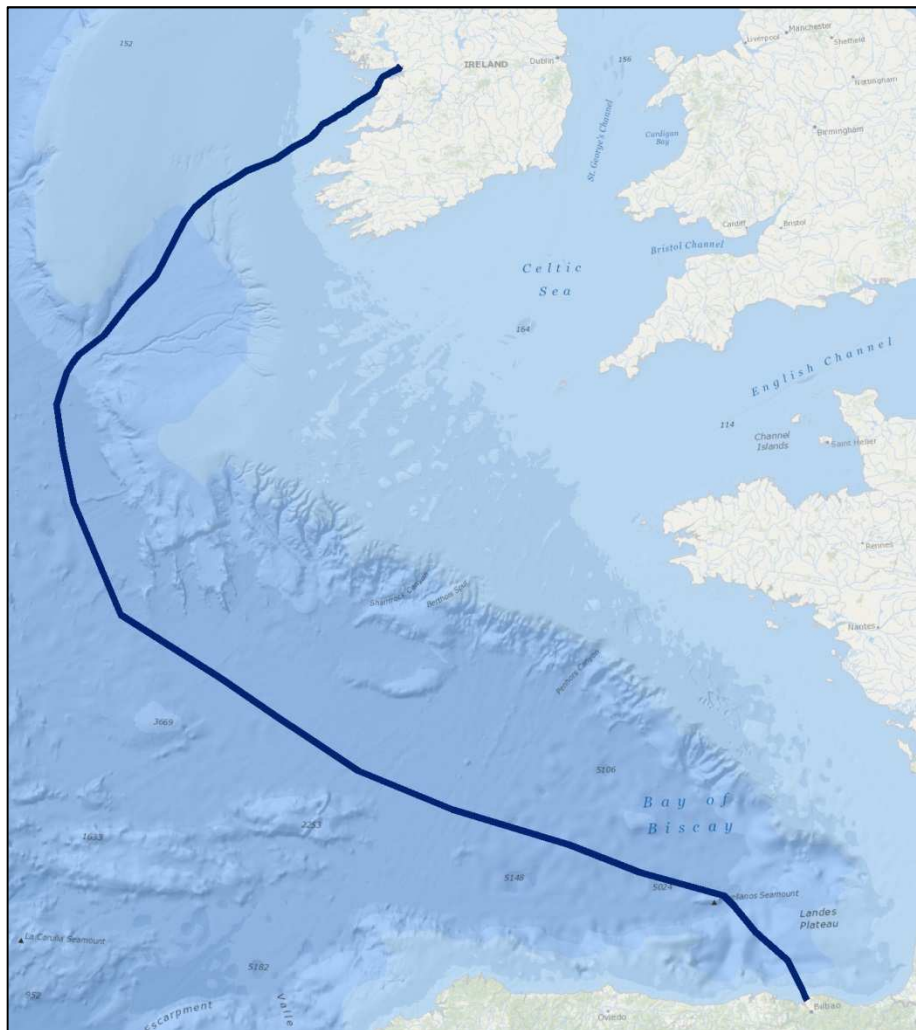


NATURA Impact Statement for a Foreshore Licence Application for pre-installation survey and main lay for a fibre optic cable with a landfall at Ballyloughane Strand, Galway Bay for Deep Sea Fibre Networks



20th June 2018

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On behalf of:

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CONTENTS

1. Introduction.....	4
Background to Altamar Ltd.	4
2. Background to the Appropriate Assessment.....	5
3. Stages of the Appropriate Assessment	6
4. Natura Impact statement.....	8
A) MANAGEMENT OF THE SITE	8
B) RELEVANCE TO THE COUNTY DEVELOPMENT PLAN.....	8
C) DESCRIPTION OF THE PROPOSED PROJECT.....	10
Background.....	10
Route.....	10
Dates of proposed works	14
Pre-Installation / Burial Assessment Survey	14
Survey Equipment Parameters.....	17
Cable Landfall at Ballyloughane Strand.....	18
Cable Installation on the Beach.....	21
Offshore Cable Installation.....	22
D) IDENTIFICATION OF NATURA 2000 SITES/HABITATS & SPECIES (WITHIN 12NM LIMIT).....	25
E) INITIAL SCREENING OF NATURA 2000 SITES, ANNEX HABITATS AND SPECIES WITHIN 15KM OF THE PROPOSED ROUTE AND LANDFALL.....	29
A) CONSERVATION OBJECTIVES OF INNER GALWAY BAY SPA	40
B) CONSERVATION OBJECTIVES OF GALWAY BAY COMPLEX SAC	45
Additional information on species/habitats	69
F) FIELD OBSERVATIONS AT BALLYLOUGHANE BEACH, CO. DUBLIN	76
G) MITIGATION MEASURES (AS SEEN IN ECIA).....	79
Pre cable laying mitigation.....	79
Construction phase mitigation measures.....	80
<i>Ecological supervision</i>	83
H) CUMULATIVE IMPACTS.....	84
I) POTENTIAL IMPACT AND THE SIGNIFICANCE OF THE IMPACT	84
References	87
APPENDIX I NOTES ON PROPOSED METHODOLOGIES	89
APPENDIX II. ENVIRONMENTAL CHARACTERISTICS OF REPEATER AND PSBU HOUSING MATERIAL.....	90
APPENDIX III: NATURAL HERITAGE AREAS WITHIN 15KM OF THE PROPOSED ROUTE.	92
APPENDIX IV RAMSAR SITES WITHIN 15KM OF THE PROPOSED ROUTE.	93
APPENDIX V OFFSHORE AREA (12NM-LIMITS TO LIMITS OF EEZ).....	94

1. INTRODUCTION

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

The following Natura Impact Statement has been prepared by **Altamar Ltd.** at the request of McMahon Design & Management Ltd. on behalf of Deep Sea Fibre Networks Ltd. as part of the application for a Foreshore Licence. The Foreshore Licence application relates to the installation and survey operations for the proposed Deep Sea Fibre Networks Ltd. fibre optic cable from Bilbao, Spain to the west coast of Ireland at Ballyloughane Strand, Galway Bay.

The proposed project will make landfall in Galway Bay Complex SAC and Inner Galway Bay SPA. The Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs have been consulted and requested a Natura Impact Statement, on potential impact of the main lay on Natura 2000 sites. Further discussions took place with NPWS in relation to further optimising the route at survey stage due to the finding of previously unrecorded subtidal sensitive communities in the vicinity of the cable during the preparation of this NIS. Inland Fisheries Ireland has been consulted in relation to the potential impacts on Atlantic salmon (*Salmo salar*), a feature of interest of the Lough Corrib SAC.

The purpose of this NIS report is to determine the impact, if any, of the survey for and the installation of, the proposed fibre-optic cable within the Irish 12nm limit and at the landing site in Galway Bay, individually or in combination with other plans or projects, on Natura 2000 sites. Following discussions with the National Parks and Wildlife Service (NPWS) an Ecological Impact Assessment (EcIA) was also requested in addition to this NIS. The EcIA is a standalone document and accompanies the NIS. However, it refers to sections within the NIS, so as to avoid unnecessary repetition e.g. methodology section.

Terrestrial elements of the project, extending inland from the beach manhole will form part of a separate application. The cable routing from the beach manhole will comprise the use of existing cable infrastructure (ducting) supplemented by sections of infill or linking infrastructure.

Background to Altamar Ltd.

Since its inception in 2001, Altamar has been delivering ecological and environmental services to a broad range of clients. Operational areas include residential, infrastructural, renewable, oil & gas, private industry, local authorities, EC projects and State/semi-State Departments. Bryan Deegan is the managing director of Altamar Ltd.. He is a marine biologist, MMO and an environmental scientist with 20 years' experience working in Irish terrestrial and aquatic environments, providing services to the State, Semi-State and industry. Bryan Deegan (MCIEEM) holds a MSc in Environmental Science, BSc (Hons.) in Applied Marine Biology, NCEA National Diploma in Applied Aquatic Science and a NCEA National Certificate in Science (Aquaculture). Bryan Deegan was a member of the MERC team that carried out subtidal surveys in Galway Bay in 2006. Altamar has developed in-house AA, EIA and environmental assessment procedures and Bryan acts as an independent "Environmental Expert" for Inland Fisheries Ireland. Altamar have previously carried out environmental assessments for site survey and main lay (AA screenings, NIS, and EcIA's) for fibre optic cable landfalls at Bull Island, Co. Dublin, Killala Bay, Co. Mayo, Garretstown, Co. Cork (including a Horizontal Directional Drill), Clew Bay, Co. Mayo and Rogerstown Estuary, Co. Dublin (including a Horizontal Directional Drill).

2. BACKGROUND TO THE APPROPRIATE ASSESSMENT

The Habitats Directive 92/43/EEC (together with the Birds Directive (79/409/EEC)) forms the cornerstone of Europe's nature conservation policy. The directive protects over 1000 animals and plant species and over 200 "habitat types" which are of European importance. In the Directive, Articles 3 to 9 provide the legislative means to protect habitats and species of European Community interest through the establishment and conservation of an EU-wide network of conservation sites (NATURA, 2000). These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Birds Directive), Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect NATURA 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment:

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

As outlined in the guidance document on Article 6(4) (January 2007):

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

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

- *Article 6(3) assessment results allow full traceability of the decisions eventually made, including the selection of alternatives and any imperative reasons of overriding public interest.*
- *The assessment should include all elements contributing to the site's integrity and to the overall coherence of the network as defined in the site's conservation objectives and Standard Data Form, and be based on best available scientific knowledge in the field. The information required should be updated and could include the following issues:*
 - *Structure and function, and the respective role of the site's ecological assets;*
 - *Area, representativity and conservation status of the priority and nonpriority habitats in the site;*
 - *Population size, degree of isolation, ecotype, genetic pool, age class structure, and conservation status of species under Annex II of the Habitats Directive or Annex I of the Birds Directive present in the site;*
 - *Role of the site within the biographical region and in the coherence of the NATURA 2000 network; and,*
 - *Any other ecological assets and functions identified in the site.*
- *It should include a comprehensive identification of all the potential impacts of the plan or project likely to be significant on the site, taking into account cumulative impacts and other impacts likely to arise as a result of the combined action of the plan or project under assessment and other plans or projects.*
- *The assessment under Article 6(3) applies the best available techniques and methods, to estimate the extent of the effects of the plan or project on the biological integrity of the site(s) likely to be damaged.*
- *The assessment provides for the incorporation of the most effective mitigation measures into the plan or project concerned, in order to avoid, reduce or even cancel the negative impacts on the site.*
- *The characterisation of the biological integrity and the impact assessment should be based on the best possible indicators specific to the NATURA 2000 assets which must also be useful to monitor the plan or project implementation."*

Plans

Plans, as defined by NPWS (2009), include all statutory and non-statutory land use, framework and sectoral plans and strategies to the extent that they have the potential to have significant effects on a NATURA 2000 site. This incorporates 'plans and programmes' covered by the SEA Directive 11, and other plans and strategies, including those that are designed or intended to benefit the environment or heritage, such as Heritage and Biodiversity plans, recreation/amenity plans or strategies, and River Basin Management Plans.

Project

The Commission (EC, 2006) puts the position as follows: "such a definition of project[i.e. definition of 'project' from the EIA Directive] is relevant to defining the concept of plan or project as provided for in the Habitats Directive, which, seeks, as does Directive 85/337, to prevent activities which are likely to damage the environment from being authorised without prior assessment of their impact on the environment", and goes on to say that "the fact that the activity has been carried on periodically for several years on the site concerned and that a licence has to be obtained for it every year does not in itself constitute an obstacle to considering it, at the time of each application, as a distinct plan or project within the meaning of the Habitats Directive".

3. STAGES OF THE APPROPRIATE ASSESSMENT

This Appropriate Assessment 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) and the European Commission Guidance '*Managing NATURA 2000 Sites*', 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.'

In order to comply with the above Guidelines, the Appropriate Assessment has been structured as follows:

1) Screening stage:

- Description of the proposed project;
- Identification of NATURA 2000 sites potentially affected;
- Identification and description of individual and cumulative impacts likely to result from the proposed project;
- Assessment of the significance of the impacts identified above on site integrity. Exclusion of sites where it can be objectively concluded that there will be no significant effects; and,
- Conclusions.

2) Natura Impact Statement: (Relevant to this Appropriate Assessment):

- Description of the NATURA 2000 sites that will be considered further;
- Description of significant impacts on the conservation feature of these sites likely to occur from the project; and,
- Mitigation/Recommendations/Conclusions.

3) Alternative Solutions (Not relevant to this Appropriate Assessment-screening):

If mitigation is possible that enables a risk to be avoided fully, then, subject to other necessary approvals, the project or plan may proceed. If mitigation measures are insufficient, or are not actually practicable and achievable to avoid the risk entirely, then, in the light of a negative assessment, the plan or project may not proceed. A wider search for alternative solutions may need to be considered – Stage 3.¹

4) Imperative Reasons of Overriding Public Interest (IROPI)/Derogation. (Not relevant to this Appropriate Assessment-screening):

¹ (DoEHLG, 2009) Appropriate Assessment of Plans and projects in Ireland: Guidance for planning authorities.

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

However, “where a proposal is unlikely to have a significant adverse impact on a habitat and/or species for which the site is designated, a clear, reasoned and scientifically rational explanation of why there is unlikely to be a significant effect should be provided. The Screening Statement should reflect this outcome; an Appropriate Assessment is not then necessary for the relevant habitat and/or species.

Where the likelihood of a significant effect cannot be excluded for a habitat and/or species for which the site is designated on the basis of the information available, the Screening Statement should reflect this and an Appropriate Assessment should be undertaken for the relevant habitat and/or species.” (NPWS, 2012)

4. NATURA IMPACT STATEMENT

A) Management of the Site

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

B) Relevance to the County Development Plan

As outlined in the Galway City Development Plan 2017-2023 the proposed landfall is in land zoned “G1 - Open space, park” which is “To provide for recreational and amenity uses”. Specific relevant objectives of the Galway City Development Plan 2017-2023 include:

Policy 9.13 Telecommunications: Support the development and expansion of telecommunication infrastructure (including the broadband network) within the city where appropriate, subject to environmental, visual and residential considerations.

Policy 4.2 Protected Spaces: Sites of European, National and Local Ecological Importance

Protect European sites that form part of the Natura 2000 network (including Special Protection Areas and Special Areas of Conservation) in accordance with the requirements in the EU Habitats Directive (92/43/EEC), EU Birds Directive (2009/147/EC) and associated national legislation.

Ensure that plans or projects within the Plan area will only be authorised and /or supported after the competent authority has ascertained based on scientific evidence, screening for appropriate assessment and /or a Habitats Directive Assessment that:

1. The plan or project will not give rise to an adverse direct, indirect or secondary effect on the integrity of any European site (either individually or in combination with other plans or projects); or
2. The plan or project will have an adverse effect on the integrity of any European site (that does not host a priority natural habitat type/and or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000; or
3. The plan or project will have an adverse effect on the integrity of any European site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000.

- Protect, conserve and promote the nationally designated sites of ecological importance, including existing and proposed Natural Heritage Areas (NHAs and pNHAs) in the city.
- Protect, conserve and support the development of an ecological network throughout the city which will improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive.
- Protect from inappropriate development the County Geological Sites in the city.
- Protect Local Biodiversity Areas, wildlife corridors and stepping stones identified in the Galway City Habitat Inventory 2005 and Galway Biodiversity Action Plan 2014-2024 in supporting the biodiversity of the city and in the Council’s role/responsibilities, works and operations, where appropriate.
- Encourage, in liaison with the NPWS, the sustainable management of features which are important for the ecological coherence of the network of European Sites and essential, by their linear or continuous nature or as stepping stones for the migration, dispersal and genetic exchange of wild species.
- Support the actions of the Galway City Heritage Plan 2016-2021 and Biodiversity Action Plan 2014-2024 relating to the promotion of ecological awareness and biodiversity, the protection of wildlife corridors and the prevention of wildlife habitat fragmentation.

- Co-operate with the NPWS, landowners and stakeholders in the preparation and implementation of management plans for designated sites.
- Protect and conserve rare and threatened flora and fauna and their key habitats, (wherever they occur) listed on Annex I and Annex IV of the EU Habitats Directive (92/43EEC) and listed for protection under the Wildlife Acts 1976-2000.
- Ensure that plans and projects with the potential to have a significant impact on European Sites (SACs or SPAs) whether directly, indirectly or in combination with other plans or projects are subject to Appropriate Assessment under Article 6 of the Habitats Directive (92/43 EEC) and associated legislation and guidelines to inform decision making.
- Achieve a sustainable balance between meeting future recreational needs (both passive and active) and the protection of the city's ecological heritage.
- Support the inclusion of natural features, such as trees, hedgerows, stones walls, ponds and the use of green design features in development layouts.
- Support and implement measures to control and manage alien/invasive species within the city boundary, where appropriate.
- Protect the ecological integrity of Statutory Nature Reserves, refuges for fauna and Annex 1 Habitats.

Policy 4.3 Blue Spaces: Coast, Canals and Waterways

- Protect and maintain the integrity of the coastal environment and waterways by avoiding significant impacts and meeting the requirements of statutory bodies, national and european legislation and standards.
- Conserve and protect natural conservation areas within the coastal area and along waterways and ensure that the range and quality of associated habitats and the range and populations of species are maintained.
- Ensure development and uses adhere to the principles of sustainable development and restrict any development or use, which negatively impact on water quality.
- Have regard to European and national best practice guidance when assessing development in or near coastal areas which is likely to have significant effects on the integrity, defined by the structure and function, of any designated European Sites, protected coastal and marine fauna and flora.
- Maintain and extend the achievement of the Blue Flag Beach status in co-operation with IW.
- Ensure any development within the aquatic environment shall be carried out in consultation with prescribed bodies and with adherence to their guidelines.
- Ensure that development does not have a significant adverse impact, incapable of satisfactory mitigation, on protected species.

C) Description of the Proposed Project

Background

Deep Sea Fibre Networks Ltd. is planning to construct a new sub-sea telecoms cable system linking Galway, on the west coast of Ireland to Bilbao on the north coast of Spain. This is referred to as the WINS System (Western Ireland Northern Spain) and the general line of the route is presented in Figure 1.

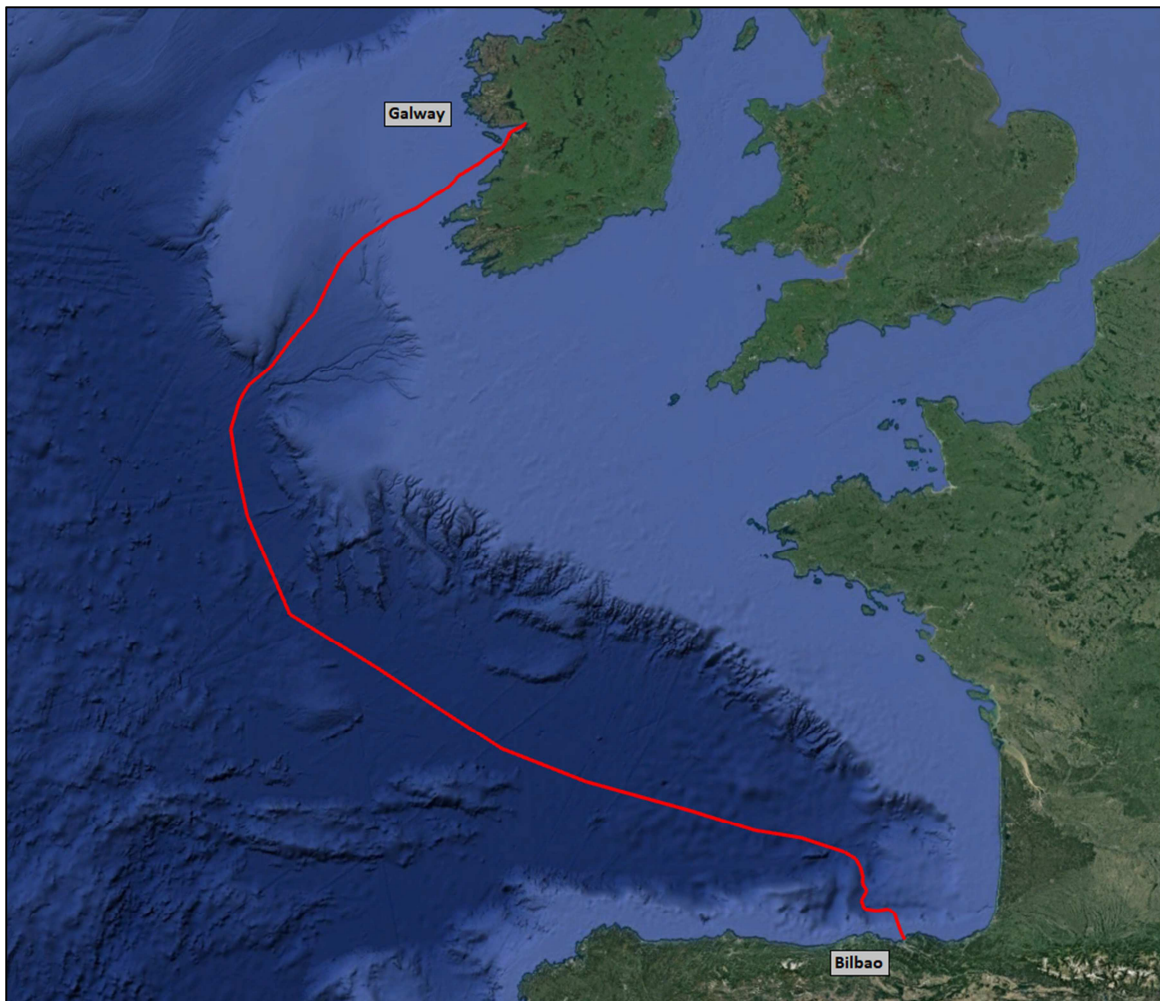


Figure 1. Schematic of the planned network.

Route

A route assessment was undertaken to establish an optimum corridor for a new high-capacity cable to link Ireland and the north of Spain. With careful route planning and a substantial level of data capture and survey interpretation, in conjunction with specific cable design and installation, this sector can provide optimum routing conditions for a robust, secure and reliable cable system.

The overall length of the route is 1,774 km with the majority of the system routed in deep water off the continental shelf. The objective of this routing is to minimize installation difficulties and maximize security of the system during its life. Of the 1774 km overall length only 325 km of the system is in water depth of less than 1500m. All of the cable crossings are also in deep water negating the need for plough up / plough down activities, guard vessels, post lay inspection and burial and associated weather delays and potential for cable damage during installation.

The line of the proposed route is presented in Figure 1 and in Figure 2. The planned route extends in a south westerly direction from a landfall at Ballyloughane Strand, Renmore, Galway City (Figure 3), proceeding out and then south of Galway Bay, before dropping into the deep water of the Porcupine Seabight and then turning south on to the Porcupine Abyssal Plain before turning south east to the Bay of Biscay and the landfall at Bilbao.

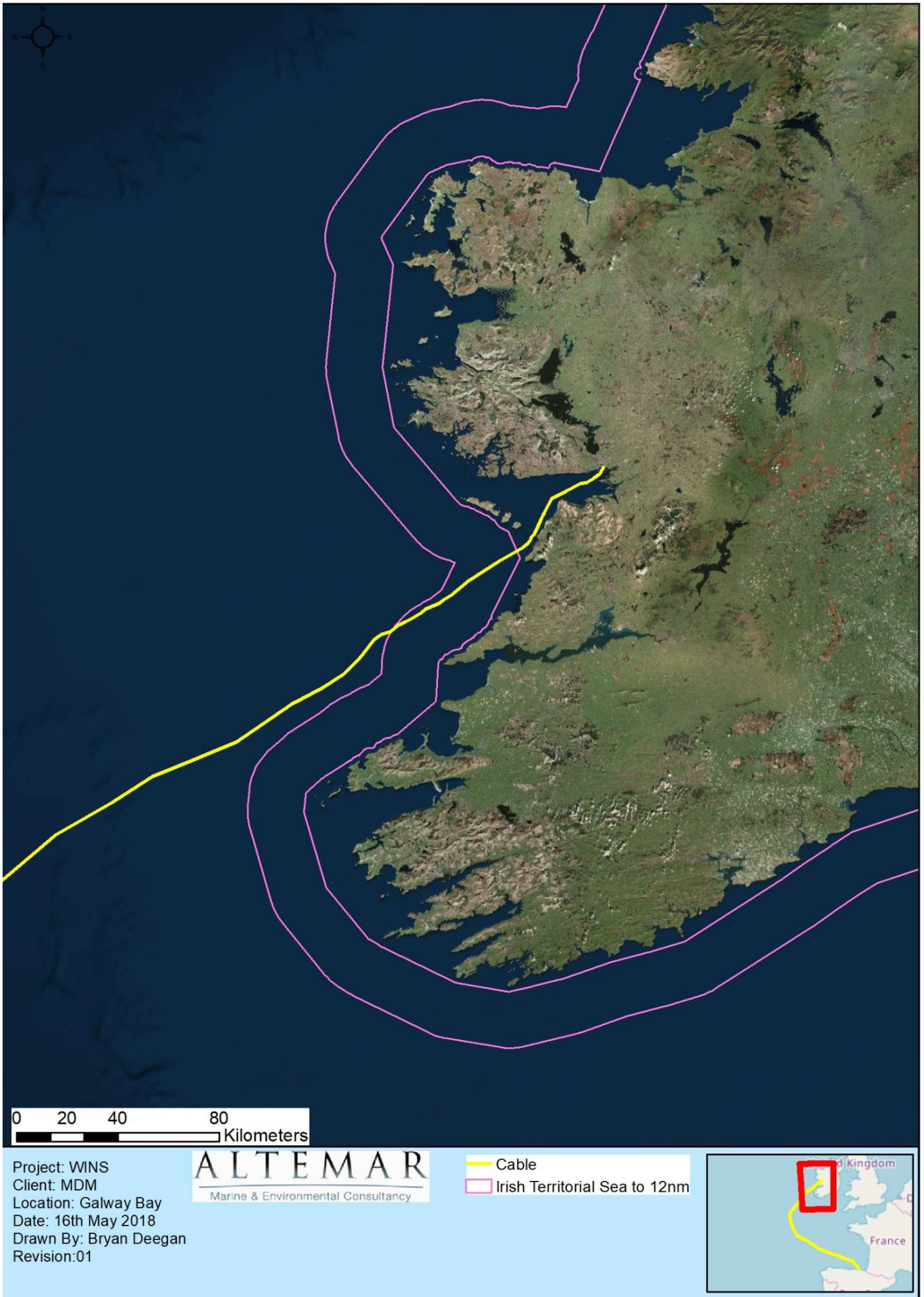


Figure 2. The proposed route through the Territorial Waters, past the 12nm limit and into the Galway Bay.

Alternative Sites

The project has previously investigated many landfall sites on the south west and west coast of Ireland. Following a desk based and visual review, Ballyloughane Strand was selected as the optimal route. As part of the route selection process a route has been selected targeting soft sediments, allowing for burial of the cable. Burial is the preferred option in order to ensure that the cable is protected from anthropogenic activities including fishing, shipping lanes, dredged channels, anchoring etc.

Seabed Sediments

The route has been selected to primarily facilitate burial of a cable, with the cable being laid passively over reef/bedrock when required. No destructive methods are proposed in reef areas. In the area from the Ballyloughane Strand to the mouth of Galway Bay sediments are soft allowing for burial. An area of reef is located on the west coast of Co. Clare and the cable will be laid passively over this reef. Once this area is passed the remainder of the route is in soft sediment.

It should be noted that the sediments in Galway Bay (Galway Bay Complex SAC (site code: 0268)) were examined for sensitive subtidal communities and the proposed route modified to avoid known sensitive communities. A detailed diving survey of the site was carried out in 2006 for NPWS as part of the Surveys of Sensitive Subtidal Benthic Communities in SAC's (MERC, 2006). The GIS outputs of these surveys included a detailed geospatial inventory of the dives and the boundaries of habitats encountered. The project used this geospatial habitat data to refine the cable routing within the SAC to avoid known sensitive communities. Following this routing revision a drop down video camera survey was carried out on the revised route, to further fine tune and groundtruth the cable routing, particularly in areas outside the surveys carried out in 2006. Further details of the communities encountered are detailed further in the EcIA.



Figure 3. Landfall location at Ballyloughane, Co. Galway.

Dates of proposed works

It should be noted that all site investigations and main lay elements will take place outside of the overwintering bird season (September to March).

<i>Works</i>	<i>Date</i>
Site Investigations	April 2019
Shore-End Installation	June 2019
Main-Lay	June - August 2019

Pre-Installation / Burial Assessment Survey

Prior to mobilisation of the main lay vessel, a detailed marine survey will be undertaken over the full width of the selected route corridor in order to fine tune and optimise the burial of the cable. The basis of the survey is to ground-truth the sea-bed conditions and check for any anomalies in terms of marine archaeology and any subsea environmental features. It will also form the basis for burial assessment throughout the relevant length of the route. The survey will include bathymetry, side scan sonar, sub-bottom profiling and magnetometer.

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 gear. The surveys will ensure that there are no gaps or un-surveyed areas between all of the different survey operations. For the marine route survey, the sidescan ranges will be limited to those providing the greatest resolution possible (able to resolve a 0.5m object or better), while following the requisite line spacing and overlap. The maximum speeds outlined will be used as guidelines. Bathymetry data collection will, at minimum, comply with the requirements in this document or with International Hydrographic Office standards (S44).

Survey line spacing is to be designed to ensure adequate coverage and overlap of geophysical measurements. For swath bathymetry, “20% overlap” signifies that adjacent acquisition swaths within the survey corridor overlap by 20%. For side scan sonar (SSS), 100% overlap requires two passes of complete coverage over a given area of sea-floor, with the two passes each ensonifying the sea-floor from opposite directions to ensure targets are adequately imaged. In order to ensure data continuity, the following overlaps between survey regions are to be established as a minimum;

Table 1. Overlap of survey Areas:

Survey	Overlap
Landfall Site Survey to Diver Swim	50m
Diver Swim Survey to Small Boat	50m
Small Boat Survey to Offshore	500m

A video survey will be carried out in the Galway Bay Complex SAC, as discussed with NPWS, to seek to further optimise the route in the vicinity of sensitive subtidal communities.

Landfall Site Survey

A Topographic Laser Scanner in combination with RTK positioning will be used to digitalize the landing site area of the beach along the line of the proposed cable route out to the low water mark.

Site Investigations at Ballyloughane will consist of;

- 3 Trial Pits at 50m centres on the beach at Ballyloughane. Trial Pits will be excavated, logged, photographed and backfilled in a single intertidal period of less than 1 hour. The trial pits will be backfilled with the original excavated materials in the sequence in which they are excavated.
- Bar probes at 25m centres from the seaward Trial Pit to the Low Water Line.
- Bar probes at 25m centres from the Low Water Line to the 3m water depth contour.
- Archaeological investigations (if relevant).

Diver Swim Survey

The Diver Swim Survey will extend from the low water line outward to the small boat survey limits in accordance with the defined overlaps. A diver swim rope with 25m gradations will be positioned along the route. Dive lines will be configured to provide representative coverage across the entire survey corridor (nominally spaced at 125m). Bathymetry will be measured by diver depth gauge at each 25m gradation. Geomorphology will be determined by underwater video along the length of the diver swim rope. The diver video will be undertaken along each line in the survey swathe; divers will use a dive slate or other clearly written method to indicate Kilometre Point (KP) and water depth at the specified gradations along the rope. Tie-lines will be nominally spaced at 125m parallel to shore and will verify primary survey data within the Diver Swim area. Bathymetry and seabed composition are to be noted along tie-lines. A minimum of 2 tie-lines will be performed. The Diver Swim Survey will also investigate and identify any obstacles found during the Small Boat Survey up to safe diving limits. Two spot dives will be considered part of the standard scope of work. The Diver Swim Survey will comply with the requirements of the Underwater Archaeology Unit of the Department of Arts, Heritage & the Gaeltacht.

In order to get relevant detailed information in deeper water it is necessary to use acoustics. Video was considered, but deemed to be ineffectual for the survey, as outlined in the rationale Appendix I for underwater acoustic survey.

Table 2. Diver swim survey requirements

Survey Area	Depth Range	Corridor	Min. # of Lines
Diver Swim	0 (LAT) to 3m	250m	5

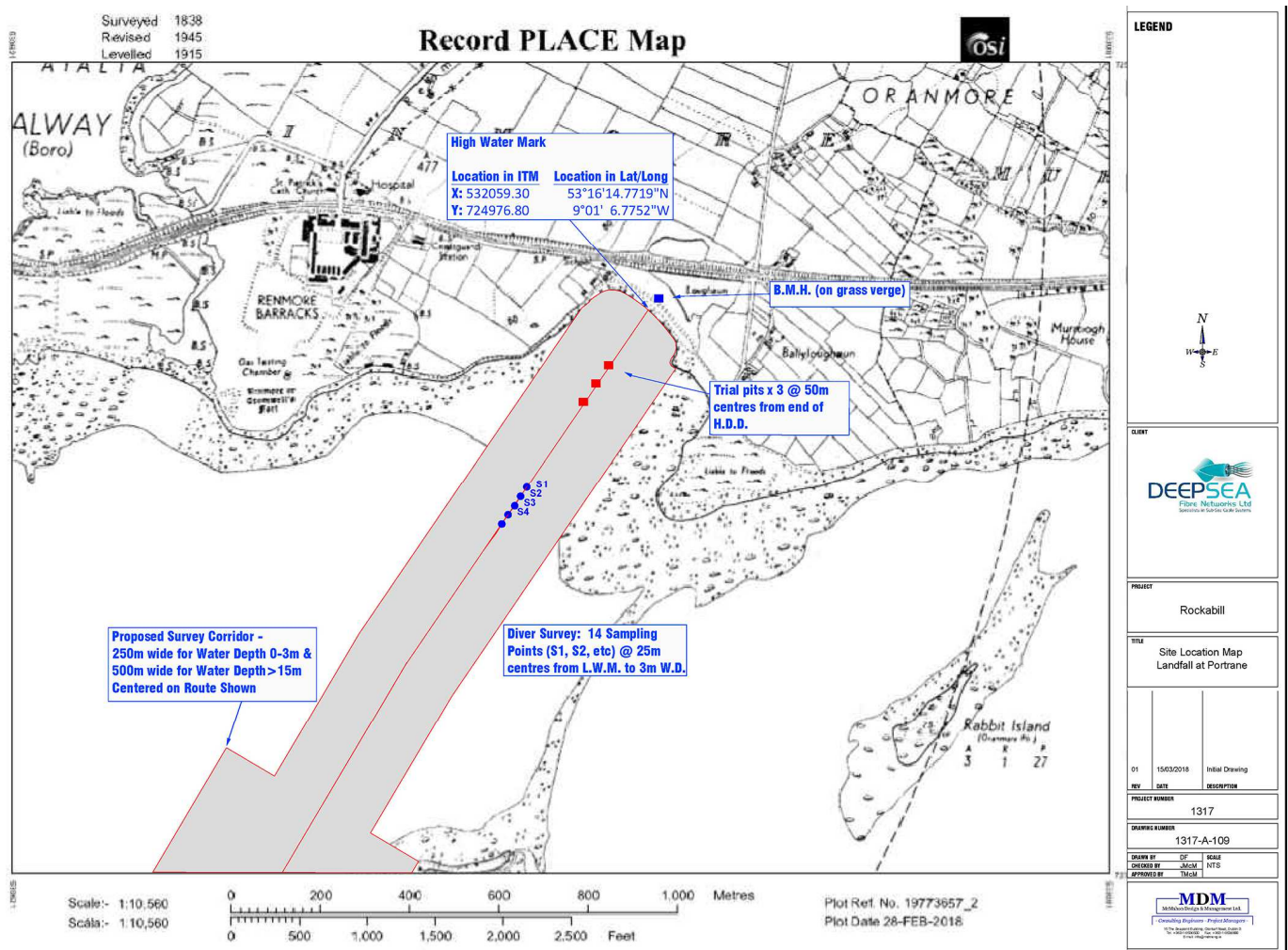


Figure 4. Proposed Landfall, diver swim sampling points and trial pit locations

Small Boat Survey

The area extending seaward from the 3m water depth contour and inshore of the safe working draft limits of the primary survey vessel will be accurately surveyed with a small craft using multibeam echosounder (MBES), sidescan sonar 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. Tie-lines will be performed to verify primary survey data and will have a nominal spacing of 10 times the primary line spacing with a minimum of two tie-lines. A minimum of seven survey lines, based upon the Survey RPL, is required. A rationale for using underwater Acoustics is seen in Appendix I.

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 diver swim survey (spot dive) may be required to investigate and identify any obstacles or archaeological features found during the small boat survey up to safe diving limits. A line plan showing number of survey lines as a function of depth will be provided prior to start of survey operations.

Table 3. Small Boat Survey Requirements

Survey Area	Depth Range	Corridor	Min. # of Lines	Min. Overlap	Max. Speed
Small Boat	3m to 15m	500m	7	SSS: 100% MBES Bathy: 20%	4 knots

Offshore Survey

A continuous bathymetric swathe (Multibeam Echosounder), along with side scan sonar imagery and sub-bottom profile will be obtained, centred on the preliminary route and along all wing lines needed to complete the corridor coverage. A minimum depth accuracy of 0.5% is required. Sub-bottom equipment will be able to discern the nature and density of upper 3m of seabed, and is to be used on a non-interfering basis with other sounding systems. Additional sounding lines may be necessary to identify any obstacles or archaeological features that may be encountered, and/or to meet the overlap and corridor requirements.

Table 4. Offshore Survey

Survey Area	Depth Range	Corridor	Min. # of Lines	Min. Overlap	Max. Speed
Offshore	> 15m	500m	3	SSS: 100% MBES Bathy:20%	4 knots

Seabed Sampling

Seabed sampling will be required at locations covered by the Small Boat and Shallow Water Surveys.

A minimum of two attempts will be made at each sampling location to acquire a suitable seabed 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 soils. Recovery of rocks and/or large size granular material will be taken as indication of a hard seabed and be deemed an acceptable sample.
- Gravity Core – recovery of no less than a 2m deep core of soil. If stiff or hard soils are encountered below 1m of seabed and are clearly indicated in the sample, a 1m+ soil sample will be deemed acceptable. Any sample site yielding less than 1m of recovery must be investigated a second time unless there is obvious damage to the coring equipment indicating a hard or rocky substrate.
- CPT – Penetration to the 2m target, but a maximum of 3m below seabed. Any push resulting in less than 2m penetration will warrant a second attempt.
-

Table 5. Seabed Sampling Requirements

Survey Area	Depth	Type	Avg. Spacing	No. Samples
Small Boat	3 - 15 m	Grab Sampler	1 per 500 m	2
Offshore	> 15m	Gravity Corer (GC) or Cone Penetrometer (CPT) Grab Sampler (After GC/CPT Failure)	1 per 10km	6

The marine survey and site investigations will be undertaken in compliance with best practice and having regard for the protection of marine mammals. The marine survey and site investigations will be undertaken along the route line shown on the Foreshore Licence Map Drawings. However, a 500m wide route corridor is shown to allow for local diversions in the event of obstructions or other routing considerations.

Survey Equipment Parameters

The marine survey will be carried out in compliance with the “Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters,” and with the “General Requirements for a Geophysical Survey for Archaeological Purposes” The marine surveys will include:

- Bathymetry
- Side Scan Sonar
- Sub-Bottom Profiling
- Magnetometer

Equipment and Procedures

The survey equipment acoustic properties have the following characteristics (Table 6);

Table 6. Survey Equipment

Equipment Type	Frequency (Energy level in dB re 1 µPa)
Dual Frequency Single Beam Echosounder – <i>Reson Navisound 420</i>	33 and 210kHz (168 – 174)
Dual Frequency Side Scan Sonar – <i>Edgetech 4200 Sidescan Tonfish</i>	100 and 400kHz (226 effective) 100/400 kHz and 300/600 kHz
Sub-bottom Profiler – <i>Geoacoustics 4 x 4 Hull-mounted SBP Pinger System</i>	3 – 7.5kHz (-225)

In the case of the Small Boat Survey the survey line spacing will be set at 50m for the Side Scan Sonar. In deeper water the spacing will increase. Specific soft-start procedures (to comply with the “Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters”) will be developed and incorporated in the project execution plan before mobilisation. The duration of noise-generating surveys will be reduced to the minimum necessary to collect results of sufficient quality. The survey will be undertaken by a specialist survey vessel having experience of marine survey and having approved appropriate survey equipment. Details of the survey vessel and of the survey equipment to be used will be made available prior to commencement of the survey. The data to be provided will include;

- Name of vessel
- Name of Captain
- Name of Client’s Representative
- Contact details for the vessel
- Details of Multi-Beam Equipment including;
 - The sound intensity, the frequency of pitch and the tone or bandwidth for the Echo Sounder, the Side Scan Sonar and the Sub-Bottom Profiler.

Cable Landfall at Ballyloughane Strand

The proposed landfall is located at the northern end of the sandy beach Ballyloughane (Figure 3) to the east of Galway City. The shoreline at Ballyloughane is in the form of a grass strip at road level with a drop of the order of 1-2 metres on to the beach. There is a wall at the top of the beach to protect a grass area and car park from erosion. At beach level there is a short sloping section which then levels out to form almost a flat foreshore over the 460 metres out to the Low-Water Line.

Horizontal Directional Drill

Taking the features of the shoreline into account and to cause minimal impact on existing infrastructure and ecology it is planned that the shore-end will be installed by means of a Horizontal Directional Drill which will be carried out in advance of the cable lay. It is planned that the drill pit will be located in the “green” immediately north of the public road, which is outside of conservation areas (Natura 2000, NHA & Ramsar) (Figure 5). The drill-casing will commence in a pit 2.5m below ground level and this will enable it to cross below the road and well below the existing beach level at the upper shoreline. This form of installation will avoid any excavation or damage to the shoreline and will ensure that nothing is done which would affect the stability of the shoreline.

The drill-casing will extend well beyond the shore-line and the shelving beach adjacent to it and will terminate in the flat sandy foreshore at a depth of 1.5m below beach level approximately 60 metres from the shoreline, within the SAC and SPA.

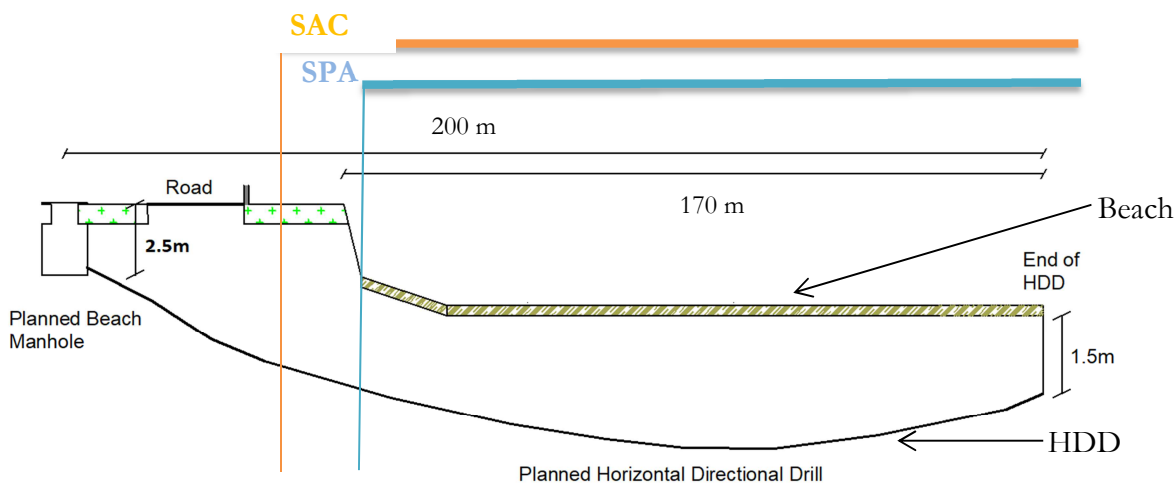


Figure 5. Schematic of the proposed HDD

The selected HDD rig for this project is a complete unit, with all the necessary equipment required for the drill formation. All consumables for the operation will be transported to the site using flatbed and closed trucks. The HDD rig will be set up in the “green” at the landward end of the cable detailed in Figure 5.

The procedure to be followed consists of three stages. First, a perimeter will be set and the site will be clearly signposted informing the general public of the work in progress, while also limiting access to the site. All the equipment necessary for the pit excavation and drill rig installation will be transported to the site. The pit will be dug and lined with geotextile and PE sheet to avoid seepage of drilling fluids in the surrounding soil. An ecologist will be on site during HDD setup to highlight sensitive habitats in proximity to the site and to ensure the integrity of these habitats including the Natura 2000 sites and pNHA, are retained.

The HDD rig will be placed in position and prepared for operations while rod placement will be conducted by a crane truck stationed next to the drill rod case. The produced sediment does not constitute harmful substance to the environment and the surrounding area as bentonite is a naturally occurring substance whilst all the additives employed for salt water tolerance are biodegradable. It is planned to clean out and flush the steel drill casing with water before finishing the drill. The drill will stop at the required distance and there will be no punch-out. Accordingly no bentonite is expected to escape from the HDD bore. No machinery will be placed on the intertidal sand during the HDD. After the HDD is complete a digger will excavate the hole 1.5m deep at the site of the termination of the HDD.

Drilling Fluids

Drilling Mud Mixing and Preparation

The preparation of drilling mud requires the use water, drilling additives and a mixing unit. The drilling additives to be used contain 98% bentonite in the form of small particles. There are three components to be added to the drilling mud with different functions regarding borehole stabilization, cuttings removal and fluid characteristics. All components are biodegradable and environmentally safe. However, if released in large quantities to the aquatic environment it could potentially impact fish and or invertebrate species by impacting on the oxygen transfer on gills by coating the membrane surface. In case of the landfall at Ballyloughane the total volume of the HDD casing will only amount to 1.90 cu metres.

The main components are:

- 1) *Soda Ash*: In case that the freshwater available in the area has a relatively high concentration of Ca and Mg ions (to be assessed prior to commencement), soda ash, i.e. sodium carbonate, is added to the mix to help raise pH and reduce ionic content, countering in such way the effects on the other additives.
- 2) *HEADS Teqgel Special*: This is the main bentonite component that is designed for environments rich in calcium, and will provide the bentonite necessary to form the borehole wall. It is an effective viscosifier and stabilizer in low consolidate, porous formations resulting in low water loss levels and excellent carrying capacity at low annular velocities. It also provides effective lubricity for the drill head.
- 3) *HEADS Teqbio XC*: This is an additive designed for maintaining better cutting suspension and borehole consolidation in salt and brackish water environments. As a biodegradable polymer, it is the chief moderator of the rheological characteristics of the drilling mud and content will be adjusted based on the returning mud's characteristics and the derived hole-cleaning rate.

Noise Generation

During the HDD there are 5 potential sources of noise. The following noise levels at distance were calculated using the formula*:

Sound level L and Distance r

$$L_2 = L_1 - |20 \cdot \log\left(\frac{r_1}{r_2}\right)| \quad L_2 = L_1 - |10 \cdot \log\left(\frac{r_1^2}{r_2^2}\right)|$$

$$r_2 = r_1 \cdot 10^{\left(\frac{L_1 - L_2}{20}\right)} \quad r_1 = \frac{r_2}{10^{\left(\frac{L_1 - L_2}{20}\right)}}$$

Sound Source	dB@ 2m	dB @ 1km
HDD Rig	80	26
4 No. Pumps	65	11.02
Mud Pump	85	31.02
Shale Shaker	80	26
Generator	75	21.02

* However, it should be noted that this formula does not take into account weather and noise travelling over water which may increase or decrease perceived sound levels at distance.

Data pertaining to the Horizontal Directional Drill is as follows;

- Length of Horizontal Directional Drill – Approximately 200m
- Internal diameter of Drill-Casing – 109mm.
- Drill-Casing Material S-135 High Strength Steel.
- Length of individual Drill-Casing Pipes – 6.1m.
- Entry Angle – Less than 10°.
- Descent Angle – Less than 15°
- Ascent Angle – Less than 15°.
- Exit Angle – Less than 10°.
- Composition of drilling fluid – 60 to 70kg Bentonite per 1m³ of water.
- Maximum volume of drilling fluid in casing – 1.9 m³.
- Expected drilling rate – Approx. 200m/day.
- Planned working hours – 12 hours/day

Site Preparation & HDD Rig Set Up

The procedure to be followed consists of three stages;

1. A perimeter will be set up and the site will be clearly signposted informing the general public of the work in progress while limiting access to the site. The minimum area necessary will be utilised to reduce the impact of the works.
2. All the equipment necessary for the drill pit and drill rig installation will be transported to the site by public road pending the excavation of the pit and the final positioning of all necessary tools and equipment.
3. The pits will be dug and lined with geotextile and polyethylene sheet to prevent any seepage of drilling fluids into the surrounding soil.

HDD Operations

The drilling process will be closely monitored and logs will be kept over the entire duration of the operations. The drill design will be followed so that the achievable drill will be within acceptable tolerances. The bore alignment will follow the reference alignment shown on the plans and will be accurate to within the following tolerances:

- Installation of the horizontal directional drill will be within 1 m of the centreline of the bore indicated on the drawings at the bore entry.
- Installation of the horizontal directional drill will be within 3 m of the centreline of the bore indicated on the drawings for the entire length of the bore.
- The bore exit angle will be maintained at ten (10) degrees or flatter.

Drill Head Tracking System

The method employed to monitor the progress of the HDD necessitates the use of a wire-line connected transmitter system in order to provide sufficient data so that the drill bit's relative position is real-time recorded throughout the entire drilling operation. A non-magnetic sonde will be installed on an adaptor casing following the mud motor attachment in the bore and wire-lined back to the HDD Rig. This sonde is responsible for transmitting a signal to provide real-time information regarding the drill bit's azimuth, vertical distance from the receiver (which is translated as depth) as well as its coordinates (latitude – longitude). All information transmitted is constantly displayed in a remote monitor mounted on the HDD machine so that the operator is always aware of the precision of the bore's progress.

Drilling Fluid/Bentonite

Bentonite is commonly used as drilling mud to lubricate and cool cutting tools, to remove cuttings and help prevent blowouts. Bentonite is a naturally occurring clay. It is inorganic, non-toxic, non-irritating. It has a specific gravity of approximately 2.4 and comes in the form of a grey powder. It expands when wet and, when mixed with water at a concentration of the order of 60-70kg of bentonite powder per m³ of water, it takes on the characteristics of a gel. Bentonite is widely used in the construction industry as a drilling fluid, as a lining for the base of landfills and for the construction of curtain walls to waterproof below-grade excavations.

Drilling Fluid Containment

It is planned to use a “drill & leave” scenario using steel drill casing pipes and then leaving them in place. When the HDD reaches its target length the steel drill casing will be cleaned and flushed with water prior to terminating the drilling. There will be no punch-out. Drilling will stop and a small excavation made on the beach to reach the end of the pipe. The drill head will be removed, a messenger line inserted and a cap placed on the end of the pipe. Whilst it is anticipated that no bentonite will escape from the HDD bore which will be 1.5m below the sand surface, any residue which may escape will be very little and will be contained in the excavation hole and removed. The drill will be timed so that there will be no water over the drill head during intertidal HDD operations. All necessary precautions shall be put in place to protect other foreshore users in accordance with relevant Health and Safety Legislation with temporary fencing, barriers and signage in place around the location of the reception pit.

On-Shore Bentonite Removal

The volume of fluids and cuttings produced during the HDD process will be removed from the landside drilling pit at regular intervals by way of sludge pumps and sent to the recycling unit positioned alongside the drilling pit. Solids can be optically assessed with accuracy after the fluid turbidity clears and the volume of fluids can be also calculated. All residue will be disposed of in accordance with the requirements of Galway City Council.

Completion of Advance Works

The installation of the messenger line marks the completion of the Advance Works seaward of the High Water Line. The small reception pit on the beach will be backfilled carefully using the excavated material in the presence of a marine ecologist.

Site Restoration

On completion of the drilling operations, a Beach Manhole will be constructed in the vicinity of the drill pit and the site will be restored to its prior condition. All materials and equipment will be removed and the site area will be cleaned and reinstated to its original condition. This will include the following:

- Remove all debris and project related material from the site at the completion of the work.
- Remove all evidence of machinery presence and reinstate the ground to its original condition.
- Replant any and all vegetation damaged during the drilling operations.
- Repair any damage to structures such as kerbs and fences.
- Re-seed the area of the works.

In addition to the above, the drill pit’s surface will be cleaned by means of an excavator/front loader and will be backfilled with the previously excavated material. Before the site is completely vacated, the appointed ecologist will revisit the site to make sure that there are no issues from their perspective

Beach Manhole

The beach manhole is to be constructed in the grassed area north of the road at Ballyloughane Strand. The Beach Manhole will be 3m long x 2m wide x 2m deep and is to be constructed in reinforced concrete. Only the manhole cover will be visible at the surface once the construction is complete.

Ocean Ground Bed

An ocean ground bed is a set of electrodes which provides the return path for the electrical circuit that powers the repeaters (amplifiers) in the submarine cable system. The Environmental Characteristics of Repeater and PSBU Housing Material are seen in Appendix II. The ocean ground bed is typically buried at least 2m below ground level. The plan dimensions of the ground bed will be 6m in length and 1m in width – it is effectively a 6m long trench. This will be covered and the ground reinstated.

Cable Installation on the Beach.

The cable installation from the end of the HDD out to the low water line will be installed by a cable plough at low tide (Plate 1), outside of the overwintering bird season. The cable will be floated ashore from a Shallow Draft Lay Vessel using ribs and buoys at high tide. Once the tide ebbs, the end of the HDD duct will be exposed and the cable will be inserted in the HDD duct and pulled into the Beach Manhole where it will be secured. A cable plough will then be pulled by a low-pressure dozer from the end of the HDD duct out to the Low Water Line with the cable being inserted and buried as the plough moves towards the low

waterline. Target burial depth is 1.5 metres. At the Low Water Line the dozer will be uncoupled from the cable plough and will then reverse towards the shoreline in the same track and will backfill the plough trench by back-blading towards the shore in advance of the flood tide. The surface will be naturally reinstated by wave action as the tide comes in. The cable plough will then be attached to the Shallow Draft Lay Vessel and the deployment and burial of the subsea cable will continue at 1kn to the 15 metre depth contour where the Main Lay Vessel will take over.

As outlined in the MDM planning report, this method has previously been used for the installation of the ESAT 2 cable at Sandymount and for Hibernia – Segment D at Sutton and proved to be quite successful and to have minimal impact.



Plate 1. Cable Plough



Plate 2. Low Draft lay vessel

Offshore Cable Installation

Pre-Lay Grapnel Run

A Pre-Lay Grapnel run will be undertaken prior to commencement of Main-Lay. This activity is to ensure that the planned line of the cable is clear of seabed debris which may include chains, steel cables, anchors nets etc. Any debris recovered will be hauled on-board and disposed of at an appropriate landfill site.

Cable Installation

At high tide, the Main Lay vessel will pick up the end of the cable for the Inshore Section and this will then be jointed to the main cable on board the Main Lay Vessel. The Main Lay Vessel will then proceed to deploy and bury the cable in the seabed using a sea-plough. The sea-plough is towed by the Main Lay Vessel and is designed to bury the cable at a depth which will be secure from fishing activities.

The plough uses a minimally invasive plough-share to create a furrow in the seabed approximately 750mm in width. As the plough moves forward the cable is placed in the bottom of the furrow which backfills with the natural movement of sediment on the seafloor. Typical ploughing speed is less than 1 knot and is dependent on the stiffness of the seabed sediment. There is no significant noise generation during ploughing operations. Cable installation by plough produces only a minor plume of suspension of seabed sediments in the water column and this is transient and localised due to the nature of the ploughing and natural backfill activities. A sketch which illustrates the Main Lay cable installation is presented in Figure 6. The target burial depth for the WINS cable systems is 1.5 metres. In areas of stiff sediment, the actual burial depth may be reduced but is planned to be still at a depth which will protect the cable from fishing operations and generally not less than 0.4 to 0.6 metres.

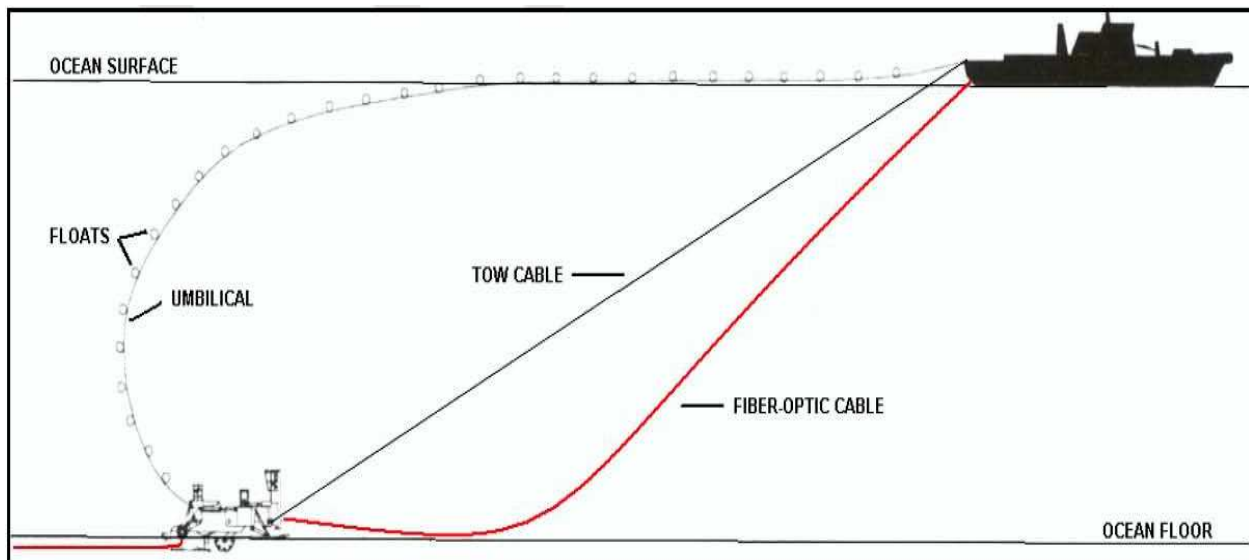


Figure 6. Cable Installation and Plough Burial (Source: TESSubCom)

Bedrock Areas

Following the initial site assessment it is proposed that geogenic reef/bedrock areas will be avoided within the Galway Bay (Inshore) SAC. Burial of the cable in sediment is possible along its entire length with the exception of an area of reef off the coast of Co. Clare where the cable will be laid passively on the reef surface.

Timeline

The project team have been made aware of the sensitivities of the proposed project and carrying out works in an SAC and SPA. As a result the proposed schedule has been developed to ensure that all operations are carried out outside over-wintering bird season (September-March inclusive)

Pre-submission Consultation & Application Preparation	April-June 2018
Submit Main-Lay Application	June 2018
Contracts for Main-Lay & Cable	August 2018
Site Investigations	April 2019
Shore-End Installation	June 2019
Main-Lay	June - August 2019

Environmental Characteristics of SL Cable Operating Current

The SL 17 and SL 21 cables that are to be used in the project are designed to conduct system power for repeatered cable systems with a maximum operating DC current of up to 10 amps. The extremely high insulating properties of the outer polyethylene jacket prevent current leakage. Therefore, environmental effects associated with current leakage are negligible. Localized temperature effects in the vicinity of undersea cable systems have been evaluated based on the maximum powering characteristics of a cable system. The fundamental relation governing the maximum power dissipated P , in a length of cable with resistance R , and applied current I , defines the maximum value for heat dissipation. TE SubCom's SL cables exhibit very minimal temperature increase due to powering with heat dissipation rates of less than 3 watts per kilometre of cable. As a point of reference, if a 3 watt power source is used to heat a tank containing 1,000 litres (1 cubic meter) of water, it would take more than 387 hours to heat the water one degree Celsius. The low heat output, large quantity of water surrounding the cable, and movement of water due to currents and tides result in a negligible environmental effect.

Double Armour Cable will be used in Irish waters. TE Subcom's SL cable is an industry standard core cable which is utilized in all present TE Subcom fibre optic telecommunications cable systems throughout the world. Information such as high-speed data and voice is transmitted via lightwave through the optical fibres contained within the central Unit Fibre Structure (UFS). A cut-away section of the Double Armour Cable is shown in Figure 7. The double armour, consisting of two layers of galvanised wire wrapped

around the cable, is coated with hot-blown petroleum asphalt and wound with asphalt-soaked yarn. The finished DA Cable has an outer diameter of 35.9mm.

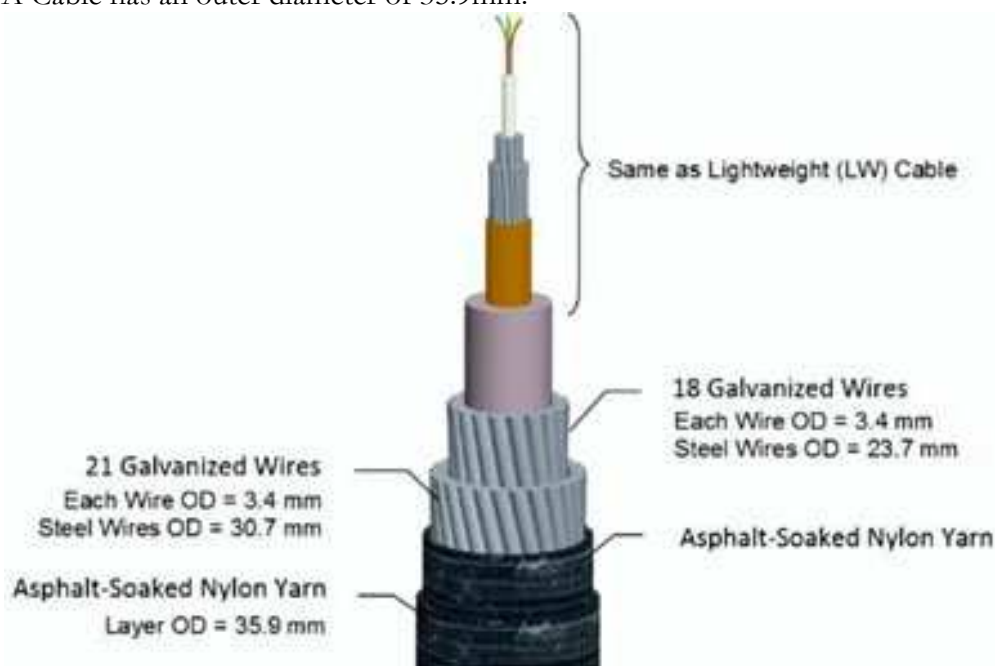


Figure 7. Cut-Away Section of Double Armour Cable

The trans-Atlantic fibre-optic cable will have Repeaters approximately 80km apart. For details of the repeaters that are to be used see Appendix II. These are “Optical Amplifiers” whose primary purpose is to boost the optical signal along the route. The copper conductors inside the cable power these Repeaters. There will be a single repeater within the 12 mile limit at approximately Kp.80.

Environmental Characteristics from SL Cable Magnetic Fields

An extremely low magnetic field may be generated at the exterior of the SL cable surface during normal operation. The maximum magnetic field intensity is at the exterior cable surface and decreases inversely with distance from the cable. The magnetic fields induced by cable powering are on the order of 30 to 38 microtesla (μT) at the cable surface. These values are lower than the background magnetic field produced by the earth ($60 \mu\text{T}$). Scientific literature suggests that few species are able to detect and differentiate features of weak magnetic fields from background noise. Therefore, the magnetic fields produced by TE SubCom’s SL undersea cables would not be expected to disrupt marine organisms. As an example of how the magnetic field decreases with distance from the cable, at 1 meter the magnetic field would be .30 to .38 μT or $1/100^{\text{th}}$ of what it is at the surface of the cable.

Decommissioning

The projected lifespan of the cable is a minimum of 25-40 years. Once the cable has passed its operational lifespan the decommissioning procedure will follow best practice guidelines at that time. This may result in the cable being left in situ, partial recovery of complete recovery/dismantling. Subject to the best practice guidelines the appropriate consultations will take place with statutory authorities.

D) Identification of NATURA 2000 sites/habitats & species (Within 12nm Limit)

Natura 2000 Sites.

The cable route, Irish territorial waters and Irish Contiguous Zone, with a 15km buffer showing proximity to Offshore SAC's is seen in Figure 8. The locations of all SPA's sites within 15km of the survey and cable route are seen in Figure 9. Special Areas of Conservation within 15 km of the proposed survey route and landfall are seen in Figure 10. Proposed Natural Heritage Areas and Ramsar Sites within 15km of the proposed route are seen in Appendix III and Appendix IV respectively. The proximity to offshore SAC's, carbonate mounds in addition to offshore cetacean activity in vicinity of the proposed offshore cable route are seen in Appendix V.

The NATURA 2000 sites within 15km of the proposed route and landfall are:

Special Protection Areas

1. Inner Galway Bay SPA (proposed cable route and survey corridor pass through this SPA)
2. Connemara Bog Complex SPA (12 km from cable route corridor)
3. Lough Corrib SPA (5.0 km from cable route corridor)
4. Cregganna Marsh (6.3 km from cable route corridor)
5. Cliffs of Moher SPA (1.3 km from cable route corridor)
6. Mid Clare Coast SPA (13.6 km from cable route corridor)

Special Areas of Conservation

1. Special Areas of Conservation
2. Galway Bay Complex SAC (proposed cable route and survey corridor pass through this SAC)
3. Lough Corrib SAC (3 km from cable route corridor)
4. Connemara Bog Complex SAC (13 km from cable route corridor)
5. Lough Fingall Complex SAC (11 km from cable route corridor)
6. East Burren Complex SAC (11.5 km from cable route corridor)
7. Moneen Mountain SAC (9.1 km from cable route corridor)
8. Ballyvaughan Turlough SAC (9 km from cable route corridor)
9. Black Head-Poulsallagh Complex SAC (1 km from cable route corridor)
10. Ballyteige (Clare) SAC (8 km from cable route corridor)
11. Inagh River Estuary SAC (8.4 km from cable route corridor)
12. Carrowmore Point To Spanish Point And Islands SAC (12.7 km from cable route corridor)
13. Inisheer Island SAC (6.1km from cable route corridor)
14. Inishmaan Island SAC (11 km from cable route corridor)
15. Inishmore Island SAC (14.9 km from cable route corridor)

Initial screening of these sites can be seen in Table 7. The proposed landfall is within a designated SAC, SPA, RAMSAR Site, pNHA (Ballyloughane Strand).

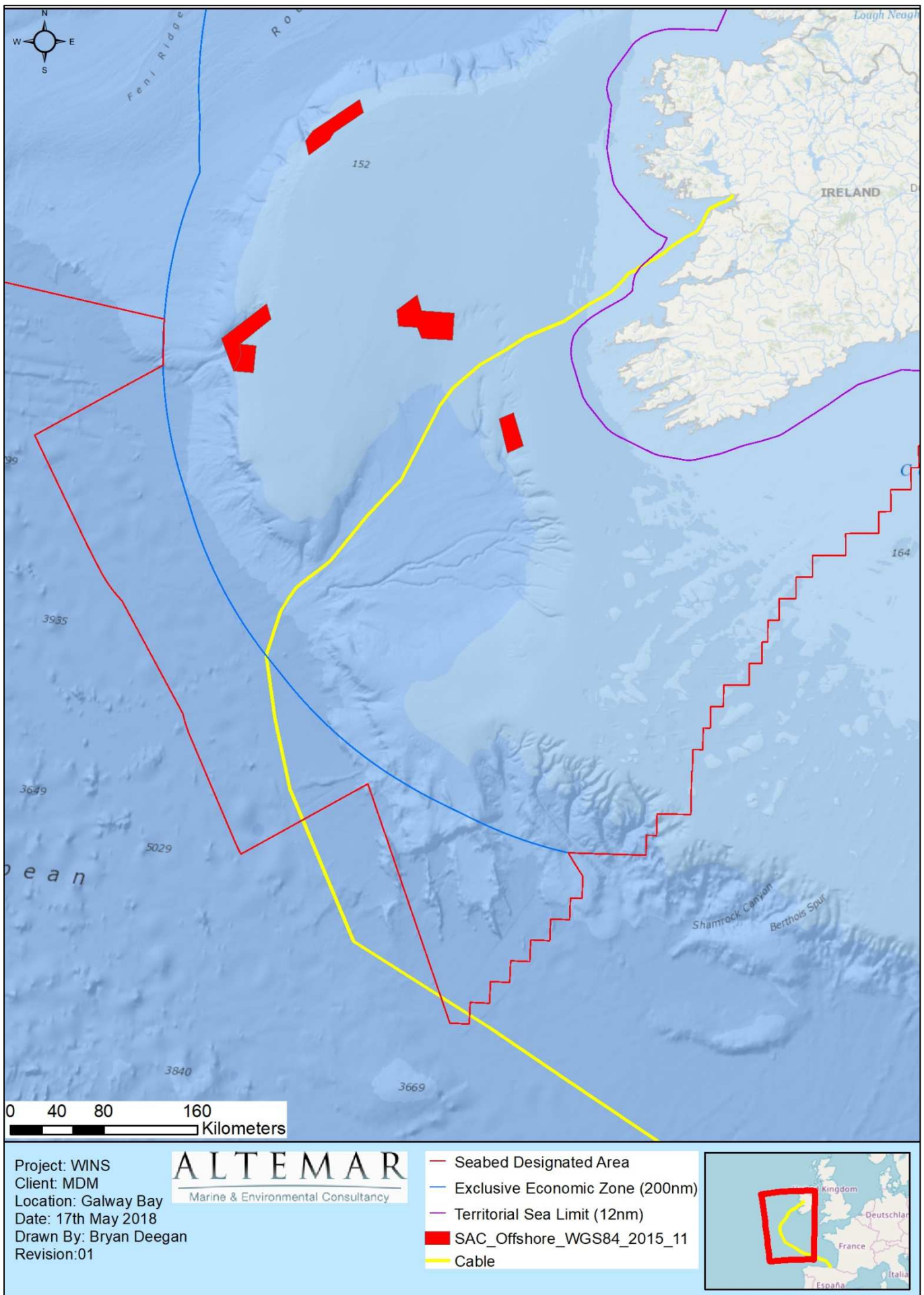


Figure 8: Fibre optic cable route in relation to the Irish EEZ, Designated Irish Continental shelf and Offshore SAC's (no offshore SAC's in the area).

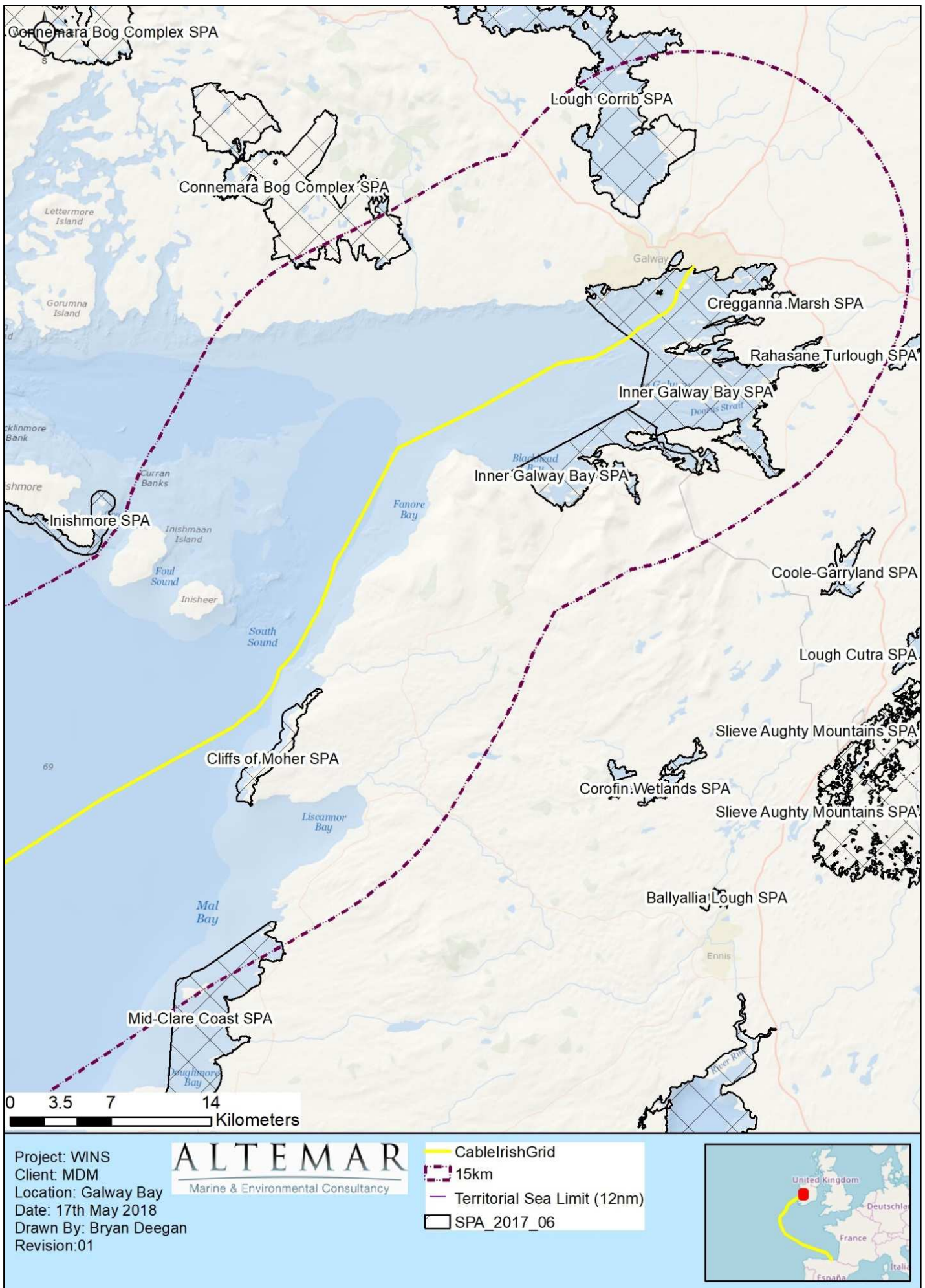


Figure 9: Special Protection Areas within 15 km of the proposed survey route and landfall.

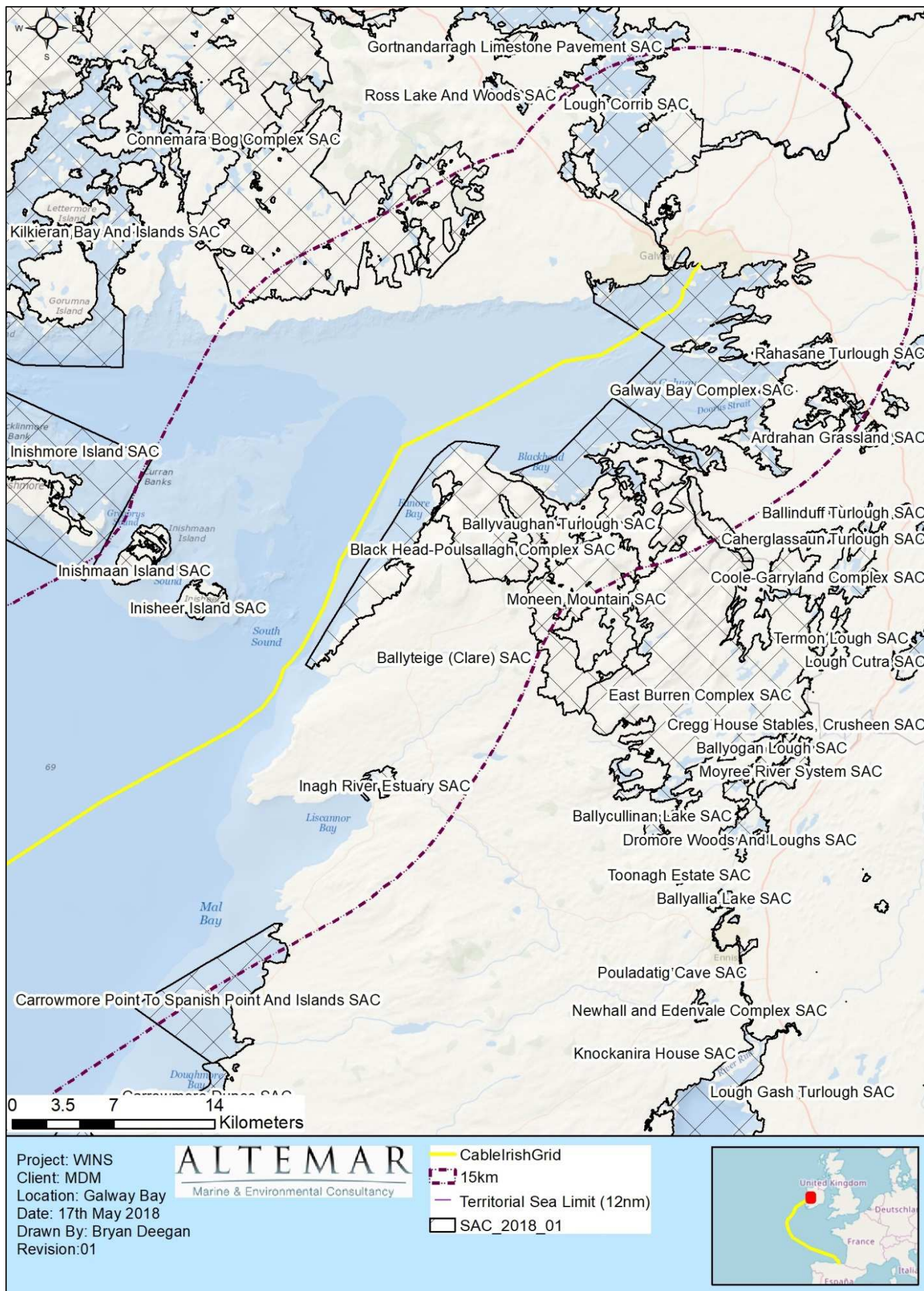


Figure 10: Special Areas of Conservation within 15 km of the proposed route and landfall.

E) Initial screening of NATURA 2000 sites, Annex habitats and species within 15km of the proposed route and landfall.

Table 7. Initial screening of Natura 2000 sites within 15km of the proposed cable route and survey.

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
Special Protection Areas			
IE004031	Inner Galway Bay SPA	IN	<p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:</p> <p>A003 Great Northern Diver <i>Gavia immer</i> A017 Cormorant <i>Phalacrocorax carbo</i> A028 Grey Heron <i>Ardea cinerea</i> A046 Brent Goose <i>Branta bernicla brota</i> A050 Wigeon <i>Anas penelope</i> A052 Teal <i>Anas crecca</i> A056 Shoveler <i>Anas chipeata</i> A069 Red-breasted Merganser <i>Mergus serrator</i> A137 Ringed Plover <i>Charadrius hiaticula</i> A140 Golden Plover <i>Pluvialis apricaria</i> A142 Lapwing <i>Vanellus vanellus</i> A149 Dunlin <i>Calidris alpina alpina</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A160 Curlew <i>Numenius arquata</i> A162 Redshank <i>Tringa totanus</i> A169 Turnstone <i>Arenaria interpres</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A182 Common Gull <i>Larus canus</i> A191 Sandwich Tern <i>Sterna sandvicensis</i> A193 Common Tern <i>Sterna hirundo</i> A999 Wetlands</p> <p>The proposed landfall is within and cable passes through this SPA. Further information is required to assess the potential impact. (See Note A following this assessment on page 40)</p>
IE0004181	Connemara Bog Complex SPA	Out	<p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:</p> <p>A017 Cormorant <i>Phalacrocorax carbo</i> A098 Merlin <i>Falco columbarius</i> A140 Golden Plover <i>Pluvialis apricaria</i> A182 Common Gull <i>Larus canus</i></p> <p>This SPA is over 12km from the proposed location of the cable survey corridor and route. The cable is in the marine subtidal and will not impact on the site specific conservation objectives of this site.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE0004042	Lough Corrib SPA	Out	<p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:</p> <p>A051 Gadwall <i>Anas strepera</i> A056 Shoveler <i>Anas chipeata</i> A059 Pochard <i>Aythya ferina</i> A061 Tufted Duck <i>Aythya fuligula</i></p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
			<p>A065 Common Scoter <i>Melanitta nigra</i> A082Hen Harrier <i>Circus cyaneus</i> A125 Coot <i>Fulica atra</i> A140 Golden Plover <i>Pluvialis apricaria</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A182 Common Gull <i>Larus canus</i> A193 Common Tern <i>Sterna hirundo</i> A194 Arctic Tern <i>Sterna paradisaea</i> A395 Greenland White-fronted Goose <i>Anser albifrons flavirostris</i> A999 Wetlands</p> <p>This SPA is over 5km from the proposed location of the cable survey corridor and route. The cable is in the marine subtidal and will not impact on the site specific conservation objectives of this site. No significant impact likely. Further Assessment is not Required.</p>
IE0004142	Cregganna Marsh	Out	<p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA: A395: Greenland White-fronted Goose <i>Anser albifrons flavirostris</i></p> <p>This SPA is over 6.3km from the proposed location of the cable survey corridor and route. The cable is in the marine subtidal and will not impact on the site specific conservation objectives of this site. No significant impact likely. Further Assessment is not Required.</p>
IE0004005	Cliffs of Moher SPA	Out	<p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:</p> <p>Fulmar (<i>Fulmarus glacialis</i>) [A009] Kittiwake (<i>Rissa tridactyla</i>) [A188] Guillemot (<i>Uria aalge</i>) [A199] Razorbill (<i>Alca torda</i>) [A200] Puffin (<i>Fratercula arctica</i>) [A204] Chough (<i>Pyrrhocorax pyrrhocorax</i>) [A346]</p> <p>This SPA is 1.3km from the proposed location of the cable survey corridor. The element of the survey in proximity to the SPA will involve a cable lay vessel proximal to one of the main vessel routes into Galway Bay/Port. The presence of a vessel 1.3km offshore in an area of significant vessel activity would not be deemed to have an impact on the conservation objectives of this SPA. The cable is in the marine subtidal and will not impact on the site specific conservation objectives of this site. No significant impact likely. Further Assessment is not Required.</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
IE0004182	Mid Clare Coast SPA	Out	<p>Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:</p> <p>Cormorant (<i>Phalacrocorax carbo</i>) [A017] Barnacle Goose (<i>Branta leucopsis</i>) [A045] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Sanderling (<i>Calidris alba</i>) [A144] Purple Sandpiper (<i>Calidris maritima</i>) [A148] Dunlin (<i>Calidris alpina</i>) [A149] Turnstone (<i>Arenaria interpres</i>) [A169] Wetland and Waterbirds [A999]</p> <p>This SPA is 13.6 km from the proposed location of the survey corridor and cable route. The element of the survey in proximity to the SPA will involve a cable lay vessel proximal to one of the main vessel routes into Galway Bay/Port. The presence of a vessel 13.6km offshore in an area of significant vessel activity would not be deemed to have an impact on the conservation objectives of this SPA. The cable is in the marine subtidal and will not impact on the site specific conservation objectives of this site.</p> <p>No significant impact likely. Further Assessment is not Required.</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
Special Areas of Conservation			
IE 000268	Galway Bay Complex SAC	In	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>1140 Mudflats and sandflats not covered by seawater at low tide 1150 Coastal lagoons* 1160 Large shallow inlets and bays 1170 Reefs 1220 Perennial vegetation of stony banks 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) 1355 Otter <i>Lutra lutra</i> 1365 Harbour seal <i>Phoca vitulina</i> 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 3180 Turloughs* 5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites) 7210 Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davalliana</i>* 7230 Alkaline fens</p> <p>The proposed locations of the landfall and cable route are within this SAC.</p> <p>Further Assessment is Required (See section B following this assessment on page 45).</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
IE 000297	Lough Corrib SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Habitats</p> <p>3110 Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)</p> <p>3140 Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.</p> <p>3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation</p> <p>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) (* important orchid sites)*</p> <p>6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)</p> <p>7110 Active raised bogs*</p> <p>7120 Degraded raised bogs still capable of natural regeneration</p> <p>7150 Depressions on peat substrates of the Rhynchosporion</p> <p>7210 Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davalliana</i>*</p> <p>7220 Petrifying springs with tufa formation (Cratoneurion)</p> <p>7230 Alkaline fens</p> <p>8240 Limestone pavements*</p> <p>91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles</p> <p>91D0 Bog woodland*</p> <p>Species</p> <p>1029 Freshwater Pearl Mussel <i>Margaritifera margaritifera</i></p> <p>1092 White-clawed Crayfish <i>Austropotamobius pallipes</i></p> <p>1095 Sea Lamprey <i>Petromyzon marinus</i></p> <p>1096 Brook Lamprey <i>Lampetra planeri</i></p> <p>1106 Salmon <i>Salmo salar</i></p> <p>1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i></p> <p>1355 Otter <i>Lutra lutra</i></p> <p>1393 Slender Green Feather-moss <i>Drepanocladus vernicosus</i></p> <p>1833 Slender Naiad <i>Najas flexilis</i></p> <p>This freshwater SAC is 3 km from the proposed location of the landfall and cable route. The proposed cable survey and main lay will not impact on freshwater or terrestrial conservation interests of this SAC. In relation to anadromous fish species, sea lamprey and Atlantic salmon that utilise this SAC may be within Galway Bay at the time of survey and main lay. The survey is solely in the marine environment, vessel speeds are slow and impacts are localised in nature. Main lay vessel speed is approx.- 1kn and it would be expected that disturbance of the seabed would be less than that of a dredge, and would easily avoided by fish species. Inland Fisheries Ireland have been consulted in relation to the proposed project.</p> <p>No significant impact likely. Further Assessment is not Required.</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
IE 002034	Connemara Bog Complex SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>1150 Coastal lagoons*</p> <p>1170 Reefs</p> <p>3110 Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)</p> <p>3160 Natural dystrophic lakes and ponds</p> <p>3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation</p> <p>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></p> <p>4030 European dry heaths</p> <p>6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)</p> <p>7130 Blanket bogs (* if active bog)</p> <p>7140 Transition mires and quaking bogs</p> <p>7150 Depressions on peat substrates of the <i>Rhynchosporion</i></p> <p>7230 Alkaline fens</p> <p>91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</p> <p>Species</p> <p>1065 Marsh Fritillary <i>Euphydryas aurinia</i></p> <p>1106 Salmon <i>Salmo salar</i></p> <p>1355 Otter <i>Lutra lutra</i></p> <p>1833 Slender Naiad <i>Najas flexilis</i></p> <p>This SAC is 8 km from the proposed location of the marine survey and cable route. Atlantic salmon is a conservation interest of this SAC. As outlined in the Site Synopsis “Atlantic Salmon, occurs in many of the rivers within the site. The Cashla and Ballynahinch systems are good examples of western acidic spate rivers which support the species. Good spawning and nursery grounds for the species occur in these systems. Arctic Char occurs in a number of lakes within the site: Ballynahinch Lake, Glenicmurrin Lough and Lough Shindilla. The species has also been reported from Lough Oorid and Lough Glendollagh in the past, but has not been recorded from these lakes in recent years. Arctic Char is listed as threatened in the Irish Red Data Book.”</p> <p>The proposed cable survey and main lay will not impact on freshwater or terrestrial conservation interests of this SAC. In relation to anadromous fish species, sea lamprey and Atlantic salmon that utilise this SAC may be within Galway Bay at the time of survey and main lay. The survey is solely in the marine environment, vessel speeds are slow and impacts are localised in nature. Main lay vessel speed is approx. 1kn and it would be expected that disturbance of the seabed would be less than that of a dredge, and would easily avoided by fish species. Inland Fisheries Ireland have been consulted in relation to the proposed project.</p> <p>No significant impact likely. Further Assessment is not Required.</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
IE 000606	Lough Fingall Complex SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Habitats 3180 Turloughs* 4060 Alpine and Boreal heaths 5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) (*important orchid sites)* 7210 Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davalliana</i>* 8240 Limestone pavements*</p> <p>Species 1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i></p> <p>This SAC is 11 km from the proposed location of the survey and cable. The proposed cable survey and main lay in the marine will not impact on the conservation interests of this SAC.</p> <p>No significant impact likely. Further Assessment is not Required</p>
IE 001926	East Burren Complex SAC [001926]	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>3140 Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. 3180 Turloughs* 3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation 4060 Alpine and Boreal heaths 5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) (* important orchid sites)* 6510 Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) 7210 Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davalliana</i>* 7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>)* 7230 Alkaline fens 8240 Limestone pavements* 8310 Caves not open to the public 91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)*</p> <p>Species 1065 Marsh Fritillary <i>Euphydryas aurinia</i> 1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i> 1355 Otter <i>Lutra lutra</i></p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
			<p>This SAC is 11.5 km from the proposed location of the marine cable survey and main lay. The proposed cable survey and main lay will be in the marine environment will not impact on the conservation interests of this SAC, which are located in freshwater and terrestrial habitats.</p> <p>No significant impact likely. Further Assessment is not Required</p>
IE 000054	Moneen Mountain SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Habitats 3180 Turloughs* 4060 Alpine and Boreal heaths 5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands 6130 Calaminarian grasslands of the <i>Violetalia calaminariae</i> 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) (* important orchid sites)* 7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>)* 8240 Limestone pavements*</p> <p>Species 1065 Marsh Fritillary <i>Euphydryas aurinia</i> 1303 Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i></p> <p>This SAC is 9.1 km from the proposed location of the marine survey and cable main lay. The proposed cable survey and main lay will be in the marine environment and will not impact on the conservation interests of this SAC, which are located in freshwater and terrestrial habitats.</p> <p>No significant impact likely. Further Assessment is not Required</p>
IE 000996	Ballyvaughan Turlough SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected: 3180 Turloughs* * denotes a priority habitat</p> <p>This SAC is 9 km from the cable survey and main lay. The proposed cable survey and main lay will be in the marine environment and will not impact on the conservation interests of this SAC, which are freshwater/terrestrial habitats.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE 000020	Black Head-Poulsallagh Complex SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected: 1170 Reefs 1220 Perennial vegetation of stony banks</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
			<p>1395 Petalwort <i>Petalophyllum ralfsii</i> 3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation 4060 Alpine and Boreal heaths 5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites) 6510 Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) 7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>) 8240 Limestone pavements* 8330 Submerged or partially submerged sea caves</p> <p>The proposed cable survey and main lay in the marine environment will not impact on the terrestrial or freshwater conservation interests of this SAC. In relation to subtidal reefs it is the intention of the main lay to bury the cable 1km from this SAC in sediment. Sediment disturbed by the works will be limited to the direct vicinity of the proposed cable route and would not impact reefs 1km from the cable route.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE 000994	Ballyteige (Clare) SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]</p> <p>This SAC is 8 km from the cable survey and main lay. The proposed cable survey and main lay will be in the marine environment and will not impact on the conservation interests of this SAC, which are located in the terrestrial.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE 000036	Inagh River Estuary SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>This SAC is 8.4 km from the cable survey and main lay. The proposed cable survey and main lay will be in the</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
			<p>marine environment and will not impact on the conservation interests of this SAC, which are terrestrial/intertidal habitats.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE 001021	Carrowmore Point To Spanish Point And Islands SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Coastal lagoons [1150] Reefs [1170] Perennial vegetation of stony banks [1220] Petrifying springs with tufa formation (Cratoneurion) [7220]</p> <p>This SAC is 12.7 km from the cable survey and main lay. The proposed cable survey and main lay will be in the marine environment will not impact on the conservation interests that are located in freshwater, intertidal or terrestrial habitats. In relation to subtidal reefs it is the intention of the main lay to bury the cable 12.7km from this SAC in sediment. Sediment disturbed by the works will be limited to the direct vicinity of the proposed cable route and would not impact reefs 12.7km from the cable route.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE 001275	Inisheer Island SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Coastal lagoons [1150] Reefs [1170] European dry heaths [4030] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510] Limestone pavements [8240]</p> <p>This SAC is 6.1 km from the cable survey and main lay. The proposed cable survey and main lay will be in the marine environment will not impact on the conservation interests that are located in freshwater, intertidal or terrestrial habitats. In relation to subtidal reefs it is the intention of the main lay to bury the cable 6.1km from this SAC in sediment. Sediment disturbed by the works will be limited to the direct vicinity of the proposed cable route and would not impact reefs 6.1km from the cable route.</p> <p>No significant impact likely. Further Assessment is not Required.</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
IE 000212	Inishmaan Island SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Machairs (* in Ireland) [21A0] European dry heaths [4030] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510] Limestone pavements [8240]</p> <p>This SAC is 11 km from the cable survey and main lay. The proposed cable survey and main lay will be in the marine environment will not impact on the conservation interests that are located in freshwater, intertidal or terrestrial habitats. In relation to subtidal reefs it is the intention of the main lay to bury the cable 11km from this SAC in sediment. Sediment disturbed by the works will be limited to the direct vicinity of the proposed cable route and would not impact reefs 11km from the cable route.</p> <p>No significant impact likely. Further Assessment is not Required.</p>
IE 000213	Inishmore Island SAC	Out	<p>Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:</p> <p>Coastal lagoons [1150] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>) [2170] Humid dune slacks [2190] Machairs (* in Ireland) [21A0] European dry heaths [4030] Alpine and Boreal heaths [4060] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510]</p>

NATURA Site	NAME	Screened In/Out	SSCO's/Reason
			<p>Limestone pavements [8240] Submerged or partially submerged sea caves [8330] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014]</p> <p>This SAC is 14.9 km from the cable survey and main lay. The proposed cable survey and main lay will be in the marine environment will not impact on the conservation interests that are located in freshwater, intertidal or terrestrial habitats. In relation to subtidal reefs it is the intention of the main lay to bury the cable 14.9km from this SAC in sediment. Sediment disturbed by the works will be limited to the direct vicinity of the proposed cable route and would not impact reefs 14.9km from the cable route.</p> <p>No significant impact likely. Further Assessment is not Required.</p>

* denotes a priority habitat

A) *Conservation Objectives of Inner Galway Bay SPA*

As outlined in the SPA Site Synopsis, Inner Galway Bay SPA is also a Ramsar Convention site and part of the Inner Galway Bay SPA is a Wildfowl Sanctuary. The site is a SPA for the following species: Great Northern Diver, Cormorant, Grey Heron, Light-bellied Brent Goose, Wigeon, Teal, Shoveler, Red-breasted Merganser, Ringed Plover, Golden Plover, Lapwing, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull, Common Gull, Sandwich Tern and Common Tern. 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.

As outlined in the SPA supporting document “the Selection Species listed for Inner Galway Bay SPA are as follows:-

1. During winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla brota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 676 individuals.
2. During winter the site regularly supports 1% or more of the all-Ireland population of Red-breasted Merganser (*Mergus serrator*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 249 individuals.
3. During winter the site regularly supports 1% or more of the biogeographical population of the Annex I species Great Northern Diver (*Gavia immer*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 94 individuals.
4. During winter the site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 266 individuals. The site is also selected for its breeding population of Cormorant. In 2000, as part of the Seabird 2000 survey, 200 pairs of Cormorant (based on apparently occupied nests) were estimated on Deer Island; exceeding the all-Ireland 1% threshold and making the site of national importance for this species.
5. During winter the site regularly supports 1% or more of the all-Ireland population of Grey Heron (*Ardea cinerea*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 102 individuals.
6. During winter the site regularly supports 1% or more of the all-Ireland population of Ringed Plover (*Charadrius hiaticula*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 335 individuals.
7. During winter the site regularly supports 1% or more of the all-Ireland population of Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 447 individuals.
8. During winter the site regularly supports 1% or more of the all-Ireland population of Turnstone (*Arenaria interpres*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 182 individuals. 9. In 1995, as part of the All-Ireland Tern survey, the breeding population of Sandwich Tern (*Sterna sandvicensis*) of Inner Galway Bay was surveyed and 81 pairs (based on apparently occupied nests) were recorded. This exceeds the All-Ireland 1% threshold for this Annex I species.
9. In 1995, as part of the All-Ireland Tern survey, 98 pairs of Common Tern (*Sterna hirundo*) (based on apparently occupied nests) were recorded on Green Island in Ballyvaughan Bay in Co. Clare. The Seabird 2000 Survey recorded 46 pairs of Common Tern (based on apparently occupied nests) on Mutton Island in Co. Galway in 2001. Both counts exceed the All-Ireland 1% threshold for this Annex I species.

The following species are identified as additional Special Conservation Interests (SCIs) for Inner Galway Bay SPA as they were recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00) Wigeon (*Anas penelope*), Teal (*Anas crecca*), Shoveler (*Anas chipeata*), Golden Plover (*Pluvialis apricaria*), Lapwing (*Vanellus vanellus*), Dunlin (*Calidris alpina*), Curlew (*Numenius arquata*), Redshank (*Tringa totanus*), Black-headed Gull (*Chroicocephalus ridibundus*) and Common Gull (*Larus canus*).

The wetland habitats contained within Inner Galway Bay SPA are identified of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore the wetland habitats are considered to be an additional Special Conservation Interest.”

The overarching Conservation Objective for Inner Galway Bay Special Protection Area is to ensure that waterbird populations and their wetland habitats are maintained at, or restored to, favourable conservation condition. This includes, as an integral part, the need to avoid deterioration of habitats and significant disturbance; thereby ensuring the persistence of site integrity.

Conservation Interest species listed for Inner Galway Bay SPA.

Objective 1: To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Inner Galway Bay SPA.

This objective is defined by the following attributes and targets:-

- To be favourable, the long term population trend for each waterbird Special Conservation Interest species should be stable or increasing. Waterbird populations are deemed to be unfavourable when they have declined by 25% or more, as assessed by the most recent population trend analysis.
- To be favourable, there should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest, other than that occurring from natural patterns of variation.

Factors that can adversely affect the achievement of Objective 1 include:

- Habitat modification: activities that modify discrete areas or the overall habitat(s) within the SPA in terms of how one or more of the listed species use the site (e.g. as a feeding resource) could result in the displacement of these species from areas within the SPA and/or a reduction in their numbers (for further discussion on this topic please refer to Section 5.4).
- Disturbance: anthropogenic disturbance that occurs in or near the site and is either singular or cumulative in nature could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers
- Ex-situ factors: several of the listed waterbird species may at times use habitats situated within the immediate hinterland of the SPA or in areas ecologically connected to it. The reliance on these habitats will vary from species to species and from site to site. Significant habitat change or increased levels of disturbance within these areas could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers.

Objective 2: To maintain the favourable conservation condition of the wetland habitat at Inner Galway Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

This objective is defined by the following attributes and targets:-

- To be favourable, the permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 13,267 ha, other than that occurring from natural patterns of variation

The proposed area of work is within OG497- Ballyloughan (Figure 11). Inner Galway Bay Subsite assessment – total numbers during LT surveys (across all behaviours and habitats) (L Low, M Moderate; H High V Very high) (Table 8).

Table 8. Ballyloughane Subsite assessment – total numbers during LT surveys

Species	PB	RM	ND	CA	H.	RP	BA	TT	WN	T.	SV	GP	L.	DN	CU	RK	BH	CM	
Subsites	n																		
OG497	4	L	H	M	H	L	M	H	M	M					M	L	M	H	L

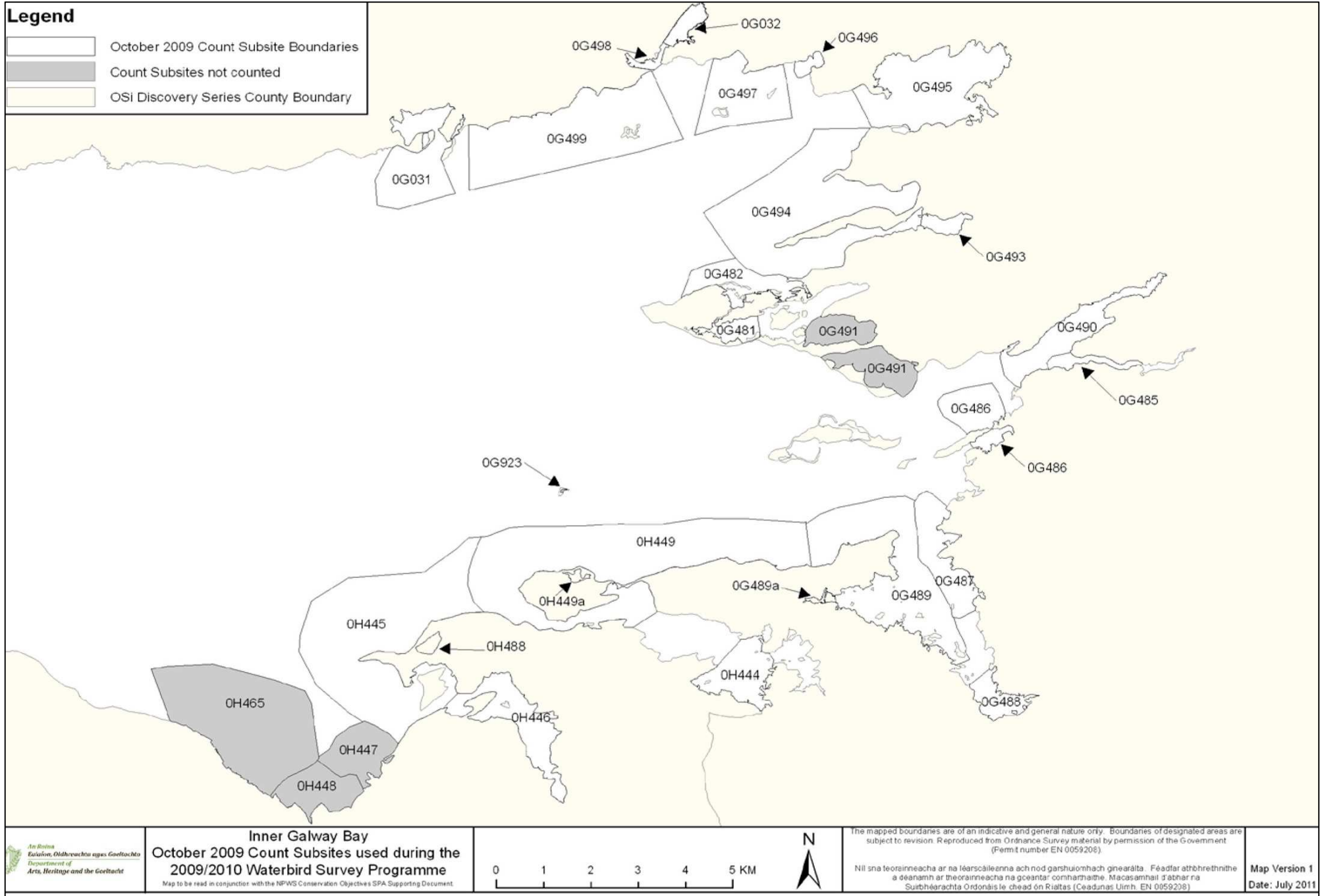


Figure 11. Inner Galway Bay Subsites.

Table 9 shows the Inner Galway Bay Subsite assessment – total numbers foraging intertidally,^I subtidally^{II} and intertidal/subtidal combined ^{III}(LT surveys).Low, M Moderate; H High, V Very high;) for the following species

PB	Light-bellied Brent Goose	<i>Branta bernicla hrotra</i>
ND	Great Northern Diver	<i>Gavia immer</i>
RM	Red-breasted Merganser	<i>Mergus serrator</i>
CA	Cormorant	<i>Phalacrocorax carbo</i>
H.	Grey Heron	<i>Ardea cinerea</i>
BA	Bar-tailed Godwit	<i>Limosa lapponica</i>
RP	Ringed Plover	<i>Charadrius hiaticula</i>
TT	Turnstone	<i>Arenaria interpres</i>
WN	Wigeon	<i>Anas penelope</i>
GP	Golden Plover	<i>Pluvialis apricaria</i>
T.	Teal	<i>Anas crecca</i>
SV	Shoveler	<i>Anas clypeata</i>
DN	Dunlin	<i>Calidris alpina</i>
L.	Lapwing	<i>Vanellus vanellus</i>
CU	Curlew	<i>Numenius arquata</i>
BH	Black-headed Gull	<i>Chroicocephalus ridibundus</i>
CM	Common Gull	<i>Larus canus</i>
RK	Redshank	<i>Tringa totanus</i>

Table 9. Ballyloughane Subsite assessment – total numbers foraging LT surveys

Species	PB ^I	PB ^{II}	RM ^{III}	ND ^{III}	CA ^{III}	H. ^{III}	RP ^{III}	BA ^{III}	TT ^{III}	WN ^{III}	WN ^{III}	T. ^{III}	T. ^{III}	SV ^{III}	GP ^{III}	L. ^{III}	DN ^{III}	CU ^{III}	RK ^{III}	BH ^{III}	CM ^{III}	
Subsites	n																					
OG497	4	L		H	L	H	L	M	H	M	L	M						M	L	M	H	M

Table 10 shows the Inner Galway Bay Subsite assessment – total numbers (roosting/other behaviour) within LT surveys (Intertidal^I, Subtidal^{II}, Intertidal/Supratidal^{III} and Int/Supra/Sub combined^{IV}. Low, M Moderate; H High, V Very high)

Table 10. Ballyloughane Subsite assessment – total numbers total numbers (roosting/other behaviour) within LT surveys

Species	PB	PB ^I	RM ^I	ND ^I	CA ^I	H. ^{II}	RP ^{II}	BA ^{II}	TT ^{II}	WN ^{II}	WN ^{II}	T. ^{III}	T. ^{III}	SV ^{III}	SV ^{III}	GP	L ^{IV}	DN ^{IV}	CU ^{IV}	RK ^{IV}	BH ^{IV}	BH ^{IV}	CM ^{IV}	CM ^{IV}	
Subsite	n																								
OG497	4				H			V																	

Table 11 shows the ranked total numbers for HT surveys (all habitats) across the SPA. Ballyloughane in red.

Table 11. Ranked total numbers for HT surveys (all habitats) across the SPA.

Species	PB	RM	ND	CA	RP	H.	BA	TT	WN	T.	SV	GP	L.	DN	CU	RK	BH	CM
Subsites	n																	
OG031	11	11	11	2	1	5	2		13			2	7	1	13	1	4	18
OG032								11	16	14			2			22	5	6
OG479	6	13	11			5		9	18	12			14		20	22	22	
OG480	8	7	6	6		1			24						23	17	18	22
OG481	4	1	3	8	9	4	5	1		17		1	4	4	15	2	11	3
OG482	3		2					13	15	12					16	22	22	
OG483	12	8	6		5			6	5	14				8	5	13	22	15
OG484	17	3				5	7	5	14				9	10	4	10	14	22
OG485		15	11						20	11							18	
OG486	7								9	1			13		16	15	16	19
OG487	20	11							10						23	11	20	21
OG488								13	12	9			5		12	21	20	17
OG489	1		3	8	6	5	8	1	4	6			1	9	1	17	13	5
OG490	15		11						7	10			10		9	14	14	22
OG491																		
OG493	19						6	13	17	4	2			3	6	3	9	1
OG494																		26
OG495	16	16	5	10				3	2	2			3	7	3	7	6	9
OG496						5	10		21	8				12	18	16	7	19
OG497	18	9	10		2		4	4	19						19	19	3	22
OG498				10		2										26	2	7
OG499	20			3			1	6	23					13	20	6	1	3
OG923				1														
OH444		6							1	3	1		8		10	4	10	8
OH445	5	5	11	6	8	5				17			12	5	8	12		9
OH446	10	2		4	4	2		10	8	5			6		2	5	8	2
OH447	12		6		7				21	7					22	19	11	13
OH448	9	4			3				6	16			11	6	10	22	17	12
OH449	2	9	1	5			9	8	11					2	13	8	22	16
OH465	14	14	6				10	11						11	7	8		11
OH488									3	19								13
n	21	16	15	11	9	10	11	15	24	19	2	2	14	13	24	26	25	26

Recreation and disturbance

As outlined in the conservation objectives supporting document “Inner Galway Bay offers a great deal in terms of coastal and marine leisure and tourism for the region. Galway City’s coastal area is an important tourist and recreational amenity. Although sandy beaches are relatively limited across the site, two areas (Salthill beach (subsite 0H499) and Silverstrand (subsite 0G031) have achieved EU Blue Flag status in recent years. The urban village of Salthill is a traditional seaside resort and major tourist attraction. Silverstrand and Ballyloughaun beaches (subsite 0G497) are also considered significant recreational assets for the city.

Of the activities that were recorded as causing disturbance during field surveys, walking (intertidal areas and including dogs) was the most widespread (13 subsites) and responsible for the peak disturbance score for 11 subsites (Table 12). 64% of field observations resulted in a response from waterbirds, the most common response being ‘moderate’ in that the waterbirds were displaced for short periods of time, most often to another part of the subsite. Higher disturbance scores relate to records where dogs, and particularly loose dogs, were involved in the activity. The overall ‘high’ score attained at 0G497 (Ballyloughlan) relates to humans and loose dogs recorded walking within this subsite frequently, with waterbirds displaced whilst the activity was occurring.”

Table 12. Recreation and disturbance activities in each SPA subsite.

Number of activities recorded to cause disturbance to waterbirds during field surveys (2009/10 water survey programme) plus the calculated peak disturbance score (see text for explanation)
 Scores 0 – 3 = **Low** Scores 4 – 6 = **Moderate** Scores 7 – 9 = **High**
 Grey shading = no activity recorded to cause disturbance during field surveys

Subsite Code	Subsite Name	Number Activities causing disturbance	Peak Disturbance Score	Activity Responsible
0G031	Lough Rusheen	1	3	• Walking (incl. dogs)
0G032	Lough Atalia	1	3	• Walking (incl. dogs)
0G479	Rinville & Ardfry South	2	3	• Flight path (aircraft)
0G480	Rinville & Ardfry North	4	4	• Motorised watercraft
0G481/482	Tawin South & North	0		
0G483/484	Baynacourty South & North	0		
0G485	Tyrone House & Morans	0		
0G486	Killeenaran	0		
0G487	Tarrea & adjacent areas	0		
0G488	Kinvarra	1	3	• Intertidal aquaculture (associated activities)
0G489	Traught & Doorus	0		
0G490	Cave – Clarinbridge	3	5	• Flight path
0G493	Kilcaimin	2	6	• Walking (incl. dogs)
0G495	Oranmore Bay	2	4	• Walking (incl. dogs)
0G496	Rosshill	0		
0G497	Ballyloughlan	1	7	• Walking (incl. dogs)
0G498	Nimmo’s Pier & Docks	1	4	• Walking (incl. dogs)
0G499	Salthill & environs	2	4	• Walking (incl. dogs)
0H444	Coranroo	0		
0H445	Martello Tower, L. Muree & shore	1	6	• Motorised watercraft
0H446	Castle – bell Harbour – Finvarra	3	6	• Walking (incl. dogs)
0H447	Bishop’s Quarter	2	5	• Walking (incl. dogs)
0H448	Ballyvaughanan Bay	1	5	• Motorised vehicles
0H449	Aughinish	3	6	• Walking (incl. dogs)
0H465	Rinn	2	6	• Walking (incl. dogs)
0H488	Rine Lough Muree Flaggy Shore	0		

Potential Impact of the Proposed works on Inner Galway Bay SPA.

As outlined in the SPA conservation objectives supporting document the proposed cable route is in an area of high disturbance at a time outside of overwintering bird season. Terns are not located in the vicinity of the landfall and would be used to vessel activity in the region of Mutton Island where they nest during the summer. The proposed laying of the cable in the intertidal is within the Mudflats and Sandflats not covered by Low tide habitat which would be an area where birds would forage when disturbance levels are low.

It is proposed that all works will be carried out outside of the overwintering bird season of September to March, so as to eliminate disturbance impacts on the overwintering features of interest of this SPA. Mitigation measures are proposed including having an ecologist present on site to ensure birds (roosting or foraging) are not disturbed by the proposed works.

The cable route would see invertebrate mortalities along the machinery access areas and in the vicinity of the plough. This would be primarily due to compression by the plough/machinery in a maximum 4m wide track and the disturbance of sand during the plough action, during one tidal cycle. These impacts would be limited in nature (4m x 460m) and would be short term.

B) Conservation Objectives of Galway Bay Complex SAC

The qualifying interests, their attributes, targets and the potential impact of the proposed fibre-optic cable survey and main lay on the each qualifying interest in Galway Bay Complex SAC are seen in Table 13.

Table 13. 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 Rogerstown Estuary.

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	<p>To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (Attribute. Target)</p> <p><i>Habitat area.</i> The permanent habitat area is stable or increasing, subject to natural processes. Habitat area was estimated using OSI data as 744ha (Figure 12).</p> <p><i>Community distribution.</i> Conserve the following community types in a natural condition: Intertidal sandy mud community complex; and Intertidal sand community complex. See (Figure 13)</p> <p>Potential Impact The proposed cable route on Ballyloughane Strand is within this habitat. The proposed works would involve machinery on a footprint of approximately 4m wide (maximum width of impact.) x 440m (distance from high tide to low tide) = 1760m² (0.176 ha) (0.023% of the habitat in the SAC) within which there would be a digging area within the corridor above, during a single tide of: a)End of the HDD on the beach (2m x 2m x 1.5m) i.e. 4m² b)Plough trench (max. 750cm x 440m) =330m²</p> <p>No intertidal infaunal species data was present in the Inner Galway Bay SPA Conservation Objectives supporting document</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p>to indicate the relative importance of the Intertidal Sand Community Complex in this area. The bird counts in NPWS Conservation Objectives Supporting Document (NPWS, 2013), with the exception of some sightings of foraging activity of ringed plover, bar-tailed godwit, dunlin, and redshank during a number of surveys, shows a noticeable lack of bird activity on Ballyloughane Beach. The ranking of the site within the SPA is relatively low with the exception of ringed plover (2), black headed gull (3), bar-tailed Godwit (4) and turnstone (4). However, this may also be due to the very high disturbance levels noted in (NPWS, 2013). However, <i>Arenicola marina</i> appeared abundant on the lower shore during on site survey which may indicate that disturbance is the restricting factor in relation to bird presence on the shore.</p> <p>The ploughing of a trench along the intertidal will result in a temporary compression of sediment due to machinery and remixing of sediment due to trenching. It would be seen that any impacts would be short-term and would not significantly impact the community within the medium or long term. The HDD would terminate in this habitat 1.5m below the surface, with no “punch out”. Mitigation measures and an ecologist will be in place to minimise potential minor adverse impacts.</p> <p>No significant impacts are foreseen on the attributes or targets of Mudflats and sandflats not covered by seawater at low tide in Galway Bay Complex SAC.</p>
[1150] Coastal lagoons	Bad	<p>To restore the favourable conservation condition of Coastal lagoons in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:</p> <p><i>(Attribute. Target)</i> <i>Habitat area.</i> Area stable, subject to slight natural variation. Favourable reference area 76.7ha. <i>Habitat distribution.</i> No decline, subject to natural processes. <i>Salinity regime.</i> Median annual salinity and temporal variation within natural ranges <i>Hydrological regime.</i> Annual water level fluctuations and minima within natural ranges <i>Barrier: connectivity between lagoon and sea.</i> Appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management. <i>Water quality: Chlorophyll a.</i> Annual median chlorophyll a within natural ranges and less than 5ug/L <i>Water quality: Molybdate Reactive Phosphorus (MRP).</i> Annual median MRP within natural ranges 0.1mg/L <i>Water quality: Dissolved Inorganic Nitrogen (DIN):</i> Annual median DIN within natural ranges and less than 0.15mg/L Depth of macrophyte colonisation. Macrophyte colonisation to at least 2m depth.</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p><i>Typical plant species.</i> Maintain number and extent of listed lagoonal specialists, subject to natural variation <i>Typical animal species.</i> Maintain listed lagoon specialists, subject to natural variation <i>Number and % cover.</i> Negative indicator species absent or under control</p> <p>Potential Impact The cable route is not within or proximal to Coastal Lagoons (Figure 14). No significant impacts are foreseen on attributes or targets of Coastal Lagoons in Galway Bay Complex SAC.</p>
[1160] Large shallow inlets and bays	Inadequate	<p>To maintain the favourable conservation condition of Large shallow inlets and bays in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:</p> <p><i>(Attribute. Target)</i> <i>Habitat area.</i> The permanent habitat area is stable or increasing, subject to natural processes.</p> <p><i>Community extent.</i> Hectares Maintain the extent of the <i>Zostera</i>-dominated community complex and the maërl-dominated community, subject to natural processes.</p> <p><i>Community structure: Zostera density.</i> Conserve the high quality of <i>Zostera</i>-dominated communities, subject to natural processes <i>Community structure: Biological composition</i> Conserve the high quality of the maërl-dominated community, subject to natural processes</p> <p><i>Community distribution.</i> Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Intertidal sand community complex; Fine to medium sand with bivalves community complex; Sandy mud to mixed sediment community complex; Mixed sediment dominated by Mytilidae community complex; Shingle; Furoid-dominated community complex; Laminaria-dominated community complex; and Shallow sponge-dominated community complex.</p> <p>Potential Impact The proposed cable route on Ballyloughane Beach is not within the area defined as Large shallow inlets and bays in Galway Bay Complex SAC (Figure 15). However, subtidal elements of the project are within the area. The sensitive communities <i>Zostera</i>-dominated community complex and the maërl-dominated community as outlined in (Figure 13) and in MERC (2006) were avoided in the initial proposed cable route. However, groundtruthing of this route by video camera identified additional Maërl areas in addition to a <i>Virgularia mirabilis</i> habitat. The cable route was revised again to avoid mearl (Conservation</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p>Interest) areas. As discussed with NPWS additional video surveys will be carried out to further optimise the route in the vicinity of <i>Virgularia mirabilis</i> (not listed as a conservation interest). (See EcIA for details of survey)</p> <p>The proposed cable route will pass through Intertidal sandy mud community complex, Sandy mud to mixed sediment community complex, and Mixed sediment dominated by Mytilidae community complex within the SAC. The burial of the cable will be by marine plough at a speed of 1kn. Short term disturbance of these habits will occur.</p> <p>Mitigation measures and an ecologist will be in place to minimise potential minor adverse impacts. No significant impacts are foreseen on the attributes or targets of Large shallow inlets and bays in Galway Bay Complex SAC.</p>
[1170] Reefs	Bad	<p>To maintain the favourable conservation condition of Reefs in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (<i>Attribute</i>. Target)</p> <p><i>Distribution.</i> The distribution of reefs is stable or increasing, subject to natural processes. (Figure 16) for mapped distribution <i>Habitat area.</i> The permanent habitat area is stable, subject to natural processes. <i>Community extent.</i> Maintain the extent of the Mytilus-dominated reef community, subject to natural processes <i>Community structure:</i> Mytilus density Individuals per m² Conserve the high quality of the Mytilus-dominated reef community, subject to natural processes <i>Community structure Biological composition.</i> Conserve the following community types in a natural condition: Fucoid dominated community complex; Laminaria dominated community complex; and Shallow sponge-dominated community complex.</p> <p>Potential Impact The methodology of cable laying is to bury the cable in inshore areas. Where this is not possible protection of the cable is required. The plotting of the cable route has been carried out to ensure burial based on available data including dropdown video within the SAC. It is proposed to avoid areas of reef within Galway Bay (Figure 17). No impacts are foreseen on attributes or targets of Reefs in Galway Bay Complex SAC.</p>
[1220] Perennial vegetation of stony banks		<p>To maintain the favourable conservation condition of Perennial vegetation of stony banks in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (<i>Attribute</i>. Target)</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes, including erosion and succession</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p><i>Habitat distribution.</i> No decline, or change in habitat distribution, subject to natural processes. See Figure 18 for mapped locations</p> <p><i>Physical structure:</i> Presence/ absence of physical barriers Maintain the natural circulation of sediment and organic matter, without any physical obstructions</p> <p><i>Vegetation structure:</i> Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession</p> <p><i>Vegetation composition:</i> typical species and sub-communities Percentage cover at a representative sample of monitoring stops Maintain the typical vegetated shingle flora including the range of subcommunities within the different zones. Typical species include sea sandwort (<i>Honckenya peploides</i>), sea beet (<i>Beta vulgaris ssp maritima</i>), rock samphire (<i>Crithmum maritimum</i>), sea mayweed (<i>Tripleurospermum maritimum</i>), yellow-horned poppy (<i>Glaucium flavum</i>) and sea campion (<i>Silene uniflora</i>)</p> <p><i>Vegetation composition:</i> Percentage cover Negative indicator species (including non-natives) to represent less than 5% cover.</p> <p>Potential Impact</p> <p>As seen in Figure 18 Perennial vegetation of stony banks are not located in the vicinity of the cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Perennial vegetation of stony banks in Galway Bay Complex SAC.</p>
[1310] Salicornia and other annuals colonising mud and sand		<p>To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (Attribute. Target)</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Barna House - 0.067ha, Seaweed Point - 0.003ha, Roscam West and South -0.023ha, Kilcaimin - 0.015, Kileenaran - 0.007ha, Kinvara West - 0.017ha, Scanlan's Island - 0.117ha, Tawin Island - 1.098ha. See Figure 19.</p> <p><i>Habitat distribution.</i> No decline, or change in habitat distribution, subject to natural processes.</p> <p><i>Physical structure:</i> Maintain/restore, natural circulation of sediments and organic matter, without any physical obstructions.</p> <p><i>Physical structure: creeks and pans.</i> Occurrence Maintain, or where necessary restore creek and pan structure, subject to natural processes, including erosion and succession</p> <p><i>Physical structure: flooding regime.</i> Maintain natural tidal regime</p> <p><i>Vegetation structure: zonation.</i> Occurrence Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p><i>Vegetation structure.</i> Maintain structural variation within sward</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p><i>Vegetation structure:</i> Maintain more than 90% of area outside creeks vegetated</p> <p><i>Vegetation composition: typical species and subcommunities</i> Maintain the range of species-poor communities with typical species listed in SMP (McCorry and Ryle, 2009)</p> <p><i>Vegetation structure: negative indicator species – Spartina anglica</i> There is currently no common cordgrass (<i>Spartina anglica</i>) in this SAC. Prevent establishment of cordgrass</p> <p>Potential Impact As seen in Figure 19 Salicornia and other annuals colonising mud and sand are not located in the vicinity of the cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Salicornia and other annuals colonising mud and sand in Galway Bay Complex SAC.</p>
1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)		<p>To restore the favourable conservation condition of Atlantic salt meadows (Glauco- Puccinellietalia maritimae) in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (Attribute. Target)</p> <p>Habitat area Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Barna House - 2.33ha, Seaweed Point - 1.41ha, Roscam West and South - 3.30ha, Oranmore North - 4.24ha, Kilcaimin - 6.82ha, Tawin Island - 53.85ha, Tyrone House- Dunbulcaun Bay - 9.83ha, Kileenaran - 15.37ha, Kinvara West - 13.33ha, Scanlan's Island - 4.13ha. See Figure 19</p> <p><i>Habitat distribution.</i> No decline or change in habitat distribution, subject to natural processes.</p> <p><i>Physical structure: sediment supply.</i> Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.</p> <p><i>Physical structure: creeks and pans.</i> Maintain creek and pan structure, subject to natural processes, including erosion and succession.</p> <p><i>Physical structure: flooding regime.</i> Maintain natural tidal regime.</p> <p><i>Vegetation structure: zonation.</i> Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p><i>Vegetation structure: vegetation height.</i> Maintain structural variation within sward.</p> <p><i>Vegetation structure: Percentage cover at a representative sample of monitoring stops.</i> Maintain more than 90% area outside creeks vegetated.</p> <p><i>Vegetation composition: typical species and subcommunities</i> Maintain range of subcommunities with typical species listed in SMP (McCorry and Ryle, 2009).</p> <p><i>Vegetation structure: negative indicator species – Spartina anglica</i> There is currently no common cordgrass (<i>Spartina anglica</i>) in this SAC. Prevent establishment of cordgrass.</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p>Potential Impact</p> <p>As seen in Figure 19 Atlantic salt meadows are not located in the vicinity of the cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of <i>Salicornia</i> and other annuals colonising mud and sand in Galway Bay Complex SAC.</p>
1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)		<p>To restore the favourable conservation condition of Mediterranean salt meadows (<i>Juncetalia maritimi</i>) in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (<i>Attribute</i>. Target)</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Barna House - 0.282ha, Seaweed Point - 0.931ha, Kilcaimin - 0.005ha, Tawin Island - 1.799ha. Tyrone House- Dunbulcan Bay -8.184ha, Kileenaran - 0.271ha. See Figure 19.</p> <p><i>Habitat distribution.</i> Occurrence No decline, subject to natural processes.</p> <p>Physical structure: sediment supply. Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.</p> <p><i>Physical structure: creeks and pans.</i> Maintain creek and pan structure, subject to natural processes, including erosion and succession</p> <p><i>Physical structure: flooding regime.</i> Maintain natural tidal regime.</p> <p><i>Vegetation structure: zonation.</i> Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p><i>Vegetation structure: vegetation height.</i> Maintain structural variation in the sward.</p> <p><i>Vegetation structure: vegetation cover.</i> Maintain more than 90% of area outside creeks vegetated.</p> <p><i>Vegetation composition: typical species and subcommunities.</i> Maintain range of subcommunities with typical species listed in SMP (McCorry and Ryle, 2009)</p> <p>Potential Impact</p> <p>As seen in Figure 19 Mediterranean salt meadows are not located in the vicinity of the cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Mediterranean salt meadows (<i>Juncetalia maritimi</i>) in Galway Bay Complex SAC.</p>

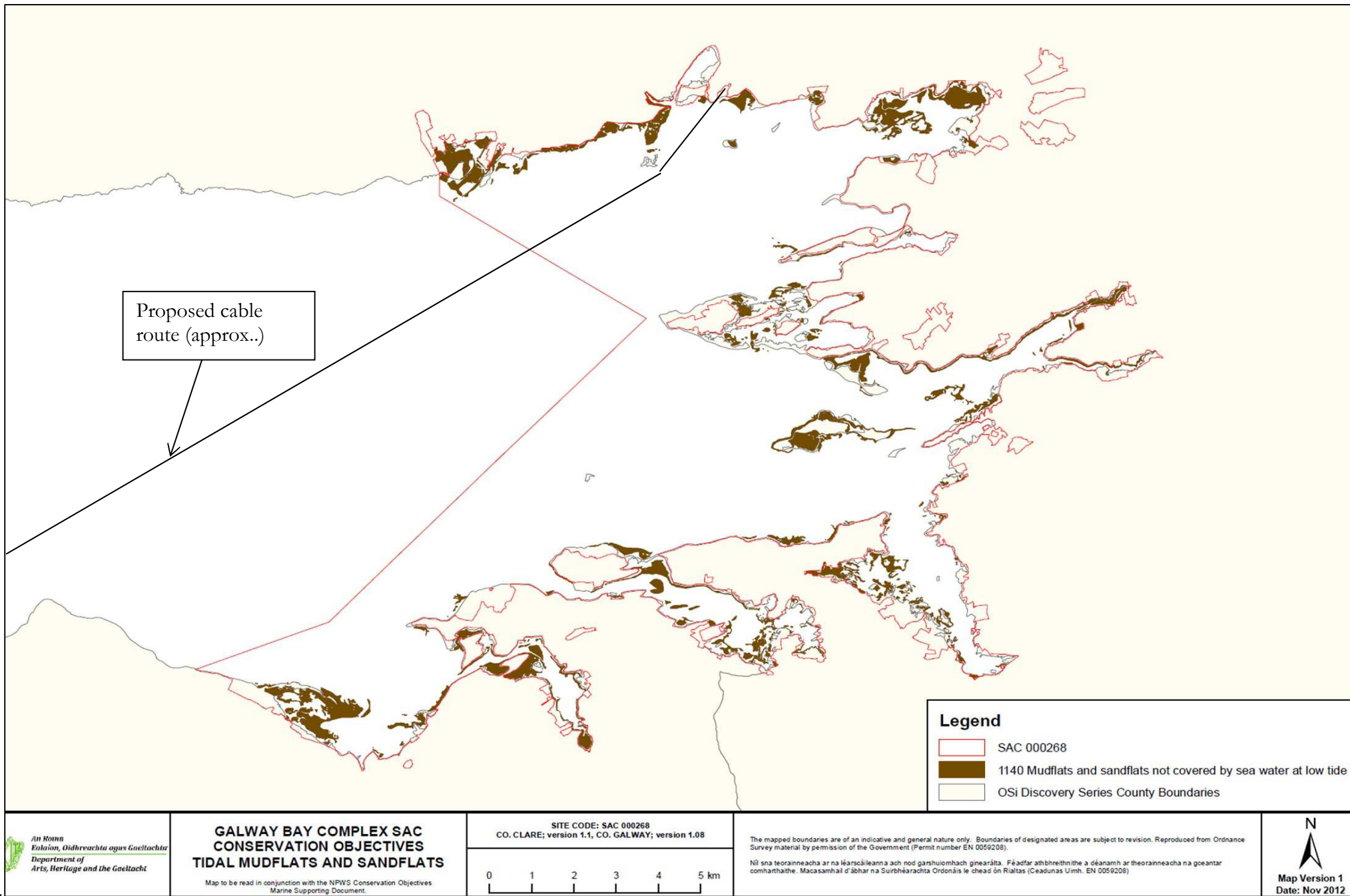
Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
[3180] Turloughs		<p>To maintain the favourable conservation condition of Turloughs in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (<i>Attribute. Target</i>)</p> <p><i>Habitat area.</i> Area stable at c.59ha or increasing, subject to natural processes. See Figure 14.</p> <p><i>Habitat distribution.</i> No decline, subject to natural processes.</p> <p><i>Hydrological regime: flood duration, frequency, area, depth; permanently flooded area.</i> Appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat</p> <p><i>Soil type: area.</i> Variety, area and extent of soil types necessary to support Turlough vegetation and other biota</p> <p><i>Soil nutrient status: nitrogen and phosphorous.</i> Nutrient status appropriate to soil types.</p> <p><i>Physical structure: bare ground.</i> Sufficient wet bare ground, as appropriate</p> <p>Chemical processes: Appropriate CaCO₃ deposition rates and concentration in soil</p> <p><i>Water quality: nutrients; colour; phytoplankton; epiphyton.</i> Appropriate water quality to support the natural structure and functioning of the habitat</p> <p><i>Active peat formation.</i> Active peat formation, where appropriate</p> <p><i>Vegetation composition: area of vegetation communities.</i> Maintain area of sensitive and high conservation value vegetation communities/units at each turlough</p> <p><i>Vegetation composition: vegetation zonation.</i> Maintain vegetation zonation/mosaic characteristic of each turlough</p> <p><i>Vegetation structure: sward height.</i> Sward heights appropriate to the vegetation unit, and a variety of sward heights across each turlough</p> <p><i>Typical species: terrestrial, wetland and aquatic plants, invertebrates and birds.</i></p> <p>Maintain typical species within and across all turloughs</p> <p><i>Fringing habitats: area.</i> Maintain marginal fringing habitats that support turlough vegetation, invertebrate, mammal and/or bird populations</p> <p>Vegetation structure: Turlough woodland. Maintain appropriate turlough woodland diversity and structure.</p> <p>Potential Impact</p> <p>As seen in Figure 14. Turloughs are not located in the vicinity of the cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Turloughs in Galway Bay Complex SAC.</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
[5130] <i>Juniperus communis</i> formations on heaths or calcareous grasslands		<p>To restore the favourable conservation condition of <i>Juniperus communis</i> formations on heaths or calcareous grasslands in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (Attribute. Target)</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes. At least 1.4ha at mapped location. See Figure 14. <i>Habitat distribution.</i> No decline. <i>Juniper population size.</i> At least 50 plants <i>Formation structure: cover and height.</i> Well-developed structure with an open to closed cover of juniper up to or exceeding 0.5 m in height with associated species. <i>Formation structure: community diversity and extent.</i> Appropriate diversity and extent of formation. <i>Formation structure: cone bearing plants.</i> At least 10% of plants bearing cones. <i>Formation structure: seedling recruitment.</i> At least 10% of juniper plants within the formation are seedlings. <i>Formation structure: dead plants.</i> Not more than 10% of plants dead. <i>Vegetation composition: typical species.</i> A variety of typical native species with a minimum of 10 species present (excluding negative indicator species) <i>Vegetation composition: negative indicator species.</i> Negative indicator species, particularly non-native invasive species, absent or under control.</p> <p>Potential Impact As seen in Figure 14 <i>Juniperus communis</i> formations on heaths or calcareous grasslands are not located in the vicinity of the cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of <i>Juniperus communis</i> formations on heaths or calcareous grasslands in Galway Bay Complex SAC.</p>
[6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites)	Bad	<p>To maintain the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) in Galway Bay Complex, which is defined by the following list of attributes and targets: (Attribute. Target)</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes <i>Habitat distribution.</i> No decline, subject to natural processes <i>Vegetation composition: broadleaf herb: grass ratio.</i> Broadleaf herb component of vegetation between 40 and 90% <i>Vegetation composition: typical species.</i> At least 7 positive indicator species present, including 2 "high quality" species <i>Vegetation composition: negative indicator species.</i> Percentage Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%. Nonnative</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p>invasive species, absent or under control. <i>Vegetation structure: sward height.</i> 30-70% of sward 5-40cm high <i>Vegetation structure: woody species and bracken (Pteridium aquilinum).</i> Cover of bracken (<i>Pteridium aquilinum</i>) and woody species (except juniper (<i>Juniperus communis</i>)) not more than 5% cover. <i>Physical structure: bare ground.</i> Not more than 10% bare ground</p> <p>Potential Impact Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) are terrestrial and not located in the vicinity of the intertidal/marine cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>) in Galway Bay Complex SAC.</p>
[7210] Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>	Bad	<p>To maintain the favourable conservation condition of Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> in Galway Bay Complex SAC, which is defined by the following list of attributes and targets: (<i>Attribute.</i> Target)</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes. The full extent of this habitat within the SAC is currently unknown. Fen vegetation occurs in wetland areas to the east of Oranmore (Internal NPWS files). It has also been recorded in Ballindereen Lough.</p> <p><i>Habitat distribution.</i> No decline, subject to natural processes</p> <p><i>Hydrological regime.</i> Appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat.</p> <p><i>Peat formation.</i> Active peat formation, where appropriate</p> <p>Water quality: nutrients. Appropriate water quality to support the natural structure and functioning of the habitat.</p> <p><i>Vegetation composition: typical species.</i> Maintain vegetation cover of typical species including brown mosses and vascular plants</p> <p><i>Vegetation composition: trees and shrubs.</i> Cover of scattered native trees and shrubs not more than than 10%</p> <p><i>Physical structure: disturbed bare ground.</i> Percentage Cover of disturbed bare ground not more than 10%.</p> <p><i>Physical structure: drainage.</i> Areas showing signs of drainage as a result of drainage ditches or heavy trampling not more than 10%.</p> <p>Potential Impact Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> not located in the vicinity of the intertidal/marine cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> in Galway Bay Complex SAC.</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
7230 Alkaline fens	Bad	<p>To maintain the favourable conservation condition of Alkaline fens in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:</p> <p><i>Habitat area.</i> Area stable or increasing, subject to natural processes <i>Habitat distribution.</i> No decline, subject to natural processes. Full distribution of this habitat in this SAC is currently unknown. Hydrological regime. Appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat Peat formation. Active peat formation, where appropriate Water quality: nutrients. Appropriate water quality to support the natural structure and functioning of the habitat <i>Vegetation composition: typical species.</i> Maintain vegetation cover of typical species including brown mosses and vascular plants. Vegetation composition: trees and shrubs. Cover of scattered native trees and shrubs less than 10% <i>Physical structure: disturbed bare ground.</i> Cover of disturbed bare ground less than 10%.Where tufa is present, disturbed bare ground less than 1% <i>Physical structure: drainage.</i> Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%</p> <p>Potential Impact Alkaline fens not located in the vicinity of the intertidal/marine cable route. Impacts would be restricted to the immediate vicinity of the cable route.</p> <p>No impacts are foreseen on attributes or targets of Alkaline fens in Galway Bay Complex SAC.</p>
[1355] Otter <i>Lutra lutra</i>	Favourable	<p>To restore the favourable conservation condition of Otter in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:</p> <p><i>Distribution.</i> No significant decline. <i>Extent of terrestrial habitat.</i> No significant decline. Area mapped and calculated as 262ha above high water mark (HWM); 14ha along river banks/around ponds. No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007) (Figure 20) <i>Extent of marine habitat.</i> No significant decline. <i>Extent of freshwater (lake/lagoon) habitat.</i> No significant decline. <i>Couching sites and bolts.</i> No significant decline <i>Fish biomass available.</i> No significant decline <i>Barriers to connectivity.</i> No significant increase.</p> <p>Potential Impact Otters may be present within the proposed landfall and shallow intertidal area. Short term disturbance may occur but it should be noted, as outlined in the SPA conservation objectives supporting document that significant human disturbance occurs</p>

Annex Species/Habitats- Qualifying Interest	Overall Conservation Status	<i>Site Specific Conservation Objectives</i> , attributes, targets and perceived impacts.
		<p>at Ballyloughane Beach. Disturbance in this area would be limited to approximately 1-2 days for marine survey in the vicinity of Ballyloughane and 1-2 days for main lay in an area of human disturbance and in close proximity to Galway Port where there is marine vessel activity. No holts or couches were noted during fieldwork. The works will not significantly impact fish biomass or introduce barriers to connectivity. Mitigation measures are proposed, including having an ecologist on site during intertidal/shallow subtidal works.</p> <p>No significant impacts are foreseen on the attributes or targets of otters in Galway Bay Complex SAC based on the successful implementation of mitigation measures outlined that primarily deal with ecological supervision and limiting disturbance.</p>
[1365] Harbour seal <i>Phoca vitulina</i>	Favourable	<p>To maintain the favourable conservation condition of Harbour Seal in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:</p> <p><i>Access to suitable habitat.</i> Species range within the site should not be restricted by artificial barriers to site use. See Figures 21-23.</p> <p><i>Breeding behaviour.</i> Conserve breeding sites in a natural condition.</p> <p><i>Moulting behaviour.</i> Conserve moult haul-out sites in a natural condition.</p> <p><i>Resting behaviour.</i> Conserve resting haul-out sites in a natural condition.</p> <p><i>Disturbance.</i> Human activities should occur at levels that do not adversely affect the harbour seal population at the site.</p> <p>Potential Impact</p> <p>Harbour seal may be present within the proximity of the cable route. Short term disturbance may occur but it should be noted, as outlined in the SPA conservation objectives supporting document that significant human disturbance occurs at Ballyloughane Beach. The proposed survey route is not proximal to resting and moulting sites. The proposed route is at least 1.5km from the nearest breeding sites at Earls Rock and Kilcolgan Point. Disturbance in this area would be limited to approximately 3-4 days for marine survey within the SAC and 1-3-4 days for main lay (intertidal and subtidal) within the SAC in an area of human disturbance and in close proximity to Galway Port where there is marine vessel activity. The works will not significantly impact on haul out, resting or breeding sites. Mitigation measures are proposed, including having an ecologist/MMO on site during intertidal/shallow subtidal works. All works will be carried out in compliance with the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters.</p> <p>No significant impacts are foreseen on the attributes or targets of Harbour Seals in Galway Bay Complex SAC based on the successful implementation of mitigation measures outlined that primarily deal with ecological supervision and limiting disturbance.</p>



CZ

Figure 12. Location of Tidal Mudflats and Sandflats in Galway Bay Complex SAC.

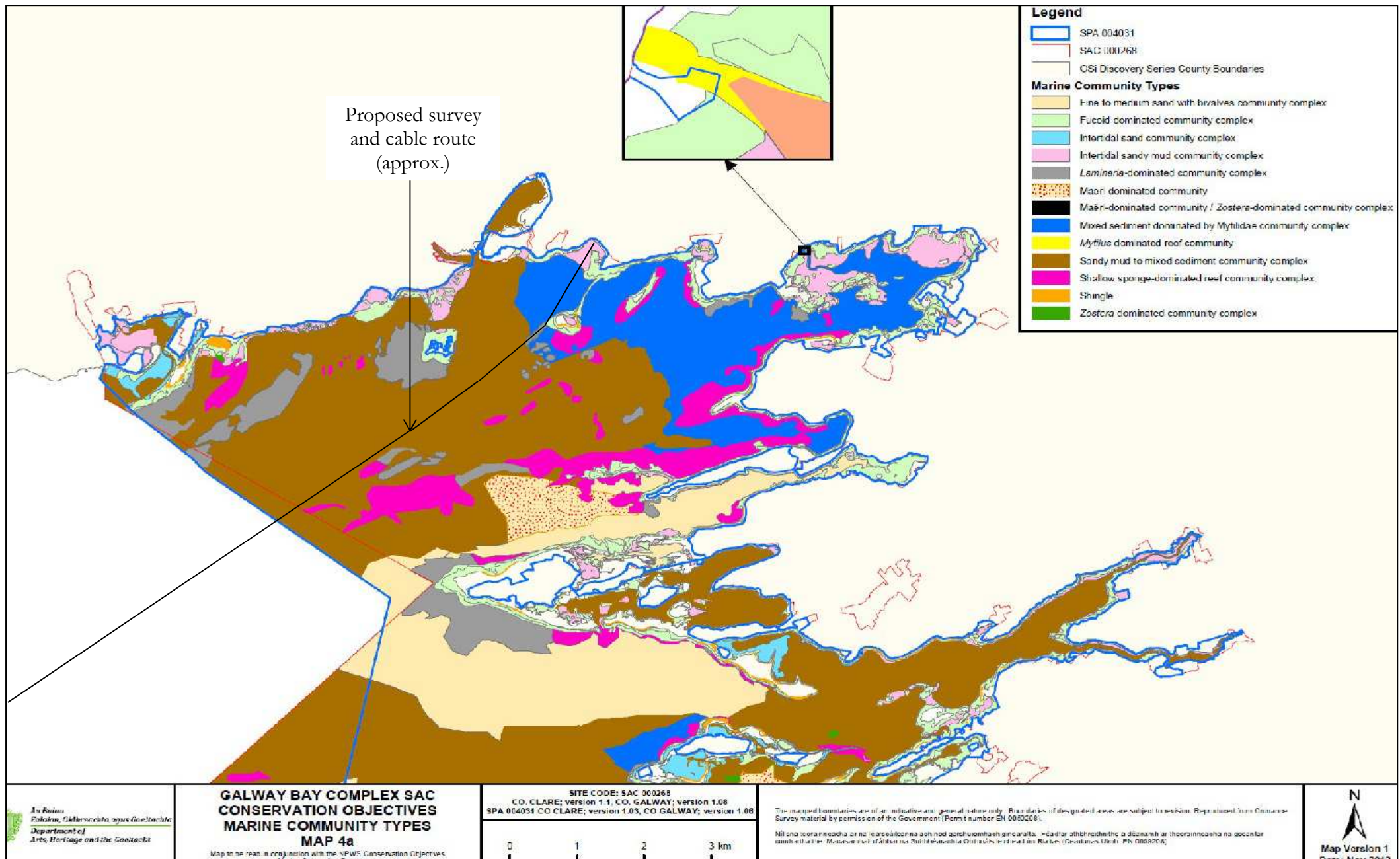


Figure 13. Marine Community Types (NPWS, 2013).

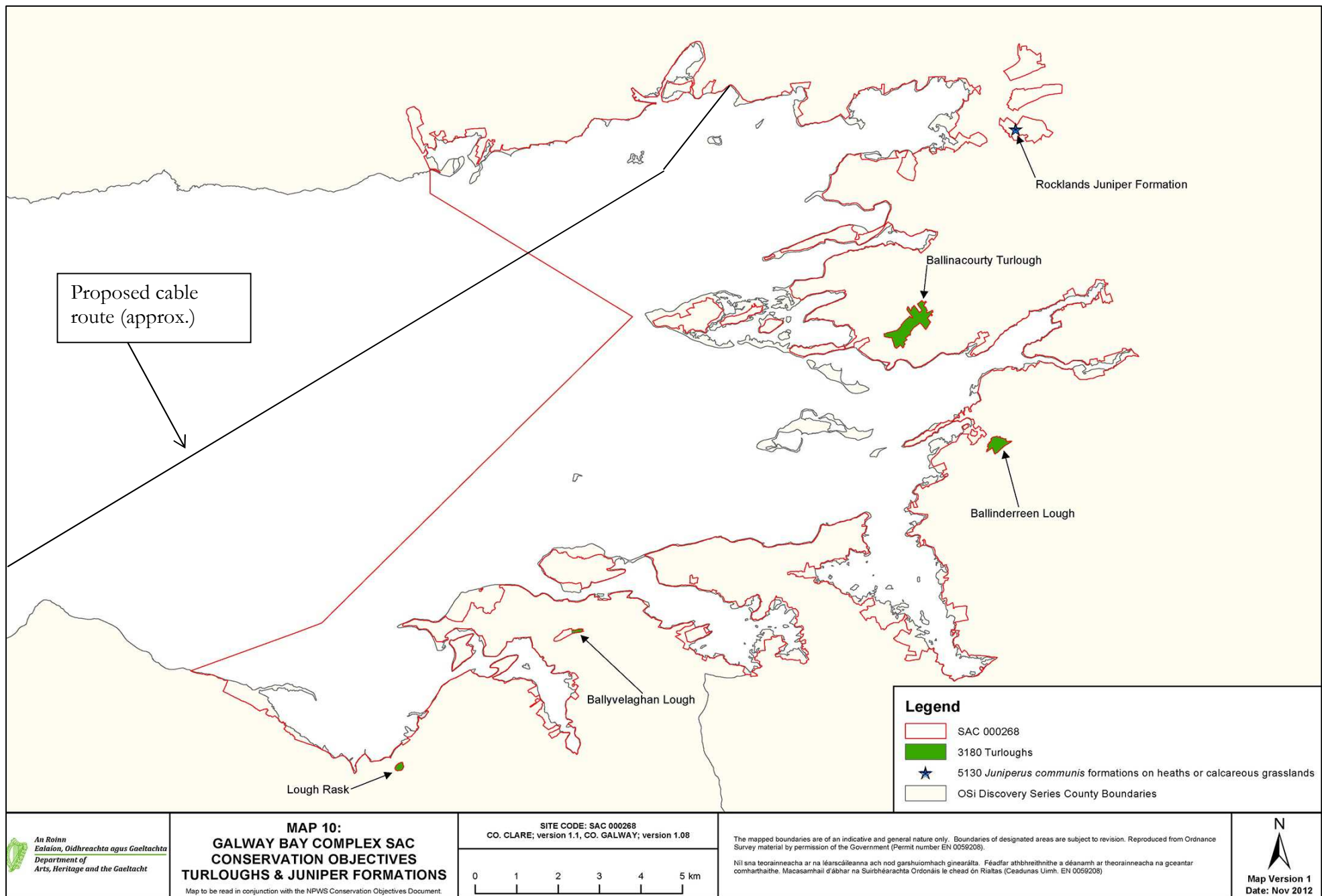


Figure 14. Location of Turloughs and Juniper formations in Galway Bay Complex SAC.

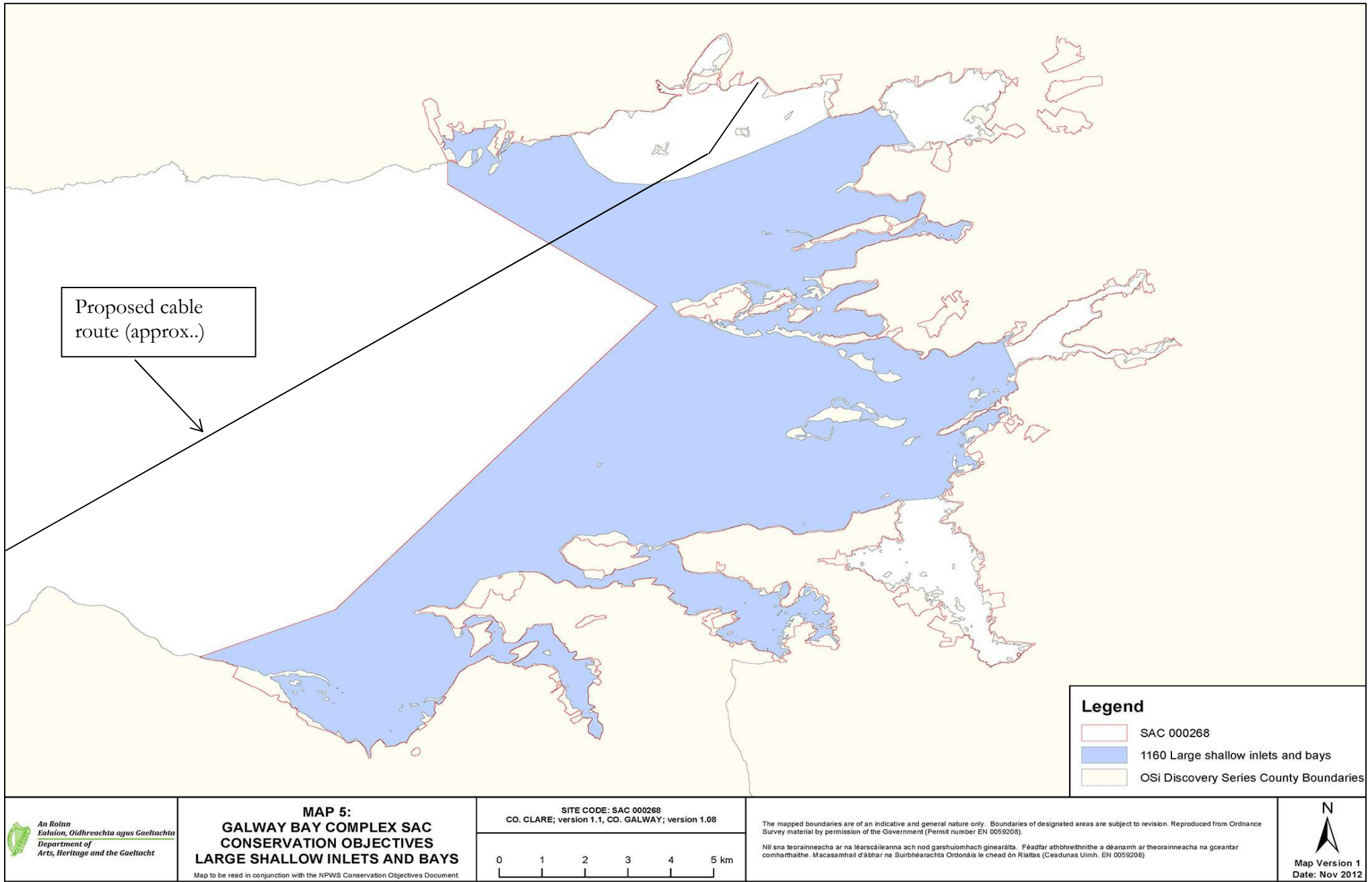


Figure 15. Location of Large Shallow inlets and Bays in Galway Bay Complex SAC.

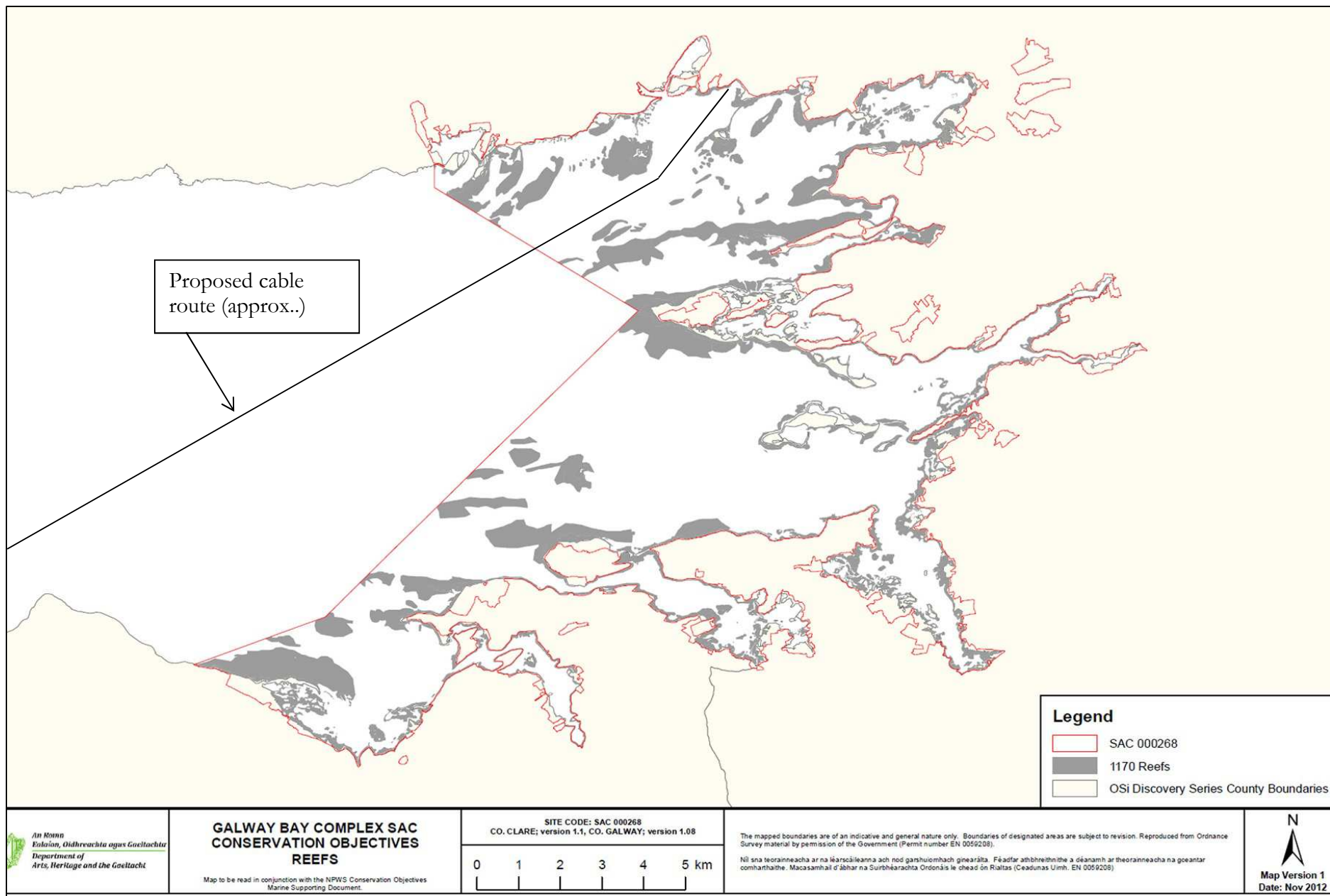


Figure 16. Location of Reefs in Galway Bay Complex SAC. .

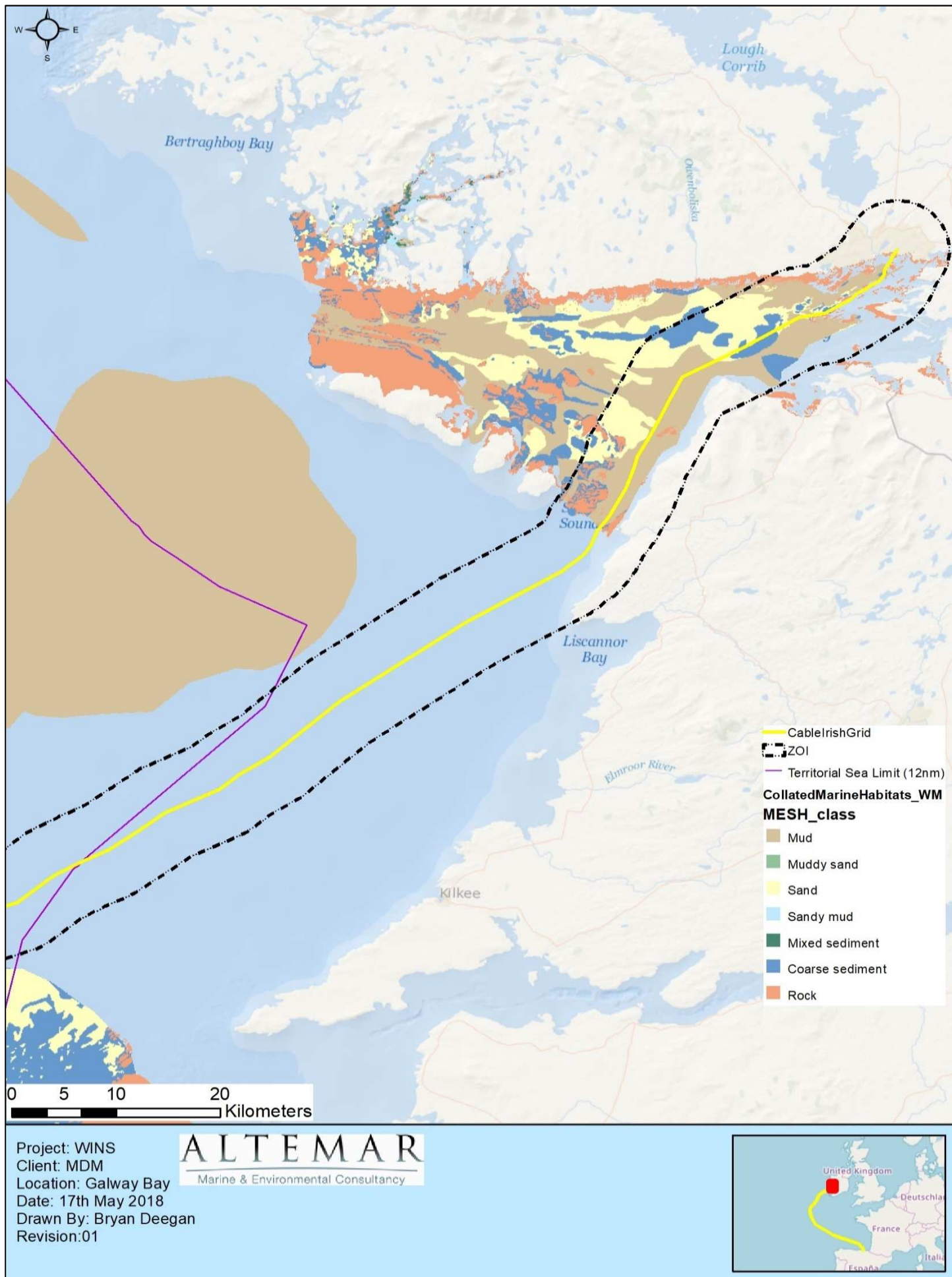


Figure 17. Predicted marine habitat data for the inshore section of the fibre optic cable route (Source MI MSFD mapping).

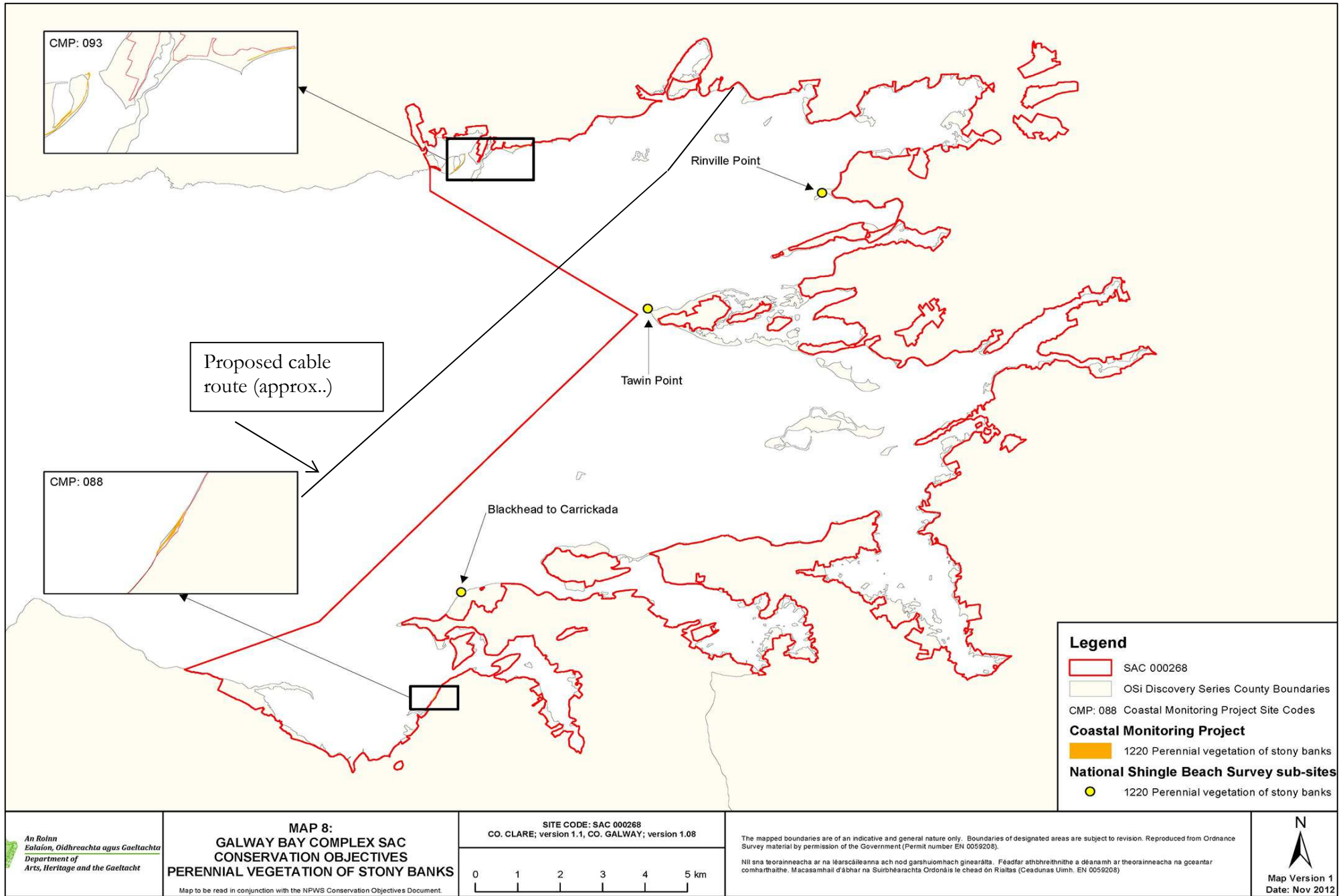


Figure 18. Location of Perennial vegetation of stony banks in Galway Bay Complex SAC.

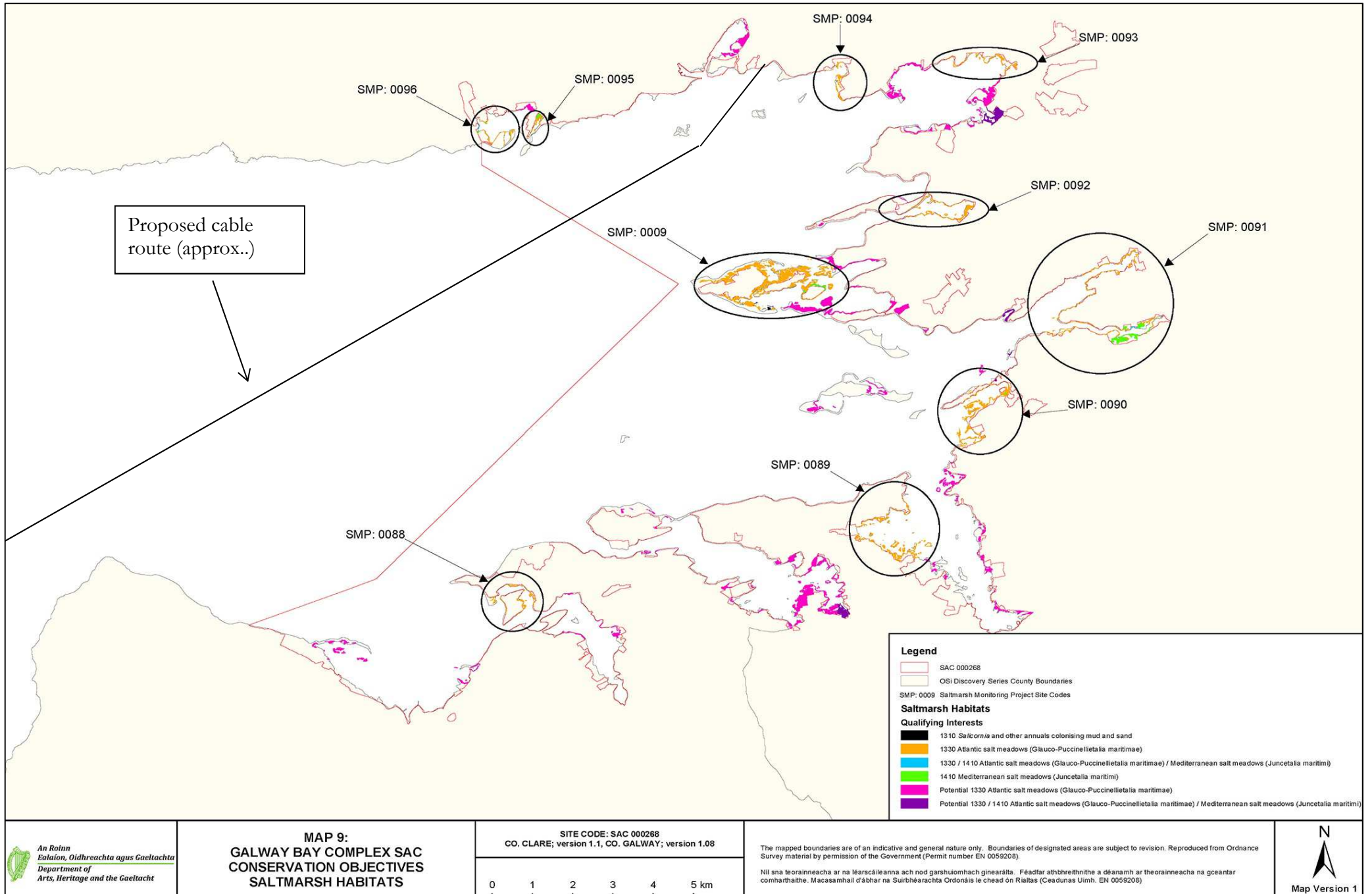


Figure 19. Location of Saltmarsh Habitats in Galway Bay Complex SAC.

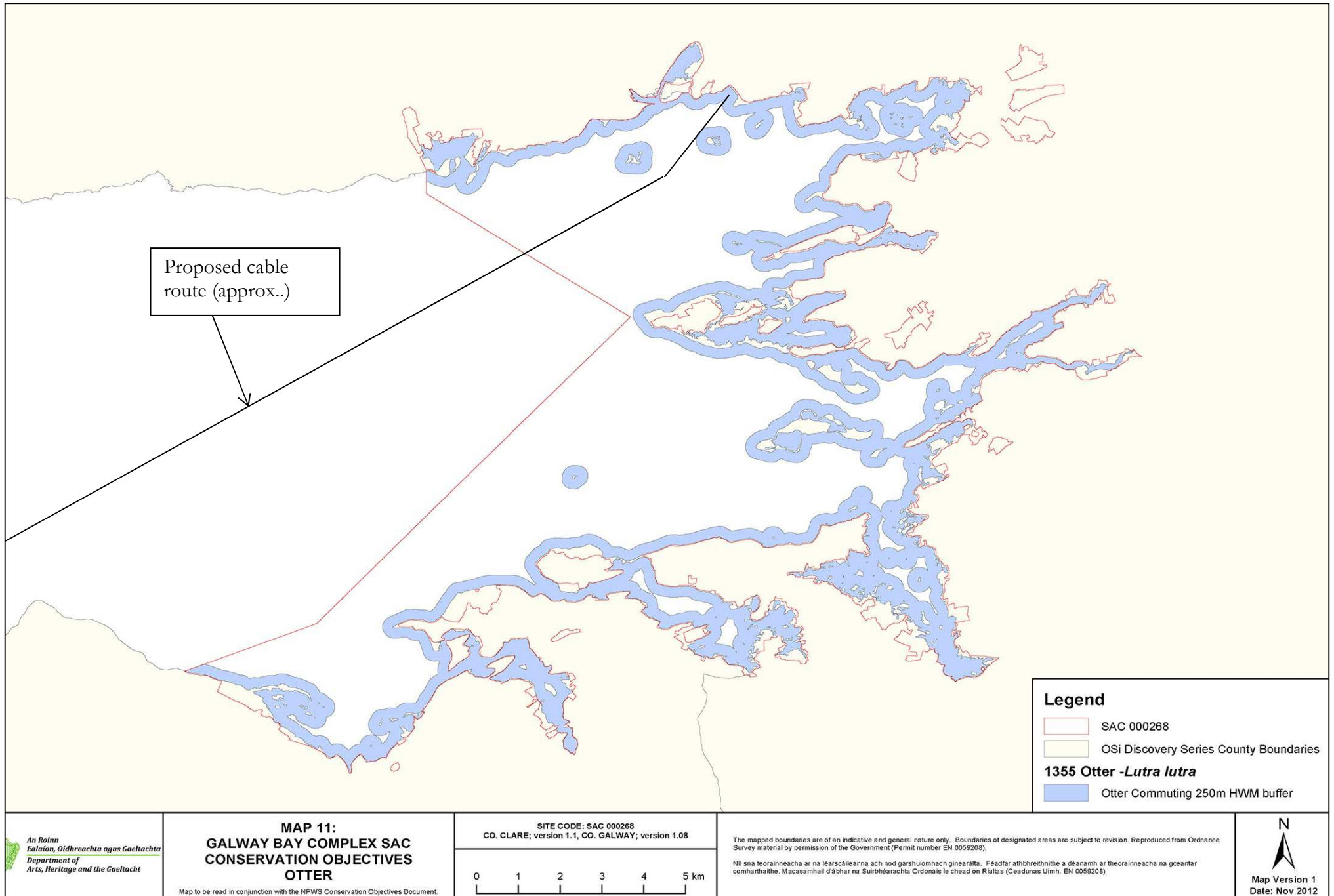


Figure 20. Location of otters in Galway Bay Complex SAC.

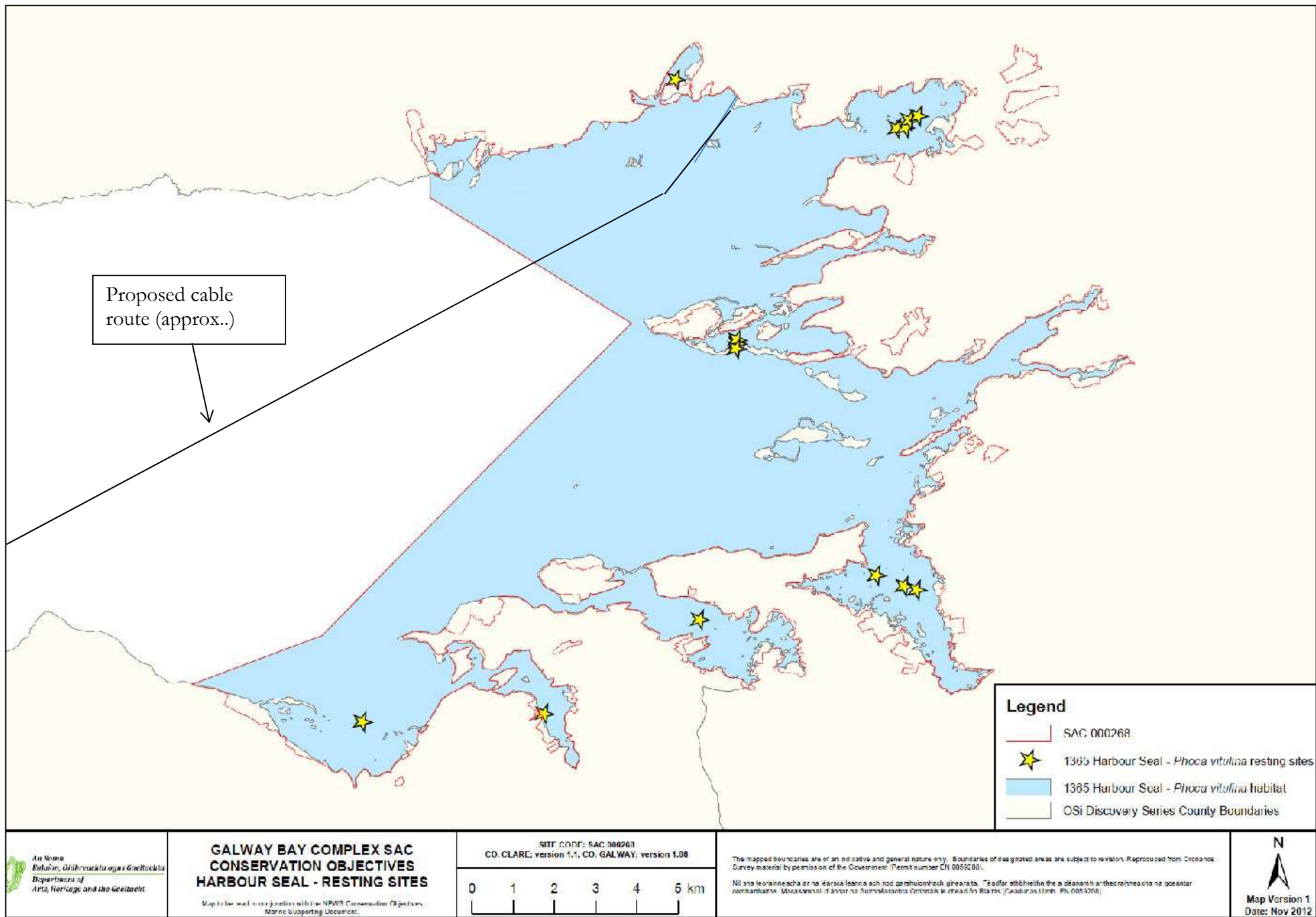


Figure 21. Harbour seal resting sites (NPWS, 2013).

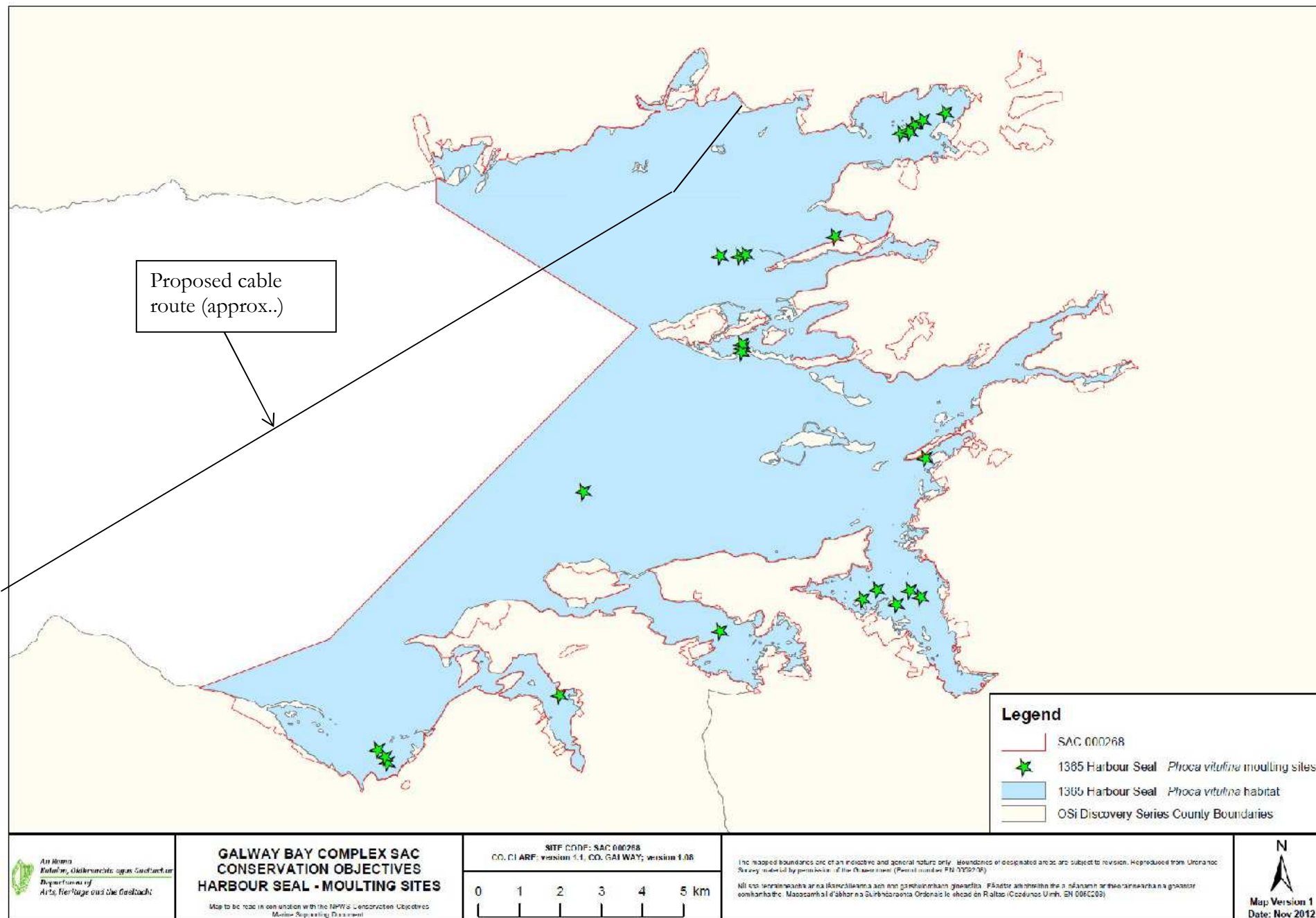


Figure 22. Harbour seal mouling sites (NPWS, 2013).

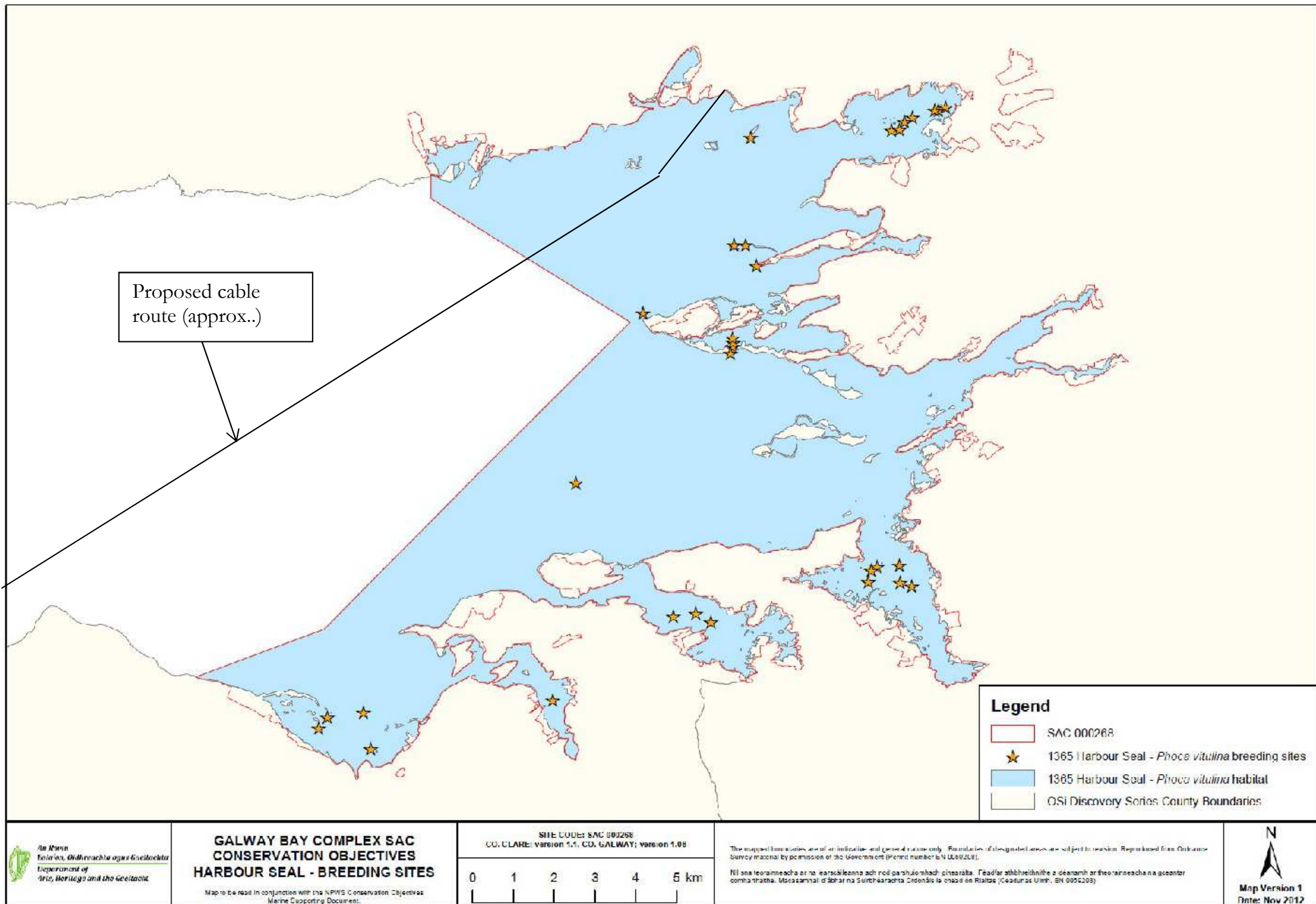


Figure 23. Harbour seal breeding sites (NPWS, 2013).

Additional information on species/habitats

Harbour Seals

Inner Galway Bay is an important site for harbour seals but, not for grey seals (Figure 24). As outlined in the Galway Bay Complex SAC (site code: 0268) Conservation objectives supporting document - Marine habitats and species, “harbour seals in Galway Bay Complex 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.

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.” “Current known sites are broadly within the following areas: Oranmore Bay, Kinvarra Bay, Aughinish Bay, Poulnaclogh Bay, Ballyvaghan Bay, Rabbit Island, Earl’s Rock, St. Brendan’s Island, Ardfry Point, Tawin Island, Glasheen Island and Deer Island.

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 317 harbour seals were recorded ashore within Galway Bay Complex SAC in August 2003 during a national aerial survey for the species. Suitable habitat for the species along with known moult haul-out locations in Galway Bay Complex SAC are indicated in figure 22. This broadly consists of Oranmore Bay, Kinvarra Bay, Aughinish Bay, Poulnaclogh Bay, Ballyvaghan Bay and on Black Rock, Earl’s Rock and St. Brendan’s Island, Tawin Island and Glasheen Island, Ringeelaun Point and Deer Island.”

As can be seen from figure 21-23, the proposed location of the cable survey and main lay are not in the vicinity of resting, moulting or breeding sites. Ballyloughane Strand is an area of human disturbance and dog walking (SPA Conservation Objectives Supporting Document) and the intertidal would not be expected to be an important area for Harbour seals. However, it is noted that as outlined in NPWS 2013 “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.” As a result, despite the location of the survey and cable outside key activity areas, the survey and main lay teams will need to be cognisant of this and take into account due diligence in relation to seal disturbance when deploying and recovering equipment.

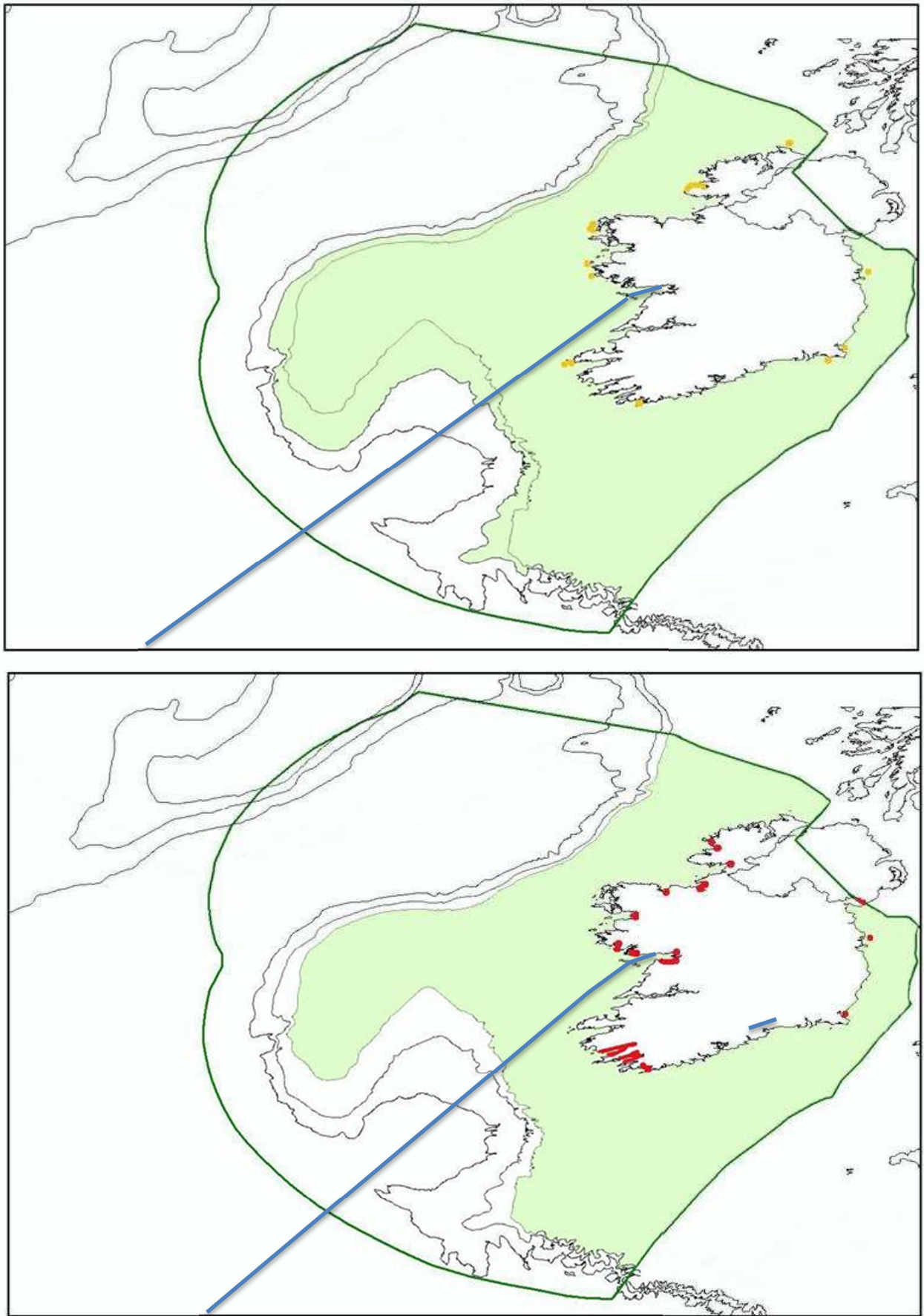


Figure 24. Harbour seal (red) and grey seal (yellow) distribution (green) and haul-out sites in the inshore area. (NPWS). Proposed cable route is the blue line.

Sensitive Subtidal Communities

As seen in Figure 13 from the Conservation Objectives document (NPWS 2013) mixed sediment dominated by Mytilidae community complex and Sandy mud to mixed sediment community complex are predicted along the proposed cable route within the SAC.

Data from the NPWS 2006 Surveys of sensitive subtidal benthic communities in Slyne Head Peninsula SAC, Clew Bay Complex SAC and Galway Bay Complex SAC (MERC, 2006) was interrogated. Cable survey and main lay are not in the vicinity of recorded *Zostera marina* sites (Figure 13). The raw GIS data from this survey was overlaid on the initial proposed cable route. This route was deemed proximal to recorded maërl sites. Following this assessment the route was modified northwards, towards the navigation channel, to avoid recorded sensitive communities (See EcIA). A follow up drop down video survey of the revised route was carried out within the SAC and 1km beyond the SAC, to identify the communities present and fine tune the proposed routing to avoid sensitive communities. *Virgularia mirabilis* and maërl communities (sprinkling on mixed sediment) were noted in several locations (Plates 3 & 4). Where these were encountered along the route additional video drops were carried out perpendicular to the route in a northwards direction, towards the shipping lane. Note was taken of where the communities were no longer present. The proposed cable route was revised to avoid these sensitive communities where possible. Maërl beds are listed as a conservation interest of Galway Bay Complex SAC (Large Shallow Inlets and Bays community) while *Virgularia mirabilis* is a relatively rare subtidal community that has been mapped previously by NPWS in other SAC's.

As outlined in MERC (2006) “The over-riding feature of many of the maërl communities in this part of Galway Bay appears to be their nature. Rather than forming large beds of dense living and non-living maërl, in many cases the communities form a thin and broken veneer on top of various sedimentary seabed types, including fine and coarse sand, gravels, cobbles and muds in some instances. Where the veneer of maërl occurs with coarse gravel and cobbles, the maërl tends to occupy the spaces between grains. The covering frequently is only one layer thick (i.e. the thickness of a single rhodolith). Within these communities, the surface area covering of maërl can vary from 100% to as little as 10% and they were seen to stretch over very large areas of the seabed. Within these areas significant variability in the nature of the underlying sediments was also recorded. However the covering of maërl can be seen to extend throughout all such variability in sediments. In many cases it is perhaps questionable as to whether the occurrence of maërl in this manner actually constitutes a maërl community or not.” Despite this, the route was revised to avoid areas where maërl was found on the video survey.

MERC 2006 also stated that the “species of maërl recorded included the discoidal form of *Lithothamnion coralloides* to the north of Finavarra and to the east and north of Aughinish Island. Also recorded was *Phymatolithon calcareum* in Muckinish Bay. Further deposits of the finely branched form of *Lithothamnion coralloides* were recorded in Doorus Strait, as well as to north of *Tawin Peninsula*” (in the vicinity of the proposed cable route) “where maërl communities formed an extensive veneer over underlying muddy and muddy sand sediments. No *Lithophyllum dentatum* was recorded during the survey of Galway Bay Complex SAC.”

In relation to the *Virgularia mirabilis* MERC 2006 stated that “despite conducting a number of specific dives in order to investigate other ‘known’ sensitive communities – most notably for *Neopentadactyla mixta* and the Sea Pen *Virgularia mirabilis* in the area to the north of Tawin Peninsula and south of Mutton Island, no such communities were recorded. Indeed, other than very occasional individual *Lanice conchilega* no other significant subtidal species or communities were encountered during the survey at this site.” The area where the *Virgularia mirabilis* was noted during this camera survey, was not covered by the 2006 surveys. No *Neopentadactyla mixta* was noted during these surveys. As stated previously the proposed route was modified to avoid these known sensitive areas. It should be stated that the camera survey carried out as part of the EcIA/NIS extends the current distribution of Maërl but has now identified an area of *Virgularia mirabilis* within Galway Bay Complex SAC.

The habitats present, the proposed cable laying methodologies, the routing of the cable and the future dredging of the navigation channel by Galway Port in this area and was discussed with David Lyons of NPWS. It was agreed that further video drops and habitat/*Virgularia mirabilis* density mapping would be carried out at survey stage to seek to further optimise the route of the cable in this area so as to select a route of minimal impact on *Virgularia mirabilis* communities.



Plate 3. *Virgularia mirabilis* noted during this camera survey.



Plate 4. *Mearl* noted during this camera survey.

Predicted marine habitat data for the inshore section of the fibre optic cable route is shown in Figure 17 (Source Marine Strategy Framework Directive (MSFD) mapping Marine Institute). As outlined by MSFD (2013) “high confidence is assigned to multibeam and backscatter derived habitat typologies and medium confidence is assigned to the modelled MESH habitat typologies. Approximately 90% of the Predicted Habitat Type (PHT) coverage within the assessment area has a confidence level of medium or high”. The survey is incomplete for the proposed route, but it should be noted that reef/rock is not noted on the route. The predicted habitats along the cable route, based on Infomar data, as the cable comes out of Galway is in the order of coarse sediment, sand and the mud.

Marine Annex IV Cetacean Species

In O'Brien (2013) "a total of 28 dedicated land-based visual watches were carried out from Spiddal Pier (2700 minutes/45 hours) between March 2005 and February 2007. Cetaceans were recorded during 10 of the 27 watches (37%). A total of 16 sightings were recorded during watches comprising of three species; including, harbour porpoise (81%), bottlenose dolphin (13%) and Minke whale (7%). Only a single sighting of two harbour seals was recorded on one occasion. All sightings recorded were within a 5km radius of Spiddal Pier. Most sightings (75%) were recorded between the months June to December with only 25% of sightings recorded in the period January to May, highlighting mid-summer through to December as the months when porpoises are most active at the site.

The OE Test site was again the target of long-term Static Acoustic Monitoring (SAM) as part of the PReCAST project, when monitoring commenced in January 2009 and continued until September 2010. During this time a total of 572 days were monitored at the site. SAM monitoring from January 2009 to September 2010 at the test site show that, on average, harbour porpoises were recorded on 95% of days monitored, while dolphins were rarely recorded (4%days). These results reflect those of the SAM I. Over the 572 days monitored, a total of 27,902 porpoise Detection Positive Minutes (DPM) were recorded (4,515 Detection Positive Hours; DPH). As dolphin sightings were rare, only the porpoise data were analysed to identify factors influencing their presence at the site.

Results from visual and acoustic monitoring are very similar as all show that autumn and winter months are when porpoises are most active at the site. Visual data shows that in comparison with other sites in the bay subjected to land-based watches, Spiddal is not the most important, with a greater relative abundance recorded from Black Head on the south shore. This is most likely due to the tidal nature at Black Head as porpoises are known to use tidal races when feeding."

Figure 25 shows all cetacean species, and Figure 26 shows monthly activity trends, in the area as recorded by IWDG sightings scheme. Cetacean activity has been seen in the vicinity of the cable route corridor. Species seen in the area and along the cable route include bottle-nosed dolphin (*Tursiops truncatus*) (especially in inner Galway Bay and inshore areas along the route), harbour porpoise (*Phocoena phocoena*), common dolphin (*Delphinus delphis*), minke whale (*Balaenoptera acutorostrata*), and a single killer whale (*Orcinus orca*). During the months of proposed survey and cable laying (July-August) bottle-nosed dolphin (*Tursiops truncatus*) harbour porpoise (*Phocoena phocoena*), common dolphin (*Delphinus delphis*) have been recorded.

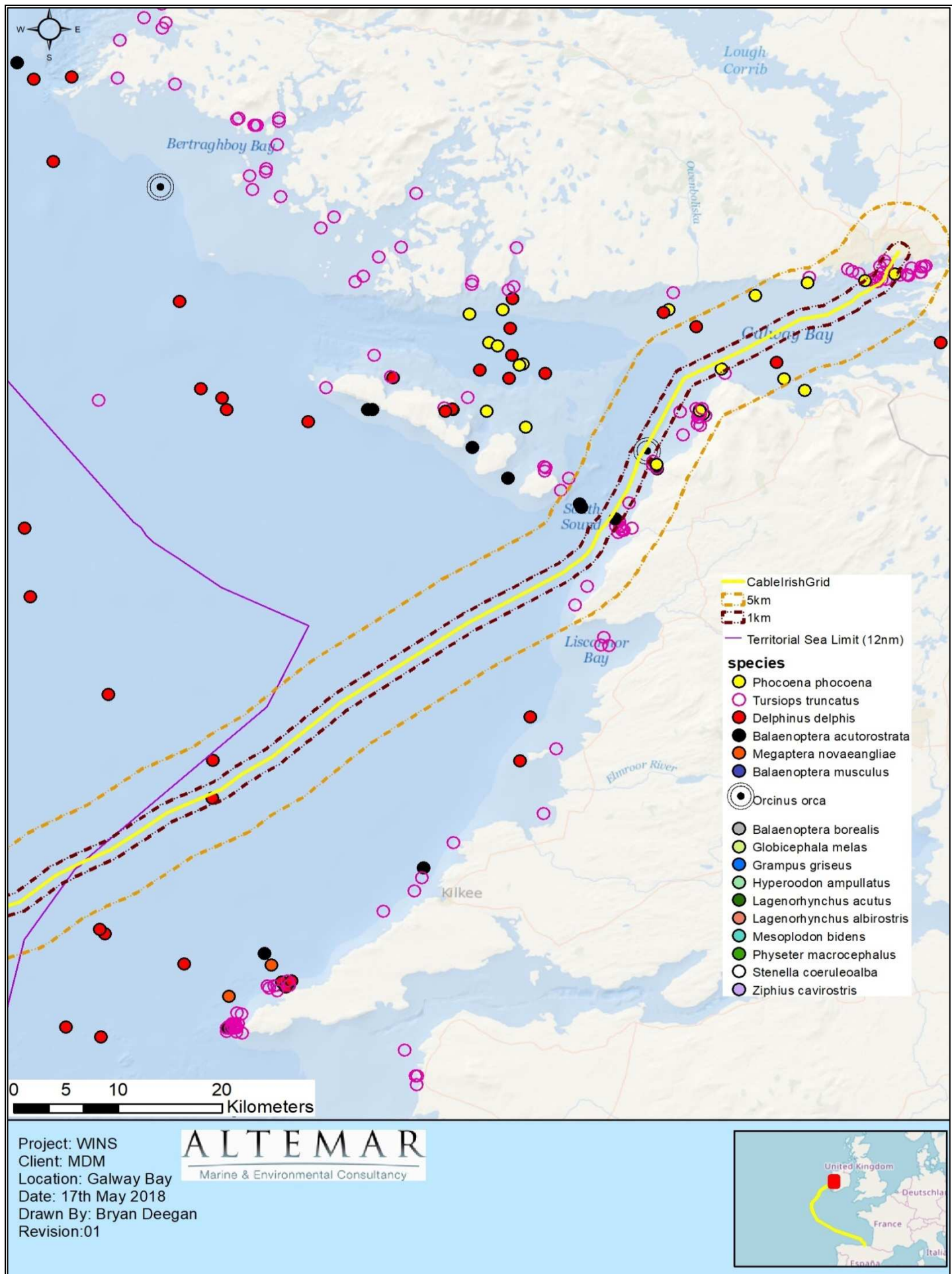


Figure 25. Recorded Cetacean species sightings (Source IWDG Sightings Data) in the inshore.

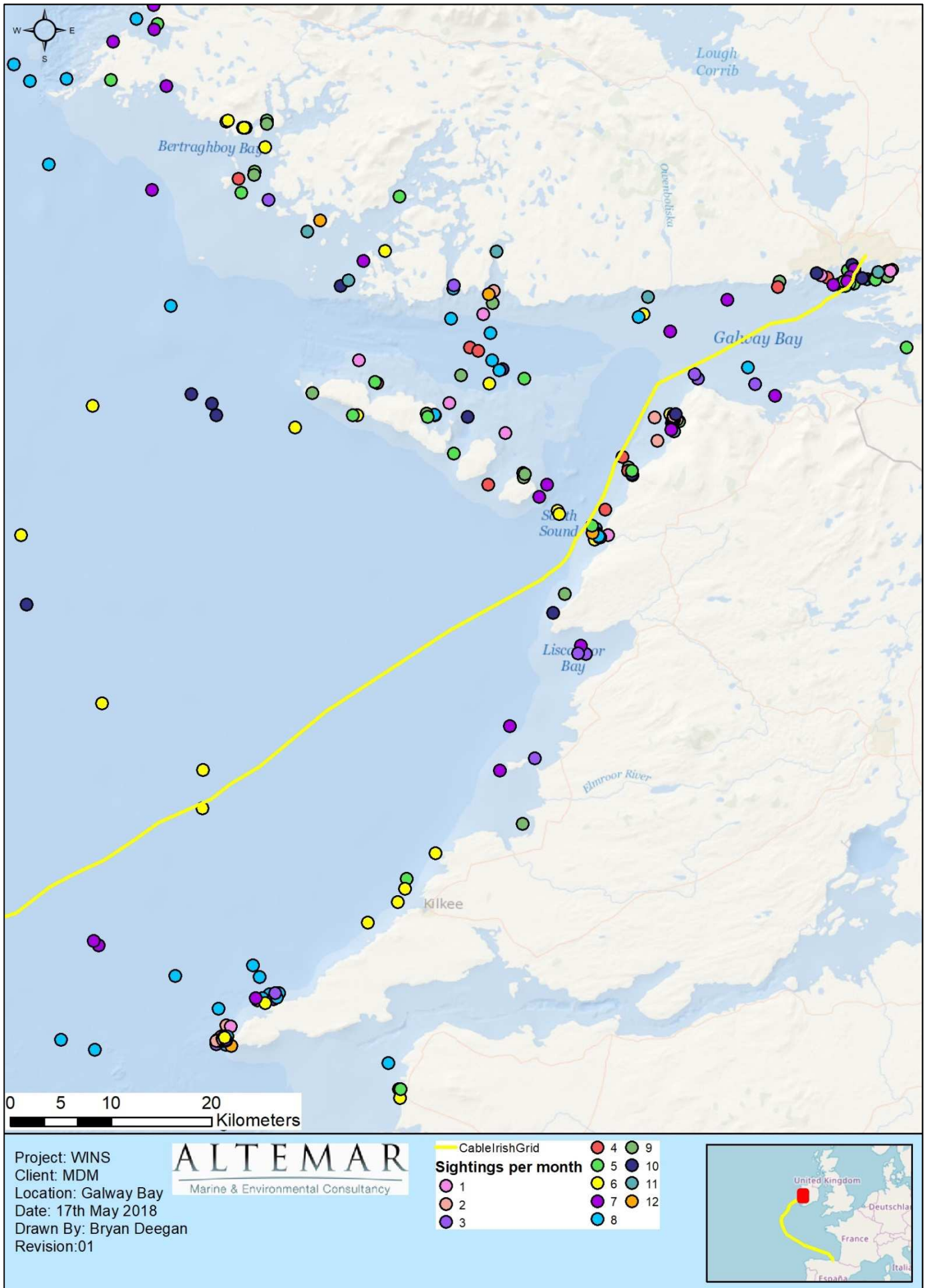


Figure 26. Recorded Cetacean sightings (Source IWDG Sightings Data) in the inshore area recorded during the 12 months of the year within the 12nm limit.

F) Field Observations at Ballyloughane Beach, Co. Dublin

During fieldwork, only those features relevant to the proposed cable survey and lay for the fibre optic cable, the potential cumulative effects in relation the installation of the fibre-optic and surrounding impacts, that may have an adverse effect on the integrity of NATURA 2000 sites, other conservation sites and species/habitats of conservation importance, have been considered.

A site visit was carried out on at low tide of 0.6m on the 2nd April 2018 by Bryan Deegan MCIEEM. The proposed route was walked and photographed (Plates 5 & 6). The proposed HDD will be located in the amenity grassland area on the north side of the road (Plate 7) will finish below the eroding foreshore (Plate 6) in the upper intertidal.

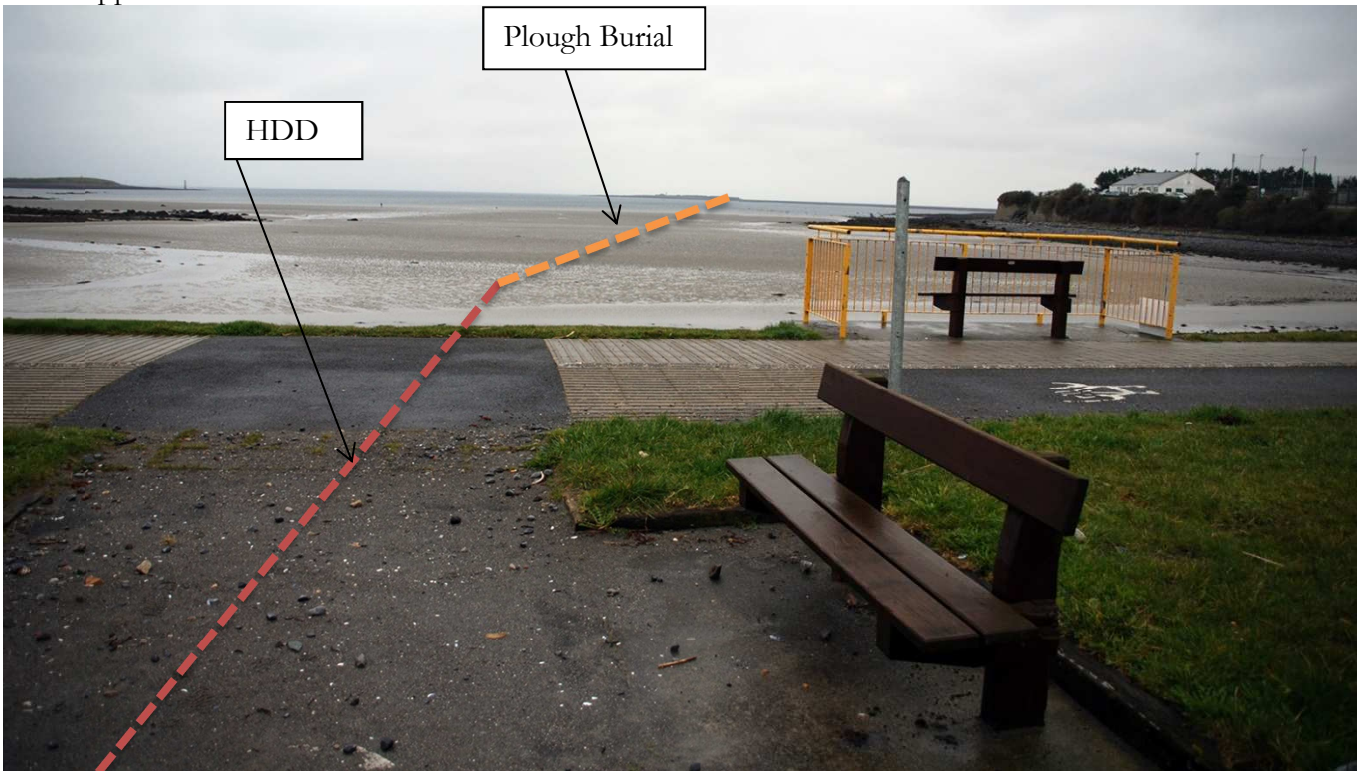


Plate 5: Uppershore on Ballyloughane Beach with the approximate location of the cable route



Plate 6: Mid-Lower shore on Ballyloughane Beach with the approximate location of the cable route



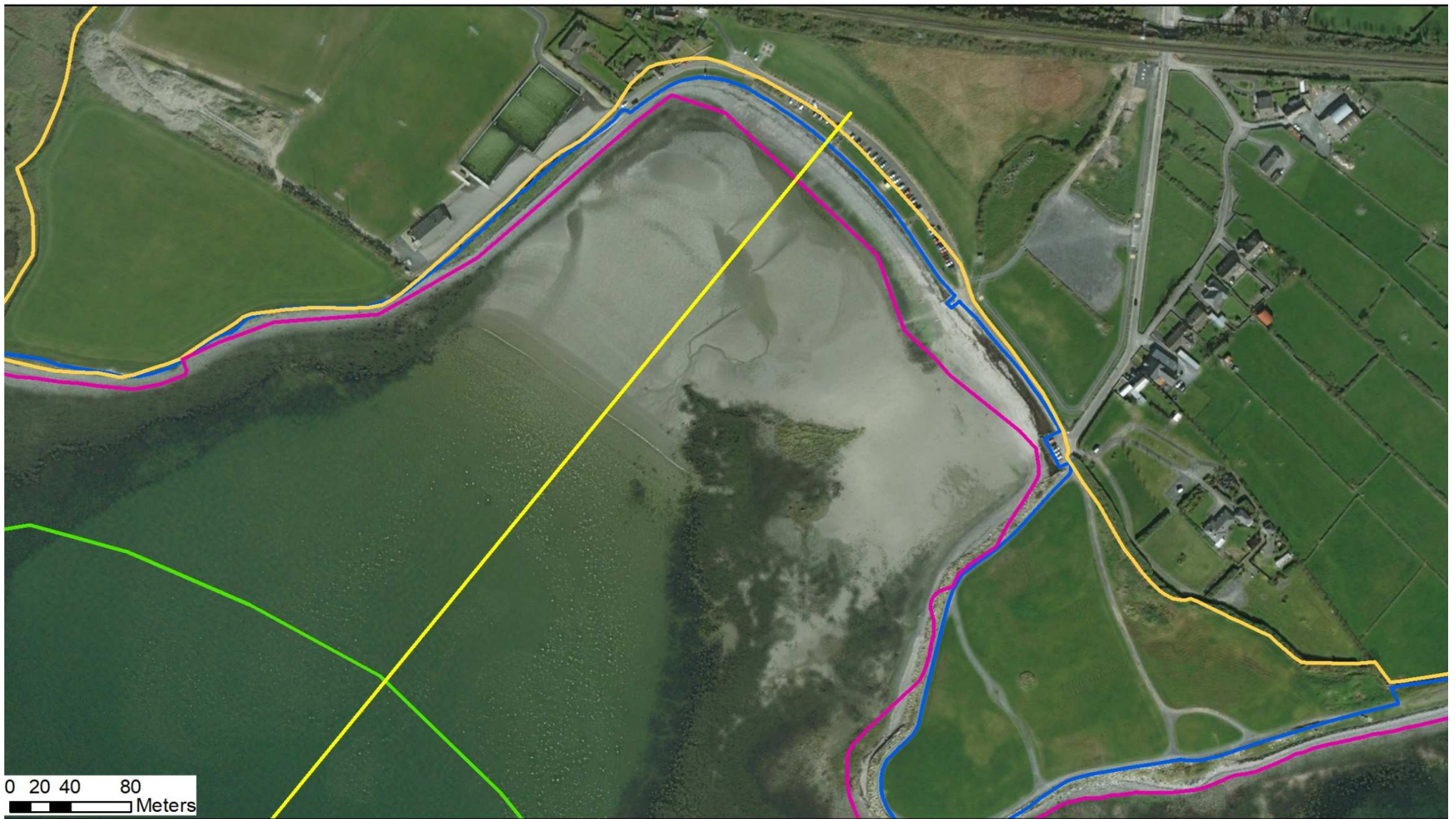
Plate 7: Site of HDD drill set-up

The upper shore of the site is bounded by a concrete wall (1m high)(Plate 7 inset) followed directly on the landward side by amenity grassland, a car park, road and then another larger area of amenity grassland.

Along the proposed cable survey and main lay route the upper shore of the beach is dominated by a cobble storm beach (approximately 10m wide) and muddy sand to the low water mark. Algal drift lines were present on the cobble storm beach at the time of survey and were dominated by Fucoids and Laminaria species. Abundant casts of juvenile *Arenicola marina* were seen on lower shore of Ballyloughane Beach in addition to rare *Lanice conchilega* on the lower shore. Bird species noted on site included black-headed gull (*Larus ridibundus*), little egret (*Egretta garzetta*), grey heron (*Ardea cinerea*) and pied wagtail (*Motacilla alba yarrellii*)

It is proposed to put the beach manhole in the larger amenity grassland on the northern section of the road and bring the cable under the road, small amenity grassland area and concrete wall (Plate 7) and into the upper shore of the Ballyloughane Beach, beneath the cobble and drift line areas.

The proposed cable route (Figure 27) was walked and it should be noted that the *Zostera* species were not noted along the proposed route and in the shallow subtidal, as noted by the video survey.



Project: WINS
 Client: MDM
 Location: Galway Bay
 Date: 1st June 2018
 Drawn By: Bryan Deegan
 Revision:01



- Cable
- OSI HWM
- OSI LWM
- SAC_2018_01
- SPA_2017_06

Figure 27: Satellite image of the Ballyloughane Beach area and the proposed cable route.

G) Mitigation Measures (as seen in EcIA)

Minor short term impacts may result as a consequence of the survey and mainlay phases 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 SSCO's. However, following the precautionary principle, substantial mitigation measures have been developed to minimise the ecological impacts of the project, not only in relation to Natura 2000 Annex habitats and species, but also additional species and habitats of conservation importance that have been recorded in the area.

Pre cable laying mitigation

Route Planning

A strict route selection process was carried out to assess the optimal route and landing site across the east coast of Galway Bay, taking into account the lowest environmental impact, highest resource efficiency and wave exposure on the basis of sound and comparable data. This included addressing engineering issues as well as environmental concerns and assessing existing subsea infrastructure.

The landfall location is within 4 overlapping sites of conservation significance (SAC, SPA, pNHA and RAMSAR). The conservation significance of the habitats and location of the important feeding grounds for overwintering birds was assessed. The route through the conservation sites was deemed to be the optimal route of satisfying conservation significance (within the designated sites) based on the assessment of NPWS ratings data, the optimal from an engineering perspective and for the stability and longevity of the cable. All saltmarsh and sand dune habitats were avoided as part of the route selection process. Initial routing used NPWS data to avoid subtidal communities. However, a video survey was carried out within the SAC to fine tune this data and avoid sensitive subtidal communities in areas not covered by previous NPWS data.

Timing of Cable Lay

The assessment of environmental factors within the landfall area was critical to the timing of the project and mitigation of impacts on species of conservation importance. The primary conservation interest of the SPA at the landfall is over-wintering birds. The cable lay is to be carried out in summer, after all over-wintering birds have left and prior to the arrival of species for the overwintering season. Terns are also listed as a conservation interest and are not located in the vicinity of the proposed cable route.

<i>Works</i>	<i>Date</i>
Site Investigations	April 2019
Shore-End Installation	June 2019
Main-Lay	June - August 2019

Harbour Seals will be at breeding sites during summer months. The cable survey is at minimum 1.5km from the nearest breeding site. As discussed with Inland Fisheries Ireland the proposed cable laying timeline (July 2019) will coincide with the main salmon run returning through Galway Bay into the River Corrib catchment for the purposes of spawning. The salmon smolt run is from mid-April to the end of May (outside the timeline of the proposed cable laying works). There is no significant noise generation during ploughing operations. As the cable installation by plough is relatively slow it produces only a minor plume of suspension of seabed sediments in the water column and this is transient and localised due to the nature of the ploughing and natural backfill activities. The cable laying operation from Ballyloughane Beach to the Aran Islands should only take approximately three days.

Laying Procedure

Subtidal burial of the cable will involve the use of a marine plough. Ploughing entails disturbing a wedge of seabed and the placing of the cable within the wedge in one pass. The seabed backfills passively over the laid cable.

As outlined by OSPAR (2012) "As far as the burial technique is concerned, installation via jetting by means of sledge or ROV or use of a plough involves the lowest environmental impacts. Jetting fluidises the seabed using high power jets, and material may suspend to the water column for prolonged periods (a number of hours), and have the capacity to be transported over longer distances, increasing the number of potential receptors. Ploughing usually entails lifting a wedge of seabed and the seabed backfills over the laid cable. The level of sediment disturbance is, therefore, lower using ploughing compared to jetting techniques."

Construction phase mitigation measures

Terrestrial

It is proposed to use a HDD to travel under the car park, beach wall, drift line, cobble upper shore and into the upper intertidal. The following will need to be provided or confirmed to the project ecologist prior to HDD commencement:

a) Supervision and Notification

An ecologist with previous experience with HDD operations in the intertidal/subtidal should observe all works from planning, initial site setup to reinstatement. NPWS and IFI should be notified of pending operations at least 1 week before operations commence and of any breaches of compliance. An Ecological Clerk of Works report should be submitted to IFI/NPWS.

b) Timing of drill

It is estimated that the HDD will take one day to drill the duct for the cable. The timing of the HDD in the intertidal should be that no water is over the drill head during drilling. This would mean that the drill should be done on a receding tide so that there would not be water in the vicinity of the bore. This would allow for observation of the drill progress by the ecologist and the rapid completion of the operation in a single tide.

c) Frac-out Contingency Plan

A Frac-out Contingency Plan should be discussed with the ecologist before works commence. The HDD operators will need to be equipped with a tracked hydraulic excavator, straw or hay bales, stakes to secure bails, silt fence, sand bags, shovels, pumps, and any other materials or equipment necessary to contain and clean up inadvertent releases.

d) Corrective Actions for an Inadvertent Release

In the event of an inadvertent release to the surface, the following actions will be taken:

- If the release is large, mud circulation will cease immediately. If the spill is small to moderate, the contractor will continue circulation in order to maintain pressure in the hole.
- Maintaining circulation will also be necessary if the native material does not have the frictional characteristics necessary to maintain hole stability without the presence of mud provided under pressure.

In all cases, the contractor will also proceed as follows:

- Contain any drilling fluid that has surfaced.
- Notify all on-site representatives.
- Reduce circulation pressure and evaluate the circumstances leading to circulation loss to determine if the fracture can be sealed.
- Thicken the drilling fluid to attempt to seal off the location of the release as reasonably practical.

d) Containment of Drilling Fluid Release

Immediately following the detection of any inadvertent drilling fluid release, containment and clean-up operations shall commence. For releases on land, Contractor shall use straw bales, silt fences, sand bags and earth berms to prevent fluid from migrating or flowing from the immediate area of the discharge. If the volume released is too small for containment measures or, if the release occurs in an environmentally sensitive area where release of containments can cause additional damage, the receiving area will be allowed to dry naturally. If there is a threat to a sensitive resource, or a threat to public safety, HDD activities will cease immediately until a plan to proceed is discussed.

Other containment measures include the following:

- Additional berms may be constructed around the release area as directed by the Engineer In Charge to prevent release of materials.
- If the amount of fluid released is large enough to prevent practical collection, the affected area will be diluted with fresh water and allowed to dry. Measures will be implemented (berm, silt fence, and/or hay bale installation) to prevent silt laden water from flowing into the sea.
- If hand tools cannot contain a small on-land release, small collection sumps may be constructed to pump the released material into the mud processing system.

The decision to proceed with the drilling operation will be at the sole discretion of the Engineer In Charge after all practical methods to seal off the location of the discharge have been attempted. Underwater releases are not expected as HDD operations in the intertidal will be carried out in the dry.

e) Clean-up of Releases

The clean-up shall commence after the release is contained. Clean-up shall include removal of all visible drilling fluid located in accessible areas. Removal methods will vary based on the volume of the release and the site specific conditions. Removal equipment may include vacuum trucks, loader and back hoe buckets, small pumps, shovels and buckets. After removal of the released drilling fluid, the release area will be reinstated as close to the original condition as possible.

f) Notification

In the event of a frack-out NPWS and IFI should be informed immediately.

Pollution

The presence of machinery on the intertidal could pose a threat of pollution. Toilet facilities will need to be provided on site. In order to minimise pollution the following should take place:

- 1) All machinery should only be fuelled on the hard stand area of a car park or road at least 10m from a drain or gully.
- 2) All waste from the beach manhole operations should be removed from the site.
- 3) Any fluid leaks/spills should be cleaned up immediately.

Intertidal

As was seen during the fieldwork, the beach at which the intertidal ploughing is to be carried out on is moderately exposed. This can be seen by the evidence of 10m wide storm beach and the presence of a concrete wall at the top of the shore. Even though the construction phase of the project is outside over-wintering bird season and during the summer when there is increased human visitor activity on the beach, disturbance of resident birds, summer visiting birds, otters and harbour seals may occur and the integrity of these conservation interests must be maintained. As a result mitigation of impacts in the intertidal should concentrate on minimising the following:

Disturbance

The proposed route is within a popular beach which will have increased activity during summer months. As a result the presence of additional personnel on the shore during summer would not be thought to cause a significant additional disturbance. However, the presence of machinery and digging generated noise could cause a localised disturbance to bird populations. In order to minimise disturbance of the intertidal habitat and species the following mitigation measures would be carried out:

1. An ecologist would be onsite for the HDD, ploughing and back blading process in order to minimise disturbance and ensure site integrity is maintained. If roosting birds are present on the shore, the cable lay should be postponed until the birds depart, without provocation.
2. Drift lines in close proximity to the proposed route would contain the highest proportion of potential food source for bird species. If present, these should be avoided by machinery and personnel.
3. Noise generated from machinery could cause a disturbance. The bucket of the digger used in gaining access to the HDD should have teeth, so as to minimize scraping of metal against the cobble or boulders (if present).
4. The cable route on the shore should be plough buried on a receding tide, as soon as practical to go along the upper shore. 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 cable route being imperceptible following a single or several tidal cycles.
5. The HDD operations in the intertidal will take one day and should commence under the intertidal element, on a receding tide when the area above the HDD has no water and should be completed within one tidal cycle. HDD operations in the intertidal should not be carried out while the HDD is covered with water, so that any potential leak of bentonite can be easily seen on the sand surface, isolated and cleaned.

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. *Reinstatement*
Reinstatement of the terrestrial and intertidal habitat should be carried out to pre-construction conditions. Any concerns in relation to the trenching process or resulting reinstatement of the habitat to pre construction conditions will be raised with NPWS by the project ecologist prior to the removal of personnel from the site. A report on the trenching and reinstatement of the intertidal habitat, with imagery, will be submitted by the project ecologist to NPWS within 1 week of the completion of works.

Subtidal

Mitigation impacts are primarily concerned with the survey and construction phases of the project as minimal impacts are foreseen during the operation phase, with the exception of human intervention in relation to a break or fault in the cable. Impacts in a decommissioning stage are similar to those of the construction phase. Repairing the cable may involve several scenarios, from *insitu* repair with divers to the use of a grapnel to lift the cable on board so that repairs can be carried out at sea. As a result the following mitigation measures would be enforced during construction, repair and decommissioning.

1. During the site survey a detailed video survey of the proposed cable route within the SAC should be carried out by a marine ecologist to provide higher resolution and habitat mapping data on the species present within the survey corridor in the SAC and the proposed route optimised in discussion with NPWS.
2. Under no circumstance should seals hauled out in the area be disturbed such that they enter the water. This is unlikely, as this area is not recognised as a haul out area. Cable laying is to be carried out outside of breeding and haul out areas, but will be carried out during haul out period. A MMO will be onboard the vessel at all times in Irish waters to enforce mitigation measures. “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” will be applied to ensure noise introduced into the marine environment have minimum effect.
3. No hydroacoustics are to be used during the cable lay so as to limit disturbance to cetaceans.
4. Additional permissions would be sought from NPWS in the case of repair/removal of the cable etc. prior to carrying out works.
5. In order to ensure the integrity of Annex habitats and additional habitats and species of conservation importance are retained in the vicinity of the planned project a marine ecologist should be onsite during all intertidal works including the final making good of site, including back filling, beach manhole completion and removal of machinery. The ecologist should also ensure that birds of conservation importance roosting on the shore should not be disturbed during works.
6. Mitigation measures will include the presence of a MMO onboard the vessel. The purpose of the MMO is to ensure that there is no disturbance of seal /cetacean populations, to ensure that the vessel stays within 250m of the cable route and that vessel-generated noise is restricted to engines and winches only.
7. On approaching the landfall area the cable ship should approach its closest point to shore at the lower end of an incoming tide. No discharges from the vessel should be made from the ship within 5km of landfall. The MMO/ecologist should ensure that mitigation measures are carried out. Sufficient resources should be made immediately available on the vessel to deal with accidental oil spills including hydraulic hoses bursting etc. and reported to the on board ecologist.
8. Laying of the cable should be carried out in calm weather to ensure that there is no risk of vessel grounding. The vessel should not carry out the landfall operations in strong northerly winds (>force 3) due to the presence of intertidal reef to the south.

9. The cable lay vessel should at all times be within 500m of the cable lay route in order to minimise disturbance of breeding birds in the surrounding SPA's.
10. Due to the presence of sensitive subtidal communities in the Galway Bay Complex SAC NPWS should be informed of the final proposed route prior to mainlay.

Post-lay Monitoring

Given the location of the cable, buried in marine sediments or laid across reef areas, monitoring of the cable would pose more of an impact on the marine environment than just leaving the cable *in situ* unmonitored. Underwater cables by their nature are passive on/within the seabed. It would not be expected that the cable will move, deteriorate or impact on marine/intertidal habitats over time, unless impacted by anthropogenic /storm influence. Problems, if they arise would be expected to result in a loss of signal and subsequent location of the break/damage and repair.

Monitoring of the intertidal could take place to assess the levels of sediment cover over the cable across the intertidal. However, the plough method ensures effective burial and reinstatement within one or several tides depending on weather conditions.

Ecological supervision

In order to ensure the integrity of Annex habitats and additional habitats/species of importance are retained in the vicinity of the planned project, the following is recommended:

- a) An ecologist should be onsite for the initial set up of HDD machinery and commencement of drill.
- b) An aquatic ecologist should be onsite to observe the HDD drill operations to ensure that no bentonite escapes into the intertidal/marine environment.
- c) An ecologist should be onsite to observe the making good of site, including back filling of drill pit and removal of machinery Images should be taken of the process and submitted to NPWS as part of an ecological report.
- d) A MMO should be present during marine survey and ship cable laying to minimise any impact on marine mammals.

H) Cumulative Impacts

“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” (OSPAR, 2012). The proposed site is in a populated area and is a popular destination for the local community. It is a location with a regular stream of dog walkers and pedestrians on the shore. Once *in situ* the cable will be unperceivable to the public, with the exception of the beach manhole lid outside the conservation areas. The laying or presence of the cable would not be seen to have an impact on water quality of the area including impacting the water quality status.

The intertidal section of this project will involve laying of the cable by plough (in SAC/SPA/pNHA & Ramsar site) and a HDD rig (outside conservation sites) that will enter the upper shore (within the conservation sites). The beach manhole in the amenity grassland area outside the Natura 2000 sites and is the termination of this aspect of the project. From here the cable will be connected to the terrestrial element of the project which will utilise existing ducting, where available, along the road network.

Galway City Council planning permission was examined for potential cumulative impacts due to development in the area. No planning applications have been received in the past four years in the vicinity of the proposed cable route on Ballyloughane Beach.

This report pertains to the terrestrial, subtidal and intertidal elements of the fibre-optic cable route within Irish waters. As can be seen from using the Best Available Techniques (see EcIA) and the development of mitigation measures prior to cable lay, including site selection, timing of the main lay in addition to mitigation measures during main lay 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).

I) Potential impact and the significance of the impact

Cetaceans

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 (No SAC's within close proximity to the cable route).

Cetaceans have been recorded near the proposed survey route, out to and beyond the 12nm limit. The proposed survey would be expected to impact on cetaceans primarily through the emission of noise due to the vessel and acoustics from survey equipment including multibeam. As outlined by O'Brien (2005), “sound travels 4.5 times faster in water than in air and low frequency sounds travel farther underwater than high frequency sounds. Multi-beam can be defined as Low frequency (<1 kHz), Mid-frequency (1-10 kHz) and High Frequency (>10 kHz). The hearing ranges and sensitivity of marine mammals differ from one species to another depending on their audiogram. For example, harbour porpoises are sensitive from 3 kHz to 130 kHz, with peak sensitivity at 125-130 kHz, and bottlenose dolphins from 5-110 kHz, with peak sensitivity at 40 and 60-116 kHz (Southall et al., 2007). Common seals are sensitive 4-45 kHz (peak sensitivity at 32 kHz) and grey seals 8-40 kHz. Humans are sensitive only to frequencies from 20 Hz to 16-18 kHz but with peak sensitivity from 2-4 kHz. Most small cetaceans, excluding harbour porpoise, have an auditory bandwidth of 150 Hz to – 160 kHz, while harbour porpoise to frequencies within 200 Hz to 180 kHz. Pinnipeds in water are thought to have an auditory bandwidth of between of 75 Hz to 75 kHz and from 75 Hz to 30 kHz in air (Southall et al. 2007).”

The cetacean species observed along the route of the proposed marine survey are high frequency (harbour porpoise), mid-frequency (common dolphin) and low frequency (Minke whale) cetaceans. Common Seals may also be present from the Galway Bay Complex SAC, where they are features of interest of the SAC. Southall *et al.* (2007) outlined in their publication “Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations” that for discrete noise events such as multi-beam, for mid-frequency and high frequency cetaceans maximum peak pressure level of **230** dB re 1 uPa and a maximum received sound pressure level of **198** dB re 1 uPa²-s (Table 10)

Table 10. Southall *et al.* (2007) Proposed injury criteria for individual marine mammals exposed to “discrete” noise events (either single or multiple exposures within a 24-h period).

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

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

The proposed survey equipment and the noise frequency emissions are seen in Table 11. The high frequencies emitted from the equipment (210 kHz and 400 kHz) are above the auditory range of the mid frequency but within the hearing range of high frequency cetaceans observed and on the proposed cable route (Table 12).

Table 11. Proposed survey equipment.

Equipment Type	Frequency (Energy level in dB re 1 μ Pa)
Dual Frequency Single Beam Echosounder – Reson Navisound 420	33 and 210kHz (168 – 174)
Dual Frequency Side Scan Sonar - Edgetech 4200 Sidescan Towfish	100 and 400kHz (226 effective)
Sub-bottom Profiler - Geoacoustics 4 x 4 Hull-mounted SBP Pinger System	3 – 7.5kHz (-225)

The 100 kHz (Edgetech 4200 Sidescan towfish) and 33 kHz (Reson Navisound 420 mid-frequencies of) emit mid-range frequencies within the hearing ranges of small cetaceans (and seals). The Geoacoustics 4x4 hull mounted sub-bottom profiler Pinger (3-7.5kHz) emits low frequency noise, within the auditory range of harbor porpoise, minke whale and the lower detection range of dolphins. The Reson Navisound 420 (168-174 dB) emits noise below the acceptable received source level (db) and should not adversely affect cetaceans. As the Geoacoustics Sub-bottom Profiler and Edgetech 4200 Sidescan towfish emit noise of 225 dB (re 1 μ Pa²) at 4-7.5k Hz and 226 dB (re 1 μ Pa²) at 11 kHz, which is above the 198 (re 1 μ Pa²) proposed injury levels indicated by Southall *et al.* (2007), negative impacts may be foreseen if cetaceans are close enough to the equipment to receive sound levels above this indicative threshold.

Table 12. Marine Mammal Functional Hearing Groups and Estimated Functional Hearing Ranges Proposed by Southall *et al.* (2007)

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

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 SPL and 12 m for SEL in the case of a 240-dB source level, considering cetaceans. For behavioural response criteria, the corresponding values are 9 m and 70 m.” The survey and mainlay would comply with the DoEHLG’s Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters². These guidelines require a 1000m distance which would be deemed adequate to mitigate the negative impacts of the proposed survey. In addition, cetaceans in the vicinity of the vessel during start up procedures would be given ample time to leave the site with the soft start procedures outlined in the guidelines. Mainlay is at a speed of 1kn with the emission of little noise or sediment plumes. It would be expected that cetaceans would not be impacted by the process of laying of the cable as it is very slow, predictable and easily avoided.

Natura 2000 Sites

The conservation objectives of Natura 2000 sites within 15km of the proposed cable survey and main lay route were assessed. The proposed works will be carried out of over-wintering bird season and will not be close to tern colonies in Galway Bay. The project may cause localised disturbance to the Mudflats and Sandflats within Ballyloughane Beach in addition to otter and harbour seals during the survey and main lay periods. However, these impacts are deemed to be short term for the period of works (1-2 days for marine survey and 2-3 days for main lay) with the reinstatement of infaunal communities within the intertidal corridor taking longer. Sensitive subtidal communities that are conservation interests within the SAC will be avoided during mainlay. In deeper areas outside of Galway Bay the laying of cable over reef habitats will be carried out by laying the cable passively on the surface. Mitigation is proposed for the proposed project to limit the disturbance caused by the project and ecological monitoring will be in place throughout the project.

In conclusion, no significant impacts are likely on the features of interest or the site specific conservation objectives of Natura 2000 sites within 15km of the proposed survey and cable laying operations associated with the proposed fibre optic cable routing within Irish waters and at the landfall at Ballyloughane Beach, individually or in combination with other plans or projects. However, mitigation measures and construction phase controls are required and should be carried out in consultation with an ecologist.

No Significant Effects on Natura 2000 sites are Likely.

² <http://www.npws.ie/sites/default/files/general/Underwater%20sound%20guidance%20Jan%202014.pdf>

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Appendix I Notes on proposed methodologies

Underwater Acoustics and Video Survey Rationale

Video is proposed within the diver swim area in order to compile geomorphological information but, this technology is not considered for the deeper-water areas. It is also proposed to seek to further optimise the route in relation to subtidal sensitive communities within the SAC. Underwater video is a very useful tool to assist in route selection and in constraints and habitat assessments in marine cable laying operations. It provides fine detail of the features on the surface of the seabed particularly in relation to species and habitats e.g. reef. However, in order to protect the cable from anthropogenic influences e.g. trawling, it is necessary to bury the cable. Underwater video alone of the deeper areas will not provide sufficient information on sediment depth, which is necessary to route the cable satisfactorily. Video would be seen as a less accurate method and would more than likely suffer from poor resolution. As a result, the field of view would be very limited and would give a very narrow survey line which would limit the ability of the cable to effectively avoid obstacles if encountered. Also, no additional information on routing options would be provided, as it is limited to a very narrow field of view. It would also be difficult for the cable lay ship to relate what is seen on the camera to accurately avoid underwater features that protrude above the seabed.

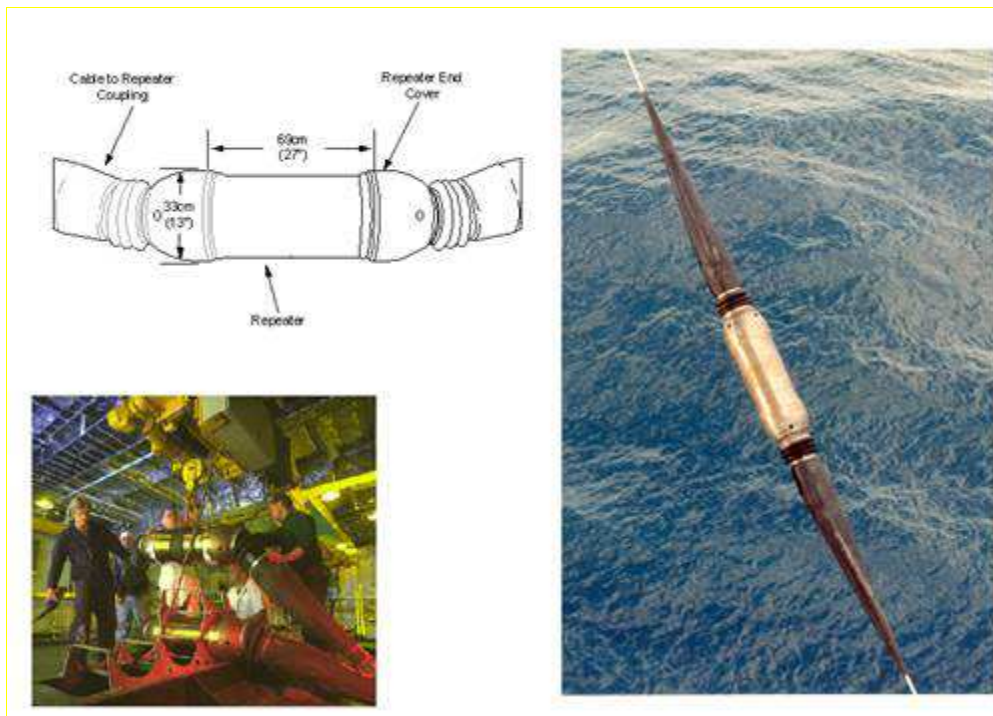
The choice of using video in the 0-3m is primarily because it is difficult to obtain good acoustic data from the seabed in the 0-3m. As a result, the divers will use video and a steel pole to test if there is sufficient depth for the cable to be buried. This is not feasible for the deeper areas of the proposed route.

Appendix II. Environmental Characteristics of Repeater and PSBU Housing Material.

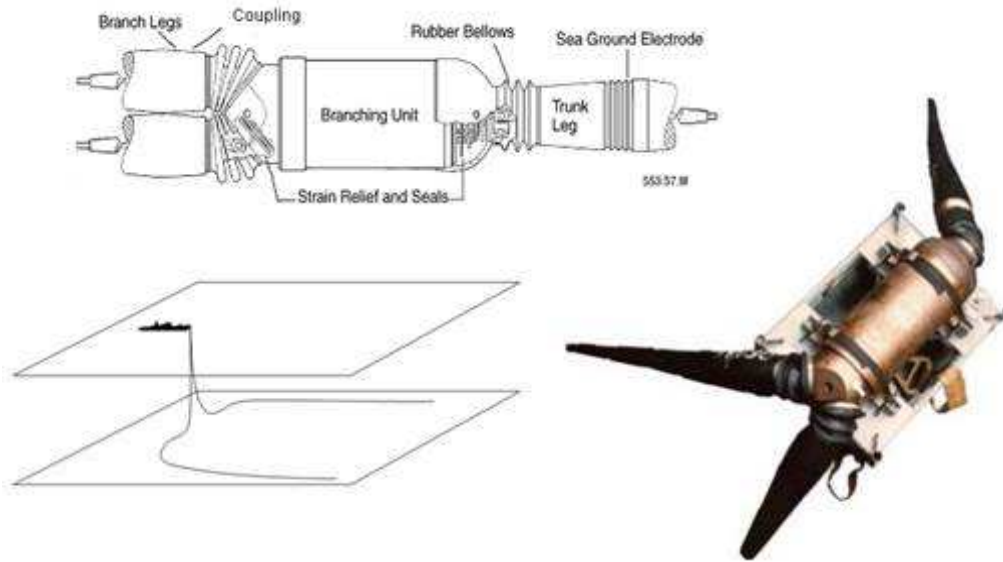
TE SubCom repeater and power switched branching unit (PSBUs) designs consist of a hydrostatic pressure sealed housing made from a copper beryllium (CuBe) alloy (1.65-1.85 wt% Be). These vessels are designed to remain water tight, resist corrosion and hydrostatic pressure, and survive mechanical stresses from aggressive handling during deployment. Copper beryllium alloys are well suited for both fresh and saltwater environments due to a low corrosion rate and resistance to biological fouling. Undersea communication housings using CuBe have been employed for several decades without evidence or reports of detrimental effects to marine environments. In part, this can be attributed to the very low corrosion rate of less than 2 mils per year in seawater. The corrosion process is one defined by selective dissolution of the copper constituent presenting a very minimal toxicological concern especially when in comparison to the ocean as a whole.

Operational Characteristics of Repeaters and Power Switched Branching Units (PSBUs)

TE SubCom's undersea cable system designs may also include power-dissipating components such as TE SubCom's repeaters and the TE SubCom power switched branching unit (PSBU). In general, repeaters, or "Optical Amplifiers", are inserted into undersea cable systems at a nominal spacing interval of 50 to 120 kilometers within the as-engineered routing. The primary purpose is to amplify the optical signal along the cable route as it travels from Cable Station A to Cable Station B. The copper conductors inside the cable power these repeaters. Branching Units are optical bodies that are inserted into a cable system so as to allow for the insertion of a "Branch Leg" which would provide connectivity to an additional cable station.



SL Repeater / Optical Amplifier



SL Power Switched Branching Unit

Evaluations of the *maximum* heat dissipation for these components are also addressed by consideration of the maximum power ratings of the components.

The below table summarizes the maximum operating current and maximum heat dissipation for the TE SubCom PSBU and the 4 amplifier pair repeater designs. The spacing of repeaters and branching units results in only very localized heating and negligible environmental effect.

	DC Current (Amps)	Power Dissipation (Watts)
PSBU	1.6 max	148
Repeater, 4 amp pair	1.6 max	48

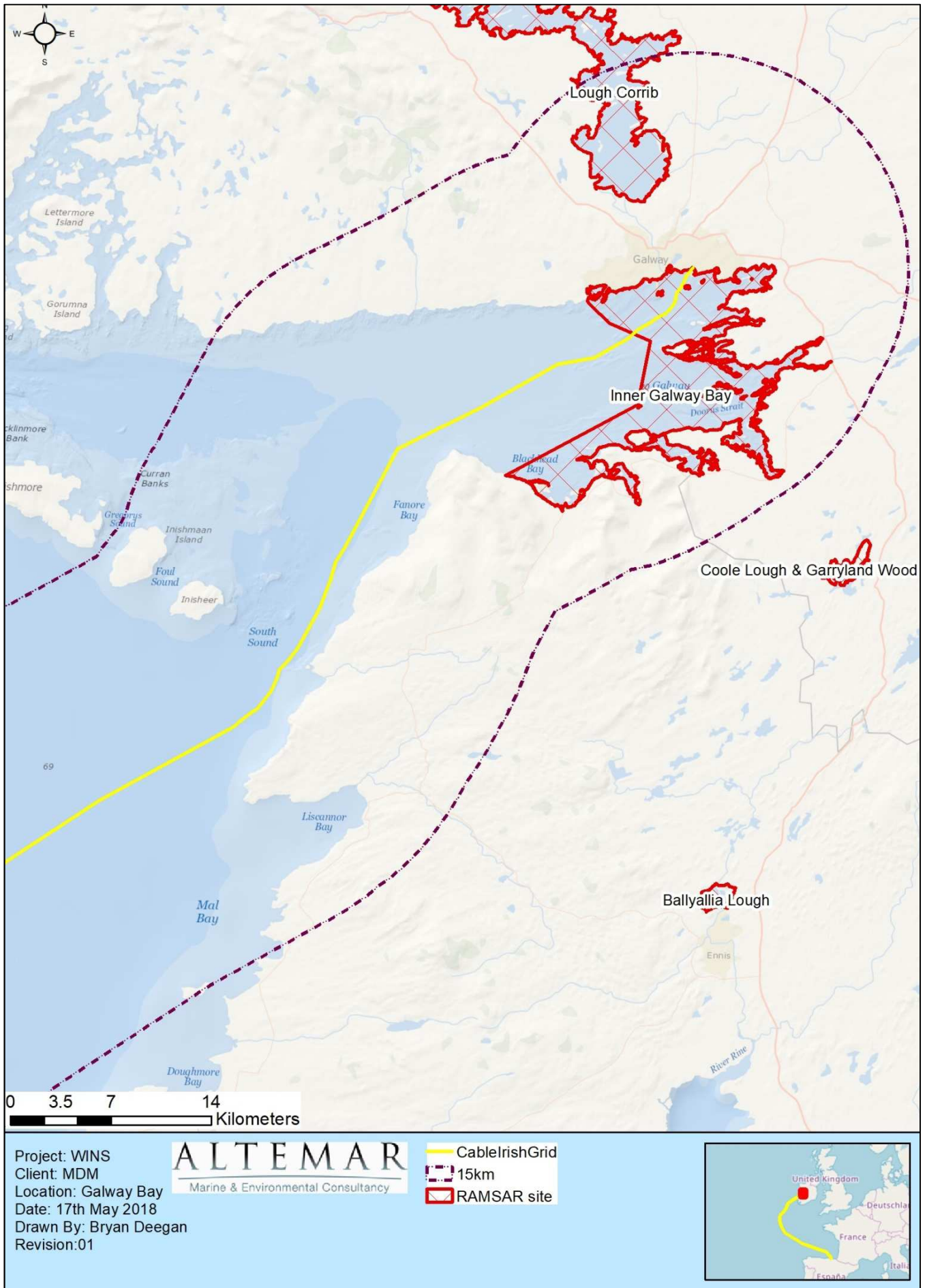
Power Dissipation of TE SubCom's PSBU and 4 Amp Pair Repeaters.

Appendix III: Natural Heritage Areas within 15km of the proposed route.



<p>Project: WINS Client: MDM Location: Galway Bay Date: 17th May 2018 Drawn By: Bryan Deegan Revision: 01</p>	<p>ALTEMAR Marine & Environmental Consultancy</p>	<ul style="list-style-type: none"> CableIrishGrid 15km Territorial Sea Limit (12nm) NHA_2015_11 pNHA_2015_11 	
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Appendix IV Ramsar Sites within 15km of the proposed route.



Appendix V Offshore Area (12nm-limits to limits of EEZ)

The proposed fibre optic cable route in relation to the Irish EEZ, designated Irish Continental shelf, 12nm Limit and Offshore SAC's for Cold Water Corals are seen in Figure APV-1. Information on and mounds which could potentially host biogenic reef (*Lophelia pertusa*) populations, not currently afforded protection, in addition to the positions of the newly protected offshore Geogenic Reefs are seen in Figure APV-2.

The entire route, within the Irish EEZ, was examined using shaded relief service of bathymetry data collected by INFOMAR. The closest the fibre optic cable route comes to mounds, or obvious anomalies that could potentially host significant biogenic reef forming populations of *Lophelia pertusa*, is 19km (Figure APIV-3). The closest designated area to the proposed cable route in the offshore area is 55km, due north of the North West Porcupine Bank SAC (Figure APV-3).

Predicted marine habitat data for the offshore section of the fibre optic cable route is shown in Figure APIV-5 (Source MSFD mapping Marine Institute). Figure APIV-6 shows all cetacean activity in the Mayo and Porcupine Bank area as recorded by IWDG sightings scheme, in addition to all sightings during August the month of the proposed routing of the fibre optic cable. Figure APV-6 shows the distribution of individual Cetacean species in the Irish EEZ (Source NPWS). All cetaceans listed in Figure APV-6 are listed under Annex IV of the Habitats Directive; in addition harbour porpoises and bottle-nosed dolphins are also listed under Annex II. Harbour and Grey seal distributions in the offshore area are seen in Figure 14 (NPWS, 2007). Both species are protected under Annex II of the Habitats Directive. .

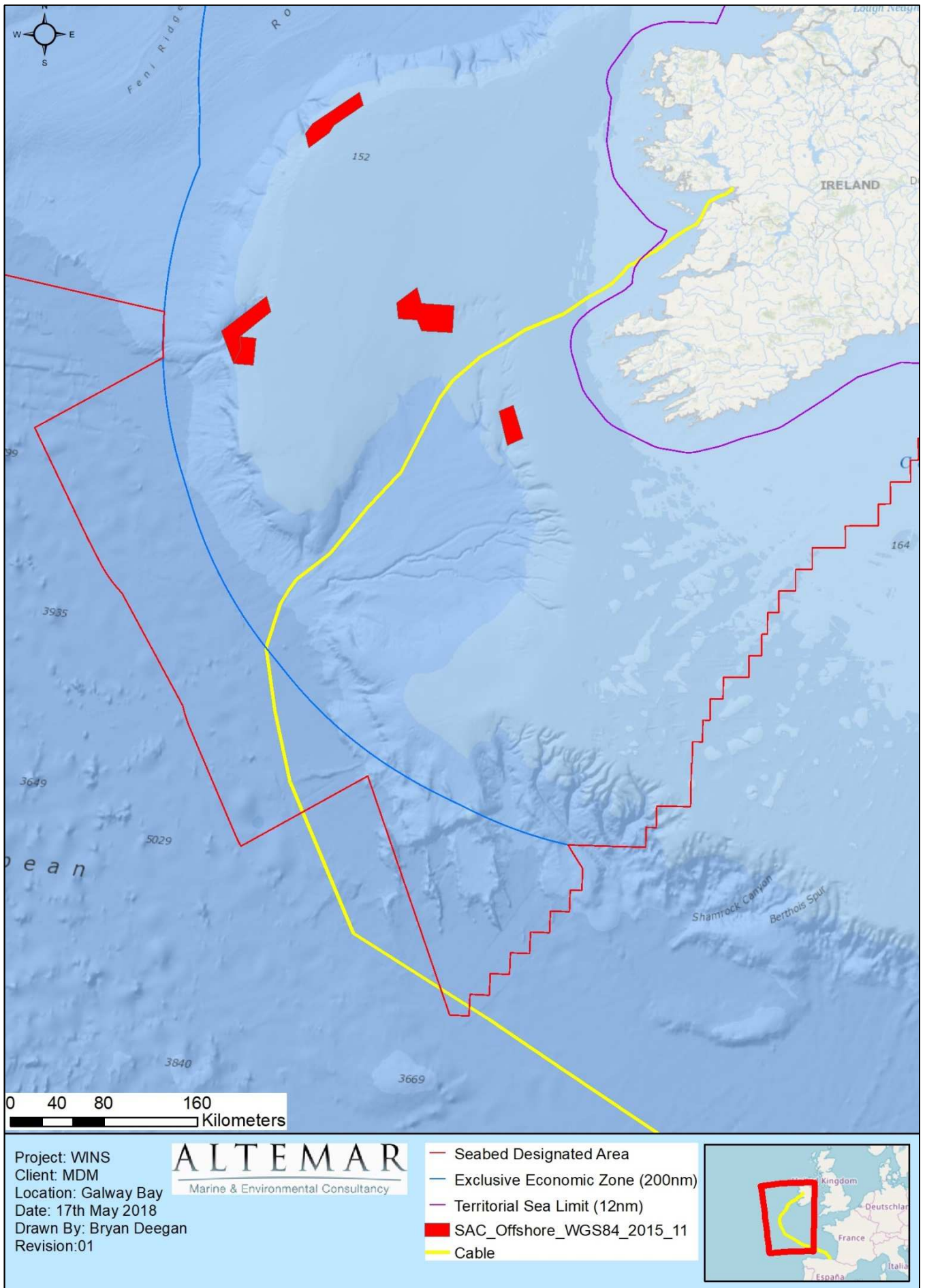


Figure APV-1: Position of offshore fibre optic cable route in relation to the Irish EEZ, Designated Irish Continental shelf and Offshore SAC's.

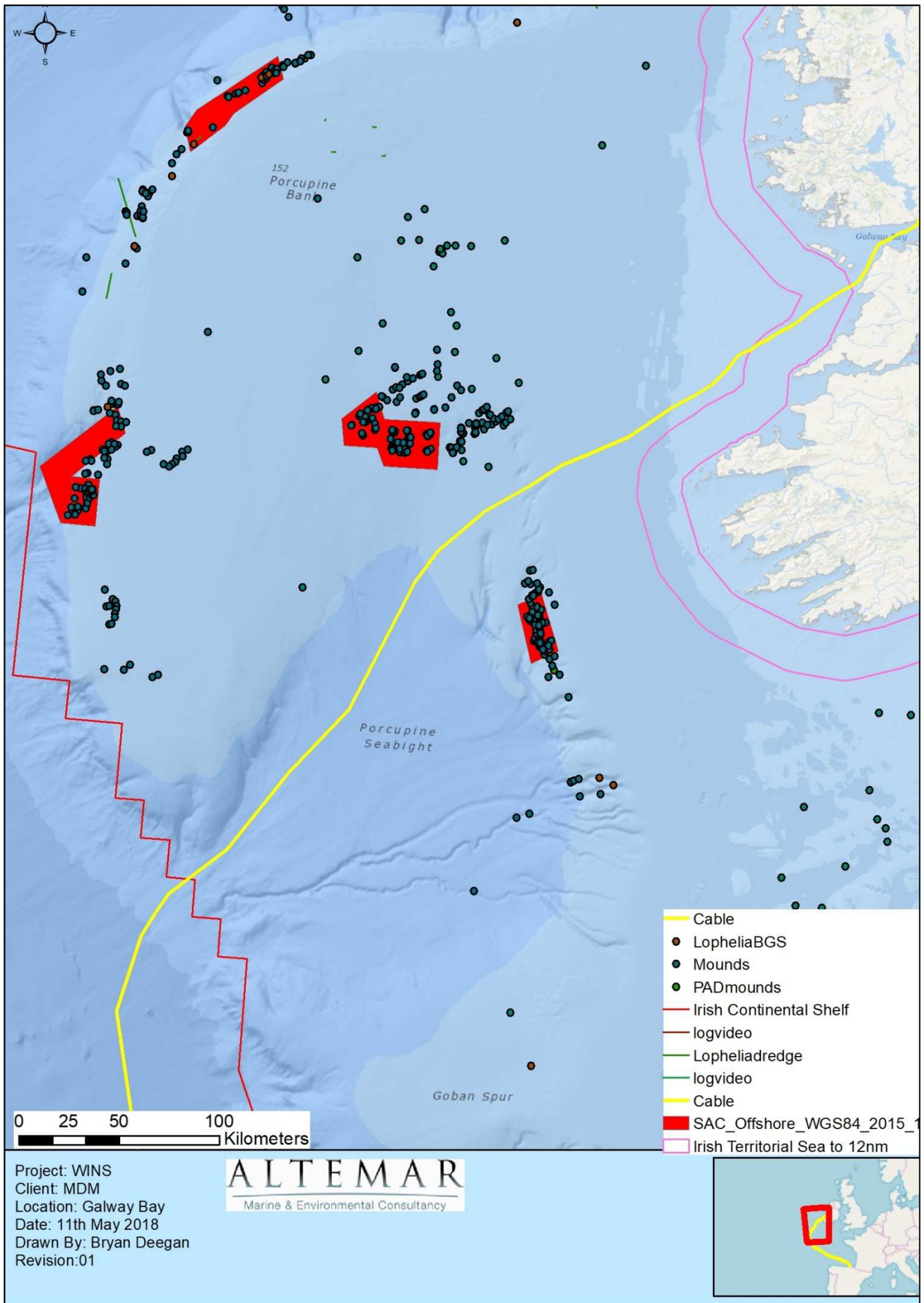


Figure APV-2. Proposed location of the fibre optic cable route in relation to SAC's, carbonate mounds or potential biogenic reefs in the offshore area.

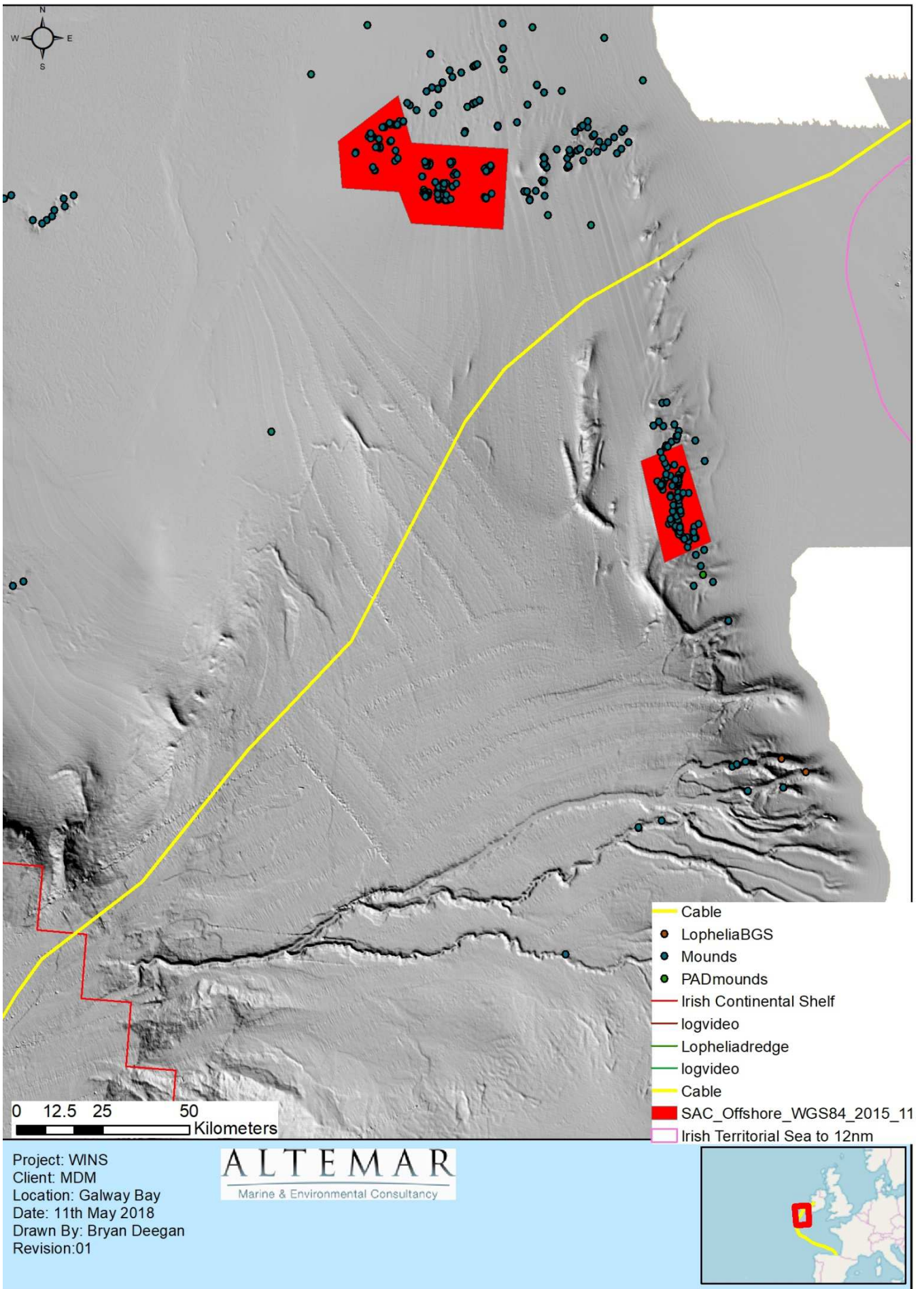


Figure APV-3. Location of the fibre optic cable route to SAC's, carbonate mounds or potential biogenic reefs in the offshore area on INFOMAR backscatter..

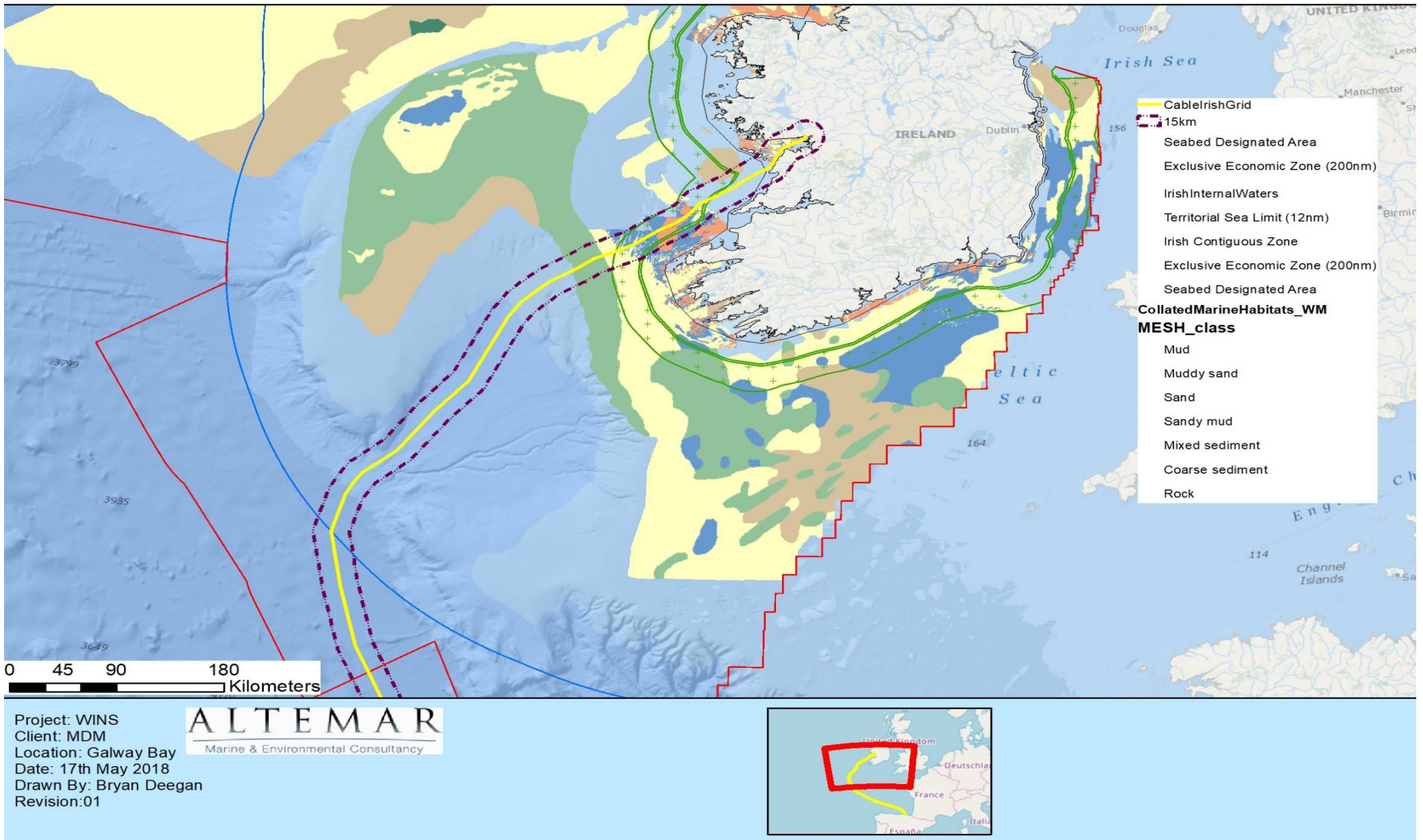
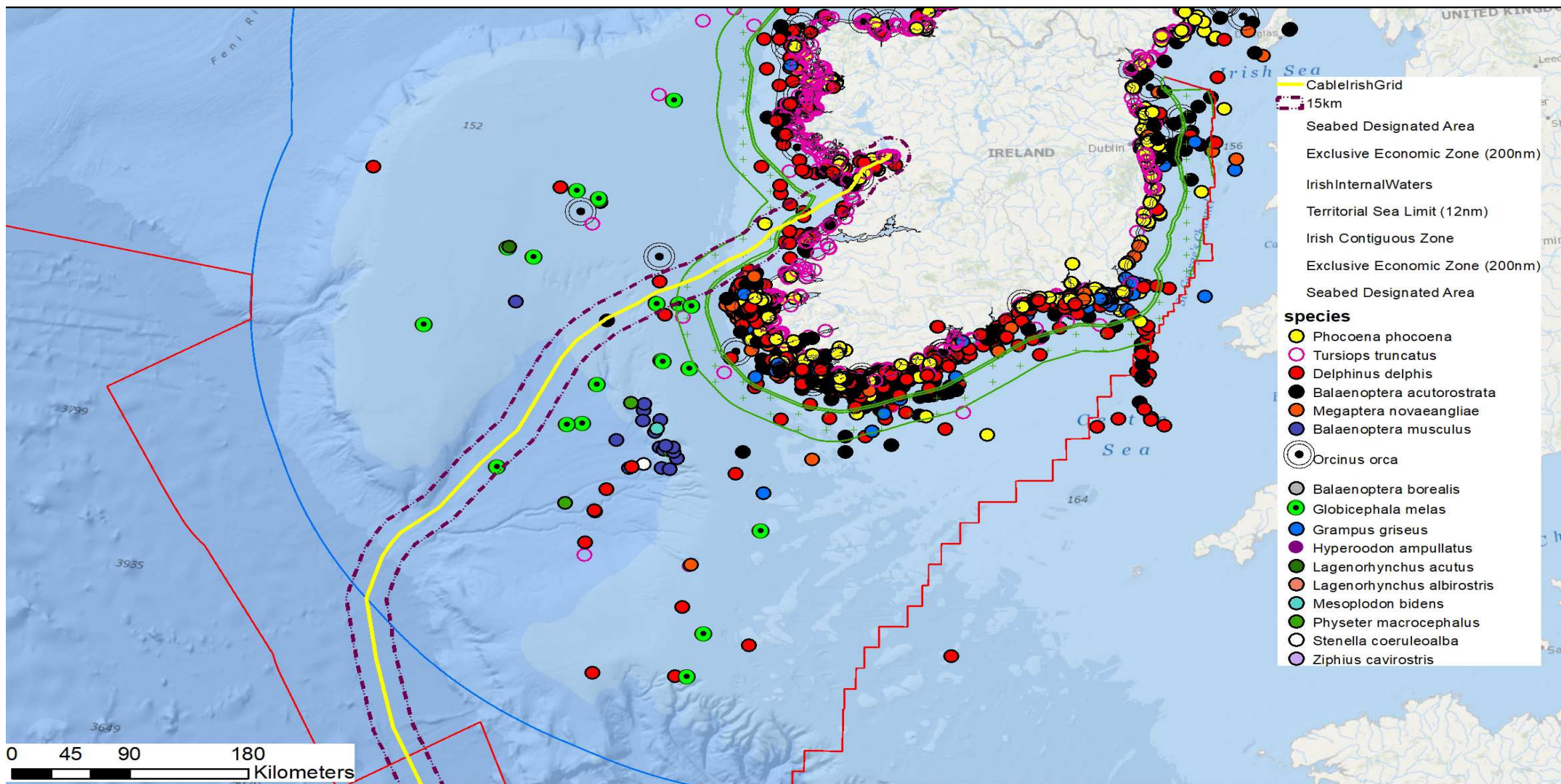


Figure APV-4: Predicted marine habitat data for the offshore section of the fibre optic cable route (Source MI MSFD Habitat mapping).



Project: WINS
 Client: MDM
 Location: Galway Bay
 Date: 17th May 2018
 Drawn By: Bryan Deegan
 Revision:01



Figure APIV-5. Recorded Cetacean sightings of Mayo Coast and Porcupine Bank/Rockall Trough (Source IWDG Sightings Data). Inset historical sightings in the offshore area of the cable route recorded during the month of April with 12nm limit.

= Cetacean habitat
 = High number of records
 v) = Vagrant species

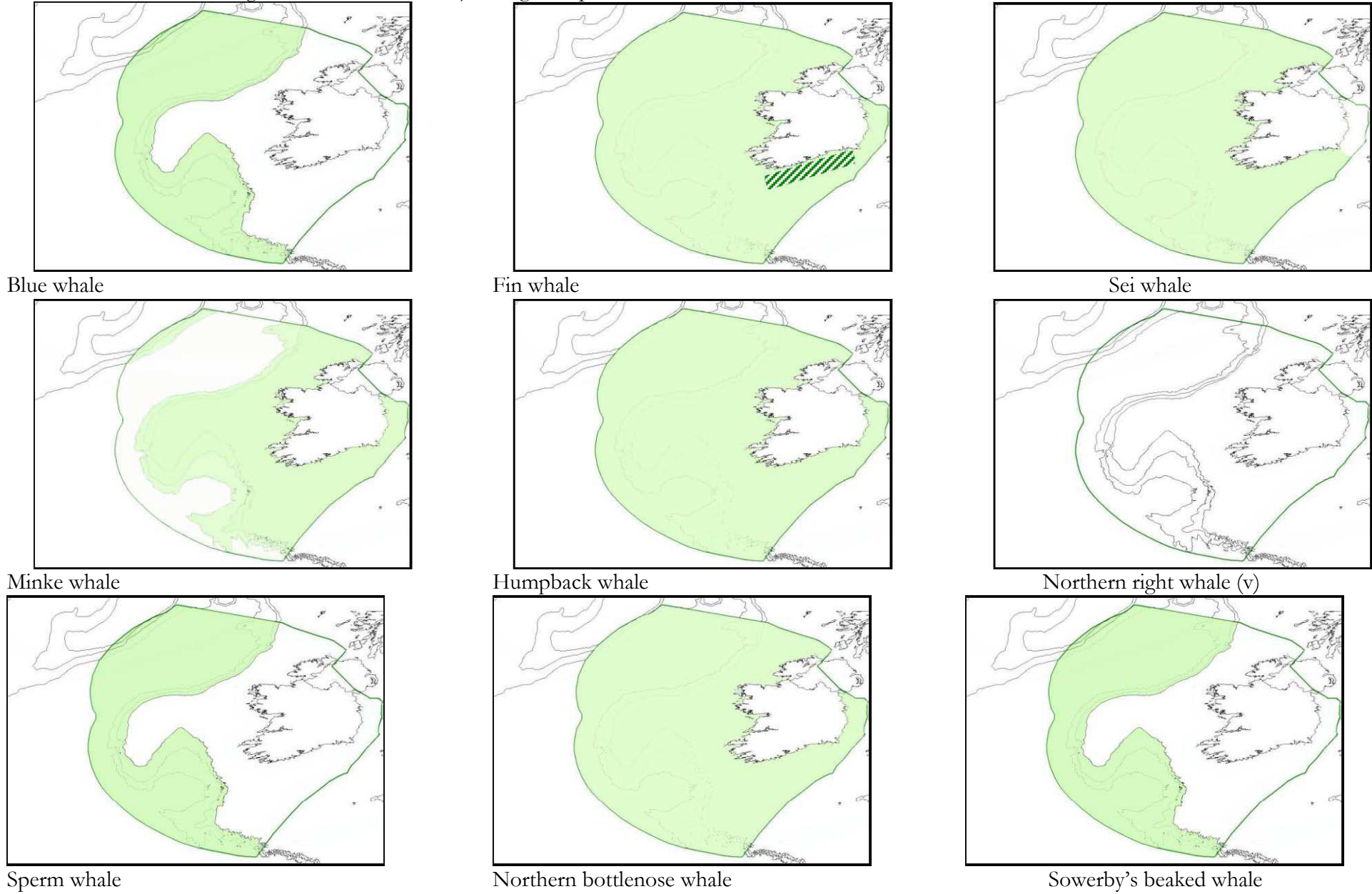
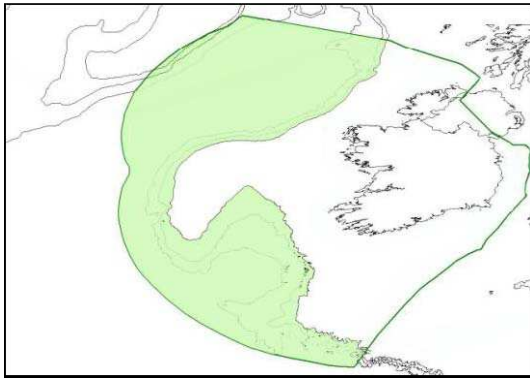
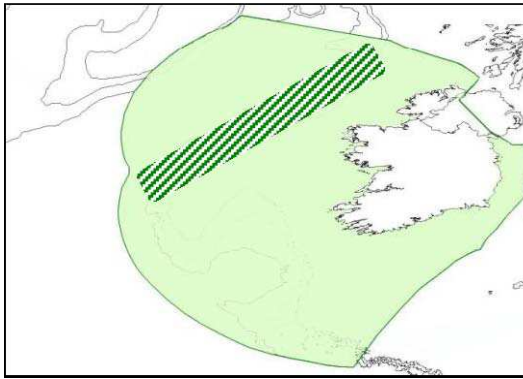


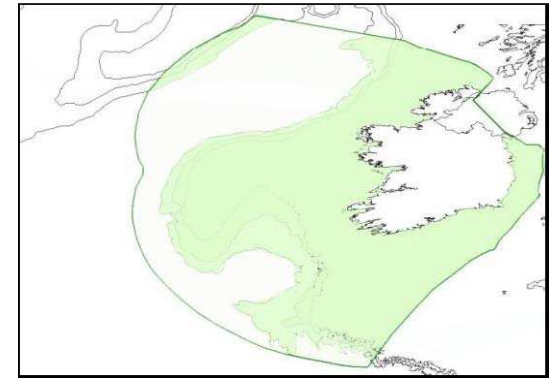
Figure APV-5. Distribution of Cetacean species in the Irish EEZ (Source NPWS).



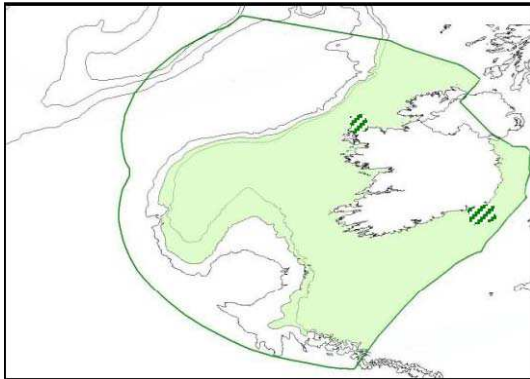
Cuvier's beaked whale



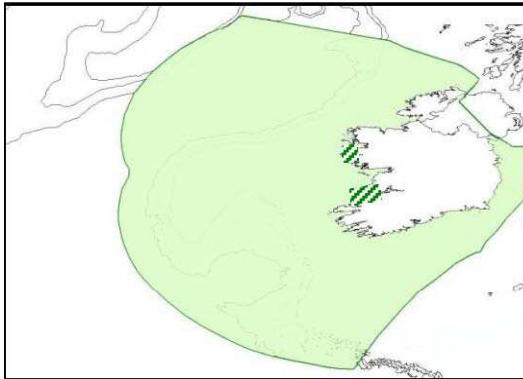
Long-finned pilot whale



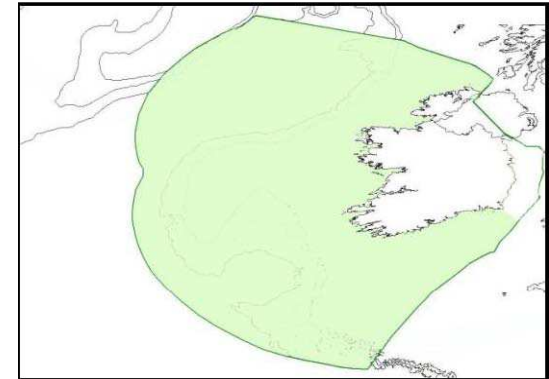
Killer whale



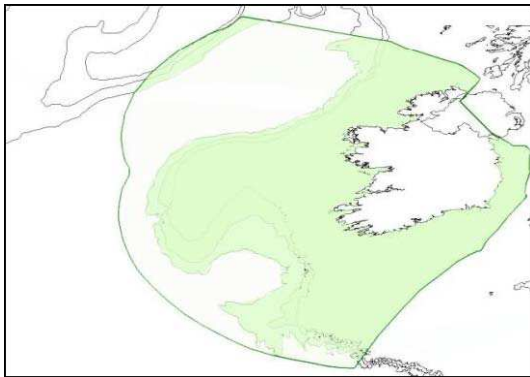
Risso's dolphin



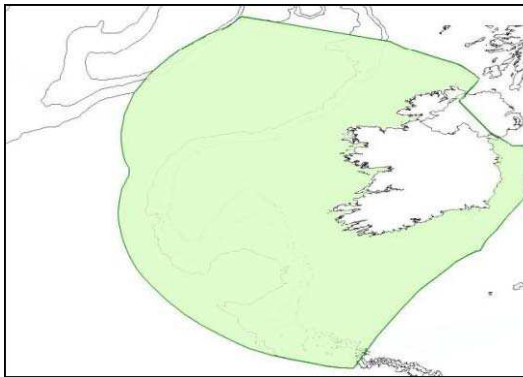
Bottlenose dolphin



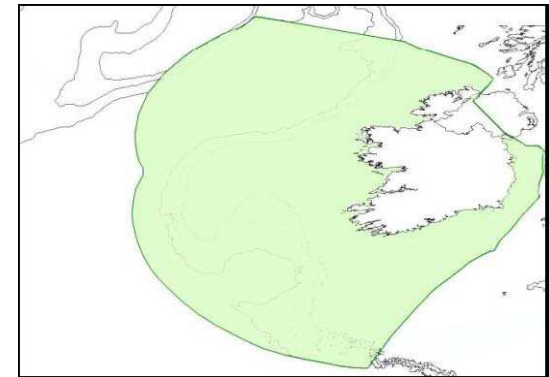
Atlantic white-sided dolphin



White-beaked dolphin

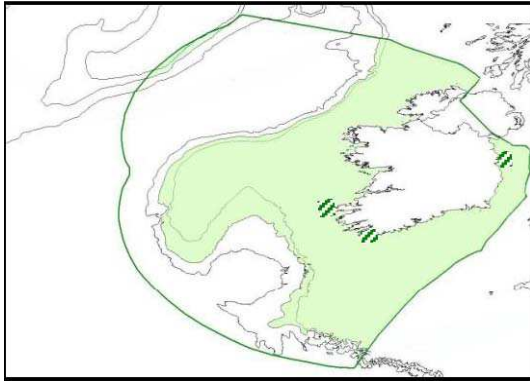


Striped dolphin

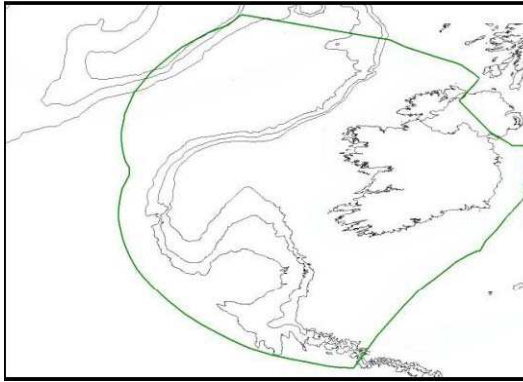


Short-beaked common dolphin

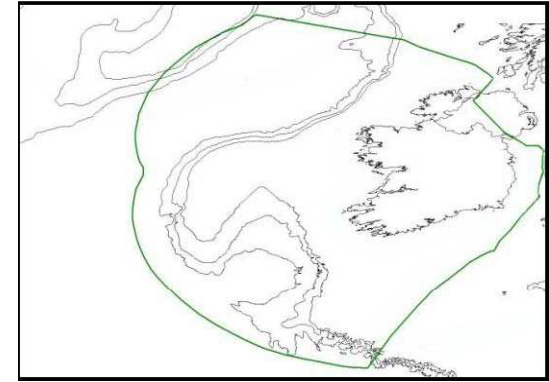
Figure APV-5. Distribution of Cetacean species in the Irish EEZ (Source NPWS) (contd.).



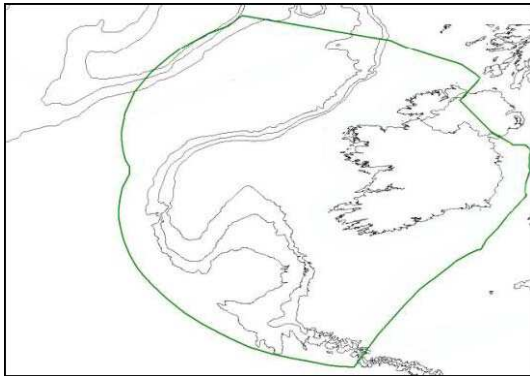
Harbour porpoise



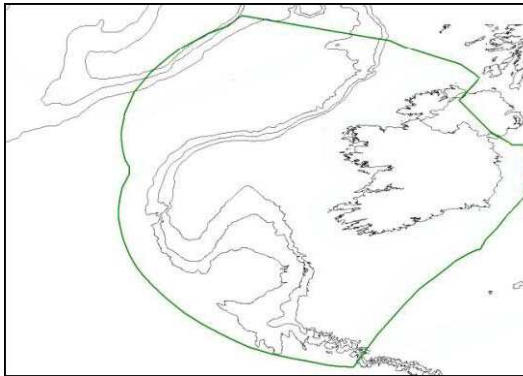
False killer whale (v)



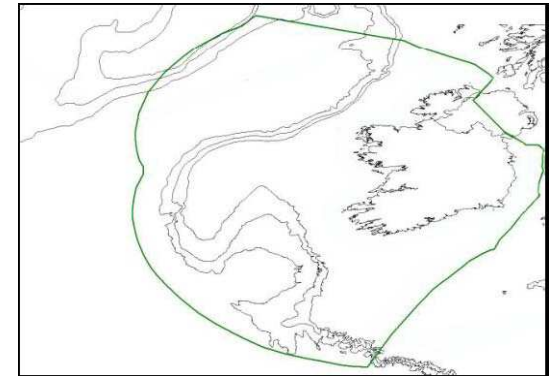
Gervais' beaked whale (v)



True's beaked whale (v)



White whale (v)



Pygmy sperm whale (v)

Figure APV-5. Distribution of Cetacean species in the Irish EEZ (Source NPWS) (contd.).