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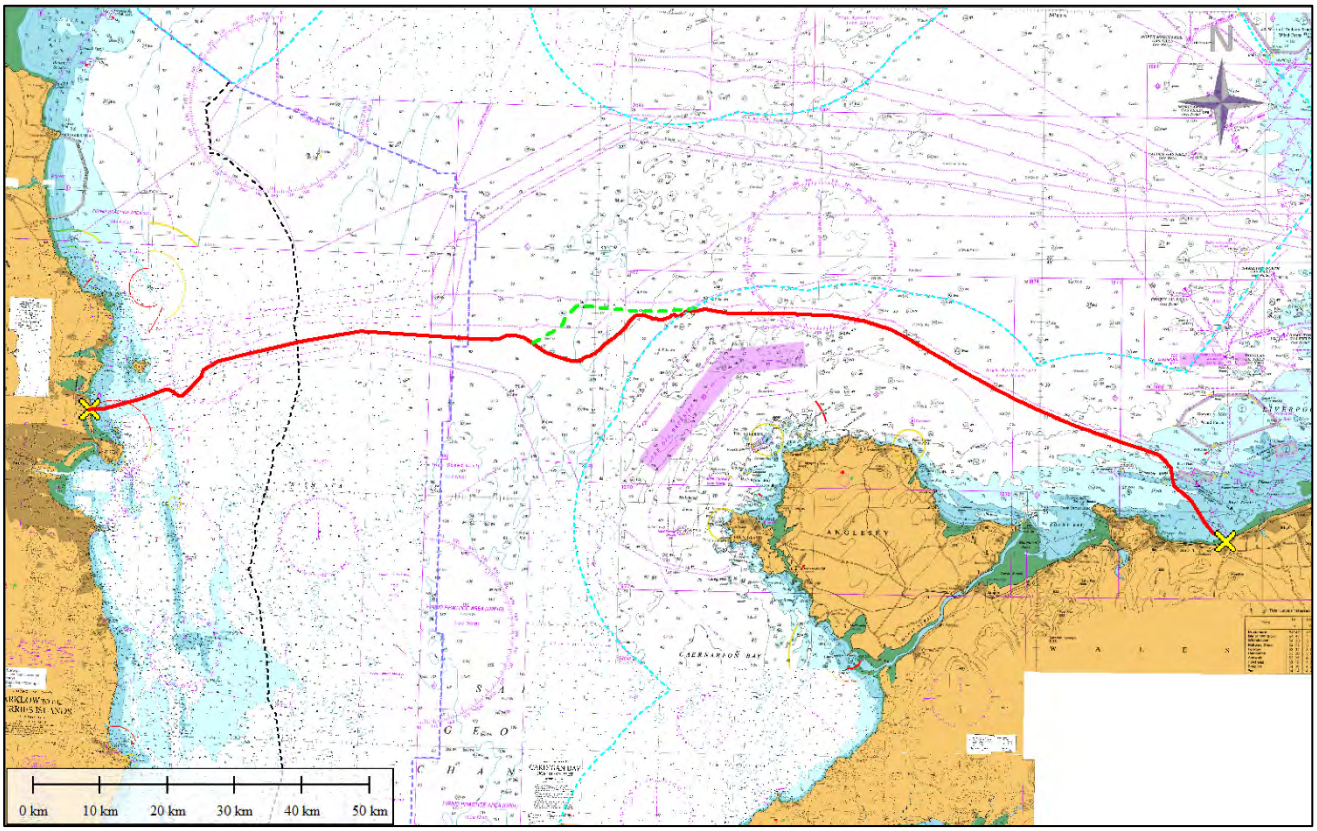
Marine & Environmental Consultancy

Natura Impact Statement – Information for a Stage 2 (Natura Impact Statement) AA for marine survey and site investigation works for a fibre optic cable at Portmarnock, Co. Dublin.



15th February 2024

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On behalf of: McMahon Design and Management Ltd.

Document Control Sheet			
Project	Natura Impact Statement - Information for a Stage 2 (Natura Impact Statement) AA for marine survey and site investigation works for a fibre optic cable at Portmarnock, Co. Dublin.		
Report	Natura Impact Statement		
Date	15th February 2024		
Version	Author	Reviewed	Date
Draft 01	[redacted]	[redacted]	5th October 2023
Planning	[redacted]		15th February 2024

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1. Introduction

The following Natura Impact Statement (NIS) has been prepared by **Altemar Ltd.** for marine survey and site investigation works for a fibre optic cable at Portmarnock, Co. Dublin.

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 European sites. European sites are those sites designated as Special Areas of Conservation (SAC) or Special Protection Areas (SPA). An Supporting Information for Screening for Appropriate Assessment Report (SISAA) was carried out for the proposed project and concluded that '*Acting on a strictly precautionary basis, NIS is required in respect of the effects of the project on the Natura 2000 sites screened IN for NIS (potential habitat and disturbance effects in the absence of mitigation) because it cannot be excluded on the basis of best objective scientific information following screening, in the absence of control or mitigation measures that the plan or project, individually and/or in combination with other plans or projects, will have a significant effect on the named European Site/s.*

An NIS or Stage 2 Appropriate Assessment is not required for the effects of the project on all other Natura sites because it can be excluded on the basis of the best objective scientific information following screening that the plan or project, individually and/or in combination with other plans or projects, will have a significant effect on the European Site/s. ***A Stage 2 AA is required for the proposed project.***'

This Natura Impact Statement (NIS) examines whether the plan or project, either alone, or in combination with other plans and projects, in the view of best scientific knowledge and in view of the sites' conservation objectives, will adversely affect the integrity of the European sites or species populations for which the site/s were designated.

1.1 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. [redacted] is the managing director of Altemar. [redacted] is an environmental scientist and marine biologist with 28 years' experience working in Irish terrestrial and aquatic environments, providing services to the State, Semi-State and industry. [redacted] (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). [redacted] carried out all elements of this Appropriate Assessment Screening.

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 Habitats 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 European sites. Article 6(3) establishes the requirement for Appropriate Assessment:

"Any plan or project not directly connected with or necessary to the management of the [EUROPEAN] 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 "Managing European sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC" (European Commission, 21 November 2018) *"The purpose of the appropriate assessment is to assess the implications of the plan or project in respect of the site's conservation objectives, either individually or in combination with other plans or projects. The conclusions should enable the competent authorities to ascertain whether the plan or project will adversely affect the integrity of the site concerned. The focus of the appropriate assessment is therefore specifically on the species and/or the habitats for which the European site is designated."*

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 European 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 European network; and,*
    - *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 European assets which must also be useful to monitor the plan or project implementation."*

[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;

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 December 2009 publication from the Department of Environment, Heritage and Local Government; 'Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities' and the European Communities (Birds and Natural Habitats) Regulations 2011. In order to comply with the above Guidelines and legislation, the Appropriate Assessment process must be structured as follows:

1) Screening stage:
    - Description of plan or project, and local site or plan area characteristics;
    - Identification of relevant European sites, and compilation of information on their qualifying interests and conservation objectives
    - 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. 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 European sites that will be considered further;
    - Identification and description of potential adverse impacts 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 impacts
    - Assessment as to whether, following the implementation of the proposed mitigation measures, 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.

If it can be demonstrated during the AA screening phase (Stage 1), that the proposed project will not have a significant effect, whether alone or in combination with other plans or projects, on the conservation objectives of a European site, then no further AA (Stage 2) will be required. It is important to note that there is a requirement to apply a precautionary approach to AA screening. Therefore, where effects are possible, certain or unknown at the screening stage, AA will be required.

In addition, it should be noted that Article 6(3) of the Habitats Directive must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an AA of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.

4. Stage 2: Appropriate Assessment

4.1 Management of the Site

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

4.2 Background

The applicant plans to investigate the feasibility of constructing a new subsea telecoms cable system, SOBR2, linking Ireland to the United Kingdom, from a landfall at Portmarnock to a landfall at Abergele on the North coast of Wales as shown in Figure 1 below. This Works Methodology is produced in support of an application for a marine survey and site investigations licence under the Maritime Area Planning Act 2021, and should not be used for any other purpose apart from that expressly stated in this document. The applicant intends to undertake the survey campaign at the proposed Licence Application Area within the IRL Exclusive Economic Zone (EEZ) in order to inform the location and design of the proposed cable route and landfall.

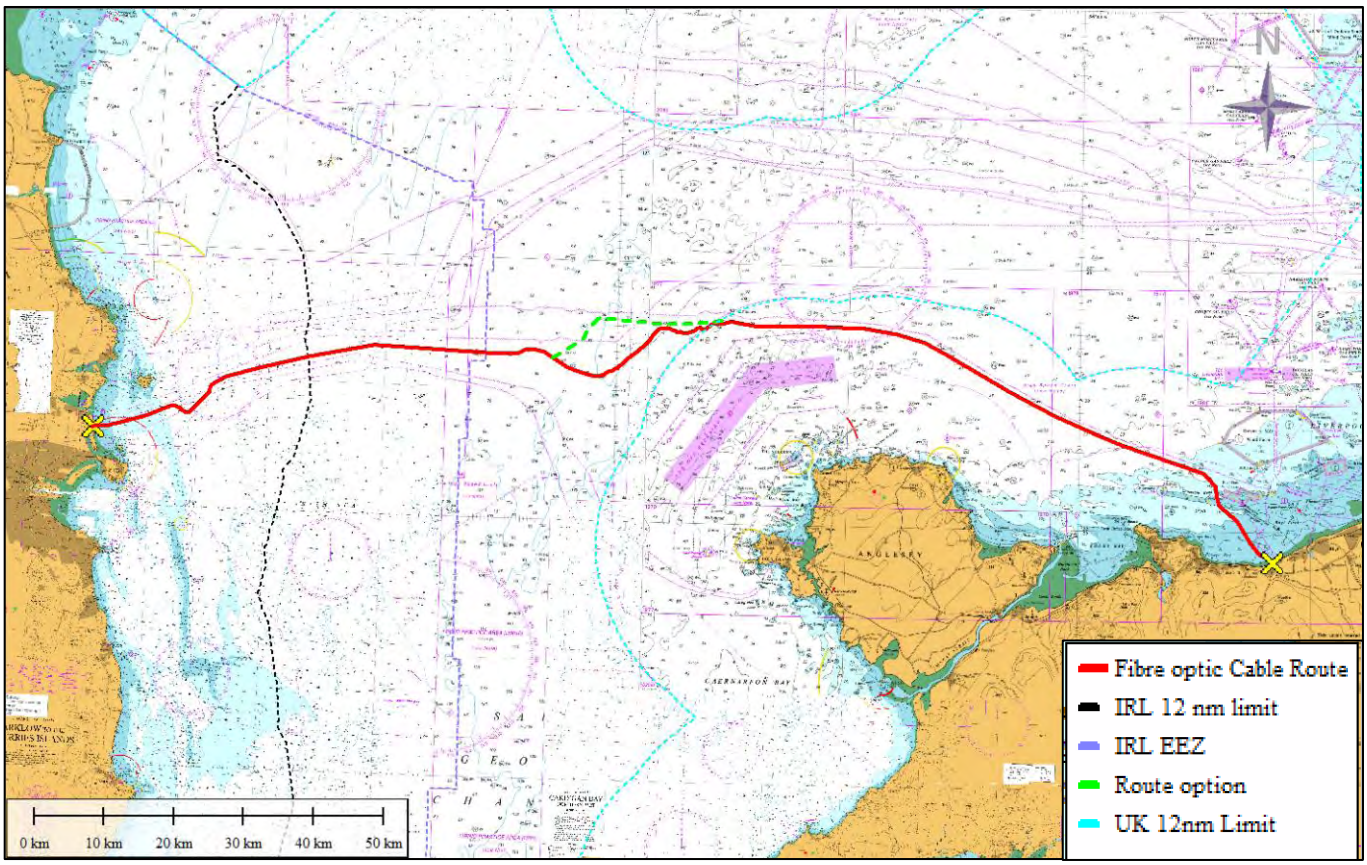


Figure 1. Proposed SOBR2 Telecoms Cable System

This Works Methodology has been prepared by McMahon Design and Management Ltd on behalf of the applicant and forms part of an application for a Licence for Marine Survey and Site Investigations for route and landfall options traversing the Irish Sea. The works will be carried out predominantly by remote sensing seabed mapping techniques (geophysical survey) with some selective sampling of the upper layers of the seabed (geotechnical survey). Once the results of the survey are obtained and analysed a preferred route corridor will be determined, design and method statements will be developed and a final Route Position List (RPL) will be defined as part of further submissions for a Maritime Area Consent and Planning consent for the installation works.

PROPOSED SURVEY ROUTE AND SURVEY LICENCE APPLICATION AREA IN IRISH TERRITORIAL WATERS

Licence Application Area

The License Application Area is situated off the coast of North Dublin (Figure 2). The licensed survey corridor has length of approx. 64.5 km and a total area of 3211 hectares within EEZ limits. A cable route corridor of approx. 500m width will be surveyed within the licence application area.

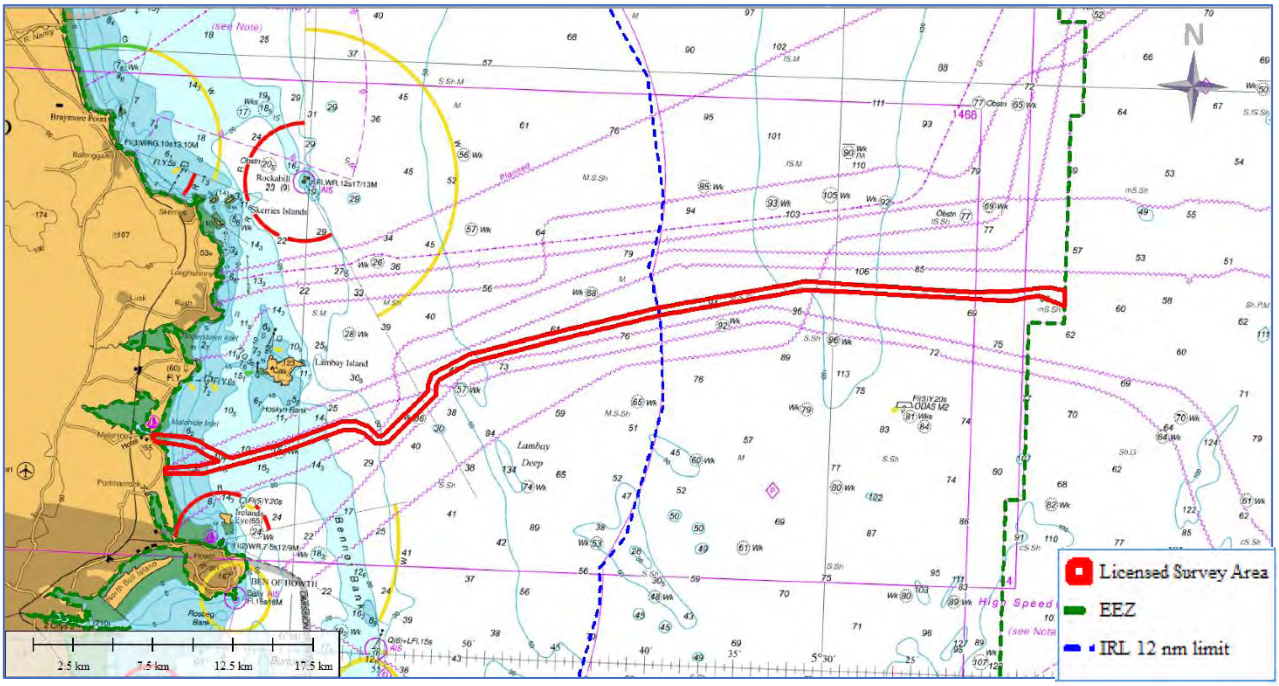


Figure 2. Proposed Survey Licence Application Area.

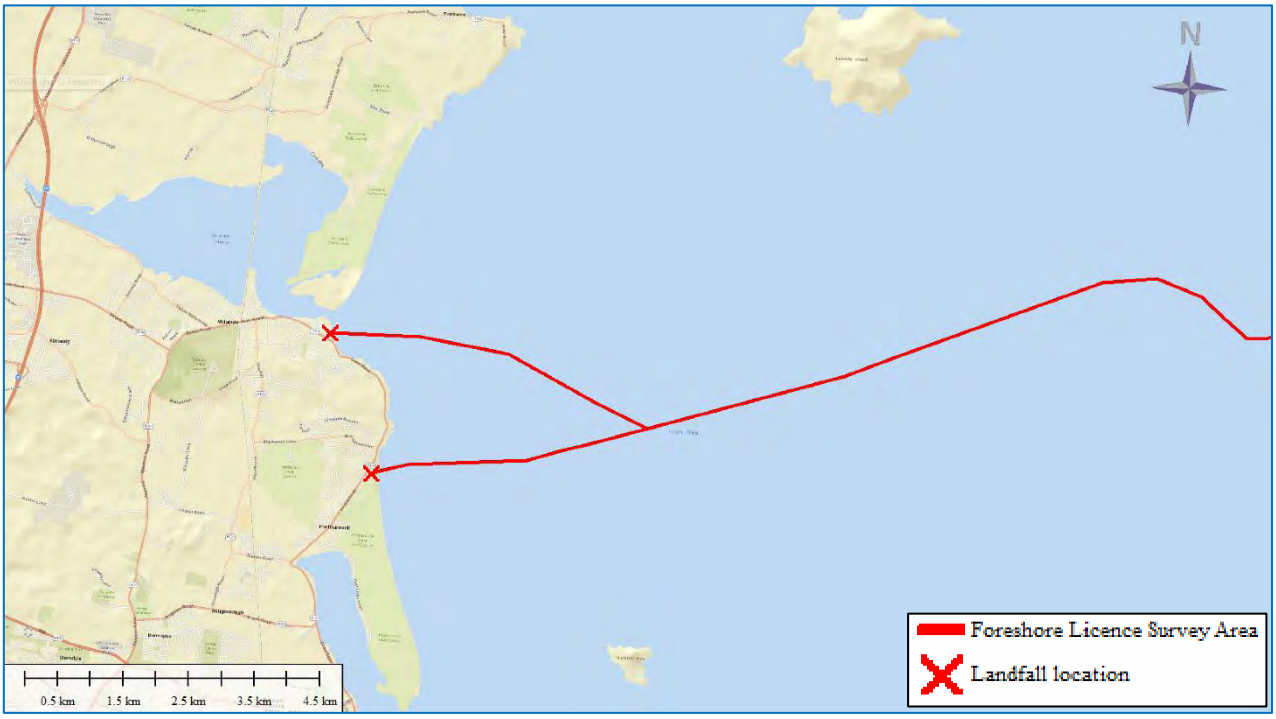


Figure 3. Landfall Location.

Landfall & Inshore Survey Corridors

The licence application area covers the proposed landfall options at Portmarnock and Malahide, with a survey corridor traversing the Irish Sea to the East. The general location is shown in Figure 3.

Portmarnock & Malahide

The licence application area covers potential landfalls at Portmarnock and Malahide. At Portmarnock the landfall location is adjacent to the R106 Strand Road and north of the Portmarnock Hotel. The landfall location at Malahide is adjacent to the public car park at Malahide South Beach. Any requirement for beach access for vehicles or equipment at the landfalls will be via the existing established slipways from the R106.

The Route Position List for the Licence Application Area is presented in Table 1 below.

Idx	Latitude	Longitude	Idx	Latitude	Longitude
1	53° 25' 47.5931" N	6° 07' 27.5129" W	30	53° 31' 03.5400" N	5° 45' 54.8588" W
2	53° 25' 50.9357" N	6° 05' 21.7543" W	31	53° 30' 14.4369" N	5° 50' 36.1001" W
3	53° 26' 39.4902" N	6° 01' 00.8514" W	32	53° 29' 31.0918" N	5° 52' 36.4157" W
4	53° 26' 49.9512" N	6° 00' 18.9929" W	33	53° 29' 11.7776" N	5° 52' 48.6081" W
5	53° 27' 30.7112" N	5° 57' 32.5247" W	34	53° 28' 54.6403" N	5° 52' 48.7172" W
6	53° 27' 33.2740" N	5° 56' 52.5744" W	35	53° 27' 25.1496" N	5° 55' 13.0236" W
7	53° 27' 26.2813" N	5° 56' 20.9305" W	36	53° 27' 21.9982" N	5° 55' 22.6914" W
8	53° 27' 05.3582" N	5° 55' 39.0283" W	37	53° 27' 21.8045" N	5° 55' 29.7342" W
9	53° 27' 06.0138" N	5° 55' 15.1948" W	38	53° 27' 40.4781" N	5° 56' 07.1319" W
10	53° 27' 12.1467" N	5° 54' 56.3805" W	39	53° 27' 49.7606" N	5° 56' 49.1374" W
11	53° 28' 48.0939" N	5° 52' 21.6463" W	40	53° 27' 46.5462" N	5° 57' 39.2451" W
12	53° 29' 08.8036" N	5° 52' 21.5107" W	41	53° 27' 04.8916" N	6° 00' 29.3685" W
13	53° 29' 20.1490" N	5° 52' 14.3471" W	42	53° 26' 54.7051" N	6° 01' 10.1281" W
14	53° 29' 59.5086" N	5° 50' 25.0878" W	43	53° 26' 25.4233" N	6° 03' 47.4718" W
15	53° 30' 47.9954" N	5° 45' 47.3664" W	44	53° 26' 41.4610" N	6° 04' 49.0097" W
16	53° 31' 47.7290" N	5° 39' 51.3161" W	45	53° 26' 44.6882" N	6° 05' 02.4690" W
17	53° 32' 50.1436" N	5° 31' 38.9254" W	46	53° 26' 57.3728" N	6° 05' 37.8271" W
18	53° 32' 41.4390" N	5° 20' 07.1803" W	47	53° 27' 03.0085" N	6° 06' 25.0628" W
19	53° 32' 53.0929" N	5° 18' 29.2293" W	48	53° 27' 06.0008" N	6° 07' 39.7846" W
20	53° 32' 34.2683" N	5° 17' 00.0341" W	49	53° 27' 04.6657" N	6° 08' 14.6837" W
21	53° 33' 06.9181" N	5° 17' 00.0098" W	50	53° 26' 59.9672" N	6° 08' 12.6978" W
22	53° 33' 11.3167" N	5° 17' 53.7841" W	51	53° 26' 51.2462" N	6° 08' 04.6861" W
23	53° 33' 09.3544" N	5° 18' 29.6663" W	52	53° 26' 46.9548" N	6° 06' 28.7450" W
24	53° 32' 59.6268" N	5° 20' 24.1487" W	53	53° 26' 42.0637" N	6° 05' 47.7492" W
25	53° 32' 59.2619" N	5° 21' 08.9449" W	54	53° 26' 30.1608" N	6° 05' 14.5701" W
26	53° 32' 55.6331" N	5° 21' 50.3126" W	55	53° 26' 26.5419" N	6° 04' 59.4764" W
27	53° 33' 06.3360" N	5° 31' 39.6477" W	56	53° 26' 18.0717" N	6° 04' 26.9751" W
28	53° 33' 06.2605" N	5° 31' 42.2162" W	57	53° 26' 06.9512" N	6° 05' 26.7302" W
29	53° 32' 03.2999" N	5° 39' 58.6545" W	58	53° 25' 58.9344" N	6° 07' 26.7586" W

Table 1. Survey Licence Area RPL

Figure 4. Landfall at Portmarnock

Figure 5. Landfall at Malahide

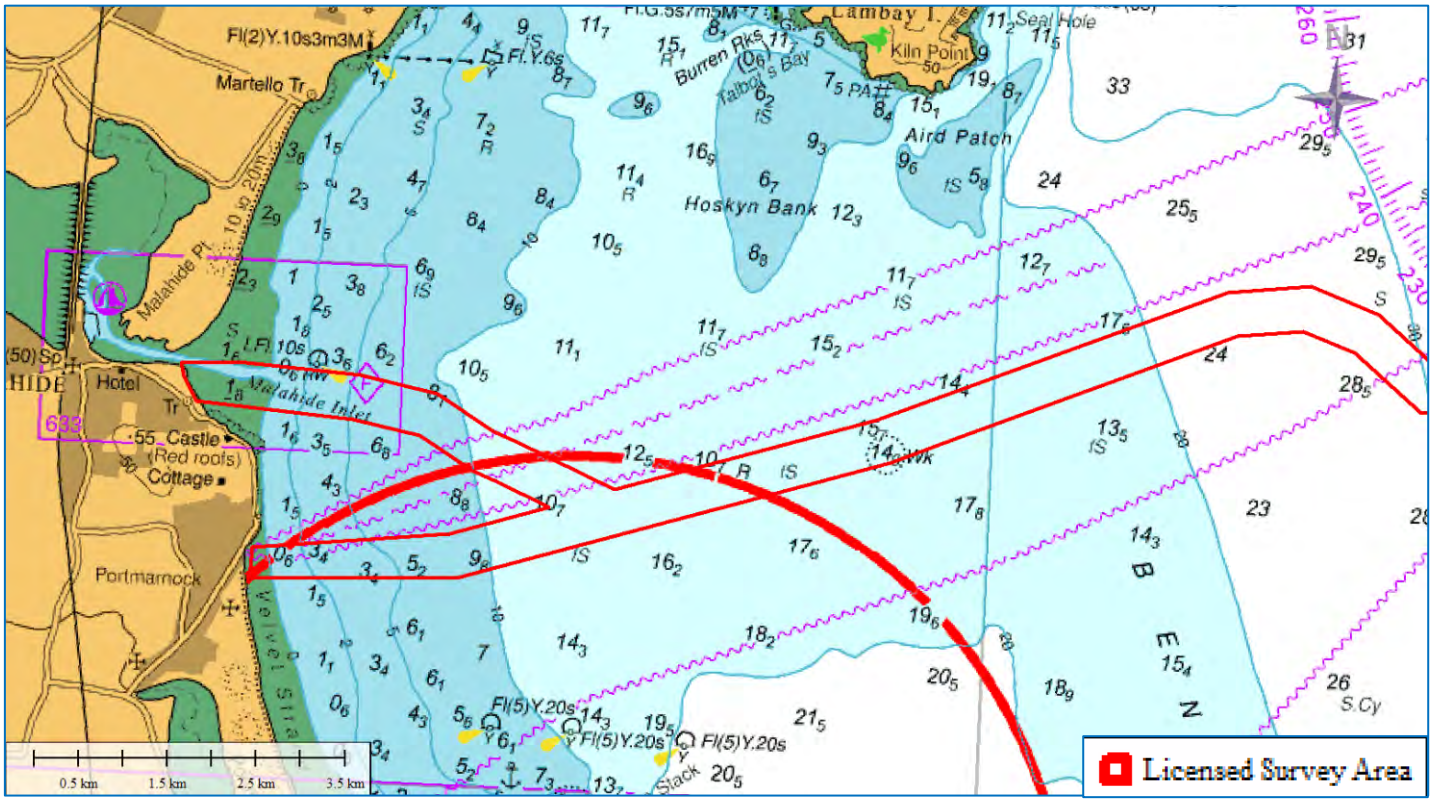


Figure 7. Inshore Survey Sections and Landfalls.

The general line of the inshore section of the proposed survey route is shown on an Admiralty Chart base in Figure 7. The route heads slightly north eastwards from the landfall, parallel to existing cables staying south of Lambay Island.

The landfall location shown on Ordnance Survey Maps are provided in Drawing 1358-001 and included with the Licence Application.

PROPOSED MARINE SURVEY & SITE INVESTIGATIONS SCHEDULE OF WORKS

The principal objective of the Marine Survey & Site Investigations is to ascertain a feasible and safe route for cable system design, deployment, survivability and subsequent maintenance with due regard for environmental and ecological considerations. The survey will also enable decisions to be made on cable armouring and burial. The survey will identify the necessary water depths, route features, seabed obstructions, seabed geomorphology and cable hazards and will also provide detailed information on the seabed sediment, subsurface stratigraphy and upper sediment layers to support cable route and installation engineering. The site investigations will provide "ground-truthing" of the geophysical data along the route.

The objectives of the marine geophysical survey shall be:

- To collect up to date high-resolution bathymetry along a 400 – 500m wide cable corridor within the License Application Area;
- To obtain information on the seabed surface (type, texture, variability, etc.) and in particular, to identify any seabed features that may be of interest.
- Identify any shallow geohazards and man-made hazards (including but not limited to outcropping, boulders, shallow gas, wrecks, debris etc.);
- Determine the stratigraphy of the upper layers of the seabed along the cable route and quantify the variability in the lateral and vertical extents to depths of 2-5m
- Identify any magnetic anomalies;
- Identify sensitive marine habitats which will need to be avoided during site investigations and sampling.

The survey operations will be broken down into separate but overlapping areas, with boundaries defined by water depth as specified in the technical requirements outlined below. These water depth boundaries

may be adjusted due to suitability of the survey vessel(s) and survey spread. The survey and survey line spacing will be designed to ensure adequate coverage and overlap of geophysical measurements.

- Landfall Survey – Intertidal Zone
- Inshore Survey – from 3m Chart Datum to 15m Chart Datum
- Offshore Survey – Water depths greater than 15m Chart Datum

In order to ensure data continuity, coverage between the survey areas is required with indicated overlap below;

- Landfall Survey to Inshore Survey – 50m overlap
- Inshore Survey to Offshore Survey – 500m overlap

Landfall Survey & Site Investigations

A non-intrusive topographic survey along the line of the proposed cable route at the landfall is required to the low water mark. Intertidal and beach surveys (walkover survey) will be carried out on the beach by the project ecologist and the project archaeologist.

The topographical survey would typically be carried out by GPS Rover, Total Station or UAV Aerial Drone using photogrammetry or LiDAR techniques. The terrestrial geophysical survey will comprise remote sensing techniques such as Ground Penetrating Radar or Electrical Resistivity Tomography (ERT) to establish subsurface features and depth to bedrock and magnetometer or handheld marine metal detector to locate buried ferrous objects.

Landfall Site Investigations will be undertaken to establish the depth and nature of the sediment. The focus of the site investigations will be on the upper layers of sediment to assess the feasibility of cable burial and installation techniques. The following may be undertaken at the landfall:

- Bar probes on the intertidal at 10m spacing (approx. 8 to 10 at each landfall).
- Bar probes from the Low Water Line to the 3m water depth contour at 30m spacing. (approx. 8 to 10 at each landfall)
- 3 Trial Pits on the beach (target depth 2.5m).

The bar probes on the intertidal are manually driven to a depth of 2 metres simply to prove the depth of upper layers of sand, gravel or soft material.

The Trial Pits will be positioned at approximately 30 to 50m centres starting seaward of the High Water Mark. The Trial Pits will be excavated, logged, photographed and backfilled in a single tidal cycle. The trial pits will be backfilled with the original excavated materials in the sequence in which they are excavated.

A summary Method Statement for excavation of the Trial Pits is as follows;

- Excavate sand and place to one side.
- Excavate substrate and place separate from sand.
- Measure, log and photograph each Trial Pit.
- Backfill in sequence compacting with bucket of back-hoe as the backfilling proceeds.

Inshore Marine Survey

The area extending seaward from the low water mark at the landfall and inshore of the safe working draft limits of the primary survey vessel will be accurately surveyed with a small craft or Unmanned Survey Vessel (USV) using Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer and sub-bottom profile equipment. Sub-bottom profile equipment will be able to discern the nature and density of the upper 3 metres of seabed and will be used on a non-interfering basis with other sounding systems. A minimum of seven survey lines, based upon the Survey RPL, is required.

Features such as shallow reefs, surge channels, debris fields, archaeological features or anything that could be a hazard to the cable or installation team will be noted. General reconnaissance of the survey corridor

beyond the planned survey lines and tie-lines may be necessary to describe the seabed as accurately as possible. A line plan showing number of survey lines as a function of depth will be determined prior to start of survey operations.

Survey Area	Depth Range	Survey Corridor Width	Min. # of Lines	Min. Overlap	Typical Survey Speed
Inshore	3m to 15m	400 - 500m	9	SSS: 100% MBES Bathy: 20%	4 knots

Table 2 Inshore Survey

Offshore Marine Survey

The area extending seaward from the outer limits of the inshore survey to the EEZ limits will be surveyed by the primary survey vessel using Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer and sub-bottom profiler equipment. A continuous bathymetric swathe along with side scan sonar imagery and sub-bottom traces will be obtained, centred on the preliminary route and along all wing lines needed to complete the route corridor coverage. A minimum of seven survey lines, based upon the Survey RPL, is required.

Sub-bottom profile equipment will be able to discern the nature and density of the upper 3 metres of seabed and will be used on a non-interfering basis with other sounding systems.

Survey Area	Depth Range	Survey Corridor Width	Min. # of Lines	Min. Overlap	Typical Survey Speed
Offshore	> 15m	500m	7	SSS: 100% MBES Bathy: 20%	4 knots

Table 3. Offshore Survey.

Marine Site Investigations and Seabed Sampling

The purpose of the marine site investigations and seabed sampling is to evaluate the physical properties of the superficial seabed sediments along the cable route. These methodologies will ensure that a full understanding of the subsurface is achieved, focussing on the upper 3 metres of sediment to subsequently develop a cable burial assessment, installation and burial plan.

The scheduled site investigations and seabed sampling within EEZ limits will comprise of the following techniques:

- Up to 15 CPTs (2m to 3m)
- Up to 12 Gravity Cores / Vibrocores (3m)
- Up to 11 Grab Samples

Indicative locations for the relevant site investigation activities (Gravity or Vibrocore and CPT's) are shown in Figure 8. Typically, individual sampling positions will be determined following initial interpretation of the geophysical survey data. The positioning of individual site investigation locations will also take into consideration environmental constraints such as the position of sensitive habitats or archaeological features.

Two or more attempts may be made at each location to acquire a suitable sample. If an acceptable sample is achieved on the first attempt, there is no need to perform a second attempt.

An acceptable sample is defined as;

- Grab Sample – recovery of approximately a full bucket of sediment. Recovery of large size granular material may be taken as indication of a hard seabed.
- Gravity Core / Vibrocore – recovery of < 3m core of soil. If stiff or hard soils are encountered and are clearly indicated in the sample, it sample may be deemed acceptable. Any sample site yielding less than 1m of recovery must be investigated a second or third time unless there is obvious damage to the coring equipment indicating a hard or rocky substrate.
- CPT – Penetration to the 2m target depth or refusal. Any push resulting in less than 2m penetration will warrant a second attempt.

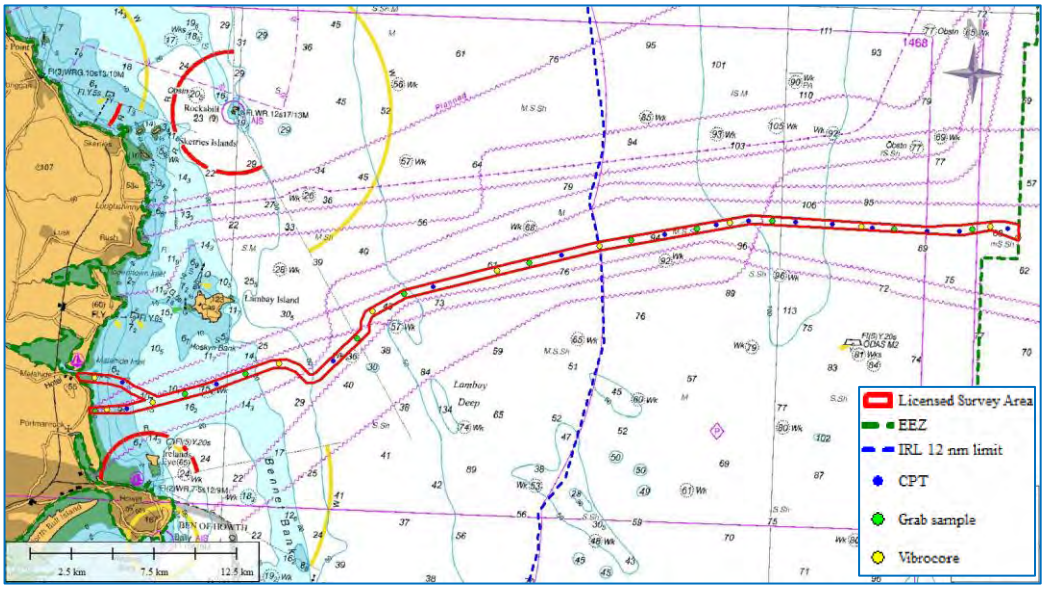


Figure 86. Indicative CPT and Vibrocore Locations

Seabed Sampling

The total overall scope of the Site Investigations is as follows

- Bar Probes — 20 No. on the intertidal
- Trial Pits — 6 No. on the beach
- Bar Probes — 20 No. from Low Water to 3m contour.
- Grab Samples — 11 No. along the route corridor.
- Gravity Cores / Vibrocores — 12 No. along the route corridor.
- Cone Penetration Tests — 15 No. along the route corridor.

Underwater Video Survey

Underwater video camera system may be used for inspections of the seabed to investigate seabed obstructions, marine archaeology or benthic habitats. An underwater drop-down camera system or similar may be used in a series of video transects which would be georeferenced and later mapped in GIS.

Archaeological Survey

The proposed survey specification takes into account archaeological data acquisition to enable professional archaeological interpretation and analysis of data. The survey equipment deployed and data acquisition and processing shall comply with the requirements of the National Monuments Service, Underwater Archaeology Unit.

All archaeological assessments will be carried out under by a suitably qualified and experienced marine archaeologist to determine the location of all known archaeological features in advance of the intrusive site investigations and seabed sampling. The data collected will be used to support the archaeological assessments.

SURVEY EQUIPMENT PARAMETERS

Multibeam Echosounder (MBES)

Echo-sounders are a diverse group of acoustic sources used to collect information on bathymetry, seabed features and objects in the water column (e.g. Multi beam echosounder, scientific echo-sounders/ fish-finders). They measure water depth by emitting rapid pulses of sound towards the seabed and measuring the sound reflected back.

Multibeam Echosounder (MBES) will be used during the marine survey to provide detailed 3 dimensional bathymetric mapping of the cable route corridor using multiple beams elongated in the across-track direction to cover a fan-shaped sector (or swath) (Figure 9). Measurements of the across-track beam from MBES showed 3 dB beam widths of 150-160°; in the along-track orientation beam width is narrow, typically ~1.5-3.0° (Crocker & Fratantonio 2016).

MBES is non-intrusive and does not interact with the seabed. The MBES system will be used will be confirmed following the appointment of a survey contractor but typical systems which can be taken as examples would be the R2 Sonic 2024, Kongsberg EM2040 or Teledyne Seabat T50 which would be hull mounted on the survey vessel.

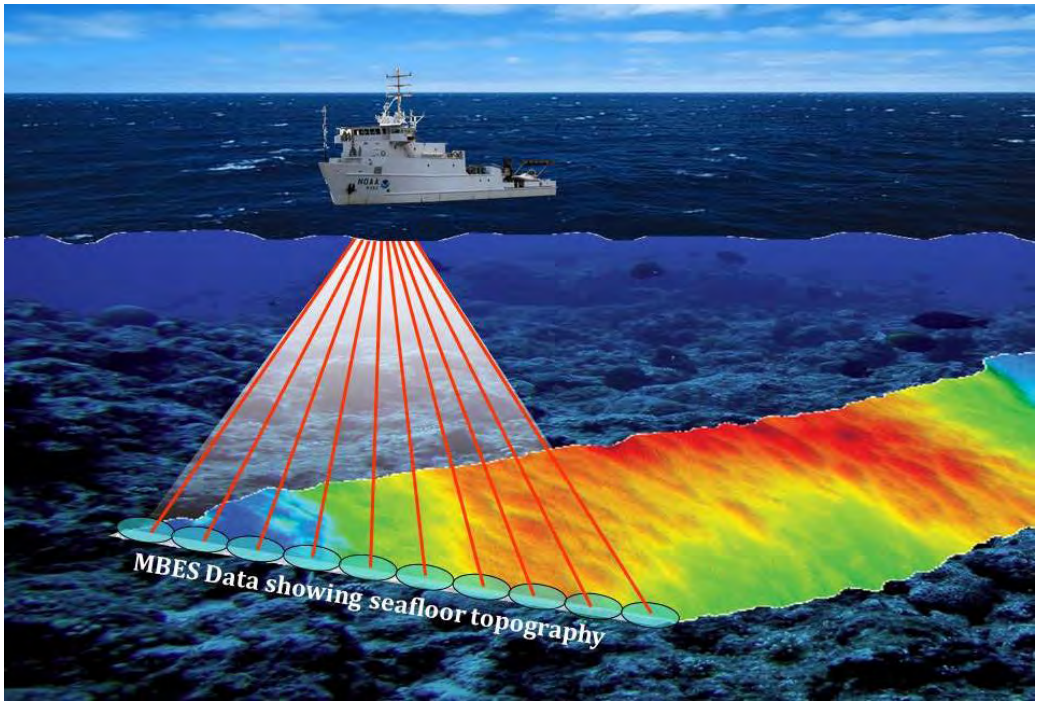


Figure 9. Graphic of MBES survey in operation

The acoustic signal emitted by MBES systems is short duration, typically of a few milliseconds or less, and can be configured to within the range 0.05-10 ms for certain systems. Repetition rates are highly customisable, varying with signal frequency and water depth. Ping rates of up to 10-20 pings per second may be used in very high frequency systems, whereas there may be several seconds between pings in low-frequency deep-water applications.

For collecting information on the seabed, emitted sound frequencies are typically between 12 – 400 kHz depending on water depth, with surveys in continental shelf applications operating at between 70 to 150 kHz, and in shallower waters of less than 200 m using multi-beam echosounders operating at between 200 and 500 kHz The typical operating frequencies for the cable route survey within the licence application area will be in the range of 200kHz to 500kHz. (Danson 2005, Hopkins 2007, Lurton and DeReutier 2011).

Maximum sound source pressure levels of MBES have been reported as ranging from 210-245 dB re 1µPa at 1m with the highest levels corresponding to the lowest frequency systems (DECC 2011, Lurton and DeReutier 2011, Lurton 2016, BEIS 2020). The highest measured source levels among three MBES systems when operated at maximum power for central operating frequencies of ≥100 kHz was between Lp,pk 225-228 dB re 1µPa at 1m (LE,p 181-197 dB re 1µPa^2 s at 1m (Crocker & Fratantonio 2016).

Side Scan Sonar

Side-scan sonar (SSS) is a seabed imaging technique used to provide high-resolution and detailed 2 dimensional imagery of the seabed for a variety of purposes. SSS involves the use of an acoustic beam to obtain an accurate image over a narrow area of seabed to either side of the instrument.

Piezoelectric transducers in the SSS generate high-frequency acoustic pulses which are directed either side of the tow fish. The transducers are oriented such that the acoustic signal covers a wide angle perpendicular to the path of the tow fish through the water, providing information on a strip either side of the device (port and starboard). The intensity of the acoustic reflections from the seafloor is recorded in a series of cross-track images. When stitched together along the direction of motion, these images form a waterfall view of the sea floor within the swath of the beam. The range (swath width) is dependent upon the frequency, power and other source configurations, but is typically between 50-300 m on both sides.

Analysis of SSS data can aid identification of seafloor sediment, surficial bedrock outcrops and geomorphology mapping. Obstacles rising proud of the seafloor, such as shipwrecks, boulders, pipelines, outfalls, exposed cables, fishing gear etc. can cast shadows on the resulting seafloor image where no acoustic signal is returned. The size of the shadow can be used to determine the size of the feature casting it (Figure 10).

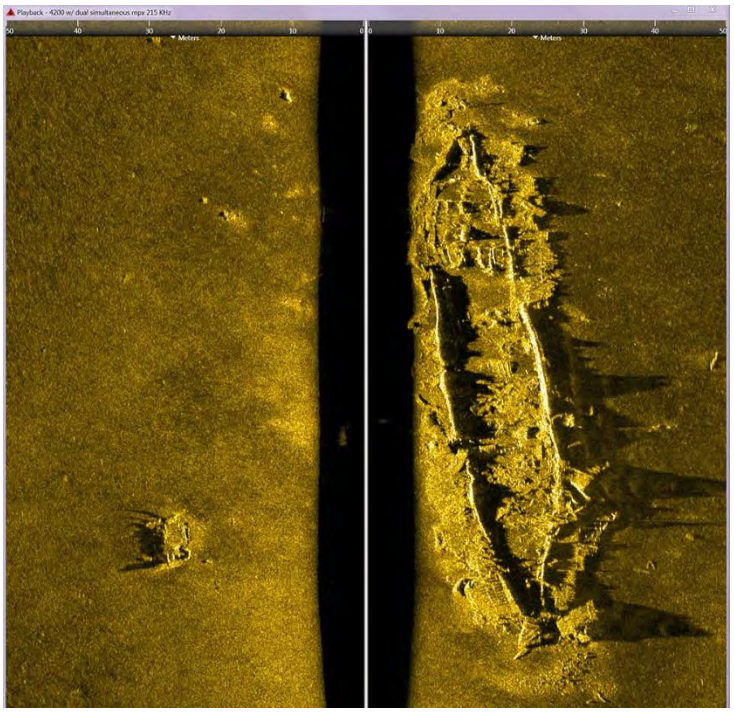


Figure 10. SSS image of shipwreck on seabed and nadir gap.

SSS is non-intrusive and does not interact with the seabed. The SSS system will be used will be confirmed following the appointment of a survey contractor but typical systems which can be taken as examples would be the Klein 3000 or Edgetech 4200 (Figure 11). The SSS may be hull mounted but is typically towed at depth behind the survey vessel on an armoured tow cable.

Figure 11. Deployment of Edgetech 4200 Tow fish

Acoustic signal durations of SSS systems are short (0.4ms – 1.0ms), but vary between models and configurations with longer signal durations are required to survey greater ranges. Repetition rates are highly customisable with ping rates of up to several tens of pings per second (Crocker & Fratantonio 2016).

The frequencies used by side-scan sonar are relatively very high, typically between 100 and 900 kHz. Most SSS systems offer real-time dual frequency operation which allows acquisition of both frequencies across a swath independently and simultaneously. The higher frequency produces higher resolution data and sharper images but with a narrow swath width while the lower frequency results in wider seabed coverage at lower resolutions.

SSS typically offer a selection of two operational frequencies in the range of 100-500 kHz, or may operate both simultaneously. Some models may offer an upper frequency of up to 900 kHz for applications requiring the highest resolution data. Across-track resolutions vary between 1-8 cm with finer resolution at higher operating frequencies. The typical operating frequencies for the cable route survey within the licence application area will be between 200 to 700 kHz.

The line spacing for the survey will be determined after consideration of all factors including water depth and prevailing conditions at time of survey. Generally for SSS, full coverage requires two passes with 100% overlap over a given area of sea-floor, with the two passes each insonifying the sea-floor from opposite directions to ensure targets are adequately imaged. This also ensures that the 'nadir gap' or the centre of the image directly under the path of the towfish is fully covered (Figure 10).

Sound source pressure levels of SSS systems have been reported typically in the range Lp,pk 200-240 dB re 1µPa at 1m. (BOEM 2016, BEIS 2020, DAHG 2014). Maximum calibrated source levels, (sound pressure) measured by Crocker & Fratantonio (2016) were Lp, pk 227 dB re 1µPa at 1m for a 0.1 ms pulse, whereas the highest energy source level of LE, p 205 dB re 1µPa^2 s at 1m corresponded to a longer pulse of 1.1 ms at lower maximum pressure (Lp, pk 210 dB re 1µPa at 1m).

Marine Magnetometer

A marine magnetometer is a passive towed sensor used to measure magnetic field strength and to detect variations in the total magnetic field of the underlying seafloor. The magnetometer does not transmit any signals into the marine environment.

Usually, the increased magnetization is caused by the presence of ferrous (unoxidized) iron on the seafloor or buried below the surface, whether from a shipwrecked vessel made of steel or from natural rock formations containing grains of magnetite. After corrections are made to measurements of the total magnetic field, magnetic data is used to locate existing infrastructure such as buried pipelines, undersea cables and to identify shipwrecks and potential unexploded ordnance.

Marine magnetometers are non-intrusive and do not interact with the seabed. They are towed at depth at least two and a half ship-lengths behind the survey vessel, so that the ship's magnetic field does not interfere with magnetic measurements. The marine magnetometer may be integrated and towed in tandem with the SSS. The marine magnetometer will be of the Caesium Vapour type and capable of recording variations in magnetic field strength during survey to an accuracy of ±0.5nT.

The marine magnetometer system to be used will be confirmed following the appointment of a survey contractor but typical systems which can be taken as examples would be the Geometrics G-882 or Marine Magnetics SeaSpy (Figure 12). The line spacing and coverage will generally match the SSS as they are towed in tandem and the parameters of the survey may be determined by the requirements of the Underwater Archaeology Unit of the National Monuments Service.

Figure 12. Marine Magnetics SeaSpy towfish.

Sub-bottom profiler

Sub-bottom profilers (SBPs) encompass a range of acoustic systems which are designed to collect information on the characteristics of strata below the seabed, establish changes in sediments and detect and image structures buried within the sediments (Figure 13). Shallow Sub-bottom profiling can penetrate the seabed to a range of depths, from a few metres to tens of metres depending on the geological conditions encountered, and with vertical resolutions from a few centimetres to a few metres. Most are towed behind a survey vessel, either at/near the surface or at depth, whereas some smaller devices may be hull-mounted or lowered over the side of a vessel on a pole mount.

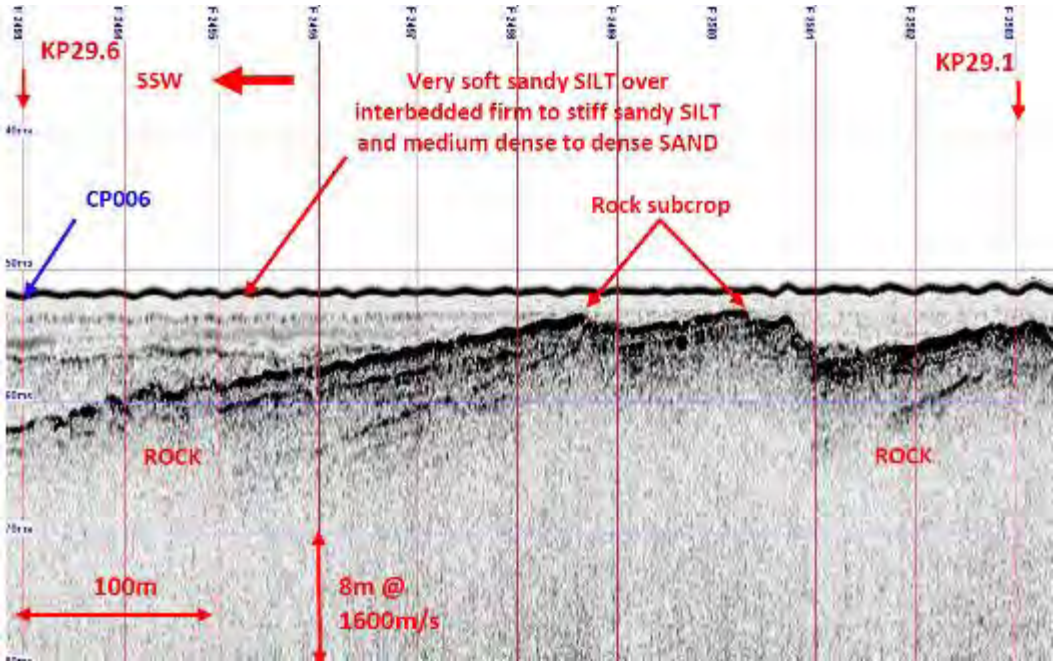


Figure 13. Interpreted SBP seabed profile.

Pulsed waveform SBPs generate an acoustic signal either through the impulsive physical processes of electrostatic discharge, as in sparkers, or electromechanically via accelerated water mass, as in boomers. All periodic waveform SBPs i.e. pingers, chirpers and parametric SBPs are electromechanical sources which employ piezoelectric transducers to generate an acoustic waveform by converting electrical energy into mechanical movement i.e. vibrations. Through the reverse of this process, the transducers can also detect sound. As such, these sources are highly customisable; in many cases, the signal is modulated in frequency and/or amplitude to improve its detectability and performance.

The systems most commonly used for high-resolution surveying are the boomer (such as the Applied Acoustics S-Boom), pinger (such as the Kongsberg GeoPulse), chirp (such as the Edgetech SB-424, Figure 14) and parametric chirp systems (such as the Innomar SES-2000). Whereas the boomer system provides best results for coarser sediments, the pinger and chirp systems deliver detail for finer sediments.

The objective of the SBP cable route survey is to investigate the upper layers of the seabed sediments for cable burial potential and installation risk from seabed obstructions such as subcropping rock formations and is not focussed on deep seabed conditions such as required for investigation of offshore wind farm foundations or deepwater seismic surveys carried out by Oil and Gas Exploration. The SBP system used for the survey will be confirmed following the appointment of a survey contractor and the most appropriate system chosen depending on the seabed, anticipated geological environment and the survey vessel capabilities.

Sound source pressure levels of various SBP systems have been reported typically in the range Lp,pk 185-247 dB re 1µPa at 1m. (Hartley Anderson 2020, Crocker & Fratantonio 2016). A summary of the Maximum Sound Pressure Levels for SBP systems is described in Table 4 below. The SBP survey is non-intrusive therefore does not interact with the seabed.

Figure 7. Edgetech SB-424 tow body.

Equipment Type	Frequency Range	Duration	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Sub-bottom Profiler (SBP) - Pinger	2 kHz to 15 kHz	0.5 - 30 ms	214 dB.	Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Chirper	2 kHz to 13 kHz	5 - 40 ms	185 - 215 dB.	Crocker & Fratantonio 2016, Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Boomer	500 Hz to 15 kHz	0.5 - 1.0 ms	205 - 215 dB.	Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Parametric	4 to 15 kHz, 85 to 115 kHz	0.2 - 30 ms	238 - 247 dB. 200 - 206 dB.	Hartley Anderson 2020

Table 4. Typical SBP specifications

Ultra-Short Baseline (USBL) Subsea Positioning

An Ultra-Short Baseline (USBL) is a subsea positioning system widely used by the offshore marine industry and scientific research vessels to accurately track the position of towed equipment and sensors. The USBL system consists of a transceiver mounted to the survey vessel, and transponders on the towed equipment.

To calculate a subsea position, the USBL calculates both a range and an angle from the transceiver to the subsea beacon. Angles are measured by the transceiver, which contains an array of transducers. The transceiver emits an acoustic signal at predetermined periods (often 0.5 seconds) which is returned by the transponder and allows for the bearing and distance to be calculated.

USBL systems are designed for close range transmission and thus typically emit pulses of medium frequency sound (20 to 50 kHz). Manufacturers report SPL values of 194 to 207dB re 1µPa at 1m depending on the model used, taking as an example the higher range of USBL source (Kongsberg HiPAP) with a SPL of 207dB re 1µPa at 1m.

Cone Penetration Test (CPT)

The survey vessel will position itself over the target position to carry out the CPT. The seabed CPT rig (such as a Neptune 3000, Figure 15) is deployed to the seabed from the vessel crane, A-frame or dedicated Launch and Recovery System (LARS). Once on the seabed, in a stable position, a steel rod with a conical tip (typically an apex angle of 60° and a diameter of 35.7 mm) is pushed at a steady rate into the seabed until it reaches target penetration depth of 3 to 6m or refusal. The penetration resistance at the tip and along a section of the shaft (friction sleeve) is measured and recorded for later analysis.

Refusal is indicated by peak system thrust, excessive load on the tip or excessive inclination of the cone. If target penetration depth is not met, the CPT rig may be moved to a nearby position on the seabed and the test repeated. The time taken to complete a shallow CPT is typically less than 10 minutes but the total time in the water from deployment to recovery may be 1 to 2 hours at each position, depending on water depth and sea state.

There is very little published information on the sound pressure levels generated from CPT equipment, collected either from field experimentation or from manufactures specifications. Data from a similar device, deep boring, indicates that sound pressure source levels are typically within the range 118 - 145 decibels (dB) (BOEM 2012, EIRGRID 2014).

Figure 8. Neptune 3000 CPT rig

Gravity Core

Gravity corers (Figure 16) provide a rapid means of obtaining a continuous core sample in water depths from a few metres down to several thousand metres. A gravity corer consists of a steel tube in which is inserted a plastic liner to hold the core sample. Gravity corers are commonly used for cable route investigations.

A set of heavy weights, up to 750 kg, is attached at the top end of the tube above which is a fin arrangement to keep the corer stable and vertical during its fall to the seabed. The sampler penetrates the seabed under its own weight. Normal practice is to lower the device to within 10 m of the seabed before releasing. The penetration depth is between 1 m and 3 m. Penetration in stiffer clays or sands is usually limited.

The penetrating end of the tube is fitted with a cutter and a concave spring-steel core-catcher to retain the sample when the corer is retracted from the soil. The suction caused when withdrawing a core barrel from a soft soil such as clay, can pull the sample from the barrel, or in other ways disturb its homogeneity. By fitting a piston above the sample, the partial vacuum caused above the piston, when the barrel is withdrawn, keeps the sample from being pulled out of the tube.

Upon refusal or at target depth of 3m, the sampler is recovered on deck where the sample is split, typically into 1m lengths, logged, sealed and stored for later laboratory analysis. The typical diameter of the liner is in the region of 90mm with a typical maximum diameter of 120mm.

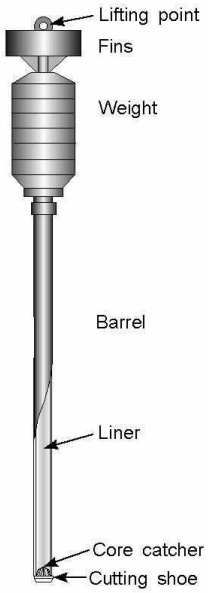


Figure 9. Gravity Corer schematic

Vibrocorer

Vibrocorers are used wherever soil conditions are unsuited to gravity corers or where greater penetration of the seabed is necessary. Vibrocore is best suited to non-cohesive soils (e.g. gravel or sand) as samples recovered are considered disturbed. Vibrocorers are commonly used for cable route investigations.

To penetrate soils such as dense sands and gravels, or to reach deeper into stiff clays, rather than depending on a gravity free-fall, the corer's barrel is vibrated, thus facilitating its penetration into the soil. This vibration energy allows the core barrel to penetrate the sediments under self-weight. In other respects, the barrel and sample retention systems are similar to gravity corers.

The typical vibrocorer consists of a tall steel frame and tripod support. Within the frame is a standard 102 mm steel coring barrel in which is inserted a PVC liner to contain the sample. The typical diameter of the PVC liner is in the region of 90mm with a typical maximum diameter of 120mm. A spring steel core catcher is fitted to the cutting shoe, as with the gravity corer. Two linear electric motors enclosed in a pressure housing provide the vibratory motion; the core barrel is attached directly to the motor housing. Power is fed to the motors via an electrical control line from the survey vessel.

Once in motion, the heavy motor housing provides the mass to drive the core barrel into the seabed. The penetration depth can be from 2m to 8m depending on seabed conditions. A typical 6 m vibrocorer will weigh nearly two tonnes and requires a crane for A-Frame or deployment and recovery. Vibrocorers come with barrel lengths of 3m, 6m and 8m. A normal coring operation in 100 m water depth will take about one hour.

Once coring is started, the core barrel will penetrate to the target depth. Upon refusal or at target depth of 3m, the vibrocore is recovered on deck where the sample in the liner is removed from the barrel, the sample is split, typically into 1m lengths, logged, sealed and stored for later laboratory analysis.

The sounds produced by the operation of a vibrocorer on the seabed consist of a series of impulses corresponding to the movement and impacts of the mechanics of the vibrating motion from the oscillating motors on the core barrel. Expected sound pressure levels generated by vibrocore equipment would be approximately 187.4 dB re 1µPa at 1m (LGL, 2010),

Figure 10. Deployment of Vibrocorer from Survey Vessel

Grab-samplers

Grab samplers are one of the most common methods of retrieving soil samples from the seabed surface. The grab sampler is a device that simply grabs a sample of the topmost layers of the seabed by bringing two steel clamshells together and cutting a bite from the seabed surface to a depth of 0.1 to 0.5m. The information they provide can be applied in a number of applications such as seabed classification, environmental sampling, chemical and biological analysis and ground truthing for morphological mapping and geophysical survey. Grab samplers can be used to recover samples of most seabed soils, although care is needed in selecting the right size unit for the task.

There are various grab sampler types to include but not limited to Van Veen (single or double, Figure 18), Hamon, Shipek and Day Grab samplers. Generally, some variants may come both as single or double, and in a variety of different sizes. The grab sampler comprises two steel clamshells acting on a single or double pivot. The shells are brought together either by a powerful spring (Shipek type) or powered hydraulic rams operated from the survey vessel.

In operation, the grab is lowered from the survey vessel to the seabed with the clamshells in the open position and which trigger shut when the sampler is in contact with the seafloor. The shells swivel together in a cutting action and retains a sample of seabed. The sampler is then recovered to the survey vessel for visual inspection, processing, logging and transfer to suitable sample containers for storage and later laboratory analysis. Typical performance rates are between three and four samples per hour.

The smaller Shipek type grab sampler is useful for ground truthing geophysical surveys for the surface layer, and samples are taken to about 0.1 m below the seabed. Larger hydraulic grabs are capable of recovering relatively intact samples of consolidated soils to a depth of about 0.5 m. In areas of large cobbles or boulders, grabs can become jammed open and their contents washed away during recovery to the surface. However, the hydraulic grab is more likely to recover cobbles and small boulders than any other system, and in this respect is invaluable. Various grabs will be available for the survey to ensure adequate sampling equipment for various sediment types.

Figure 11. Single and Double Van Veen Grab.

SURVEY VESSELS

Offshore survey vessels are typically between 15m and 75m in length with potential for smaller vessels to be used in nearshore / shallow water areas. Offshore survey vessel typically have an endurance of approximately 14 to 28 days. A vessel with a shallow water draft will be utilised for the inshore survey area. An unmanned surface vehicle (USV) and/or autonomous surface vehicle (ASV) may also be used for the geophysical survey. The survey vessels may use a local port for personnel / equipment mobilisation, bunkering and provisioning.

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 survey vessels will be fit for purpose, will possess all relevant classification certificates and capable of safely undertaking the survey work required. Health, safety, environment and welfare considerations will be a priority and will be actively managed during the course of the survey scopes of work. Appointed contractors will be required to comply with all legislation relevant to the activities within their scope of work. Prior to survey works taking place under Licence, both Project Supervisor for Design Process (PSDP) and Project Supervisor for Construction Stage (PSCS) will be appointed under the relevant legislation and project / survey specific HSE plans will be put in place which will form part of the survey project execution plans.

The vessels 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;
- Calibrated equipment and spares with necessary tools for all specified works;
- Endurance (e.g. fuel, water, stores, etc.) to undertake the required survey works;
- 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.

Survey vessels will generate some subsea noise in the marine environment from engine noise and dynamic positioning thrusters. Shipping noise is typically within the 50-300 Hz frequency band and is the dominant noise source in deeper water (DECC, 2011). Propellers on vessels all have the potential to produce cavitation noise. This sound is caused by vacuum bubbles that were generated by the collapse of bubbles created by the spinning of the propellers.

Acoustic broadband source pressure levels typically increase with increasing vessel size, with smaller vessels (<50 m) having source pressure levels 160-175 dB (re 1µPa at 1m), medium size vessel (50-100 m) 165-180 dB (re 1µPa at 1m) and large vessels (>100 m) 180-190 dB (re 1µPa at 1m) (DECC, 2011). Every vessel has a unique noise signature and for each vessel this can change in response to a number of factors, including; ship speed, operational status, vessel load, the condition of the vessel and even the properties of the water that the vessel is operating in.

MARINE SURVEY AND SITE INVESTIGATIONS SOUND PRESSURE LEVEL SUMMARY

All survey works that involve the use of acoustic instrumentation will follow the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters, 2014.

The ranges of noise frequency and sound pressure levels associated with all the surveys outlined in previous sections is summarised in Tables 5. and 6 below. It can be noted that as the focus of the cable route surveys within the licence application area is the seabed surface and upper layers of seabed sediments and generally obtaining higher resolution data, the geophysical equipment such as MBES and SSS is generally operated more towards the higher end of the frequency range where possible.

TIMELINE AND DURATION OF SURVEY ACTIVITIES

The intention is to commence the survey as soon as feasible following license award, taking into account survey vessel availability, the overall cable route survey programme, seasonality and suitable weather windows. The exact mobilisation dates will not be known until the process of procuring a contractor and issue of the marine licence is complete. It is anticipated that the marine geophysical survey and site investigations activities within the marine licence area will take less than 6 weeks in total and will be completed over a 6 month period.

The estimated time required to complete the cable route survey campaign activities is described in Table 7 below.

Equipment Type	Purpose	Frequency Range	Duration	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Multibeam Echo Sounder (MBES)	Measure detailed bathymetry by transmitting sound pulses (active sonar).	200 kHz to 500 kHz	0.05 - 10 ms	210 - 245 dB.	Danson 2005, Hopkins 2007, DECC 2011, Lurton and DeReutier 2011, Lurton 2016, BEIS 2020, Crocker & Fratantonio 2016
Side Scan Sonar (SSS)	Determine surficial nature of the seabed and detect objects by transmitting sound pulse.	200 kHz to 700 kHz	0.4 - 1.0 ms	200 - 240 dB.	BOEM 2016, BEIS 2020, DAHG 2014, Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Pinger	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 15 kHz	0.5 - 30 ms	214 dB.	Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Chirper	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 13 kHz	5 - 40 ms	185 - 215 dB.	Crocker & Fratantonio 2016, Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Boomer	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	500 Hz to 15 kHz	0.5 - 1.0 ms	205 - 215 dB.	Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Parametric	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	4 to 15 kHz, 85 to 115 kHz	0.2 - 30 ms	238 - 247 dB. 200 - 206 dB.	Hartley Anderson 2020
Ultra-Short Base Line (USBL)	Subsea positioning.	20 kHz to 50 kHz	5 - 10 ms	194 - 207 dB.	Kongsberg
Magnetometer	Identify ferrous anomalies for metal obstructions, shipwrecks, etc. on and under the seabed.	Passive	N/A	Passive	N/A
Survey Vessels	Carry out the survey and deploy the equipment.	50 Hz to 300 Hz	N/A	160 - 190 dB.	DECC 2011

Table 5. Marine Survey Activities.

Equipment Type	Purpose	Number of locations within Licence Application Area (up to)	Frequency Range	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Cone Penetration Test (CPT)	Determine geotechnical engineering properties of seabed sediments.	15	28 Hz	118 - 145 dB.	BOEM 2012, EIRGRID 2014
Gravity Corer	Retrieve a seabed sediment sample by penetrating seabed with a steel core barrel under self-weight	12	N/A	N/A	N/A
Vibrocorer	Retrieve a seabed sediment sample by penetrating seabed with a vibrating steel core barrel	12	30 Hz	187.4 dB.	LGL 2010
Grab Samples	Collect small sediment samples from seabed surface with clamshell mechanism	11	N/A	N/A	N/A

Table 6. Marine Site Investigation Activities.

Activity	Typical Time Period Required for Activity	Total Number of SI Locations	Total Time for SI	Foot Print Affected per SI	Foot Print Affected per SI (ha)	Total Foot Print (ha)	Area Directly Affected as % of Licence Application Area
Inshore Geophysical Survey	3 to 4 days (weather and sea state dependent)	400 - 500 m cable route corridor	3 to 4 days (weather and sea state dependent)	N/A	N/A	718 ha	22.36064%
Offshore Geophysical Survey	8 to 10 days (weather and sea state dependent)	500 m cable route corridor	8 to 10 days (weather and sea state dependent)	N/A	N/A	2493 ha	77.63936%
CPT	30 minutes - 2 hours in any one location	15	30 hours within total 6 days of Site Investigations campaign (weather and sea state dependent)	8m²	0.0008 ha	0.012 ha	0.00037%
Gravity Corer	30 minutes - 2 hours in any one location	12	24 hours within total 6 days of Site Investigations campaign (weather and sea state dependent)	1m²	0.0001 ha	0.0012 ha	0.00004%
Vibro Corer	30 minutes - 2 hours in any one location	12	24 hours within total 6 days of Site Investigations campaign (weather and sea state dependent)	8m²	0.0008 ha	0.0096 ha	0.00030%
Grab Samples	20 minutes - 45 minutes in any one location	11	9 hours within total 6 days of Site Investigations campaign (weather and sea state dependent)	0.5m²	0.00005 ha	0.00055 ha	0.00002%

Table 7. Estimated Time and Duration of Survey Activities

4.3 Zone of Influence

As outlined in Office of the Planning Regulator (2021) "*The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15 km)*."

IEEM (2006) defined the zone of influence as "*the areas/resources that may be affected by the biophysical changes caused by activities associated with a project*". In order to define the extent of the study area for assessment, all elements of the project were assessed and reviewed in order to identify the spatial scale at which ecological features could be impacted. Due to the limited temporal and geographical scale of the project and the use of Best Available Techniques (BAT), the slow speed of the survey vessel (4kn), it is considered that the potential impacts of the proposed works could only extend beyond 500 m of the subtidal elements of the project due to noise generation and potential disturbance of sediment. However, as outlined in IEEM (2010) "*in the marine environment it is more difficult to define the geographical framework precisely and to accommodate all factors that should influence the definition of value, e.g. size or conservation status of populations or the quality of habitats*." As a result, "*it is very unlikely that the impacts on integrity can be evaluated without considering functions and processes acting outside the site's formal boundary*." It is important to note that unlike other maritime operations, the research vessel speed will be very slow (4 knots). However, the project has the potential to introduce noise into the marine environment particularly through the use of Ultra-Short Baseline (USBL), Multibeam Echosounder (MBES), and Side-scan Sonar (SSS) equipment, which may extend the effects of the project beyond 2km. In the interest of carrying out a thorough assessment in line with both the Habitats Directive, and the precautionary principle, the ZoI was expanded for this assessment to include designated sites within 15km of the proposed development site, and sites beyond 15km that have the potential to be impacted by the proposed survey works based on the Source-Pathway-Receptor model. This was done in the interest of ensuring that any potential impacts, however indirect or remote, were taken into account.

4.3.1 Marine Mammals

4.3.1.1 Seals and Cetaceans

As outlined in NPWS[2] "*Cetaceans account for 48% of all the native species of mammals, both marine and terrestrial, recorded in Ireland and Irish waters are thought to contain important habitats for cetaceans within the northeast Atlantic. To date, 24 species of cetacean, or 28% of species described worldwide, have been recorded in Ireland. Irish cetaceans include six species of baleen whale and eighteen species of toothed whale, including five species of beaked whale. Twenty-two of these have been reported stranded ashore and 20 species observed at sea. Two species (Pygmy sperm whale and Gervais' beaked whale) are only known from stranded individuals and two species (Northern right whale and White whale/beluga) have only been recorded historically, with neither species occurring in the stranding record so far.*

Ireland also has two species of seals, the Common Seal (or Harbour Seal) and the Grey Seal. Whilst both species haul out on land for key stages of their life history, the majority of their time is spent in the marine environment.

In Ireland, the 1992 EC Habitats Directive as transposed by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) requires that both seal species and all cetaceans occurring in Ireland are maintained at favourable conservation status. Under Article 12 of the Directive, all cetaceans should receive strict protection within the Exclusive Economic Zone. Under Article 4 of the Directive, Special Areas of Conservation (SACs) must be proposed for the following species:"

- Bottlenose Dolphin
- Harbour Porpoise
- Common Seal
- Grey Seal

[2] https://www.npws.ie/marine/marine-species/cetaceans

The protection afforded to marine mammals in Ireland is summarised below:

- Harbour Porpoise Annex II of EC Habitats Directive Annex IV of EC Habitats Directive/Protected species of Wildlife (Amendment) Act/OSPAR List of Threatened and Declining Species and Habitats
- Bottlenose Dolphin Annex II of EC Habitats Directive/Annex IV of EC Habitats Directive/Protected species of Wildlife (Amendment) Act
- All Cetacea Annex IV of EC Habitats Directive/Protected species of Wildlife (Amendment) Act
- Grey Seal/Harbour Seal Annex II of EC Habitats Directive/Protected species of Wildlife (Amendment) Act

Recent research suggests that the foraging range for grey seals is 448km Carter et al., 2022). Further, the foraging range for harbour seal is estimated at 273 km (Carter et al., 2022). Further, there are a number of SACs designated for cetaceans (harbour porpoise and common dolphin) in Ireland. As these species are a highly mobile species, and are designated as qualifying interests of Natura 2000 sites outside the Irish EEZ, specific Management Units (MU) are utilised to assess the potential impacts of a proposed project on these species, based on the JNCC Review of Management Unit boundaries for cetaceans in UK waters (2023) methodology[3]. The proposed project is located within the Celtic and Irish Seas MU for harbour porpoise, and the Irish Sea MU for bottlenose dolphin (IAMMWG, 2015). The ZoI of the proposed project has been extended to include the potential for significant effects on grey seal, harbour seal, harbour porpoise and common bottlenose dolphin as there is potential for these mobile marine mammals to enter the ZoI from within the Celtic and Irish Seas MU.

4.3.1.2 Otter

Otters are a semi-aquatic species who use the marine environment for foraging and are protected under Annex II and Annex IV of the Habitats Directive. As detailed by Reid et al. (2013), female otters have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability. Out of an abundance of caution, the ZoI of the proposed project has been extended to include the potential for significant effects on otter that may enter the proposed area of works.

4.3.2 Migratory Fish

In relation to Atlantic salmon, it has been found that salmon populations from southeast Ireland appear to migrate towards the shelf edge before crossing the Atlantic towards Greenland for feeding (Rikardson et al., 2021). The recorded areas of salmon migration are demonstrated in Figure A.1 in Appendix I.

Recent studies on Twaite Shad recorded movement of up to 950km from the River Severn with one individual detected in the Blackwater Estuary (Davies et al. 2020). However given the spatial and temporal nature of the proposed works, and the distance to this SAC, the proposed project is considered too distant from Natura 2000 sites where it is a feature of interest, for any significant interaction to occur. Similarly distant SACs designated for lamprey species were considered too distant for any significant interaction to occur.

[3] https://data.jncc.gov.uk/data/b48b8332-349f-4358-b080-b4506384f4f7/jncc-report-734.pdf

4.4 Identification of Relevant Natura 2000 Sites

4.4.1 Management of the Site

The proposed works are not directly connected with, or necessary to, the management of Natura 2000 sites.

4.4.2 Relevant Natura 2000 Sites to the Proposed Project

A key factor in the consideration as to whether or not a particular European site is likely to be affected by the proposed survey works is its distance from the works location. It is generally, but not necessarily, the case that the greater the distance from the plan or project the smaller the likelihood of impacts. In this case, the proposed survey works are located within the Malahide Estuary SAC, Rockabill to Dalkey Island SAC, Malahide Estuary SPA, and North-West Irish Sea SPA.

Given that the proposed survey route is located within the Malahide Estuary SAC, Rockabill to Dalkey Island SAC, Malahide Estuary SPA, and North-West Irish Sea SPA, out of an abundance of caution, in the absence of mitigation, during the survey works there is the potential for significant effects on the qualifying interests of these European Sites through disturbance, pollution and physical impact on habitats and species. Further information is required to assess the potential effects of the proposed works on European Sites.

In relation to marine mammals, given that the proposed survey route is located within Rockabill to Dalkey Island SAC, there is potential for marine mammals from Rockabill to Dalkey Islands SAC (*Phocoena phocoena* (harbour porpoise)) to be in the vicinity of the proposed survey works. Although Lambay Island SAC is located 3km from the proposed cable survey corridor, the qualifying interests of this SAC (harbour seal and grey seal) are mobile species and there is the potential for these species to be in the vicinity of the proposed survey works. Further, following an examination of relevant MU's and foraging areas for grey seal and harbour seal, the following Natura 2000 sites have been screened IN due to the potential movements of harbour porpoise, common bottlenose dolphin, harbour seals, and grey seals (qualifying interests of these SAC):

- Slaney River Valley SAC (IE)
- Saltee Islands SAC (IE)
- Roaring Water Bay and Islands SAC (IE)
- Blasket Islands SAC (IE)
- North Anglesey Marine/Gogledd Môn Forol (UK)
- West Wales Marine / Gorllewin Cymru Forol (UK)
- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau (UK)
- Murlough (UK)
- North Channel (UK)
- Strangford Lough (UK)
- Cardigan Bay / Bae Ceredigion (UK)
- Pembrokeshire Marine / Sir Benfro Forol (UK)
- The Maidens SAC (UK)
- Bristol Channel Approaches/Dynesfeydd Môr Hafren (UK)
- South-East Islay Skerries (UK)
- Lundy (UK)
- Isles of Scilly Complex (UK)
- Nord Bretagne DH (FR)
- Récifs et landes de la Hague (FR)
- Anse de Vauville (FR)
- Mers Celtiques – Talus du golfe de Gascogne (FR)
- Banc et récifs de Surtainville (FR)
- Côte de Granit rose-Sept-Iles (FR)
- Trégor – Goëlo (FR)
- Baie de Morlaix (FR)
- Abers – Côtes des legends (FR)
- Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay (FR)
- Cap d'Erquy-Cap Fréhel (FR)

- Ouessant-Molène (FR)
- Chausey (FR)
- Baie de Saint-Brieuc – Est (FR)
- Côtes de Crozon (FR)
- Baie du Mont Saint-Michel (FR)
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (FR)
- Estuairie de la Rance (FR)
- Chaussée de Sein (FR)
- Récifs du talus du golfe de Gascogne (FR)

Further information is required to assess the potential effects of the proposed works on these European Sites.

All Natura 2000 sites within 15km, and beyond 15km with the potential for significant effects on Natura 2000 sites (including Irish, French, and UK sites), are listed in Tables 8-10. The qualifying interests, and the potential impact of the development on each European site and qualifying interest, are screened in/out in Table 11.

The proposed Survey Route Corridor and Works (including landfall onto Malahide & Portmarnock Beach) is demonstrated in Figures 19-22. Waterbodies located proximate to the Survey Route Corridor is demonstrated in Figure 23. SPAs (incl. Marine SPAs) and SACs within / proximate to the proposed Survey Route Corridor are demonstrated in Figures 24-26. SACs and SPAs within 10km of the proposed Survey Route Corridor are demonstrated in Figures 27 - 29. SACs and SPAs within 15 km of the proposed Survey Route Corridor are seen in Figures 30 - 32. The proposed fibre optic survey route in relation to the 12 nm limit, Designated Irish Continental shelf and Offshore SAC's (no offshore SAC's in the area) is demonstrated in Figure 33. IE, FR, & UK SACs designated for Grey Seals (*Halichoerus grypus*) within 448km of the Proposed Survey Route Corridor are demonstrated in Figure 34. IE, FR, & UK SACs designated for Harbour Seals (*Phoca vitulina*) within 273km of the Proposed Survey Route Corridor are demonstrated in Figure 35. IE, FR, & UK SACs located within the Management Units (MU) for Bottlenose dolphin (*Tursiops truncatus*) and Harbour Porpoise (*Phocoena phocoena*) are demonstrated in Figures 36 & 37.

4.4.3 UK Natura 2000 Sites

MARA licencing in Ireland relates to licence applications out to the Irish EEZ limit. As a consequence of Brexit, from 1st January 2021, previously designated UK sites are no longer part of the Natura 2000 network but have designation as SAC's and SPA's and protection under UK law. The licencing within the UK territorial sea is covered by a permitting licence system managed by the Marine Management Organisation (MMO)[4], Marine Scotland and Natural Resources Wales, depending on UK jurisdiction. The cable routes within UK waters are subject to this UK permitting process and the potential impacts on designated sites are subject to a separate application process assessed by UK authorities. Because the proposed cable system passes through UK waters and UK designated sites, mitigation measures will be implemented to protect the qualifying interests of the UK designated sites. It should be noted that a marine mammal observer will be in place within Irish waters.

For this overall project to take place it requires permitting both within UK and Irish waters. For the UK element of the proposed cable lay to proceed, it has to be approved by UK authorities and the reporting conclude that, following the implementation of appropriate mitigation, the proposed project would not adversely affect the integrity of UK designated sites, alone or in combination with other projects. The nearest UK designated site to the proposed cable route within the Irish EEZ limit is North Anglesey Marine/Gogledd Môn Forol SAC, which borders the proposed cable route (within UK waters). Out of an abundance of caution, given that this site borders the proposed cable route to the Irish EEZ limit, mitigation measures are required to ensure no significant impact on this designated site. Given the distance from the proposed route within the Irish marine area to all other UK designated sites, the project would not adversely affect the integrity of UK designated sites (with the exception of sites Screened IN due to underwater noise impacts on marine mammals in Table 2). These sites are assessed under UK licencing permissions.

Table 8. Proximity to designated sites of conservation importance (IE)

[4] L/2023/00095/1

Designation	European Site	Distance
SAC	Malahide Estuary SAC	**Within**
SAC	Rockabill to Dalkey Island SAC	**Within**
SAC	Baldoyle Bay SAC	1.2 km
SAC	Ireland's Eye SAC	2.7 km
SAC	Lambay Island SAC	3 km
SAC	North Dublin Bay SAC	4.5 km
SAC	Rogerstown Estuary SAC	4.7 km
SAC	Howth Head SAC	4.8 km
SAC	South Dublin Bay SAC	10.3 km
SAC	Slaney River Valley SAC	53.9 km
SAC	Saltee Islands SAC	141 km
SAC	Roaring Water Bay and Islands SAC	304.8 km
SAC	Blasket Islands SAC	325.9 km
SPA	Malahide Estuary SPA	**Within**
SPA	North-West Irish Sea SPA	**Within**
SPA	Baldoyle Bay SPA	1.2 km
SPA	Ireland's Eye SPA	2.2 km
SPA	Lambay Island SPA	2.7 km
SPA	Rogerstown Estuary SPA	4.3 km
SPA	North Bull Island SPA	4.5 km
SPA	Howth Head Coast SPA	4.9 km
SPA	South Dublin Bay and River Tolka SPA	8.6 km
SPA	Rockabill SPA	9.3 km
SPA	Skerries Islands SPA	13 km

Table 9. Proximity to designated sites of conservation importance (UK)

Designation	European Site	Distance
SAC	North Anglesey Marine/Gogledd Môn Forol	Borders the Survey Area **(Within MU for Harbour Porpoise)**
SAC	Murlough	67 km
SAC	North Channel	68.7 km **(Within MU for Harbour Porpoise)**
SAC	West Wales Marine / Gorllewin Cymru Forol	75.2 km **(Within MU for Harbour Porpoise)**
SAC	Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau	78.2 km **(Within MU for Bottlenose Dolphin)**
SAC	Strangford Lough	83.4 km
SAC	Cardigan Bay / Bae Ceredigion	139 km **(Within MU for Bottlenose Dolphin)**
SAC	The Maidens SAC	146.9 km
SAC	Pembrokeshire Marine / Sir Benfro Forol	170.1 km
SAC	Bristol Channel Approaches/Dynesfeydd Môr Hafren	205.9 km **(Within MU for Harbour Porpoise)**
SAC	South-East Islay Skerries	233 km
SAC	Lundy	261.8 km
SAC	Isles of Scilly Complex	381.5 km

Table 10. Proximity to designated sites of conservation importance (FR)

Designation	European Site	Distance
SAC	Nord Bretagne DH	451.5 km **(Within MU for Harbour Porpoise)**
SAC	Récifs et landes de la Hague	478.2 km **(Within MU for Harbour Porpoise)**
SAC	Mers Celtiques – Talus du golfe de Gascogne	480.6 km **(Within MU for Harbour Porpoise)**
SAC	Anse de Vauville	486.5 km **(Within MU for Harbour Porpoise)**
SAC	Banc et récifs de Surtainville	505.7 km **(Within MU for Harbour Porpoise)**
SAC	Côte de Granit rose-Sept-Iles	512.8 km **(Within MU for Harbour Porpoise)**
SAC	Trégor – Goëlo	517.6 km **(Within MU for Harbour Porpoise)**
SAC	Baie de Morlaix	537 km **(Within MU for Harbour Porpoise)**
SAC	Abers – Côtes des légendes	539.2 km **(Within MU for Harbour Porpoise)**
SAC	Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay	546.4 km **(Within MU for Harbour Porpoise)**
SAC	Ouessant-Molène	551.9 km **(Within MU for Harbour Porpoise)**
SAC	Cap d'Erquy-Cap Fréhel	554.2 km **(Within MU for Harbour Porpoise)**
SAC	Chausey	555.7 km **(Within MU for Harbour Porpoise)**
SAC	Baie de Saint-Brieuc - Est	572.8 km **(Within MU for Harbour Porpoise)**
SAC	Côtes de Crozon	582.6 km **(Within MU for Harbour Porpoise)**
SAC	Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard	585.6 km **(Within MU for Harbour Porpoise)**
SAC	Estuairie de la Rance	593.6 km **(Within MU for Harbour Porpoise)**
SAC	Chaussée de Sein	600.5 km **(Within MU for Harbour Porpoise)**
SAC	Baie du Mont Saint-Michel	604.5 km **(Within MU for Harbour Porpoise)**
SAC	Récifs du talus du golfe de Gascogne	607.4 km **(Within MU for Harbour Porpoise)**

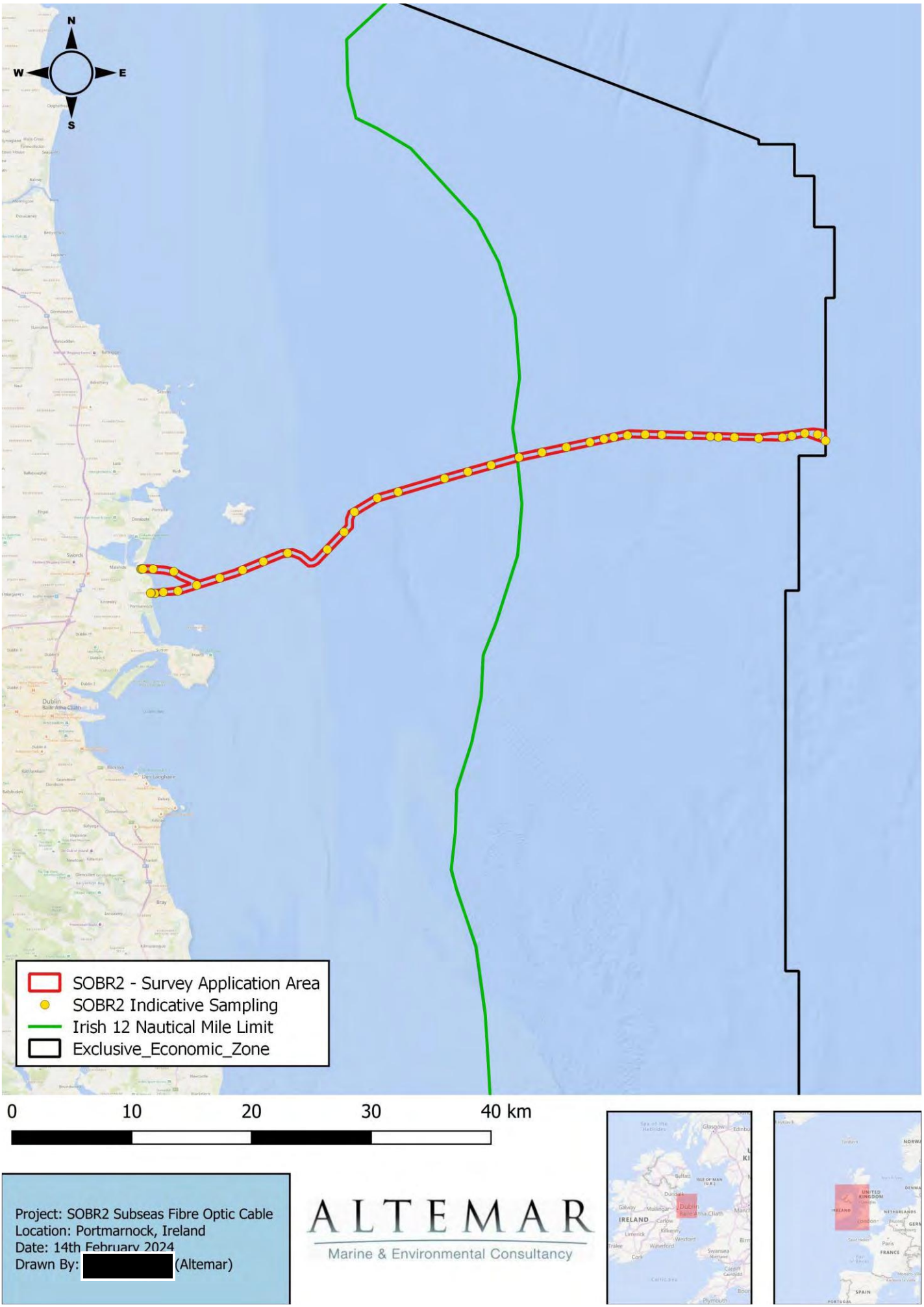


Figure 19: Proposed Survey Route Corridor and Works (to Irish Exclusive Economic Zone).

Figure 20: Proposed Survey Route Corridor and Works (to Irish 12 Nautical Mile Limit).

Figure 21. Proposed Survey Route Corridor within Malahide Beach

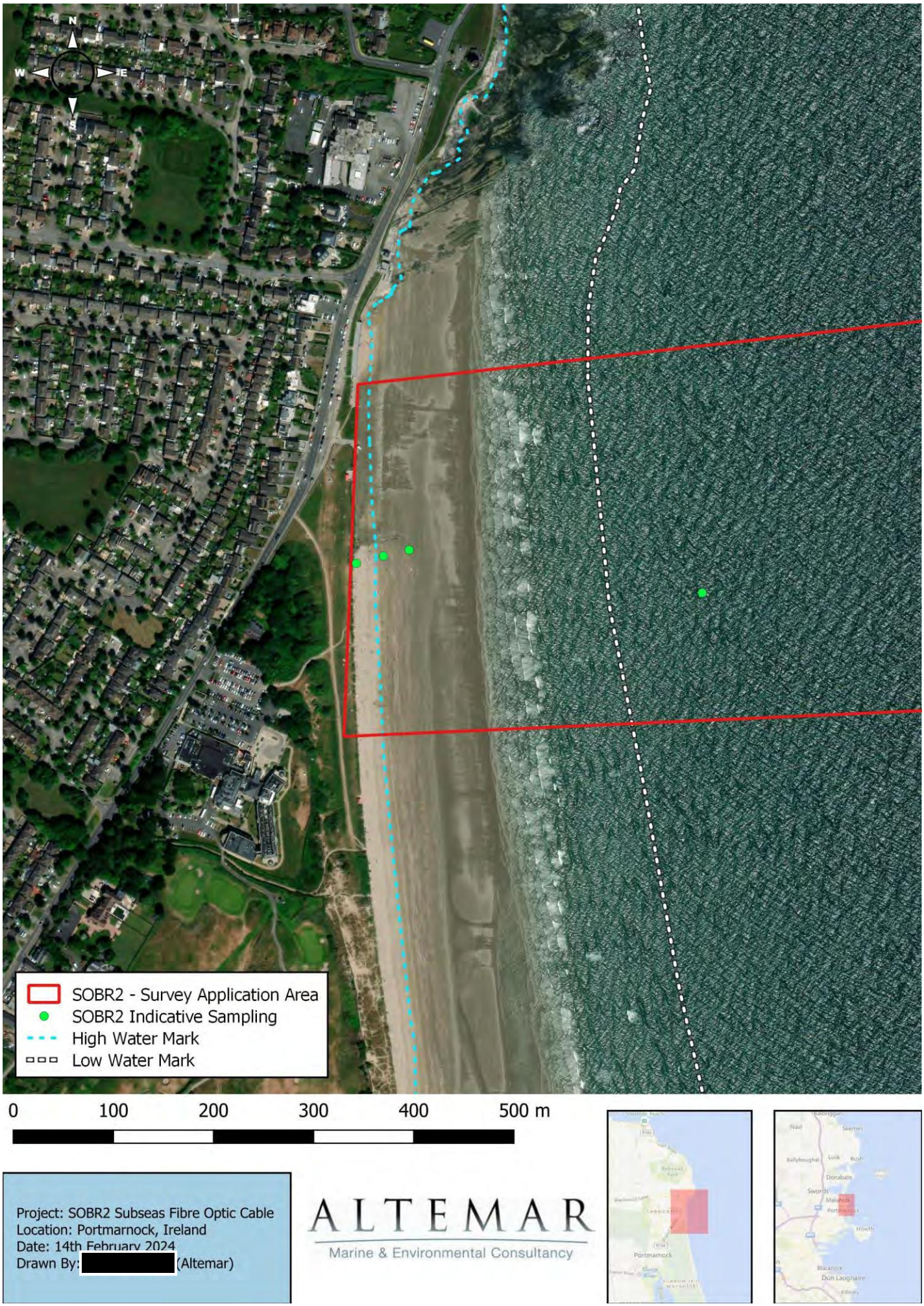


Figure 22. Proposed Survey Route Corridor within Portmarnock Beach

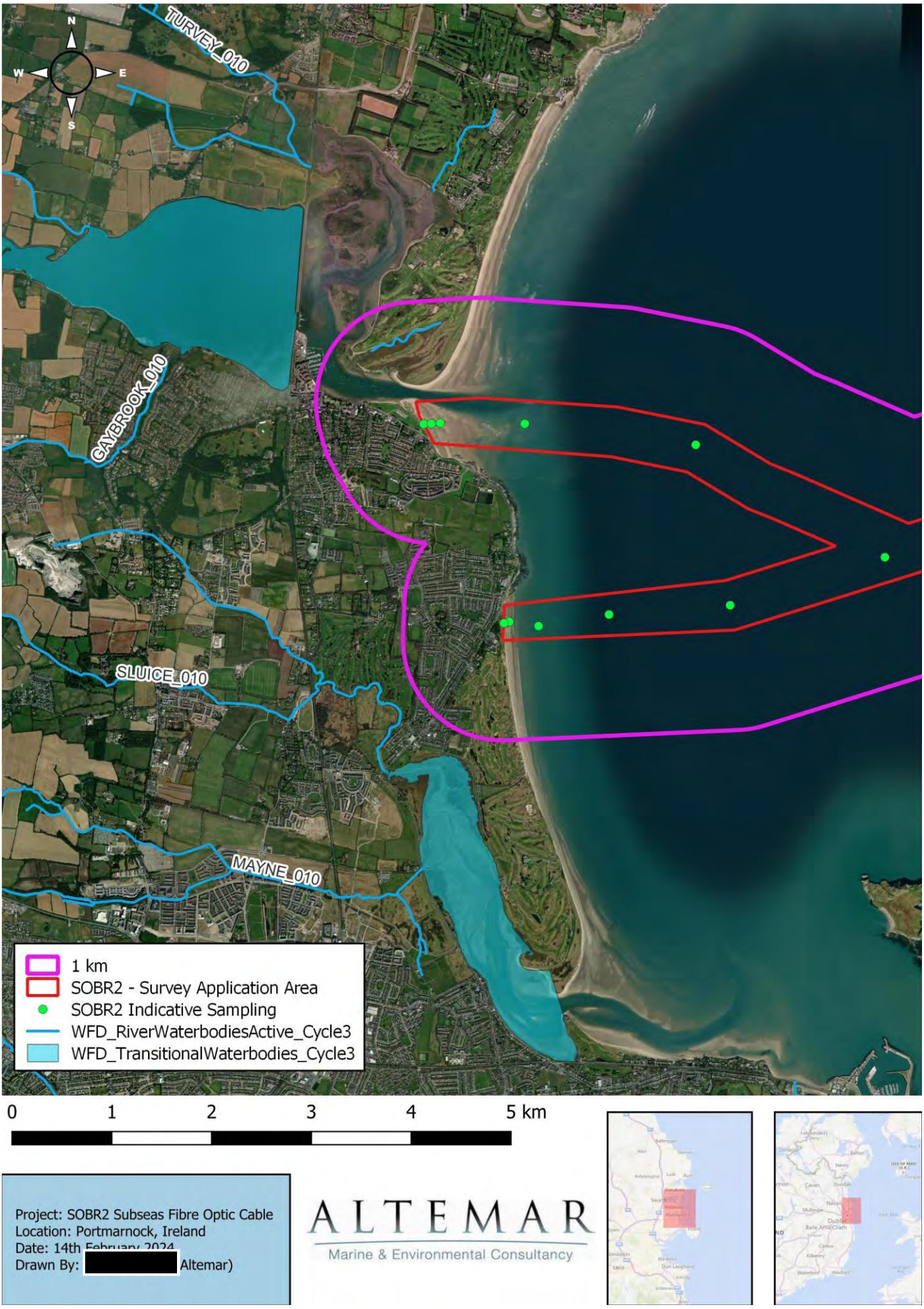


Figure 23. Waterbodies proximate to the proposed Survey Route Corridor.

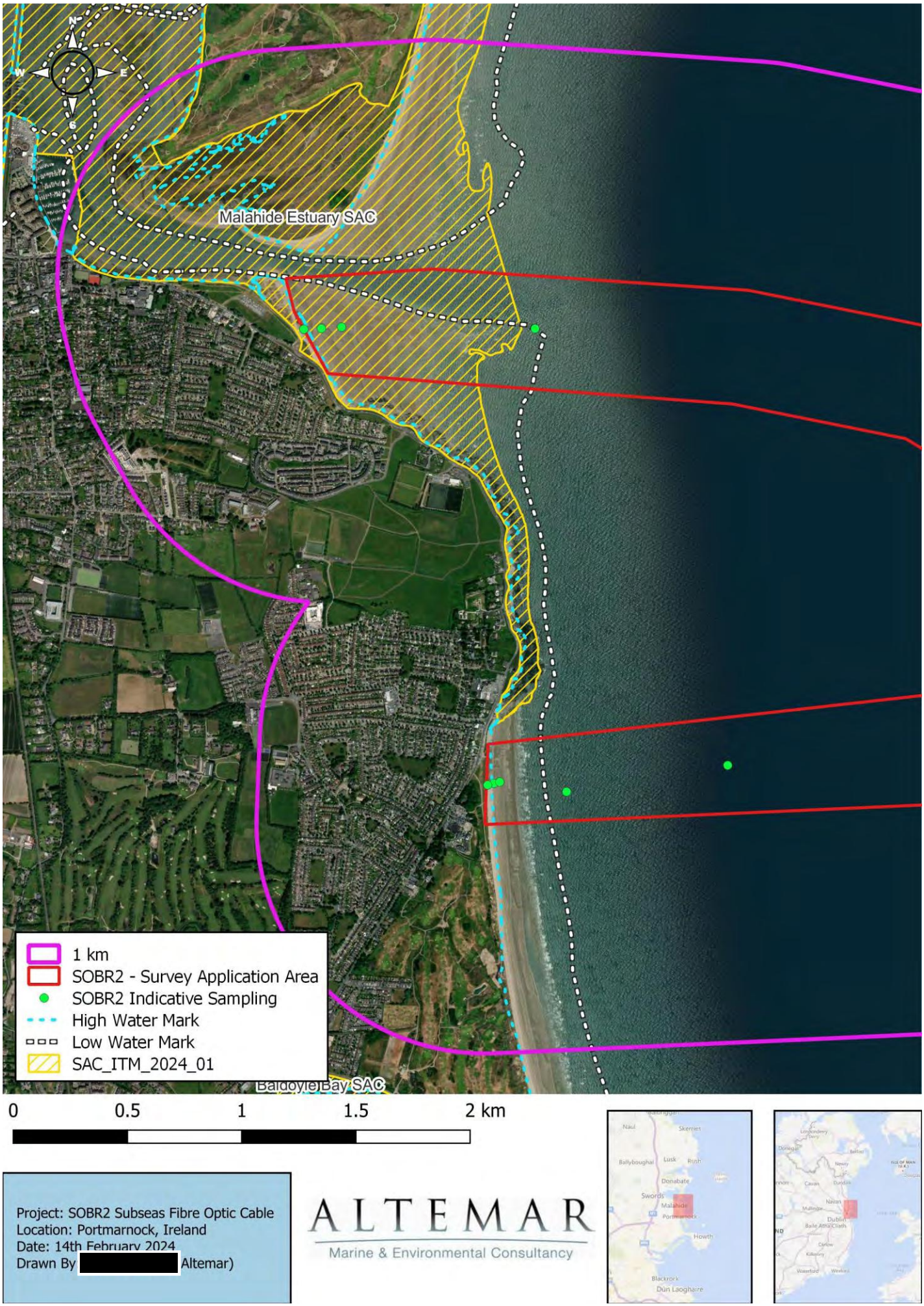


Figure 24: Special Areas of Conservation proximate to the proposed Survey Route Corridor.

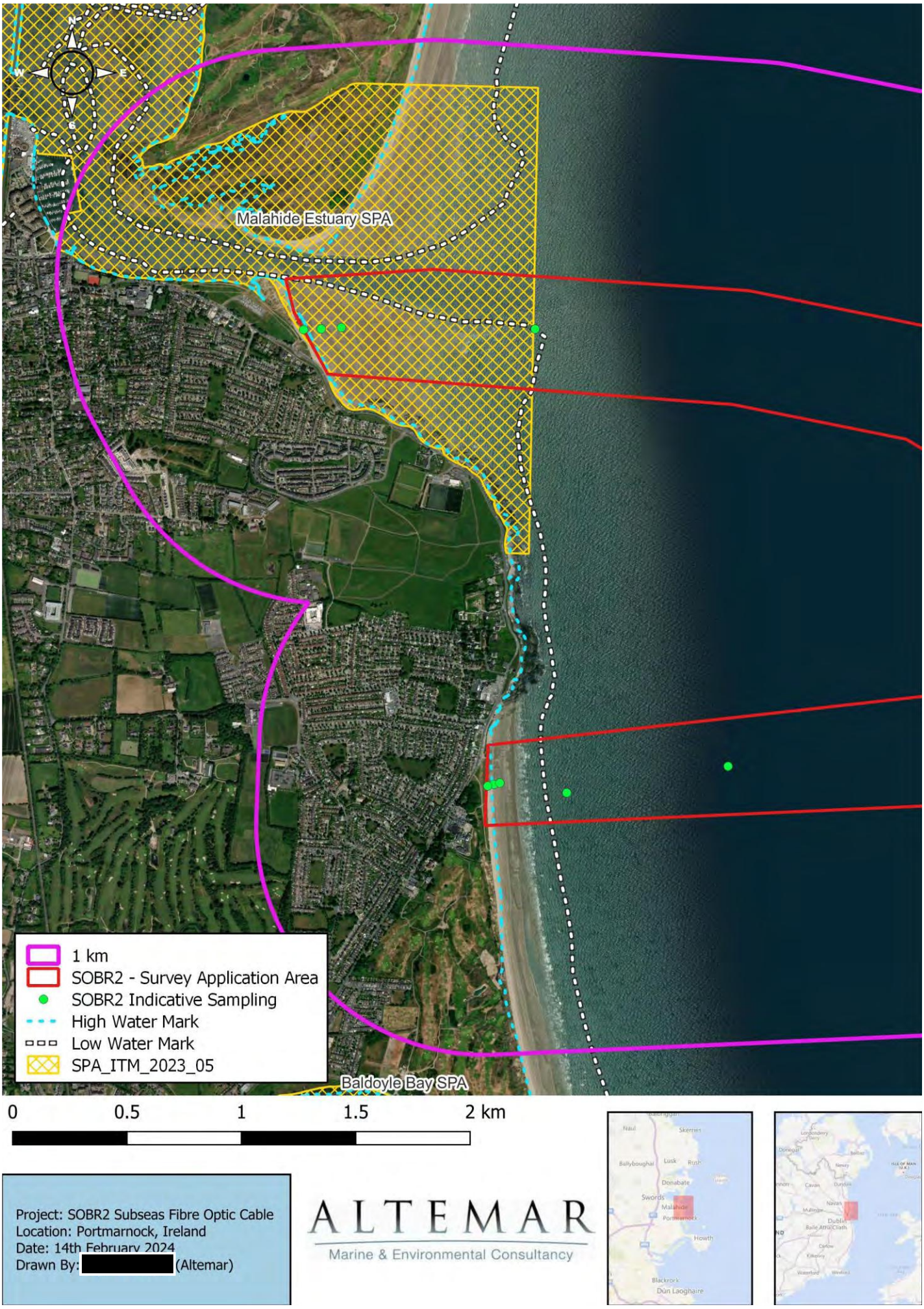


Figure 25: Special Protection Areas proximate to the proposed Survey Route Corridor.

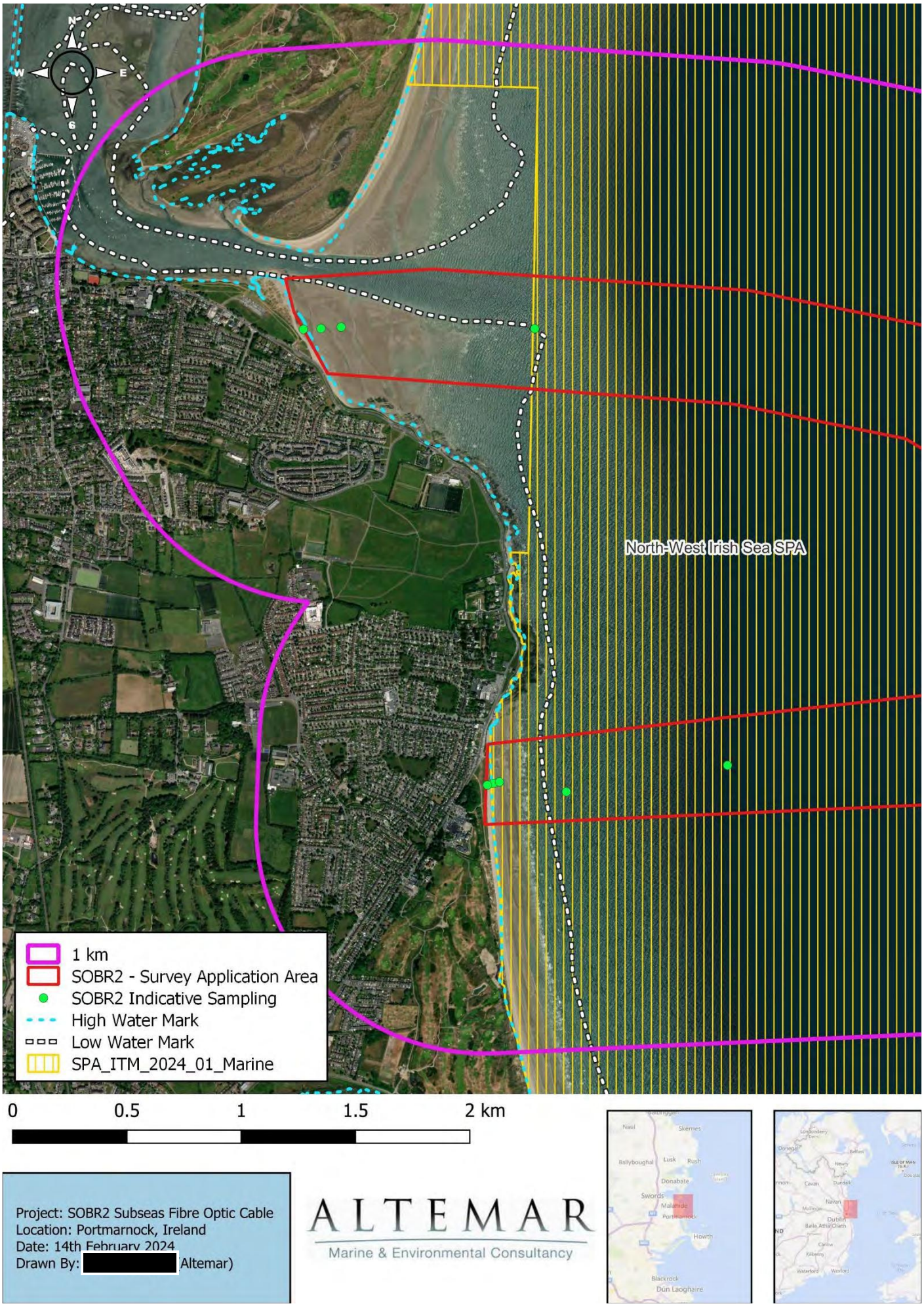


Figure 26: Marine SPAs proximate to the proposed Survey Route Corridor.

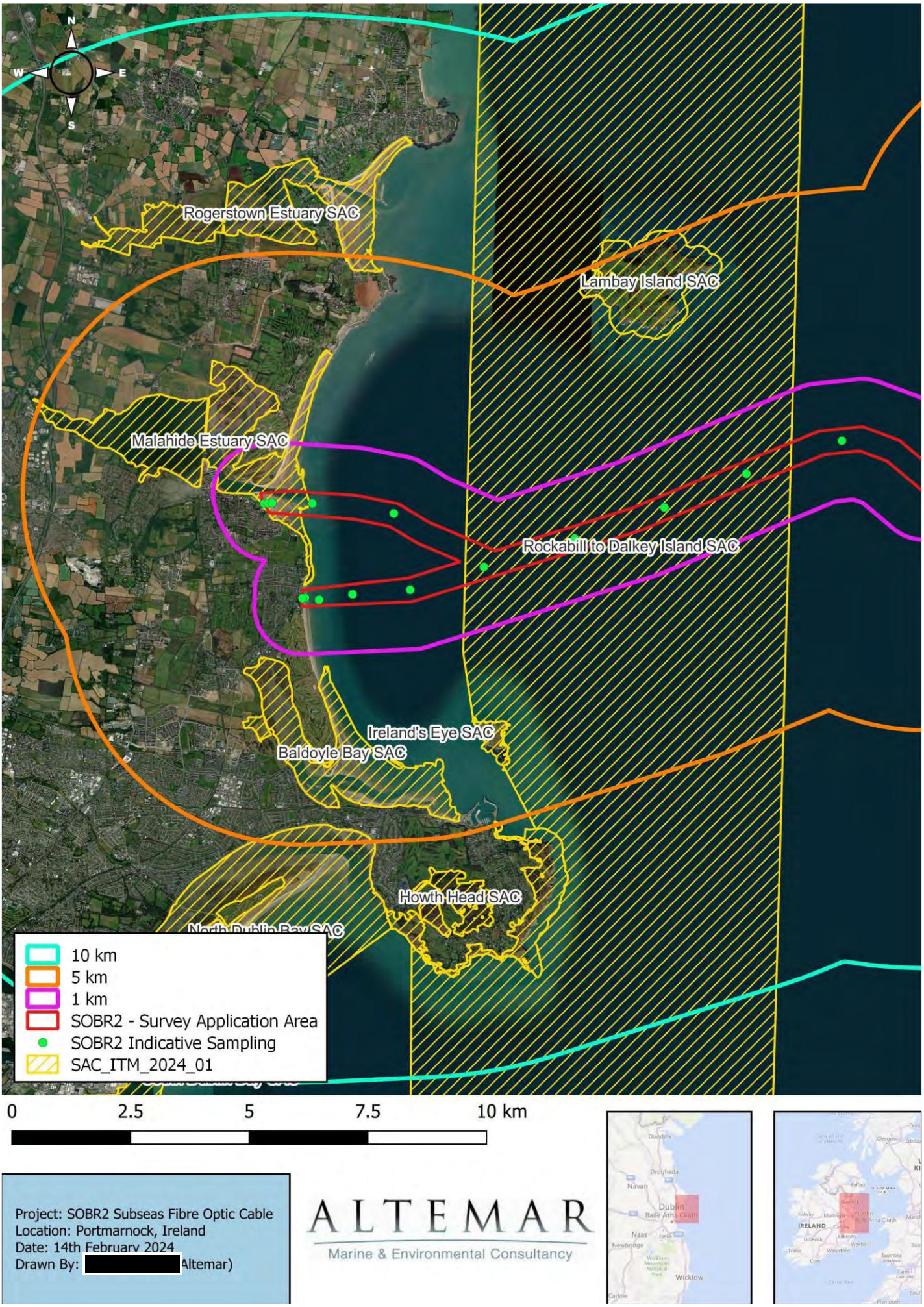


Figure 27: Special Areas of Conservation within 10km of the proposed Survey Route Corridor

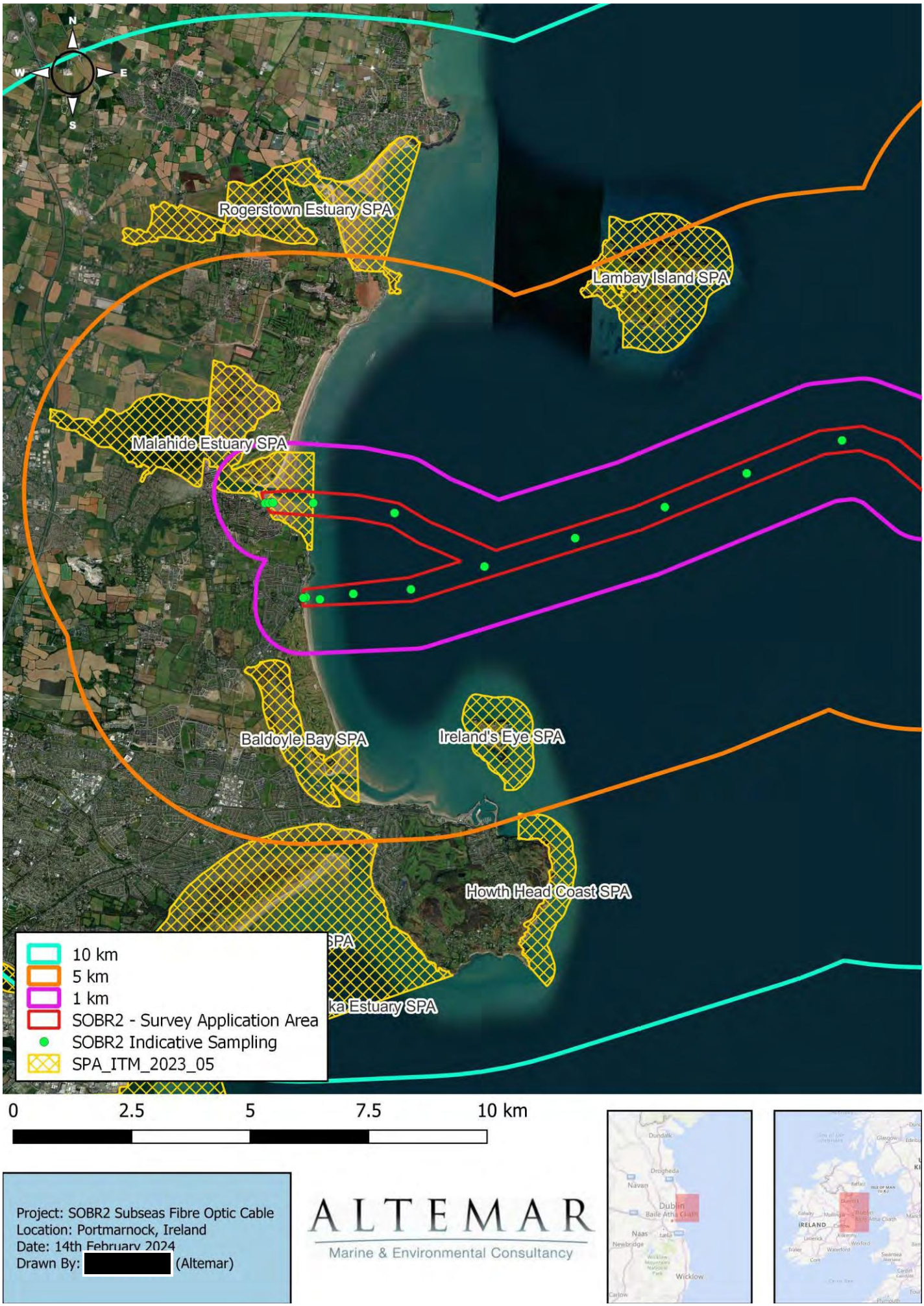


Figure 28: Special Protection Areas within 10km of the proposed Survey Route Corridor .

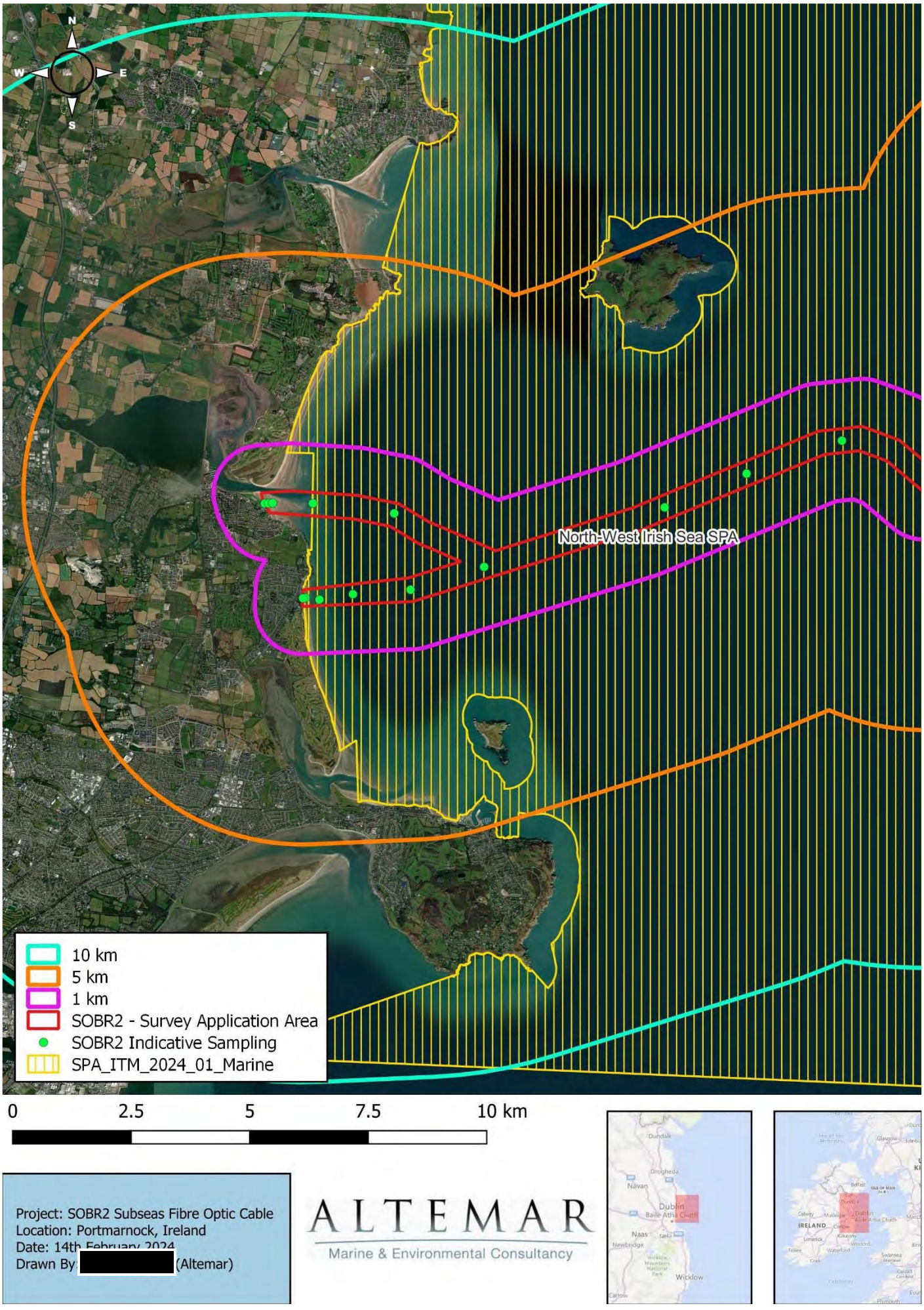


Figure 29: Marine SPAs within 10km of the proposed Survey Route Corridor

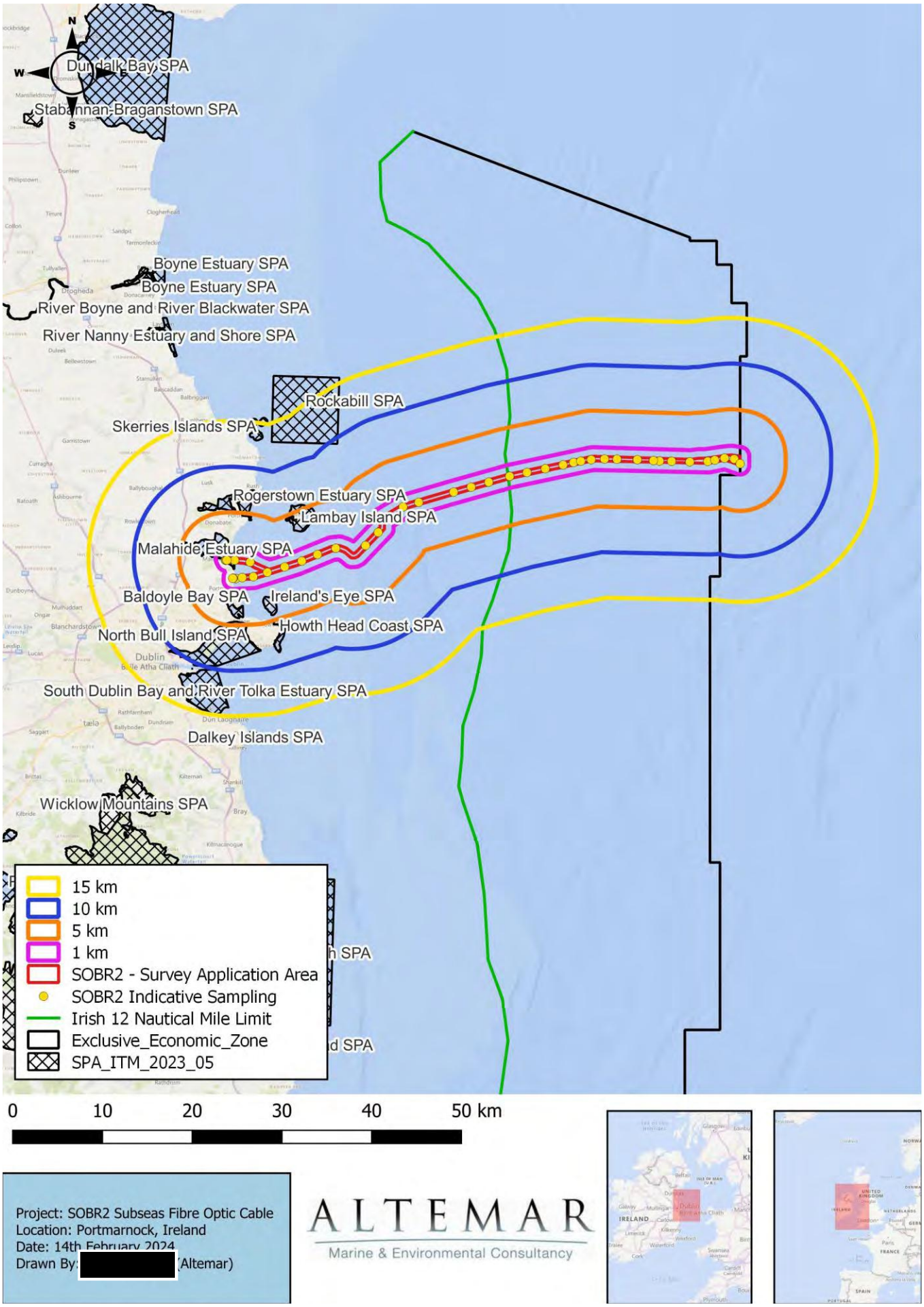


Figure 30: Special Protection Areas within 15 km of the proposed Survey Route Corridor.

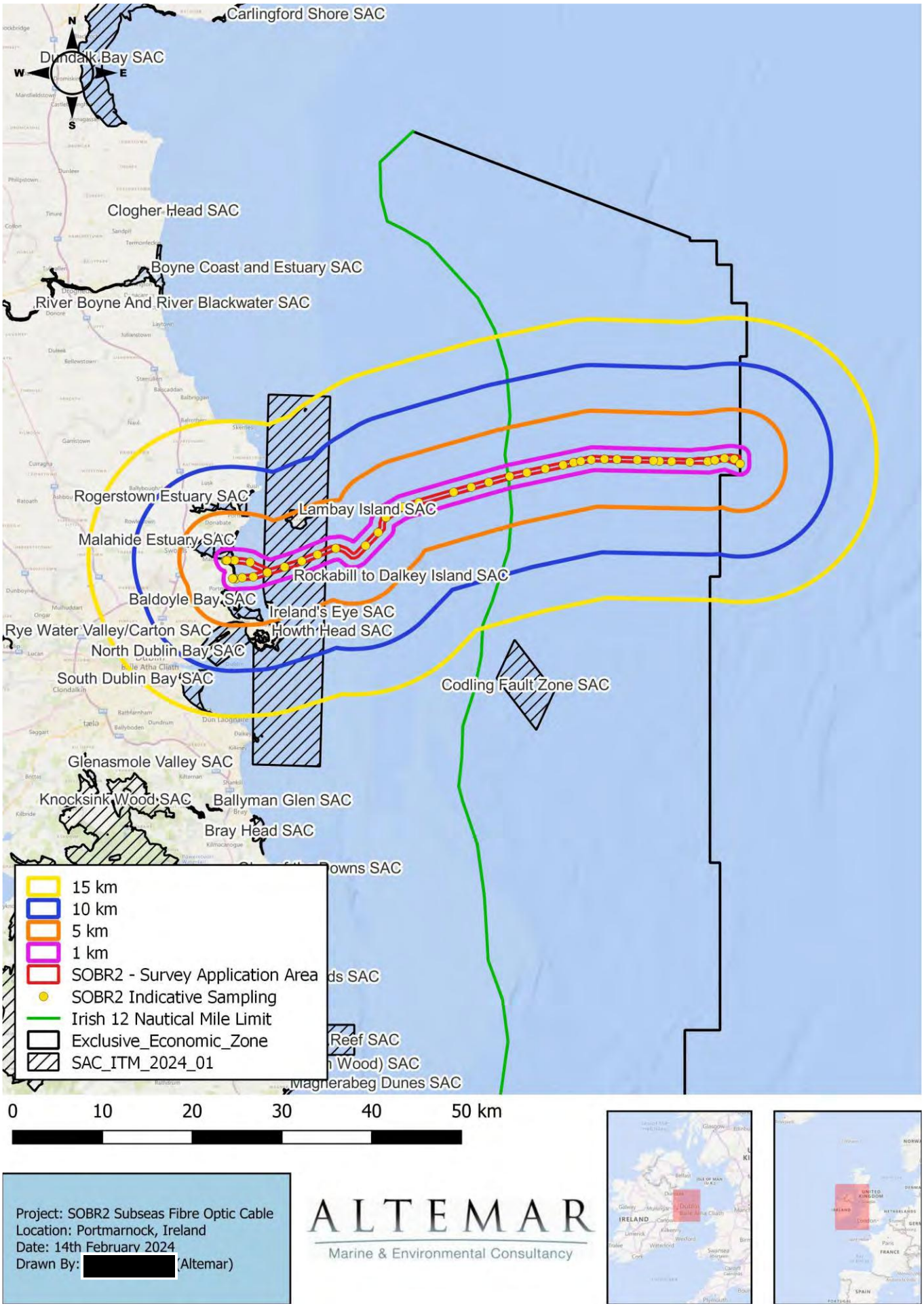


Figure 31: Special Areas of Conservation within 15 km of the proposed Survey Route Corridor.

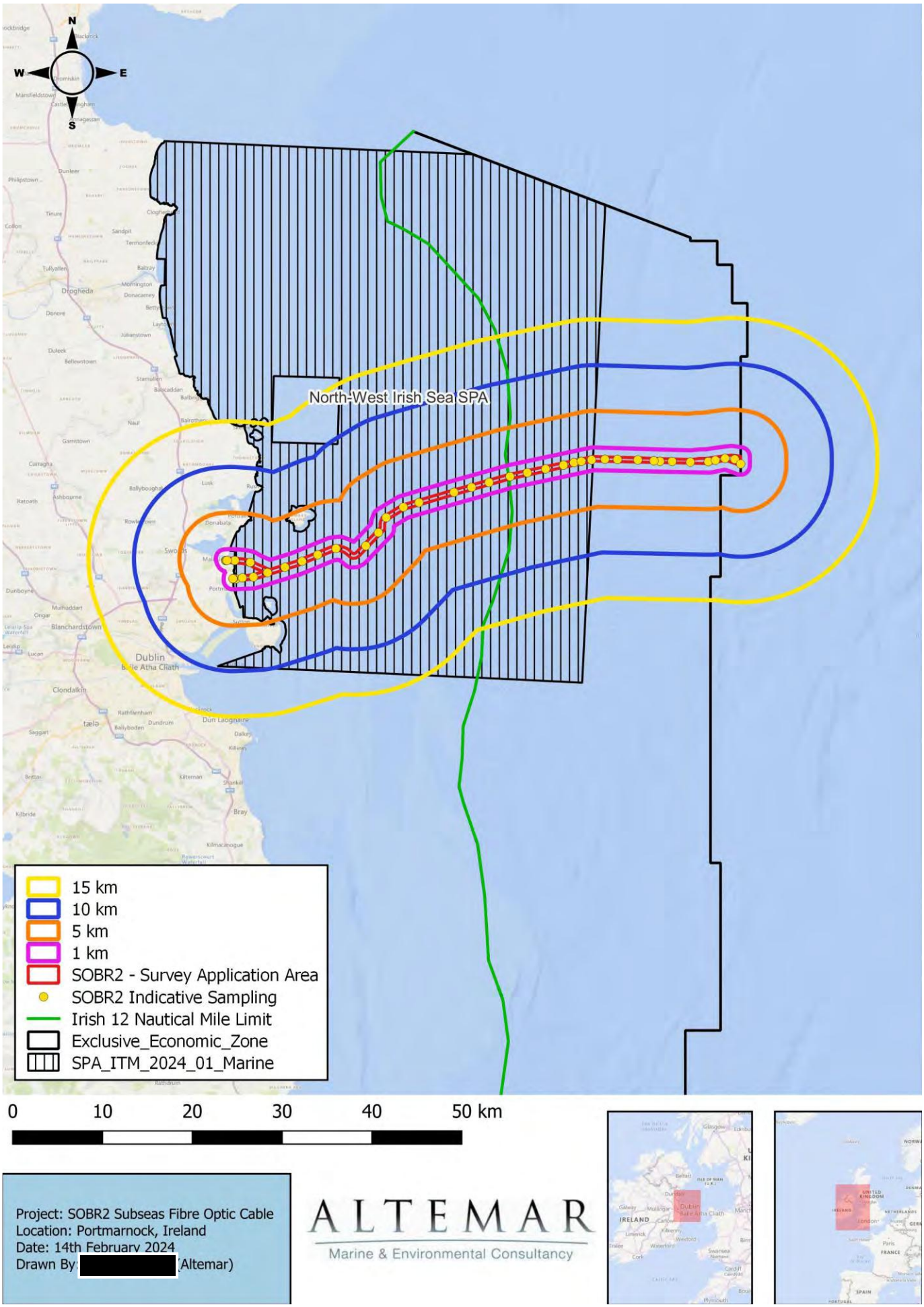


Figure 32: Marine SPAs within 15 km of the proposed Survey Route Corridor.

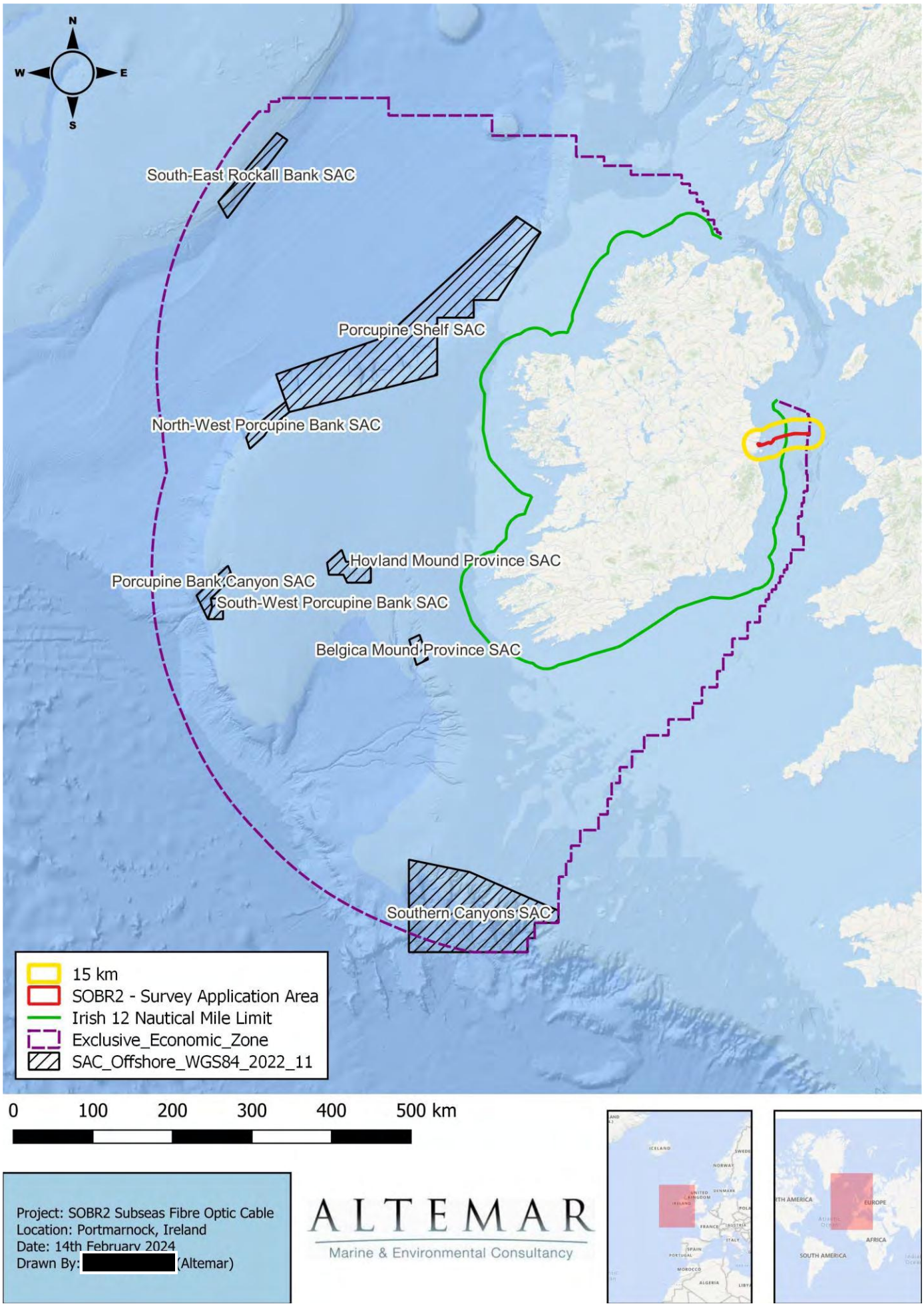


Figure 33: Fibre optic survey route in relation to the 12 nm limit, Designated Irish Continental shelf and Offshore SAC's (no offshore SAC's in the area).

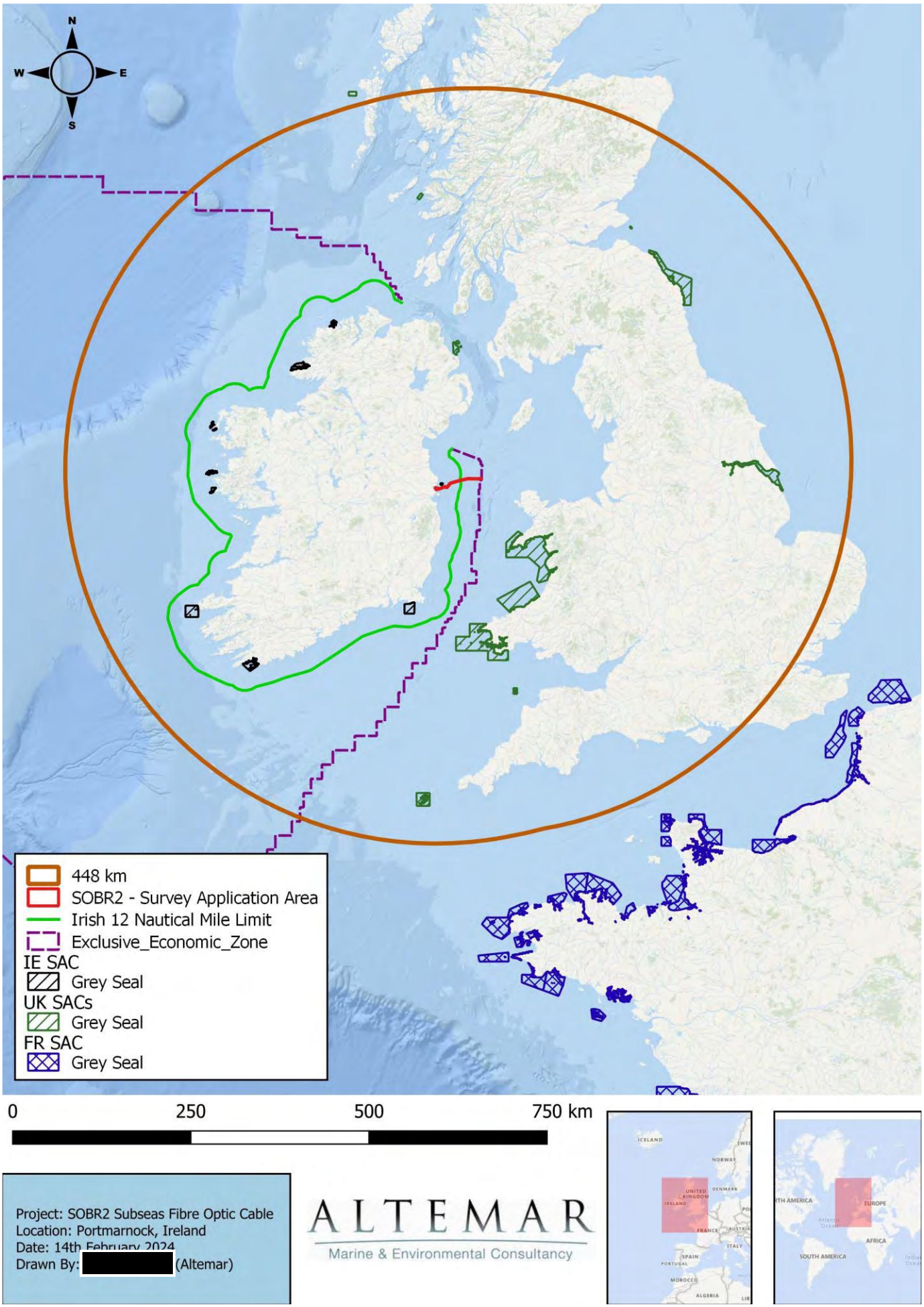


Figure 34: IE, FR, & UK SACs designated for Grey Seals (*Halichoerus grypus*) within 448km of the Proposed Survey Route Corridor.

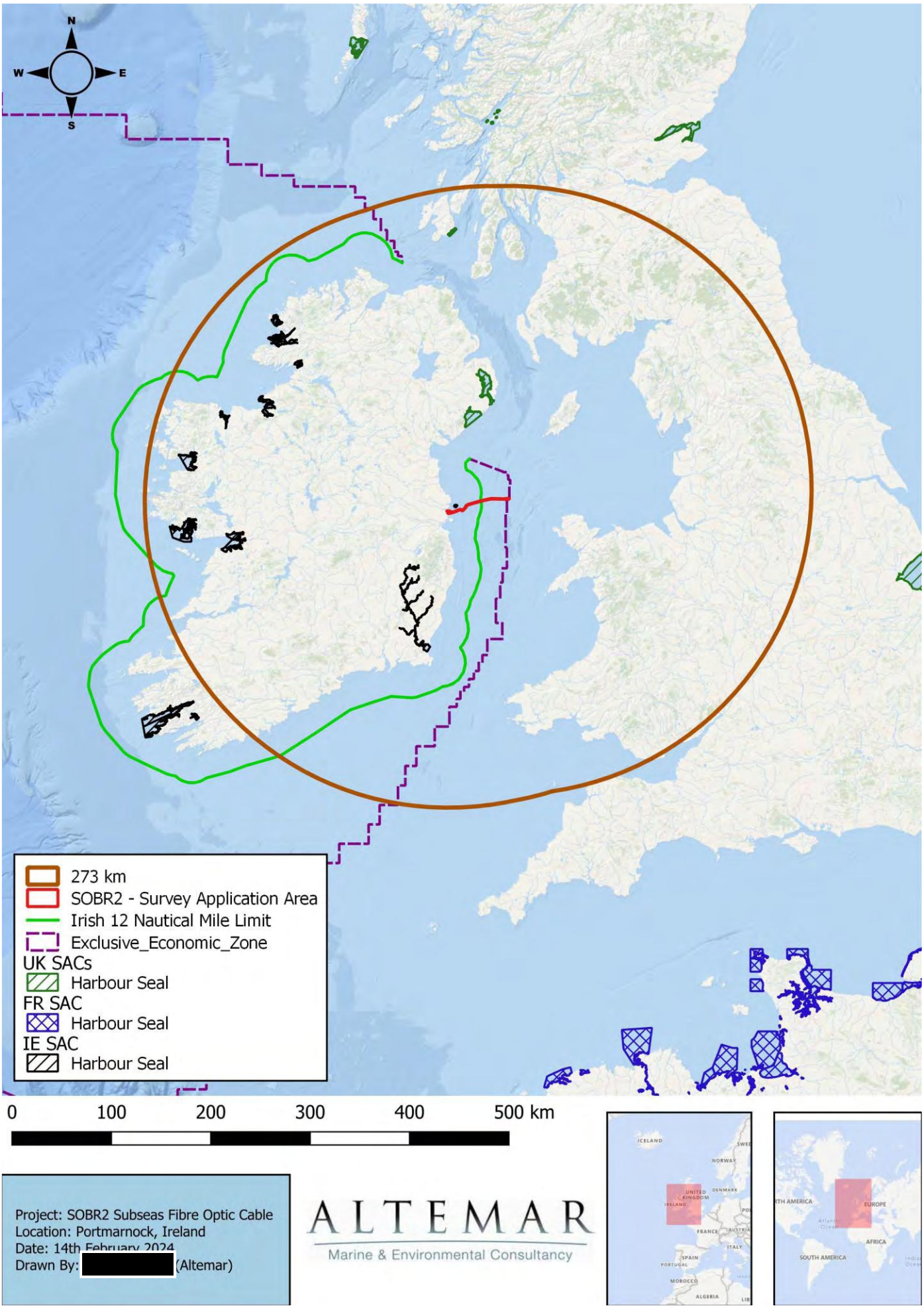


Figure 35: IE, FR, & UK SACs designated for Harbour Seals (*Phoca vitulina*) within 273km of the Proposed Survey Route Corridor

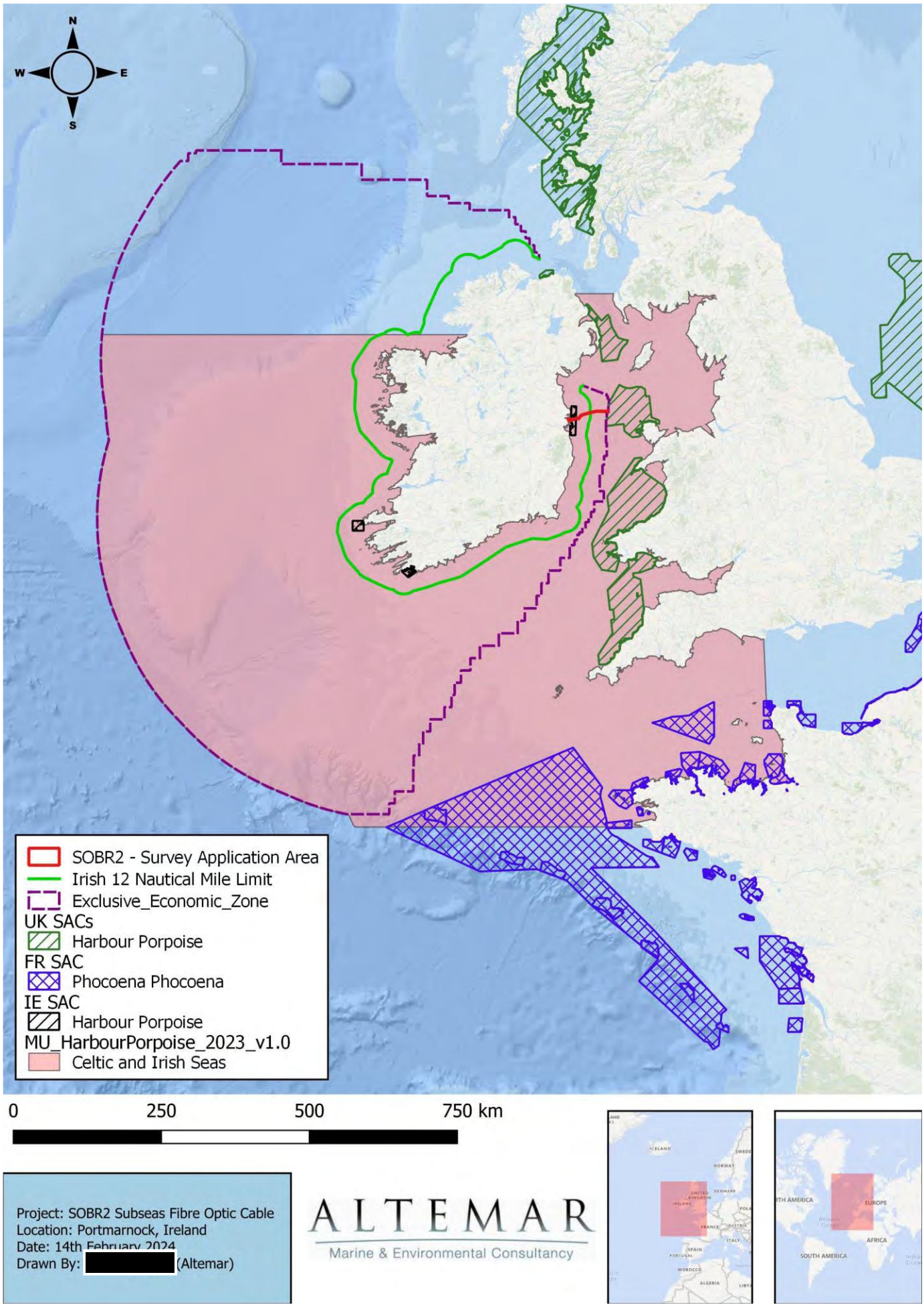


Figure 36: IE, FR, & UK SACs designated for Harbour Porpoise (*Phocoena phocoena*) within the Celtic and Irish Seas MU for Harbour Porpoise

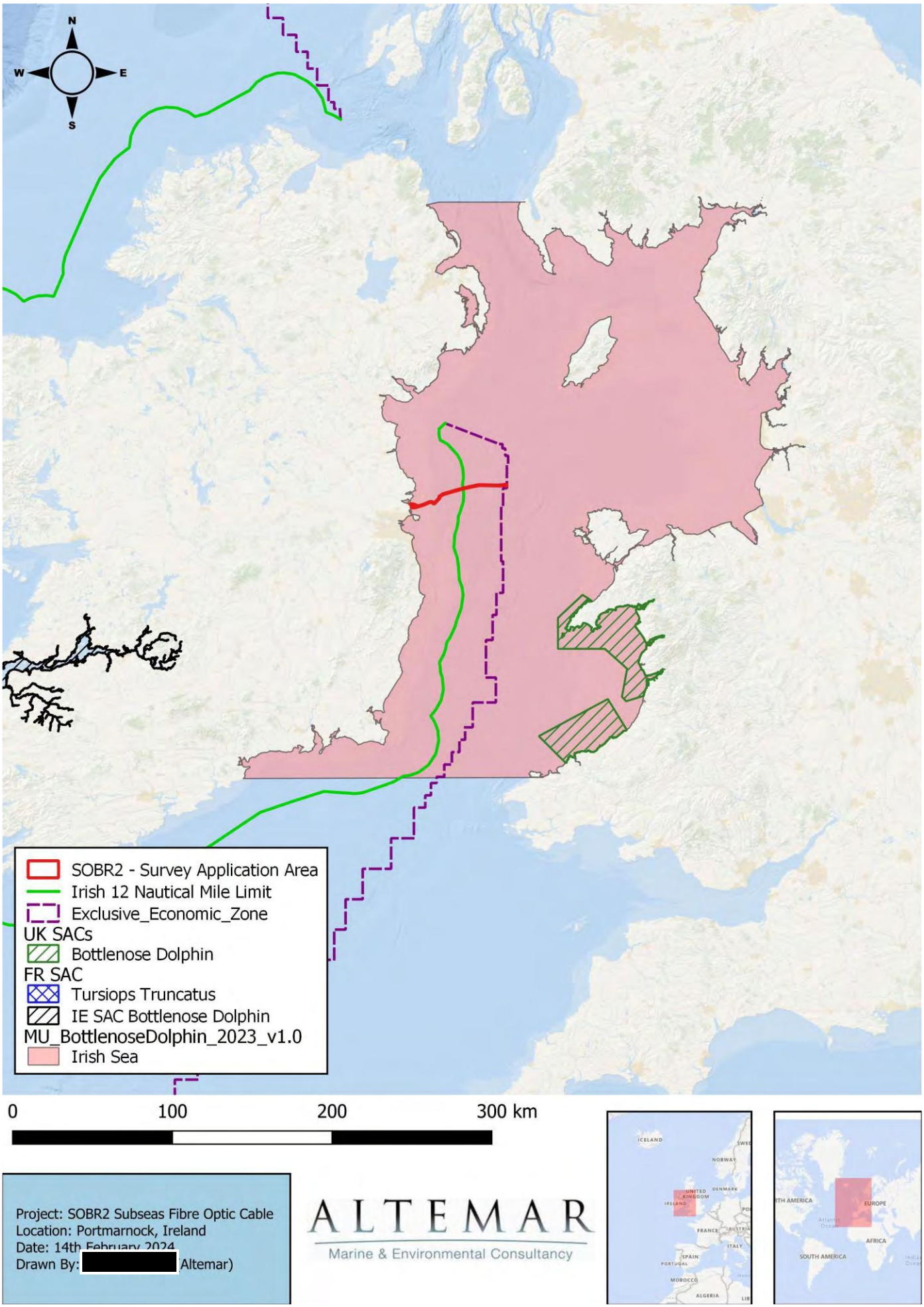


Figure 37: IE, FR, & UK SACs designated for Bottlenose Dolphin (*Tursiops truncatus*) within the Celtic and Irish Seas MU for Bottlenose Dolphin

Table 11. Initial screening of Natura 2000 sites within the potential ZOI of the proposed survey route.

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
Special Protection Areas			
IE004025	Malahide Estuary 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 Interest** Great Crested Grebe (*Podiceps cristatus*) [A005] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Pintail (*Anas acuta)* [A054] Goldeneye (*Bucephala clangula*) [A067] Red-breasted Merganser (*Mergus serrator*) [A069] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Wetland and Waterbirds [A999] **Potential Impact** The proposed cable survey route passes through this SPA. The survey is in the marine intertidal and subtidal element of Malahide Beach (within SPA) and Portmarnock Beach. The proposed survey works will be within an area of existing vessel traffic in proximate to the Malahide Marina and Howth Harbour, and the intertidal element is on popular beaches (Malahide (within SPA) & Portmarnock) with car parks and existing human and dog walking activity. However, initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on the features of interest of this SPA through physical impact on the intertidal and subtidal sediments within the SPA and physical disturbance which could impact the Features of Interest of this SPA. Mitigation measures are required to protect the SPA from significant effects. **Natura Impact Statement Required.**
IE004236	North-West Irish Sea SPA	**In**	**Conservation Objectives** The maintenance of habitats and species within European 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** Red-throated Diver (*Gavia stellata*) [A001] Great Northern Diver (*Gavia immer*) [A003]

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			Fulmar (*Fulmarus glacialis*) [A009] Manx Shearwater (*Puffinus puffinus*) [A013] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Common Scoter (*Melanitta nigra*) [A065] Little Gull (*Larus minutus*) [A177] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Great Black-backed Gull (*Larus marinus*) [A187] Kittiwake (*Rissa tridactyla*) [A188] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Little Tern (*Sterna albifrons*) [A195] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204] **Potential Impact** This SPA is located within the proposed intertidal and subtidal cable survey area. The proposed survey route is located in an area that currently experiences a high level of vessel activity. Given the nature and scale of the proposed survey works within open water, and the fact that the qualifying interests of this SPA are bird species, which are highly mobile and accustomed to vessel activity in this area, no significant disturbance impacts on the North-West Irish Sea SPA are foreseen in the absence of mitigation. However, initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on the features of interest of this SPA through potential pollution within the SPA which could impact the Features of Interest of this SPA. Mitigation measures are required to protect the SPA from significant effects. **Natura Impact Statement Required.**
Special Areas of Conservation			
IE000205	Malahide Estuary SAC	**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. **Features of Interest** Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410]

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] **Potential Impact** The proposed intertidal works are within and cable survey route passes through, this SAC. The survey is in the marine intertidal and subtidal element of Malahide Beach (within SAC) and Portmarnock Beach. The marine survey is proximate to an area of existing vessel activity (Malahide Marina & Howth Harbour). The proposed survey works will be within an area of existing vessel traffic in proximate to the Malahide Marina and Howth Harbour, and the intertidal element is on popular beaches (Malahide & Portmarnock) with car parks and existing human and dog walking activity. However, initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on the features of interest of this SAC through physical impact on the intertidal and subtidal sediments within the SAC and physical disturbance which could impact the Features of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. **Natura Impact Statement Required**
IE003000	Rockabill to Dalkey Island SAC	**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** Reefs [1170] *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** The proposed subtidal cable survey route passes through this SAC. The survey is in the marine intertidal and subtidal element of Malahide Beach and Portmarnock Beach. The marine survey is proximate to an area of existing vessel activity (Malahide Marina & Howth Harbour). Harbour Porpoise (*Phocoena phocoena*) are a conservation interest of this SAC and mitigation measures are required in relation marine mammals during the proposed project. The proposed survey works will be within an area of existing vessel traffic in proximate to the Malahide Marina and Howth Harbour, and the intertidal element is on popular beaches (Malahide & Portmarnock) with car parks and existing human and dog walking activity. However, initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on the features of interest of this SAC through underwater noise, pollution, physical impact on the intertidal and subtidal sediments within the SAC and physical

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			disturbance which could impact the Features of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. **Natura Impact Statement Required**
IE000204	Lambay Island SAC	**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. **Features of Interest** Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] *Halichoerus grypus* (Grey Seal) [1364] *Phoca vitulina* (Harbour Seal) [1365] **Potential Impact** The proposed cable survey area is located 3km from this SAC. Initial assessment identifies that in the absence of mitigation measures there may be potential for impact on the qualifying interests of this SAC through disturbance (noise). In particular, mitigation measures are required to ensure that there are no impacts on grey seals and harbour seals, which are features of interest of this SAC. Due to short term scale of the project, the distance from the works to the SAC, and the low level of impact, there is no possibility of significant effects on the other features of interest of this SAC. Mitigation measures are required for grey seals and harbour seals. Further information is required to determine the potential for adverse effects on this SAC. **Natura Impact Statement Required.**
IE000781	Slaney River Valley SAC	**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. **Features of Interest** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Lampetra fluviatilis (River Lamprey) [1099] Alosa fallax fallax (Twaite Shad) [1103] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355] Phoca vitulina (Harbour Seal) [1365] **Potential Impact** This SAC is 53.9 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of harbour seal (273 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on harbour seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC should this species enter the Zone of Influence. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 53.9 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on designated habitats, Lamprey species (Sea, Brook, and River), or Freshwater pearl mussel protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. In relation to Atlantic salmon, it has been found that salmon from southeast Ireland tend to move out to the shelf edge before crossing the Atlantic towards Greenland (Rikardson et al., 2021). Given that the proposed project is located within Dublin Bay (outside of the recorded areas of salmon migration – see Appendix I), and the temporal nature of the proposed works, no significant impacts on salmon are foreseen as a result of the proposed project in the absence of mitigation. In relation to Twaite Shad, given the spatial and temporal nature of the proposed works, and the distance to this SAC, the proposed project is considered too far for any significant interaction to occur. Further, no significant impacts on otter are foreseen. As detailed by Reid et al. (2013), female otters have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability. Given the nature of the proposed works and the significant distance between the proposed survey area and this SAC (53.9 km), in the absence of mitigation, no significant

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			effects on otter species are likely as a result of the proposed project. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour seals. **Natura Impact Statement Required**
IE000707	Saltee Islands SAC	**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. **Features of Interest** Mudflats and sandflats not covered by seawater at low tide [1140] Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Submerged or partially submerged sea caves [8330] Halichoerus grypus (Grey Seal) [1364] **Potential Impact** This SAC is located 141 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC if grey seal from this SAC were to enter the SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 141 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect grey seals. **Natura Impact Statement Required**
IE000101	Roaringwater Bay and Islands SAC	**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. **Features of Interest**

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330] Phocoena phocoena (Harbour Porpoise) [1351] Lutra lutra (Otter) [1355] Halichoerus grypus (Grey Seal) [1364] **Potential Impact** This SAC is 304.8 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023) and is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal and harbour porpoise (features of interest of this SAC) through underwater noise and physical disturbance which could impact the Features of Interest of this SAC should this mobile marine mammal enter the ZoI. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 304.8 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. Further, no significant impacts on otter are foreseen. As detailed by Reid et al. (2013), female otters have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability. Given the nature of the proposed works and the significant distance between the proposed survey area and this SAC (304.8 km), in the absence of mitigation, no significant effects on otter species are likely as a result of the proposed project. The proposed project has the potential to introduce noise, pollution, and physical disturbance into the marine environment and mitigation measures are required to protect harbour porpoise and grey seals. **Natura Impact Statement Required**
IE002172	Blasket Islands SAC	**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.

NATURA Site Code	NAME	Screened In/Out	SSCO's/Reason
			Features of Interest Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330] Phocoena phocoena (Harbour Porpoise) [1351] Halichoerus grypus (Grey Seal) [1364] **Potential Impact** This SAC is 325.9 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023) and is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal and harbour porpoise (features of interest of this SAC) through underwater noise and physical disturbance which could impact the Features of Interest of this SAC should this mobile marine mammal enter the ZoI. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 325.9 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise and grey seals. **Natura Impact Statement Required**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
Special Areas of Conservation (UK)			
UK0030398	North Anglesey Marine/Gogledd Môn Forol	**In**	**Conservation Objective** Maintain site integrity by ensuring: 1. Harbour porpoise are a viable component of the site. 2. There is no significant disturbance of the species. 3. The condition of supporting habitats and processes, and the availability of prey is maintained. **Qualifying Interest** Harbour Porpoise (*Phocoena phocoena*) [1351]

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			Potential Impact This SAC borders the proposed cable survey area within the Irish EEZ. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise, pollution, and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
UK0016612	Murlough	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Fixed coastal dunes with herbaceous vegetation ("grey dunes") [2130] *priority habitat. Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150] *priority habitat. Sandbanks which are slightly covered by sea water all the time [1110] Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") [2120] Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170] Marsh fritillary butterfly (*Euphydryas (Eurodryas, Hypodryas) aurinia*) [1065] Harbour Seal (*Phoca vitulina*) [1365] **Potential Impact** This SAC is 67 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of harbour seal (273 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour seals (qualifying interests of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC.

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			Mitigation measures are required to protect the SAC from significant effects. The survey area is located 67 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats or the marsh fritillary butterfly protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour seals. **Natura Impact Statement Required**
UK0030399	North Channel	In	**Conservation Objective** Maintain site integrity by ensuring: 1. Harbour porpoise are a viable component of the site. 2. There is no significant disturbance of the species. 3. The condition of supporting habitats and processes, and the availability of prey is maintained. **Qualifying Interest** Harbour Porpoise (*Phocoena phocoena*) [1351] **Potential Impact** This SAC is 68.7 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
UK0030397	West Wales Marine / Gorllewin Cymru Forol	In	**Conservation Objective** Maintain site integrity by ensuring: 1. Harbour porpoise are a viable component of the site. 2. There is no significant disturbance of the species. 3. The condition of supporting habitats and processes, and the availability of prey is maintained. **Qualifying Interest**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			Harbour Porpoise (*Phocoena phocoena*) [1351] **Potential Impact** This SAC is 75.2 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
UK0013117	Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau	**In**	**Conservation Objective** To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status. **Qualifying Interest** Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Submerged or partially submerged sea caves [8330] *Lutra lutra* (Otter) [1355] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Halichoerus grypus* (Grey Seal) [1364] **Potential Impact** This SAC is 78.2 km from the proposed cable survey area. The proposed cable survey area is located within the Irish Sea MU for Bottlenose Dolphin (JNCC, 2023) and is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal and bottlenose dolphin (features of interest of this SAC) through underwater noise and physical disturbance which could impact the Features of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 78.2 km from this conservation site. Given the nature of the proposed works, and the significant

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. Further, no significant impacts on otter are foreseen. As detailed by Reid et al. (2013), female otters have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability. Given the nature of the proposed works and the significant distance between the proposed survey area and this SAC (78.2 km), in the absence of mitigation, no significant effects on otter species are likely as a result of the proposed project. Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on bottlenose dolphins and grey seals (qualifying interests of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect bottlenose dolphins and grey seals. **Natura Impact Statement Required**
UK0016618	Strangford Lough	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Large shallow inlet and bay [1160] Coastal lagoons [1150] Mudflats and sandflats not covered by sea water at low tide [1140] Reefs [1170] Annual vegetation of drift lines [1210] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Harbour (Common) Seal (*Phoca vitulina*) [1351] **Potential Impact** This SAC is 83.4 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of harbour seal (273 km) (Carter et al., 2022).

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on harbour seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 83.4 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats protected as qualifying interests of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour seals. **Natura Impact Statement Required**
UK0012712	Cardigan Bay / Bae Ceredigion	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Bottlenose dolphin (*Tursiops truncatus*) [1349] **Potential Impact** This SAC is 139 km from the proposed cable survey area. The proposed cable survey area is located within the Irish Sea MU for Bottlenose dolphin (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on bottlenose dolphin (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect bottlenose dolphin. **Natura Impact Statement Required**
UK0030384	The Maidens	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Sandbanks which are slightly covered by seawater all the time [1110] Reefs [1170]

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			Grey Seal (*Halichoeurus grypus*) [1364] **Potential Impact** This SAC is 146.9 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 146.9 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on sandbanks or reefs protected as qualifying interests of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect grey seals. **Natura Impact Statement Required**
UK0013116	Pembrokeshire Marine / Sir Benfro Forol	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interests** Sandbanks which are slightly covered by seawater all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Submerged or partially submerged sea caves [8330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Grey Seal (*Halichoeurus grypus*) [1364] Otter (*Lutra lutra*) [1355] Allis shad (*Alosa alosa*) [1102] Twaite shad (*Alosa fallax*) [1103] River lamprey (*Lampetra fluviatilis*) [1099] Sea lamprey (*Petromyzon marinus*) [1095] Shore dock (*Rumex rupestris*) [1441]

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			Potential Impact This SAC is 170.1 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on grey seal (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 170.1 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on designated habitats, Lamprey species (Sea and River), or Shore dock protected as a qualifying interest of this SAC are foreseen from the proposed works associated with this survey license application. In relation to Twaite shad and Allis shad, given the spatial and temporal nature of the proposed works, and the distance to this SAC, the proposed project is considered too far for any significant interaction to occur. Further, no significant impacts on otter are foreseen. As detailed by Reid et al. (2013), female otters have territories of 7.5 ± 1.5km in length along a riverine environment and 6.5 ± 1.0km in coastal environments, while male otter territory along rivers is approximately 13.2 ± 5.3km in length with a high degree of variability. Given the nature of the proposed works and the significant distance between the proposed survey area and this SAC (170.1 km), in the absence of mitigation, no significant effects on otter species are likely as a result of the proposed project. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour seals. **Natura Impact Statement Required**
UK0030396	Bristol Channel Approaches/Dynesfeydd Môr Hafren	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Harbour porpoise (*Phocoena phocoena*) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 205.9 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for harbour porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
UK0030067	South-East Islay Skerries	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Harbour (Common) Seal (*Phoca vitulina*) [1351] **Potential Impact** This SAC is 233 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of harbour seal (273 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on harbour seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour seals. **Natura Impact Statement Required**
UK0013114	Lundy	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Sandbanks which are slightly covered by seawater all the time [1110] Reefs [1170] Submerged or partially submerged sea caves [8330] Grey Seal (*Halichoeurus grypus*) [1364] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 261.8 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 261.8 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment, in the absence of mitigation measures, no significant impacts on habitats protected as qualifying interests of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect grey seals. **Natura Impact Statement Required**
UK0013694	Isles of Scilly Complex	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interest** Sandbanks which are slightly covered by seawater all the time [1110] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] Shore Dock (*Rumex rupestris*) [1441] Grey Seal (*Halichoeurus grypus*) [1364] **Potential Impact** This SAC is 381.5 km from the proposed cable survey area. The proposed cable survey area is located within the foraging range of grey seal (448 km) (Carter et al., 2022). Initial assessment identifies that, in the absence of mitigation measures, there may be potential for impact on grey seal (feature of interest of this SAC) through underwater noise and physical disturbance which could impact the Feature of Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The survey area is located 381.5 km from this conservation site. Given the nature of the proposed works, and the significant distance to this SAC across a marine environment,

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			in the absence of mitigation measures, no significant impacts on habitats or shore dock protected as qualifying interests of this SAC are foreseen from the proposed works associated with this survey license application. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect grey seals. **Natura Impact Statement Required**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
Special Areas of Conservation (FR)			
FR2502022	Nord Bretagne DH	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 451.5 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR2500084	Récifs et landes de la Hague	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 478.2 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5302015	Mers Celtiques – Talus du golfe de Gascogne	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 480.6 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR2502019	Anse de Vauville	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 486.5 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR2502018	Banc et récifs de Surtainville	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 505.7 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300009	Côte de Granit rose-Sept-Iles	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 512.8 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300010	Trégor – Goëlo	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 517.6 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300015	Baie de Morlaix	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 537 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300017	Abers – Côtes des légendes	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 539.2 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300008	Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 546.4 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300018	Ouessant-Molène	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 551.9 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300011	Cap d'Erquy-Cap Fréhel	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 554.2 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR2500079	Chausey	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 555.7 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300066	Baie de Saint-Brieuc - Est	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 572.8 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5302006	Côtes de Crozon	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 582.6 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300012	Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 585.6 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5300061	Estuairie de la Rance	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 593.6 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5302007	Chaussée de Sein	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 600.5 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR2500077	Baie du Mont Saint-Michel	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact** This SAC is 604.5 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**
FR5302016	Récifs du talus du golfe de Gascogne	**In**	**Conservation Objective** To maintain (or restore where appropriate) the qualifying interests to favourable condition. **Relevant Qualifying Interests** *Phocoena phocoena* (Harbour Porpoise) [1351] **Potential Impact**

NATURA Site Code	NAME	Screened In/Out	Conservation Objectives/ Features of interest/ Potential impact on Natura 2000 site.
			This SAC is 607.4 km from the proposed cable survey area. The proposed cable survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise (JNCC, 2023). Initial assessment identifies that, in the absence of mitigation measures, and out of an abundance of caution, there may be potential for impact on harbour porpoise (qualifying interest of this SAC) through underwater noise and physical disturbance which could impact the Qualifying Interest of this SAC. Mitigation measures are required to protect the SAC from significant effects. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect harbour porpoise. **Natura Impact Statement Required**

4.5 Cumulative Impact Assessment

As outlined by (OSPAR, 2012) "*Cumulative effects, the combined effect of more than one activity, may reinforce the impacts of a single activity due to temporal and/or spatial overlaps*". The potential for in-combination effects within the ZoI that may occur as a result of the proposed project, during and post works has been assessed. The following cumulative impact assessment has been guided by the EC 2021 AA guidance document[e], with particular reference to "Table 2. Cumulative impact assessment".

4.5.1 Geographic Boundaries and the Timeline for Assessment

The proposed project is primarily located within the intertidal and subtidal elements of Malahide Beach, Portmarnock Beach, and within the Irish EEZ. The potential ZoI for in-combination effects for this assessment has been deemed to be projects located proximate to the landfall and intertidal elements of the survey works in addition to subtidal elements relating to underwater noise. Terrestrial planning applications have been examined for the potential for in-combination effects. Given that the proposed survey works extend to the offshore subtidal in the Irish Sea, the geographic boundaries of assessment was expanded to include coastal and offshore marine projects located within the Irish Sea.

In relation to the timeline for assessment, given the short temporal nature of the proposed works, and the fact that the proposed works will be isolated to the survey corridor extents with potential for noise to extend beyond the survey area, the most recent projects located within the vicinity of the proposed survey works area have been examined for potential in-combination effects.

4.5.2 Identification of Plans/Projects that could act In Combination

Fingal County Council planning permissions, Foreshore Applications, MARA Licence Applications, and EIA portal were examined, and the potential for in-combination effects due to development in the area.

[e] Official Journal C 437/2021 (europa.eu)

Table 12. *Fingal County Council Planning Permissions.*

Ref. No.	Address	Proposal
F21A/0447	Gannon Park, Coast Road, Malahide, Co. Dublin	A temporary five year planning permission sought for a single storey portacabin to the rear of the fitness centre, as an extension to the existing creche. Permission also sought to relocate the existing out door play area, including all site works for same.
F20A/0576	Robswall Cottage, Coast Road, Malahide, Co. Dublin	The demolition of unfinished structures on site and the construction of a 2 storey, 5-bedroom dwelling at the north of the site and a 3 storey over lower ground floor apartment block (4 storey in total) building containing four 3-bedroom apartments and five 2-bedroom apartments, (9 apartments in total) at the south of the site. A new vehicular entrance is proposed onto the existing cul-de-sac roadway at the north of the site, removal and modifications to existing boundary walls, new access gates and piers, 14 no. car parking spaces will be provided for the apartments and 3 no. car parking spaces for the dwelling. 11 no bicycle parking spaces are provided for the apartment development. Construction of a bin and bike store together with all associated site works, drainage, boundary treatments, green roofs, tree planting and landscaping.
F18A/0437	Gannon Park, Coast Road, Malahide, Co. Dublin	Permission for 6 no. additional flood lighting columns 15m high to new all weather football pitch with associated enclosure fencing and site development work to the eastern side.
F18A/0373	White Sands Hotel, Coast Road, Portmarnock, Co. Dublin	Construction of new single storey 7sq.m. entrance lobby, entrance canopy, universal access ramp and new steps to existing front entrance and associated alterations to the elevation, all to the east elevation of the White Sands Hotel.
F18A/0249	Eagle's View, Wendell Avenue, Portmarnock, Dublin 13	The development will consist of (A) Part demolitions of existing two storey detached dwelling and removal of the roof (B) Construction of one and two storey extensions to the front, side and rear elevations (C) Revisions to external finishes to include new window sizes and locations (D) Construction of a new pitched roof with provision of dormer roof windows and rooflights (E) Provision of 1st floor roof terrace with privacy screening to protect existing residential amenities to the south east (F) Provision of a new, wider vehicular entrance gate accessed from Wendell Avenue (G) All associate site works.
F17A/0296	Lenaboy, Coast Road, Malahide, Co. Dublin	Permission for the demolition of an existing two storey detached dwelling and single storey garage to rear. The construction of a replacement two storey detached dwelling to accommodate a Kitchen, Dining Room, Living Room at ground floor, 4 No. bedrooms with Bathroom on the first floor and an attic Studio space, all in lieu of demolished structure. A new landscape layout to front and rear gardens to include parking area for 3 No. cars the construction of new entrance walls, piers and gates increasing the existing vehicle entrance width in front and the alteration of the existing foul and surface water drainage to replace existing surface water drainage.

Table 13. *Foreshore/Marine licence applications proximate to the proposed survey corridor*

Reference	Title	Year	Location	Activity	Status
FS007635	MaresConnect Electricity Interconnector Site Investigation	2023	FLAA is from Portmarknock, Co. Dublin to Skerries, Co. Dublin Investigative landfall zones include: Ardgillan - Barnageeragh Cove Balcarrick - Eagans Field Loughshiny - Rockabill View Robswalls - Malahide Rush	Marine investigative survey works for the MaresConnect Ltd (MCL) Interconnector. The proposed works includes surveys 50m landward of the high-water mark to overlap with the terrestrial survey works.	Applied
FS007180	Tech Works Marine Ltd. Data Buoy Deployment	2022	Scotsman's Bay, Dun Laoghaire, Co. Dublin	Deployment of a small Data Buoy with multiple environmental (non-acoustic) sensors to test communications technology for data acquisition	Applied
FS006984	Rush Sailing Club Landing Pontoon	2022	Rush Sailing Club, Rogerstown, Rush, Co. Dublin	Construction of a new disability access landing pontoon to include new floating pontoon, access gangway, landing area, and alterations to existing boundary sea wall, boundary wall, and footpath to accommodate same, and associated site works	Applied
FS007605	Irish Water Benthic Survey	2022	Survey area commences at the R106 Coast Road (at Maynetown), north of Baldoyle and terminates 1km north-east of Ireland's Eye	Benthic survey of the proposed outfall pipeline (marine section) area and its environs associated with the Greater Dublin Drainage Project.	Consultation
FS007472	Mac Lir Offshore Wind Limited Site Investigations for proposed Offshore Wind Farm, off Counties Wexford, Wicklow, and Dublin	2022	Off Counties Wicklow, Wexford, and Dublin	Benthic ecology surveys within a potential offshore export cable corridor area. The proposed surveys will be conducted on the shoreline and in the marine area and are routine in establishing the baseline benthic ecology conditions for areas for a number of purposes including conservation, environmental status and in this particular case to support the Environmental Impact Assessment Report for the proposed Mac Lir Offshore Wind Farm.	Applied
FS007363	Greystones (OWL) Windfarm Ltd. proposing to develop windfarm off Dublin/Wicklow	2022	Off Counties Wicklow and Dublin	Greystones OWL Windfarm Limited is proposing to develop an offshore wind farm at a site off the Wicklow/Dublin coast. Greystones OWL Windfarm Limited is seeking to undertake a variety of marine surveys at the proposed site to inform the specific location, design and layout of the proposed offshore	Applied

Reference	Title	Year	Location	Activity	Status
				wind farm and export cable route to shore.	
FS007546	Site Investigations for proposed Offshore Wind Farm, off counties Wicklow and Dublin	2022	Off counties Wicklow and Dublin	The main aims and objectives of the proposed activities are to: • Provide up to date detailed bathymetric mapping of the seabed; • Provide further information on the soil stability and morphology of the seabed; • Provide detailed information on ground conditions and geology; • Obtain up to date wind resource and metocean data for the site; and • To generate environmental and ecological data to inform the EIA and AA for the Codling Wind Park project.	Determination
FS007330	Site Investigations off the coasts of Wicklow and Dublin	2021	Off Counties Wicklow and Dublin	Site investigation works to determine the suitability for cable routeing, and positioning of turbines and other electrical infrastructure associated with the development of an OWF. The results of these surveys will also provide baseline data for Environmental Impact Assessment (EIA) and a subsequent Environmental Impact Assessment Report (EIAR) should the development be taken forward to the planning/consenting stage.	Applied
FS007392	Site Investigations for the proposed Lir Offshore Array, off counties Louth, Meath, and Dublin	2021	Off Counties Louth, Meath, and Dublin	Surveys and Site Investigations (SI) to inform development and project design for the proposed site. The surveys will be geophysical, geotechnical, environmental and metocean.	Applied
FS007151	Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow	2021	Off Counties Dublin and Wicklow	Site investigation activities to undertake a variety of marine surveys at the proposed site in order to inform the specific location, design and layout of the proposed offshore wind farm and export cable route to shore. The surveys will include geophysical, geotechnical, environmental and metocean campaigns. The site investigation surveys in the proposed Foreshore Licence Application Area will support the development of the proposed Sunrise Offshore Wind Farm.	Consultation

Reference	Title	Year	Location	Activity	Status
FS006909	Broadmeadow Way Greenway	2021	Malahide Demesne to Newbridge Demesne	A new greenway (shared footpath and cycleway) between Malahide Demesne and Newbridge Demesne via the railway causeway across the Malahide Estuary. The proposed greenway would be c. 6km in length. Much of the the proposed greenway follows existing pathways and roads.	Consultation
FS007373	Site Investigations off Co. Dublin	2021	Off the coast of Dublin	Site Investigations to inform feasibility assessments and design in relation to the proposed development of an offshore wind farm array to the east of County Dublin.	Consultation
FS007358	Site Investigations for Export Cable Route	2021	Off the coast of Co. Louth, Meath, and Dublin	Site investigation surveys necessary to determine the seabed and sub-sea conditions to establish the optimum location for and design of the export cable(s) to shore, and to establish the most appropriate route corridor and landfall location for the export cable(s) from the proposed North Irish Sea Array (NISA) offshore wind farm, located off the coasts of Dublin, Meath and Louth. The application includes for geophysical surveys (mutli-beam echo sounder, sub bottom profiling, side-scan sonar and magnetometer), geotechnical surveys (cone penetration tests and vibrocores along the potential routes and boreholes at the landfalls) and ecological surveys (fisheries surveys, benthic grab samples, intertidal benthic sampling).	Determination
FS007188	Site Investigations for the proposed Dublin Array Offshore Wind Farm	2021	Off the coast of County Dublin and Wicklow	Geotechnical and geophysical site investigations and ecological, wind, wave and current monitoring to provide further data to refine wind farm design, cable routing, landfall design and associated installation methodologies for the proposed Dublin Array offshore wind farm.	Determination
FS007164	Dublin Port Capital Dredging Project	2021	Dublin Port	Capital Dredging at various locations around Dublin Port	Consultation
FS007132	Dublin Port Maintenance Dredging	2021	Dublin Port	Maintenance dredging at various locations in Dublin Port for the years 2022 to 2029.	Determination

Table 14. *MARA licence applications proximate to the proposed survey corridor*

Reference	Title	Year	Location	Activity	Status
LIC230028	LIC230028 – Iarnrod Eireann	2023	East Coast – Dublin to Wicklow	A Geotechnical Investigation (GI) and Geophysical site investigation surveys to inform design options for the proposed East Coast Rail Infrastructure Protection Projects (ECRIPP). The purpose of ECRIPP is to implement protection measures to at risk sections of the Dublin to Wexford railway line from the effects of climate change and coastal erosion	Applied
LIC230016	LIC230016 – Microsoft Ireland Operations Ltd.	2023	Dublin Port, Co. Dublin	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Dublin Port, County Dublin and to evaluate options for the route traversing Dublin Bay, across the Irish Sea to Anglesey, Wales.	Applied
LC230006	**University College Cork Cetacean study within the Irish and Celtic Seas**	2023	Irish and Celtic Seas	The proposed maritime usage is to deploy passive acoustic monitoring devices to describe seasonal and diurnal occurrence of whales, dolphins and porpoises (cetaceans) in the Irish Sea and the Celtic Sea. The work is being carried out as part of a larger multidisciplinary research project called CETUS. The CETUS project: Cetacean, Elasmobranch, Turtle, and Seabird distribution modelling platform will provide scientific data that can be used to support the sustainable development of offshore renewable energy and is funded by Sustainable Energy Authority of Ireland (SEAI).	Determined

4.5.3 Impact Identification

There are no projects, identified within Fingal County Council, Foreshore Licence applications, or MARA planning records, that have been granted planning or currently under construction, proximate to the proposed survey works, that could potentially cause significant in combination effects on European sites.

The potential impacts of the proposed cable route survey are Temporary (i.e. Effects lasting less than a year) in relation to seabed sampling and brief, lasting less than a day, in relation to underwater noise and primarily to occur during the brief survey period (with the presence of boats, machinery and personnel in the vicinity of the works). Impacts on infauna would be deemed to be temporary (i.e. Effects lasting less than a year).

4.5.4 Pathway Identification

The proposed cable survey route is in an area that experiences existing vessel activity. Given that intertidal elements of the proposed survey works are located within the intertidal of Malahide Beach and Portmarnock Beach, there is a potential hydrological pathway from the research vessel to designated conservation sites located within Malahide Estuary. These conservation sites are located downstream of a

number of terrestrial planning applications outlined in Table 12. In the marine offshore subtidal of Malahide Estuary and the Irish Sea, there is a potential hydrological pathway from the research vessel to marine-based conservation sites within the Irish Sea. A number of Foreshore applications are located in this area, and may share a hydrological pathway with the proposed survey works.

4.5.5 Prediction

The survey works would not be seen to have a significant impact on water quality of the area, including impacting the water quality status. Given the scale and the temporal nature of the proposed survey works, no significant cumulative effects with other identified plans or projects are foreseen. Any potential impacts from a pathway that the research vessel may share with projects identified in Tables 12 - 14 are considered to be minimal, and no significant cumulative effects on designated conservation sites are foreseen.

4.5.6 Assessment

The projects outlined above are either completed or, are currently going through planning stages and are not expected to be carried out concurrently or are not at a scale or location where in combination effects are foresee with the proposed project. This report pertains to survey works for the proposed route for a marine fibre optic cable in subtidal and intertidal habitats. As can be seen from using the Best Available Techniques and mitigation measures during survey works, considerable effort has gone into minimising the potential environmental impact of the project. "*Generally all mitigation measures applied for individual cables also contribute to reduction of cumulative impacts*" (OSPAR, 2012).

No likely in combination effects are foreseen from the project in conjunction with other projects.

5. Further Information on European Sites Screened in for NIS

5.1 Malahide Estuary SAC (site code: 000205)

As outlined in the Malahide Estuary SAC Site Synopsis (NPWS 2017)[6]:

'Malahide Estuary is situated immediately north of Malahide and east of Swords in Co. Dublin. It is the estuary of the River Broadmeadow. The site is divided by a railway viaduct which was built in the 1800s.'

'The outer part of the estuary is mostly cut off from the sea by a large sand spit, known as 'the island'. The outer estuary drains almost completely at low tide, exposing sand and mud flats. There is a large bed of Eelgrass (Dwarf Eelgrass, Zostera noltii, and Narrow-leaved Eelgrass, Z. angustifolia) in the north section of the outer estuary, along with Beaked Tasselweed (Ruppia maritima) and extensive mats of green algae (Enteromorphaspp., Ulva lactuca). Common Cord-grass (Spartinaanglica) is also widespread in this sheltered part of the estuary.

The dune spit has a well developed outer dune ridge dominated by Marram Grass (Ammophila arenaria). The dry areas of the stabilised dunes have a dense covering of Burnet Rose (Rosa pimpinellifolia), Red Fescue (Festucarubra) and species such as Yellow-wort (Blackstoniaperfoliata), Autumn Gentian (Gentianella amarella), Hound's-tongue (Cynoglossum officinale), Carline Thistle (Carlinavulgaris) and Pyramidal Orchid (Anacamptis pyramidalis). Much of the interior of the spit is taken up by a golf course. The inner stony shore has frequent Sea-holly (Eryngium maritimum). Well-developed saltmarshes occur at the tip of the spit. Atlantic salt meadow is the principle type and is characterised by species such as Sea-purslane (Halimoine portulacoides), Sea Aster (Aster tripolium), Thrift (Armeria maritima), Sea Arrowgrass (Triglochin maritima) and Common Saltmarsh-grass (Puccinellia maritima). Elsewhere in the outer estuary, a small area of Mediterranean salt meadow occurs which is characterised by the presence of Sea Rush (Juncus maritimus). Below the salt marshes there are good examples of pioneering glasswort (Salicornia spp.) swards and other annual species, typified by S. dolichostachyaand Annual Sea-blite (Suaeda maritima).

The inner estuary does not drain at low tide apart from the extreme inner part. Here, patches of saltmarsh and salt meadows occur, with Sea Aster, Sea Plantain (Plantago maritima) and Sea Club-rush (Scirpusmaritimus). Beaked Tasselweed occurs in one of the channels.

The site includes a fine area of rocky shore south-east of Malahide and extending towards Portmarnock. This represents the only continuous section through the fossiliferous Lower Carboniferous rocks in the Dublin Basin, and is the type locality for several species of fossil coral.

The estuary is an important wintering bird site and holds an internationally important population of Brent Goose and nationally important populations of a further 15 species. Average maximum counts during the 1995/96-1997/98 period were: Brent Goose 1217; Great Crested Grebe 52; Mute Swan 106; Shelduck 471; Pochard 200; Goldeneye 333; Red-breasted Merganser 116; Oystercatcher 1228; Golden Plover 2123; Grey Plover 190; Redshank 454; Wigeon 50; Teal 78; Ringed Plover 106; Knot 858; Dunlin 1474; Greenshank 38; Pintail 53; Black-tailed Godwit 345; Bar-tailed Godwit 99. The high numbers of diving birds reflects the lagoon-type nature of the inner estuary.

The estuary also attracts migrant species such as Ruff, Curlew Sandpiper, Spotted Redshank and Little Stint. Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of the island and the habitat remains suitable for these birds.

The inner part of the estuary is heavily used for water sports. A section of the outer estuary has recently been infilled for a marina and housing development.

This site is a fine example of an estuarine system with all the main habitats represented. The site is important ornithologically, with a population of Brent Goose of international significance."

[6] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000205.pdf

The European Standard Data Form (2020) states that:

"The site is situated in north Co. Dublin, between the towns of Malahide and Swords. It comprises the estuary of the River Broadmeadow. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well sheltered from the sea by a large sand spit, known as ?the island?. This spit is now mostly converted to golf-course though some sand dunes and salt marshes remain. A section of bedrock shore extending towards Portmarnock is included as it represents the only continuous section through the fossiliferous Lower Carboniferous rocks in the Dublin Basin, and is the type locality for several species of fossil coral.

The site has an important example of intertidal sand and mud flats, with Zostera spp. Their quality is variable but generally good. Salt marshes are well represented, particularly Atlantic salt meadows and Salicornia flats. Most of the sand dune system is managed for a golf course but significant areas of fixed dunes and shifting white dunes remain. The site has Viola hirta, a Red Data Book plant species. It is of high importance for wintering waterfowl, with an internationally important population of Branta bernicla horta and nationally important populations of a further 14 species, including Pluvialis apricaria. It also supports a regionally important population of Limosa lapponica. this site has educational value and has been the subject of a number of research projects."

As outlined in the Conservation objectives supporting document, "Malahide Estuary SAC (site code: 205) is designated for a range of coastal habitats including saltmarshes and sand dunes. The following five coastal habitats are included in the qualifying interests for the site (denotes a priority habitat):*

- *Salicornia and other annuals colonising mud and sand (1310*
- *Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (ASM) (1330)*
- *Mediterranean salt meadows (Juncetaliea maritimi) (MSM) (1410)*
- *Shifting dunes along the shoreline with Ammophila arenaria (white dunes) (2120)*
- *Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)**

The first three are saltmarsh habitats and the last two are associated with sand dune systems, although all five of these habitats are found in close association with each other (McCorry, 2007; Ryle et al., 2009).A sixth Annex I habitat Spartina swards (Spartinion maritimae) (1320) is also currently listed as a qualifying interest for this site due to historical records in the Broadmeadow estuary of two other forms of cordgrass – small cordgrass (Spartina maritima) and Townsend's cordgrass (S. x townsendii). However, Preston et al. (2002) consider both S. maritimaand S. x townsendii to be alien to Ireland. In addition, neither of these rare cordgrasses has been recorded in the recent past (Doogue et al., 1998; Reynolds, 2002) and all stands of cordgrass in the Republic of Ireland are now thought to be common cordgrass (S. anglica) (McCorry et al., 2003, McCorry & Ryle, 2009). Consequently, conservation objecttives for the habitat Spartina swards have not been set for this site.'

As outlined in the Conservation objectives supporting document – marine habitats[7] (NPWS, 2013):

'Section 1

Principal Benthic Communities

Within Malahide Estuary SAC five community types were recorded in the Annex I habitat and the overlapping SPA. These are presented in table 1 and a description of each community type is given below.

Community Type	SAC Annex I Habitat	SPA
	Mudflats and sandflats not covered by seawater at low tide (1140)	
Fine sand with oligochaetes, amphipods, bivalves and polychaetes community complex	✓	✓
Estuarine sandy mud with Chironomidae and *Hediste diversicolor* community complex	✓	✓
Sand to muddy sand with *Peringia ulvae*, *Tubificoides benedii* and *Cerastoderma edule* community complex	✓	✓
Zostera-dominated community	✓	✓
Mytilus-dominated community complex	✓	✓

Table 1. *The community types recorded in Malahide Estuary SAC and the overlapping SPA.*

Estimated areas of each community type in the Annex I habitat, based on interpolation, are given in the objective targets in Section 2.

The development of a community complex target arises when an area possesses similar abiotic features but records a number of biological communities that are not regarded as being sufficiently stable and/or distinct temporally or spatially to become the focus of conservation efforts. In this case, examination of the available data from Malahide Estuary SAC identified a number of biological communities whose species composition overlapped significantly. Such biological communities are grouped together into what experts consider are sufficiently stable units (i.e. a complex) for conservation targets.

FINE SAND WITH OLIGOCHAETES, AMPHIPODS, BIVALVES AND POLYCHAETES COMMUNITY COMPLEX

This community complex occurs along the eastern boundary of the site from the Martello Tower at Balcarrick in the north to Portmarnock in the south (Figure 2).

The sediment of this community complex is largely that of fine sand (ranging from 74% to 88.9%) with negligible amounts of coarse material (

[7] https://www.npws.ie/sites/default/files/publications/pdf/000205_Malahide%20Estuary%20SAC%20Marine%20Supporting%20Doc_V1.pdf

The complex is distinguished by the oligochaete Tubificoides benedii, the crustacean Bathyporeia guilliamsoniana, the bivalve Angulus tenuis and the polychaetes Nephtys cirrosa, Hediste diversicolor, Scoloplos armiger and Scolelepis squamata, all of which occur in moderate abundances here (Table 2).

Distinguishing species of the Fine sand with oligochaetes, amphipods, bivalves and polychaetes community complex	
Tubificoides benedii	*Hediste diversicolor*
Bathyporeia guilliamsoniana	*Scoloplos armiger*
Angulus tenuis	*Scolelepis squamata*
Nephtys cirrosa	

Table 2. *Distinguishing species of the Fine sand with oligochaetes, amphipods, bivalves and polychaetes*

ESTUARINE SANDY MUD WITH CHIRONOMIDAE AND HEDISTE DIVERSICOLOR COMMUNITY COMPLEX

This complex is recorded at Swords where the Ward River and Broad Meadow River enter the Malahide estuary (Figure 2).

The sediment is largely that of sandy mud with silt-clay and very fine sand accounting for between 19.6% to 59.7% and 12.4% to 28.4% of the sediment fractions respectively. The remaining fractions range from 0.8% to 12.5% coarse sand, very coarse sand from 0.4% to 5.1%, medium sand from 1.6% to 27.7% and the fine sand fraction from 8.7% to 21.9%. The proportion of gravel recorded is negligible (<1%).

The fauna is distinguished by unidentified Chironomidae species and the polychaete Hediste diversicolor which occur in high to moderate abundances here. The oligochaetes Heterochaeta costata and Paranais litoralis are also recorded here (Table 3).

Distinguishing species of the Estuarine sandy mud with Chironomidae and *Hediste diversicolor* community complex	
Chironomidae	*Heterochaeta costata*
Hediste diversicolor	*Paranais litoralis*

Table 3 *Distinguishing species of the Estuarine sandy mud with Chironomidae and Hediste diversicolor community complex.*

SAND TO MUDDY SAND WITH PERINGIA ULVAE, TUBIFICOIDES BENEDII AND CERASTODERMA EDULE COMMUNITY COMPLEX

This community complex is recorded extensively within the estuary from Donabate to Malahide (Figure 2).

The substrate here is composed largely of fine material with silt-clay ranging from 2.2% to 59.7%, very fine sand from 3.2% to 32.9% and fine sand from 6.1% to 80%. Coarse material accounts for less than 7% of the sediment fractions.

The fauna is distinguished by the gastropod Peringia ulvae, the oligochaete Tubificoides benedii and the bivalve Cerastoderma edule which all occur in moderate abundances within this complex. The polychaete Hediste diversicolor and the bivalve Scrobicularia plana are not uniformly distributed, having their highest abundances near Malahide Point. The polychaetes Scoloplos armiger, Pygospio elegans and Nephtys hombergii are also recorded here (Table 4).

Distinguishing species of the Sand to muddy sand with *Peringia ulvae, Tubificoides benedii* and *Cerastoderma edule* community complex	
Peringia ulvae	*Scrobicularia plana*
Tubificoides benedii	*Scoloplos armiger*
Cerastoderma edule	*Pygospio elegans*
Hediste diversicolor	*Nephtys hombergii*

Table 4 *Distinguishing species of the Sand to muddy sand with Peringia ulvae, Tubificoides benedii and Cerastoderma edule community complex*.

ZOSTERA-DOMINATED COMMUNITY

The intertidal seagrass Zostera noltii is recorded in two discrete areas to the north of the site, on Burrow Strand at Corballis and along the shore to the east of Kilcrea (Figure 2).

The sediment here is largely that of fine sand which accounts for 80% of the sediment fractions. Coarse material and fines fractions are negligible.

The coverage of Zostera noltii at this site ranges from 60% in the more westerly bed to 82% in the beds on Burrow Strand. The fauna is dominated by the gastropod Peringia ulvae which is recorded in very high abundances; the polychaetes Pygospio elegans and Scoloplos armiger occur in high abundance here. The infauna is similar to that recorded for the "Sand to muddy sand with Peringia ulvae, Tubificoides benedii and Cerastoderma edule community complex" (See Table 4).

MYTILUS-DOMINATED COMMUNITY COMPLEX

This community occurs on the intertidal expanse between the railway line and the spit at Malahide Point (Figure 2).

The bivalve Mytilus edulis, with algal epibionts such as Ectocarpus sp. are abundant here. Between the clumps of mussel patches of sandy mud occur in which the polychaete Arenicola marina is recorded in densities of between 3-4m^2 . The bivalve Scrobicularia plana, barnacles and encrusting polychaetes also occur within this complex (Table 5).

Distinguishing species of the *Mytilus*-dominated community complex	
Mytilus edulis	*Fucus vesiculosus*
Ectocarpus sp.	*Enteromorpha* sp.
Arenicola marina	*Ulva intestinalis*
Littorina littorea	*Scrobicularia plana*

Table 5 *Distinguishing species of the Mytilus-dominated community complex.*

Section 2

Annex I Habitats

It is worth considering at the outset that in relation to Annex I habitat structure and function, the extent and quality of all habitats varies considerably in space and time and marine habitats are particularly prone to such variation. Habitats which are varying naturally, i.e. biotic and/or abiotic variables are changing within an envelope of natural variation, must be considered to have favourable conservation condition. Anthropogenic disturbance may be considered significant when it causes a change in biotic and/or abiotic variables in excess of what could reasonably be envisaged under natural processes. The capacity of the habitat to recover from this change is obviously an important consideration (i.e. habitat resilience) thereafter.

This Department has adopted a prioritized approach to conservation of structure and function in marine Annex I habitats.

1. *Those communities that are key contributors to overall biodiversity at a site by virtue of their structure and/or function (keystone communities) and their low resilience should be afforded the highest degree of protection and any significant anthropogenic disturbance should be avoided.*
2. *In relation to the remaining constituent communities that are structurally important (e.g. broad sedimentary communities) within an Annex I marine habitat, there are two considerations.*
    - *2.1 Significant anthropogenic disturbance may occur with such intensity and/or frequency as to effectively represent a continuous or ongoing source of disturbance over time and space (e.g. effluent discharge within a given area). Drawing from the principle outlined in the European Commission's Article 17 reporting framework that disturbance of greater than 25% of the area of an Annex I habitat represents unfavourable conservation status, this Department takes the view that licensing of activities likely to cause continuous disturbance of each community type should not exceed an approximate area of 15%. Thereafter, an increasingly cautious approach is advocated. Prior to any further licensing of this category of activities, an interDepartmental management review (considering inter alia robustness of available scientific knowledge, future site requirements, etc) of the site is recommended.*
    - *2.2 Some activities may cause significant disturbance but may not necessarily represent a continuous or ongoing source of disturbance over time and space. This may arise for intermittent or episodic activities for which the receiving environment would have some resilience and may be expected to recover within a reasonable timeframe relative to the six-year reporting cycle (as required under Article 17 of the Directive). This Department is satisfied that such activities could be assessed in a contextspecific manner giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.*

The following technical clarification is provided in relation to specific conservation objectives and targets for Annex I habitats to facilitate the appropriate assessment process:

Objective: To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Malahide Estuary SAC, which is defined by the following list of attributes and targets.

Target 1 - *The permanent habitat area is stable or increasing, subject to natural processes.*

- *This target refers to activities or operations that propose to permanently remove habitat from a site, thereby reducing the permanent amount of habitat area. It does not refer to long or short term disturbance of the biology of a site.*
- *Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.*

Target 2 *- Maintain the extent of the Zostera-dominated community and Mytilus dominated community complex, subject to natural processes.*

- *The Zostera-dominated community and Mytilus-dominated community complex are considered to be keystone communities that are of considerable importance to the overall ecology and biodiversity of a habitat by virtue of its physical complexity, e.g. the former community serves as important nursery grounds for commercial and non commercial species while both provide important food sources for a number of bird species.*
- *Any significant anthropogenic disturbance to the extent of this community should be avoided.*
- *An interpolation of the likely distribution of these community types are provided in figure 2. The areas given below are based on spatial interpolation and therefore should be considered indicative:*
    - *Zostera-dominated community – 5ha*
    - *Mytilus-dominated community complex- 4ha*

Target 3 *- Conserve the high quality of the Zostera-dominated community, subject to natural processes.*

- *It is important to ensure the quality as well as the extent of Zostera-dominated communities is conserved. For example, percent coverage can provide an indication of the habitat quality as well as giving information on the habitat complexity and refuge capability; all important components in maintaining the structural and functional integrity of the habitat.*

Target 4 *- Conserve the high quality of the Mytilus edulis-dominated community complex, subject to natural processes.*

- *Every effort should be made to avoid any death to living Mytilus edulis.*
- *Any significant anthropogenic disturbance to the quality (e.g. living individual/m2) of the community should be avoided.*

Target 5 *- Conserve the following community types in a natural condition: Fine sand with oligochaetes, amphipods, bivalves and polychaetes community complex; Estuarine sandy mud with Chironomidae and Hediste diversicolor community complex; and Sand to muddy sand with Peringia ulvae, Tubificoides benedii and Cerastoderma edule community complex.*

- *A semi-quantitative description of the communities has been provided in Section 1.*
- *An interpolation of their likely distribution is provided in figure 2.*
- *The estimated areas of the communities within the Mudflats and sandflats not covered by seawater at low tide habitat given below are based on spatial interpolation and therefore should be considered indicative:*
    - *Fine sand with oligochaetes, amphipods, bivalves and polychaetes community complex – 126ha*
    - *Estuarine sandy mud with Chironomidae and Hediste diversicolor community complex – 7ha*
    - *Sand to muddy sand with Peringia ulvae, Tubificoides benedii and Cerastoderma edule community complex – 169ha*
- *Significant continuous or ongoing disturbance of communities should not exceed an approximate area of 15% of the interpolated area of each community type, at which point an inter-Departmental management review is recommended prior to further licensing of such activities.*
- *Proposed activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.'*

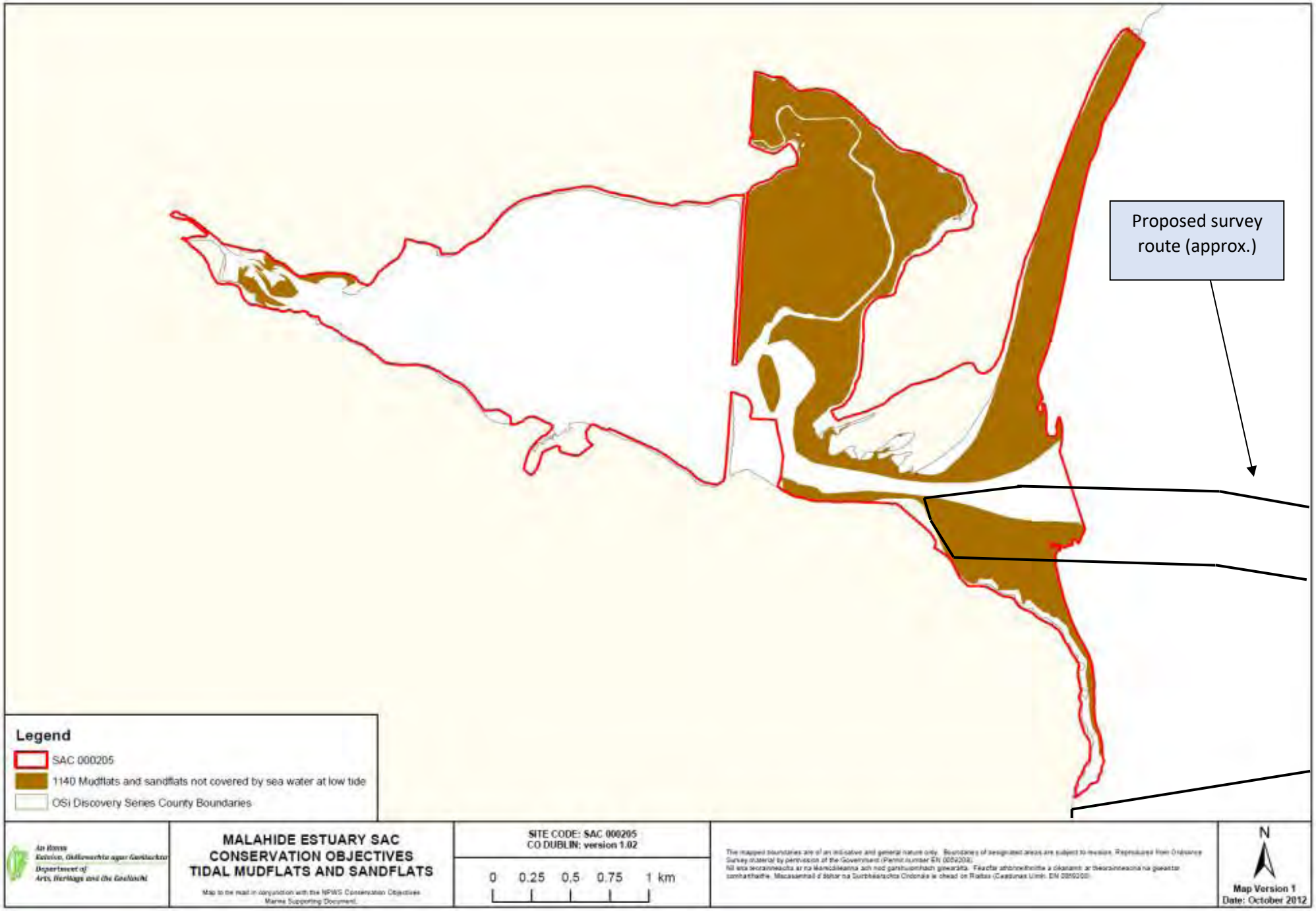


Figure 38. *Extent of Mudflats and sandflats not covered by seawater at low tide in Malahide Estuary SAC*

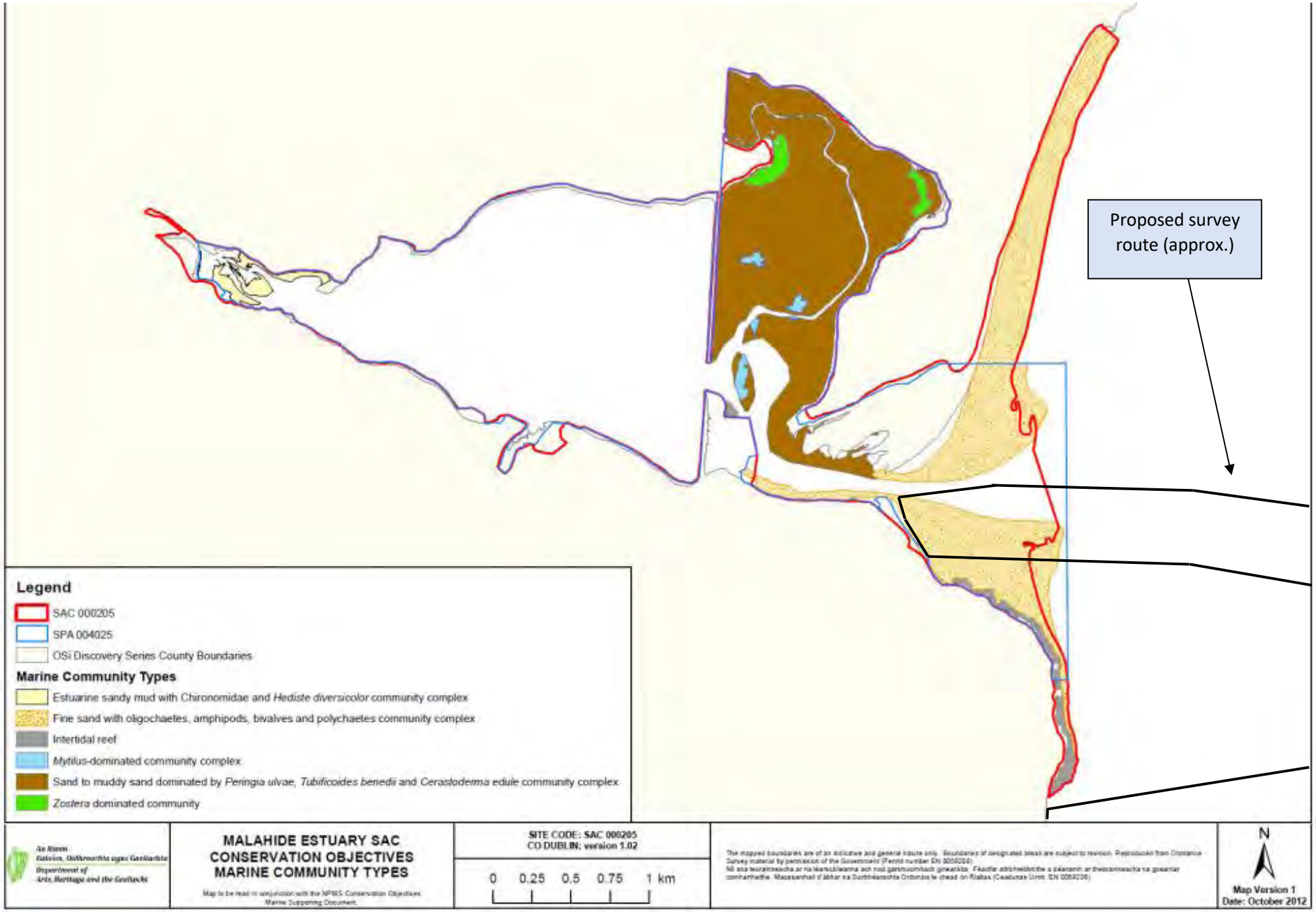


Figure 39. *Distribution of community types in Malahide Estuary SAC*

As outlined in the Conservation objectives supporting document – coastal habitats[8] (NPWS, 2013):

*'**2 Conservation Objectives***

The conservation objective aims to define the favourable conservation condition of a habitat or species at a particular site. Implementation of these objectives will help to ensure that the habitat or species achieves favourable conservation status at a national level.

3 Saltmarsh habitats

Saltmarshes are stands of vegetation that occur along sheltered coasts, mainly on mud or sand, and are flooded periodically by the sea. They are restricted to the area between mid neap tide level and high water spring tide level. In Ireland, there are four saltmarsh habitats listed under Annex I of the EU Habitats Directive (92/43/EEC):

- *Salicornia and other annuals colonising mud and sand (1310)*
- *Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (ASM) (1330)*
- *Mediterranean salt meadows (Juncetalia maritimi) (MSM) (1410)*
- *Mediterranean and thermo-Atlantic halophilous scrub (1420)*

Three of the above habitats (in bold) are listed as Qualifying Interests for Malahide Estuary SAC. The last habitat is restricted in its distribution to sites in the southeast of the country.

The distribution of saltmarsh habitats within Malahide Estuary SAC is presented in Appendix I. The SMP surveyed, mapped and assessed one sub-site within Malahide Estuary SAC (McCorry, 2007) - Malahide Estuary (Appendix II).

Within Malahide Estuary SAC, ASM and Salicornia flats are particularly well represented. MSM is present only in small amounts at the two small strips of marsh in the northern part of the outer estuary. Detailed descriptions of each habitat in the sub-site recorded by McCorry (2007) in Malahide Estuary can be found in Appendix II.

3.1 Overall Objectives

The overall objective for 'Salicornia and other annuals colonising mud and sand' in Malahide Estuary SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Atlantic salt meadows' in Malahide Estuary SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Mediterranean salt meadows' in Malahide Estuary SAC is to 'maintain the favourable conservation condition'.

These objectives are based on an assessment of the recorded condition of each habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Area (b) Range and (c) Structure and Functions.

3.2 Area

3.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is no decrease in extent from the baseline which was established by McCorry (2007). Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

A baseline habitat map was produced for the saltmarsh in Malahide Estuary during the SMP. This map is included with the individual site report in the Appendices at the end of this document (Appendix II).

The total areas of each saltmarsh habitat within each sub-site as mapped by the SMP and the total area of the habitat within the SAC are presented in the following tables.

[8] https://www.npws.ie/sites/default/files/publications/pdf/000205_Malahide%20Estuary%20SAC%20Coastal%20Supporting%20Doc_V1.pdf

There are a number of differences in the figures below. Most of the differences can be explained by the fact that the SMP mapped the total saltmarsh resource at Malahide Estuary and not all of the saltmarsh mapped is contained within the SAC boundary. In addition, the total area within the SAC can be greater than given in the SMP as the SMP did not include any mosaics when calculating their total areas. The following rules were applied when calculating the areas for the site's conservation objectives:

1. *Where a polygon was identified as a mosaic of an Annex I habitat and a non-Annex I habitat, then the entire area was counted as the Annex I habitat.*
2. *Where a polygon was identified as a mosaic of two Annex I habitats, the area was divided 50:50 for each habitat.*

Sub-site	Total area (ha) of *Salicornia* mudflats from SMP	Total area (ha) of *Salicornia* mudflats within SAC boundary (including mosaics)
Malahide Estuary	1.95	1.925
Total	**1.95**	**1.925**

The target for Salicornia flats is that the area should be stable or increasing, subject to natural processes, including erosion and succession.

The target for ASM is that the area should be increasing, subject to natural processes, including erosion and succession.

Sub-site	Total area (ha) of ASM (excluding mosaics) from SMP	Total area (ha) of ASM within SAC boundary (including mosaics)
Malahide Estuary	26.21	25.33
Total	**26.21**	**25.33**

Sub-site	Total area (ha) of MSM (excluding mosaics) from SMP	Total area (ha) of MSM within SAC boundary (including mosaics)
Malahide Estuary	0.64	0.636
Total	**0.64**	**0.636**

The target for MSM is that the area should be stable or increasing, subject to natural processes, including erosion and succession.

3.3 Range

3.3.1 Habitat distribution

The SMP sub-divided the Malahide Estuary into three sub-sites:

i. Malahide Island
ii. Outer estuary
iii. Inner Estuary

i. Malahide Island

This saltmarsh is located on the eastern side of the outer estuary on the sand spit and ASM dominates. The site has an unusual topography and there are long narrow bands of saltmarsh situated between sand dune ridges. Creeks flow into these narrow bands and drain them. Salicornia flats occur on the seaward side of the ASM on sand and mud. Common cord grass (Spartina anglica) is also found here.

ii. Outer Estuary

Saltmarsh is also located along the northern side of the outer estuary and is mainly situated in both of the corners of the estuary. The north-eastern corner of the estuary contains a range of different Annex I habitats that are located in a sheltered area and are typically zoned in an arc around the edge of the shoreline. The most prominent habitat is ASM. There are several patches of MSM located to the landward side of the ASM and this is the only MSM present within Malahide Estuary. Spartina swards also occur in this area.

iii. Inner Estuary

Most of the saltmarsh in the inner estuary is situated at the western end, although there are several other fragments on the north and southern sides further east. The saltmarsh at the western side of the inner estuary is made up of low-lying islands at Lissenhall including Horse Bank and Mill Marsh, which are all dominated by ASM (McCorry, 2007)

The target is that there should be no decline or change in the distribution of these saltmarsh habitats, unless it is the result of natural processes, including erosion, accretion and succession.

3.4 Structure and Functions

The location, character and dynamic behaviour of saltmarshes are governed by sediment supply, tidal regime, wind-wave climate and sea level change. The slope of the saltmarsh allows the development of several ecological gradients such as tidal submergence and salinity, and this influences the development of distinctive zones of halophytic and salt tolerant plant communities. Maintaining the favourable conservation condition of the saltmarsh habitats in Malahide Estuary in terms of its structure and functions depends on a range of attributes for which targets have been set as outlined below.

3.4.1 Physical structure: sediment supply

Accretion and erosion are natural elements of saltmarsh systems. Maintaining the sediment supply is vital for the continued development and natural functioning of a saltmarsh system. Interruption to the sediment circulation through physical structures can starve the system and lead to accelerated erosion rates.

The saltmarsh habitats at this site have been disturbed in the past by the construction of the railway viaduct across the estuary. This has led to the development of more brackish or lagoonal-type conditions in the inner estuary and a reduced tidal range (McCorry, 2007).

The M1 Broadmeadow Motorway Bridge was constructed to cross the estuary at Lissenhall in 2001-2003. Care was taken during the construction phase not to damage the structure or surface of the saltmarsh and by and large the structure of the saltmarsh has remained intact (McCorry, 2007).

A comparison of the 1920's OSI 2nd edition six inch map to the current extent of saltmarsh shows there has been some minor gains and losses of saltmarsh around the estuary. The southern edge of Malahide Island indicates some erosion and realignment of saltmarsh since the 1920s. There has also been some accretion in portions of this site which is actively occurring albeit at a slow rate. There has also been some transition of saltmarsh to sand dune and vice versa. Active accretion at this location may also affect the extent of Salicornia flats as this habitat transitions to ASM (McCorry, 2007).

A substantial area of the estuary at the north-western corner was reclaimed between the drawing of the 1st and 2nd edition 6inch maps. This probably occurred in the 19th Century and was facilitated by the construction of the viaduct across the estuary. The area reclaimed was behind the viaduct in Mullan Intake. There has been some loss of saltmarsh around this old shoreline due to this reclamation (McCorry, 2007).

Within the ASM there is some erosion albeit at a slow rate at the seaward side of the northern tip as seen from comparisons of the 2nd ed OS map with 2000 aerial photos. The erosion is countered by accretion along the north side of the causeway (McCorry, 2007). The MSM is mainly situated along the boundary of St Anne's Golf Course and the extent of this habitat is likely to have been greater in the past prior to the development of the golf courses (McCorry, 2007).

The target is to maintain the natural circulation of sediment and organic matter, without any physical obstructions.

3.4.2 Physical structure: creeks and pans

Saltmarshes can contain a distinctive topography with an intricate network of creeks and pans occurring on medium to large-sized sites. Creek density is influenced by vegetation cover, sediment supply and tidal influence. Creeks absorb tidal energy and assist with delivery of sediment into the saltmarsh. The efficiency of this process depends on creek pattern. Creeks allow pioneer vegetation to

become established along their banks higher up into the saltmarsh system. Major erosion of saltmarsh is indicated by internal dissection and enlargement of the drainage network, ultimately leading to the creation of mud basins.

At Malahide Island the saltmarsh is in good condition, though there are fewer saltpans than expected for a saltmarsh associated with a sandier substrate. The ASM at Lissenhall is also in relatively good condition despite any disturbance resulting from construction of the M1 motorway bridge. There are few signs of disturbance to the physical structure of the saltmarsh and old pans are still present in some of the brackish communities.

The target is to maintain creek and pan networks where they exist and to restore areas that have been altered.

3.4.3 Physical structure: flooding regime

The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and indeed survival of saltmarshes. Saltmarsh vegetation consists of a limited number of halophytic (salt-tolerant) species that are adapted to regular immersion by the tides. Species in the lowest part of the saltmarsh require regular inundation, while those higher up on the marsh can only tolerate occasional inundation.

The viaduct that was built over the estuary in the 1800s has modified the tidal regime of the estuary over time, which prevents the inner estuary from emptying completely at low tide, therby creating a lagoon (McCorry, 2007).

The target is to maintain a flooding regime whereby the lowest levels of the saltmarsh are flooded daily, while the upper levels are flooded occasionally (e.g. highest spring tides).

3.4.4 Vegetation structure: zonation

Saltmarshes are naturally dynamic coastal systems. As is the case on the majority of Irish saltmarshes, ASM is the dominant saltmarsh habitat at Malahide Estuary where it occurs in a mosaic with other saltmarsh habitats, including 'Salicornia and other annuals colonising mud and sand' and 'Mediterranean salt meadows'.

At Malahide Island there is some natural transition between ASM and Salicornia flats in an actively accreting area. This is a feature of particular significance and indicates active accretion is occurring and the saltmarsh is in transition. There are also some natural transitions between the ASM and the sand dune habitats, as well as transitions between ASM and Spartina swards at the northern end of the outer estuary (McCorry, 2007).

The target is to maintain the range of coastal habitats, including transitional zones, subject to natural processes including erosion and succession.

3.4.5 Vegetation structure: vegetation height

A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. Grazing is often used as a tool for maintaining structural diversity in the sward but stocking levels need to be appropriate. Overgrazing can lead to loss of species and destruction of the vegetation cover, while undergrazing can lead to a loss of plant diversity due to competitive exclusion.

Grazing by livestock is absent from Malahide Estuary resulting in a high vegetation cover and a wide range of sward heights (McCorry, 2007). The saltmarsh is grazed by wildfowl as the estuary is an important wintering bird site.

The target is to maintain structural variation within the sward. A general guideline is that there should be a sward ratio of 30% tall:70% short across the entire saltmarsh.

3.4.6 Vegetation structure: vegetation cover

Vegetation cover can have a major effect on saltmarsh development by reducing the velocity of the tide and thereby enhancing the deposition of sediment. Excessive bare mud, however, is often a sign

of overuse by livestock or humans and can lead to destabilisation and accelerated erosion of the system.

There is some amenity use of the saltmarsh at Malahide Island, such as by walkers and probably off-road vehicles and motor bikes. This use has created eroded tracks in the saltmarsh. There are also wheel ruts present in the ASM at the north-eastern corner of the outer estuary. O'Reilly & Pantin (1957) recorded cart tracks across the saltmarsh which may have been related to the collection of gravel from the foreshore (McCorry, 2007).

The target is to maintain 90% of the area outside of the creeks vegetated.

3.4.7 Vegetation composition: typical species & sub-communities

Saltmarshes contain several distinct zones that are related to elevation and frequency of flooding. The lowest part along the tidal zone is generally dominated by the most halophytic (salt-tolerant) species including common saltmarsh-grass (Puccinellia maritima) and species more usually associated with Salicornia muds. The mid-marsh zone is generally characterised by sea thrift (Armeria maritima), sea plantain (Plantago maritima) and sea aster (Aster tripolium). This mid-zone vegetation generally grades into an herbaceous community in the upper marsh, dominated by red fescue (Festuca rubra), sea milkwort (Glaux maritima) and saltmarsh rush (Juncus gerardii). Below are lists of typical species for the different saltmarsh zones, although some of these species have a restricted distribution nationally and may not occur in the Malahide Estuary area.

Typical species		
Lower marsh	**Low-mid marsh**	**Mid-upper marsh**
Salicornia spp. *Suaeda maritima* *Puccinellia maritima* *Aster tripolium*	*Puccinellia maritima* *Triglochin maritima* *Plantago maritima* *Atriplex portulacoides* *Aster tripolium* *Spergularia* sp. *Suaeda maritima* *Salicornia* spp. *Glaux maritima*	*Festuca rubra* *Juncus gerardii* *Armeria maritima* *Agrostis stolonifera* *Limonium humile* *Glaux maritima* *Seriphidium maritimum* *Plantago maritima* *Aster tripolium* *Juncus maritimus* *Triglochin maritima* *Blysmus rufus* *Eleocharis uniglumis* *Leontodon autumnalis* *Carex flacca* *Carex extensa*

The target for this attribute is to ensure that a typical flora of saltmarshes is maintained, as are the range of sub-communities within the different zones.

3.4.8 Vegetation structure: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (Spartina anglica), which was recorded throughout the SAC by the SMP (McCorry, 2007).

The largest area of Spartina sward is situated in the north-western corner of the outer estuary. This is quite a dense stand and there are frequent creeks draining the sward that link to the main channel. There are some small open patches within the sward with exposed mud and less aggregated clumps of common cordgrass (McCorry, 2007).

Spartina sward is also located in the north-east corner of the outer estuary. There is natural transition seaward from ASM to dense Spartina swards to a mosaic of frequent clumps of Common cord grass and exposed mud flats to isolated clumps of cord grass (McCorry, 2007).

Some small patches of Spartina sward are located in the inner estuary on the saltmarsh at Lissenhall, where Spartina has colonised the edge of established saltmarsh and along the adjacent mudflats. There is also a small area of Spartina sward located at the Southern end of Malahide Island (McCorry, 2007).

The aim is that negative indicators such as Spartina should be absent or under control. The current target for this particular site is no significant expansion and an annual spread of less than 1%.

4 Sand dune habitats

Sand dunes are hills of wind blown sand that have become progressively more stabilised by a cover of vegetation. In general, most sites display a progression through strandline, foredunes, mobile dunes and fixed dunes. Where the sandy substrate is decalcified, fixed dunes may give way to dune heath. Wet hollows, or dune slacks, occur where the dunes have been eroded down to the level of the water-table. Machair is a specialised form of dune system that is only found on the northwest coasts of Ireland and Scotland. Transitional communities can occur between dune habitats and they may also form mosaics with each other. Dune systems are in a constant state of change and maintaining this natural dynamism is essential to ensure that all of the habitats present at a site achieve favourable conservation condition.

In Ireland, there are 9 sand dune habitats (including annual vegetation of drift lines) listed under Annex I of the EU Habitats Directive (92/43/EEC) (denotes a priority habitat):*

- *Annual vegetation of drift lines (1210)*
- *Embryonic shifting dunes (2110)*
- *Shifting dunes along the shoreline with Ammophila arenaria (2120)*
- *Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) **
- *Decalcified dunes with Empetrum nigrum (2140) **
- *Decalcified dune heath (2150) **
- *Dunes with Salix repens (2170)*
- *Humid dune slacks (2190)*
- *Machair (21AO) **

Three dune habitats were recorded by Ryle et al. (2009) and two are listed as Qualifying Interests (indicated in bold above) for Malahide Estuary SAC. Embryonic shifting dunes were also recorded by the CMP. These habitats include mobile areas at the front, as well as more stabilised parts of dune systems.

Annual vegetation of drift lines is found on beaches along the high tide mark, where tidal litter accumulates. It is dominated by a small number of annual species (i.e. plants that complete their life-cycle within a single season). Tidal litter contains the remains of marine algal and faunal material, as well as a quantity of seeds. Decaying detritus in the tidal litter releases nutrients into what would otherwise be a nutrient-poor environment. The habitat is often represented as patchy, fragmented stands of vegetation that are short-lived and subject to frequent re-working of the sediment. The vegetation is limited to a small number of highly specialised species that are capable of coping with salinity, wind exposure, an unstable substrate and lack of soil moisture. Typical species include spear-leaved orache (Atriplex prostrata), frosted orache (A. laciniata), sea rocket (Cakile maritima), sea sandwort (Honckenya peploides) and prickly saltwort (Salsola kali).

Embryonic dunes are low accumulations of sand that form above the strandline. They are sometimes referred to as foredunes, pioneer dunes or embryo dunes, as they can represent the primary stage of dune formation. They are characterised by the presence of the salttolerant dune grasses sand couch (Elytrigia juncea) and lyme grass (Leymus arenarius), which act as an impediment to airborne sand. Strandline species can remain a persistent element of the vegetation.

Where sand accumulation is more rapid, marram grass (Ammophila arenaria) invades, initiating the transition to mobile dunes (Shifting dunes along the shoreline with Ammophila arenaria). Marram growth is actively stimulated by sand accumulation. These unstable and mobile areas are sometimes referred to as 'yellow dunes' (or white dunes in some European countries), owing to the areas of bare sand visible between the tussocks of marram.

Fixed dunes refers to the more stabilised area of dune systems, generally located in the shelter of the mobile dune ridges, where the wind speed is reduced and the vegetation is removed from the influence of tidal inundation and salt spray. This leads to the development of a more or less closed or 'fixed' carpet of vegetation dominated by a range of sand-binding species (Gaynor, 2008).

All the dune habitats indicated above occur as a complex mosaic of constantly changing and evolving vegetation communities. They are inextricably linked in terms of their ecological functioning and

should be regarded as single geomorphological units. As such, no dune habitat should be considered in isolation from the other dune habitats present at a site, or the adjoining semi-natural habitats with which they often form important transitional communities. Detailed descriptions from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) of each sand dune habitat found at Malahide Estuary are presented in Appendix IV.

The CMP surveyed a single sub-site within Malahide Estuary SAC. See Appendix III for map:

- *Malahide Island (Appendix IV for site report)*

Malahide Island is a sand spit overlying a gravel ridge and extends 3km southwards in to Malahide estuary from the rocky promontory of Portrane. The Corballis Golf Course and the Island Golf Course occupy most of the sand dune system. These golf courses have been excluded from the SAC.

4.1 Overall objectives

The overall objective for 'Shifting dunes along the shoreline with Ammophila arenaria' in Malahide Estuary SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation' in Malahide Estuary SAC is to 'restore the favourable conservation condition'.

These objectives are based on an assessment of the current condition of each habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Area (b) Range and (c) Structure and Functions.

4.2 Area

4.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. A baseline habitat map was produced for the sand dune habitats at each sub-site in Malahide Estuary SAC during the Coastal Monitoring Project (CMP) (Ryle et al., 2009). The map for Malahide Island is included with the individual site report in Appendix IV.

The total areas of each sand dune habitat within the SAC as estimated by Ryle et al. (2009) are presented in the second column of the following table. These figures were subsequently checked and adjusted to take into account some overlapping polygons and mapping errors. The adjusted figures are presented in the final column

Habitat	Total area (ha) of habitat from CMP	Total area (ha) of habitat within SAC boundary
Shifting dunes along the shoreline with *Ammophila arenaria*	1.804	1.80
Fixed coastal dunes with herbaceous vegetation	21.430	21.42
Total	**23.234**	**23.22**

The general target for this attribute in the case of each habitat is that the area should be stable, or increasing. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is always assessed subject to natural processes, including erosion and succession

4.3 Range

4.3.1 Habitat distribution

The fixed dune habitat flanks the eastern and southern edge of Malahide Island while the mobile dunes occur as a thin band along the northeastern edge of the spit (Ryle et al., 2009).

The distribution of sand dune habitats as mapped by Ryle et al. (2009) is presented in Appendix II.

There should be no decline or change in the distribution of these sand dune habitats, unless it is the result of natural processes, including erosion, and succession.

4.4 Structure and Functions

The location, character and dynamic behaviour of sand dunes are governed by a combination of geographic, climatic, edaphic and anthropogenic factors. Sand dunes are highly complex, dynamic

systems, where the habitats occur in a complex and constantly evolving and changing mosaic. They function as systems in terms of geomorphology and hydrology and maintaining the favourable conservation condition of the habitats present depends on allowing these processes to continue unhindered. Maintaining the favourable conservation condition of all of the sand dune habitats in Malahide Estuary SAC in terms of structure and functions depends on a range of attributes for which targets have been set as outlined below.

4.4.1 Physical structure: functionality and sediment supply

Coastlines naturally undergo a constant cycle of erosion and accretion. There are two main causes of erosion: (a) those resulting from natural causes and (b) those resulting from human interference. Natural causes include the continual tendency towards a state of equilibrium between coasts and environmental forces, climatic change (particularly an increase in the frequency of storms or a shift in storm tracks), relative sea level rise and natural changes in the sediment supply. Human interference is usually associated with changes in the sediment budget, either directly, through the removal of beach or inshore sediment, or indirectly, by impeding or altering sediment movement. It is important to recognise that the process of coastal erosion is part of a natural tendency towards equilibrium. Natural shorelines attempt to absorb the energy entering the coastal zone by redistributing sediment.

Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Sediment supply is especially important in the embryonic dunes and mobile dunes, as well as the strandline communities where accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to develop, increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or overstabilisation of dunes.

The mobile dunes at Malahide Island are undergoing some erosion along the north and eastern edge of the site as well as some accretion to the south. Erosion due to overuse of the dunes is affecting all areas of the mobile and embryonic dunes at the site. Coastal protection works have been installed on the seaward side of the spit in the form of railway sleepers and chestnut paling. The installation of concrete filled plastic barrels and planting of sea buckthorn (Hippophae rhamnoides) are measures that have been used for coastal protection by the golf course (Ryle et al., 2009).

The target for this attribute is to maintain the natural circulation of sediment and organic matter throughout the entire dune system, without any physical obstructions.

4.4.2 Vegetation structure: zonation

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation; therefore, it is important that the transitional communities are also conserved, including those to the saltmarsh communities.

As well as transitions between sand dune habitats, the fixed dune habitat at Malahide Island is closely associated with saltmarsh habitat that has recently developed over the gravel material at the southern tip of the spit. This is one of the more intact sand dune-saltmarsh complexes on the northeastern coastline (Ryle et al., 2009).

The target is to maintain the range of coastal habitats, including transitional zones, subject to natural processes, including erosion and succession.

4.4.3 Vegetation structure: bare ground

*This target only applies to fixed dunes. It does not apply to the other habitats present where high levels of bare sand are a natural component of the habitat (*e.g. mobile dunes). In the fixed areas some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions including invertebrates, helping to increase biodiversity.*

The target is to achieve up to 10% bare sand. This target is assessed subject to natural processes.

4.4.4 Vegetation structure: vegetation height

This attribute applies to the fixed dunes, where a varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of moderate levels of grazing on dunes have been well documented (Gaynor, 2008). Moderate grazing regimes lead to the development of a species-rich vegetation cover. The animals increase biodiversity by creating micro-habitats through their grazing, dunging and trampling activities. Grazing slows down successional processes and in some cases reverses them, helping to achieve a diverse and dynamic landscape. The effects of trampling assist the internal movement of sand through the development of small-scale blowouts, while dunging can eutrophicate those dune habitats whose nutrient-poor status is crucial for the survival of certain vegetation types. Many species, from plants to invertebrates, benefit immensely from the open and diverse system created by a sustainable grazing regime. Many dune species are small in size and have relatively low competitive ability.

Consequently, the maintenance of high species diversity on a dune system is dependent on the existence of some control to limit the growth of rank coarse vegetation (Gaynor, 2008).

Grazing by livestock is absent from Malahide Island (Ryle et al., 2009). The target for this attribute is to maintain structural variation within the sward.

4.4.5 Vegetation composition: plant health of dune grasses

This attribute applies to mobile dunes, where blown sand is a natural feature. The health of the dune grasses (particularly Ammophila arenaria and Elytrigia juncea) is assessed by the plant parts above the ground (they should be green) and the presence of flowering heads. This gives a clear indication of the status of the supply of blown sand, which is required for these species to thrive.

The target for this attribute is that more than 95% of the dune grasses should be healthy.

4.4.6 Vegetation composition: typical species & sub-communities

Species diversity and plant distribution in dunes is strongly controlled by a range of factors, including mobility of the substrate, grazing intensities, moisture gradients, nutrient gradients and human disturbance. In the younger, more mobile dunes, marram (Ammophila arenaria) is common, while groundsel (Senecio vulgaris), sea rocket (Cakile maritima) and dandelion (Taraxacum sp.) are also present. The fixed, more stable dune vegetation includes lady's bedstraw (Galium verum), common birdsfoot trefoil (Lotus corniculatus), wild thyme (Thymus praecox), kidney vetch (Anthyllis vulneraria), wild pansy (Viola tricolor) and biting stonecrop (Sedum acre).

The typical species of the mobile dunes at Malahide Island include marram (Ammophila arenaria), Lyme-grass (Leymus arenarius) and sea spurge (Euphorbia paralias). Sea holly (Eryngium maritimum) occurs occasionally throughout the mobile dunes (Ryle et al., 2009).

Typical species recorded in the fixed dunes at Malahide Island include red fescue (Festuca rubra), birdsfoot-trefoil (Lotus corniculatus), lady's bedstraw (Galium verum), wild thyme (Thymus polytrichus) and wild pansy (Viola tricolor sub sp. cutisii). Species typical of calcareous dunes such as eyebright (Euphrasia officinalis) and biting stonecrop (Sedum acre) were also recorded at the site by the CMP. The fixed dunes also contain a high cover of marram (Ammophilla arenaria) attributed to the lack of grazing. The Irish Red Data book and Flora Protection Order (1999) species, hairy violet (Viola hirta) occurs at the site (Ryle et al., 2009).

The target for this attribute is to maintain a typical flora for the particular sand dune habitat.

4.4.7 Vegetation composition: negative indicator species

Negative indicators include non-native species (e.g. Hippophae rhamnoides), species indicative of changes in nutrient status (e.g. Urtica dioica) and species not considered characteristic of the habitat. Sea-buckthorn (Hippophae rhamnoides) should be absent or effectively controlled.

The main invasive species identified in Gaynor (2008) were bracken (Pteridium aquilinum) and sea buckthorn (Hippophae rhamnoides). The invasion of non-native species compromises the typical plant community structure. Bracken (Pteridium aquilinum) is becoming increasingly dominant, particularly

where sites have been abandoned or where grazing levels have been significantly reduced. The vegetation retains many elements of the original vegetation cover, but there is a reduction in biodiversity. As the canopy becomes taller and ranker, many of the low-growing species disappear. In this case, the vegetation is treated as a sub-community of the original community that was invaded. This is always the case unless the original vegetation cover has been completely destroyed, as can happen with H. rhamnoides, which can form dense impenetrable thickets.

Sea buckthorn (Hippophae rhamnoides) has been planted at the western edge of the golf course and is extending into the fixed dune. Other negative indicators recorded by the CMP in the fixed dune include creeping thistle (Cirsium arvense), bracken (Pteridium aquilinum), ragwort (Senecio jacobaea) and bramble (Rubus fruticosus). Creeping thistle (Cirsium arvense) also occurs within the mobile dune habitat at Malahide Island (Ryle et al., 2009).

The target is that negative indicators (including non-native species) should represent less than 5% of the vegetation cover.

4.4.8 Vegetation composition: scrub/trees

This attribute only applies to the fixed dunes. Scrub encroachment leads to reduction in dune biodiversity and needs to be controlled.

Within Malahide Estuary, the fixed dune area has been invaded by dog-rose (Rosa canina), privet (Ligustrum sp.) as well as single trees of turkey oak (Quercus cerris) (Ryle et al., 2009)

The target for this attribute therefore is that the cover of scrub and tree species should be under control or make up less than 5% of the vegetation cover.'

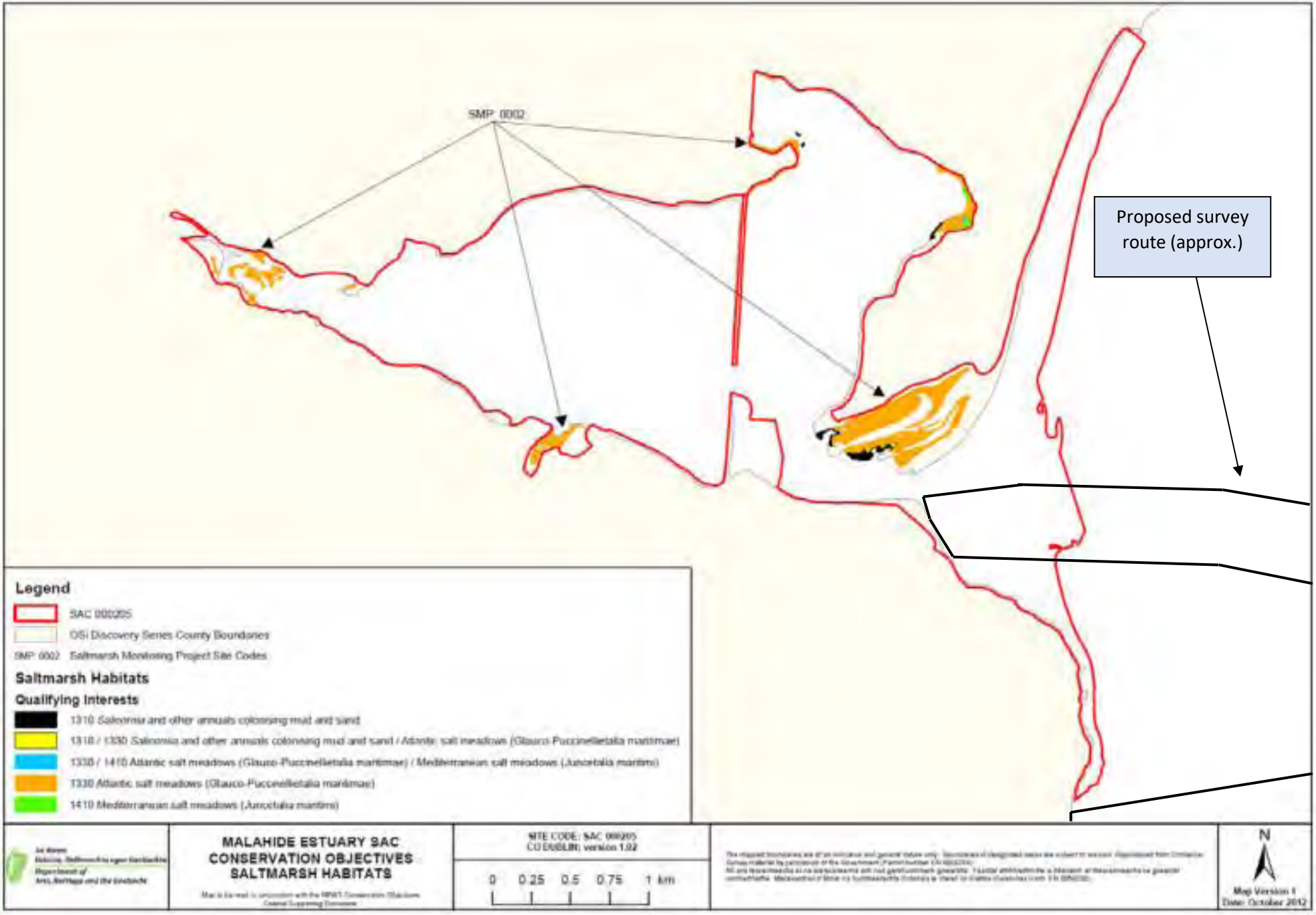


Figure 40. *Distribution map of saltmarsh habitats within Malahide Estuary SAC*

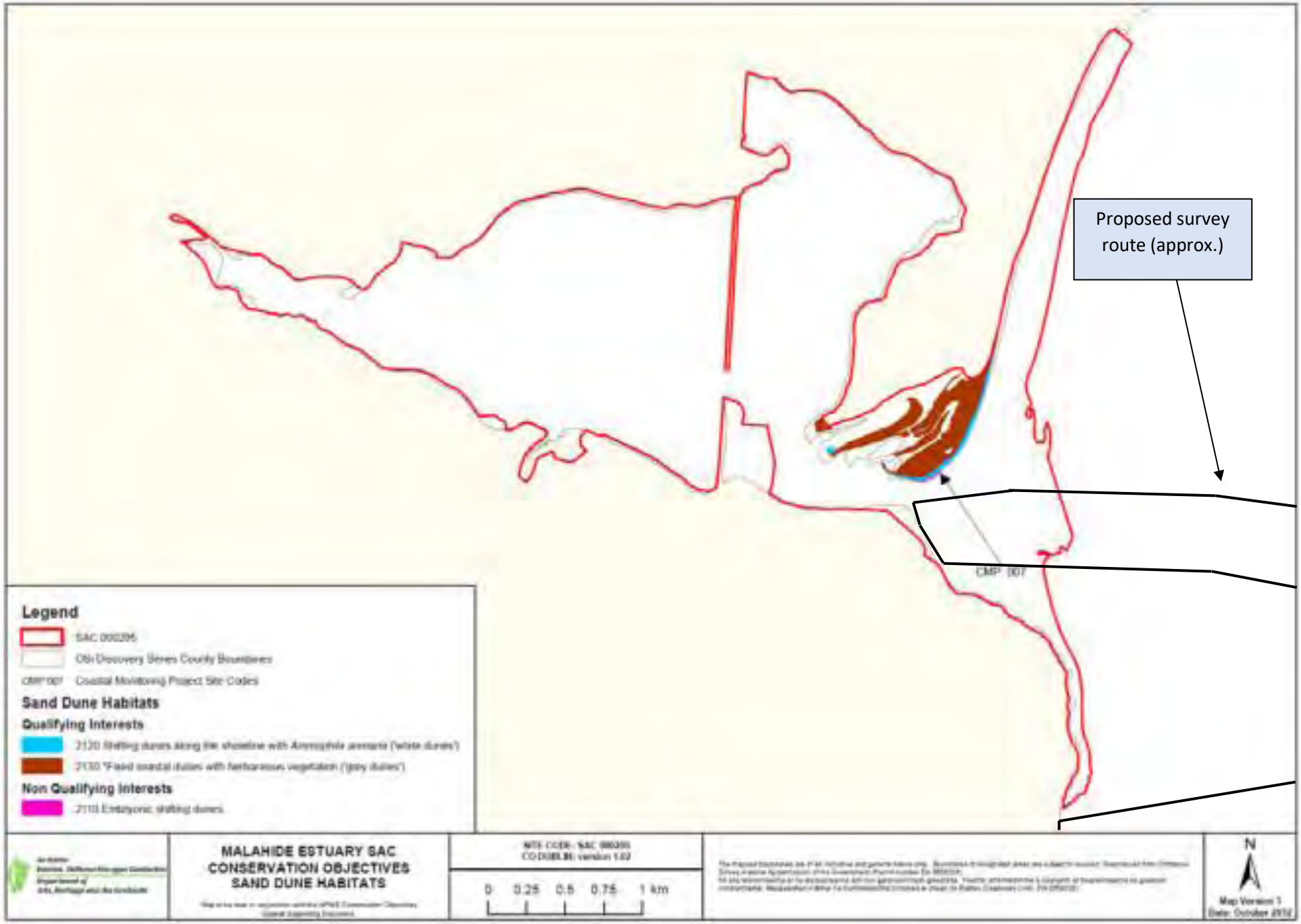


Figure 41. *Distribution map of sand dune habitats within Malahide Estuary SAC*

5.1.1 Conservation Objectives of Malahide Estuary SAC 000205 (All Habitats and Species)

The qualifying interests, their attributes, targets and the potential impact of the proposed fibre-optic cable survey on each of the features of interest of Malahide Estuary SAC are seen in Table 15.

Table 15. The site-specific Conservation Objectives, overall status of species and habitats and the potential impact of the proposed works on the features of interest and conservation objectives of Malahide Estuary SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
[1140] Mudflats and sandflats not covered by seawater at low tide	**Inadequate**	**To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Malahide Estuary SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area.* The permanent habitat area is stable or increasing, subject to natural processes. *Community extent.* Maintain the extent of the *Zostera*-dominated community and the *Mytilus edulis*-dominated community complex, subject to natural processes. *Community Structure: Zostera density:* Conserve the high quality of the *Zostera* -dominated community, subject to natural processes. *Community Structure: Mytilus edulis density:* Conserve the high quality of the *Mytilus edulis*-dominated community, subject to natural processes. *Community Distribution.* Conserve the following community types in a natural condition: Fine sand with oligochaetes, amphipods, bivalves and polychaetes community complex; Estuarine sandy mud with Chironomidae and *Hediste diversicolor* community complex; and Sand to muddy sand with *Peringia ulvae, Tubificoides benedii* and *Cerastoderma edule* community complex. **Potential Effect** The proposed cable survey route on Malahide Beach is within this habitat (Figure 40). The proposed survey works involve Landfall Site Investigations, which will be undertaken to establish the depth and nature of the sediment. The focus of the site investigations will be on the upper layers of sediment to assess the feasibility of cable burial and installation techniques. The following may be undertaken at the landfall: • Bar probes on the intertidal at 10m spacing (approx. 8 to 10 at each landfall). • Bar probes from the Low Water Line to the 3m water depth contour at 30m spacing. (approx. 8 to 10 at each landfall) • 3 Trial Pits on the beach (target depth 2.5m). The bar probes on the intertidal are manually driven to a depth of 2 metres simply to prove the depth of upper layers of sand, gravel or soft material.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		The Trial Pits will be positioned at approximately 30 to 50m centres starting seaward of the High Water Mark. The Trial Pits will be excavated, logged, photographed and backfilled in a single tidal cycle. The trial pits will be backfilled with the original excavated materials in the sequence in which they are excavated. Access to the beach will be via an existing unsurfaced vehicular track across the amenity grassland and dune habitat. The works on the beach will be on one single tide and access across the dune by machinery will be one single return journey. During the Altemar survey *Arenicola marina* appeared frequent on the lower shore during on site survey. In the absence of mitigation, the proposed survey works could result in the temporary disturbance within the dune habitat due to access and within this mudflat and sandflat habitat due to access and the digging of trial pits and the utilisation of bar probes. It would be seen that any impacts would be short-term and would not significantly impact the community within the medium or long term. Out of an abundance of caution, mitigation measures are required to minimise potential minor adverse impacts.
[1310] *Salicornia* and other annuals colonising mud and sand	**Favourable**	**To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Malahide Estuary SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area:* Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Malahide Estuary- 1.93ha. *Habitat distribution:* No decline, or change in habitat distribution, subject to natural processes. *Physical structure: sediment supply:* Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions. *Physical structure: creeks and pans*: Maintain creek and pan structure, subject to natural processes, including erosion and succession. *Physical structure: flooding regime:* Maintain natural tidal regime. *Vegetation structure: zonation:* Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. *Vegetation structure: vegetation height.* Maintain structural variation within sward. *Vegetation structure: vegetation cover.* Maintain more than 90% of area outside creeks vegetated.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		Vegetation composition: typical species and subcommunities: Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). *Vegetation structure: negative indicator species – Spartina anglica.* No significant expansion of common cordgrass (Spartina anglica). No new sites for this species and an annual spread of less than 1% where it is already known to occur. **Potential Effect** The cable survey route is intertidal & subtidal and not within or proximal to *Salicornia* and other annuals colonising mud and sand. However, out of an abundance of caution there is potential for pollution and mitigation measures are required.
[1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	**Inadequate**	To restore the favourable conservation condition of Atlantic salt meadows (*GlaucoPuccinellietalia maritimae*) in Malahide Estuary SAC, which is defined by the following list of attributes and targets**:** *(Attribute.* Target) *Habitat area:* Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Malahide Estuary - 25.33ha. *Habitat distribution:* No decline or change in habitat distribution, subject to natural processes. *Physical structure: sediment supply:* Maintain natural circulation of sediments and organic matter, without any physical obstructions. *Physical structure: creeks and pans*: Allow creek and pan structure to develop, subject to natural processes, including erosion and succession. *Physical structure: flooding regime:* Maintain natural tidal regime. *Vegetation structure: zonation:* Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. *Vegetation structure: vegetation height.* Maintain structural variation within sward. *Vegetation structure: vegetation cover.* Maintain more than 90% area outside creeks vegetated. *Vegetation composition: typical species and subcommunities:* Maintain range of subcommunities with typical species listed in SMP (McCorry and Ryle, 2009). *Vegetation structure: negative indicator species – Spartina anglica.* No significant expansion of common cordgrass (Spartina anglica), with an annual spread of less than 1% where it is known to occur.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		Potential Effect The cable survey route is intertidal & subtidal and not within or proximal to Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). No significant impacts are foreseen on Atlantic salt meadows (Glauco-Puccinellietalia maritimae). However, out of an abundance of caution there is potential for pollution and mitigation measures are required.
[1410] Mediterranean salt meadows (*Juncetalia maritimi*)	**Inadequate**	**To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Malahide Estuary SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area:* Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Malahide Estuary - 0.64ha. *Habitat distribution:* No decline, subject to natural processes. *Physical structure: sediment supply:* Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions. *Physical structure: creeks and pans*: Maintain creek and pan structure, subject to natural processes, including erosion and succession. *Physical structure: flooding regime:* Maintain natural tidal regime. *Vegetation structure: zonation:* Maintain range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession. *Vegetation structure: vegetation height.* Maintain structural variation in the sward. *Vegetation structure: vegetation cover.* Maintain more than 90% of area outside creeks vegetated. *Vegetation composition: typical species and subcommunities:* Maintain range of subcommunities with characteristic species listed in SMP (McCorry and Ryle, 2009). *Vegetation structure: negative indicator species – Spartina anglica.* No significant expansion of common cordgrass (Spartina anglica), with an annual spread of less than 1% where it is already known to occur. **Potential Effect** The cable survey route is intertidal & subtidal and not within or proximal to Mediterranean salt meadows (*Juncetalia maritimi*). No significant impacts are foreseen on Mediterranean salt meadows

Annex Species/Habitats-Qualifying Interest	Overall Conservation Status	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		(*Juncetalia maritimi*). However, out of an abundance of caution there is potential for pollution and mitigation measures are required.
[2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	**Inadequate**	**To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') in Malahide Estuary SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area:* Area stable or increasing, subject to natural processes including erosion and succession. Total area mapped: 1.80ha. *Habitat distribution:* No decline, or change in habitat distribution, subject to natural processes. *Physical structure: functionality and sediment supply:* Maintain the natural circulation of sediment and organic matter, without any physical obstructions. *Vegetation structure: zonation:* Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. *Vegetation composition: plant health of dune grasses:* 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). *Vegetation composition: typical species and subcommunities:* Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria*) and/or lymegrass (*Leymus arenarius*). *Vegetation composition: negative indicator species:* Negative indicator species (including non-natives) to represent less than 5% cover. **Potential Impact** The cable survey route is intertidal & subtidal and not within the officially mapped Shifting dunes along the shoreline with *Ammophila arenarya* (white dunes) habitat within the SAC that forms the area of official habitat. Nonetheless, the access crosses a small section of Shifting dunes along the shoreline with Ammophila arenaria (white dunes) dune habitat within the SAC. Access to the beach will be via an existing unsurfaced vehicular track across the amenity grassland and dune habitat. The works on the beach will be on one single tide and access across the dune by machinery will be one single return journey. No significant impacts are foreseen on Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes). However, out of an

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		abundance of caution mitigation measures are required to protect the dune habitat.
[2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)	**Bad**	**To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in Malahide Estuary SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area.* Area stable or increasing, subject to natural processes including erosion and succession. Total area mapped: 21.42ha. *Habitat distribution.* No decline, or change in habitat distribution, subject to natural processes. *Physical structure: functionality and sediment supply:* Maintain the natural circulation of sediment and organic matter, without any physical obstructions. *Vegetation structure: zonation:* Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. *Vegetation structure: bare ground:* Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes. *Vegetation structure: sward height:* Maintain structural variation within sward. *Vegetation composition: typical species and subcommunities:* Maintain range of subcommunities with typical species listed in Ryle et al. (2009). *Vegetation composition: negative indicator species (including Hippophae rhamnoides):* Negative indicator species (including non-natives) to represent less than 5% cover. *Vegetation composition: scrub/trees:* No more than 5% cover or under control. **Potential Impact** The cable survey route is intertidal & subtidal and not within or proximal to Fixed coastal dunes with herbaceous vegetation (grey dunes). No significant impacts are foreseen on Fixed coastal dunes with herbaceous vegetation (grey dunes). However, out of an abundance of caution mitigation measures are required.

5.2 Rockabill to Dalkey Island SAC (Site code: 003000)

***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 15) 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 km^2, 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."

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 CV 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.

Cetaceans have been located in the vicinity of the proposed marine survey (IWDG sightings). Records of Cetacean activity in the vicinity of the survey route are seen in Figures 37-40. This includes numerous sightings of Harbour Porpoise in the vicinity of Howth Head.

The length of the preliminary cable route within the SAC is 9.4 km (5.2 nautical miles). As seen from Table 16 based on a vessel speed of 4kn the time within the SAC carrying out acoustic surveys would be approximately 234 minutes, excluding any groundtruthing time.

Table 16: Approximate length of time the proposed survey will be within the Rockabill to Dalkey SAC (excluding groundtruthing).

	Cable Route in SAC (Km)	Cable Route in SAC (nm)	Speed of Survey (kn)	No. of passes (>15m water depth)	Time in SAC (=5.2x3/4) hr	Time in SAC (min)
Survey	9.4	5.2	4	3	3.9	234

The potential impact of the proposed works on Harbour Porpoise is discussed further in the NIS (impacts section).

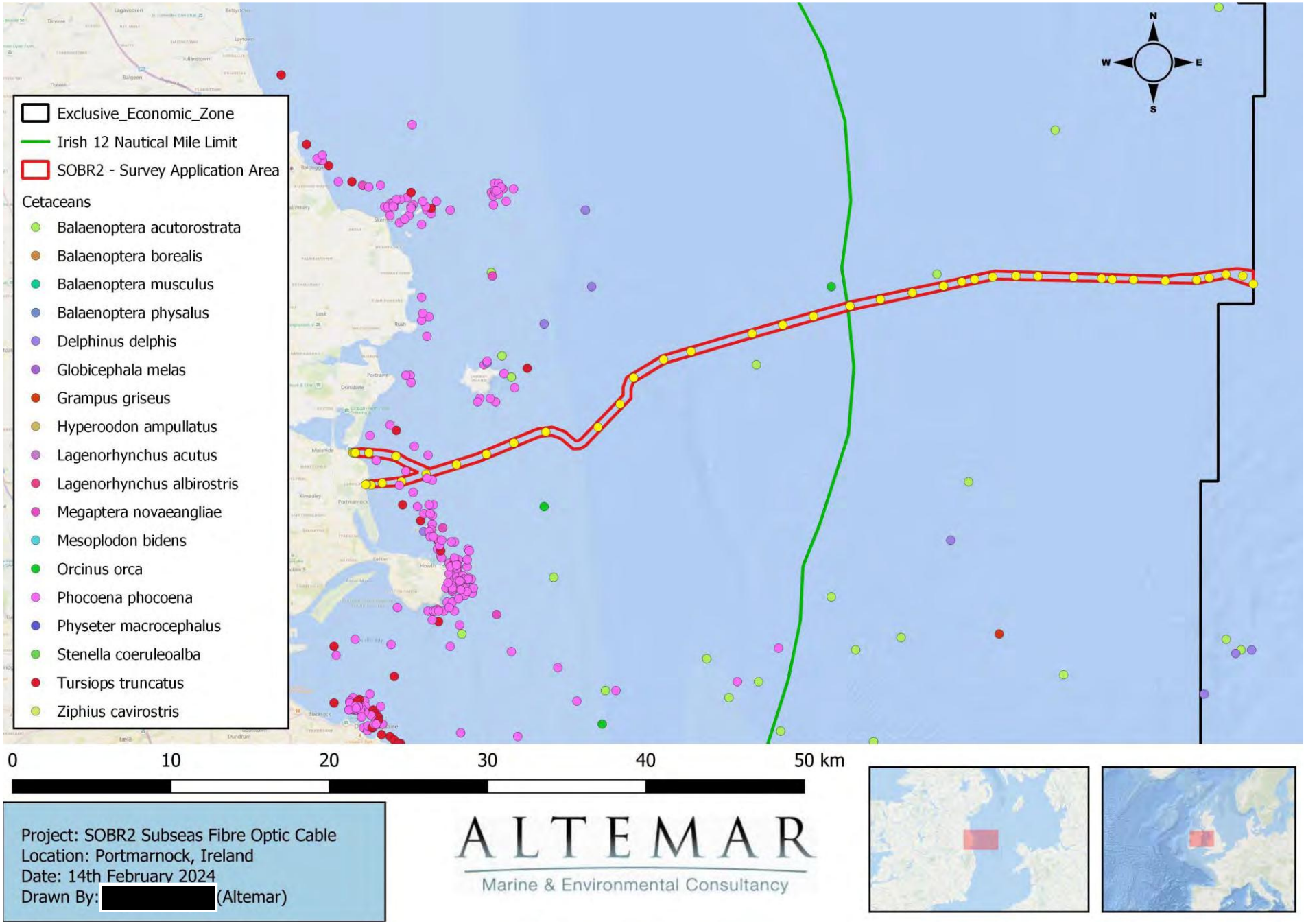


Figure 42. *Recorded Cetacean species sightings (Source NBDC sightings data) within the Irish EEZ*

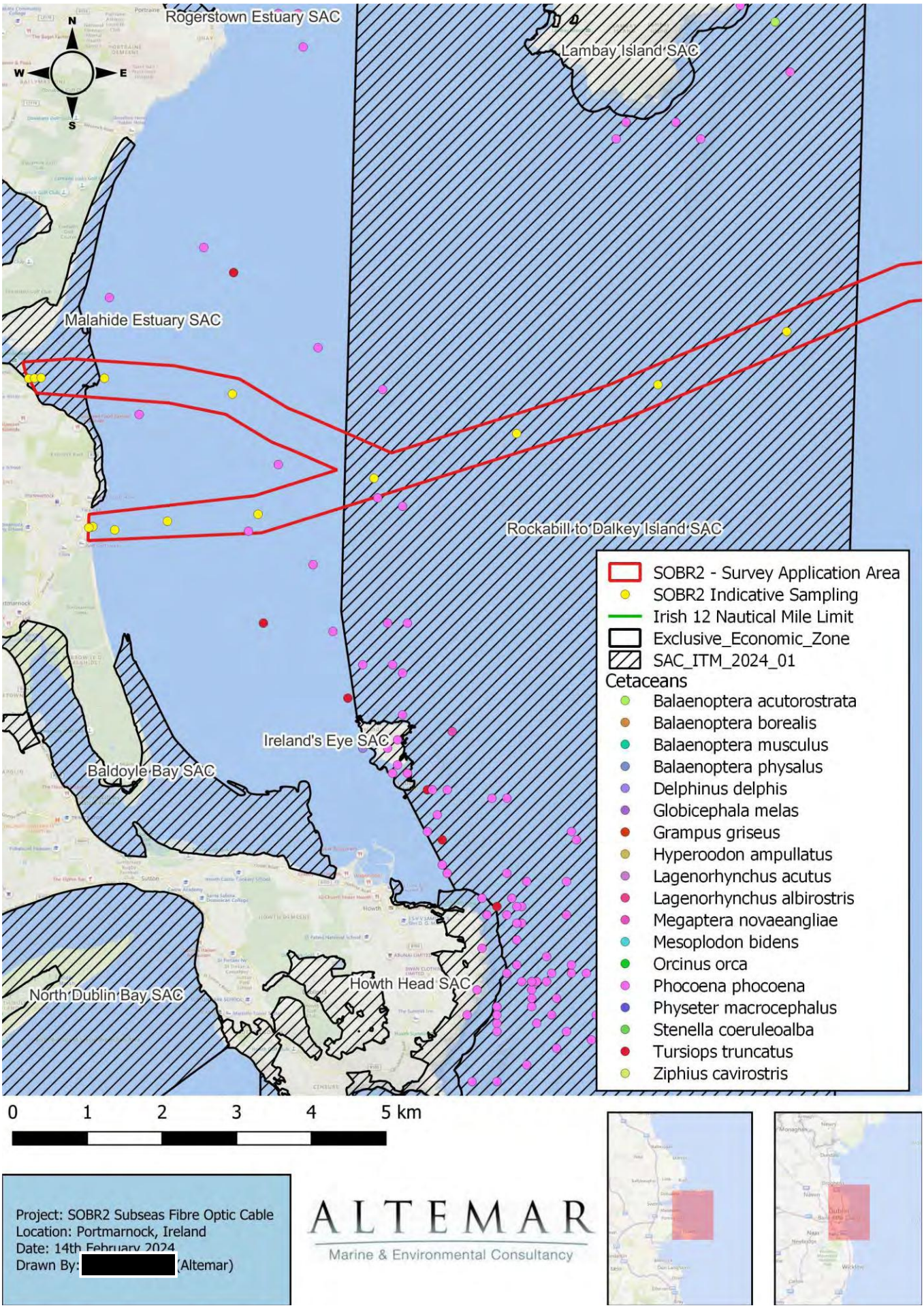


Figure 43. *Recorded Cetacean species sightings (Source NBDC sightings data) proximate to Lambay Island SAC & Rockabill to Dalkey Island SAC*

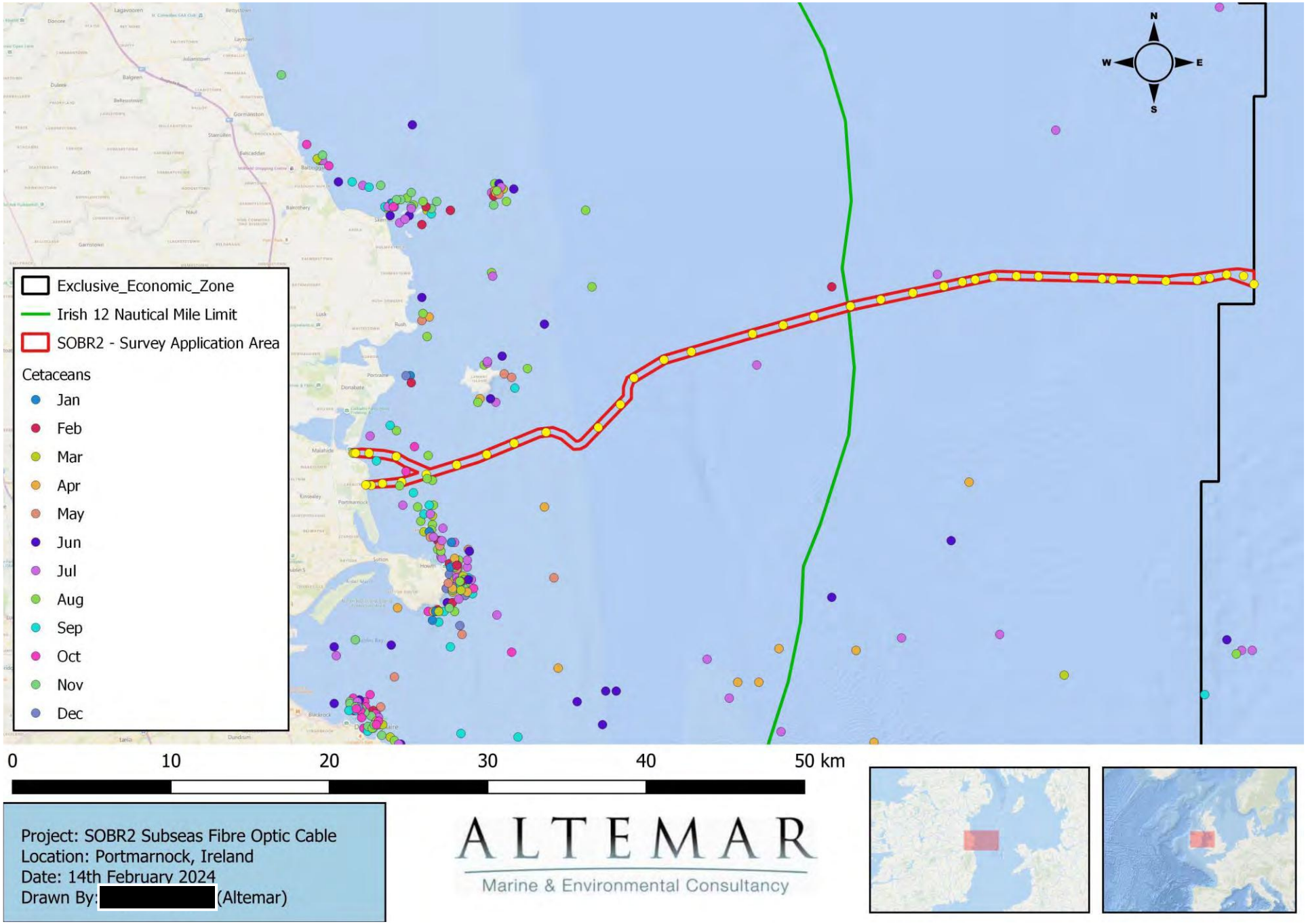


Figure 44. *Recorded Cetacean sightings (Source NBDC Sightings Data) recorded during the 12 months of the year within the Irish EEZ*

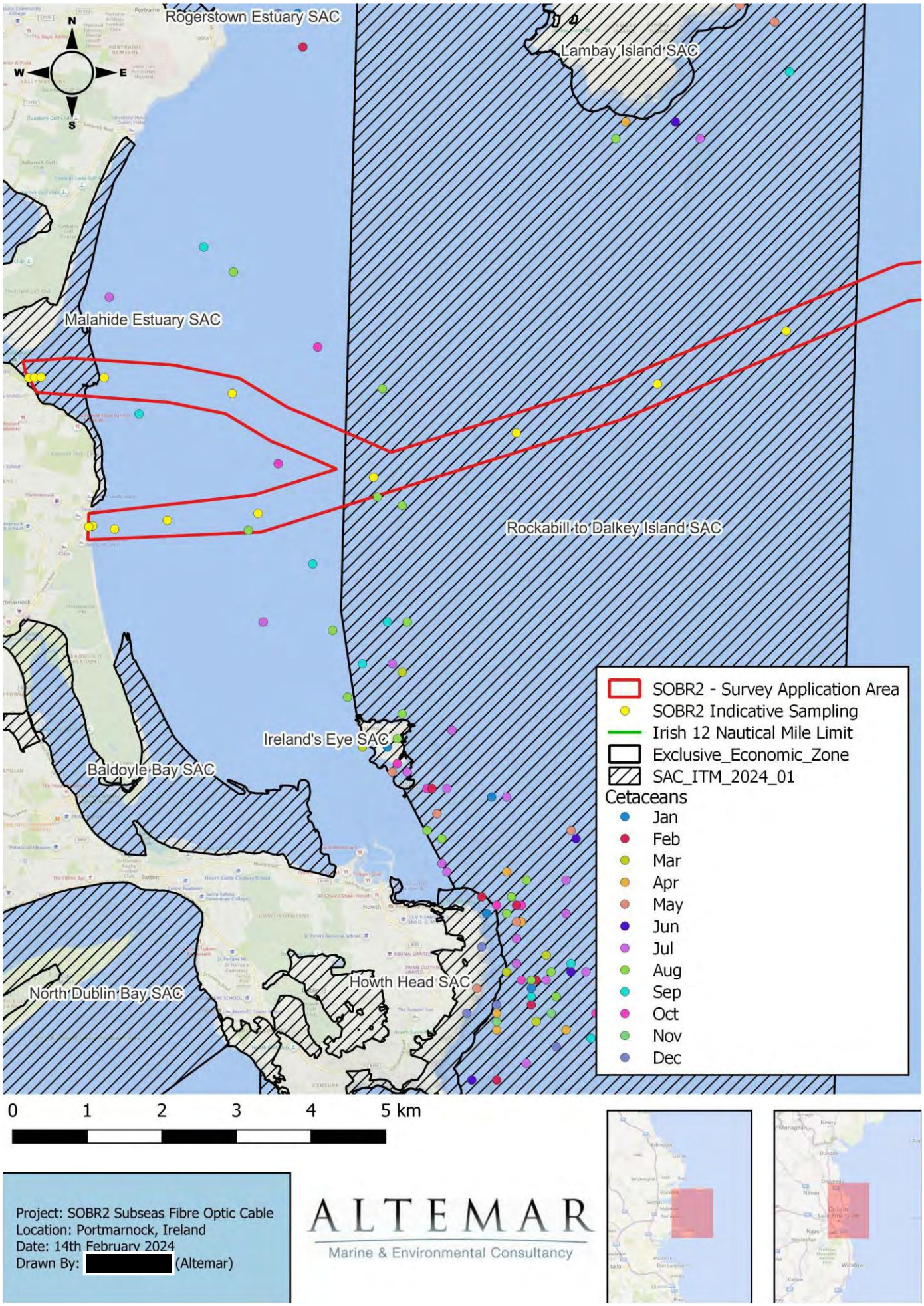


Figure 45. *Recorded Cetacean sightings (Source NBDC Sightings Data) recorded during the 12 months of the year proximate to Lambay Island SAC & Rockabill to Dalkey Island SAC*

Reef

This site is of conservation importance for reefs, listed on Annex I, and Harbour Porpoise, listed on Annex II, of the E.U. Habitats Directive.'

As outlined in the Conservation objectives supporting document – Marine Habitats and Species[9] (NPWS, 2013):

'***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 2). 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 (Table 2). 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	
Fucus serratus	*Fucus spiralis*
Fucus vesiculosus	*Semibalanus balanoides*
Ascophyllum nodosum	*Mytilus edulis*
Pelvetia canaliculata	*Patella vulgata*
Laminaria digitata	*Littorina* sp.

Table 2 Species associated with the Intertidal reef community complex.

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 2). 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) the anemone Alcyonium digitatum occurs in moderate abundances and Metridium senile also being recorded here (Table 3). 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.

[9] https://www.npws.ie/sites/default/files/publications/pdf/003000_Rockabill%20to%20Dalkey%20Island%20SAC%20Marine%20Supporting%20Doc_V1.pdf

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.

Species associated with the Subtidal reef community complex	
Alcyonium digitatum	*Echinus esculentus*
Asterias rubens	*Brongniartella byssoides*
Metridium senile	*Pomatoceros triqueter*
Necora puber	*Chartella papyracea*
Laminaria hyperborea	*Antedon bifida*
Nemertesia antennina	*Flustra foliacea*
Balanus crenatus	*Membranoptera alata*
Aplidium punctum	*Phycodrys rubens*
Hypoglossum hypoglossoides	*Delesseria sanguinea*
Sagartia elegans	

Table 3 Species associated with the Subtidal reef community complex.

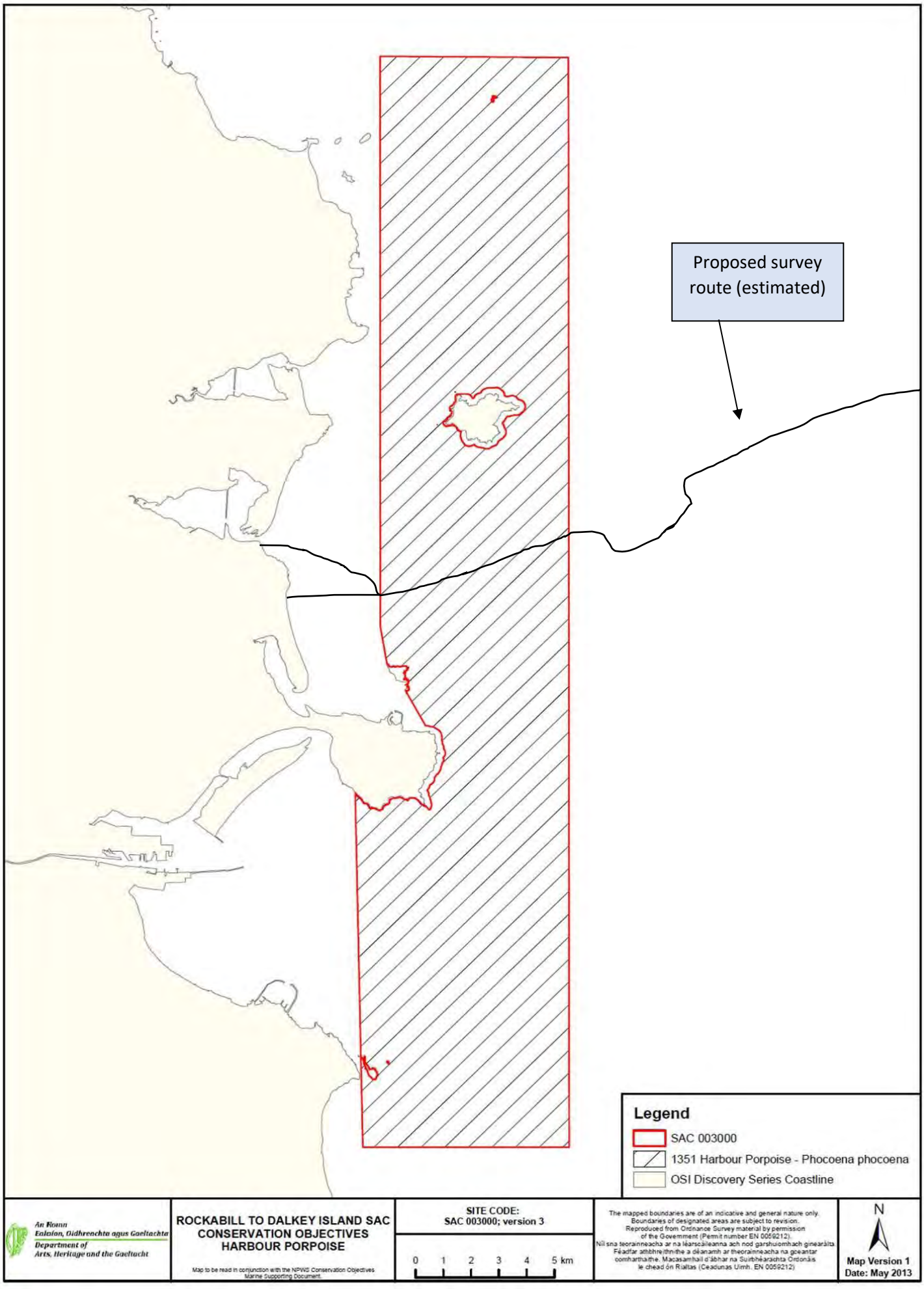


Figure 46. Harbour Porpoise – Rockabill to Dalkey Island SAC

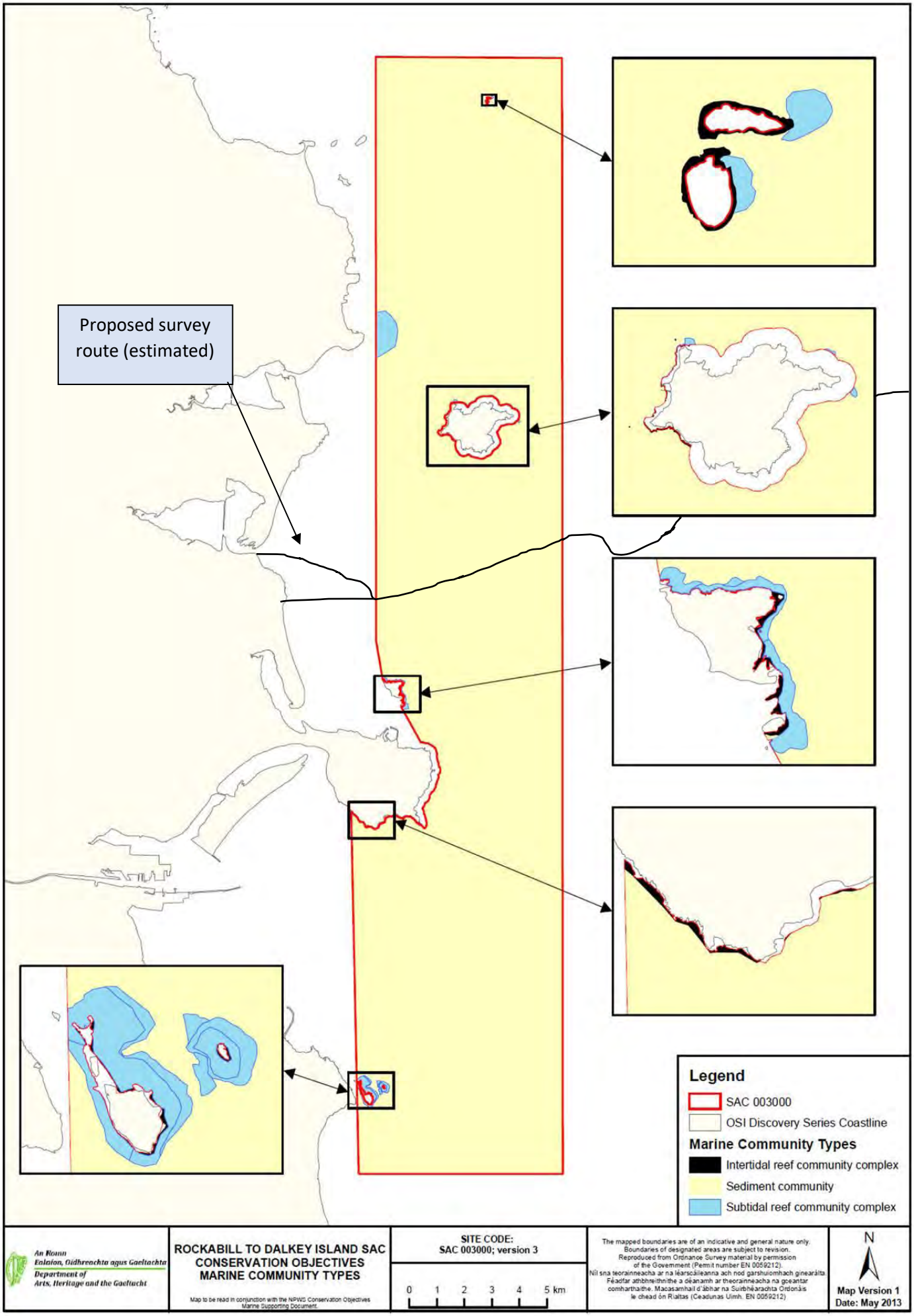


Figure 47. Marine Community Types – Rockabill to Dalkey Island SAC

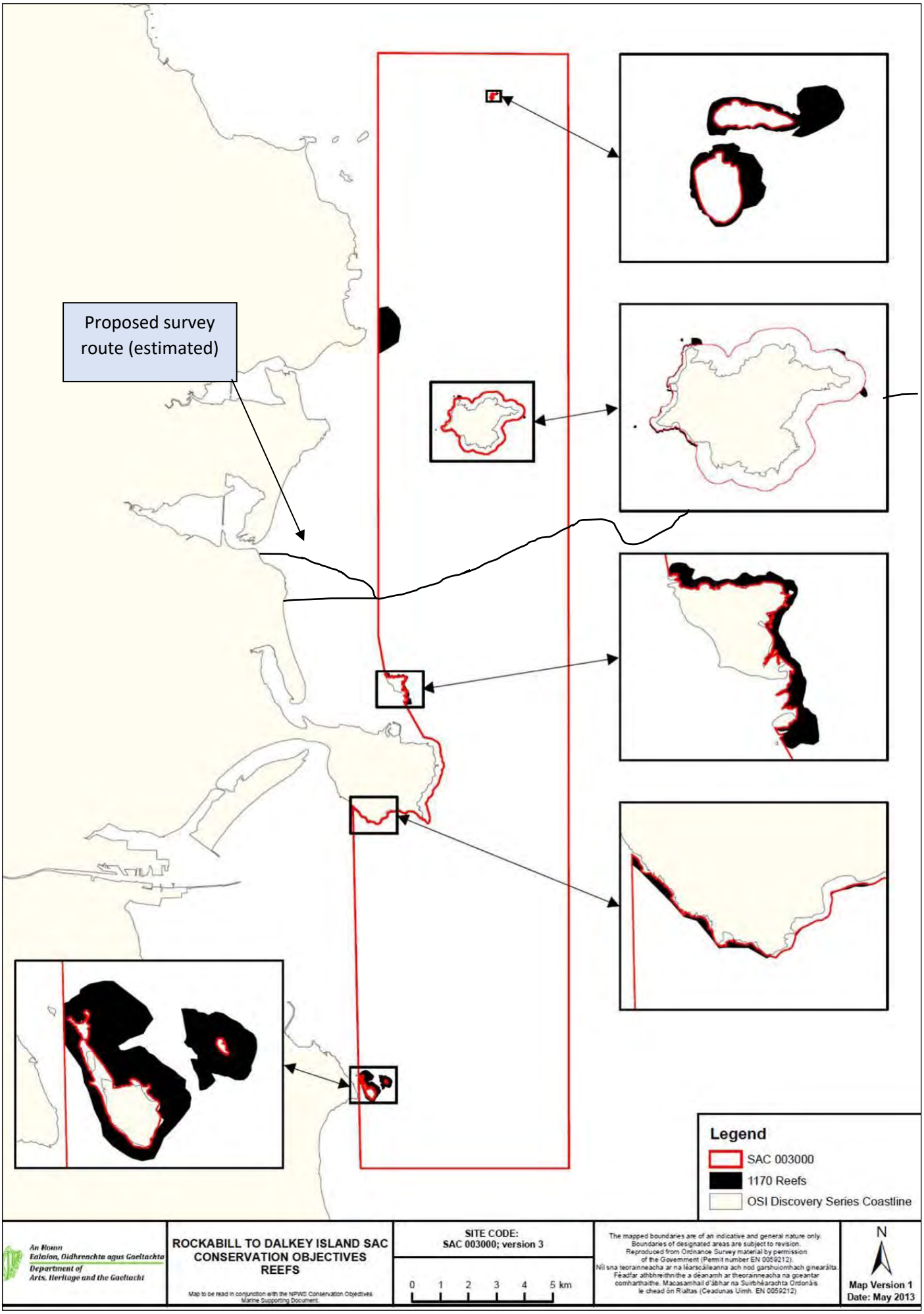


Figure 48. Reefs – Rockabill to Dalkey Island SAC

The qualifying interests, their attributes, targets and the potential impact of the proposed fibre-optic cable survey on each of the features of interest of Rockabill to Dalkey Island SAC are seen in Table 17.

Table 17. The site-specific Conservation Objectives, overall status of species and habitats and the potential impact of the proposed works on the features of interest and conservation objectives of Rockabill to Dalkey Island SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
[1170] Reefs	**Inadequate**	**To maintain the favourable conservation condition of Reefs in Rockabill to Dalkey Island SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area.* The permanent area is stable or increasing, subject to natural processes. *Habitat distribution.* Distribution is stable or increasing, subject to natural processes. *Community Structure:* Conserve the following community types in a natural condition: Intertidal reef community complex; and Subtidal reef community complex. **Potential Effect** The cable survey route has been provisionally assessed and optimised in consultation with Altemar through the use of existing multibeam and backscatter from the Irish National Seabed Survey is addition to examination of habitat maps, Admiralty Charts, existing buried cables, so select a route that allows for burial throughout the cable length. As a result, it is the intention to avoid areas of reef within the SAC. In addition, subtidal SI have been chosen to take place in areas of sediment and to avoid areas of reef where burial to 1.5m would not be possible. Further information is seen in Figures 47 & 48 in relation to the habitats within the SAC, as observed in the backscatter and sea substrate maps based on Informar data. No reef is located within the proposed sampling areas within the SAC. A small area of reef is noted between the potential landfall area at Malahide and the SAC . Reef habitat within the SAC will not be impacted by the proposed marine survey.
[1351] Harbour Porpoise (*Phocoena phocoena*)	**Favourable**	**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:** *(Attribute.* Target) *Access to suitable habitat:* Species range within the site should not be restricted by artificial barriers to site use. *Disturbance:* Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment and within the SAC. Detailed assessment is required in relation to the potential effects on Harbour Porpoise. Mitigation measures are required.

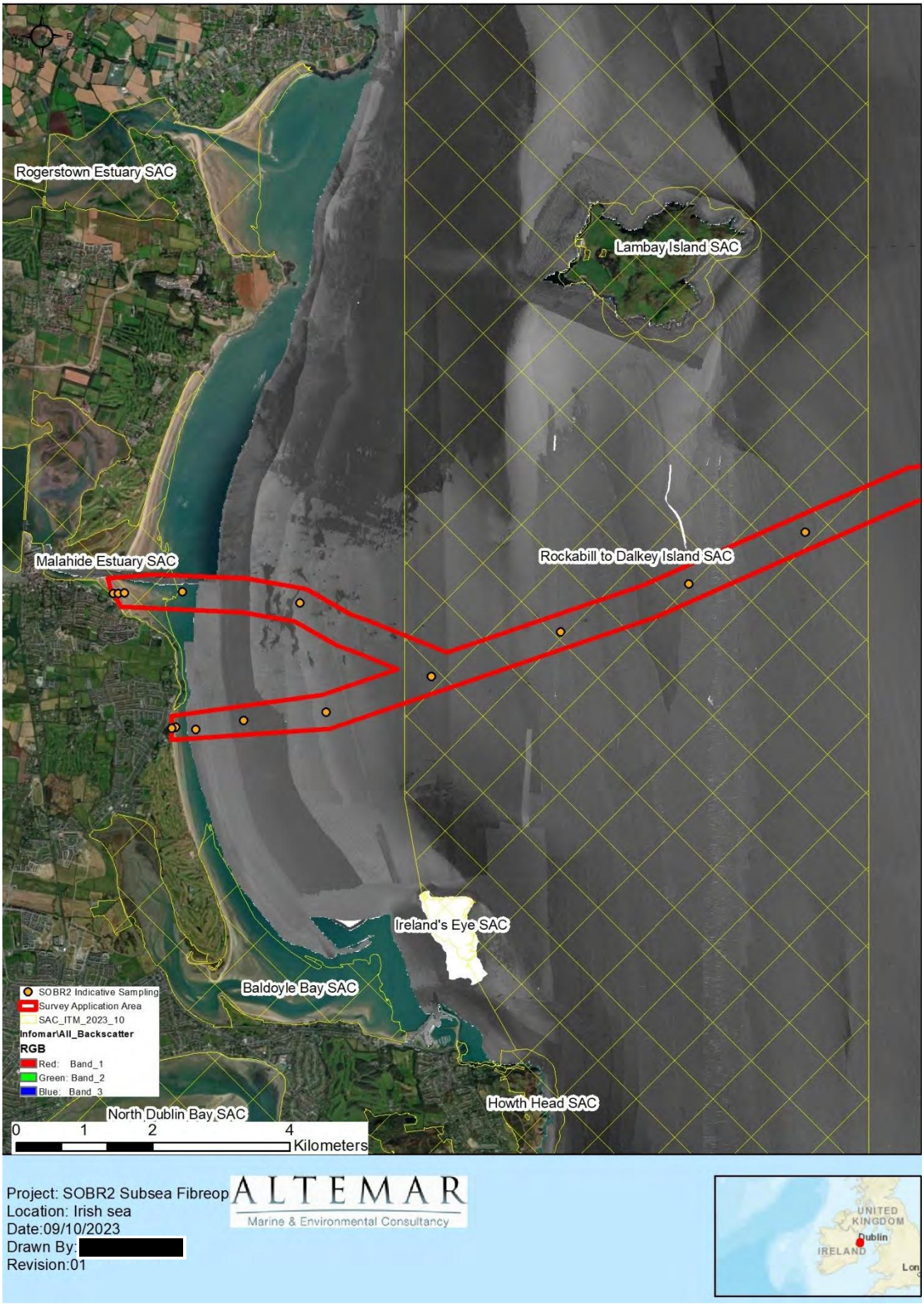


Figure 49. Proposed sampling within Rockabill to Dalkey SAC (Informar backscatter)

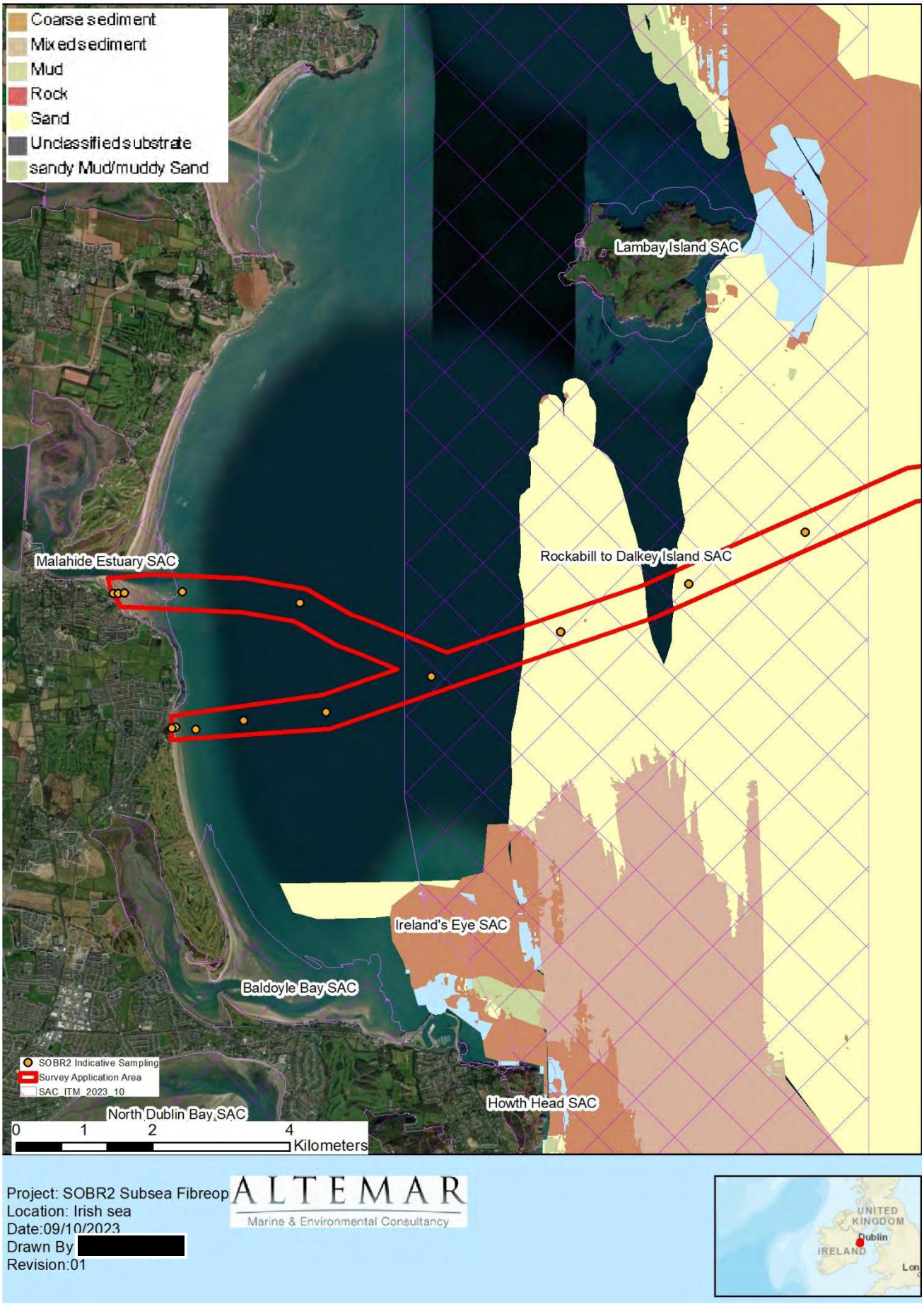


Figure 50. Proposed sampling within Rockabill to Dalkey SAC (Informar sea substrate)

5.3 Lambay Island SAC (Site code: 000204)

As outlined in the Lambay Island SAC Site Synopsis[10] (NPWS, version date 31.01.2014):

'*Lambay Island is a large (250 ha) inhabited island lying 4 km off Portrane on the north Co. Dublin coast. It is privately owned and is accessible by boat from Rogerstown Quay. The island rises to 127 m and is surrounded by steep cliffs on the north, east and south slopes. These cliffs contain good diversity in height, slope and aspect. The west shore is low-lying and the land slopes gently eastwards to the summit in the centre of the island. The underlying geology is varied, but is dominated by igneous rocks (of andesitic type) and ash. Also present are shales and limestones of Silurian origin, limestone conglomerates, and shales from the Old Red Sandstone era. The bedrock is exposed on the fringing cliffs and in rocky outcrops; elsewhere it is overlain by varying depths of glacial drift.*

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (= priority; numbers in brackets are Natura 2000 codes):*

[1170] Reefs [1230] Vegetated Sea Cliffs [1364] Grey Seal (Halichoerus grypus) [1365] Common (Harbour) Seal (Phoca vitulina)

Much of the western third of the island is intensively farmed (mostly pasture), and there are small areas of parkland, deciduous and coniferous woodland, buildings, walled gardens and the harbour. The rest of the island is a mixture of less intensively grazed land, rocky outcrops, patches of Bracken (Pteridium aquilinum) and Bramble (Rubus fruticosus agg.), and cliff slopes with typical maritime vegetation e.g. Thrift (Armeria maritima), Sea Campion (Silene vulgaris subsp. maritima), Rock Sea-spurrey (Spergularia rupicola) and Spring Squill (Scilla verna). Some sheltered gullies have small areas of scrub woodland dominated by Elder (Sambucus nigra).

Lambay Island is flanked by extensive areas of reef habitat. Typical species in the intertidal include Ascophyllum nodosum, Fucus spp., Laminaria spp., Dynamena pumila, Actinia equina, Littorina littorea, L. saxatilis, Patella vulgata and Semibalanus balanoides. In the subtidal reef the following algal species are frequently encountered - Palmaria palmata, Cystoclonium purpureum, Delesseria sanguinea, Membranoptera alata, Hypoglossum hypoglossoides, Chorda filum, Laminaria saccharina and Halidrys siliquosa. Invertebrate species commonly recorded include the typical shallow reef species Obelia geniculata, Alcyonium digitatum, Caryophyllia smithii, Pomatoceros triqueter, Helcion pellucidum, Balanus crenatus, Echinus esculentus and Asterias rubens.

Lambay supports the principal breeding colony of Grey Seal on the east coast of Ireland, numbering 196-252 seals, across all ages. It also contains regionally significant numbers of Common Seal, of which up to 47 individuals have been counted at the site. Grey Seals and Common Seals occur year-round and the island's intertidal shorelines, coves and caves are used by resting and moulting seals.

A herd of Fallow Deer (approx. 80) roams the higher parts of the island, and a small number of wallabies (approx. 10) survive in a feral state. This island may also hold the last Irish population of the Ship Rat, a species listed in the vertebrate Red Data Book.

Lambay Island is internationally important for its breeding seabirds. The most numerous species is the Guillemot, with almost 52,000 individuals on the cliffs. Razorbills (3,646 individuals), Kittiwakes (5,102 individuals), Herring Gulls (2,500 pairs), Cormorants (605 pairs), Shags (1,164 pairs), Puffins (235 pairs), and small numbers of Great and Lesser Black-backed Gulls also breed (all figures from 1995). Between 1991 and 1995 Fulmar numbers varied between 573-737 pairs. There is a small colony (<100 pairs) of the nocturnal Manx Shearwater on the island and up to 20 pairs of Common Terns have bred in recent years. A few Black Guillemots have been recorded on Lambay, but it is not clear if they breed. A pair of Peregrines are known to breed on the island.

In winter the most notable bird species on Lambay Island is the Greylag Goose with numbers peaking at 1,000, though in recent winters there has been a decline to 400- 700 individuals. There is also a small wintering flock of Barnacle Goose (up to 50), and recently Brent Goose (up to 100) have started to occur regularly. Small numbers of Great Northern Diver and Red-throated Diver are also present in winter.

An intensive survey of the natural history of Lambay Island was carried out in 1906 and published in the Irish Naturalist. A similar, comparative survey has been carried out in the early 1990s. With this background, Lambay

[10] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000204.pdf

Island is an excellent site for studies of marine biology, terrestrial fauna and flora, geology, geomorphology and ecology.

The island has been maintained as a wildlife sanctuary by its owners and no threats are envisaged should the present land use continue. Rodents may be causing some damage to the populations of burrow-nesting seabirds. Lambay Island has good examples of vegetated sea cliffs, a habitat listed on Annex I of the E.U. Habitats Directive, and these cliffs hold internationally important populations of seabirds. The site is also of conservation importance for the populations of Grey Seal and Common Seal, species listed on Annex II of this Directive, that it supports.'

As outlined in the Conservation objectives supporting document – Marine Habitats and Species[11] (NPWS, 2013):

'***INTERTIDAL REEF COMMUNITY COMPLEX***

This community complex is recorded extensively on all shores of the island with the exception of the sandy beach around the quay on the western shore (Figure 2).

The substrate here is that of boulders and cobbles with some bedrock outcrops in the northwest and southwest.

The species associated with this community are the gastropods Littorina littorea and Patella vulgata, the brown alga Ascophyllum nodosum, the red algae Lomentaria articulata, Vertebrata lanosa, Mastocarpus stellatus and species of the family Corallinaceae.

The brown alga Fucus serratus and Laminaria digitata, the red alga Chondrus crispus, the hydroid Dynamena pumila and the barnacle Semibalanus balanoides are also recorded from this community complex.

Species associated with the Intertidal reef community complex	
Littorina littorea	*Vertebrata lanosa*
Patella vulgata	*Mastocarpus stellatus*
Lomentaria articulata	*Ascophyllum nodosum*
Corallinaceae	

Table 1 Species associated with the Intertidal reef community complex.

LAMINARIA-DOMINATED COMMUNITY COMPLEX

This community complex occurs on the broad expanse of hard substrate in the north, east and southern shores of the island and in a narrow band on its western shore. It is recorded in water depths of between 0m and 20m. The exposure regime is that of exposed to moderately exposed reef.

The substrate of this community is primarily that of bedrock. In the northeast of the site large boulders, cobble and pebbles overly the bedrock. Vertical or near vertical faces are recorded throughout the community but are more prominent in shallower water (0m to 10m). In deeper water (ca. 20m) boulders and bedrock have a veneer of silt.

The species associated with this community are the kelp Laminaria hyperborea, the red algae Phycodrys rubens and Delesseria sanguinea, the barnacle Balanus crenatus, the echinoderm Asterias rubens, the crustacean Necora puber and the cnidarian Alcyonium digitatum. The density of Laminaria hyperborea exhibits a gradation with depth becoming less dense with increasing depth.

[11] https://www.npws.ie/sites/default/files/publications/pdf/000204_Lambay%20Island%20SAC%20Marine%20Supporting%20Doc_V1.pdf

The red algae Hypoglossum hypoglossoides and Membranoptera alata, Palmaria palmata and Corallinaceae, the bryozoan Membranipora membranacea and bryozoan crusts are also recorded from this community complex.

Species associated with the *Laminaria*-dominated community complex	
Laminaria hyperborea	*Delesseria sanguinea*
Phycodrys rubens	*Alcyonium digitatum*
Balanus crenatus	*Asterias rubens*
Necora puber	

Table 1 Species associated with the *Laminaria*-dominated community complex.

Annex II Marine mammals

HALICHOERUS GRYPUS (GREY SEAL)

This marine mammal species occurs in estuarine, coastal and offshore waters but also utilises a range of intertidal and terrestrial habitats for important life history functions such as breeding, moulting, resting and social activity. Its aquatic range for foraging and inter-site movement extends predominantly into continental shelf and slope waters. Grey seal occupies both aquatic and terrestrial habitats in Lambay Island SAC, including intertidal shorelines and skerries that become exposed during the tidal cycle. It is present at the site throughout the year during all aspects of its annual life cycle which includes breeding (August to December approx.), moulting (December to April approx.) and non-breeding, foraging and resting phases. In acknowledging the limited understanding of aquatic habitat use by the species within the site, it should be noted that all suitable aquatic habitat is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by grey seals.

Grey seals are vulnerable to disturbance during periods when time is spent ashore by individuals or groups of animals. This occurs immediately prior to and during the annual breeding season, which takes place predominantly during the months of August to December. Pups are born on land, usually on remote beaches and uninhabited islands or in sheltered caves. While there may be outliers in any year, specific established sites are used annually for breeding-associated behaviour by adult females, adult males, newborn and weaned pups. Such habitats are critical to the maintenance of the species within any site since pups are nursed there for a period of several weeks by the mother prior to weaning and abandonment. During this period, adult females also mate with adult males at, or adjacent to, breeding sites. In addition to delivering information on breeding dynamics, pup production (i.e. the number of pups born each year) can be measured or estimated in order to deliver an assessment of population size. However, the relationship between pup production and total population size is not well known. An estimated 56 pups were born in Lambay Island SAC in 2005. The corresponding minimum population estimate for the site numbered between 196 and 252 grey seals of all ages. Known and suitable habitats for the species in Lambay Island SAC during the breeding season are indicated in figure 3. Current breeding sites in Lambay Island SAC are broadly distributed around the island among its numerous gullies, caves, beaches, rock ledges and coves where access for seals to intertidal shorelines and the area above high water mark is possible.

Grey seal also occurs at the site during the annual moult (i.e. hair shedding and replacement), a protracted period during which individual animals spend significant periods of days or weeks on the shore. Moulting is considered an intensive, energetically-demanding process that all seals must undergo, incurring further vulnerability for individuals during this period. Terrestrial or intertidal sites where seals can be found ashore are known as haul-out sites. Moult locations may be preferentially selected by the species. Those currently described in Ireland are remote from human habitation and interference, being on uninhabited islands or remote beaches, with specific established sites used annually by moulting adult females, adult males and juveniles. In Ireland the moulting phase in the annual life cycle occurs predominantly during the months of December to April. A minimum estimate of 110 grey seals was recorded at this site during the moult season in 2007. Known moult haul-out locations at this site are indicated in figure 4, broadly consisting of numerous gullies, caves, rock ledges, beaches and coves where access for seals to intertidal shorelines and the area above high water mark is possible.

Grey seal is a successful aquatic predator that feeds on a wide variety of fish and cephalopod species. For individual grey seals of all ages, intervals between foraging trips in coastal or offshore waters are spent resting ashore at terrestrial or intertidal haul-out sites, or in the water. Resting locations selected by grey seals may

be more variable and dispersed than those used during the breeding or moulting seasons. While outliers may occur, there is nevertheless a tendency for recurrent selection by grey seal of particular habitats and sites for terrestrial/intertidal resting behaviour (e.g. low-lying rocks and skerries). Known and suitable habitats for resting by the species are indicated in figure 5. Current sites described in Lambay Island SAC broadly consist of its numerous gullies, caves, rock ledges, beaches and coves where access for seals to intertidal shorelines and the area above high water mark is possible.

PHOCA VITULINA (HARBOUR SEAL)

This marine mammal species occurs in estuarine, coastal and offshore waters but also utilises a range of intertidal and terrestrial habitats for important life history functions such as breeding, moulting, resting and social activity. Its aquatic range for foraging and inter-site movement extends into continental shelf waters. When hauling out ashore, harbour seals tend to prefer comparatively sheltered locations where exposure to wind, wave action and precipitation, for example, are minimised. Thus in Ireland the species is more commonly found ashore in sheltered bays, inlets and enclosed estuaries.

Harbour seals in Lambay Island SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle. The species is present at the site throughout the year during all aspects of its annual life cycle which includes breeding (May to July approx.), moulting (August to September approx.) and non-breeding foraging and resting phases. In particular, comparatively limited information is available from the last period in the annual cycle spanning the months of October to May. In acknowledging the limited understanding of aquatic habitat use by the species within the site it should be noted that all suitable aquatic habitat is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by harbour seals.

Harbour seals are vulnerable to disturbance during periods in which time is spent ashore, or in shallow waters, by individuals or groups of animals. This occurs immediately prior to and during the annual breeding season, which takes place predominantly during the months of May to July. Pups are born on land, usually on sheltered shorelines, islets or skerries and uninhabited islands removed from the risk of predation and human interference. While there may be outliers in any year, specific established locations tend to be used annually for breeding-associated behaviour by adult males, adult females and their newborn pups. Such habitats are critical to the maintenance of the species within any site. Pups are able to swim soon after birth and may be observed accompanying their mother close to shore in the early days or weeks of life. They are nursed for a period of several weeks by the mother prior to weaning and abandonment. During this period adult females mate with adult males, an activity that takes place in the water. Current information on breeding locations selected by harbour seals in Lambay Island SAC is comparatively limited. Known and suitable habitats for the species in Lambay Island SAC during the breeding season are indicated in figure 6.

The necessity for individual seals to undergo an annual moult (i.e. hair shedding and replacement), which generally results in seals spending more time ashore during a relatively discrete season, provides an opportunity to record the minimum number of harbour seals occurring in a given area (i.e. minimum population estimate). Moulting is considered an intensive, energetically-demanding process which incurs further vulnerability for individuals during this period. Terrestrial or intertidal locations where seals can be found ashore are known as haul-out sites. The harbour seal moult season takes place predominantly during the months of August to September. A total of 31 harbour seals were recorded ashore within Lambay Island SAC in August 2003 during a national aerial survey for the species, while maximum counts of 38-47 harbour seals were recorded more recently during the moult season. Suitable habitat for the species along with known moult haul-out locations in Lambay Island SAC are indicated in figure 7.

Harbour seal is a successful aquatic predator that feeds on a wide variety of fish, cephalopod and crustacean species. For individual harbour seals of all ages, intervals between foraging trips in coastal or offshore waters are spent resting ashore at terrestrial or intertidal haul-out sites, or in the water. Outside the breeding and moulting seasons (i.e. from October to April) the location and composition of haul-out groups and individual seals may be different to those normally observed during breeding or moulting. Current information on resting locations selected by harbour seals in Lambay Island SAC outside the moulting season is comparatively limited. Known and suitable habitats for resting by the species are indicated in figure 8.'

Further, this document outlines the following conservation objectives and targets for Lambay Island SAC:

'***Objective: To maintain the favourable conservation condition of Reefs in Lambay Island SAC, which is defined by the following list of attributes and targets:***

Target 1 *- The permanent area is stable or increasing, subject to natural processes.*

- The area of this habitat represents the minimum estimated area of reef at this site and underestimates the actual area due to the many areas of sheer and steeply sloping rock within the reef habitat.
- This target refers to activities or operations that propose to permanently remove habitat from the site, thereby reducing the permanent amount of habitat area. It does not refer to long or short term disturbance of the biology of a site.
- Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

Target 2 *- The distribution of reefs is stable or increasing, subject to natural processes.*

- The likely distribution of reef habitat in this SAC is indicated in figure 1.
- This target refers to activities or operations that propose to permanently remove reef habitat, thus reducing the range over which this habitat occurs within the site. It does not refer to long or short term disturbance of the biology of reef habitats.
- Early consultation or scoping with the Department in advance of formal application is advisable for such proposals.

Target 3 - Conserve the following community types in a natural condition: Intertidal reef community complex and Laminaria-dominated community complex.

- A semi-quantitative description of the communities has been provided in Section 1.
- An interpolation of their likely distribution is provided in figure 2.
- The estimated areas of the communities within the Reefs habitat given below are based on spatial interpolation and therefore should be considered indicative. In addition, as this habitat contains significant areas of sheer and steeply sloping rock, the mapped community extents will be underestimated:
  - Intertidal reef community complex - 11ha
  - Laminaria-dominated community complex - 47ha
- This target relates to the structure and function of the reef and therefore it is of relevance to those activities that may cause disturbance to the ecology of the habitat.
- Significant continuous or ongoing disturbance of communities should not exceed an approximate area of 15% of the interpolated area of each community type, at which point an inter-Departmental management review is recommended prior to further licensing of such activities.
- Proposed activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.'

'***Objective: To maintain the favourable conservation condition of grey seal in Lambay Island SAC which is defined by the following list of attributes and targets***

Target 1 *- Species range within the site is not 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 grey seal 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 *- Conserve the breeding sites in a natural condition.*

- *This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) breeding behaviour by grey seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual breeding season.*
- *Operations or activities that cause displacement of individuals from a breeding site or alteration of natural breeding behaviour, and that may result in higher mortality or reduced reproductive success, would be regarded as significant and should therefore be avoided.*

Target 3 *- Conserve the moult haul-out sites in a natural condition.*

- *This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) moulting behaviour by grey seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual moult.*
- *Operations or activities that cause displacement of individuals from a moult haul-out site or alteration of natural moulting behaviour to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.*

Target 4 *- Conserve the resting haul-out sites in a natural condition.*

- *This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) resting behaviour by grey seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used for resting.*
- *Operations or activities that cause displacement of individuals from a resting haul-out site to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.*

Target 5 *- Human activities should occur at levels that do not adversely affect the grey seal population 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 population of grey seal within the site. This refers to both the aquatic and terrestrial/intertidal 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 grey seals 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 grey seal population at the site.*

Objective: To maintain the favourable conservation condition of harbour seal in Lambay 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 seal 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 *- Conserve the breeding sites in a natural condition.*

- *This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) breeding behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual breeding season.*
- *Operations or activities that cause displacement of individuals from a breeding site or alteration of natural breeding behaviour, and that may result in higher mortality or reduced reproductive success, would be regarded as significant and should therefore be avoided.*

Target 3 *- Conserve the moult haul-out sites in a natural condition.*

- *This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) moulting behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used during the annual moult.*
- *Operations or activities that cause displacement of individuals from a moult haul-out site or alteration of natural moulting behaviour to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.*

Target 4 *- Conserve the resting haul-out sites in a natural condition.*

- *This target is relevant to proposed activities or operations that will result in significant interference with or disturbance of (a) resting behaviour by harbour seal within the site and/or (b) aquatic/terrestrial/intertidal habitat used for resting.*
- *Operations or activities that cause displacement of individuals from a resting haul-out site to an extent that may ultimately interfere with key ecological functions would be regarded as significant and should therefore be avoided.*

Target 5 *- Human activities should occur at levels that do not adversely affect the harbour seal population 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 population of harbour seal within the site. This refers to both the aquatic and terrestrial/intertidal 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 seals 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 seal population at the site.'*

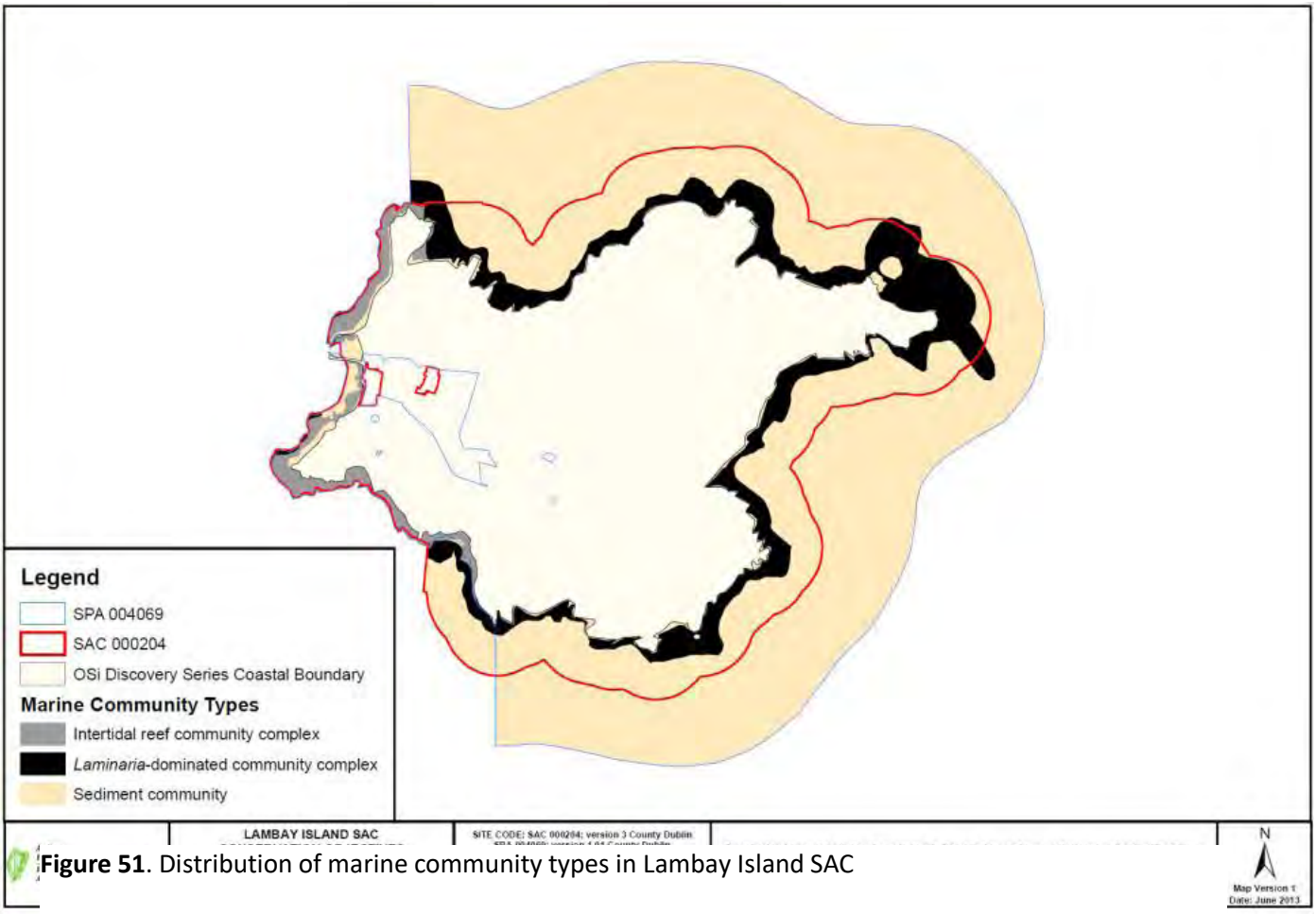
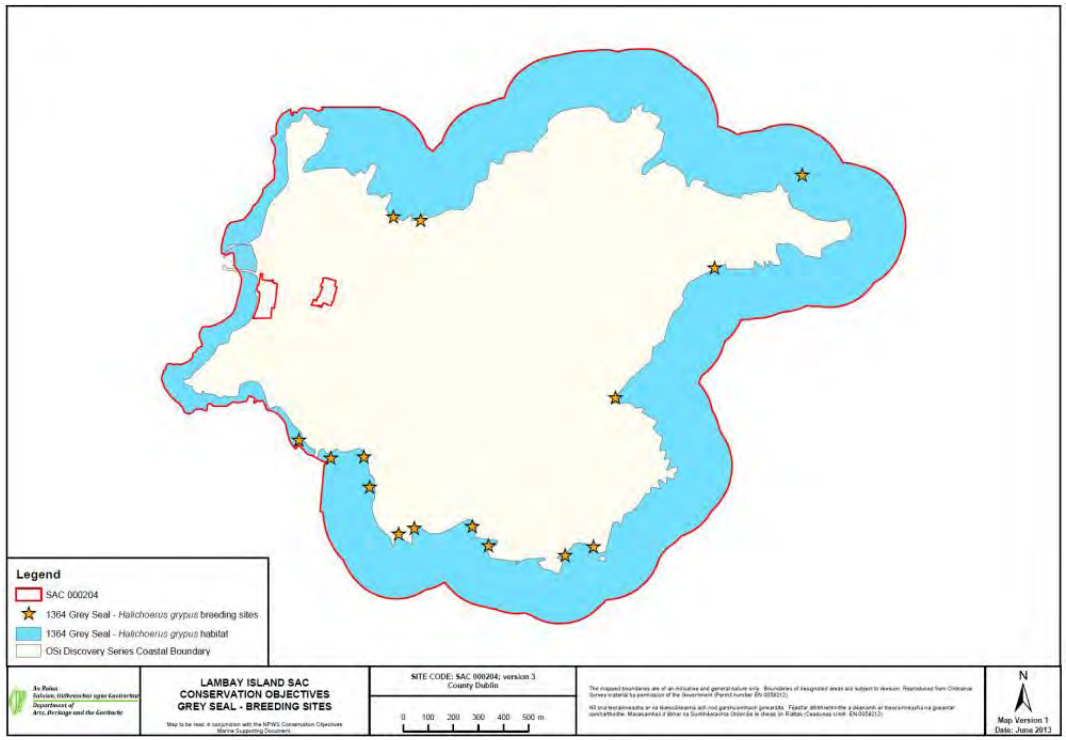
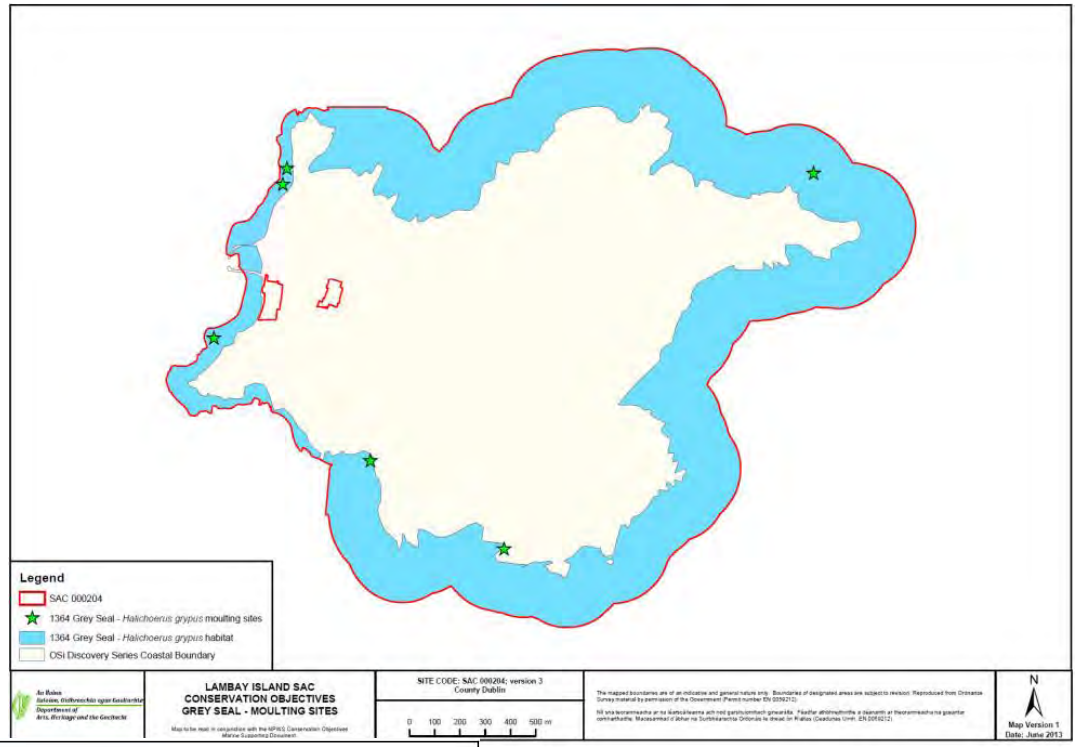
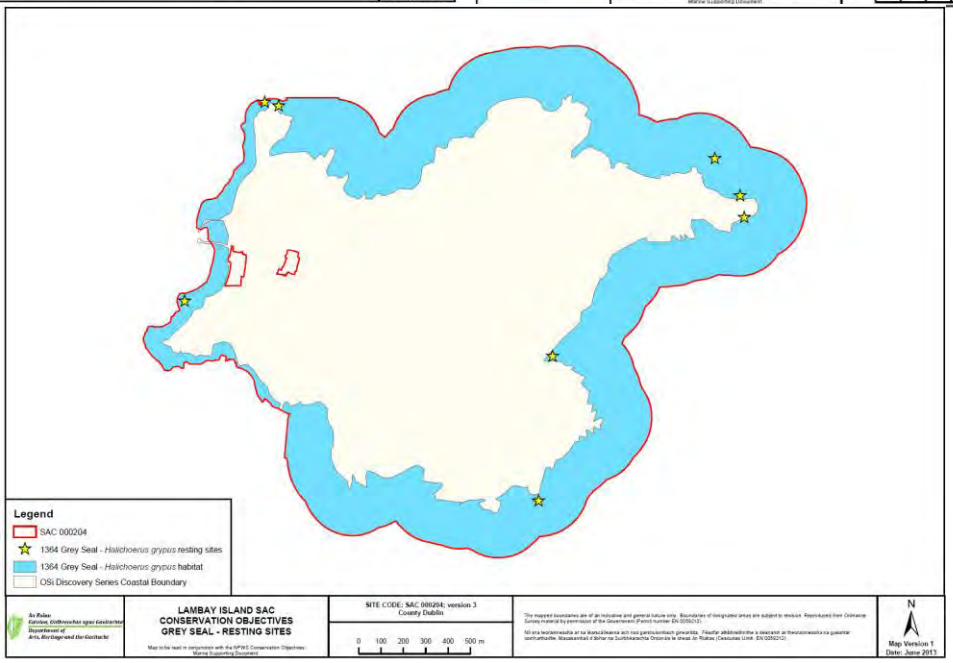


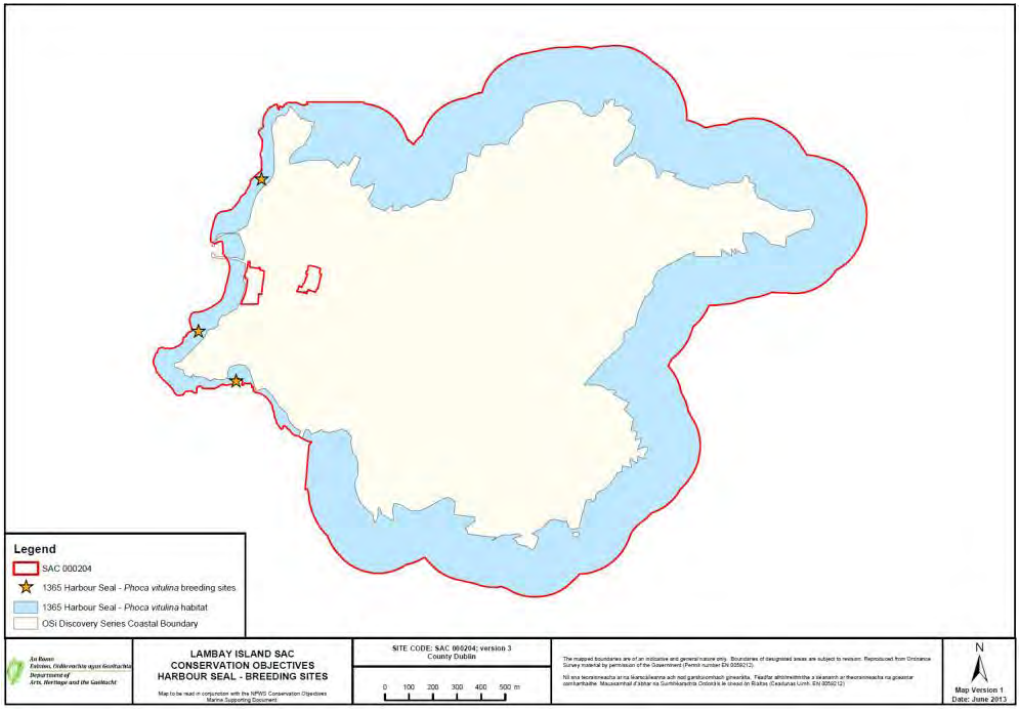
Figure 51. Distribution of marine community types in Lambay Island SAC

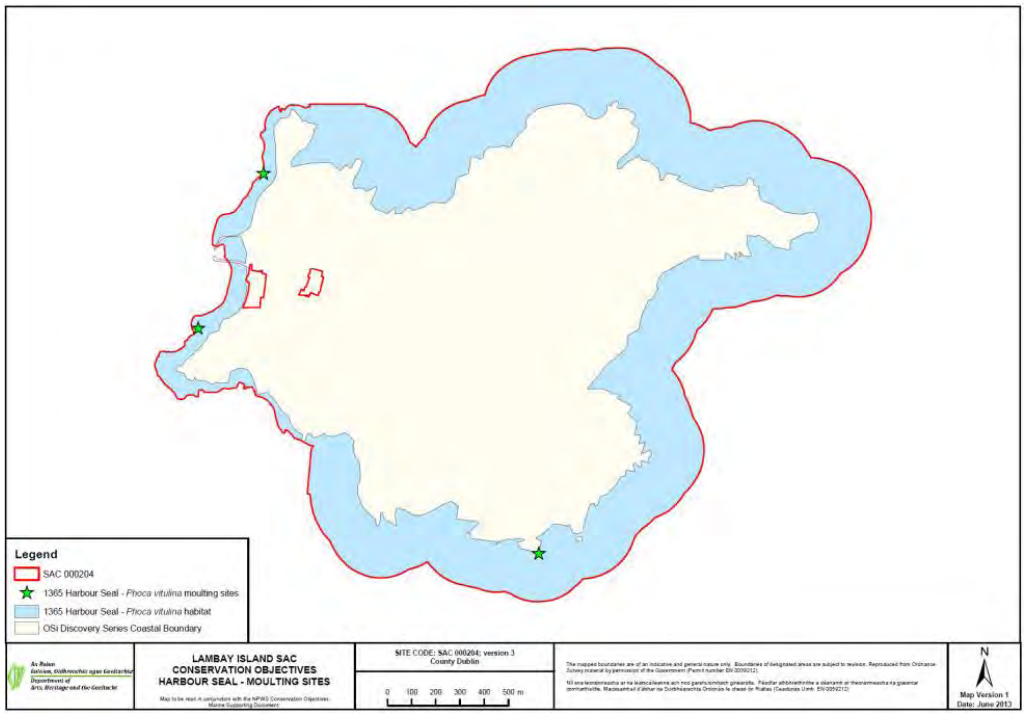


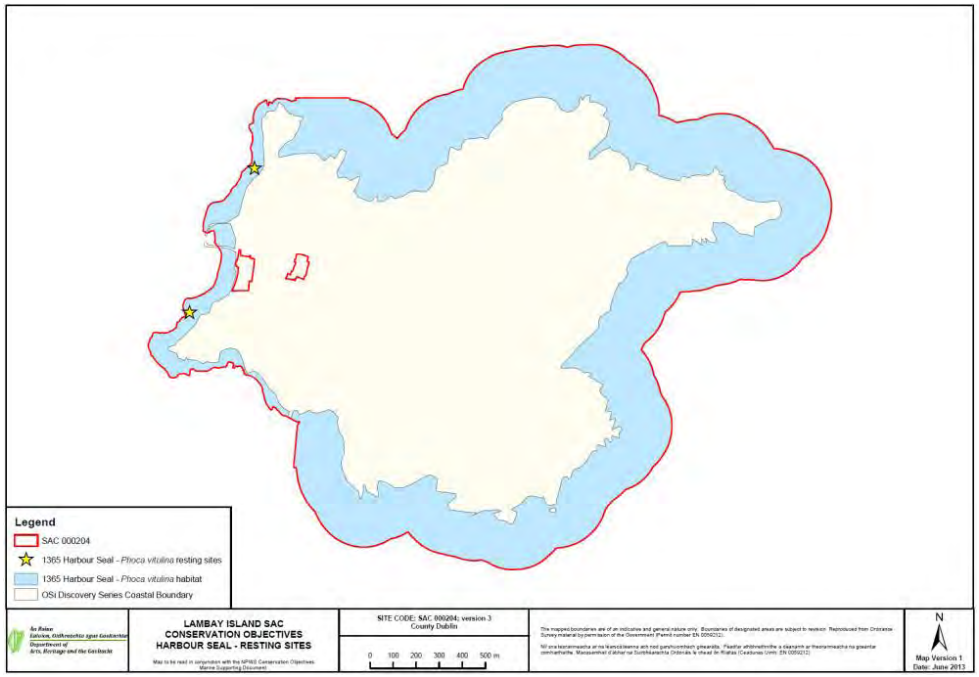




Figures 52 - 54. Distribution of Grey seal breeding, moulting, and resting sites on Lambay Island SAC







Figures 55 - 57. Distribution of Harbour seal breeding, moulting, and resting sites on Lambay Island SAC

5.3.1 Conservation Objectives of Lambay Island SAC 000204 (All Habitats and Species)

All habitats and non-marine mammal species that are features of interest of Lambay Island SAC have been screened out in relation to potential effect in Table 9. However, grey seal and harbour seal within Lambay Island SAC have been included in the NIS as individuals from the SAC may be within the survey area and standard marine mammal mitigation measures are required. All other features of interest have been screened out as there is a significant distance between the proposed survey and Lambay Island SAC and no effects are foreseen on these features of interest. However, as standard mitigation will be in place in relation to marine mammals and it is considered that grey seal and harbour seal from this SAC have the potential to be in the vicinity of the proposed survey and are therefore screened in for NIS.

The qualifying interests, their attributes, targets and the potential impact of the proposed fibre-optic cable survey on each of the features of interest of Lambay SAC are seen in Table 18.

Table 18. The site-specific Conservation Objectives, overall status of species and habitats and the potential impact of the proposed works on the features of interest and conservation objectives of Lambay Island SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
[1170] Reefs	**Inadequate**	**To maintain the favourable conservation condition of Reefs in Lambay Island SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat area.* The permanent area is stable or increasing, subject to natural processes. *Distribution.* The distribution of reefs is stable or increasing, subject to natural processes. *Community Structure:* Conserve the following community types in a natural condition: Intertidal reef community complex; Laminaria-dominated community complex. **Potential Effect** The cable survey route is not within or proximal to reef habitat. No significant effects are foreseen on Reef habitat.
[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts	**Inadequate**	**To maintain the favourable conservation condition of Vegetated sea cliffs of the Atlantic and Baltic coasts in Lambay Island SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Habitat length.* Area stable, subject to natural processes, including erosion. Total length of cliff section mapped: 7.27km. *Habitat distribution.* No decline, subject to natural processes. *Physical structure: functionality and hydrological regime:* No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		Vegetation structure: zonation: Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession. *Vegetation structure: vegetation height:* Maintain structural variation within sward. *Vegetation composition: typical species and subcommunities:* Maintain range of subcommunities with typical species listed in the Irish Sea Cliff Survey (Barron et al., 2011). *Vegetation composition: negative indicator species:* Negative indicator species (including non-natives) to represent less than 5% cover. *Vegetation composition: bracken and woody species:* Cover of bracken (Pteridium aquilinum) on grassland and/or heath less than 10%. Cover of woody species on grassland and/or heath less than 20%. **Potential Effect** The cable survey route is not within or proximal to Vegetated sea cliffs of the Atlantic and Baltic coasts habitat. No significant effects are foreseen on Vegetated sea cliffs of the Atlantic and Baltic coasts habitat.
Grey Seal (*Halichoerus grypus*) [1364]	**Favourable**	**To maintain the favourable conservation condition of Grey Seal in Lambay Island SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Access to suitable habitat:* Species range within the site should not be restricted by artificial barriers to site use. *Breeding behaviour:* The breeding sites should be maintained in a natural condition. *Moulting behaviour:* The moult haul-out sites should be maintained in a natural condition. *Resting behaviour:* The resting haul-out sites should be maintained in a natural condition. *Disturbance:* Human activities should occur at levels that do not adversely affect the grey seal population at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The survey is 3km from this SAC. Detailed assessment is required in relation to the potential effects on Grey Seal. Mitigation measures are required.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Harbour seal (*Phoca vitulina*) [1365]	**Favourable**	**To maintain the favourable conservation condition of Harbour Seal in Lambay Island SAC, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Access to suitable habitat:* Species range within the site should not be restricted by artificial barriers to site use. *Breeding behaviour:* The breeding sites should be maintained in a natural condition. *Moulting behaviour:* The moult haul-out sites should be maintained in a natural condition. *Resting behaviour:* The resting haul-out sites should be maintained in a natural condition. *Disturbance:* Human activities should occur at levels that do not adversely affect the harbour seal population at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The survey is 3km from this SAC. Detailed assessment is required in relation to the potential effects on Harbour Seal. Mitigation measures are required.

5.4 Malahide Estuary SPA (site code: 004025)

As outlined in the Malahide Estuary SPA Site Synopsis (NPWS 2013)[12]:

'*The site encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well-sheltered from the sea by a large sand spit, known as "The Island". This spit is now mostly converted to golf-course. The outer part empties almost completely at low tide and there are extensive intertidal flats exposed. Substantial stands of eelgrass (both Zostera noltii and Z. angustifolia) occur in the sheltered part of the outer estuary, along with Tasselweed (Ruppia maritima). Green algae, mostly Ulva spp.,are frequent on the sheltered flats. Common Cord-grass (Spartina anglica) is well established in the outer estuary and also in the innermost part of the site. The intertidal flats support a typical macro-invertebrate fauna, with polychaete worms (Arenicola marina and Hediste diversicolor), bivalves such as Cerastoderma edule, Macoma balthica and Scrobicularia plana, the small gastropod Hydrobia ulvae and the crustacean Corophium volutator. Salt marshes, which provide important roosts during high tide, occur in parts of the outer estuary and in the extreme inner part of the inner estuary. These are characterised by such species as Sea Purslane (Halimione portulacoides), Sea Aster (Aster tripolium), Thrift (Armeria maritima), Sea Arrowgrass (Triglochin maritima) and Common Saltmarsh-grass (Puccinellia maritima).*

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Crested Grebe, Light-bellied Brent Goose, Shelduck, Pintail, Goldeneye, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit and Redshank. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

This site is of high importance for wintering waterfowl and supports a particularly good diversity of species. It has internationally important populations of Light-bellied Brent Goose (1,104 individuals or 5% of the all-Ireland total) and Black-tailed Godwit (409 individuals or 2.9% of the all-Ireland total) - figures given here and below are mean peaks for the five winters 1995/96-1999/2000. Furthermore, the site supports nationally important populations of an additional 12 species: Great Crested Grebe (63), Shelduck (439), Pintail (58), Goldeneye (215), Red-breasted Merganser (99), Oystercatcher (1,360), Golden Plover (1,843), Grey Plover (201), Knot (915), Dunlin (1,594), Bar-tailed Godwit (156) and Redshank (581). The high numbers of diving ducks reflects the lagoon-type nature of the inner estuary, and this is one of the few sites in eastern Ireland where substantial numbers of Goldeneye can be found.

A range of other species occurs, including Mute Swan (37), Pochard (36), Ringed Plover (86), Lapwing (1,542), Curlew (548), Greenshank (38) and Turnstone (112).

The estuary also attracts other migrant wader species such as Ruff, Curlew Sandpiper, Spotted Redshank and Little Stint. These occur mainly in autumn, though occasionally in spring and winter.

Breeding birds of the site include Ringed Plover, Shelduck and Mallard. Up to the 1950s there was a major tern colony at the southern end of Malahide Island. Grey Herons breed nearby and feed regularly within the site.

Malahide Estuary SPA is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The lagoonal nature of the inner estuary is of particular value as it increases the diversity of birds which occur. The site is of high conservation importance, with internationally important populations of Light-bellied Brent Goose and Black-tailed Godwit, and nationally important populations of a further 12 species. Two of the species which occur regularly (Golden Plover and Bar-tailed Godwit) are listed on Annex I of the E.U. Birds Directive. Malahide Estuary (also known as Broadmeadow Estuary) is a Ramsar Convention site."

[12] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004025.pdf

The European Standard Data Form (2020)[13] states that:

"The site is situated in north Co. Dublin, between the towns of Malahide and Swords. It comprises the estuary of the River Broadmeadow. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well-sheltered from the sea by a large sand spit, known as "the island". This spit is now mostly converted to golf-course. The outer part empties almost completely at low tide and there are extensive intertidal flats. Salt marshes occur in parts of the outer estuary and in the extreme inner part of the inner estuary.

The site is of high importance for wintering waterfowl and supports a particularly good diversity of species. It has an internationally important population of Branta bernicla hrota (4.8% of national total), and nationally important populations of a further 12 species. Of particular note are the populations of Tadorna tadorna (3.0% of national total), Anas acuta (2.9% of national total), Mergus serrator (2.8% of national total), Pluvialis squatarola (2.7% of national total) and Calidris canutus (3.7% of national total). The site is one of the few in eastern Ireland where substantial numbers of Bucephala clangula occur. It has a regionally important population of Limosa lapponica. The site is an important and regular site for a range of autumn passage migrants, especially Calidris ferruginea and Philomachus pugnax. It supports a regular flock of non-breeding Cygnus olor.'

5.4.1 Conservation Objectives of Malahide Estuary SPA 004025 (All Habitats and Species)

The qualifying interests, their attributes, targets and the potential impact of the proposed fibre-optic cable survey on each of the features of interest of Malahide Estuary SPA are seen in Table 19.

Table 19. The site-specific Conservation Objectives, overall status of species and habitats and the potential impact of the proposed works on the features of interest and conservation objectives of Malahide Estuary SPA.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Great Crested Grebe (*Podiceps cristatus*) [A005], Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Shelduck (*Tadorna tadorna*) [A048], Pintail (*Anas acuta*) [A054], Goldeneye (*Bucephala clangula*) [A067], Red-breasted Merganser (*Mergus serrator*) [A069], Oystercatcher (*Haematopus ostralegus*) [A130], Golden Plover (*Pluvialis apricaria*) [A140], Grey Plover (*Pluvialis squatarola*) [A141], Knot (*Calidris canutus*) [A143], Dunlin (*Calidris alpina alpina*) [A149], Black-tailed Godwit (*Limosa limosa*) [A156], Bar-tailed Godwit (*Limosa lapponica*) [A157], Redshank (*Tringa totanus*) [A162]	**[A005]** Amber; **[A046]** Amber; **[A048]** Amber; **[A054]** Red; **[A067]** Red; **[A069]** Green; **[A130]** Amber; **[A140]** Red; **[A141]** Amber; **[A143]** Amber; **[A149]** Red; **[A156]** Ambe; **[A157]** Amber; **[A162]** Red;	**To maintain the favourable conservation condition of the qualifying interests in Malahide Estuary SPA, which is defined by the following list of attributes and targets:** *(Attribute.* Target) *Population Trend.* Long term population trend stable or increasing. *Distribution.* 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. **Potential Effect** The landfall survey area is proximate to a busy car park in Malahide and a shore that has a high number has walkers and dogs, that have access to the beach through the dunes. An existing unpaved vehicular track through the dunes is noted. Birds in the vicinity of the cable route survey will be accustomed to disturbance and activity on the shore. All proposed works in intertidal sandflat area will be carried out when the tide is out and is not covered by water. All works will take place over a single tide. However, out of an abundance of caution there is potential for pollution and disturbance. Mitigation measures are required to protect bird species in addition to wetlands on site.

[13] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004025.pdf

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Wetland and Waterbirds [A999]		
[A999] Wetlands	**N/A**	**To maintain the favourable conservation condition of the wetland habitat in Malahide Estuary SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:** (*Attribute*. Target) *Habitat area*. The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 765 hectares, other than that occurring from natural patterns of variation. **Potential Effect** The proposed cable survey route on Malahide Beach is within a portion of this habitat. The proposed survey works involve Landfall Site Investigations, which will be undertaken to establish the depth and nature of the sediment. The focus of the site investigations will be on the upper layers of sediment to assess the feasibility of cable burial and installation techniques. The following may be undertaken at the landfall: • Bar probes on the intertidal at 10m spacing (approx. 8 to 10 at each landfall). • Bar probes from the Low Water Line to the 3m water depth contour at 30m spacing. (approx. 8 to 10 at each landfall) • 3 Trial Pits on the beach (target depth 2.5m). The bar probes on the intertidal are manually driven to a depth of 2 metres simply to prove the depth of upper layers of sand, gravel or soft material. The Trial Pits will be positioned at approximately 30 to 50m centres starting seaward of the High Water Mark. The Trial Pits will be excavated, logged, photographed and backfilled in a single tidal cycle. The trial pits will be backfilled with the original excavated materials in the sequence in which they are excavated. During the Altemar survey *Arenicola marina* appeared frequent on the lower shore during on site survey. The proposed survey works will result in the temporary disturbance of sediment (200m x 2m) within this habitat due to the track machine, the digging of trial pits and the utilisation of bar probes. It would be seen that any impacts would be short-term and would not significantly impact the community within the medium or long term. Out of an abundance of caution, mitigation measures are required to minimise potential adverse impacts.

5.5 North-west Irish Sea SPA 004236

As outlined in the North-west Irish Sea Synopsis[14] (NPWS, version date 17.7.2023)

"*The North-west Irish Sea cSPA constitutes an important resource for marine birds. The estuaries and bays that open into it along with connecting coastal stretches of intertidal and shallow subtidal habitats, provide safe feeding and roosting habitats for waterbirds throughout the winter and migration periods. These areas, along with more pelagic marine waters further offshore, provide additional supporting habitats (for foraging and other maintenance behaviours) for those seabirds that breed at colonies on the north-west Irish Sea's islands and coastal headlands. These marine areas are also important for seabirds outside the breeding period.*

This SPA extends offshore along the coasts of counties Louth, Meath and Dublin, and is approximately 2,333km2 in area. This SPA is ecologically connected to several existing SPAs in this area.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Common Scoter, Red-throated Diver, Great Northern Diver, Fulmar, Manx Shearwater, Shag, Cormorant, Little Gull, Kittiwake, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Little Tern, Roseate Tern, Common Tern, Arctic Tern, Puffin, Razorbill and Guillemot.

The breeding seabird species listed for those SPAs, which abut the North-West Irish Sea SPA are: Fulmar (Lambay Island SPA); Cormorant (Skerries Island SPA; Ireland's Eye SPA; Lambay Island SPA); Shag (Skerries Island SPA; Lambay Island SPA); Lesser Black-backed Gull (Lambay Island SPA); Herring Gull (Skerries Island SPA; Ireland's Eye SPA; Lambay Island SPA); Kittiwake (Lambay Island SPA; Ireland's Eye SPA; Howth Head SPA); Roseate Tern (Rockabill SPA); Common Tern (Rockabill SPA;); Arctic Tern (Rockabill SPA); Little Tern (Boyne Estuary SPA); Guillemot (Lambay Island SPA, Ireland's Eye SPA); Razorbill (Lambay Island SPA, Ireland's Eye SPA); and Puffin (Lambay Island SPA). The Common Tern population that is listed for the nearby South Dublin Bay and River Tolka Estuary SPA is also likely to use this SPA as a foraging resource.

Informed by two surveys of the western Irish Sea region in 2016 an estimated 120,232 and 34,626 individual marine birds occurred in this SPA during autumn and winter respectively. Those marine bird species whose estimated abundances equalled or exceeded 1% of the total estimated size of the winter assemblage are: Red-throated Diver (538), Fulmar (506), Little Gull (391), Kittiwake (944), Black-headed Gull (508), Common Gull (2,866), Herring Gull (6,893), Great Black-backed Gull (2,096), Razorbill (4,638) and Guillemot (13,914).

The estimated 2016 summer abundance of Manx Shearwater in the North West Irish Sea SPA is 13,010 and is of international importance. The estimated 2016 autumn and winter abundances of Great Northern Diver in the North West Irish Sea SPA is 248 and 230 respectively and are of international importance. The estimated abundances of Common Scoter over parts of this SPA can reach significant numbers (e.g. 14,567 in December 2018) which is also of international importance."

5.5.1 Conservation Objectives of North-west Irish Sea SPA 004236 (All Habitats and Species)

The qualifying interests, their attributes, targets and the potential impact of the proposed fibre-optic cable survey on each of the features of interest of North-west Irish Sea SPA 004236 are seen in Table 20.

Table 20. The site-specific Conservation Objectives, overall status of species and habitats and the potential impact of the proposed works on the features of interest and conservation objectives of North-west Irish Sea SPA.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Common Scoter (*Melanitta nigra*) [A065] Red-throated Diver (*Gavia stellata*) [A001]	**[A065] Red;** **[A001] Amber;** **[A003] Amber;**	**To maintain the favourable conservation condition of the qualifying interests in North-west Irish Sea SPA, which is defined by the following list of attributes and targets:**

[14] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004236.pdf

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Great Northern Diver (*Gavia immer*) [A003] Fulmar (*Fulmarus glacialis*) [A009] Manx Shearwater (*Puffinus puffinus*) [A013] Cormorant (*Phalacrocorax carbo*) [A017] Little Tern (*Sterna albifrons*) [A195] Kittiwake (*Rissa tridactyla*) [A188] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Roseate Tern (*Sterna dougallii*) [A192] Arctic Tern (*Sterna paradisaea*) [A194] Puffin (*Fratercula arctica*) [A204] Razorbill (*Alca torda*) [A200] Guillemot (*Uria aalge*) [A199] Little Gull (*Hydrocoloeus minutus*) (A862) Common Tern (*Sterna hirundo*) (A193)	**[A009]** Amber; **[A013]** Amber; **[A017]** Amber; **[A195]** Amber; **[A188]** Red; **[A179]** Amber; **[A182]** Amber; **[A183]** Amber; **[A184]** Amber; **[A192]** Amber; **[A194]** Amber; **[A204]** Red; **[A200]** Amber; **[A199]** Amber; **[A862]** Amber; **[A193]** Amber;	*(Attribute.* Target) *Population Size.* Long term SPA population trend is stable or increasing *Spatial Distribution.* Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population *Forage spatial distribution, extent, abundance and availability.* Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target *Disturbance across the site*. The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution. *Barriers to connectivity.* The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA. **Potential Effect** The proposed cable survey route on Portmarnock Beach is within a portion of this SPA. The proposed survey works involve Landfall Site Investigations, which will be undertaken to establish the depth and nature of the sediment. The focus of the site investigations will be on the upper layers of sediment to assess the feasibility of cable burial and installation techniques. The following may be undertaken at the landfall: • Bar probes on the intertidal at 10m spacing (approx. 8 to 10 at each landfall). • Bar probes from the Low Water Line to the 3m water depth contour at 30m spacing. (approx. 8 to 10 at each landfall) • 3 Trial Pits on the beach (target depth 2.5m). The bar probes on the intertidal are manually driven to a depth of 2 metres simply to prove the depth of upper layers of sand, gravel or soft material. The Trial Pits will be positioned at approximately 30 to 50m centres starting seaward of the High Water Mark. The Trial Pits will be excavated, logged, photographed and backfilled in a single tidal cycle. The trial pits will be backfilled with the original excavated materials in the sequence in which they are excavated. During the Altemar survey *Arenicola marina* appeared frequent on the lower shore during on site survey.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
		The proposed survey works will result in the temporary disturbance of sediment (33m x 2m) within this SPA due to the track machine, the digging of trial pits and the utilisation of bar probes. It would be seen that any impacts would be short-term and would not significantly impact the community within the medium or long term. Out of an abundance of caution, mitigation measures are required to minimise potential adverse impacts.

5.6 Slaney River Valley SAC 000781

5.6.1 Conservation Objectives of Slaney River Valley SAC (Harbour Seal)

The attributes and targets of harbour seal (screened in), and the potential impact of the proposed fibre-optic cable survey on this feature of interest of Slaney River Valley SAC 000781 are seen in Table 21. All other features of interest were screened out at initial screening.

Table 21. The site-specific Conservation Objectives, overall status of harbour seal, and the potential impact of the proposed works on this feature of interest and conservation objectives of Slaney River Valley SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Harbour seal (*Phoca vitulina*) [1365]	**Favourable**	**To maintain the favourable conservation condition of Harbour Seal in the Slaney River Valley SAC, which is defined by the following list of attributes and targets:** (*Attribute*. Target) *Access to suitable habitat*: Species range within the site should not be restricted by artificial barriers to site use. *Breeding behaviour*: The breeding sites should be maintained in a natural condition. *Moulting behaviour*: The moult haul-out sites should be maintained in a natural condition. *Resting behaviour*: The resting haul-out sites should be maintained in a natural condition. *Disturbance*: Human activities should occur at levels that do not adversely affect the harbour seal population at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The survey is 53.9 km from this SAC, which is within the foraging range (273km) of harbour seal (Carter et al., 2022). Detailed assessment is required in relation to the potential effects on Harbour Seal. Mitigation measures are required.

5.7 Saltee Islands SAC 000707

5.7.1 Conservation Objectives of Saltee Islands SAC (Grey Seal)

The attributes and targets of grey seal, and the potential impact of the proposed fibre-optic cable survey on this feature of interest of Saltee Islands SAC 000707 (Screened in) are seen in Table 22. All other features of interest were screened out at initial screening.

Table 22. The site-specific Conservation Objectives, overall status of grey seal, and the potential impact of the proposed works on this feature of interest and conservation objectives of Saltee Islands SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Grey Seal (Halichoerus grypus) [1364]	**Favourable**	**To maintain the favourable conservation condition of Grey Seal in the Saltee Islands SAC, which is defined by the following list of attributes and targets:** (*Attribute*. Target) *Access to suitable habitat*: Species range within the site should not be restricted by artificial barriers to site use. *Breeding behaviour*: The breeding sites should be maintained in a natural condition. *Moulting behaviour*: The moult haul-out sites should be maintained in a natural condition. *Resting behaviour*: The resting haul-out sites should be maintained in a natural condition. *Population composition*: The grey seal population occurring within this site should contain adult, juvenile and pup cohorts annually. *Disturbance*: Human activities should occur at levels that do not adversely affect the grey seal population. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The survey is 141 km from this SAC, which is within the foraging range (448km) of grey seal (Carter et al., 2022). Detailed assessment is required in relation to the potential effects on Grey Seal. Mitigation measures are required.

5.8 Roaringwater Bay and Islands SAC 000101

5.8.1 Conservation Objectives of Roaringwater Bay and Islands SAC (Grey Seal & Harbour Porpoise)

The attributes and targets of grey seal and harbour porpoise, and the potential impact of the proposed fibre-optic cable survey on these features of interest of Roaringwater Bay and Islands SAC are seen in Table 23. All other features of interest were screened out at initial screening.

Table 23. The site-specific Conservation Objectives, overall status of grey seal and harbour porpoise, and the potential impact of the proposed works on this feature of interest and conservation objectives of Roaringwater Bay and Islands SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Grey Seal (Halichoerus grypus) [1364]	**Favourable**	**To maintain the favourable conservation condition of Grey Seal in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets:** (*Attribute*. Target) *Access to suitable habitat*: Species range within the site should not be restricted by artificial barriers to site use. *Breeding behaviour*: The breeding sites should be maintained in a natural condition. *Moulting behaviour*: The moult haul-out sites should be maintained in a natural condition. *Resting behaviour*: The resting haul-out sites should be maintained in a natural condition. *Population composition*: The grey seal population occurring within this site should contain adult, juvenile and pup cohorts annually. *Disturbance*: Human activities should occur at levels that do not adversely affect the grey seal population at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The survey is 304.8 km from this SAC, which is within the foraging range (448km) of grey seal (Carter et al., 2022). Detailed assessment is required in relation to the potential effects on Grey Seal. Mitigation measures are required.
[1351] Harbour Porpoise (Phocoena phocoena)	**Favourable**	**To maintain the favourable conservation condition of Harbour Porpoise in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets:** (*Attribute*. Target) *Access to suitable habitat:* Species range within the site should not be restricted by artificial barriers to site use. *Disturbance:* Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise, which includes this SAC (JNCC, 2023). Detailed assessment is required in relation to the potential effects on Harbour Porpoise. Mitigation measures are required.

5.9 Blasket Islands SAC 002172

5.9.1 Conservation Objectives of Blasket Islands SAC (Grey Seal & Harbour Porpoise)

The attributes and targets of grey seal and harbour porpoise, and the potential impact of the proposed fibre-optic cable survey on these features of interest of Blasket Islands SAC are seen in Table 24. All other features of interest were screened out at initial screening.

Table 24. The site-specific Conservation Objectives, overall status of grey seal and harbour porpoise, and the potential impact of the proposed works on this feature of interest and conservation objectives of Blasket Islands SAC.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives*, attributes, targets and perceived impacts.
Grey Seal (Halichoerus grypus) [1364]	**Favourable**	**To maintain the favourable conservation condition of Grey Seal in Blasket Islands SAC, which is defined by the following list of attributes and targets:** (*Attribute*. Target) *Access to suitable habitat*: Species range within the site should not be restricted by artificial barriers to site use. *Breeding behaviour*: The breeding sites should be maintained in a natural condition. *Moulting behaviour*: The moult haul-out sites should be maintained in a natural condition. *Resting behaviour*: The resting haul-out sites should be maintained in a natural condition. *Disturbance*: Human activities should occur at levels that do not adversely affect the grey seal population at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The survey is 325.9 km from this SAC, which is within the foraging range (448km) of grey seal (Carter et al., 2022). Detailed assessment is required in relation to the potential effects on Grey Seal. Mitigation measures are required.
[1351] Harbour Porpoise (Phocoena phocoena)	**Favourable**	**To maintain the favourable conservation condition of Harbour Porpoise in Blasket Islands SAC, which is defined by the following list of attributes and targets:** (*Attribute*. Target) *Access to suitable habitat:* Species range within the site should not be restricted by artificial barriers to site use. *Disturbance:* Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise, which includes this SAC (JNCC, 2023). Detailed assessment is required in relation to the potential effects on Harbour Porpoise. Mitigation measures are required.

5.10 UK SACs Designated for Harbour Porpoise

5.10.1 Conservation Objectives of UK Sites Designated for Harbour Porpoise

The potential impact of the proposed fibre-optic cable survey on the features of interest (screened in) of the following sites designated for harbour porpoise are seen in Table 25:

- North Anglesey Marine/Gogledd Môn Forol (**UK0030398**)
- North Channel (**UK0030399**)
- West Wales Marine / Gorllewin Cymru Forol (**UK0030397**)
- Bristol Channel Approaches/Dynesfeydd Môr Hafren (**UK0030396**)

Table 25. The site-specific Conservation Objectives, overall status of harbour porpoise, and the potential impact of the proposed works on this feature of interest and conservation objectives of the above sites.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives* and perceived impacts.
[1351] Harbour Porpoise (Phocoena phocoena)	**Unknown**	**Ensuring:** **1. Harbour porpoise are a viable component of the site.** **2. There is no significant disturbance of the species.** **3. The condition of supporting habitats and processes, and the availability of prey is maintained.** **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise, which includes the following SACs (JNCC, 2023): • North Anglesey Marine/Gogledd Môn Forol (**UK0030398**) • West Wales Marine / Gorllewin Cymru Forol (**UK0030397**) • North Channel (**UK0030399**) • Bristol Channel Approaches/Dynesfeydd Môr Hafren (**UK0030396**) Detailed assessment is required in relation to the potential effects on Harbour Porpoise. Mitigation measures are required.

5.11 UK SACs Designated for Bottlenose Dolphin

5.11.1 Conservation Objectives of UK Sites Designated for Bottlenose Dolphin

The potential impact of the proposed fibre-optic cable survey on these features of interest (screened in) of the following sites designated for common bottlenose dolphin are seen in Table 26:

- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau (**UK0013117**)
- Cardigan Bay / Bae Ceredigion (**UK0012712**)

Table 26. The site-specific Conservation Objectives, overall status of common bottlenose dolphin, and the potential impact of the proposed works on this feature of interest and conservation objectives of the above sites.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives* and perceived impacts.
[1349] Common Bottlenose Dolphin (Tursiops truncatus)	**Unknown**	**To maintain / restore the favourable conservation condition of Bottlenose Dolphin.** **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the Irish Sea MU for Bottlenose Dolphin, which includes the following SACs (JNCC, 2023): • Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau (**UK0013117**) • Cardigan Bay / Bae Ceredigion (**UK0012712**) Detailed assessment is required in relation to the potential effects on Bottlenose Dolphin. Mitigation measures are required.

5.12 UK SACs Designated for Grey Seal

5.12.1 Conservation Objectives of UK Sites Designated for Grey Seal

The potential impact of the proposed fibre-optic cable survey on these features of interest (screened in) of the following sites designated for grey seal are seen in Table 27:

- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau (**UK0013117**)
- The Maidens (**UK0030384**)
- Lundy (**UK0013114**)
- Pembrokeshire Marine / Sir Benfro Forol (**UK0013116**)
- Isles of Scilly Complex (**UK0013694**)

Table 27. The site-specific Conservation Objectives, overall status of grey seal, and the potential impact of the proposed works on this feature of interest and conservation objectives of the above sites.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives* and perceived impacts.
[1364] Grey Seal (*Halichoeurus grypus*)	**Favourable**	**To maintain / restore the favourable conservation condition of Grey Seal.** **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the 448km foraging range of grey seal (Carter et al., 2022), which includes the following SACs: • Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau (**UK0013117**) • The Maidens (**UK0030384**) • Lundy (**UK0013114**) • Pembrokeshire Marine / Sir Benfro Forol (**UK0013116**) • Isles of Scilly Complex (**UK0013694**) Detailed assessment is required in relation to the potential effects on Grey Seal. Mitigation measures are required.

5.13 UK SACs Designated for Harbour Seal

5.13.1 Conservation Objectives of UK Sites Designated for Harbour Seal

The potential impact of the proposed fibre-optic cable survey on these features of interest (screened in) of the following sites designated for harbour seal are seen in Table 28:

- Murlough (**UK0016612**)
- Strangford Lough (**UK0016618**)
- South-East Islay Skerries (**UK0030067**)

Table 28. The site-specific Conservation Objectives, overall status of harbour seal, and the potential impact of the proposed works on this feature of interest and conservation objectives of the above sites.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives* and perceived impacts.
[1351] Harbour Seal (*Phoca vitulina*)	**Unfavourable - Inadequate**	**To maintain / restore the favourable conservation condition of Harbour Seal.** **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the 273km foraging range of harbour seal (Carter et al., 2022), which includes the following SACs: • Murlough (**UK0016612**) • Strangford Lough (**UK0016618**) • South-East Islay Skerries (**UK0030067**) Detailed assessment is required in relation to the potential effects on Harbour Seal. Mitigation measures are required.

5.14 French SACs Designated for Harbour Porpoise

5.14.1 Conservation Objectives of French Sites Designated for Harbour Porpoise

The potential impact of the proposed fibre-optic cable survey on these features of interest of the following sites designated for harbour porpoise are seen in Table 29:

- Nord Bretagne DH (**FR2502022**)
- Récifs et landes de la Hague (**FR2500084**)
- Anse de Vauville (**FR2502019**)
- Mers Celtiques – Talus du golfe de Gascogne (**FR5302015**)
- Banc et récifs de Surtainville (**FR2502018**)
- Côte de Granit rose-Sept-Iles (**FR5300009**)
- Trégor – Goëlo (**FR5300010**)
- Baie de Morlaix (**FR5300015**)
- Abers – Côtes des legends (**FR5300017**)
- Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay (**FR5300008**)
- Cap d'Erquy-Cap Fréhel (**FR5300011**)
- Ouessant-Molène (**FR5300018**)
- Chausey (**FR2500079**)
- Baie de Saint-Brieuc – Est (**FR5300066**)
- Côtes de Crozon (**FR5302006**)
- Baie du Mont Saint-Michel (**FR2500077**)
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (**FR5300012**)
- Estuairie de la Rance (**FR5300061**)
- Chaussée de Sein (**FR5302007**)
- Récifs du talus du golfe de Gascogne (**FR5302016**)

Table 29. The site-specific Conservation Objectives, overall status of harbour porpoise, and the potential impact of the proposed works on this feature of interest (screened in) and conservation objectives of the above sites.

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives* and perceived impacts.
[1351] Harbour Porpoise (Phocoena phocoena)	**Poor**	**To maintain (or restore where appropriate) the qualifying interests to favourable condition.** **Potential Effect** The proposed survey will introduce underwater noise into the marine environment. The proposed survey area is located within the Celtic and Irish Seas MU for Harbour Porpoise, which includes the following SACs (JNCC, 2023): • Nord Bretagne DH (**FR2502022**) • Récifs et landes de la Hague (**FR2500084**) • Anse de Vauville (**FR2502019**) • Mers Celtiques – Talus du golfe de Gascogne (**FR5302015**) • Banc et récifs de Surtainville (**FR2502018**) • Côte de Granit rose-Sept-Iles (**FR5300009**) • Trégor – Goëlo (**FR5300010**) • Baie de Morlaix (**FR5300015**) • Abers – Côtes des legends (**FR5300017**) • Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay (**FR5300008**) • Cap d'Erquy-Cap Fréhel (**FR5300011**) • Ouessant-Molène (**FR5300018**) • Chausey (**FR2500079**)

Annex Species/Habitats-Qualifying Interest	**Overall Conservation Status**	*Site Specific Conservation Objectives* and perceived impacts.
		• Baie de Saint-Brieuc – Est (**FR5300066**) • Côtes de Crozon (**FR5302006**) • Baie du Mont Saint-Michel (**FR2500077**) • Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (**FR5300012**) • Estuairie de la Rance (**FR5300061**) • Chaussée de Sein (**FR5302007**) • Récifs du talus du golfe de Gascogne (**FR5302016**) Detailed assessment is required in relation to the potential effects on Harbour Porpoise. Mitigation measures are required.

6. Site visit

Malahide

A site visit was carried out to the proposed landfall area in Malahide on the 18th September 2023. As seen in plates 1-3 it is proposed to use an existing informal vehicular track to access the beach area to carry out the site investigations. The SAC commences at the landward side of the dune habitat and much of the dune is contained within the SAC, including the Access route. The majority of the dune habitat is not within the Malahide Estuary SPA. The dune habitat in which the access to the beach goes through is considered to be Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] a feature of interest of the SAC.

Plate 1. Approximate access route from the car park area, through the dune using the existing track to the beach area.

Plate 2. Existing informal vehicular path through the dune habitat.

Plate 3. Vehicular path through the dune habitat.

Plate 4. Beach at Malahide.

Portmarnock

A site visit was carried out to the proposed landfall area in Portmarnock on the 18th September 2023. As seen in plates 5 there is an existing formal slipway entrance to the beach which allows good access to the beach at all tides.

Plate 5. Access Ramp to Portmarnock Beach

Plate 6. Portmarnock Beach.

7. Further information on the potential impacts on Cetaceans and Pinnipeds

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.

The proposed survey would be expected to impact on cetaceans primarily through the emission of noise due to the vessel and 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).

Southall *et al*. (2019) outlined in their publication "*Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects*" revised the marine mammal hearing groups, which are seen in Table 30.

Table 30. *Marine Mammal Functional Hearing Groups and Estimated Functional Hearing groups Proposed by Southall et al. (2019)*

Marine mammal hearing group	Auditory weighting function	Genera (or species) included
Low-frequency cetaceans	LF	*Balaenidae (Balaena, Eubalaenidae spp.); Balaenopteridae (Balaenoptera physalus, B. musculus)*
		Balaenopteridae (Balaenoptera acutorostrata, B. bonaerensis, B. borealis, 1 B. edeni, B. omurai; Megaptera novaeangliae); Neobalenidae (Caperea);Eschrichtiidae (Eschrichtius)
High-frequency cetaceans	HF	*Physeteridae (Physeter); Ziphiidae (Berardius spp., Hyperoodon spp., Indopacetus, Mesoplodon spp., Tasmacetus, Ziphius); Delphinidae (Orcinus)*
		Delphinidae (Delphinus, Feresa, Globicephala spp., Grampus, 2 Lagenodelphis, Lagenorhynchus acutus, L. albirostris, L. obliquidens, L. obscurus, Lissodelphis spp., Orcaella spp., Peponocephala, Pseudorca, Sotalia spp., Sousa spp., Stenella spp., Steno, Tursiops spp.); Montodontidae (Delphinapterus, Monodon); Plantanistidae (Plantanista)
Very high frequency cetaceans	VHF	*Delphinidae (Cephalorhynchus spp.; Lagenorhynchus cruciger, L. australis); Phocoenidae (Neophocaena spp., Phocoena spp., Phocoenoides); Iniidae (Inia); Kogiidae (Kogia); Lipotidae (Lipotes); Pontoporiidae (Pontoporia)*
Phocid carnivores in water	PCW	*Phocidae (Cystophora, Erignathus, Halichoerus, Histriophoca, Hydrurga,Leptonychotes, Lobodon, Mirounga spp., Monachus, Neomonachus, Ommatophoca, Pagophilus, Phoca spp., Pusa spp.)*

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018) outlined the hearing groups of marine mammals including the generalised hearing range of these cetacean groups (Table 31). They also noted that "*Exposures exceeding the specified respective criteria level for any exposure metric are interpreted as resulting in predicted temporary threshold shift (TTS) or permanent threshold shift (PTS) onset*." The onset of PTS on marine mammals was also outlined in NOAA 2018 (Table 32). The updated figures for PTS and TTS for are outlined in Table 33.

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). 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.

Table 31. 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 32. 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).

Table 33. Southall *et al.* (2019) TTS- and PTS-onset thresholds for marine mammals exposed to impulsive noise: SEL thresholds in dB re 1 µPa^{2}s under water and dB re (20 µPa)^{2}s; and peak SPL thresholds in dB re 1 µPa under water.

Hearing Group	Impulsive Noise		Non-impulsive Noise
	Unweighted SPLpeak(dB re 1 µPa)	Weighted SELcum (dB re 1 µPa^{2}s)	Weighted SELcum (dB re 1 µPa^{2}s)
PTS Criteria			
Low-frequency (LF) cetaceans	219	183	199
High-frequency (HF) cetaceans	230	185	198
Very-frequency cetaceans (VHF)	202	155	173
Phocid carnivores in water (PCW)	218	185	201
TTS Criteria			
Low-frequency cetaceans	213	168	179
High-frequency cetaceans	224	170	178
Very high-frequency cetaceans	196	140	153
Phocid carnivores in water	212	170	181

Most small cetaceans, excluding harbour porpoise, have an auditory bandwidth of 150 HZ to – 160 kHz, while harbour porpoise have an auditory bandwidth 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)."

The proposed survey equipment and the noise frequency emissions are seen in Table 34.

Equipment Type	Purpose	Frequency Range	Duration	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Multibeam Echo Sounder (MBES)	Measure detailed bathymetry by transmitting sound pulses (active sonar).	200 kHz to 500 kHz	0.05 - 10 ms	210 - 245 dB.	Danson 2005, Hopkins 2007, DECC 2011, Lurton and DeReutier 2011, Lurton 2016, BEIS 2020, Crocker & Fratantonio 2016
Side Scan Sonar (SSS)	Determine surficial nature of the seabed and detect objects by transmitting sound pulse.	200 kHz to 700 kHz	0.4 - 1.0 ms	200 - 240 dB.	BOEM 2016, BEIS 2020, DAHG 2014, Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Pinger	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 15 kHz	0.5 - 30 ms	214 dB.	Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Chirper	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	2 kHz to 13 kHz	5 - 40 ms	185 - 215 dB.	Crocker & Fratantonio 2016, Hartley Anderson 2020
Sub-bottom Profiler (SBP) - Boomer	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	500 Hz to 15 kHz	0.5 - 1.0 ms	205 - 215 dB.	Crocker & Fratantonio 2016
Sub-bottom Profiler (SBP) - Parametric	Identify different geological layers encountered in the shallow sediments and sediment thicknesses beneath the seabed.	4 to 15 kHz, 85 to 115 kHz	0.2 - 30 ms	238 - 247 dB. 200 - 206 dB.	Hartley Anderson 2020
Ultra-Short Base Line (USBL)	Subsea positioning.	20 kHz to 50 kHz	5 - 10 ms	194 - 207 dB.	Kongsberg
Magnetometer	Identify ferrous anomalies for metal obstructions, shipwrecks, etc. on and under the seabed.	Passive	N/A	Passive	N/A
Survey Vessels	Carry out the survey and deploy the equipment.	50 Hz to 300 Hz	N/A	160 - 190 dB.	DECC 2011

Table 34a. Details of the proposed types of acoustic equipment which emit sound.

Equipment Type	Purpose	Number of locations within Foreshore Application Area (up to)	Frequency Range	*Maximum* Source Pressure Level (re 1µPa at 1 m)	Reference
Cone Penetration Test (CPT)	Determine geotechnical engineering properties of seabed sediments.	10	28 Hz	118 - 145 dB.	BOEM 2012, EIRGRID 2014
Gravity Corer	Retrieve a seabed sediment sample by penetrating seabed with a steel core barrel under self-weight	10	N/A	N/A	N/A
Vibrocorer	Retrieve a seabed sediment sample by penetrating seabed with a vibrating steel core barrel	10	30 Hz	187.4 dB.	LGL 2010
Grab Samples	Collect small sediment samples from seabed surface with clamshell mechanism	12	N/A	N/A	N/A

Table 34b. Details of the proposed types of geophysical equipment which emit sound.

The cetacean species observed in the survey area are high frequency, mid-frequency and low frequency cetaceans. Grey and Common Seals may also be present. The proposed survey equipment and the noise frequency emissions are seen in Table 17. 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.

The Multibeam Echo Sounder (MBES) (200 kHz to 500 kHz) and Side Scan Sonar (SSS)(200 kHz to 700 kHz), 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 (SBP) – Pinger (2 kHz to 15 kHz) and Sub-bottom Profiler (SBP) - Chirper(2 kHz to 13 kHz), Sub-bottom Profiler (SBP) - Boomer (15 to 500 Hz), Sub-bottom Profiler (SBP) – Parametric (4 to 15 kHz, 85 to 115 kHz) and Ultra-Short Base Line (USBL) Subsea positioning. (20 kHz to 50 kHz) emits low and mid frequency noise, within the auditory range of all marine mammals including harbour porpoise, grey seal and harbour seal. 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. (2019). 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. As outlined int Table 17 the inshore Geophysical Survey 3 to 4 days (weather and sea state dependent) offshore Geophysical Survey 4 to 6 days (weather and sea state dependent).

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."

As previously outlined the estimated time that the survey would take (excluding SI) within the Rockabill to Dalkey SAC would be 234 minutes. The operations would comply with the NPWS (2014) "*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*". These guidelines would be deemed adequate to mitigate the negative impacts of the proposed works. 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. In addition, vessel speeds are extremely slow which would give marine mammals ample opportunity to move from the area.

These guidelines would be deemed adequate to mitigate the negative impacts of the proposed works. 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. In addition, vessel speeds are extremely slow which would give marine mammals ample opportunity to move from the area.

Note: in relation to consistency between Southall (2019) and NOAA (2018)

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018) (or National Marine Fisheries Service, 2018 (as quoted in Southall 2019)), outlines the hearing groups of marine mammals including the generalised hearing range of these cetacean groups (Annex II). NOAA (2018) also noted that "*Exposures exceeding the specified respective criteria level for any exposure metric are interpreted as resulting in predicted temporary threshold shift (TTS) or permanent threshold shift (PTS) onset.*" The thresholds for the onset of PTS on marine mammals were also outlined in NOAA 2018. The updated Southall (2019) figures for PTS and TTS for are outlined in Annex IV.

Southall (2019) outlined the main differences between their publication and previous publications including NOAA (2018) which was referenced as NMFS (2018) in Southall (2019). Southall (2019) states that "The noise criteria here represent the next step in a sequential process of evolution of the criteria proposed by Southall et al. (2007), substantially modified with new analytical methods by Finneran (2016), and recently adopted as U.S. regulatory guidance by the NMFS (2016, 2018). While the quantitative process described herein and the resulting exposure criteria here are based on, and in many respects are identical to, those derived by Finneran (2016) and adopted by the NMFS (2016, 2018), there are a number of significant distinctions. The exposure criteria here appear in a peer-reviewed publication and include all marine mammal species for all noise exposures, both under water and in air for amphibious species. NMFS (2016, 2018) provides regulatory guidance only for the subset of marine mammals under their jurisdiction and do not include criteria for aerial noise exposures, an important consideration in many locations for which some earlier assessments were made (Finneran & Jenkins, 2012). The exposure criteria here, while based on the Finneran (2016) quantitative method and consistent with the NMFS (2016, 2018) guidance where they overlap, are thus more broadly relevant, peer-reviewed, and less subject to potential changes in national regulatory policy."

Southall (2019) also stated that "It should be noted that this results in some proposed differences in the terminology of hearing groups relative to those used in Finneran (2016) and NMFS (2016, 2018). These proposed differences in nomenclature may be confusing, but we believe they are justified (see the "Marine Mammal Hearing Groups and Estimated Group Audiograms" section and Appendices 1-6) and will support future criteria as new information emerges."

The difference in nomenclature between NOAA 2018 and Southall (2019) is that NOAA (2018) classified cetaceans as Low-frequency (LF) cetaceans (baleen whales), Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales) and High-frequency (HF) cetaceans (true porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchus cruciger & L. australis) while Southall reclassified these groups to Low-frequency cetaceans, High-frequency cetaceans, Very high-frequency cetaceans. As outlined in Southall (2019) "*The distinction between HF and VHF cetacean groups (as opposed to mid- and high-frequency) reflects the regions of best hearing sensitivities within these groups, often including frequencies approaching or exceeding 100 kHz; these frequencies would be more appropriately described within marine bioacoustics as high to very high. Further, as discussed in more detail below, a number of anatomical and sound production properties suggest a potential distinction of very low-(VLF) and LF cetaceans among mysticetes. Some evidence also suggests a potential segregation of mid-frequency (MF) and HF cetaceans in addition to the distinction of HF and VHF cetaceans*." This is in effect a relabelling of Mid-Frequency (MF) Cetaceans and High-Frequency (HF) Cetaceans to High-frequency cetaceans and Very high-frequency cetaceans respectively. It should be clearly noted that the PTS values within the updated groups were identical between NOAA, 2018 and Southall 2019 and it was in effect a renaming of the groups.

8. Mitigation Measures & Monitoring

Specific controls will be incorporated into the proposed project to minimise the potential negative effects on the features of interest of the Natura 2000 sites screened in for NIS and are outlined in below:

Minor short-term impacts may result as a consequence of the survey phase of the project, but these are believed not to be at the scale to impact on the integrity of the Natura 2000 sites, species or the site-specific conservation objectives. However, following the precautionary principle, mitigation measures have been developed to minimise the ecological impacts of the project, in relation to Natura 2000 Annex habitats and species. This is primarily as a result of disturbance, potential impacts on dune and sandflat habitat and the potential for pollution within the marine environment.

Intertidal Works

As was seen during the fieldwork, the beaches at which the intertidal works are proposed is to be carried out on are moderately exposed with coarse sand, proximate to public car park areas. Human activity and canine (off-leash) activity was noted at both sites. Both sites are popular coastal walking sites. It would be expected that there is increased human activity on the beach and the main access to the beach is via the proposed access route for a single tidal cycle would not significantly impact on bird populations due to the high levels of existing activity on site. However, there is potential to impact on habitats in the absence of mitigation. As a result, mitigation of impacts in the intertidal will concentrate on minimising the following:

Disturbance

The proposed survey routes are within popular beaches with existing high levels of canine and human activity and vehicular access. As a result, the presence of additional personnel/machinery on the shore would not be thought to cause a significant additional disturbance. However, there is potential for disturbance of the dune and sandflat habitat and as a result the following mitigation measures would be carried out:

1. An ecologist would be onsite during the surveys in order to minimise disturbance and ensure site integrity is maintained. Prior to the commencement of the works (min 1 weeks notice) the NPWS will be informed of the proposed works.
2. A track will be marked out by the ecologist prior to machinery accessing the dune area and beaches. This will be marked out prior to access of personnel and machinery to the shore to avoid features of interest of the SAC.
3. Within the dune habitat in Malahide protective matting will be placed under the machinery tracks when accessing the dune habitat. The ecologist will supervise the access across the dune habitat to ensure matting is in place and the machinery does not stray from the existing informal vehicular track.
4. Drift lines and vegetation on the shore 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.
5. The surveys should commence on a receding tide. This is to ensure all operations are done within one tide. Operations must be completed before an incoming tide when many of the birds return to feed. This should result in the site investigations being imperceptible following a single or several tidal cycles.
6. 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.
7. Roosting birds, if present in the vicinity of the works, will not be disturbed. The ecologist will ensure that roosting birds are not impacted by the works.

Reinstatement

Reinstatement of the terrestrial and intertidal habitat will be carried out to pre-construction conditions. Any concerns in relation to the survey process or resulting reinstatement of the habitat to pre survey conditions will be raised with NPWS by the project ecologist prior to the removal of personnel from the site.

Subtidal

Mitigation impacts are primarily concerned with the survey and the following mitigation measures will be enforced.

1. Mitigation measures will include the presence of a MMO onboard the survey vessel. The purpose of the MMO is to ensure that there is no disturbance of seal /cetacean populations.
2. The NPWS Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters' (NPWS, 2014) should be followed throughout the survey.
3. The MMO/ecologist will ensure that mitigation measures are carried out. Sufficient resources should be made immediately available on the survey vessel to deal with accidental oil spills including hydraulic hoses bursting etc. and reported to the on-board ecologist.
4. A spill kit will be on board all vessels involved in the works.

9. Natura Impact Statement Conclusions

The conservation objectives of Natura 2000 sites within, and beyond 15km where there is a potential for significant effects, of the proposed cable survey route were assessed.

In the absence of mitigation it was determined that the project may cause localised disturbance to the habitats within Malahide Estuary SAC & SPA and North-west Irish Sea SPA. In addition, there is potential for minor localised disturbance to birds within Malahide Estuary SPA and North-west Irish Sea SPA and underwater noise effects to harbour porpoise, harbour seals, bottlenose dolphin, and grey seals during the survey periods, in the absence of mitigation. However, these impacts are deemed to be short term for the period of works (1 tidal cycle per beach and 3-4 days for inshore marine survey). Mitigation measures including ecological supervision and compliance with "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014) will be carried out.

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 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 of 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:

- Malahide Estuary SAC, Rockabill to Dalkey Island SAC, North-west Irish Sea SPA and Malahide Estuary SPA from intertidal works
- Rockabill to Dalkey Island SAC, Lambay Island SAC, Slaney River Valley SAC, Saltee Islands SAC, Roaringwater Bay and Islands SAC, Blasket Islands SAC, North Anglesey Marine/Gogledd Môn Forol, West Wales Marine / Gorllewin Cymru Forol, Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau, Murlough, North Channel, Strangford Lough, Cardigan Bay / Bae Ceredigion, Pembrokeshire Marine / Sir Benfro Forol, The Maidens, Bristol Channel Approaches/Dynesfeydd Môr Hafren, South-East Islay Skerries, Lundy, Isles of Scilly Complex, Nord Bretagne DH, Récifs et landes de la Hague, Anse de Vauville, Mers Celtiques – Talus du golfe de Gascogne, Banc et récifs de Surtainville, Côte de Granit rose-Sept-Iles, Trégor – Goëlo, Baie de Morlaix, Abers – Côtes des legends, Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay, Cap d'Erquy-Cap Fréhel, Ouessant-Molène, Chausey, Baie de Saint-Brieuc – Est, Côtes de Crozon, Baie du Mont Saint-Michel, Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard, Estuairie de la Rance, Chaussée de Sein, Récifs du talus du golfe de Gascogne (potential impact on harbour porpoise, bottlenose dolphin, grey seal, harbour seal). Standard mitigation measures used for harbour porpoise, bottlenose dolphin, grey seal, and harbour seal,

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 sites' 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, 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 the European site **No significant effects will arise on Natura 2000 sites, their features of interest or conservation objectives. The proposed project will not will adversely affect the integrity of European sites.**

10. Data used for the NIS

NPWS site synopses and Conservation objectives of sites within 15km were assessed. The most recent SAC and SPA boundary shapefiles were downloaded and overlaid on Bing road maps and satellite imagery. A site visit was carried out on the September 2023 in the landfall areas.

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Appendix I

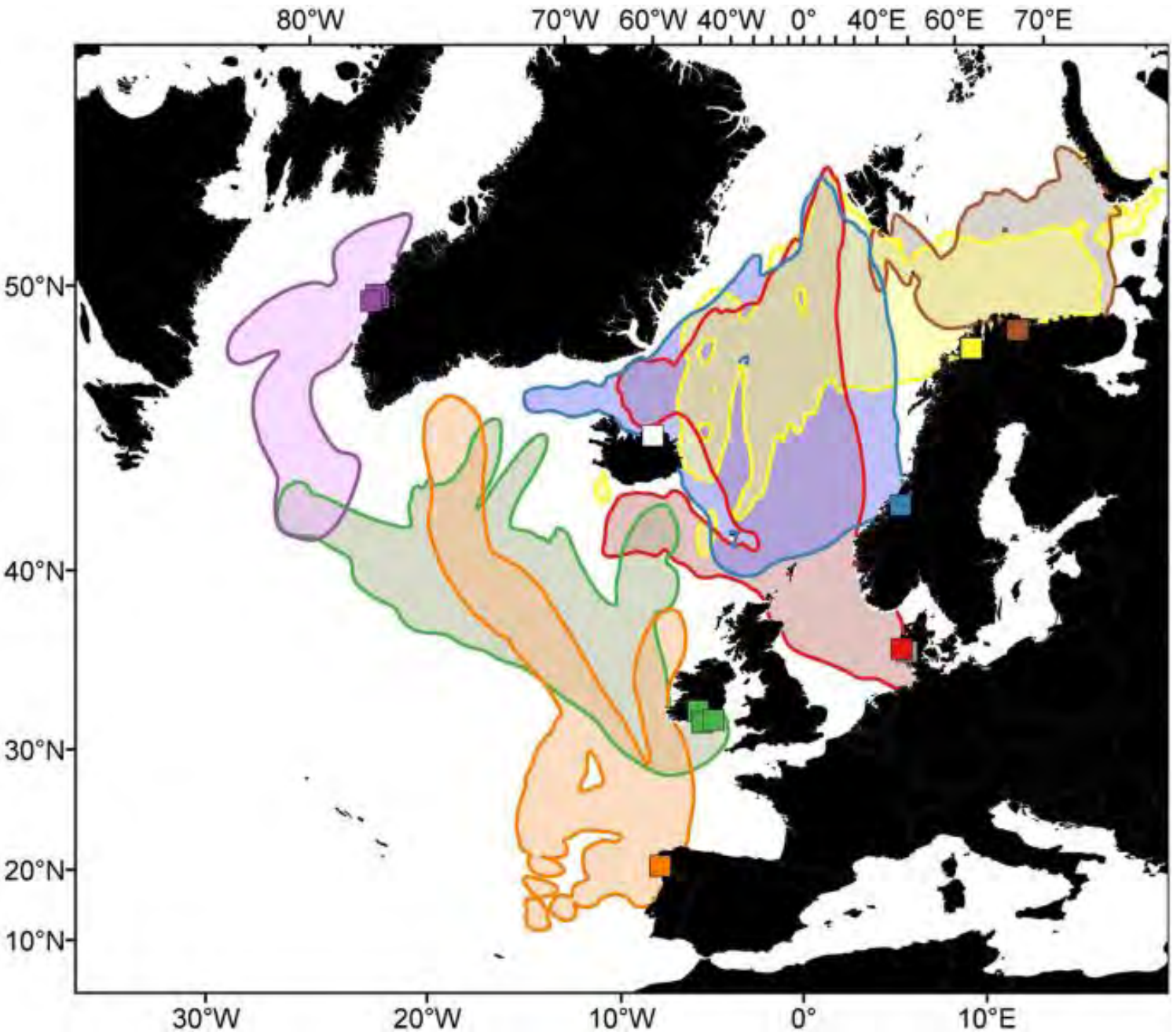

Figure A.1. Area use during the ocean migration of tagged Atlantic salmon (Ireland = Green) (Source: Rikardsen et al., 2021).