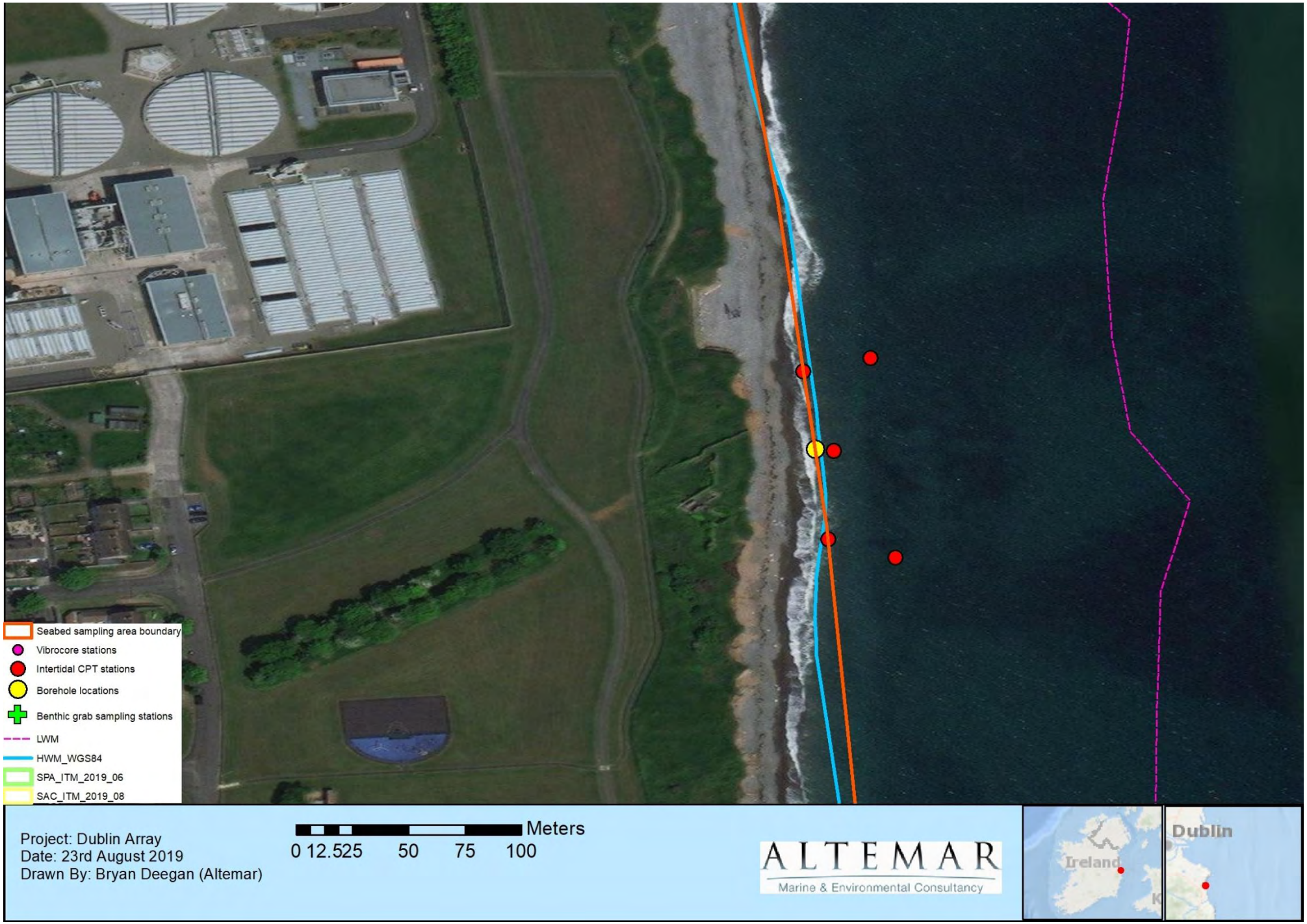


Figure 9. Location of intertidal sampling in the Shanganagh Area (North) and Natura 2000 sites (none)

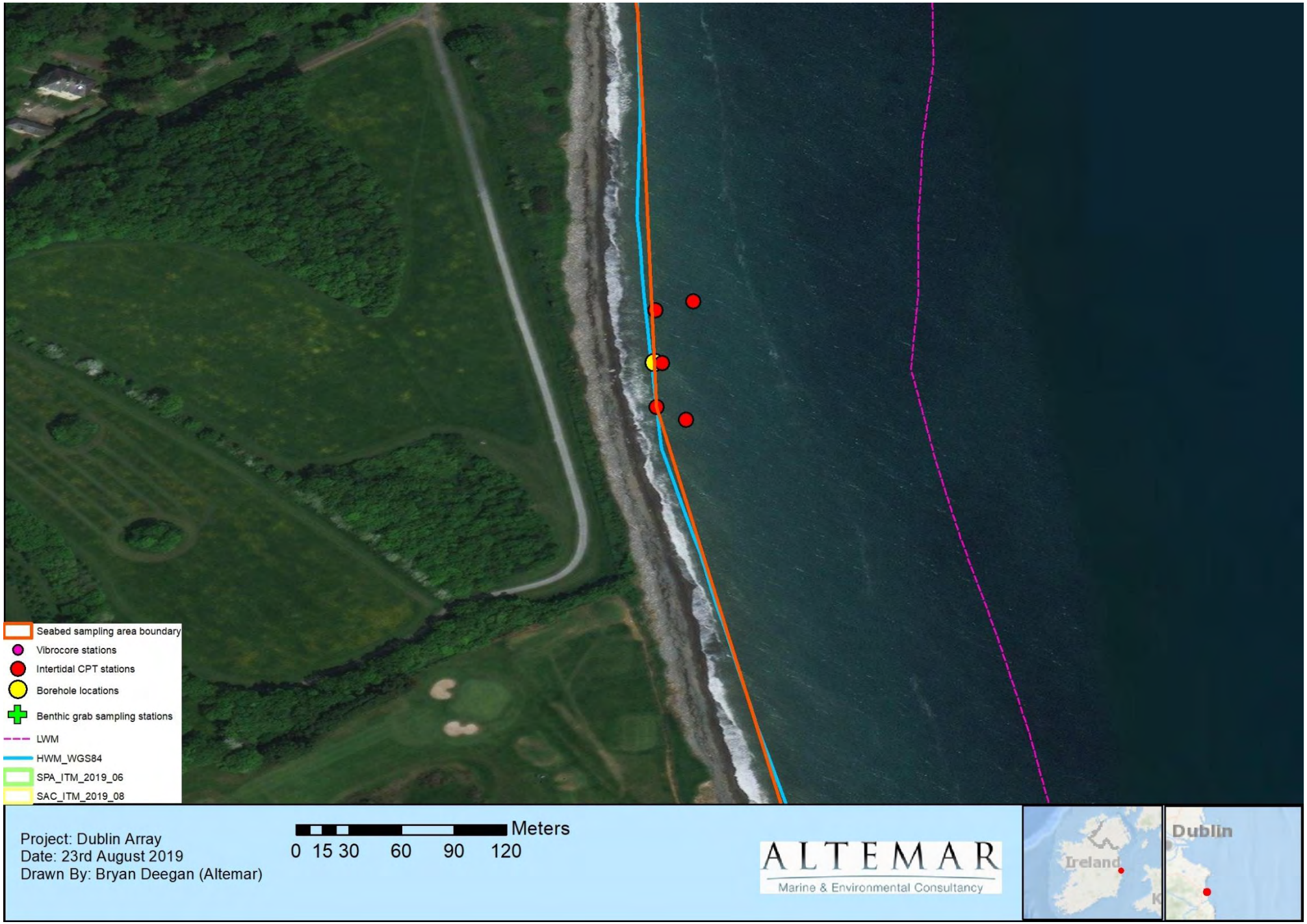


Figure 10. Location of intertidal sampling in the Shanganagh Area (South) and Natura 2000 sites (none)

MARINE ZONE SURVEY

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 Area and shallow geological cross sections along the Cable Route Corridors.

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.

Seabed sampling will also be undertaken including grab samples and vibrocores (Figure 11). Vibrocores to a depth of 6m and 80mm in diameter will be collected at 47 locations within the cable route corridors and across the lease application area. On recovery, vibrocore samples will be cut into 1 m lengths, labelled, capped and stored vertically prior to processing. The vibrocorer shall be deployed from the geophysical vessel. Benthic survey is also proposed which will include grab sampling across the Seabed Sampling Area using a Van Veen or Day Grab type sampler.

Metocean data collection requires deployment of up to two buoy mounted FLiDAR and two wave rider buoys. The proposed Metocean Equipment Deployment Areas are seen in Figure 14.

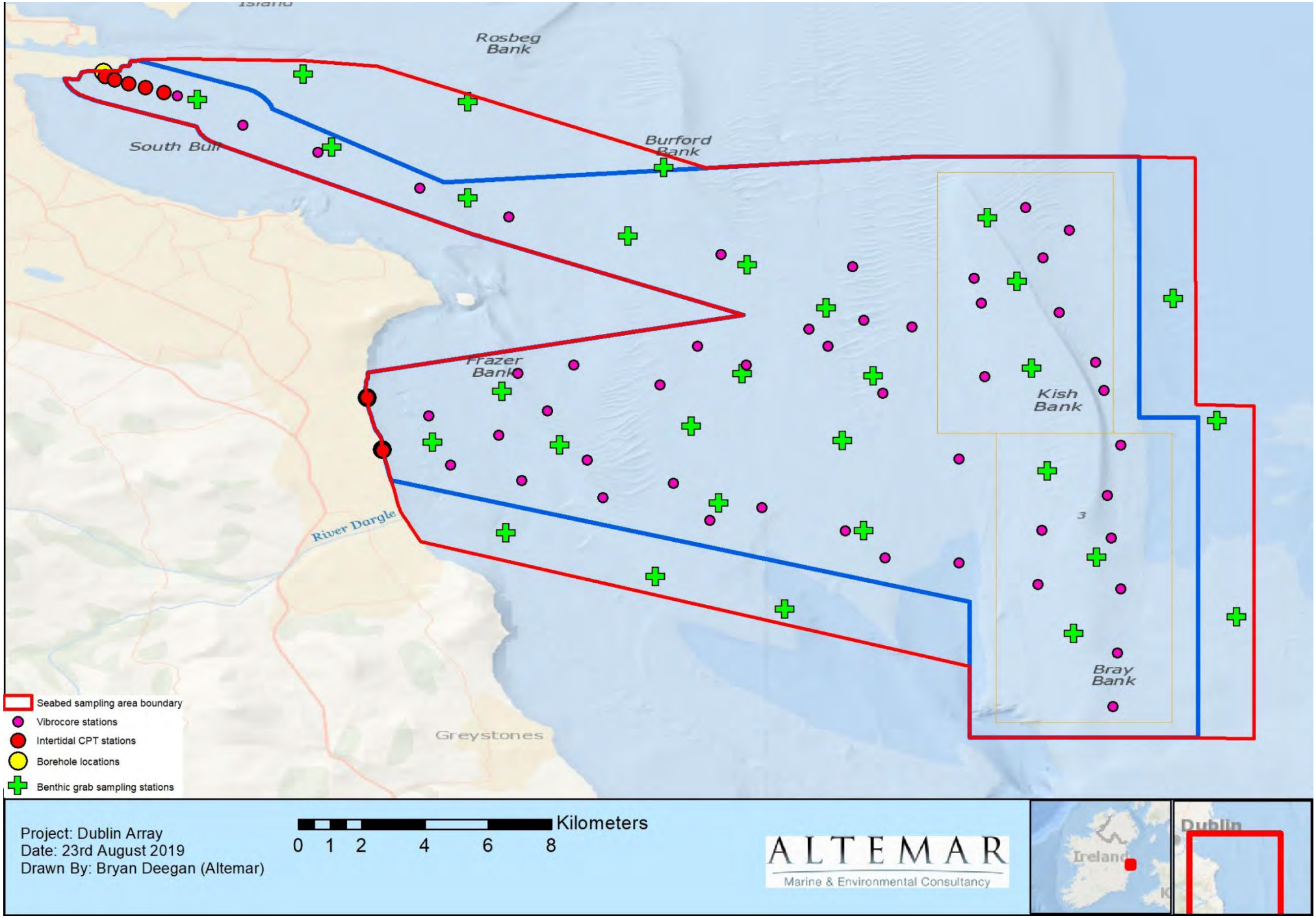


Figure 11. Intertidal and subtidal sampling locations.

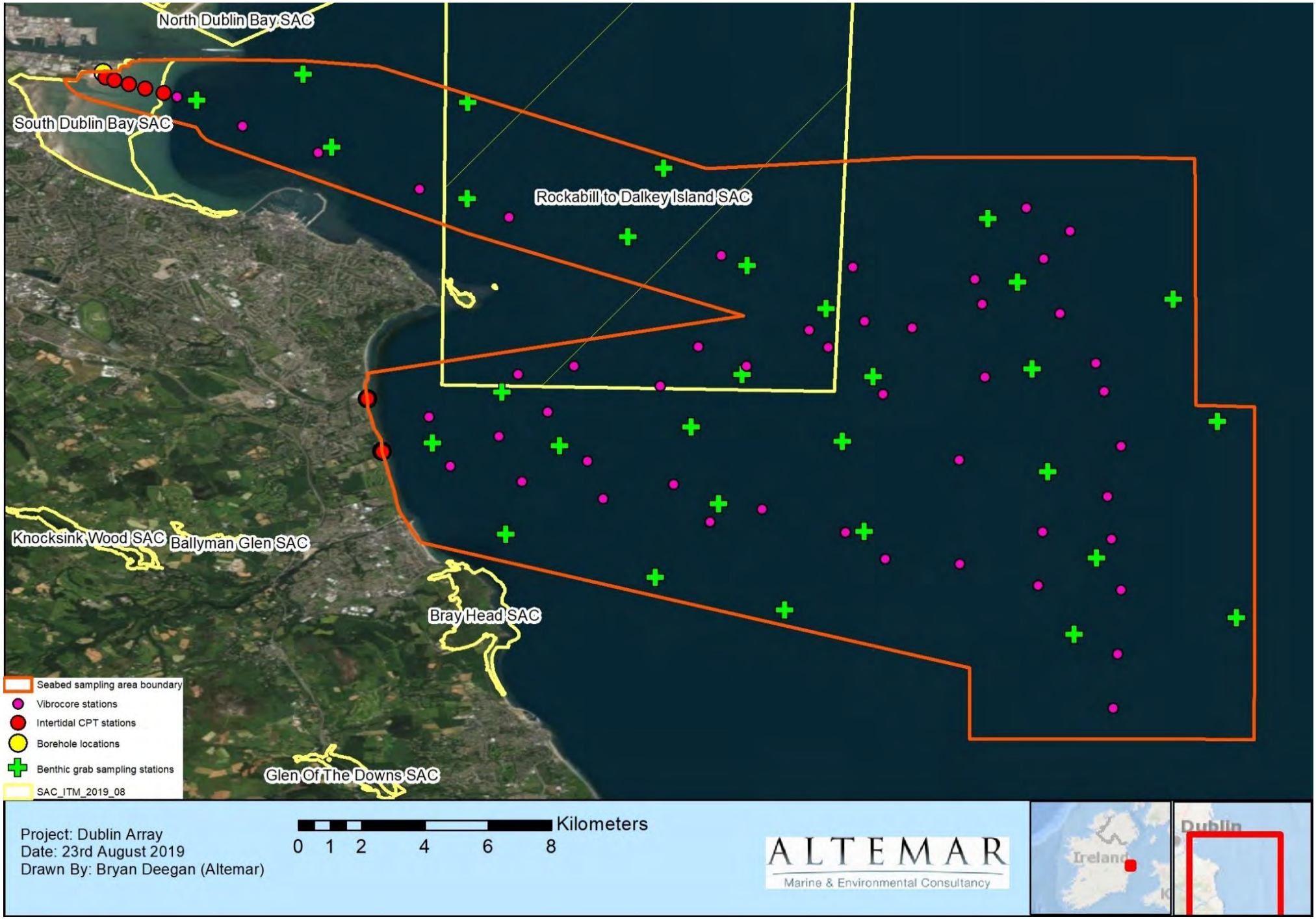


Figure 12. Proximity of intertidal and subtidal sampling locations to SAC's.

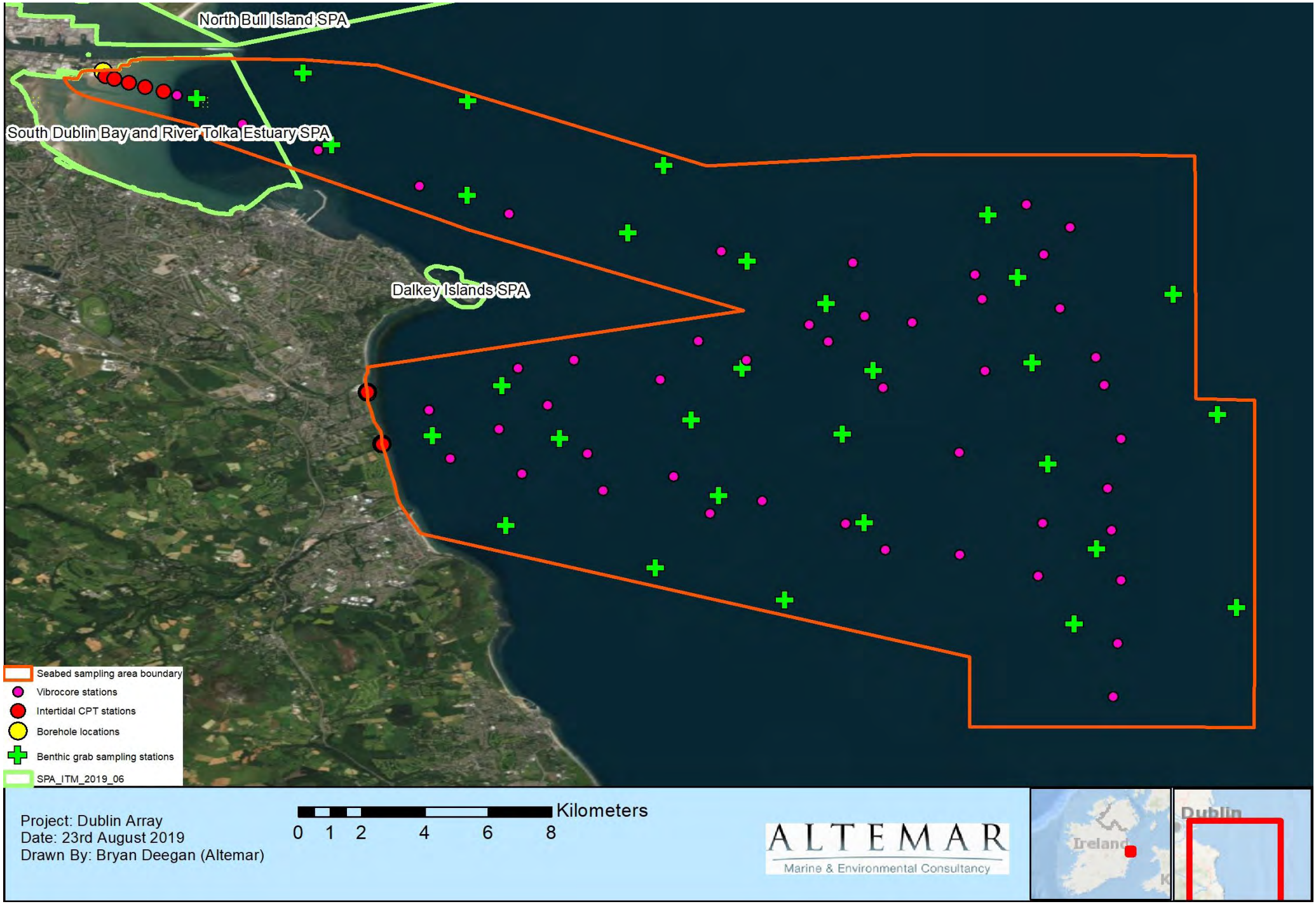


Figure 13. Proximity of intertidal and subtidal sampling locations to SPA's.

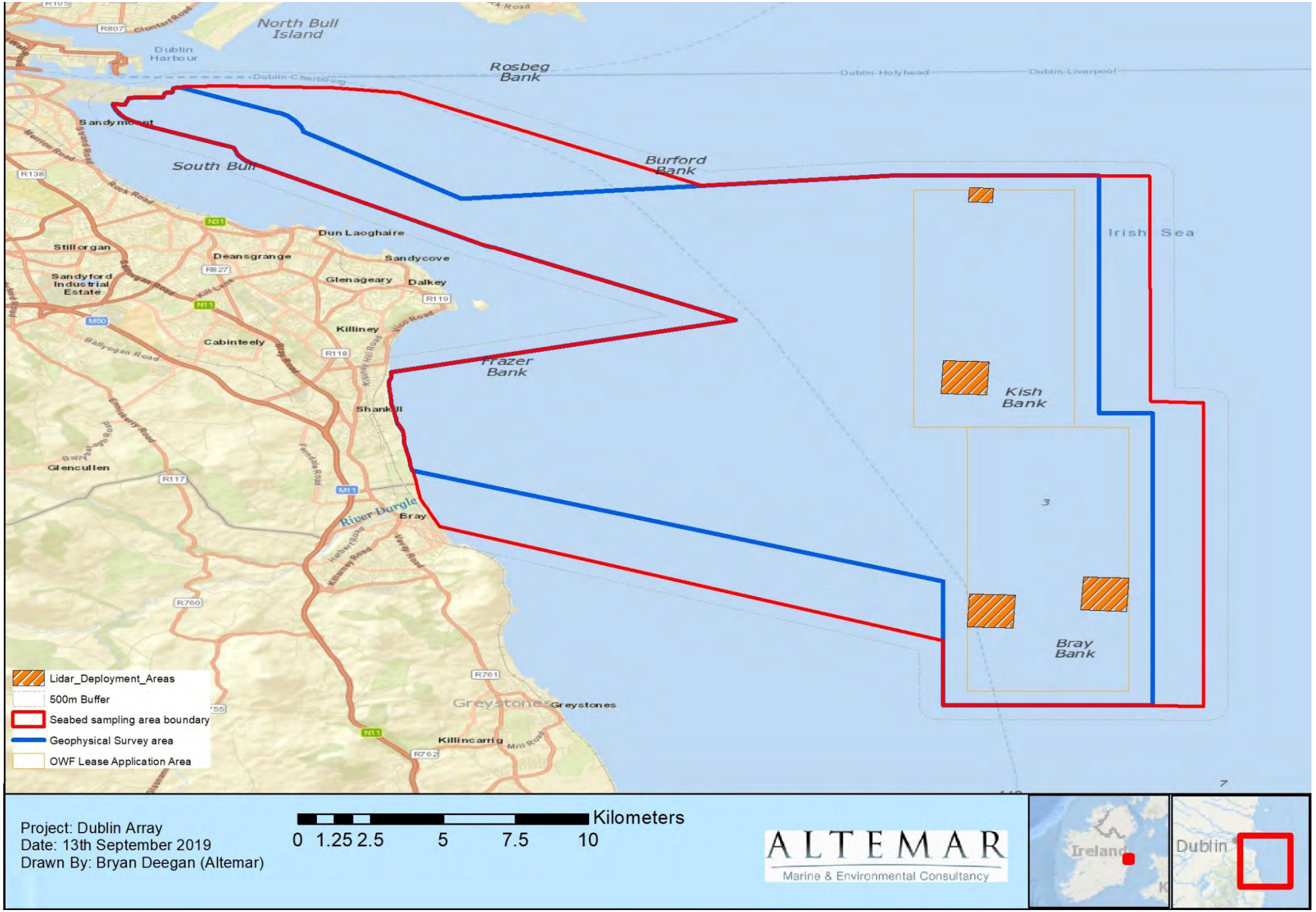


Figure 14. Lidar Deployment Areas.

SURVEY VESSEL AND EQUIPMENT PARAMETERS

SURVEY VESSELS

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.

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.

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.

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.

The Fugro Pioneer may be taken as an indicative example of a marine survey vessel and the datasheet for this vessel in 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

Up to two LiDAR units will be deployed on site. The exact details of the LiDAR 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 of the Planning Report)

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

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.

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.

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.

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.

The metocean units will be mounted on a 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.

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

It is envisaged that the geophysical data acquisition will involve the following acoustic-based 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.

Typical acoustic properties of geophysical survey equipment is outlined in Table 1.

Multibeam Echosounder (MBES)

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[3] may be taken as an indicative example and datasheet for this MBES.

[3] https://www.macartney.de/fileadmin/redakteur/Hydrographie/Multibeam/SeaBat_T50/SeaBat-T50-R-product-leaflet.pdf

Side Scan Sonar

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[4] may be taken as an indicative example.

Marine Magnetometer

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[5] may be taken as an indicative example and datasheet for this device.

Sub Bottom Profiler (SBP)

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.

Across the cable corridors shallow investigation will be sufficient, usually achieved with a hull mounted pinger operating in single channel mode. In the lease application / array area, 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.

The Knudsen Pinger Sub Bottom Profiler[6] may be taken as an indicative example of a pinger system and the Applied Acoustics S-Boom Sub Bottom Profiler[7] may be taken as an indicative example of a Boomer system.

Cone Penetrometer /Borehole Rig (CPT)

Intrusive tests such as the CPT's and boreholes will be conducted using equipment incorporated into tracked vehicles. The Lankelma UK8 Tracked Rig[8] may be taken as an indicative example of a suitable tracked rig.

Grab Samples

Samples will be taken using a Hamon or Van Veen grab (0.1 – 0.2 m^2)[9] with a stainless steel bucket. Sample depth may be up to 20 cm depending on seabed type. The grab will be deployed

[4] http://www.kleinmarinesystems.com/PDF/datasheets/Klein_System_3000_rev0718.pdf
[5] ftp://geom.geometrics.com/pub/mag/DataSheets/G-882_Spec_Sheet.pdf
[6] https://knudseneng.com/files/brochures/pinger/pinger-D131-05191-Rev5.2.pdf
[7] https://appliedacoustics.com/wp-content/uploads/2015/10/S-Boom-Brochure.pdf
[8] http://www.lankelma.co.uk/wp-content/uploads/2018/02/Bogskipper-Crawler-Rig-UK8.pdf
[9] http://www.kc-denmark.dk/products/sediment-samplers/van-veen-grab/van-veen-grab-1000-cm%C2%B2.aspx

and retrieved by winch. In deep or fast-moving water additional weights may be required to ensure the grab operates successfully.

Vibrocores

Vibrocoring 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.

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 m^3. The Ocean Scientific International Ltd (OSIL) High Power Vibrocorer[10] may be taken as an indicative example of a suitable Vibrocore Rig.

CONE PENETROMETER /BOREHOLE RIG (CPT)

Intrusive tests such as the CPT's and boreholes will be conducted using equipment incorporated into tracked vehicles. The Lankelma UK8 Tracked Rig[11] may be taken as an indicative example of a suitable tracked rig.

GRAB SAMPLES

Samples will be taken using a Hamon or Van Veen grab (0.1 – 0.2 m^2)[12] 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.

[10] https://geo-matching.com/ocean-sensors/osil-vibrocorer-3-12m
[11] http://www.lankelma.co.uk/wp-content/uploads/2018/02/Bogskipper-Crawler-Rig-UK8.pdf
[12] http://www.kc-denmark.dk/products/sediment-samplers/van-veen-grab/van-veen-grab-1000-cm%C2%B2.aspx

Table 1. Acoustic Properties of survey equipment

Survey technique	Range of Operating frequency (kHZ)	Estimated sound level at 1m over frequency band 10 Hz to 10kHZ Sound Pressure Level (dB re1µPa_{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 - 235
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

SURVEY PROCEDURES

The marine survey will be carried out in compliance with the Department of Culture, 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. The duration of noise-generating surveys will be reduced to the minimum necessary to collect results of sufficient quality.

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

POTENTIAL IMPACT AND THE SIGNIFICANCE OF THE IMPACT

Marine Mammals

All cetaceans are listed under Annex IV of the Habitats Directive, which means that they are protected wherever they occur. Bottle-nosed Dolphin and Harbour Porpoise are also listed under Annex II of the Directive. Annex II species require that core areas of their habitat are designated as sites of Community importance i.e. SAC's. Rockabill to Dalkey SAC has been designated for Harbour Porpoise.

Cetaceans have been recorded near the proposed survey route, (Figure 14), with Harbour Porpoise (*Phocoena phocoena*) and Common bottlenose dolphin (*Tursiops truncates*) being the species most frequently reported inshore with the Common minke whale (or northern minke whale) (*Balaenoptera acutorostrata*) also frequently present (IWDG, sighting scheme).

The proposed survey would be expected to impact on cetaceans primarily through the emission of noise due to the vessel and acoustics from survey equipment including multibeam. As outlined by O'Brien (2005), "sound travels 4.5 times faster in water than in air and low frequency sounds travel farther underwater than high frequency sounds. Multi-beam can be defined as Low frequency (<1 kHz), Mid-frequency (1-10 kHz) and High Frequency (>10 kHz). The hearing ranges and sensitivity of marine mammals differ from one species to another depending on their audiogram. For example, harbour porpoises are sensitive from 3 kHz to 130 kHz, with peak sensitivity at 125-130 kHz, and bottlenose dolphins from 5-110 kHz, with peak sensitivity at 40 and 60-116 kHz (Southall et al., 2007) (Table 2). Common seals are sensitive 4-45 kHz (peak sensitivity at 32 kHz) and grey seals 8-40 kHz. Humans are sensitive only to frequencies from 20 Hz to 16-18 kHz but with peak sensitivity from 2-4 kHz. Most small cetaceans, excluding harbour porpoise, have an auditory bandwidth of 150 HZ to – 160 kHz, while harbour porpoise to frequencies within 200 Hz to 180 kHz. Pinnipeds in water are thought to have an auditory bandwidth of between of 75 Hz to 75 kHz and from 75 Hz to 30 kHz in air (Southall et al. 2007)." Southall (et al. 2007) also outlined Marine Mammal Functional Hearing Groups and Estimated Functional Hearing Ranges (Table 3). The hearing groups of marine mammals was also outlined by NOAA (2018) and is seen in Table 4.

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018) outlined the Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. Exposure to intense sound may produce an elevated hearing threshold, also known as a threshold shift (TS). If the threshold returns to the pre-exposure level after a period of time, the TS is known as a temporary threshold shift (TTS); if the threshold does not return to the pre-exposure level, the TS is called a permanent threshold shift (PTS). and the PTS of marine mammals are seen in Table 5.

Table 2. Southall *et al.* (2007) Proposed injury criteria for individual marine mammals exposed to "discrete" noise events (either single or multiple exposures within a 24-h period).

	Sound type		
Marine mammal group	Single pulses	Multiple pulses	Nonpulses
Low-frequency cetaceans	Cell 1	Cell 2	Cell 3
Sound pressure level	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)
Sound exposure level	198 dB re: 1 μPa^2-s (M_{lf})	198 dB re: 1 μPa^2-s (M_{lf})	215 dB re: 1 μPa^2-s (M_{lf})
Mid-frequency cetaceans	Cell 4	Cell 5	Cell 6
Sound pressure level	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)
Sound exposure level	198 dB re: 1 μPa^2-s (M_{mf})	198 dB re: 1 μPa^2-s (M_{mf})	215 dB re: 1 μPa^2-s (M_{mf})
High-frequency cetaceans	Cell 7	Cell 8	Cell 9
Sound pressure level	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)
Sound exposure level	198 dB re: 1 μPa^2-s (M_{hf})	198 dB re: 1 μPa^2-s (M_{hf})	215 dB re: 1 μPa^2-s (M_{hf})
Pinnipeds (in water)	Cell 10	Cell 11	Cell 12
Sound pressure level	218 dB re: 1 μPa (peak) (flat)	218 dB re: 1 μPa (peak) (flat)	218 dB re: 1 μPa (peak) (flat)
Sound exposure level	186 dB re: 1 μPa^2-s (M_{pw})	186 dB re: 1 μPa^2-s (M_{pw})	203 dB re: 1 μPa^2-s (M_{pw})
Pinnipeds (in air)	Cell 13	Cell 14	Cell 15
Sound pressure level	149 dB re: 20 μPa (peak) (flat)	149 dB re: 20 μPa (peak) (flat)	149 dB re: 20 μPa (peak) (flat)
Sound exposure level	144 dB re: (20 $\mu Pa)^2$-s (M_{pa})	144 dB re: (20 $\mu Pa)^2$-s (M_{pa})	144.5 dB re: (20 $\mu Pa)^2$-s (M_{pa})

Note: All criteria in the "Sound pressure level" lines are based on the peak pressure known or assumed to elicit TTS-onset, plus 6 dB. Criteria in the "Sound exposure level" lines are based on the SEL eliciting TTS-onset plus (1) 15 dB for any type of marine mammal exposed to single or multiple pulses, (2) 20 dB for cetaceans or pinnipeds in water exposed to nonpulses, or (3) 13.5 dB for pinnipeds in air exposed to nonpulses. See text for details and derivation.

As outlined by Southall et al (2007) "The format of the recommended marine mammal noise exposure criteria is thus a matrix of 15 "cells" that systematically considers three sound types (see next section) and five functional marine mammal hearing groups (see the "Marine Mammal Functional Hearing Groups" section of this chapter). Within each of those 15 cells, we consider two general acoustic metrics (see the "Exposure Criteria Metrics" section) and two levels of exposure effect ("Levels of Noise Effect: Injury and Behavorial Disturbance" section of this chapter). Sixty possible criteria result (i.e., 3 sound types × 5 marine mammal groups × 2 metrics × 2 impact levels), although fewer than 60 are reported due to data limitations."

Table 3. Marine Mammal Functional Hearing Groups and Estimated Functional Hearing Ranges Proposed by Southall *et al.* (2007)

Functional Hearing Group	Estimated Auditory Bandwidth	Genera Represented (Number Species/Subspecies)	Frequency-Weighting Network
Low-frequency cetaceans	7 Hz to 22 kHz	*Balaena, Caperea, Eschrichtius, Megaptera, Balaenoptera* (13 species/subspecies)	M_{lf} (lf: low-frequency cetaceans)
Mid-frequency cetaceans	150 Hz to 160 kHz	*Steno, Sousa, Sotalia, Tursiops, Stenella, Delphinus, Lagenodelphis, Lagenorhynchus, Lissodelphis, Grampus, Peponocephala, Feresa, Pseudorca, Orcinus, Globicephala, Orcacella, Physeter, Delphinapterus, Monodon, Ziphius, Berardius, Tasmacetus, Hyperoodon, Mesoplodon* (57 species/subspecies)	M_{mf} (mf: mid-frequency cetaceans)
High-frequency cetaceans	200 Hz to 180 kHz	*Phocoena, Neophocaena, Phocoenoides, Platanista, Inia, Kogia, Lipotes, Pontoporia, Cephalorhynchus* (19 species/subspecies)	M_{hf} (hf: high-frequency cetaceans)
Pinnipeds in water	75 Hz to 75 kHz	*Arctocephalus, Callorhinus, Zalophus, Eumetopias, Neophoca, Phocarctos, Otaria, Erignathus, Phoca, Pusa, Halichoerus, Histriophoca, Pagophilus, Cystophora, Monachus, Mirounga, Leptonychotes, Ommatophoca, Lobodon, Hydrurga, Odobenus* (41 species/subspecies)	M_{pw} (pw: pinnipeds in water)
Pinnipeds in air	75 Hz to 30 kHz	Same species as pinnipeds in water (41 species/subspecies)	M_{pa} (pa: pinnipeds in air)

Table 4. Hearing Groups of Marine Mammals (NOAA, 2018)

Hearing Group	**Generalized Hearing Range***
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchus cruciger & L. australis)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

***** Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and PW pinniped (approximation).

Table 5. Onset of PTS in Marine mammals

	PTS Onset Thresholds (Received Level)	
Hearing Group	Impulsive[1]	Non-impulsive[2]
Low-Frequency (LF) Cetaceans	Cell 1 *Lpk,flat:* 219 dB *LE,LF,24h:* 183 dB	Cell 2 *LE,LF,24h:* 199 dB
Mid-Frequency (MF) Cetaceans	Cell 3 *Lpk,flat*: 230 dB *LE,MF,24h:* 185 dB	Cell 4 *LE,MF,24h*: 198 dB
High-Frequency (HF) Cetaceans	Cell 5 *Lpk,flat:* 202 dB *LE,HF,24h:* 155 dB	Cell 6 *LE,HF,24h:* 173 dB
Phocid Pinnipeds (PW) (Underwater)	Cell 7 *Lpk,flat:* 218 dB *LE,PW,24h*: 185 dB	Cell 8 *LE,PW*,24h: 201 dB
Otariid Pinnipeds (OW) (Underwater)	Cell 9 *Lpk,flat:* 232 dB *LE,OW,24h:* 203 dB	Cell 10 *LE,OW,24h:* 219 dB

[1]Impulsive: produce sounds that are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI 1986; NIOSH 1998; ANSI 2005).

[2]Non-impulsive: produce sounds that can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent) and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998).

The cetacean species observed in the survey area are high frequency (harbour porpoise), mid-frequency (common bottlenose dolphin) and low frequency (Minke whale) cetaceans. Grey and Common Seals may also be present from the nearby Dalkey Islands. Southall et al. (2007) outlined in their publication "Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations" that for discrete noise events such as multi-beam, for mid-frequency and high frequency cetaceans maximum peak pressure level of 230 dB re 1 uPa and a maximum received sound pressure level of 198 dB re 1 uPa2-s (Table 2). The onset of PTS for Non-impulsive sounds for high, medium, low frequency cetaceans and Phocid Pinnipeds outlined by NOAA (2018) was 173 dB, 198 dB, 199 dB and 219dB respectively.

The proposed survey equipment and the noise frequency emissions are seen in Table 1. The high frequencies emitted from the equipment are above the auditory range of the mid frequency (150Hz-160 kHz) but within the hearing range of high frequency cetaceans (275Hz -160kHz)-observed and on the proposed survey area (Table 2).

The sidescan sonar, single beam echo sounder and Multi Beam Echo Sounder (MBES) will emit noise above the hearing frequency of marine mammals. The hull mounted sub-bottom profiler Pinger (2-200 kHz) emits low and mid frequency noise, within the auditory range of all marine mammals including harbour porpoise, minke whale and dolphin species. The Sub Bottom Profiler (boomer), UHR seismic (sparker source), and Air Gun emit noise below the auditory range of marine mammals. However, all of the equipment (peak noise) at 1m from source emit noise above the onset of PTS for non-impulsive sounds for high, medium, low frequency cetaceans and Phocid Pinnipeds outlined by NOAA (2018) was 173 dB, 198 dB, 199 dB and 219dB respectively and the 198dB proposed injury levels indicated by Southall *et al.* (2007). As a result, negative impacts may be foreseen if marine mammals are close enough to the equipment to receive sound levels above this indicative threshold.

Lurton (2016) modelled the sound field radiated by multibeam echosounders for acoustical impact assessment. He stated that "considering the injury criteria, the results illustrate that injury hazards are possible only at very short distances from the source: e.g. about 5 m for maximum Sound Pressure Level and 12 m for cumulative Sound Exposure Level in the case of a 240-dB source level, considering cetaceans. For behavioural response criteria, the corresponding values are 9 m and 70 m."

By ensuring that the survey complies with DAHG (2014) "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters" sufficient distance will be maintained between the proposed sources of underwater noise and marine mammals. These guidelines require a 1000m distance which would be deemed adequate to mitigate the negative impacts of the proposed survey. In addition, cetaceans in the vicinity of the vessel during start up procedures would be given ample time to leave the site with the soft start procedures outlined in the guidelines. Following consultation with NPWS, which was carried out due to the fact that the works will be carried out during the calving period of harbour porpoise, additional time is to be given to harbour porpoise to leave the survey area prior to starting procedures for soft start procedures if calves are seen within the survey area. 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.

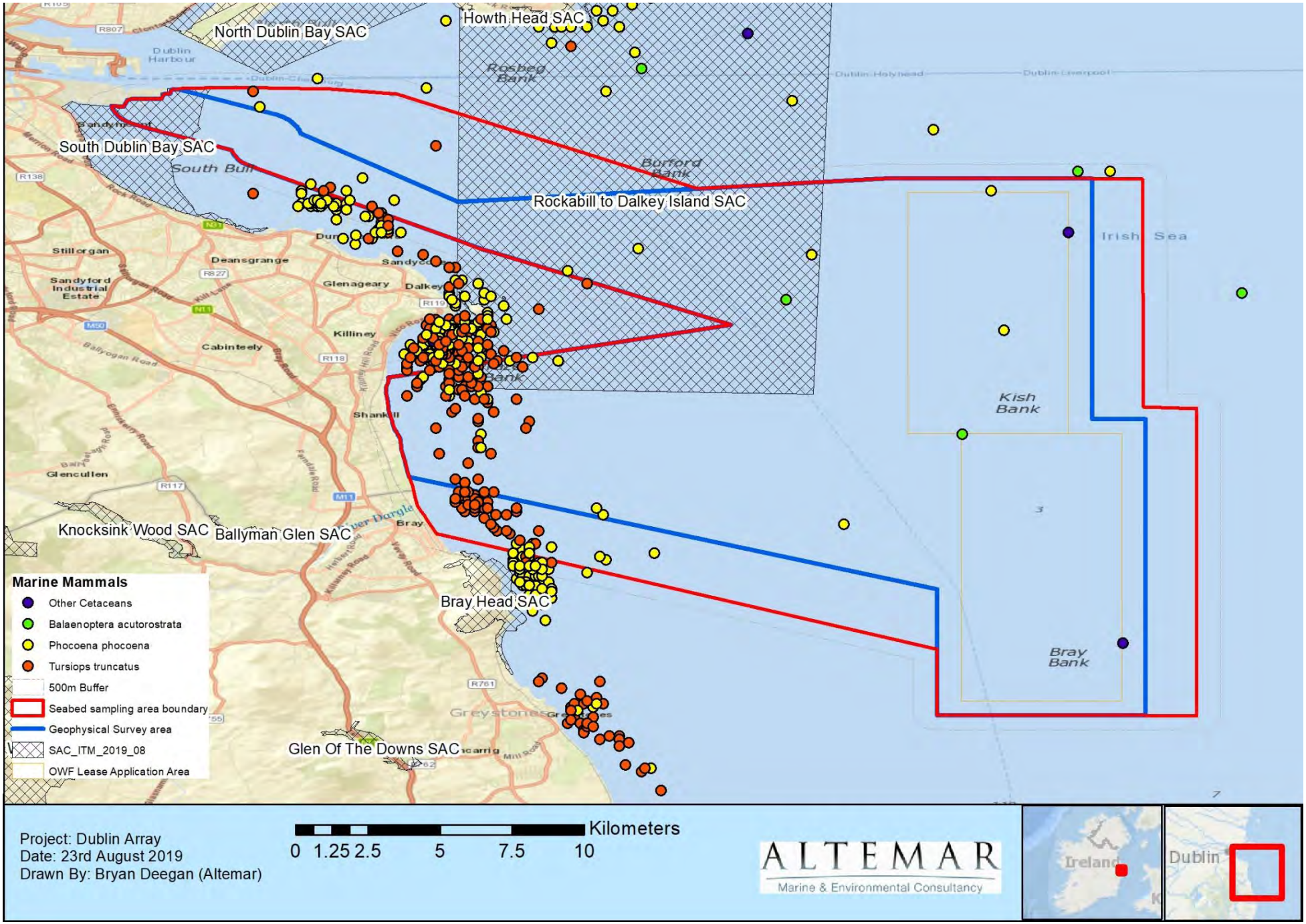


Figure 14. Cetaceans within proximity of the proposed survey.

SITE VISIT AND EVALUATION OF SPECIES AND HABITATS ON SITE.

A site visit was carried out to the three intertidal sampling sites at low tide on the 8th August 2019 (Plates 1-3). This included an inspection of the for species and habitats of conservation importance. The site at Poolbeg (Plate I) primarily consisted of extensive sandflat areas. The borehole location is proximate to the Poolbeg Power station. The High Water Mark (HWM) is located on infill and the area of the proposed borehole is near the HWM but was within an extensive area of decaying marine algae, primarily Ulva sp. with varying water depth up to 15cm. Marram Grass (*Ammophila arenaria*) is present at the top of the infill area and along the northern shore. The sandflat level rises shortly out from shore and became drier underfoot with frequent lugworm (*Arenicola marina*) casts. All CPT samples sites are within the intertidal zone on the sandflat area. No Zostera sp. were noted along the proposed cable survey corridor. The known *Zostera noltii* bed in Pidgeon House Harbour is just outside the 500m buffer and survey to the west of the borehole location. This site is within the South Dublin Bay SAC and the South Dublin Bay and River Tolka SPA.

Plate 1. Poolbeg intertidal sample location (borehole).

The Shanganagh (North) intertidal Sampling Site is seen in Figure 9 and Plate 2. This is a moderately exposed sandy beach in the vicinity of the Shanganagh WWTP. Of note are areas of concrete in the intertidal in the vicinity of the proposed sampling area. Species of algae noted here included., *Palmaria palmata*, *Ceramium* sp, *Fucus serratus*, *Fucus vesiculosus*, *Chondrus crispus Gelidium sp Chorda filum*, *Cladophora rupestris Rhodothamniella floridula*, *Mastocarpus stellatus, Poyphyra sp* and *Lomentaria articulata*. The southern Shanganagh site plate 3 is a more exposed cobble beach with large sedimentary cliffs to the rear. Of note in this area are sand martin (*Riparia riparia*) nests within the cliffs, but not in the immediate area of the sampling.

Plate 2. Shanganagh (North) intertidal Sampling Site.

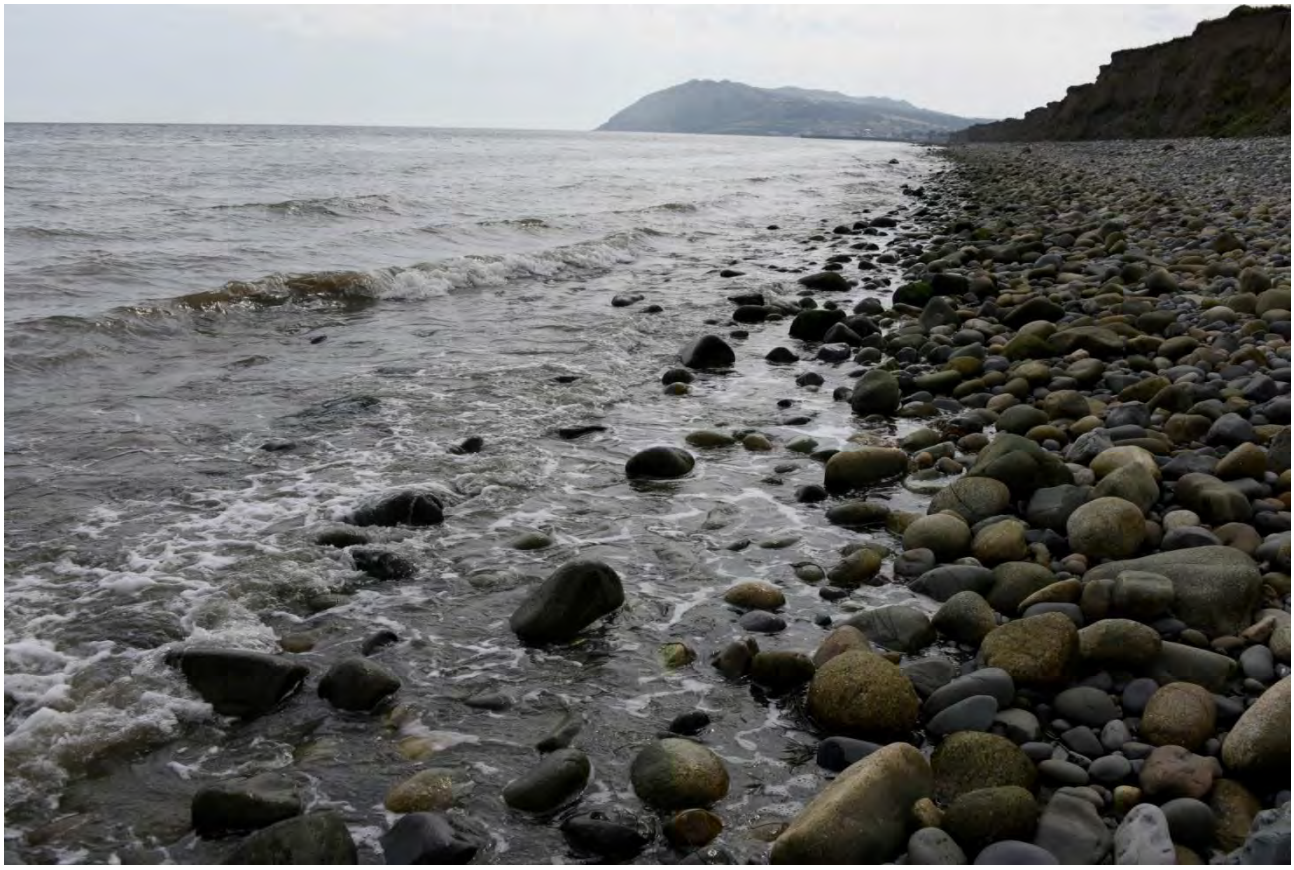


Plate 3. Shanganagh (South) Sampling site.

IDENTIFICATION OF NATURA 2000 SITES POTENTIALLY AFFECTED.

The distance from the proposed survey area to Natura 2000 sites within 15km is seen in Table 2. The proposed survey area is within three NATURA 2000 sites (underlined in Table 2). In addition, as it is proposed to carry out an underwater geophysical survey in the marine environment acoustic noise will be generated. Under the precautionary principle it was deemed possible that the extent of the potential Zone of Influence could be beyond 15km due to noise in the marine environment. As a result, the potential for impact from noise generated from marine survey on SACs (Irish and UK including Northern Ireland) SACs within the Irish Sea up to 250km from the survey area, where cetaceans are features of interest, were also assessed. Based on an evaluation of noise dissipation models in Konsberg (2010), the distance of 250km is considered as extremely conservative in relation to the assessment of noise impacts from the survey, given the dissipation of noise levels over distance and the low levels of noise generated from the survey in an area with high levels of shipping and fishing activity.

Table 2. Linear distances of the proposed site to Natura 2000 sites

Natura 2000 Site	Distance
Special Protection Areas	
South Dublin Bay and River Tolka Estuary SPA [004024] (Within SPA)	0 km
North Bull Island SPA [004006]	0.59 km
Dalkey Islands SPA [004172]	1.2 km
Howth Head Coast SPA [004113]	3.8 km
Baldoyle Bay SPA [004016]	5.4 km
Ireland's Eye SPA [004117]	7.8 km
Broadmeadow/Swords SPA [004025]	11.2 km
The Murrough SPA	8.7 km
Wicklow Mountains SPA [004040]	8.2 km
Special Areas of Conservation	
South Dublin Bay SAC [000210] (Within SAC)	0 km
Rockabill to Dalkey Island SAC [003000] (Within SAC)	0 km
North Dublin Bay SAC [000206]	0.5 km
Bray Head SAC [000714]	0.53km
Howth Head SAC [000202]	3.4 km
Ballyman Glen [000713]	3.6 km
Knocksink wood SAC [000725]	5.6 km
Glen of the Downs SAC	6.2 km
Baldoyle Bay SAC [000199]	6.4 km
Ireland's Eye SAC [002193]	7.8 km
The Murrough Wetlands SAC	9.1 km
Wicklow Mountains SAC [002122]	10.7 km
Malahide Estuary SAC [000205]	10.4 km
Carriggower Bog SAC	11.2 km
Glenasmole Valley SAC [001209]	14.9 km
Codling Fault Zone SAC [003015	13.2 km
UK Marine SAC's in Irish sea (<250km) with cetaceans as a Feature of Interest	
North Anglesey Marine SAC/ Gogledd Môn Forol [UK0030398]	38 km
West Wales Marine SAC / Gorllewin Cymru Forol [UK0030397]	83 km
North Channel SAC [UK0030399]	100 km
Bristol Channel Approaches SAC / Dynesfeydd Môr Hafren [UK0030396]	215 km

The initial screening of NATURA 2000 sites within 15km and UK marine SACs with cetaceans as a feature of interest (<250km) from the site, their features of interest and the Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in adverse effects (without mitigation measures) on each NATURA 2000 site and features of interest, are seen in Table 3. SPAs and

SAC's within 15km are seen in Figures 15 -18. UK offshore SACs within 250km with harbour porpoise as a feature of interest are seen in Figure 19.

Table 3. Screening of NATURA 2000 sites within 15km and sites with cetaceans as features of interest up to 250km of the proposed development.

NATURA CODE	NAME	Screened In/Out	Details/Reason
Special Protection Areas			
IE0004024	South Dublin Bay and River Tolka Estuary SPA	IN	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. **Qualifying Interest** A046 Light-bellied Brent Goose (*Branta bernicla hrota*) A130 Oystercatcher (*Haematopus ostralegus*) A137 Ringed Plover (*Charadrius hiaticula*) A141 Grey Plover (*Pluvialis squatarola*) A143 Knot (*Calidris canutus*) A144 Sanderling (*Calidris alba*) A149 Dunlin (*Calidris alpina*) A157 Bar-tailed Godwit (*Limosa lapponica*) A162 Redshank (*Tringa totanus*) A179 Black-headed Gull (*Chroicocephalus ridibundus*) A192 Roseate Tern (*Sterna dougallii*) A193 Common Tern (*Sterna hirundo*) A194 Arctic Tern (*Sterna paradisaea)* **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** The proposed survey area is within this SPA. Noise and disturbance would be generated from the survey activities which could impact on the qualifying interests of this SPA. Under the precautionary principle there is potential for impact on features of interest without the use of mitigation measures. **Likely significant effects cannot be discounted. Further information is required to determine the potential for adverse effects in the absence of mitigation measures. NIS is Required.**
IE0004006	North Bull Island SPA	IN	**Conservation Objective:** The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. **Qualifying Interests** A046 Light-bellied Brent Goose (*Branta bernicla hrota*) A048 Shelduck (*Tadorna tadorna*) A052 Teal (*Anas crecca*) A054 Pintail (*Anas acuta*) A056 Shoveler (*Anas clypeata*) A130 Oystercatcher (*Haematopus ostralegus*) A140 Golden Plover (*Pluvialis apricaria*) A141 Grey Plover (*Pluvialis squatarola*) A143 Knot (*Calidris canutus*)

NATURA CODE	NAME	Screened In/Out	Details/Reason
			A144 Sanderling (*Calidris alba*) A149 Dunlin (*Calidris alpina alpine*) A156 Black-tailed Godwit (*Limosa limosa*) A157 Bar-tailed Godwit (*Limosa lapponica*) A160 Curlew (*Numenius arquata*) A162 Redshank (*Tringa tetanus*) A169 Turnstone (*Arenaria interpres*) A179 Black-headed Gull (*Chroicocephalus ridibundus*) A999 Wetlands **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** The proposed development site is located within 590m of this SPA. Noise and disturbance would be generated from the survey activities which could impact on the qualifying interests of this SPA. **Likely significant effects cannot be discounted. Further information is required to determine the potential for adverse effects in the absence of mitigation measures. NIS is Required.**
IE004172	Dalkey Islands SPA	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. **Qualifying Interest** *Sterna dougallii* (Roseate Tern) [A192] *Sterna hirundo* (Common Tern) [A193] *Sterna paradisaea* (Arctic Tern) [A194] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the bird species representing the qualifying interest of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 1.2 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, scale of the works and the dilution/mixing in the marine environment any materials from site would be negligible in this Natura 2000 site. marine environment any materials from site would be negligible in this Natura 2000 site. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials within the marine environment any silt, noise or pollution generated from the surveys would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0004113	Howth Head Coast SPA	Out	**Conservation Objective:** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA **Qualifying Interests**

NATURA CODE	NAME	Screened In/Out	Details/Reason
			A188 Kittiwake (*Rissa tridactyla*) **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the bird species representing the qualifying interest of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 3.8 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0004016	Baldoyle Bay SPA	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA **Qualifying Interests** A046 Brent Goose (*Branta bernicla hrota*) A048 Shelduck (*Tadorna tadorna*) A137 Ringed Plover (*Charadrius hiaticula*) A140 Golden Plover (*Pluvialis apricaria*) A141 Grey Plover (*Pluvialis squatarola*) A157 Bar-tailed Godwit (*Limosa lapponica*) A999 Wetlands. **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the bird species or wetlands representing the qualifying interests of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 5.4 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. No *Zostera* sp. were noted in the vicinity of the intertidal survey areas which could be an important habitat for the features of interest of this SPA. The proposed works will not displace birds from a feeding are in the intertidal areas. **No significant effects are likely**
IE0004117	Ireland's Eye SPA	Out	**Conservation Objective:** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

NATURA CODE	NAME	Screened In/Out	Details/Reason
			Qualifying Interests A017 Cormorant (*Phalacrocorax carbo*) A184 Herring Gull (*Larus argentatus*) A188 Kittiwake (*Rissa tridactyla*) A199 Guillemot (*Uria aalge*) A200 Razorbill (*Alca torda*) **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the bird species representing the qualifying interests of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 7.8 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0004025	Broadmeadow Swords Estuary SPA	Out	**Conservation Objectives:** The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Objective 1: To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Broadmeadow Swords Estuary SPA. Objective 2: To maintain the favourable conservation condition of the wetland habitat at Broadmeadow Swords Estuary SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. **Qualifying Interest** A005 Great Crested Grebe (*Podiceps cristatus*) A046 Brent Goose (*Branta bernicla hrota*) A048 Shelduck (*Tadorna tadorna*) A054 Pintail (*Anas acuta*) A067 Goldeneye (*Bucephala clangula*) A069 Red-breasted Merganser (*Mergus serrator*) A130 Oystercatcher (*Haematopus ostralegus*) A140 Golden Plover (*Pluvialis apricaria*) A141 Grey Plover (*Pluvialis squatarola*) A143 Knot (*Calidris canutus*) A149 Dunlin (*Calidris alpina alpine*) A156 Black-tailed Godwit (*Limosa limosa*) A157 Bar-tailed Godwit (*Limosa lapponica*) A162 Redshank (*Tringa tetanus*) A999 Wetlands

NATURA CODE	NAME	Screened In/Out	Details/Reason
			Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects. No impact on the bird species or wetlands representing the qualifying interests of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 11.2 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. No *Zostera* sp. were noted in the vicinity of the intertidal survey areas which could be an important habitat for the features of interest of this SPA. The works will not displace birds from the intertidal areas within this SPA. **No significant effects are likely**
IE004040	Wicklow Mountains SPA	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. **Features of Interest** *Falco colombarius* (Merlin) [A098] *Falco peregrinus* (Peregrine) [A103] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the bird species representing the qualifying interests of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 8.2 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, scale of the works and the dilution/mixing in the marine environment any materials from site would be negligible in this Natura 2000 site. **No significant effects are likely**
IE00004186	The Murrough SPA	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. **Features of Interest** *Red-throated Diver (Gavia stellata) [A001]* *Greylag Goose (Anser anser) [A043]* *Light-bellied Brent Goose (Branta bernicla hrota) [A046]* *Wigeon (Anas penelope) [A050]* *Teal (Anas crecca) [A052]* *Black-headed Gull (Chroicocephalus ridibundus) [A179]* *Herring Gull (Larus argentatus) [A184]*

NATURA CODE	NAME	Screened In/Out	Details/Reason
			Little Tern (Sterna albifrons) [A195] *Wetland and Waterbirds [A999]* **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the bird species representing the qualifying interests of this SPA is foreseen, due to the limited nature of the works in both area and temporal extent. All operations will be a minimum of 8.7 km from the SPA in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**

NATURA CODE	NAME	Screened In/Out	Details/Reason
Special Areas of Conservation			
IE0000210	South Dublin Bay SAC	IN	**Conservation Objectives** To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in South Dublin Bay SAC, which is defined by the following list of targets: • The permanent habitat area is stable or increasing, subject to natural processes. • Maintain the extent of the *Zostera* –dominated community, subject to natural processes. • Conserve the high quality of the *Zostera* –dominated community, subject to natural processes • Conserve the following community type in a natural condition: Fine sands with *Angulus tenuis* community complex. **Feature of Interest** Mudflats and sandflats not covered by seawater at low tide [1140] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** The proposed survey area is within this SAC and intertidal elements of the survey are intrusive and will be carried out on the mudflats and sandflats not covered by seawater at low tide. There is potential for impacts to this habitat and the site's conservation objectives in the absence of mitigation measures. **Likely significant effects cannot be discounted. Further information is required to determine the potential for adverse effects in the absence of mitigation measures. NIS is Required.**
IE0003000	Rockabill to Dalkey Island SAC	IN	**Conservation Objectives:**

NATURA CODE	NAME	Screened In/Out	Details/Reason
			To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** 1170 Reefs 1351 Harbour porpoise *Phocoena phocoena* **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** The proposed survey area is within this SAC and includes geophysical survey which have the potential to generate noise that exceeds thresholds of injury of marine mammals including harbour porpoise. Disturbance of the seabed can lead to suspension of sediments which can lead to impacts on reef habitat communities within the SAC. Under the precautionary principle there is potential for impact on features of interest without the use of mitigation measures. **Likely significant effects cannot be discounted. Further information is required to determine the potential for adverse effects in the absence of mitigation measures. NIS is Required.**
IE0000206	North Dublin Bay SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1395 Petalwort *Petalophyllum ralfsii* 1410 Mediterranean salt meadows (*Juncetalia maritimi*) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with *Ammophila arenaria* 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) 2190 Humid dune slacks **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The features of interest represent coastal habitats and intertidal habitats. No works are proposed in this SAC and the survey works in the vicinity of the SAC are not significant in nature and would not cause significant resuspension of sediments of effects that would cause impact to the features of interest of this SAC. All operations will be a minimum of 530m from the SAC in an area that has regular boat traffic proximate to and

NATURA CODE	NAME	Screened In/Out	Details/Reason
			within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0000714	Bray Head SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Qualifying Interests** (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts (4030) European dry heaths **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The features of interest represent coastal habitats. No works are proposed in this SAC and the survey works in the vicinity of the SAC are not significant in nature and would not generate any effects that would cause impact to the features of interest of this SAC which are terrestrial. All operations will be a minimum of 0.53 km from the SAC in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, scale of the works and the dilution/mixing in the marine environment any materials from site would be negligible in this Natura 2000 site. **No significant adverse effects are likely**
IE0000202	Howth Head SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Qualifying Interests** (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts (4030) European dry heaths **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The features of interest represent coastal habitats. No works are proposed in this SAC and the survey works in the vicinity of the SAC are not significant in nature and would not cause significant effects that would cause impact to the features of interest of this SAC which are terrestrial.. **No significant adverse effects are likely**

NATURA CODE	NAME	Screened In/Out	Details/Reason
IE0000713	Ballyman Glen SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Petrifying springs with tufa formation (Cratoneurion) [7220] Alkaline fens [7230] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. This SAC is located inland and there is no pathway to this SAC from the proposed works. All operations will be a minimum of 3.6 km from the SAC in marine/intertidal habitats. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0000725	Knocksink Wood SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Petrifying springs with tufa formation (Cratoneurion) [7220] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*) [91E0] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** All operations will be a minimum of 5.6 km from the SAC. No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. This SAC is located inland and there is no pathway to this SAC from the proposed works. **No significant effects are likely**
IE0000719	Glen of the Downs SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]

NATURA CODE	NAME	Screened In/Out	Details/Reason
			Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects. All operations will be a minimum of 6.2 km from the SAC. No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. This SAC is located inland and there is no pathway to this SAC from the proposed works. **No significant effects are likely**
IE0000199	Baldoyle Bay SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Salicornia and other annuals colonising mud and sand (1310) Atlantic salt meadows (*Glauco - Puccinellietalia maritimae*) (1330) Mediterranean salt meadows (*Juncetalia maritimi*)(MSM) (1410) The following habitats were recorded during the Coastal Monitoring Project (Ryle *et al.,* 2009) but they are not listed in the qualifying interests for the site: Annual vegetation of drift lines (1210) Embryonic shifting dunes (2110) Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120) Fixed coastal dunes with herbaceous vegetation (2130) Humid dune slacks (2190) **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The features of interest represent coastal habitats and intertidal habitats. No works are proposed in this SAC and the survey works. All operations will be a minimum of 6.4 km from the SAC in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0002193	Ireland's Eye SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

NATURA CODE	NAME	Screened In/Out	Details/Reason
			Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects. No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The features of interest represent coastal habitats and intertidal habitats. No works are proposed in this SAC and the survey works. All operations will be a minimum of 7.8 km from the SAC in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0002249	The Murrough Wetlands SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Alkaline fens [7230] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. No works are proposed in this SAC and the survey works. All operations will be a minimum of 9.1 km from the SAC in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site.. **No significant effects are likely**
IE0002122	Wicklow Mountains SAC	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with Erica tetralix [4010]

NATURA CODE	NAME	Screened In/Out	Details/Reason
			European dry heaths [4030] Alpine and Boreal heaths [4060] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] *Lutra lutra* (Otter) [1355] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** All operations will be a minimum of 10.7 km away from the SAC. No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. This SAC is located inland and there is no pathway to this SAC from the proposed works **No significant effects are likely**
IE0000205	Malahide Estuary SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** 1140 Mudflats and sandflats not covered by seawater at low tide. 1310 Salicornia and other annuals colonising mud and sand 1320 Spartina swards (*Spartinion maritimae*) As outlined in NPWS (2013) it not be necessary to assess the likely effects of plans or projects against this Annex I habitat at this site. 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1410 Mediterranean salt meadows (*Juncetalia maritimi*) 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The features of interest represent coastal habitats and intertidal habitats. No works are proposed in this SAC and the survey works. All operations will be a minimum of 10.4 km from the SAC in an area that has regular boat traffic proximate to and within Dublin Bay. As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor

NATURA CODE	NAME	Screened In/Out	Details/Reason
			and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0000716	Carriggower Bog SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Transition mires and quaking bogs [7140] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** All operations will be a minimum of 11.2 km from the SAC. No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. This SAC is located inland and there is no pathway to this SAC from the proposed works. . **No significant effects are likely**
IE0003015	Codling Fault Zone SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Submarine structures made by leaking gases [1180] **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** The works are not in the vicinity of the SAC. All works are a minimum of 13.2km from this SAC. No impact on the feature of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. The feature of interest is a marine habitat. No works are proposed in this SAC As a result of the distance, the small scale of the works in the intertidal and subtidal environments, the minor and localised nature of perceived impacts and the dilution of materials /mixing in within the marine environment any silt, noise or pollution generated from the surveys materials or terrestrial noise from works would be negligible in this Natura 2000 site. **No significant effects are likely**
IE0001209	Glenasmole Valley SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. The favourable conservation status of a species is achieved when:

NATURA CODE	NAME	Screened In/Out	Details/Reason
			• population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. **Qualifying Interests** 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*) (* important orchid sites)* 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) 7220 Petrifying springs with tufa formation (Cratoneurion)* * denotes a priority habitat **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** All operations will be a minimum of 14.9 km from the SAC. No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent. This SAC is located inland and there is no pathway to this SAC from the proposed works. **No significant effects are likely**

NATURA CODE	NAME	Screened In/Out	Details/Reason
UK Offshore **Special Areas of Conservation**			
UK0030398	North Anglesey Marine SAC/ Gogledd Môn Forol	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Feature of Interest** Annex II species that are a primary reason for selection of this site 1351 Harbour porpoise *Phocoena phocoena* **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent and the distance between the works and this SAC.

NATURA CODE	NAME	Screened In/Out	Details/Reason
			This SAC is located 38km from the proposed works in a busy shipping area where fishing is also carried out. Existing anthropogenic noise exists due to shipping and fishing activity in the area. As there is a significant distance (38km) from the survey, noise generated from the survey would not be at levels to impact on Harbour porpoise As a result of the distance, scale of the works and the background noise levels in the marine environment any noise from the works would be negligible in this Natura 2000 site and not at levels that would impact on the harbour porpoise within this SAC. **No significant adverse effects are likely**
UK0030397	West Wales Marine SAC / Gorllewin Cymru Forol	Out	**Conservation Objectives** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Feature of Interest** Annex II species that are a primary reason for selection of this site 1351 Harbour porpoise *Phocoena phocoena* **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent and the distance between the works and this SAC. This SAC is located 83km from the proposed works in a busy shipping area where fishing is also carried out. Existing anthropogenic noise exists due to shipping and fishing activity in the area. As there is a significant distance from the survey (83km) noise generated from the survey would not be at levels to impact on Harbour porpoise As a result of the distance, scale of the works and the background noise levels in the marine environment any noise from the works would be negligible in this Natura 2000 site and not at levels that would impact on the harbour porpoise within this SAC. . **No significant effects are likely**
UK0030399	North Channel SAC	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Feature of Interest** Annex II species that are a primary reason for selection of this site 1351 Harbour porpoise Phocoena phocoena **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent and the distance between the works and this SAC. This SAC is located 100km from the proposed works in a busy

NATURA CODE	NAME	Screened In/Out	Details/Reason
			shipping area where fishing is also carried out. Existing background noise levels exist. As there is a significant distance from the survey As there is a significant distance (100km) from the survey, noise generated from the survey would not be at levels to impact on Harbour porpoise As a result of the distance, scale of the works and the background noise levels in the marine environment any noise from the works would be negligible in this Natura 2000 site and not at levels that would impact on the harbour porpoise within this SAC. . **No significant effects are likely**
UK0030396	Bristol Channel Approaches SAC / Dynesfeydd Môr Hafren	Out	**Conservation Objectives:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Features of Interest** Annex II species that are a primary reason for selection of this site 1351 Harbour porpoise Phocoena phocoena **Source/Pathway/Receptor links between the works and the Natura 2000 site, with the potential to result in significant adverse effects.** No impact on the features of interest of this SAC is foreseen, due to the limited nature of the works in both area and temporal extent and the distance between the works and this SAC. This SAC is located 215km from the proposed works in a busy shipping area where fishing is also carried out. Existing anthropogenic noise exists due to shipping and fishing activity in the area. As there is a significant distance (215km) from the survey, noise generated from the survey would not be at levels to impact on Harbour porpoise As a result of the distance, scale of the works and the background noise levels in the marine environment any noise from the works would be negligible in this Natura 2000 site and not at levels that would impact on the harbour porpoise within this SAC. **No significant effects are likely**

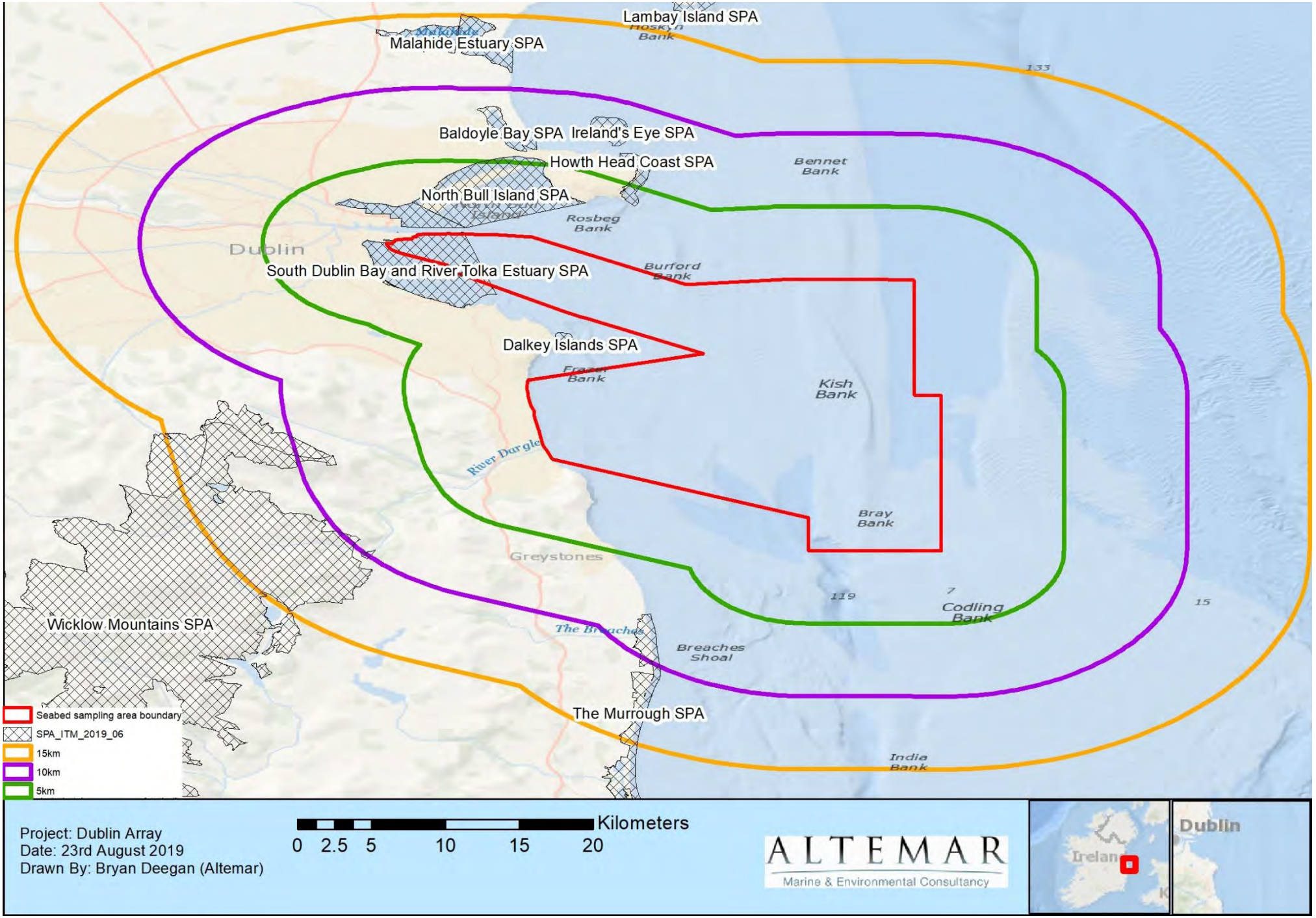


Figure 15. Special Protected Areas located within 15km of the proposed survey.

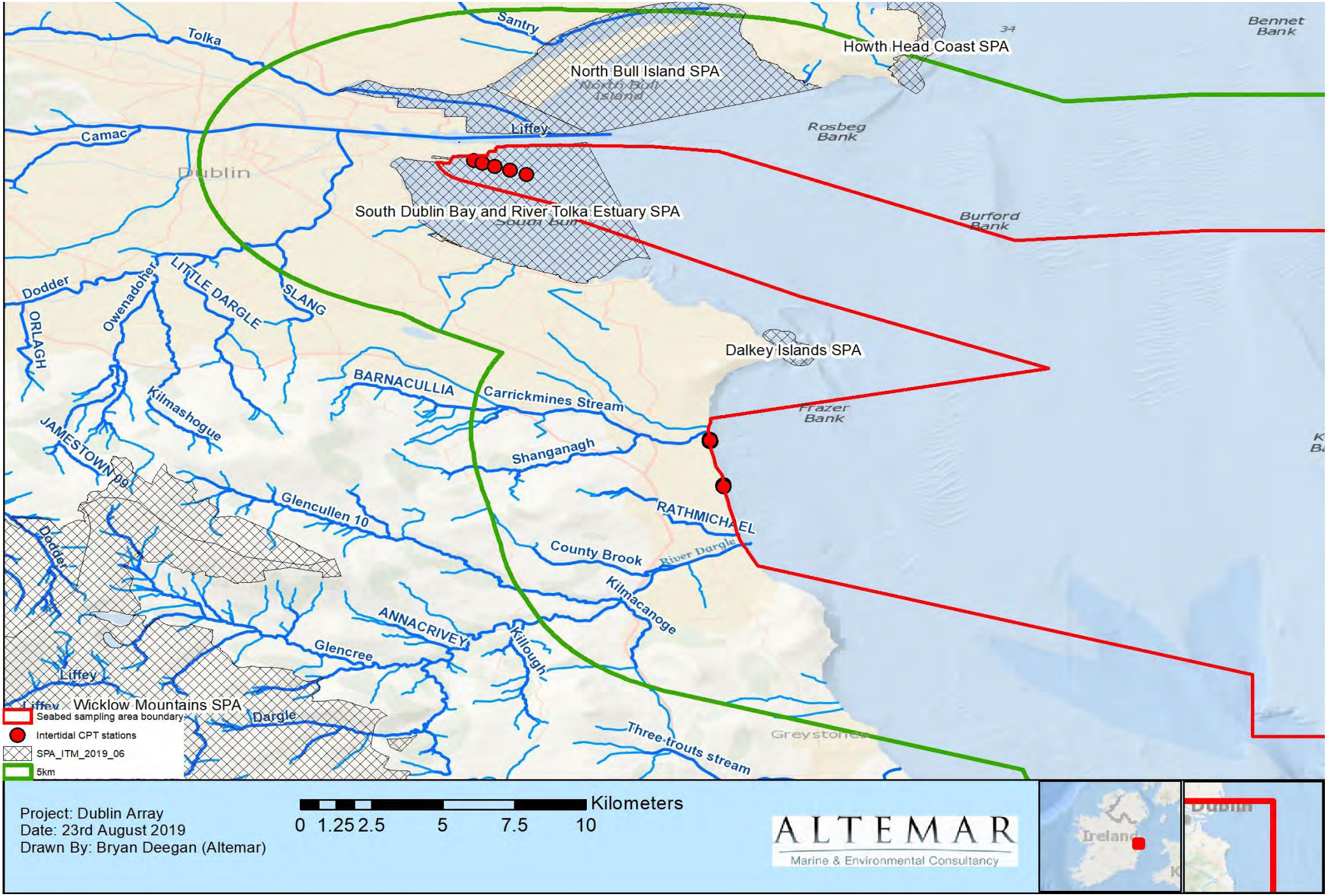


Figure 16. Special Protected Areas and watercourses located within the vicinity of the inshore survey elements.

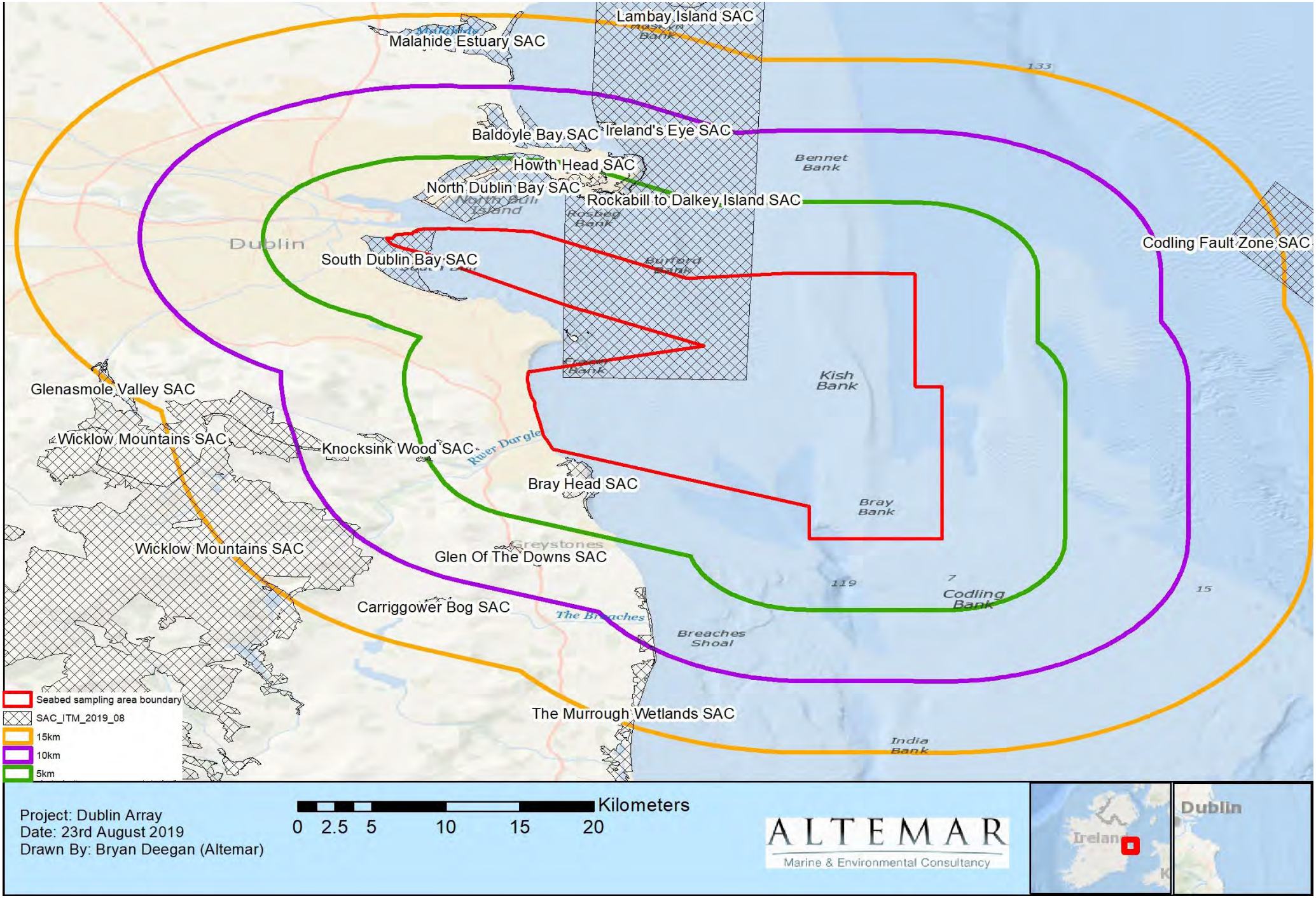


Figure 17. Special Areas of Conservation located within 15km of the proposed survey.

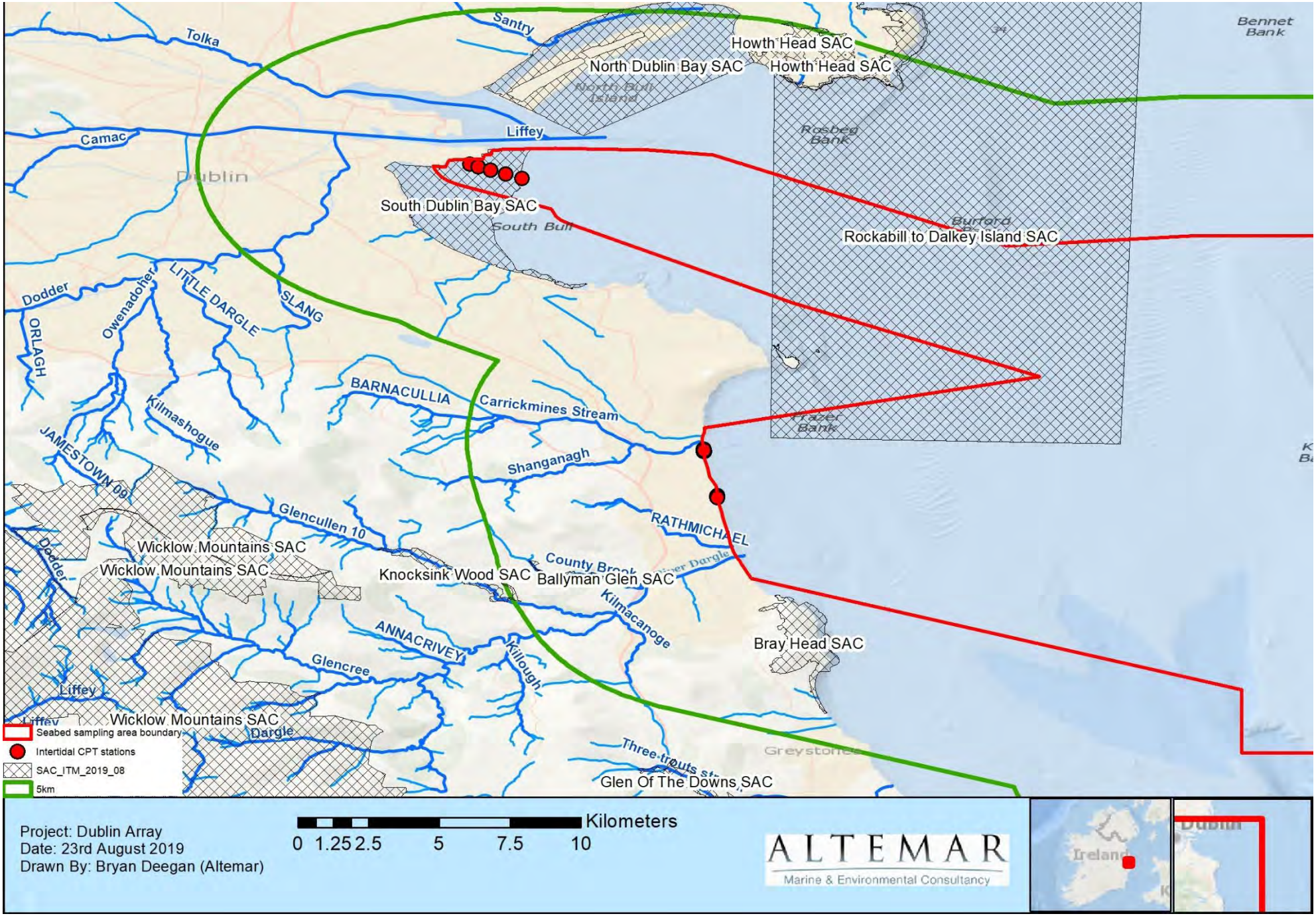


Figure 18. Special Areas of Conservation and watercourses located within the vicinity of the inshore survey elements.

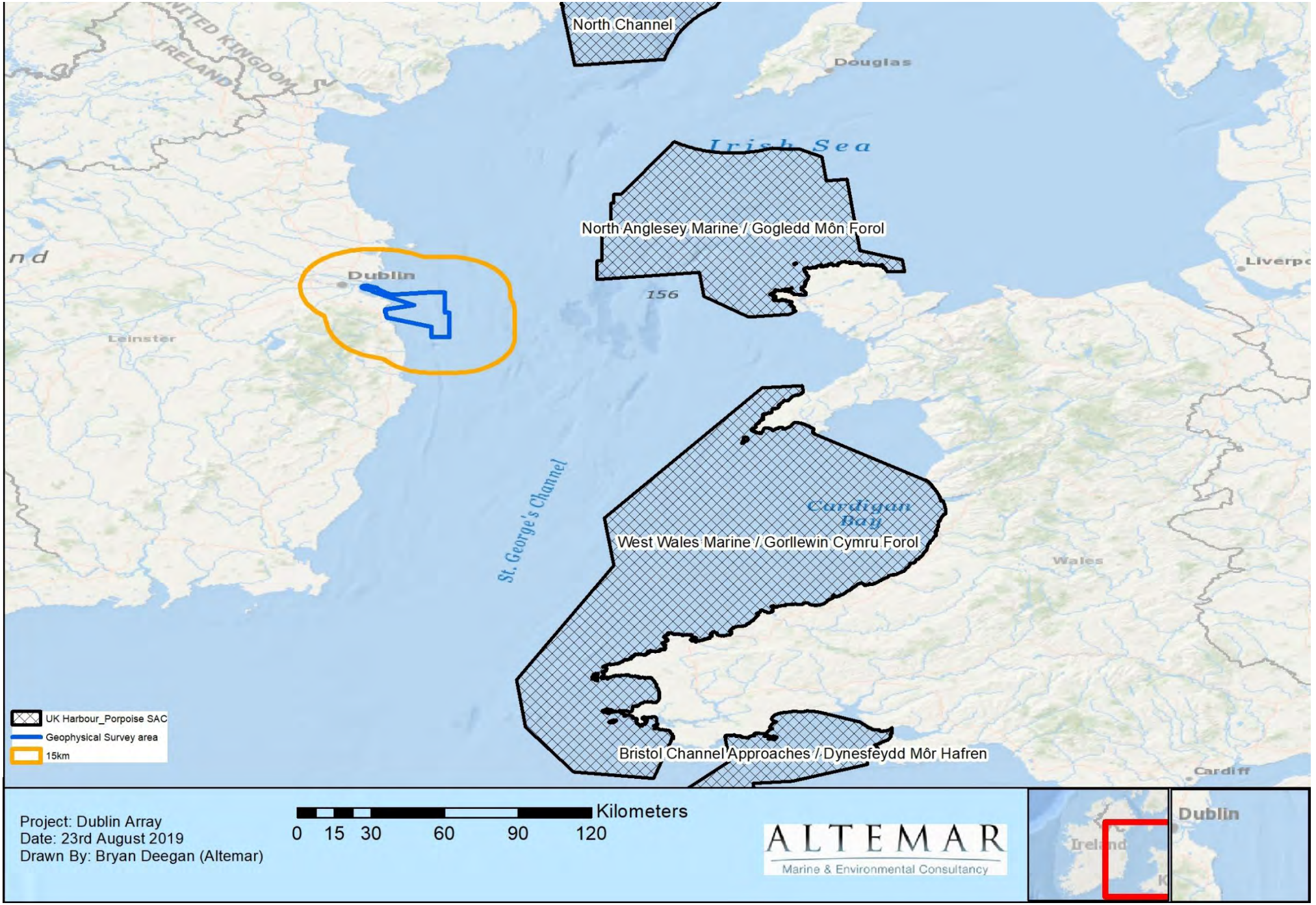


Figure 19. UK offshore SAC's within 250km with harbour porpoise as a feature of interest.

IN-COMBINATION EFFECTS

The proposed works are in the intertidal and marine environment. A search of foreshore applications and determinations[13] indicate that several projects are within proximity to the proposed surveys which could potentially lead to in combination effects.

Celtix Connect Limited, is proposing the installation and maintenance of a fibre-optic Havhingsten Telecommunications Cable - landing site is at Loughshinny, Fingal, Co Dublin. The application is currently being assessed and the area is 23km to the north of the proposed survey area. There is a significant distance between the proposed survey and the cable laying project. No in combination effects are foreseen. .

SSE Renewables submitted an application for geophysical, geotechnical and environmental site investigation works at off Clogher Head, Co. Louth and Braymore Point, Co. Dublin. The proposed site investigation works will likely be carried out between April and October within the five years following award of the Foreshore Licence to minimise the risk associated with operating offshore in poor winter weather conditions. However, SSE "would like the Foreshore Licence to start on 01 August 2019". The geophysical survey campaign is expected to take up to 2 months. No in combination effects would be foreseen.

Dublin Port Company (DPC) is currently undergoing a Capital Dredging programme in relation to the Alexandra Basin Re-development (FS005699) which was granted in 2015 and have applied for a Foreshore Licence (April 2019) as they need to carry out regular maintenance dredging of the navigation channel, basins and berthing pockets in order to maintain their advertised charted depths and hence provide safe navigation for vessels to and from the Port. Maintenance dredging campaigns are required approximately every 18 months but may need to be carried out more regularly as a result of extreme weather events causing excessive siltation in the channel. The designated spoil area is in Dublin Bay within the proposed survey area. The NIS for the Capital Dredging programme "concluded, beyond reasonable scientific doubt, that the proposed project with the implementation of the prescribed mitigation measures will not give rise to significant impacts, either individually or in combination with other plans and projects, in a manner which adversely affects the integrity of any designated site within the Natura 2000 network". The AA screening for the maintenance dredging project assessed the project in combination other plans and projects. It stated that "As there are no appreciable effects as a result of the proposed development alone which is likely to result in significant effects, there is no pathway of additive effect between the proposed development and the projects listed above for significant cumulative or in-combination effects which can be considered to significantly affect the QIs, SCIs or conservation objectives of the European sites considered in this exercise." This area is not adjacent to the proposed survey and no in combination effects are foreseen.

Dun Laoghaire Rathdown County Council – was granted permission in December 2018 to transport to site of rock across the foreshore at Corbawn Lane Beach Access, Shankill, Co Dublin. Ongoing erosion at the location has led to a situation where the concrete public access structure is at risk of future instability due to the over steep nature of the glacial till cliff on which the access structure is located. The underlying foundation of the access structure is also being undermined and outflanked due to coastal erosion, with the foundation toe of the structure being exposed. There are currently 25m and 50m lengths of revetment to the south and north of the access structure respectively. The works are necessary to stabilise the public access structure as well as the cliffs adjacent to this structure which are over-steep and at risk of falling on to the beach. These coastal protection measures are also important for the protection of the ten properties which are located back from the cliff face to the immediate north of Corbawn Lane, on Seafield Road. This area is proximate to the proposed sampling site Shanganagh (North). The AA screening for this project stated that "it has been objectively concluded during the screening process that significant impacts to Natura 2000 or Ramsar site are not expected to ensue from the project considered in this report." The works in the vicinity of this area are minor in nature and involve

[13] https://www.housing.gov.ie/planning/foreshore/applications/overview

survey of the intertidal and subtidal, which will not impact significantly on the intertidal or subtidal habitats. No in combination effects are foreseen as the projects are localised in an area 2km from the nearest Natura 2000 site.

In 2019 Ringsend WWTP was granted permission to upgrade its facilities. This would see an improvement in water quality. No in combination effects are foreseen to arise from the construction of a new outfall and the proposed marine survey activities . Recent water quality assessment of Dublin Bay (which includes part of the survey area) and the Liffey Estuary Lower are currently classified as 'Unpolluted' water quality status (https://gis.epa.ie/EPAMaps/). On the basis of the works in proximity of the proposed survey their location and distance to the nearest Natura 2000 sites, there will be no significant in combination effect.

APPROPRIATE ASSESSMENT SCREENING CONCLUSIONS

An initial screening of the proposed works, using the precautionary principle (without the use of any mitigation measures) and the Source/Pathway/Receptor links between the proposed works and Natura 2000 sites with the potential to result in significant adverse effects on the conservation objectives and features of interest of the Natura 2000 sites was carried out in Table 3.

Based on objective information and assessment, the possibility of significant adverse effects caused by the proposed project was excluded for the following Natura 2000 sites.

Special Protection Areas
Dalkey Islands SPA [004172]
Howth Head Coast SPA [004113]
Baldoyle Bay SPA [004016]
Ireland's Eye SPA [004117]
Broadmeadow/Swords SPA [004025]
The Murrough SPA
Wicklow Mountains SPA [004040]

Special Areas of Conservation
Bray Head SAC [000714]
Howth Head SAC [000202]
Ballyman Glen [000713]
Knocksink wood SAC [000725]
Glen of the Downs SAC
Baldoyle Bay SAC [000199]
Ireland's Eye SAC [002193]
The Murrough Wetlands SAC
Wicklow Mountains SAC [002122]
Malahide Estuary SAC [000205]
Carriggower Bog SAC
Glenasmole Valley SAC [001209]
Codling Fault Zone SAC [003015

UK Marine SAC's in Irish sea (<250km) with cetaceans as a Feature of Interest
North Anglesey Marine SAC/ Gogledd Môn Forol [UK0030398]
West Wales Marine SAC / Gorllewin Cymru Forol [UK0030397]
North Channel SAC [UK0030399]
Bristol Channel Approaches SAC / Dynesfeydd Môr Hafren [UK0030396]

The project is limited in scale and extent and the potential zone of influence is restricted to the immediate vicinity of the proposed development. However, it should also be noted that no effects are foreseen on Natura 2000 sites beyond 15km from the proposed development due to the limited scale and nature of the project. However, despite the fact that potential effects are deemed to be restricted to a very localised zone of influence, under the precautionary principle the localised

disturbance, acoustic noise may have the potential for impact on the features of interest for the following Natura 2000 sites (without the use of mitigation measures):

Special Protection Areas

- South Dublin Bay and River Tolka Estuary SPA [004024] (Survey within SPA)
- North Bull Island SPA [004006]

Special Areas of Conservation

- South Dublin Bay SAC [000210] (Survey within SAC)
- Rockabill to Dalkey Island SAC [003000] (Survey within SAC)
- North Dublin Bay SAC [000206]

Mitigation measures are proposed during the survey. A Stage 2 AA (NIS) of the proposed survey is required as it cannot be excluded, on the basis of objective information (without the use of mitigation measures), that the proposed survey, individually or in combination with other plans or projects, will have a significant effect on a European site. The proposed mitigation measures are outlined in the NIS.

5. NATURA IMPACT STATEMENT

A Natura Impact Statement (NIS) is Stage 2 of the Appropriate Assessment process. In the case of the proposed project, as a result of survey being carried out within Natura 2000, a NIS is required as it cannot be excluded, on the basis of objective information (without the use of mitigation measures), that the proposed development, individually or in combination with other plans or projects, will have a significant effect on the following Natura 2000 sites:

Special Protection Areas

- South Dublin Bay and River Tolka Estuary SPA [004024] (Survey within SPA)
- North Bull Island SPA [004006]

Special Areas of Conservation

- South Dublin Bay SAC [000210] (Survey within SAC)
- Rockabill to Dalkey Island SAC [003000] (Survey within SAC)

The NIS evaluates the potential for direct, indirect effects, alone or in combination with other plans and projects having taken into account the use of mitigation measures.

SITE RELATED INFORMATION.

SOUTH DUBLIN BAY AND RIVER TOLKA ESTUARY SPA

As outlined in the site synopsis (NPWS, 2015) the "South Dublin Bay and River Tolka Estuary SPA is of ornithological importance as it supports an internationally important population of Light-bellied Brent Goose and nationally important populations of a further nine wintering species. Furthermore, the site supports a nationally important colony of breeding Common Tern and is an internationally important passage/staging site for three tern species. It is of note that four of the species that regularly occur at this site are listed on Annex I of the E.U. Birds Directive, i.e. Bar-tailed Godwit, Common Tern, Arctic Tern and Roseate Tern." Of particular note to the proposed development "Both Common Tern and Arctic Tern breed in Dublin Docks, on a man-made mooring structure known as the E.S.B. dolphin– this is included within the site (Figure 6). Small numbers of Common Tern and Arctic Tern were recorded nesting on this dolphin in the 1980s. A survey in 1995 recorded nationally important numbers of Common Tern nesting here (52 pairs). The breeding population of Common Tern at this site has increased, with 216 pairs recorded in 2000. This increase was largely due to the ongoing management of the site for breeding terns. More recent data highlights this site as one of the most important Common Tern sites in the country with over 400 pairs recorded here in 2007."

The Natura 2000 Standard Data Form (2015b) states that "this site comprises a substantial part of Dublin Bay. It includes virtually all of the intertidal area in the south bay, as well as much of the Tolka Estuary to the north of the River Liffey. A portion of the shallow bay waters is also included. In the south bay, the intertidal flats extend for almost 3 km at their widest. The sediments are predominantly well-aerated sands. The sands support the largest stand of *Zostera noltii* on the East Coast. Several permanent channels exist, the largest being Cockle Lake. A small sandy beach occurs at Merrion Gates, while some bedrock shore occurs near Dun Laoghaire. The landward boundary is now almost entirely artificially embanked. Sediments in the Tolka Estuary vary from soft thixotrophic muds with a high organic content in the inner estuary to exposed, well aerated sands off the Bull Wall. The proximity of the site to Dublin City results in it being a very popular recreational area. It is also important for educational and research purposes. The site possesses extensive intertidal flats which support wintering waterfowl which are part of the overall Dublin Bay population. It regularly has an internationally important population of Branta bernicla hrota, which feeds on *Zostera noltii* in the autumn. It has nationally important numbers of a further 6 species: *Haematopus ostralegus*, *Charadrius hiaticula*, *Calidris canutus*, *Calidris alba*, *Calidris alpina* and *Limosa lapponica*. It is an important site for wintering gulls, especially *Larus ridibundus* and *Larus*

canus. South Dublin Bay is the premier site in Ireland for *Larus melanocephalus,* with up to 20 birds present at times. Is a regular autumn roosting ground for significant numbers of terns, including *Sterna dougallii*, *S. hirundo* and *S. paradisaea*."

NORTH BULL ISLAND SPA

As outlined in the Site Synopsis (NPWS, 2015c) "the North Bull Island SPA is an excellent example of an estuarine complex and is one of the top sites in Ireland for wintering waterfowl. It is of international importance on account of both the total number of waterfowl and the individual populations of Light-bellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit
that use it. Also of significance is the regular presence of several species that are listed on Annex I of the E.U. Birds Directive, notably Golden Plover and Bar -tailed Godwit, but also Ruff and Short-eared Owl. North Bull Island is a Ramsar Convention site, and part of the North Bull Island SPA is a Statutory Nature Reserve and a Wildfowl Sanctuary.

The Natura 2000 Standard Data Form (NPWS, 2015d) "the North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the 18th and 19th centuries. It is almost 5km long and 1km wide and runs parallel to the coast between Clontarf and Sutton. The sediment which forms the island is predominantly glacial in origin and siliceous in nature. A well-developed dune system runs the length of the island, with good examples of embryonic, shifting marram and fixed dunes, as well as excellent examples of humid dune slacks. Extensive salt marshes also occur. Between the island and the mainland occur two sheltered intertidal areas which are separated by a solid causeway constructed in 1964. The seaward side of the island has a fine sandy beach.

A substantial area of shallow marine water is included in the site. Part of the interior of the island has been converted to golf courses. The proximity of the North Bull Island to Dublin City results in it being a very popular recreational area. It is also very important for educational and research purposes. Nature conservation is a main land use within the site.

The site is among the top ten sites for wintering waterfowl in the country. It supports internationally important populations of *Branta bernicila hrota* and *Limosa lapponica* and is the top site in the country for both of these species. A further 14 species have populations of national importance, with particular notable numbers of *Tadorna tadorna* (8.5% of national total), *Anas acuta* (11.6% of national total), *Pluvialis squatarola* (6.9% of national total), *Calidris canutus* (10.5% of national total). North Bull Island SPA is a regular site for passage waders such as *Philomachus pugnax*, *Calidris ferruginea* and *Tringa erythropus*. The site supports *Asio flammeus* in winter. Formerly the site had an important colony of *Sterna albifrons* but breeding has not occurred in recent years. The site provides both feeding and roosting areas for the waterfowl species. Habitat quality for most of the estuarine habitats is very good. The site has a population of the rare *Petalophyllum ralfsii* which is the only known station away from the western seaboard as well as five Red Data Book vascular plant species and four bryophyte species. It is nationally important for three insect species. Wintering bird populations have been monitored more or less continuously since the late 1960s, and the other scientific interests of the site have also been well documented. Future prospects are good owing to various designations assigned to site."

SOUTH DUBLIN BAY SAC

As outlined in the Site Synopsis (NPWS, 2015e) "South Dublin Bay is an important site for waterfowl. Although birds regularly commute between the south bay and the north bay, recent studies have shown that certain populations which occur in the south bay spend most of their time there. The principal species are Oystercatcher (1215), Ringed Plover (120), Sanderling (344), Dunlin (2628) and Redshank (356) (average winter peaks 1996/97 and 1997/98). Up to 100 Turnstones are usual in the south bay during winter. Brent Goose regularly occur in numbers of international importance (average peak 299). Bar -tailed Godwit (565), a species listed on Annex I of the E.U. Birds Directive, also occur. Large numbers of gulls roost in South Dublin Bay, e.g. 4,500 Black-headed Gulls in February 1990; 500 Common Gulls in February 1991. It is also an important tern roost in the autumn, regularly holding 2000-3000 terns including Roseate Terns, a

species listed on Annex I of the E.U. Birds Directive. South Dublin Bay is largely protected as a Special Protection Area."
The Natura 2000 Standard Data Form (NPWS, 2015f) "This intertidal site extends from the South Wall at Dublin Port to the West Pier at Dun Laoghaire, a distance of c. 5 km. At their widest, the intertidal flats extend for almost 3 km. The seaward boundary is marked by the low tide mark, while the landward boundary is now almost entirely artificially embanked. Several permanent channels exist, the largest being Cockle Lake. A small sandy beach occurs at Merrion Gates, while some bedrock shore occurs near Dun Laoghaire. A number of small streams and drains flow into the site. The proximity of the site to Dublin City results in it being a very popular recreational area. It is also important for educational and research purposes."

The "Site possesses a fine and fairly extensive example of intertidal flats. Sediment type is predominantly sand, with muddy sands in the more sheltered areas. A typical macro-invertebrate fauna exists. Has the largest stand of Zostera on the east coast. Supports part of the important wintering waterfowl populations of Dublin Bay. Regularly has an internationally population of *Branta bernicila horta*, plus nationally important numbers of at least a further 6 species, including *Limosa lapponica*. Regular autumn roosting ground for significant numbers of Sterna terns, including *S. dougallii*. The scientific interests of the site have been well documented.

At low tide the inner parts of the south bay are used for amenity purposes. Bait-digging is a regular activity on the sandy flats. At high tide some areas have wind-surfing and jet-skiing. This site is a fine example of a coastal system, with extensive sand and mudflats, and incipient dune formations. South Dublin Bay is also an internationally important bird site."

NORTH DUBLIN BAY cSAC

As outlined in the NPWS Site Synopsis (NPWS, 2016g) "this site is an excellent example of a coastal site with all the main habitats represented. The site holds good examples of nine habitats that are listed on Annex I of the E.U. Habitats Directive; one of these is listed with priority status. Several of the wintering bird species have populations of international importance, while some of the invertebrates are of national importance. The site contains a numbers of rare and scarce plants including some which are legally protected."

The Natura 2000 Standard Data Form (NPWS, 2015a) states that "the North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the 18th and 19th centuries. It is almost 5km long and 1km wide and runs parallel to the coast between Clontarf and Sutton. The sediment which forms the island is predominantly glacial in origin and siliceous in nature. Between the island and the mainland there occurs two sheltered intertidal areas which are separated by a solid causeway constructed in 1964. The seaward side of the island has a fine sandy beach. A substantial area of shallow marine water is included in the site.

Site possesses an excellent diversity of coastal habitats. The North Bull Island dune system is one of the most important systems on the east coast and is one of the few in Ireland that is actively accreting. It possesses extensive and mostly good quality examples of embryonic, shifting marram and fixed dunes, as well as excellent examples of humid dune slacks. Both Atlantic and Mediterranean salt marshes are well represented and a particularly good marsh zonation is shown. The salt marshes grade into mudflats and sandflats, some of which are dominated by annual Salicornia species. *Petalophyllum ralfsii* occurs at its only known station away from the western seaboard. The site has five Red Data Book vascular plant species and four Red Data Book bryophyte species. This is one of the most important sites for wintering waterfowl in Ireland, with internationally important populations of *Branta bernicla horta*, *Calidris canutus* and *Limosa lapponica*, plus nationally important numbers of a further 14 species. 20% of the national total of *Pluvialis squatarola* occurs here. Formerly it had important colony of *Sterna albifrons*. North Dublin Bay is nationally important for three insect species."

ROCKABILL TO DALKEY SAC
***Phocoena Phocoena* (Harbour porpoise)**

As stated in NPWS (2013b) "this small toothed cetacean species (from the mammal Order Cetacea - whales, dolphins and porpoises) occurs in estuarine, coastal and offshore waters in which it carries out breeding, foraging, resting, social activity and other life history functions. Its distribution extends predominantly throughout continental shelf waters and the species may range over many hundreds or thousands of kilometres. As air-breathing mammals, harbour porpoises must return to the water surface to breathe but they are otherwise wholly aquatic. Individual porpoises of all ages use sound as their primary sensory tool in order to navigate, communicate, avoid predators, or locate and facilitate the capture of prey under water. Group sizes tend to be small (i.e. in single figures, more commonly 2 to 3 individuals) although larger aggregations may occasionally be recorded, particularly in the summer months.

Harbour porpoise breed annually in Ireland, predominantly during the months of May to September. The principal calving period in Irish waters is thought to occur in the months of May and June, although it may extend throughout the summer months and into early autumn. Newborn calves are weaned before they are one year old. Mating commonly occurs several weeks after the calving season.

The occurrence of harbour porpoises within a prescribed marine area can be estimated using visual observation and passive acoustic methods in order to deliver an assessment of community or population size (i.e. relative abundance or absolute abundance), density and distribution. The size, community structure and distribution or habitat use of harbour porpoise inhabiting Rockabill to Dalkey Island SAC are not fully understood. In acknowledging limitations in the understanding of aquatic habitat use by the species within the site, it should be noted that all suitable aquatic habitat (Figure 19) is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by harbour porpoises.

Survey effort targeting the 2008 summer-autumn season delivered initial estimates of 0.54-6.93 animals per km2 within the northern half of the site (overall estimate across four surveys: 2.03 individuals per km2, N=211±47 individuals, 95% Confidence Intervals: 137-327, Coefficient of Variation=0.23) and 0.48-2.05 animals per km2 within the southern half of the site, including outer Dublin Bay (overall estimate across four surveys: 1.19 individuals per km2, N=138±33 individuals, 95% Confidence Intervals: 86-221, Coefficient of Variation=0.24). While the numbers of harbour porpoise encountered during any survey within the site are variable, additional acoustic data plus casual and effort-related sighting rates from coastal observation stations are significant for the east coast of Ireland and, comparatively high group sizes (>5 individuals) have been recorded from this area. The species is present at the site in all seasons, while important cohorts within the harbour porpoise community such as adults juveniles and newborn calves have also been recorded within the site, including during the calving/breeding season.

Harbour porpoise is a successful aquatic predator that feeds on a wide variety of fish, cephalopod and crustacean species occurring in the water column or close to the seabed. Dive depths in excess of 200m have been recorded for the species. Foraging areas for harbour porpoise are often associated with areas of strong tidal current and associated eddies; therefore the occurrence of porpoises close to shore or adjacent to islands and prominent headlands is commonly reported. However gaps remain in the knowledge of the species foraging ecology within Rockabill to Dalkey Island SAC and the available data may be biased toward particular locations due to the nature of survey effort and opportunistic reports from a range of sources. No detailed information is currently available on individual or group movements by harbour porpoise within or into and out

of the site, nor is it known whether individuals or groups of the species demonstrate any faithfulness to the site (i.e. site fidelity or residency). Nevertheless, the consistent annual and seasonal occurrence of the species at the site, its occurrence during the calving/breeding period and density/population estimates available to date all indicate the importance of this coastal site for the species.

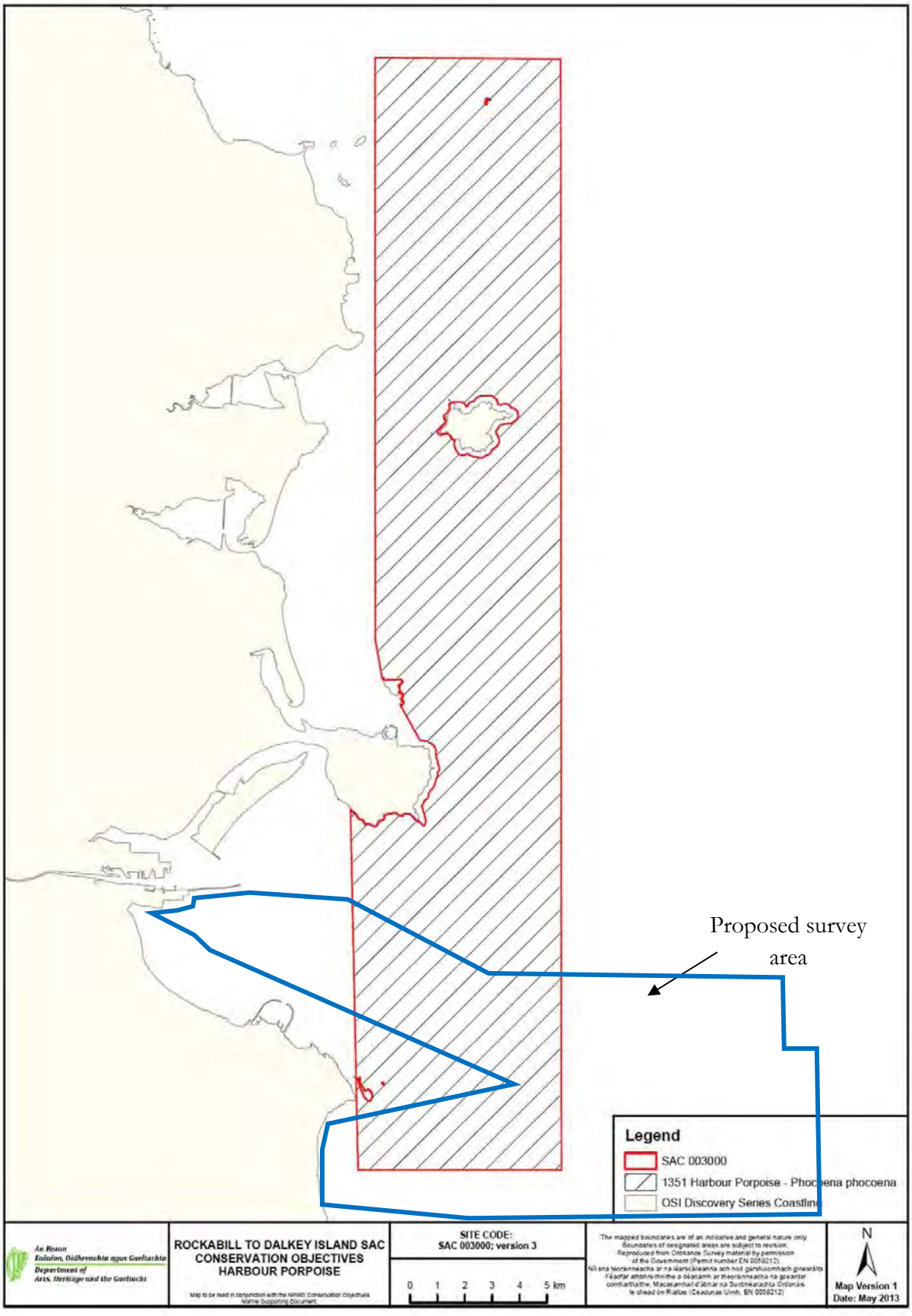


Figure 19. Distribution of Harbour Porpoise in Rockabill to Dalkey SAC.

According to Berrow & O'Brien (2013) who carried out six surveys in Rockabill to Dalkey Island SAC between July and September 2013, estimates in Rockabill to Dalkey Island SAC ranged from 1.13 porpoises per km^2 to a maximum of 2.61, with an overall density of 1.44±0.09 porpoises per km^2 with a very low coefficient of variation of 0.06. Harbour porpoise abundance for Rockabill to Dalkey Island SAC was around 400 individuals (391±25 with 95% CI of 344- 445). The proportion of young harbour porpoises (i.e., juveniles +calves) recorded on survey days ranged from c. 4-19% of all animals seen and was c. 7% overall using the combined dataset. The proportion of calves recorded on each survey ranged from 0 to c. 8% of all animals seen and was c. 2% overall using the combined dataset. The following technical clarification is provided in relation to specific conservation objectives and targets for Annex II species to facilitate the appropriate assessment process (NPWS, 2013b):

Harbour Porpoise

Objective: To maintain the favourable conservation condition of harbour porpoise in Rockabill to Dalkey Island SAC, which is defined by the following list of attributes and targets

Target 1 Species range within the site should not be restricted by artificial barriers to site use.

This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site, or will permanently prevent access for the species to suitable habitat therein. It does not refer to short-term or temporary restriction of access or range. Early consultation or scoping with the Department in advance of formal application is advisable for proposals that are likely to result in permanent exclusion.

Target 2 Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site.
Proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and/or the community of harbour porpoise within the site. This refers to the aquatic habitats used by the species in addition to important natural behaviours during the species annual cycle. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc) upon which harbour porpoises depend. In the absence of complete knowledge on the species ecological requirements in this site, such considerations should be assessed where appropriate on a case-by-case basis. Proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise community at the site.

Reef
Within the Rockabill to Dalkey Island SAC two community types are recorded within the Annex I Reef habitat, namely Intertidal reef community complex and Subtidal reef community complex (Figures 20 & 21).

Intertidal reef community complex
This reef community complex is recorded on the islands within this site and on the south coast of Howth. The exposure regime of the complex ranges from exposed to moderately exposed reef (Figure 16). Exposed reef is recorded on the east side of Dalkey Island, on the east and southern shores of Ireland's Eye and on all shores of Rockabill and the Muglins. Moderately exposed reef occurs on the western shores of Dalkey and at Howth and Ireland's Eye.

The substrate here is that of flat and sloping bedrock; around Rockabill cobbles and boulders occur on bedrock. Vertical cliff faces are found on the north and northeast shores of Ireland's

Eye; steep shorelines are a feature of Rockabill, Muglins and the eastern shore of Dalkey Island. The species associated with this community complex include the fucoids *Fucus serratus*, *F. vesiculosus*, *F. spiralis*, *Ascophyllum nodosum* and *Pelvetia canaliculata*, the barnacle *Semibalanus balanoides* and the bivalve *Mytilus edulis*. In the more exposed areas *Semibalanus balanoides* and *Mytilus edulis* dominate while in the more moderately exposed areas it is the fucoid species that are more abundant. The gastropods *Patella vulgata* and *Littorina sp.* are also recorded here. In all area the kelp species *Laminaria digitata* is recorded at the low water mark. Species associated with the Intertidal reef community complex include *Fucus serratus*, *Fucus spiralis, Fucus vesiculosus*, *Semibalanus balanoides*, *Ascophyllum nodosum, Mytilus edulis, Pelvetia canaliculata, Patella vulgata, Laminaria digitata* and *Littorina* sp.

Subtidal reef community complex.
This community complex is recorded off the islands within the site and also off the coast between Lambay Island and Rush Village (Figure 16). The exposure regime here ranges from moderately exposed reef at the Muglins, to exposed reef over the remainder of the site. The substrate ranges from that of flat and sloping bedrock, to bedrock with boulders and also a mosaic of cobbles and boulders. Vertical rock walls occur on the north and east of Ireland's Eye and to the east of Lambay Island where they give way to sloping bedrock at c.20m. In the northern reaches of the site, at Rockabill and Ireland's Eye, areas of both sediment scouring and a thin veneer of silt were observed on the reefs; the veneer of silt was also recorded at Lambay Island. In the south of the site, strong currents were experienced in the channel between Dalkey Island and the Muglins.

In the shallow reaches of this community complex (<10m) a sparse covering of the kelp species *Laminaria hyperborea* occurs with an undercover of red algal species including *Hypoglossum hypoglossoides*, *Brongniartella byssoides*, *Membranoptera alata*, *Phycodrys rubens* and *Delesseria sanguinea*. In deeper water (>10m) the anemone *Alcyonium digitatum* occurs in moderate abundances and *Metridium senile* also being recorded here. Faunal crusts of bryozoans such as *Flustra foliacea* and *Chartella papyracea* and hydroids including *Nemertesia antennina* are recorded in deeper water (>20m) along with the ascidian *Aplidium punctum*. The asteroid *Asterias rubens* is recorded throughout the site while the barnacle *Balanus crenatus*, the echinoderms *Echinus esculentus* and *Antedon bifida* also occur here. In general, it was noted that where the reef was subjected to the effects of sediment, either through scouring or settlement of silt, low numbers of species and individuals occurred.

CONSERVATION OBJECTIVES

The Qualifying Interests (QI) (Features of Interest), Special Conservation Interests (SCIs) for the SPA sites and the National conservation status of the QI of four Natura 2000 sites subject to the NIS are seen in Table 4. The site specific conservation Objectives for Natura 2000 sites are seen in Table 5.

ADVERSE EFFECTS ON THE CONSERVATION OBJECTIVES OF NATURA 2000 LIKELY TO OCCUR FROM THE PROJECT WITHOUT MITIGATION

The adverse effects on the conservation objectives of Natura 2000 likely to occur from the project without mitigation are seen in Table 6.

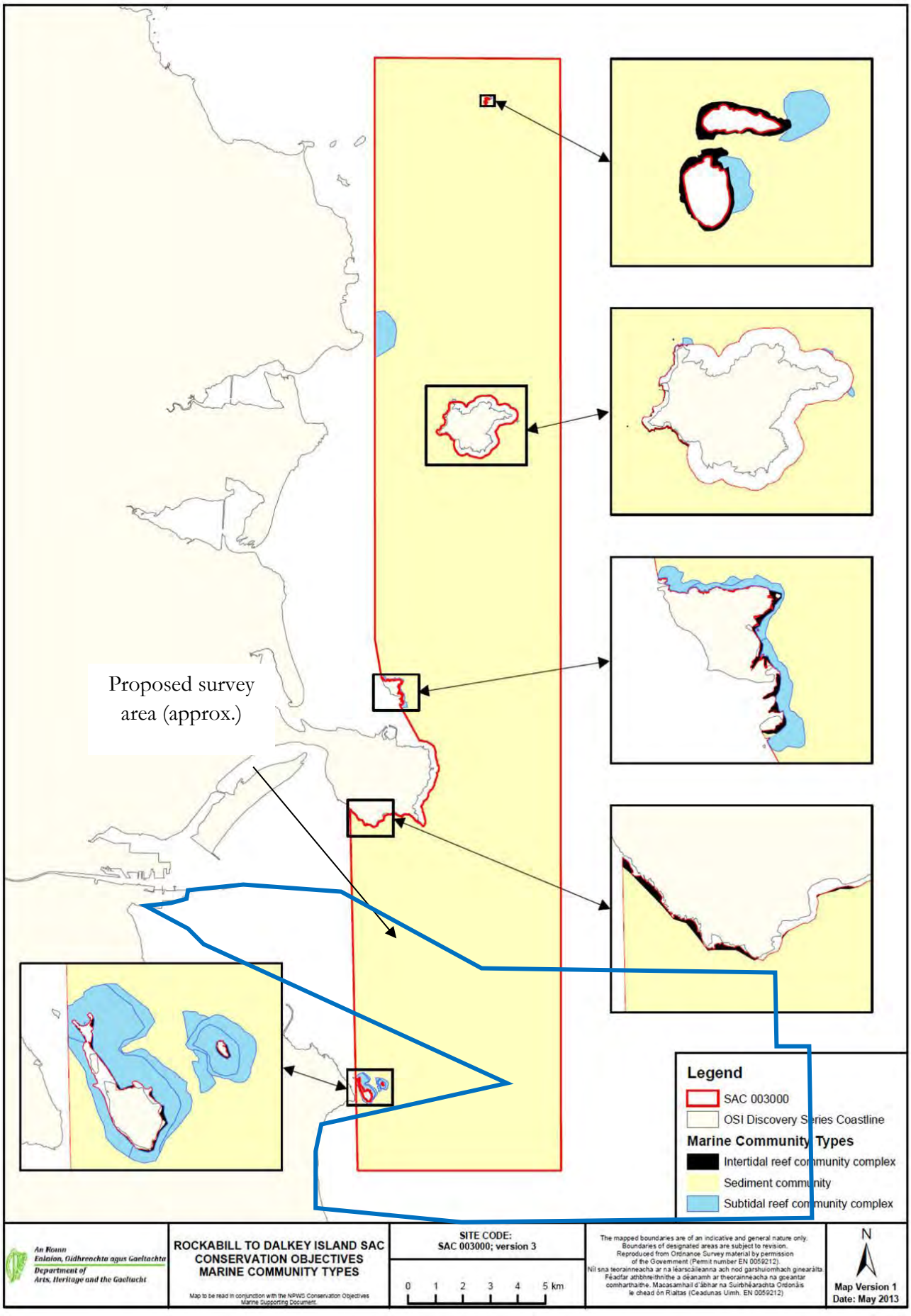


Figure 20. Conservation Objectives-Marine community types in Rockabill to Dalkey SAC.

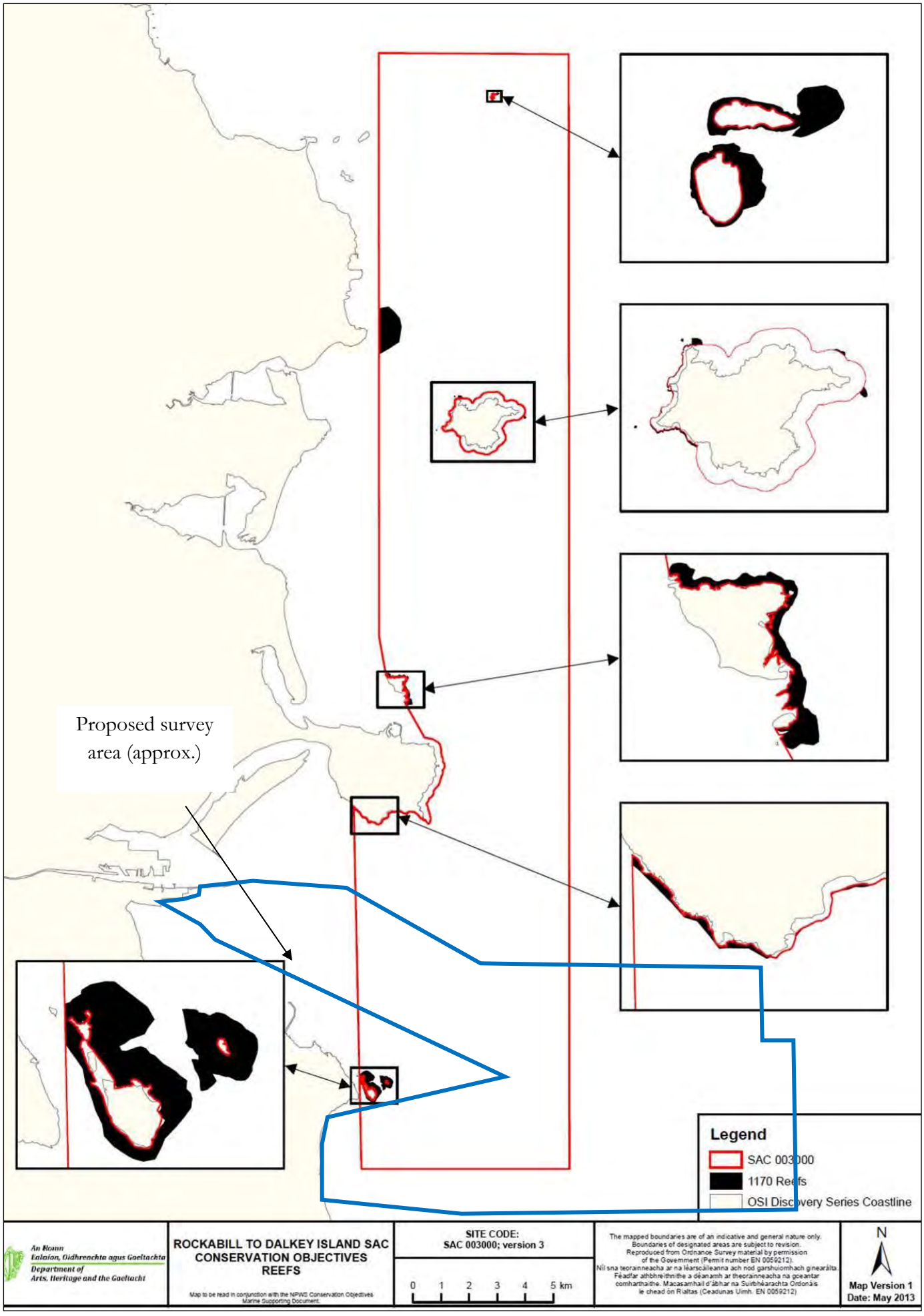


Figure 21. Conservation Objectives-Reef Habitat in Rockabill to Dalkey SAC.

Table 4 Qualifying Interests, Conservation Status, Management Objectives, Conditions underpinning site integrity for relevant European sites		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Current Conservation Status (NPWS, 2019)**
South Dublin Bay SAC (IE000210)	*Annex I Habitats (Features of interest):* Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Embryonic shifting dunes [2110]	 **Unfavourable/Inadequate** **Unfavourable/Inadequate** **Favourable** **Unfavourable/Inadequate**
North Dublin Bay SAC (IE000206)	*Annex I Habitats (Features of interest):* Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows *Glauco- Puccinellietalia maritimae* [1330] Mediterranean salt meadows *Juncetalia maritimi* [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] *Annex II species (Features of interest):* Petalwort *Petalophyllum ralfsii* [1395]	 **Unfavourable/Inadequate** **Unfavourable/Inadequate** **Favourable** **Unfavourable/Inadequate** **Unfavourable/Inadequate** **Unfavourable/Inadequate** **Unfavourable/Inadequate** **Unfavourable/Bad** **Unfavourable/Inadequate** **Favourable**
Rockabill to Dalkey SAC	Harbour Porpoise [1351] Reef [1170]	**Favourable** **Unfavourable/Inadequate**
Special Protection Areas (SPAs)		
South Dublin Bay and River Tolka Estuary SPA (IE004024)	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*)[A130] Ringed Plover (*Charadrius hiaticula*) [A137] Grey Plover (*Pluvialis squatarola*) [A140] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*)[A157] Redshank (*Tringa totanus*) [A162] Black-headed Gull (*Larus ridibundus*) [A179] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194]	**Amber** **Amber** **Amber** **Amber** **Red** **Green** **Amber** **Amber** **Red** **Red** **Amber** **Amber** **Amber**

Table 4 Qualifying Interests, Conservation Status, Management Objectives, Conditions underpinning site integrity for relevant European sites		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Current Conservation Status (NPWS, 2019)**
	Wetlands & Waterbirds [A999]	
North Bull Island SPA (004006)	Oystercatcher (*Haematopus ostralegus*) [A130] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Larus ridibundus*) [A179] Wetlands & Waterbirds [A999]	**Amber** **Red** **Amber** **Red** **Green** **Amber** **Amber** **Amber** **Amber** **Amber** **Red** **Amber** **Amber** **Red** **Red** **Green** **Red**

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
South Dublin Bay SAC		
Mudflats and sandflats not covered by water at low tide [1140] (Maintain the favourable conservation condition)		
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
Community extent	Hectares	Maintain the extent of the Zostera dominated community, subject to natural processes
Community Structure: Zostera density	Shoots/m^2	Conserve the high quality of the Zostera dominated community, subject to natural processes
Community distribution	Hectares	Conserve the following community type in a natural condition: Fine sands with *Angulus tenuis* community complex
Annual vegetation of drift lines [1210] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex* spp.)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
Salicornia and other annuals colonising mud and sand [1310] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and subcommunities	Percentage cover	Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009)
Vegetation structure: negative indicator species- *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
Embryonic shifting dunes [2110] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation composition: plant health of fore dune grasses	Percentage cover	More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lymegrass (*Leymus arenarius*)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover
North Dublin Bay SAC		
Mudflats and sandflats not covered by water at low tide [1140] (Maintain the favourable conservation condition)		
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
Community extent	Hectares	Maintain the extent of the Mytilus edulis-dominated community, subject to natural processes
Community structure: Mytilus edulis density	Individuals/m^2	Conserve the high quality of the *Mytilus edulis* dominated community, subject to natural processes
Community distribution	Hectares	Conserve the following community types in a natural condition: Fine sand to sandy mud with *Pygospio elegans* and *Crangon crangon* community complex; Fine sand with *Spio martinensis* community complex
Annual Vegetation of drift lines [1210] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex* spp.)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
Salicornia and other annuals colonising mud and sand [1310] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and subcommunities	Percentage cover	Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009)
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
Atlantic salt meadows (Glauco-Puccinellietalia maritimae [1330] (Maintain the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009)
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
Mediterranean salt meadows (*Juncetalia maritimi*) [1410] (Maintain the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009)
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
Embryonic shifting dunes [2110] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation composition: plant health of for dune grasses	Percentage cover	More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)
Vegetation composition: typical species and subcommunities (*Leymus arenarius*)	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lymegrass
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover
Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation composition: plant health of dune grasses	Percentage cover	95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of Monitoring stops	Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria*) and/or lymegrass (*Leymus arenarius*)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes
Vegetation structure: sward height	Centimetres	Maintain structural variation in the sward
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)
Vegetation composition: negative indicator species (including Hippophae rhamnoides)	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control
Humid dune slacks [2190] (Restore the favourable conservation condition)		
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: hydrological and flooding regime	Water table levels; groundwater fluctuations (metres)	Maintain natural hydrological regime

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within the sward
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)
Vegetation composition: cover of *Salix repens*	Percentage cover; centimetres	Maintain less than 40% cover of creeping willow (*Salix repens*)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control
Petalwort *Petalophyllum ralfsii* [1395] (Maintain the favourable conservation condition)		
Distribution of populations	Number and geographical spread of populations	No decline
Population size	Number of individuals	No decline
Area of suitable habitat	Hectares	No decline
Hydrological conditions: soil moisture	Occurrence	Maintain hydrological conditions so that substrate is kept moist and damp throughout the year, but not subject to prolonged inundation by flooding in winter
Vegetation structure: height and cover	Centimetres and percentage	Maintain open, low vegetation with a high percentage of bryophytes (small acrocarps and liverwort turf) and bare ground
Rockabill to Dalkey SAC		
1170 Reefs		
Habitat area	Hectares	The permanent area (182 ha) is stable or increasing, subject to natural processes.
Habitat distribution	Occurrence	Distribution is stable or increasing, subject to natural processes.
Community structure:	Biological Composition	Conserve the following community types in a natural condition: Intertidal reef community complex; and Subtidal reef community complex
Harbour Porpoise		
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use.

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site
South Dublin Bay and River Tolka Estuary SPA		
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Oystercatcher (*Haematopus ostralegus*) [A130], Ringed Plover (*Charadrius hiaticula*) [A137], Knot (*Calidris canutus*) [A143], Sanderling (*Calidris alba*) [A144], Dunlin (*Calidris alpina alpina*) [A149], Bar-tailed Godwit (*Limosa lapponica*) [A157], Redshank (*Tringa totanus*) [A162], Black-headed Gull (*Chroicocephalus ridibundus*) [A179] (Maintain the favourable conservation condition) Note: Grey Plover (*Pluvialis squatarola*) [A141] is proposed for removal from the list of SCI's for the site so no site specific conservation objective is included for the species		
Population trend	Percentage change	Long term population trend stable or increasing
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by all of the above named species, other than that occurring from natural patterns of variation
Roseate Tern *Sterna dougallii* [A192]		
Passage population: individuals	Number	No significant decline
Distribution: roosting areas	Number; location; area (ha)	No significant decline
Prey biomass available	Kilogrammes	No significant decline
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of roseate tern among the post-breeding aggregation of terns
Common Tern *Sterna hirundo* [A193]		
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline
Productivity rate: fledged young per breeding pair	Mean number	No significant decline
Passage population: individuals	Number	No significant decline
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline
Distribution: roosting areas	Number; location; area (hectares)	No significant decline
Prey biomass available	Kilogrammes	No significant decline

Table 5Detailed Conservation Objectives for Natura 2000 sites		
Attribute	**Measure**	**Target**
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding common tern population
Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of common tern among the post-breeding aggregation of terns
Arctic Tern *Sterna paradisaea* [A194]		
Passage population: individuals	Number	No significant decline
Distribution: roosting areas	Number; location; area (hectares)	No significant decline
Prey biomass available	Kilogrammes	No significant decline
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of Arctic tern among the post-breeding aggregation of terns
Wetlands [A999] (Maintain the favourable conservation condition)		
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,192ha, other than that occurring from natural patterns of variation
North Bull Island SPA		
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Shelduck (*Tadorna tadorna*) [A048], Teal (*Anas crecca*) [A052], Pintail (*Anas acuta*) [A054], Shoveler (*Anas clypeata*) [A056], Oystercatcher (*Haematopus ostralegus*) [A130], Golden Plover (*Pluvialis apricaria*) [A140], Grey Plover (*Pluvialis squatarola*) [A141], Knot (*Calidris canutus*) [A143], Sanderling (*Calidris alba*) [A144], Dunlin (*Calidris alpina alpina*) [A149], Black-tailed Godwit (*Limosa limosa*) [A156], Bar-tailed Godwit (*Limosa lapponica*) [A157], Curlew (*Numenius arquata*) [A160], Redshank (*Tringa totanus*) [A162], Turnstone (*Arenaria interpres*) [A169], Black-headed Gull (*Chroicocephalus ridibundus*) [A179] (Maintain the favourable conservation condition)		
Population trend	Percentage change	Long term population trend stable or increasing
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by all of the above named species, other than that occurring from natural patterns of variation
Wetlands [A999] (Maintain the favourable conservation condition)		
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 1,713ha, other than that occurring from natural patterns of variation

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
South Dublin Bay SAC (IE000210)	*Annex I Habitats (Features of interest):* Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Embryonic shifting dunes [2110]	The works in the vicinity of Poolbeg are within this SAC. The use of plant and machinery, as well as the associated temporary storage of construction materials, oils, fuels and chemicals could lead to pollution on site, the intertidal or in the marine environment. No species of conservation importance are noted in the vicinity of the borehole or CPT sites. However, access to the beach by the track machine could have potential to impact, areas of *Zostera noltii*, marram grass (*Ammophila arenaria*) and Annual vegetation of drift lines [1210]. Mitigation in the form of ecological supervision is required. If access is not possible without traversing these habitats in a track machine, NPWS should be consulted. The machine should be lowered to the borehole location by crane from the Shelly Banks Road or brought by barge to the location. Spoil from the borehole should be contained and removed off site. Given the nature of the works in the intertidal all of these effects would be expected to be localised in nature restricted to the immediate vicinity of the site and would have little effect on Natura 2000 sites. However, without the presence of mitigation measures there is a potential for localised effects if the site is accessed over sensitive habitats or significant quantities of pollution or silt were introduced into the marine environment. Given the nature of the potential effects and the scale of the project outlined above, the proposed project would not be expected to effect the: 1) Habitat area, Community extent on Community Structure: Zostera density Community distribution of *Mudflats and sandflats not covered by water at low tide* [1140]. 2) Habitat area, Physical structure: functionality and sediment supply, Habitat distribution, Vegetation structure: zonation, Vegetation composition: typical species and subcommunities, Vegetation composition: negative indicator species of *Annual vegetation of drift lines* [1210]. 3) Habitat area, Habitat distribution, Physical structure: sediment supply, Physical structure: creeks and pans, Physical structure: flooding regime, Vegetation structure: zonation, Vegetation structure: vegetation height, Vegetation structure: vegetation cover, Vegetation composition: typical species and subcommunities, Vegetation structure: negative indicator species-*Spartina anglica* of *Salicornia and other annuals colonising mud and sand* [1310]. 4) Habitat area, Habitat distribution, Physical structure: functionality sediment supply, Vegetation structure: zonation, Vegetation composition: plant health of fore dune grasses, Vegetation

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
		composition: typical species and subcommunities Vegetation composition: negative indicator species of *Embryonic shifting dunes* [2110]. Mitigation measures should be carried out to ensure that access to the site does not impact on sensitive species or habitats and that no contamination, silt or pollution enters the marine environment and create localised pollution. However, the level of effect on South Dublin Bay SAC, without the use of mitigation measures, is not deemed to be significant due to the small scale of the proposed works. However, as a precaution and to ensure habitats are protected and to comply with Water Pollution Acts mitigation measures should be carried out to protect habitats on site and maintain water quality.
North Dublin Bay SAC (IE000206)	*Annex I Habitats (Features of interest):* Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows *Glauco-Puccinellietalia maritimae* [1330] Mediterranean salt meadows *Juncetalia maritimi* [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	The works in the vicinity of Poolbeg are not within this SAC and the estuarine element of the River Liffey is between the works and this SAC. The use of plant and machinery, as well as the associated temporary storage of construction materials, oils, fuels and chemicals could lead to pollution on site, the intertidal or in the marine environment. Given the nature of the works in the intertidal all of these effects would be expected to be localised in nature restricted to the immediate vicinity of the site and would have little effect on Natura 2000 sites. However, without the presence of mitigation measures there is a potential for localised effects if significant quantities of pollution or silt were introduced into the marine environment. The potential impacts outlined above would not be expected to impact on the: 1) Habitat area, Community extent on Community Structure: Zostera density Community distribution. *Mudflats and sandflats not covered by water at low tide* [1140]. 2) Habitat area, Habitat distribution, Physical structure: functionality and sediment supply, Vegetation structure: zonation, Vegetation composition: typical species and subcommunities, Vegetation composition: negative indicator species of *Annual vegetation of drift lines* [1210] 3) Habitat area, Habitat distribution, Physical structure: sediment supply, Physical structure: creeks and pans, Physical structure: flooding regime, Vegetation structure: zonation, Vegetation structure: vegetation height, Vegetation structure: vegetation cover, Vegetation composition: typical species and subcommunities, Vegetation structure: negative indicator species-*Spartina anglica* of *Salicornia and other annuals colonising mud and sand* [1310]. 4) Habitat area, Habitat distribution, Physical structure: sediment supply, Physical structure: creeks and pans, Physical structure: flooding regime, Vegetation structure: zonation, Vegetation structure: vegetation height, Vegetation structure: vegetation cover, Vegetation composition:

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
	Humid dune slacks [2190] *Annex II species (Features of interest):* Petalwort *Petalophyllum ralfsii* [1395]	typical species and subcommunities, Vegetation structure: negative indicator species -Spartina anglica of Atlantic salt meadows Glauco- Puccinellietalia maritimae [1330]. 5) Habitat area, Habitat distribution, Physical structure: sediment supply, Physical structure: creeks and pans, Physical structure: flooding regime, Vegetation structure: zonation, Vegetation structure: vegetation height, Vegetation structure: vegetation cover, Vegetation composition: typical species and subcommunities, Vegetation structure: negative indicator species -Spartina anglica of Mediterranean salt meadows Juncetalia maritimi [1410] 6) Habitat area, Habitat distribution, Physical structure: functionality sediment supply, Vegetation structure: zonation, Vegetation composition: plant health of for dune grasses, Vegetation composition: typical species and subcommunities (Leymus arenarius), Vegetation composition: negative indicator species of Embryonic shifting dunes [2110] 7) Habitat area, Habitat distribution , Physical structure: functionality sediment supply, Vegetation structure: zonation, Vegetation composition: plant health of dune grasses, Vegetation composition: typical species and subcommunities, Vegetation composition: negative indicator species of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] 8) Habitat area, Habitat distribution, Physical structure: functionality sediment supply, Vegetation structure: zonation, Vegetation structure: bare ground, Vegetation structure: sward height, Vegetation composition: typical species and subcommunities, Vegetation composition: negative indicator species (including *Hippophae rhamnoides*), Vegetation composition: scrub/trees of Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] 9) Habitat area, Habitat distribution, Physical structure: functionality sediment supply, Physical structure: hydrological and flooding regime, Vegetation structure: zonation, Vegetation structure: bare ground, Vegetation structure: vegetation height, Vegetation composition: typical species and subcommunities, Vegetation composition: cover of *Salix repens*, Vegetation composition: negative indicator species, Vegetation composition: scrub/trees of Humid dune slacks [2190] 10) Distribution of populations, Population size, Area of suitable habitat, Hydrological conditions: soil moisture, Vegetation structure: height and cover of Petalwort *Petalophyllum ralfsii* [1395] Mitigation measures should be carried out to ensure that no contamination, silt or pollution enters the marine environment. However, the level of effect on North Dublin Bay SAC, without the use of mitigation measures, is not deemed to be significant due to the small scale of the survey, the distance to the SAC and the significant mixing in the estuarine element of the River Liffey and Dublin Bay.

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
		However, as a precaution and to prevent pollution mitigation measures should be carried out to protect the water quality of the marine environment.
South Dublin Bay and River Tolka Estuary SPA (IE004024)	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*)[A130] Ringed Plover (*Charadrius hiaticula*) [A137] Grey Plover (*Pluvialis squatarola*) [A140] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*)[A157] Redshank (*Tringa totanus*) [A162] Black-headed Gull (*Larus ridibundus*) [A179] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Wetlands & Waterbirds [A999]	The works in the vicinity of Poolbeg are within this SPA. The use of plant and machinery, as well as the associated temporary storage of construction materials, oils, fuels and chemicals could lead to pollution on site, the intertidal or in the marine environment. In addition noise and disturbance would be seen from the presence of machinery and personnel on the shore. However, this area is a high amenity area and the species on site would be accustomed to a high level of disturbance. No species of conservation importance are noted in the vicinity of the borehole or CPT sites. However, access to the beach by the track machine could have potential to impact, areas of Zostera noltii, marram grass (Ammophila arenaria) and Annual vegetation of drift lines [1210]. Mitigation in the form of ecological supervision is required. If access is not possible without traversing these habitats in a track machine, NPWS should be consulted. The machine should be lowered to the borehole location by crane from the Shelly Banks Road or brought by barge to the location. Spoil from the borehole should be contained and removed off site. Given the nature of the works in the intertidal all of these effects would be expected to be temporary, localised in nature restricted to the immediate vicinity of the site and would have little effect on Natura 2000 sites. However, without the presence of mitigation measures there is a potential for localised effects if significant noise is generated, the site is accessed over sensitive habitats or significant quantities of pollution or silt were introduced into the marine environment. Given the nature of the potential effects outlined above, the proposed project would not be expected to effect the: 1) Distribution and Range, timing and intensity of use of areas of the SPA for Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Oystercatcher (*Haematopus ostralegus*)[A130], Ringed Plover (*Charadrius hiaticula*) [A137], Grey Plover (*Pluvialis squatarola*) [A140], Knot (*Calidris canutus*) [A143], Sanderling (*Calidris alba*) [A144], Dunlin (*Calidris alpina*) [A149], Bar-tailed Godwit (*Limosa lapponica*)[A157], Redshank (*Tringa totanus*) [A162], Black-headed Gull (*Larus ridibundus*) [A179] 2) Breeding population abundance: apparently occupied nests (AONs), Productivity rate: fledged young per breeding pair, Passage population: individuals, Distribution: breeding colonies Distribution:roosting areas, Barriers to connectivity, Disturbance at breeding site, Disturbance at roosting site for Common Tern *Sterna hirundo* [A193] but, not the Prey biomass available.

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
		3) Passage population: individuals, Distribution: roosting areas, Barriers to connectivity, Disturbance at roosting site Arctic Tern *Sterna paradisaea* [A194] but not the Prey biomass available 4) Passage population: individuals, Distribution: roosting areas, Barriers to connectivity, Disturbance at roosting site of Roseate Tern *Sterna dougallii* [A192] 5) The area of Wetlands [A999] Mitigation measures should be carried out to minimise disturbance of the qualifying interests of this SPA. However, the level of effect on South Dublin Bay and River Tolka SPA, without the use of mitigation measures, is not deemed to be significant due to the small scale of the proposed survey, the existing high level of disturbance on site and the significant mixing in the estuarine element of the River Liffey and Dublin Bay. However, as a precaution and to comply with Water Pollution Acts mitigation measures should be carried out to protect the water quality of Dublin Bay and the qualifying interests of the site.
North Bull Island SPA (004006)	Oystercatcher (*Haematopus ostralegus*) [A130] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157]	The works in the vicinity of Poolbeg are not within this SPA. The use of plant and machinery, as well as the associated temporary storage of construction materials, oils, fuels and chemicals could lead to pollution on site, the intertidal or in the marine environment. In addition noise and disturbance would be seen from the presence of machinery and personnel on the shore. However, this area is a high amenity area and the species on site would be accustomed to a high level of disturbance. No species of conservation importance are noted in the vicinity of the borehole or CPT sites. However, access to the beach by the track machine could have potential to impact, areas of *Zostera noltii*, marram grass (*Ammophila arenaria*) and Annual vegetation of drift lines [1210]. Mitigation in the form of ecological supervision is required. If access is not possible without traversing these habitats in a track machine, the machine should be lowered to the borehole location by crane from the Shelly Banks Road. Spoil from the borehole should be contained and removed off site. Given the nature of the works in the intertidal all of these effects would be expected to be temporary, localised in nature restricted to the immediate vicinity of the site and would have little effect on Natura 2000 sites. However, without the presence of mitigation measures there is a potential for localised effects if significant noise is generated, the site is accessed over sensitive habitats or significant quantities of pollution or silt were introduced into the marine environment. Given the nature of the potential effects outlined above, the proposed project would not be expected to effect the:

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
	Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Larus ridibundus*) [A179] Wetlands & Waterbirds [A999]	1) Distribution and Range, timing and intensity of use of areas of the SPA for Oystercatcher (*Haematopus ostralegus*) [A130], Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Shelduck (*Tadorna tadorna*) [A048], Teal (*Anas crecca*) [A052], Pintail (*Anas acuta*) [A054], Shoveler (*Anas clypeata*) [A056], Golden Plover (*Pluvialis apricaria*) [A140], Grey Plover (*Pluvialis squatarola*) [A141], Knot (*Calidris canutus*) [A143], Sanderling (*Calidris alba*) [A144], Dunlin (*Calidris alpina*) [A149], Black-tailed Godwit (*Limosa limosa*) [A156], Bar-tailed Godwit (*Limosa lapponica*) [A157], Curlew (*Numenius arquata*) [A160], Redshank (*Tringa totanus*) [A162], Turnstone (*Arenaria interpres*) [A169], Black-headed Gull (*Larus ridibundus*) [A179]. 2) The area Wetlands & Waterbirds [A999] The area of Wetlands [A999] Mitigation measures should be carried out to minimise disturbance of the qualifying interests of this SPA. However, the level of effect on North Bull Island SPA, without the use of mitigation measures, is not deemed to be significant due to the small scale of the proposed survey, the existing high level of disturbance on site and the significant mixing in the estuarine element of the River Liffey and Dublin Bay. However, as a precaution and to comply with Water Pollution Acts mitigation measures should be carried out to protect the water quality of Dublin Bay and the qualifying interests of the site.
Rockabill to Dalkey SAC	1170 Reefs 1351Harbour Porpoise	The proposed survey will not impact on the habitat area, habitat distribution and community structure of reef within the Roakabill to Dalkey SAC. Sampling of the seabed has targeted areas of sediment so that samples can be taken. No significant silt will be generated from the survey that would be seen to impact on the Reef habitat. During grab sampling for sediment samples there is potential for the grab to cause localised damage to reef habitat if this habitat is present. The proposed survey equipment and the noise frequency emissions are seen in Table 1. The high frequencies emitted from the equipment are above the auditory range of the mid frequency cetaceans (150Hz-160 kHz) but within the hearing range of high frequency cetaceans (275Hz -160kHz)- observed and on the proposed cable route (Table 2). The Sidescan sonar, single beam echo sounder and Multi Beam Echo Sounder (MBES)will emit noise above the frequency of marine mammals. The hull mounted sub-bottom profiler Pinger (2-200 kHz) emits low and mid frequency noise, within the auditory range of all marine mammals including harbour porpoise, minke whale and dolphin species. The Sub Bottom Profiler (boomer), UHR seismic (sparker source), and Air Gun emit noise below the auditory range of marine mammals. However, all of the equipment (peak noise) at 1m from source emit noise above the onset of PTS for Non-impulsive sounds for high, medium, low frequency cetaceans and Phocid Pinnipeds outlined by NOAA (2018) was 173 dB, 198 dB, 199 dB and 219dB respectively and the 198dB proposed injury levels indicated by Southall

Table 6 Potential for adverse effects on the qualifying Interests and conservation objectives of Natura 2000 sites.		
Natura 2000 Site Name & Site Code	**Qualifying Interests**	**Potential for adverse effects on site integrity.**
		et al. (2007). As a result negative impacts may be foreseen if marine mammals are close enough to the equipment to receive sound levels above this indicative threshold.

MITIGATION MEASURES

The following section outlines the proposed mitigation measures to be carried out as part of the proposed survey. Minor short term impacts may result as a consequence of the survey, but these are believed not to impact on the integrity of the Natura 2000 sites, species or the Site Specific Conservation Objectives. However, following the precautionary principle, substantial mitigation measures have been developed to minimise the ecological impacts of the project, not only in relation to Natura 2000 Annex habitats and species, but also additional species and habitats of conservation importance that have been recorded in the area.

CONSULTATION WITH NPWS

The proposed project was discussed with David Lyons of NPWS. The proposed geophysical survey is being carried out during calving period of Harbour porpoise within Rockabill to Dalkey SAC. Additional mitigation beyond the standard MMO guidance was requested in the form of providing additional time for calves to leave the exclusion zone if calves are noted within the exclusion zone during the calving period from May to August. 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.

SURVEY SITES

The survey location at Poolbeg is within two overlapping sites of conservation significance (SAC & SPA). The conservation significance of the habitats and location of the important feeding grounds for overwintering birds was assessed. The route through the conservation sites was deemed to be the optimal route of satisfying minimal conservation significance (within the designated sites) based on the assessment of NPWS bird count data, the optimal from an engineering perspective and for the stability and longevity of the cable. All saltmarsh, Zostera and sand dune habitats were avoided as part of the route corridor identification process. However, access to the site by track machine will be supervised by an ecologist to ensure avoidance of impacts.

TIMING OF SURVEY

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 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. 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

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.

SURVEY

Mitigation impacts are primarily concerned with the survey procedures. As a result 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).

NATURA IMPACT STATEMENT CONCLUSIONS

This NIS has 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. It is the professional opinion of the author of this report 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 a MMO, will be sufficient to prevent adverse effects on the integrity of Natura 2000 sites.

The mitigation measures detailed in this NIS have been carefully considered to ensure no adverse effects on the integrity of the following NATURA 2000 sites in light of the site's conservation objectives and status:

- South Dublin Bay and River Tolka Estuary SPA [004024] (Within SPA)
- North Bull Island SPA [004006]
- South Dublin Bay SAC [000210] (Within SAC)
- Rockabill to Dalkey Island SAC [003000] (Within SAC)

Based on the assessment of the proposed development (survey) alone and in combination with other projects and plans, including the implementation of mitigation measures, it can be concluded that no adverse effects on the site's integrity will arise, in view of the site's conservation objectives.

This report presents a Stage II Natura Impact Statement for the proposed survey, outlining the information required for the competent authority to screen for appropriate assessment and to determine whether or not the Proposed Development, either alone or in combination with other plans and projects, in view of best scientific knowledge, will adversely affect the integrity of European sites.

On the basis of the content of this report, the competent authority is enabled to conduct an Appropriate Assessment and consider whether the proposed development, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites conservation objectives, will adversely affect the integrity of any European site

DATA USED FOR THE AA SCREENING & NIS ASSESSMENT

NPWS site synopses and Conservation objectives of sites within 15km were examined. The most recent SAC and SPA boundary shapefiles were downloaded and overlaid on Bing road map and satellite imagery. A site visit was carried out including survey to determine if the site contained possible threats to a NATURA 2000 site.

REFERENCES

The following references were used in the preparation of this AA screening report.

1. Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities March 2010.
2. Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government 2009; http://www.npws.ie/publications/archive/NPWS_2009_AA_Guidance.pdf
3. Managing NATURA 2000 Sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC, European Commission 2000; http://ec.europa.eu/environment/nature/Natura2000/management/docs/art6/provision_of_art6_en.pdf
4. Assessment of Plans and Projects Significantly Affecting NATURA 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC; http://ec.europa.eu/environment/nature/Natura2000management/docs/art6/Natura_2000_assess_en.pdf
5. Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; http://ec.europa.eu/environment/nature/Natura2000/management/docs/art6/guidance_art6_4_en.pdf
6. Guidance document on the implementation of the birds and habitats directive in estuaries and coastal zones with particular attention to port development and dredging; http://ec.europa.eu/environment/nature/Natura2000/management/docs/guidance_doc.pdf
7. The Status of EU Protected Habitats and Species in Ireland. http://www.npws.ie/publications/euconservationstatus/NPWS_2007_Conservation_Status_Report.pdf
8. Managing Natura 2000 sites The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/Provisions_Art_._nov_2018_endocx.pdf
9. NPWS (2013) Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
10. NPWS (2012). Conservation Objectives: Baldoyle Bay SAC 000199. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
11. NPWS (2012b). Baldoyle Bay SAC (site code 199)Conservation objectives supporting document -coastal habitats
12. NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
13. NPWS (2013) Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
14. NPWS (2015) Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
15. NPWS (2015) Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
16. NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

17. NPWS (2015) Conservation objectives for Howth Head SAC [000202]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
18. NPWS (2015) Conservation objectives for Ireland's Eye SAC [002193]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.
19. NPWS (2013) Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
20. NPWS (2013b) Rockabill to Dalkey Island SAC (site code: 3000)Conservation objectives supporting document. -Marine Habitats and Species Version 1
21. NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf
22. Konsberg (2010), Underwater noise propagation modelling and estimate of impact zones for seismic operations in the Moray Firth. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/50020/mf-annexii.pdf
23. NOAA 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. NOAA Technical Memorandum NMFS-OPR-59 April 2018.
24. DAHG (2014). Guidance to Manage the Risk to Marine Mammals from Man made Sound Sources in Irish Waters. https://www.npws.ie/sites/default/files/general/Underwater%20sound%20guidance_Jan%202014.pdf