Natura Impact Statement – Information for a Stage 2 (Natura Impact Statement) AA for the proposed main lay of the 2Africa submarine fibre-optic cable system within the Irish EEZ.

15th December 2023

Prepared by: [redacted] (MCIEEM) of Altemar Ltd.
On behalf of: Apollo Submarine Cable System Limited

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1. Introduction

The following Natura Impact Statement (NIS) has been prepared by **Altemar Ltd.** for **Apollo Submarine Cable System Limited, a Vodafone Group Services Limited company** as part of this Maritime Usage Licence request (MUL) application. The MUL application relates to the proposed installation and operation of the 2Africa Submarine Cable System within the Irish Exclusive Economic Zone (EEZ). The planned cable will extend from Widemouth Bay in Cornwall to a number of countries in Europe, Africa, and the Middle East. The proposed new cable will traverse through the offshore Southern Canyons SAC. The purpose of this NIS is to determine the impact of the installation of the proposed submarine cable system within the Irish EEZ, individually or in combination with other plans or projects, on Natura 2000 sites. An Appropriate Assessment is an assessment of the potential effects of a proposed project or plan, on its own, or in combination with other plans or projects, on one or more European sites. European sites are those sites designated as Special Areas of Conservation (SAC) or Special Protection Areas (SPA).

A Supporting Information for Appropriate Assessment Report was carried out for the proposed project and concluded that '*The project is limited in scale and extent and the potential zone of influence is restricted to the immediate vicinity of the cable laying route, with the exception of underwater noise that may extend beyond the cable laying. Subtidal elements of the project are within the offshore Southern Canyons SAC.*

Acting on a strictly precautionary basis, NIS is required in respect of the effects of the project on the Southern Canyons SAC (potential habitat impacts) because it cannot be excluded on the basis of best objective scientific information following screening, in the absence of control or mitigation measures that the plan or project, individually and/or in combination with other plans or projects, will have a significant effect on the named European Site/s.

Further, out of an abundance of caution, NIS is required in respect of the potential effects of the project on marine mammals protected as an Annex IV species as a result of heightened underwater noise during the cable laying process.

A NIS or Stage 2 Appropriate Assessment is not required for the effects of the project on all other Natura sites (excluding Southern Canyons cSAC). On the basis of the best objective scientific information following screening it can be concluded that the plan or project, individually and/or in combination with other plans or projects, will not have a significant effect on other European Site/s.'

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

1.1 Altemar Ltd.

Since its inception in 2001, Altemar has been delivering ecological and environmental services to a broad range of clients. Operational areas include: residential; infrastructural; renewable; oil & gas; private industry; Local Authorities; EC projects; and, State/semi-State Departments. [redacted], the managing director of Altemar, is an Environmental Scientist and Marine Biologist with 28 years' experience working in Irish terrestrial and aquatic environments, providing services to the State, Semi-State and industry. He is currently contracted to Inland Fisheries Ireland as the sole "External Expert" to environmentally assess internal and external projects. He is also chair of an internal IFI working group on environmental assessment. [redacted] (MCIEEM) holds a MSc in Environmental Science, BSc (Hons.) in Applied Marine Biology, NCEA National Diploma in Applied Aquatic Science and a NCEA National Certificate in Science (Aquaculture). [redacted] carried out all elements of this Appropriate Assessment Screening. Bryan has been involved in elecen international sub marine fibre optic cable projects, many of which involved Horizontal Directional Drills within designated sites and all works required ecological supervision.

2. Background to the Appropriate Assessment

The Habitats Directive 92/43/EEC (together with the Birds Directive (2009/1477/EC)) forms the cornerstone of Europe's nature conservation policy. The Directive protects over 1000 animals and plant species and over 200 "habitat types" which are of European importance. In the Habitats Directive, Articles 3 to 9 provide the legislative means to protect habitats and species of European Community interest through the establishment and conservation of an EU-wide network of conservation sites (NATURA, 2000). These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Birds Directive), Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites (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 “Managing European sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC” (European Commission, 21 November 2018) *“The purpose of the appropriate assessment is to assess the implications of the plan or project in respect of the site’s conservation objectives, either individually or in combination with other plans or projects. The conclusions should enable the competent authorities to ascertain whether the plan or project will adversely affect the integrity of the site concerned. The focus of the appropriate assessment is therefore specifically on the species and/or the habitats for which the European site is designated.”*

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

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

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

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

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

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

3. Stages of the Appropriate Assessment

This Appropriate Assessment screening was undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC, 2001), Part XAB of the Planning and Development Act 2000, as amended, in addition to the December 2009 publication from the Department of Environment, Heritage and Local Government; 'Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities' and the European Communities (Birds and Natural Habitats) Regulations 2011. In order to comply with the above Guidelines and legislation, the Appropriate Assessment process must be structured as follows:

1) Screening stage:
    - Description of plan or project, and local site or plan area characteristics;
    - Identification of relevant European sites, and compilation of information on their qualifying interests and conservation objectives
    - Identification and description of individual in combination effects likely to result from the proposed project;
    - Assessment of the likely significance of the effects identified above. Exclusion of sites where it can be objectively concluded that there will be no likely significant effects; and,
      Conclusions
2) Appropriate Assessment (Natura Impact Statement):
    - Description of the European sites that will be considered further;
    - Identification and description of potential adverse impacts on the conservation objectives of these sites likely to occur from the project or plan; and,
    - Mitigation Measures that will be implemented to avoid, reduce or remedy any such potential adverse impacts
    - Assessment as to whether, following the implementation of the proposed mitigation measures, it can be concluded, beyond all reasonable scientific doubt, that there will be no adverse impact on the integrity of the relevant European Site in light of its conservation objectives"
    - Conclusions.

If it can be demonstrated during the AA screening phase (Stage 1), that the proposed project will not have a significant effect, whether alone or in combination with other plans or projects, on the conservation objectives of a Natura 2000 site, then no further AA (Stage 2) will be required. It is important to note that there is a requirement to apply a precautionary approach to AA screening. Therefore, where effects are possible, certain or unknown at the screening stage, AA will be required.

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

4. Stage 2: Appropriate Assessment

4.1 Description of the Proposed Project

Project Overview

2Africa is a new submarine cable system over 45,000km in length that will connect the UK to a number of countries in Europe, Africa, the Middle East and Asia to support global data growth. The level of broadband traffic is growing exponentially. Consumer appetites for new applications like cloud computing, on-demand video and social media appear limitless. The demand for new connectivity is driven by a business environment in which ultra-broadband access is essential for sustainable growth and development. The purpose of the submarine cable project is to significantly increase the capacity, quality and availability of internet connectivity between Africa and the rest of the world. This is of particular significance for a continent that has historically been behind the global average in internet penetration.

By directly connecting numerous countries around the entire coast of Africa to Europe and the Middle East region, businesses and consumers will benefit from enhanced capacity and reliability for services such as telecommuting, HD TV broadcasting, internet services, video conferencing, advanced multimedia and mobile video applications. The project will also underpin future mobile and fixed broadband access. This will help African leaders to implement their 2030 visions and to meet many of the Sustainable Development Goal (SDG) challenges related to or depending on internet connectivity.

Alcatel Submarine Networks (ASN) have been contracted by the 2Africa Consortium to engineer, manufacture and install the cable system, which is expected to be ready for service in 2024 (Figure 1). The system is to extend from a landfall in the UK through the Irish Exclusive Economic Zone (EEZ) as shown in Figures 2 and 3. The cable will contain optical repeaters powered by high-voltage Power Feed Equipment (PFE) which is located in the existing Cable Landing Station (CLS) at Bude, UK.

4.2 Project Installation Timeframes

The 2Africa cable installation within Ireland's EEZ and the Southern Canyon cSAC was planned for December 2023, and is now being rescheduled for Q2 2024.

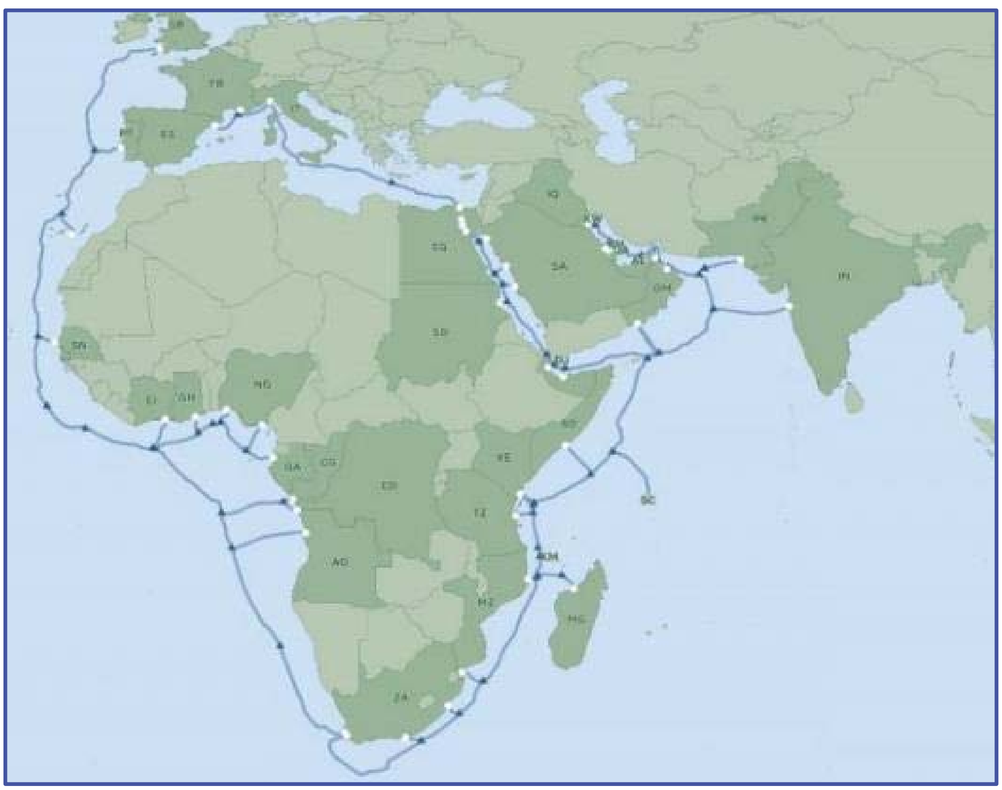

***Figure 1**: 2Africa Overview Chart (Source: ASN, 2021)*

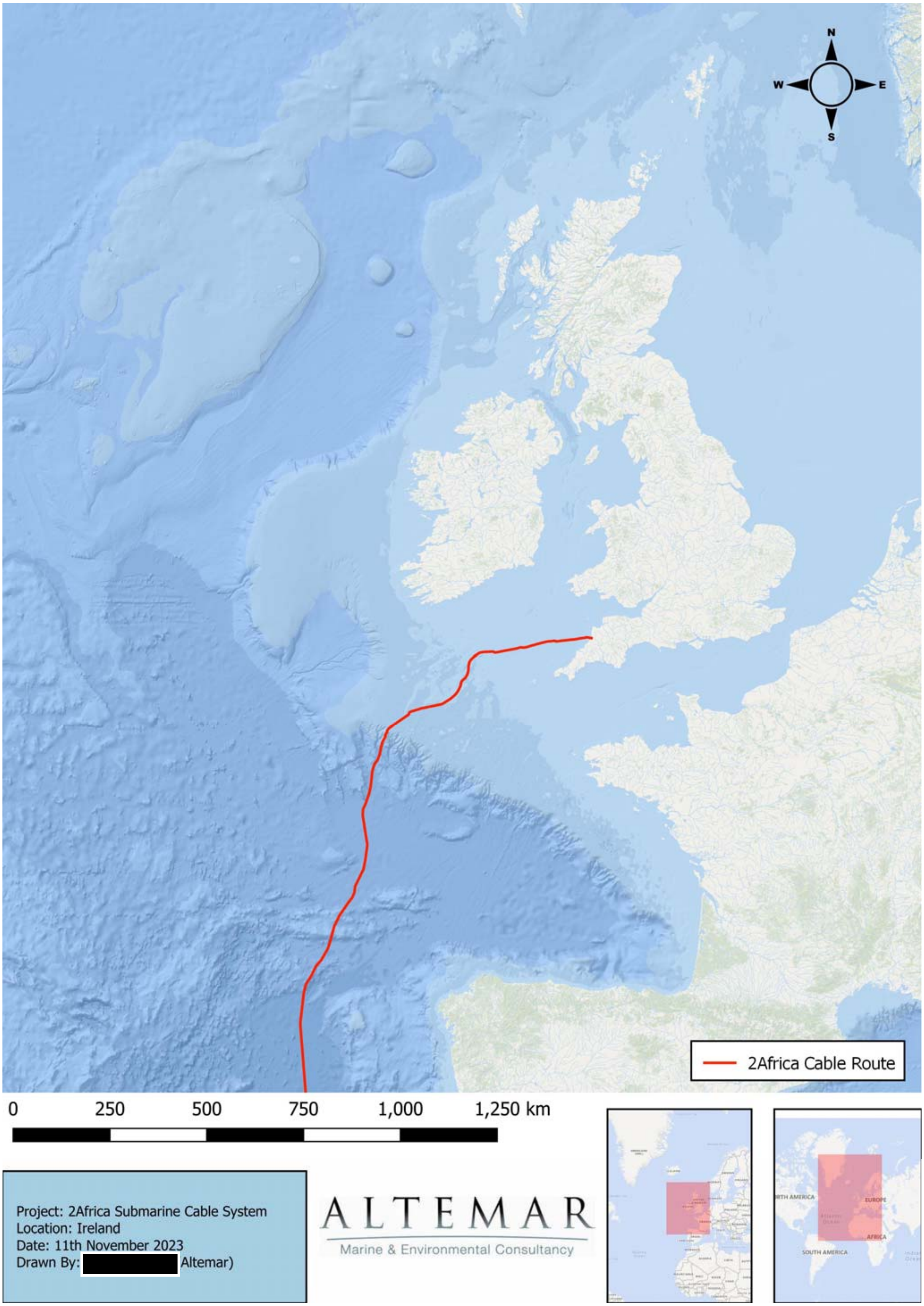

Figure 2. *Schematic of the proposed network*

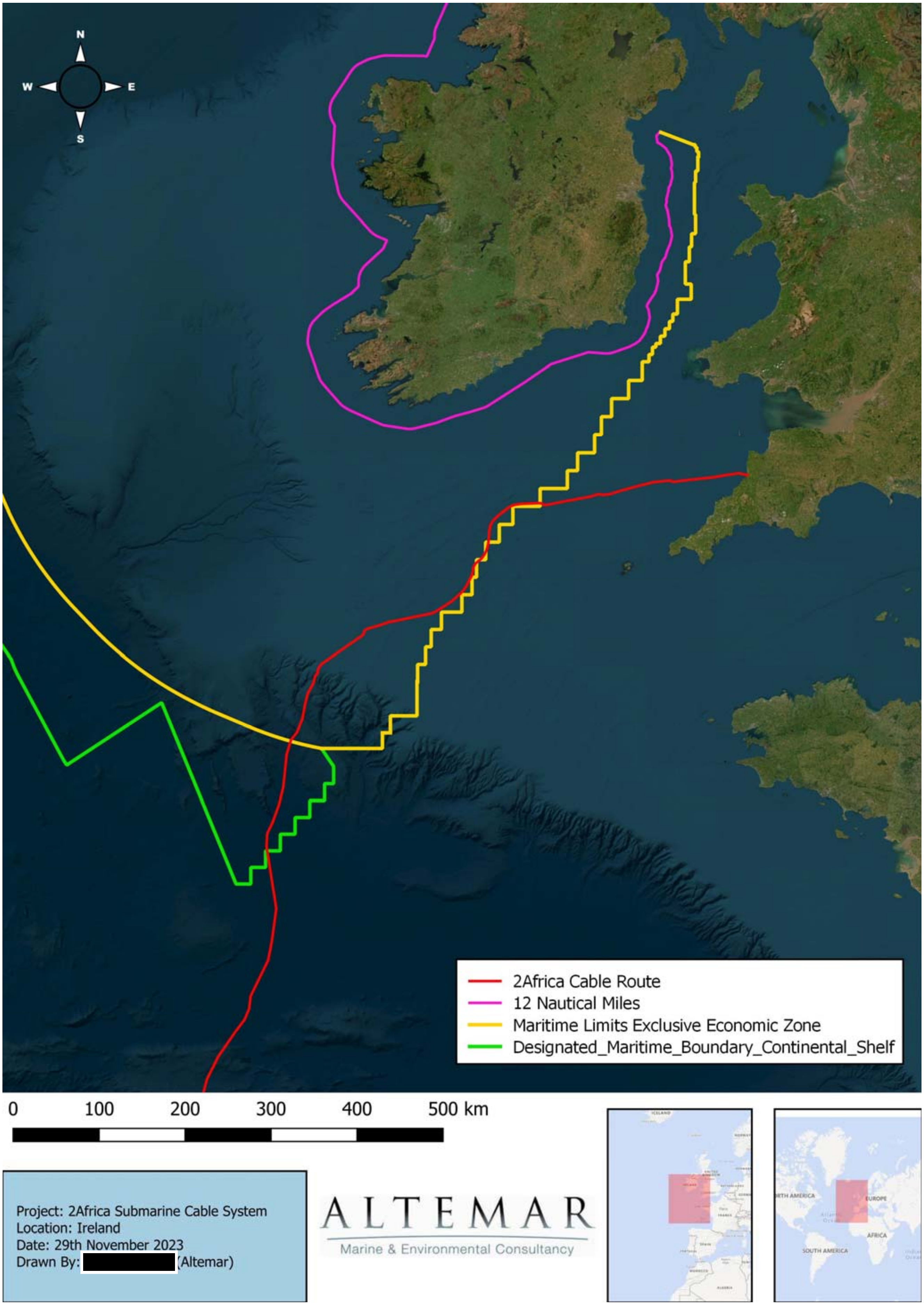

Figure 3. *Proposed route through Irish waters*

4.3 2Africa Subsea Cable Design

The subsea fibre optic cable installed for the 2Africa system in the UK will be the OALC4 cable, developed and manufactured by ASN. One of the functions of submarine cables is to protect the fibre pairs they contain to ensure data can be transmitted across the system. They also contain metallic elements which power the repeaters in the system as well as feed an electric current to enable cable breaks to be localised so any issues can be identified and fixed quickly, minimising disruption.

To meet these functions, submarine cables contain fibre optic pairs that float freely in a hydrophobic jelly which are then encased in a stainless-steel tube. Two layers of steel wires are wrapped around the outside of the tube to protect against pressure, any contact with the cable and to provide tensile strength. This is then contained in a hermetically sealed conductor tube and insulated with a layer of polyethylene to form the basic Light Weight (LW) cable that is used in deep-sea environments. The polyethylene layer provides high voltage electrical insulation. In shallow water or high-risk areas, additional layers of steel armour wires are added to further protect the cable from external factors such as anchor damage and trawling.

All components encased within the cable package are environmentally benign and stable. There is no possibility of any chemical leaching or similar.

There are five types of protection available for the OALC4 cable: Light Weight (LW), Light Weight Protected (LWP), Single Armour (SA), Double Armour (DA) and Double Armour Heavy (DAH). Figures 4 and 5 show the specifications of each of these cables.

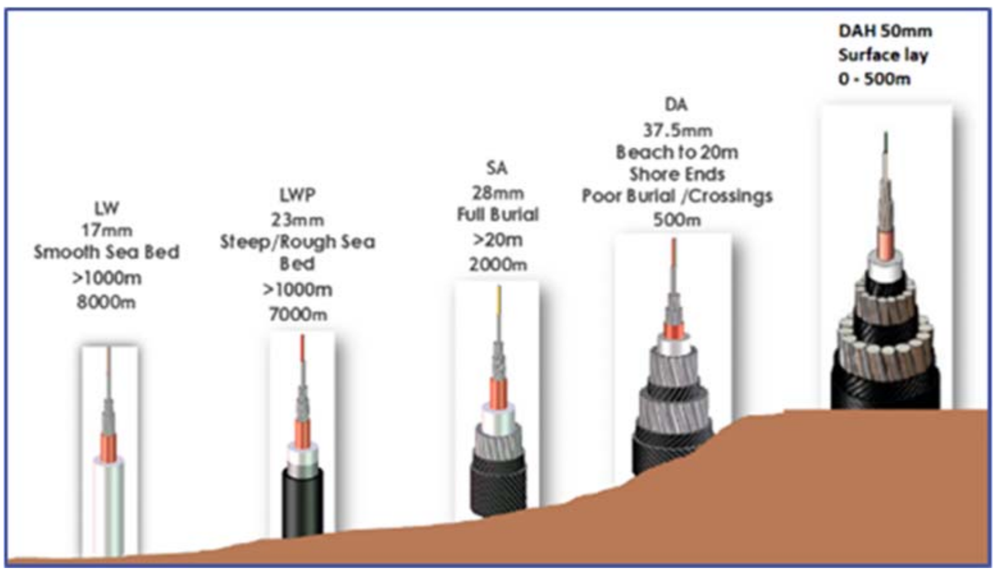

***Figure 4**: Protection choices and conditions of the OALC4 cable (Source: ASN, 2021)*

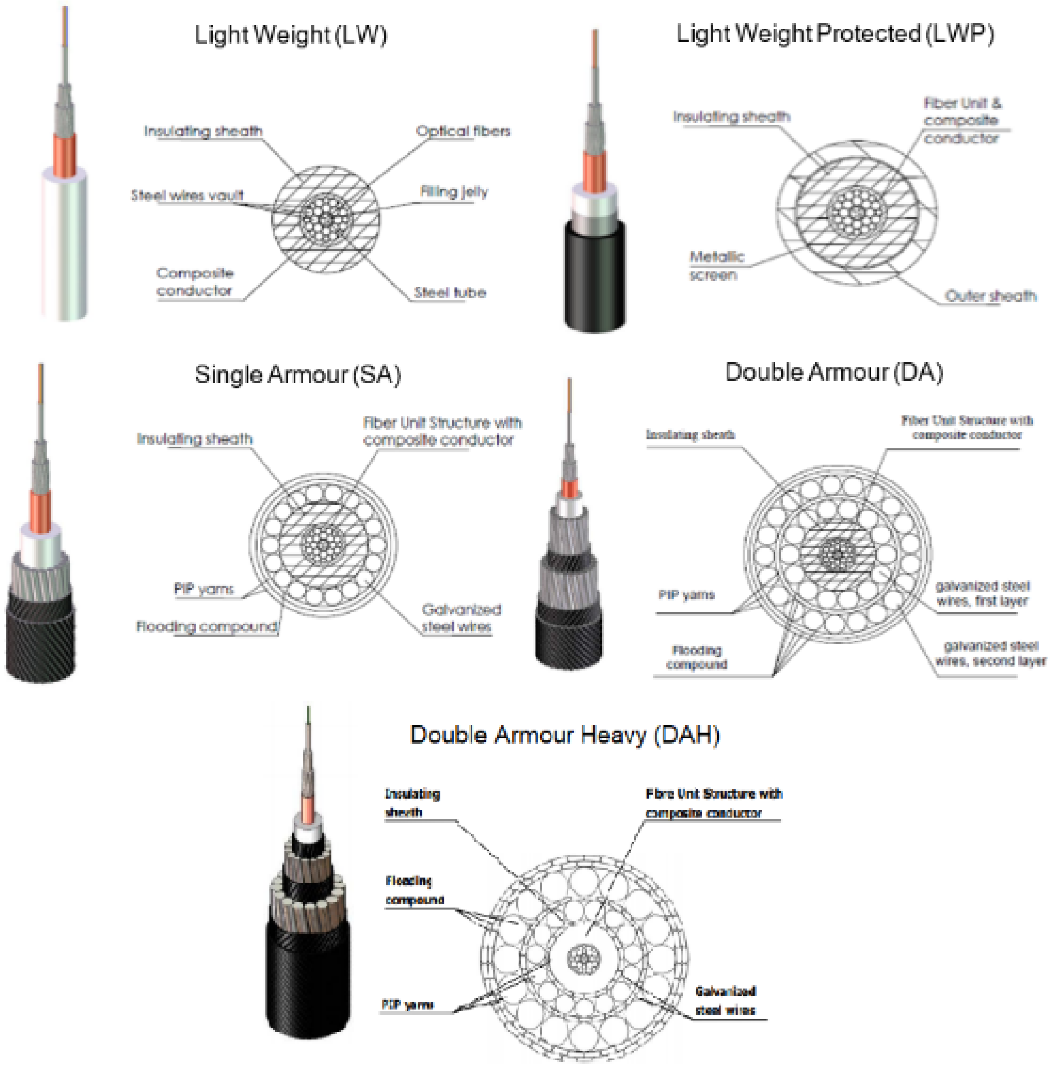

Figure 5*: Cross sections of OALC4 cable types (Source: ASN, 2021)*

4.4 Installation of 2Africa in the Southern Canyons cSAC and Through the Irish EEZ

4.4.1 Work Performed Prior to Installation

Cable Route Selection & Cable Engineering

During the planning and engineering stage, desktop studies were completed to assess site-specific conditions and areas to avoid when routing the cable, as well as identifying key stakeholders in the area. Some of the key factors assessed during the desktop study include anthropogenic factors (such as fishing, shipping and anchoring), meteorological conditions, oceanographic conditions, geological conditions, marine protected areas, permitting and marine operations. The desktop study was conducted in July 2020; it did avoid all established marine protected areas proximate to the 2Africa route within the Irish EEZ and Continental Shelf, however at that time the Southern Canyons cSAC had not been established. It was declared on 18th November 2022. A key output of the study includes a Route Position List (RPL) which was used for initial planning, approximate cable quantities and the subsequent cable route survey operations. The RPL is a list of coordinates, normally referred to the WGS84 Datum, that describes the planned cable route via a number of alter courses positions, cable slack, cable type, water depth, heading, maritime boundaries, cable body placement (where appropriate), planned burial locations, and crossing locations of other undersea cables.

Cable Route Survey

The geophysical and geotechnical surveys for the Irish EEZ section of the proposed 2Africa subsea cable system were conducted by Fugro between December 2020 and March 2021. This data informed further route engineering within the survey swathe to find the optimum route for the cable, avoiding known hazards and rough topography. The RPL was subsequently revised to present the optimum route based on the survey data.

As part of the preliminary work and the cable route survey, cable crossings along the proposed route were identified. The 2Africa system crosses 6 in-service cables within the Ireland EEZ, but none are situated within the Southern Canyons cSAC.

Stakeholder Engagement

Fisheries

Brown & May Marine Ltd (BMML) were contracted to act as Fishery Liaison Consultants for the 2Africa cable survey operations. Fisheries liaison will continue prior to and throughout cable installation.

Marine Aggregates

There will be no interaction with any marine aggregates activity.

Offshore Energy

There will be no interaction with any offshore energy activity within Irish waters or the Southern Canyon cSAC during cable installation.

Oil and Gas

There will be no interaction with any offshore oil and gas activity within Irish waters or the Southern Canyon cSAC during cable installation.

4.4.2 Cable Laying Operations through Ireland's EEZ and Southern Canyons cSAC

Cable Route Selection & Cable Engineering

The 2Afica cable first enters the Irish EEZ at position 50° 31.7852'N, 007° 36.000'W.

Thereafter, the cable sequentially exits the Irish EEZ, re-enters the UK EEZ at several locations.. The reason for the several exit/entry points is due to the stepped nature of the UK and Ireland EEZ boundary in this area.

The positions are as follows:

Exit UK EEZ/Enter Ireland EEZ - 50° 31.7852'N, 007° 36.0000'W.

Exit Ireland EEZ/Enter UK EEZ - 50° 10.0000'N, 008° 21.5637'W.

Exit UK EEZ/Enter Ireland EEZ - 50° 04.3746'N, 008° 24.0000'W.

Exit Ireland EEZ/Enter UK EEZ - 50° 00.0000'N, 008° 28.7633'W.

Exit UK EEZ/Enter Ireland EEZ - 49° 58.3420'N, 008° 32.0226'W.

Enter Southern Canyons cSAC - 49° 01.3370'N, 010° 46.1588'W.

Exit Ireland EEZ to High Seas - 48° 15.1144'N, 011° 15.9334'W

Exit Southern Canyons cSAC - 48° 10.8165'N, 011° 17.8675'W.

See Figure 6 below.

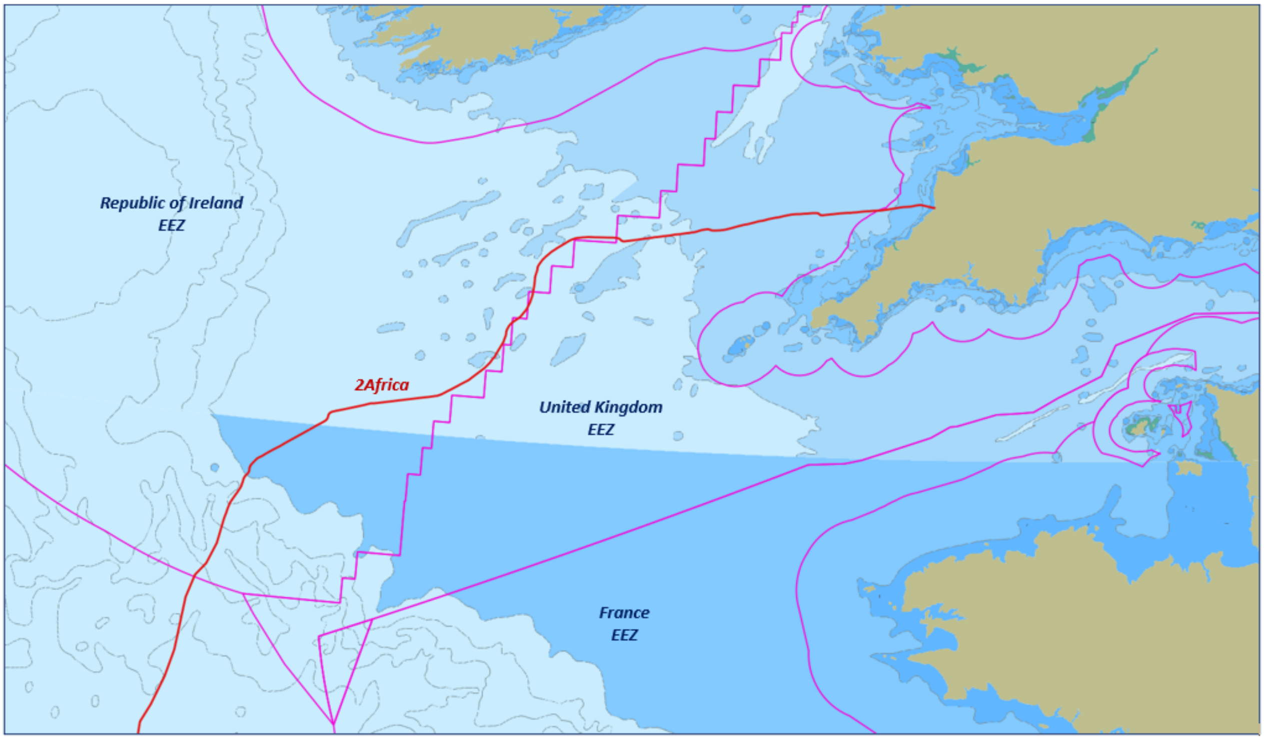

***Figure 6**: Entry & Exit Points of the Irish EEZ*

The 2Africa cable system will be predominantly buried by cable plough (see Figure 9) in water depths to 1,470 metres, at which point, ploughing operations will cease. The main rationale for plough burial is to protect the cable against external aggression; in this case demersal fishing activities i.e. bottom trawling. Without such protection, the cable could become easily damaged by fishing activities, requiring unnecessary, costly and time-consuming cable repairs. Cable protection/burial by plough has proven to be a very effective protection methodology, with a very low seabed surface area affected and is extensively utilised worldwide.

At crossings with other in-service cables, the plough is recovered and the short unburied section is latterly buried by means of a water jetting Remotely Operated Vehicle (ROV) see Figure 12.

In some limited areas within Ireland's EEZ, cable burial cannot be conducted due to unavoidable hard bottom conditions or areas of steep seabed slopes, high relief, or similar.

4.4.3 Pre-Lay Grapnel Run (PLGR) Operations

Prior to the cable installation and burial activities, a PLGR operation campaign will be conducted only in areas of burial to detect and clear any possible objects or debris along the route so that the trenching tools can operate safely and to maximise burial potential. Examples of debris can include old out-of-service telecommunications cables (usually telegraph) which may have been broken and pulled out of position, old fishing gear, rope and anchor chains.

A towed grapnel will be used (see Figures 7 and 8), the type of which are selected depending on the seabed conditions. Adjustments may be made to the grapnel train offshore subject to site experience – for instance, more chain may be added to weigh down the leading end of the assembly. This is determined by the Master/Officer on Watch, based on the seabed and tension feedback recorded.

The operations will follow the recommendations set out in ICPC Recommendation No. 2 (ICPC, 2015). Any debris recovered during the PLGR operations will be disposed of appropriately onshore. The PLGR operations can be performed by the cable ship or another vessel with specific equipment fitted and the same specification navigation and positioning system as the main lay vessel.

***Figure 7**: Spearpoint Grapnel & Giffords*

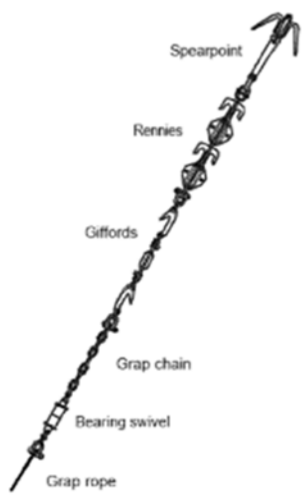

***Figure 8:** Typical PLGR rigging (Source: ASN, 2021)*

4.4.4 Main Lay Operations

Within Ireland's EEZ and through the Southern Canyons cSAC, the 2Africa cable system will be installed using a dedicated cable lay vessel. Where the cable is to be buried, a plough will be used to a target burial depth of 2m (depending on seabed conditions). The cable will be surface laid whilst traversing an area of hard ground with some boulders at the entry point to the cSAC. From KP 544 – 553, the cable will be surface laid from the edge of the shelf break to deeper water due to steep side slopes and high relief etc., from the 264 to 440 metre water depth contours (Table 1). Within this surface laid section, cable slack is engineered such that the cable accurately conforms to the seabed contours, eliminating the potential for any lateral movement of the cable and ensuring its stability on the seabed. No trawl scars have been noted within this area. At the end of last section of plough burial at KP577, the cable will be surface laid thereon to the exit of the Southern Canyons cSAC at KP 632 at a water depth of 4,003 metres. During surface lay operations, the cable slack i.e. the excess cable paid out vs. ground covered is laid slightly positive at c. 3%, such that the cable thus closely follows the seabed contours and remains in contact with it. This laying methodology ensures that the cable remains stable on the seabed without any lateral movement. The cable lay vessel will use a dual high accuracy Dynamic Global Positioning System (DGPS) navigation system to lay the cable as per the target route shown in the RPL.

KP[1] range	Latitude/Longitude	Water Depth (metres)	Comments
528	49° 01.3370'N 010° 46.1588'W	**155**	**Enter Southern Canyons cSAC – no plough burial due to boulders**
529	49° 01.1268'N 010° 46.6925'W	**156**	**Commence plough burial**
531	49° 00.7114'N 010° 47.7468'W	156	Trawl scar north of cable line
536	48° 58.6362'N 010° 50.5012'W	158	Trawl scars across cable route
536 - 542	48° 58.6362'N 010° 50.5012'W to 48° 55.6511'N 010° 51.9127'W	158 - 194	Very heavy accumulation of trawl scars
544 - 553	48° 54.6941'N 010° 52.5352'W to 48° 50.3281'N 010° 55.2881'W	**264 - 550**	**No plough burial due side slopes, steep slopes, high relief at shelf break**
553	48° 50.3281'N 010° 55.2881'W	550	Resume plough burial
557	48° 48.4750'N 010° 56.7500'W	730	Trawl scars
558	48° 48.4700'N 010° 57.0000'W	780	Trawl scars
561 - 567	48° 46.4259'N 010° 58.1431'W to 48° 43.7171'N 011° 00.3797'W	836 – 1,000	Numerous trawl scars
568.5	48° 43.0000'N 011° 00.9000'W	1,060	Trawl scars
571	48° 41.4721'N 011° 01.4836'W	1,150	Trawl scars
573 - 574	48° 40.5011'N 011° 01.8722'W to 48° 40.0955'N 011° 01.9962'W	1,210 – 1,270	Numerous trawl scars
577	48° 38.5311'N 011° 02.5770'W	**1,470**	**End of plough burial**
580	48° 36.9968'N 011° 03.1443'W	1,733	Cable transition from Single Armoured Light (SAL) to Lightweight Protected cable (LWP)
622	48° 16.2646'N 011° 15.1230'W	3,781	Cable transition from LWP to Lightweight cable (LW)
632	48° 10.8165'N 011° 17.8675'W	**4,003**	**Exit Southern Canyons cSAC**

[1] KP refers to "kiliometre point" and refers to the distance from the beach manhole (BMH) at Widemouth, UK.

Table 1: *Lengths of cable to be buried and surface laid within Southern Canyons cSAC.*

Onboard, the cable will be stowed into the integrated cable storage tank(s). The cable lay vessel is also equipped with high-end cable laying equipment to load and lay the fibre optic cable. The cable lay vessel will be dynamic positioning (DP) controlled. Vessel specifications for ASN's main lay cable ships are included in Appendix I of this document. One of these vessels or similar will be used to install the 2Africa cable system.

During main lay operations, the average operational speed of the vessel during plough burial is 0.3 knots and up to 4 knots (averaging around 500m / hour) for surface lay in waters shallower than 1500m water depth. The speed may need to be adjusted during installation depending on the topography of the area and weather conditions.

Burial Operations

Beyond the 15m water depth where burial is proposed, a jetting plough will be used for burial, with a target burial depth of between 1.5m and 2m (or to bedrock, whichever is reached first). The plough is in contact with the seabed using its four plough skids and the plough share, which is approximately 0.2m wide. The jets on the plough lubricate the ploughshare to reduce friction between the plough and the seabed during burial operations. The jets naturally fluidise the seabed ahead of the ploughshare and cable burial, making the burial operation smoother and potentially improving the burial depth (although burial depth is dependent on the nature of the seabed). Temporary track marks are left from the plough which will disappear over time leaving the seabed to its natural state due to sediment movement. Figure 10 shows a jetting plough setup.

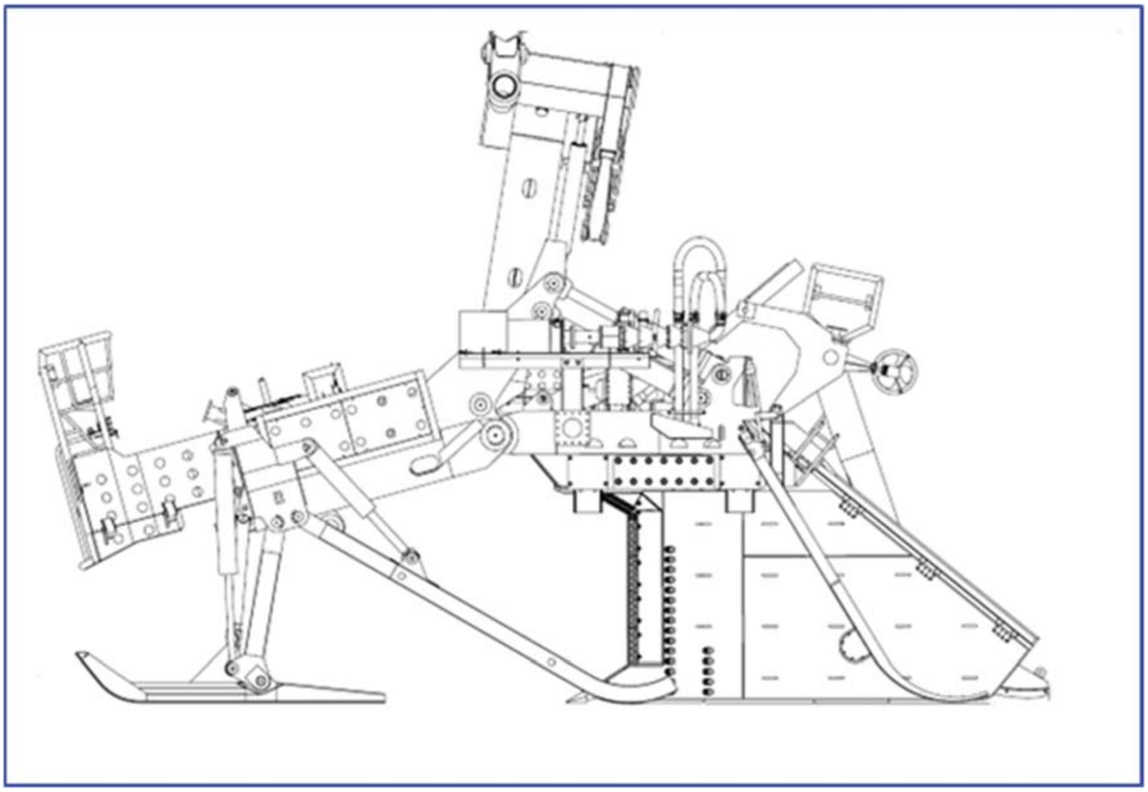

Figure 9: *Jetting plough diagram (Source: ASN, 2021)*

Cable laying commences at a slow speed to ensure correct grade-in of the burial tool, i.e. 10m horizontal movement per 1m grade-in. During grade-in, the cable tension is continuously monitored at the deck tensioner and the catenary is continuously monitored at the chute of the vessel. If there is too much tension in the cable, the pay-out speed of cable needs to be increased accordingly to reduce the tension in the cable such that the cable can approach the natural catenary shape. One of the aims of the jetting plough is to reduce the cable tension at the point of burial.

The cable lay vessel will proceed at a steady speed along the cable route. Typically, during the lay the plough is towed 2-3 times the water depth behind the vessel in a straight line except at alter course positions. Acoustic positioning is used to ensure the plough follows the planned route as precisely as possible. The plough's position behind the vessel is calculated using acoustic positioning, the tow wire length deployed and the water depth in the area.

The tension on the cable will be constantly monitored during this lay operation, along with the cable slack compared to relative ship movement, and the position and orientation of the cable. These measures prevent the formation of loops and help to ensure the minimum bending radius is not compromised.

Key data for monitoring purposes include:

- Cable length;
- Departure angle (visual monitoring);
- Tension at the tensioner;
- Water depth;
- Position of the burial tool; and
- Cable burial depth.

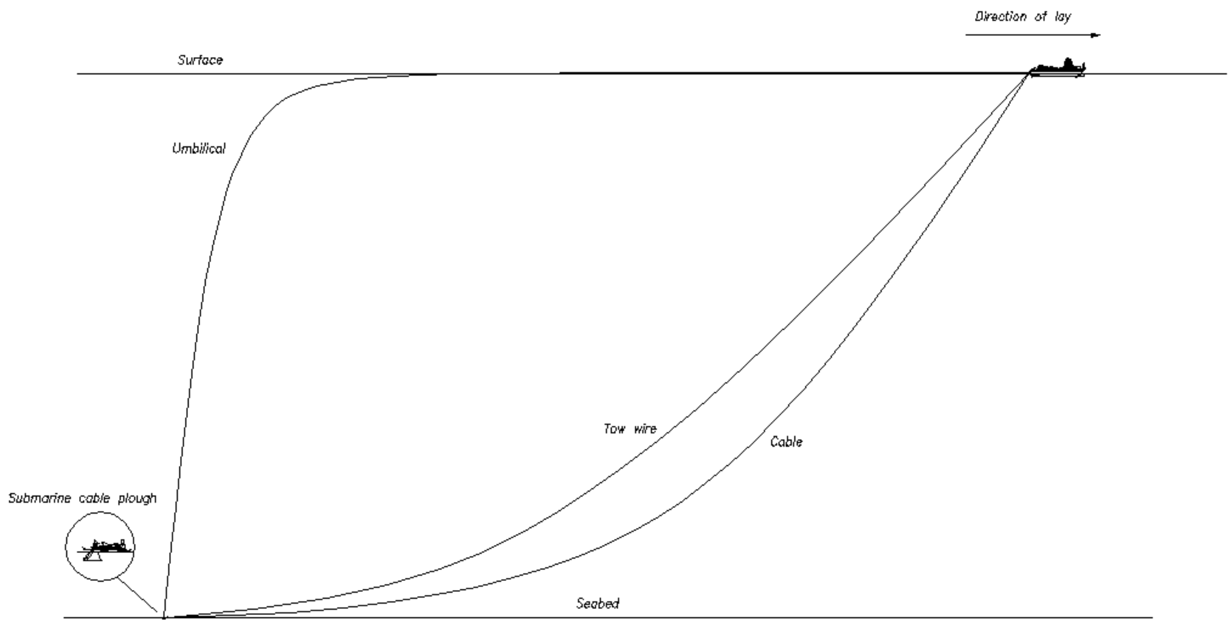

Figure 10: *Diagram of plough operations (Source: ASN, 2021)*

Surface Lay Operations

During the surface lay operations within the Southern Canyons cSAC and into deeper water, the surface lay precision on the seabed is +/- 1% of water depth from the centreline. The surface lay and touchdown positioning is calculated using a force based 2D model which is used across the industry as a standard calculation method to ensure that the cable naturally conforms to the seabed contours. The cable will have very limited movement on the seabed once installed as it is held in position under its own weight.

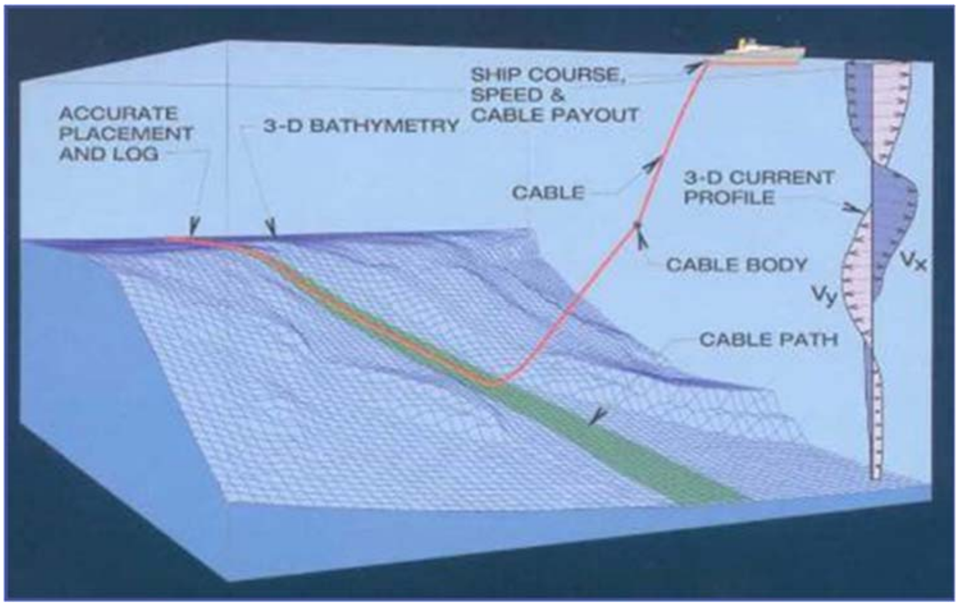

Figure 11: *Surface lay operations diagram (Source: ASN, 2021)*

4.4.5 Post Lay Inspection & Burial (PLIB) Operations

Post Lay Inspection and Burial (PLIB) operations may be carried out in some areas along the route. A visual inspection will be dependent on visibility at the time of the inspection, alternatively the inspection will use cable tracking sensors and forward-facing sonar to determine the burial.

Post lay burial operations will be carried out in plough burial areas at several locations:

- At in-service cable crossings (none planned within the Southern Canyons cSAC, but there are 6 in-service cable crossings within the Ireland EEZ);
- Initial, intermediate and final splices;
- Unplanned plough skips; and
- Areas where seabed slopes are not suited for ploughing and jetting burial is viable (not planned within the Southern Canyons cSAC).

A remotely operated vehicle (ROV) will be deployed to bury the cable (in areas identified in the bullet points above) using a jetting tool.

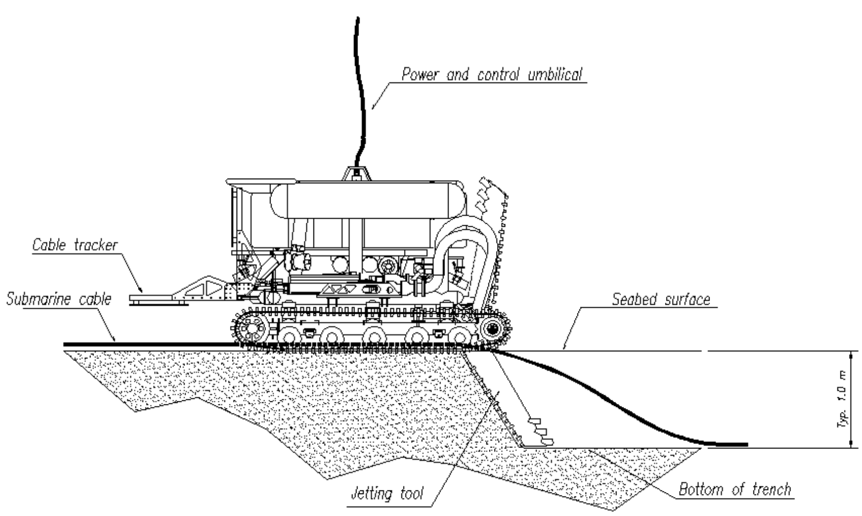

Figure 12: *ROV jetting operations diagram (Source: ASN, 2021)*

4.5 Time in Irish waters and in Southern Canyons cSAC

The following is an outline of the perceived time spent in Irish waters and the activities that will be carried out:

	Activity	Time	Within cSAC
	Enter EEZ		
	Ploughing 8.7 km	0.6 days	No
	Plough up	0.3 days	No
	Cable Crossing	0.3 days	No
	Plough Down	0.3 days	No
	Ploughing 13.5 km	1.1 day	No
	Plough up	0.3 days	No
	Surface Lay 2.1km	0.3 days	No
	Plough Down	0.3 days	No
	Ploughing 0.6km km	0.04 day	No
	Plough up	0.3 days	No
	Cable Crossing	0.3 days	No
	Plough Down	0.3 days	No
	Ploughing 49.4km km	3.4 day	No
	Plough up	0.3 days	No
	Cable Crossing	0.3 days	No
	Plough Down	0.3 days	No
	Ploughing 43km km	3 day	No
	Plough up	0.3 days	No
	Cable Crossing	0.3 days	No
	Plough Down	0.3 days	No
	Ploughing 31.8km km	2.2 day	No
	Plough up	0.3 days	No
	Cable Crossing	0.3 days	No
	Plough Down	0.3 days	No
	Ploughing 52km km	3.6 day	No
	Plough up	0.3 days	No
	Cable Crossing	0.3 days	No
	Plough Down	0.3 days	Yes
	Ploughing 14.6km km	**1.0 day**	**Yes**
	Plough up	0.3 days	Yes
	Surface Lay 9km	0.3 days	Yes
	Plough Down	0.3 days	Yes
	Ploughing 23.9km km	**1.7 day**	**Yes**
	Plough up	0.3 days	Yes
	Surface Lay 52.3km	0.3 days	Yes
	Exit EEZ		No

4.6 Plough Deployment Procedure

When commencing ploughing operations, the plough is loaded with the telecommunications cable on the deck of the cableship. The plough is then lifted from deck and slowly deployed overboard vis the use of an 'A' frame.

Once overboarded, the plough is then very slowly lowered into the water column, utilising the towing wire. The plough is then slowly lowered to the seabed vertically while paying out the tow wire, the plough control umbilical and the telecommunications cable. The USBL would be activated at the point of lowering to the seabed in order to monitor the plough position relative to the cableship.

Once on the seabed, the plough is then reconfigured into full ploughing mode. The tow wire, umbilical and telecommunications cables are all paid out slowly to reposition the plough directly behind the cableship to be able to commence ploughing. At the same time, the cableship commences to transition into forward motion, towing the plough behind the cableship and the plough share grades into the seabed to the predetermined burial depth and burial thus commences. The plough positioning behind the cableship is monitored by means of the USBL and navigation positioning systems.

The plough deployment is conducted in a very slow, determined manner to avoid the potential for damage to the plough or telecommunications cable. The deployment can take up to 12 hours.

Plough recovery is a reverse process whereby the cableship slowly stops burial, the plough share is graded out of the seabed at the same time. Once the cableship is positioned directly over the plough, the plough is then lifted from the seabed by the tow wire and the plough is slowly recovered to deck. This operation may also take up to 12 hours.

4.7 Future Maintenance Activities

In the waters of Ireland's Exclusive Economic Zone (EEZ) and within the Southern Canyons Special Area of Conservation (SAC), the 2Africa cable system may require repairs primarily due to external factors like fishing activities e.g. fishing gear strikes, and occasionally, product failures. The precise frequency of these repairs cannot be accurately anticipated. The location and extent of future repairs are difficult to predict but is not expected to exceed five repairs over the 25 year design life within Irish Waters but is expected to be considerably fewer.

4.8 Decommissioning

There is no definitive position on decommissioning of telecommunication submarine cables. UNEP-WCMC (United Nations Environment Program) document, CARTER *et al,* 2009, points out that the removal of submarine telecommunication cables should be evaluated on a case-by-case basis, as the procedures for withdrawal and some local conditions (soil type, crossing with other cables, etc.) can often have a greater environmental impact than the procedures related to the installation itself. In some cases, cables that have a depleted business life may serve research and teaching purposes, which in other words is an extension of their “useful life”, but now under the responsibility of another owner / manager.

The system has a system design life of 25 years however cable system can operate long after this period, and its deactivation can only be performed by the shutdown of the electrical / electronic system and disabling the transmission of information. There are no plans to recover the cable as part of the decommissioning plan.

5. Identification of Relevant European Sites (Natura 2000 sites)

Special Areas of Conservation within Irish Waters are seen in Figure 13 and Figure 15. The locations of SPA's within 15km of the cable route are seen in Figure 14. The cable route, Irish territorial waters and Irish Contiguous Zone, with a 15km buffer showing proximity to Offshore SAC's is seen in Figure 15. Habitats noted based on 2Africa Marine survey in Southern Canyons cSAC down to 1500m (burial depth) are seen in Figure 16. It should be noted that beneath 1470m the cable is surface laid. Based on 2Africa survey data the habitats observed in the cSAC are seen in Figure 16. These primarily consisted of fine sediment, course sediment and hard ground. The proposed cable route (burial and surface lay) through Southern Canyons cSAC including detailed Backscatter and Sonar Contact data is demonstrated in Figures 17 and 18. The proposed cable route through Southern Canyons cSAC showing sonar contacts (e.g boulders) and trawl marks are seen in Figures 18 and 19. It should be noted that the routing of the cable has been modified to take these into account. It should be noted that evidence of fishing is noted in the cSAC along the proposed route where the cable is to be buried. This enforces the requirement for burial in these areas. It should also be noted that the routing of the cable avoids the majority of sonar contacts.

Informar shaded relief of the routh through the cSAC is seen in Figures 22-24. Further information on the proximity to offshore cSAC's, carbonate mounds, in addition to SeaRover ROV dives, offshore cetacean activity in vicinity of the proposed offshore cable route is outlined in Appendix II. Detailed Admiralty Charts including sonar contacts and trawl scars along the survey route through Irish waters are demonstrated in Appendix III.

Table 2 outlines the NATURA 2000 sites within 15km of the proposed route. Due to the localised and minor nature of the impacts during the installation and operation of the fibre optic cable it is purely out of an abundance of caution that all Natura 2000 sites within 15km of the cable are assessed. No likely significant effects are foreseen on Natura 2000 sites beyond 15km due to the minor and localised nature of the works. An initial screening of NATURA 2000 sites within 15km of the proposed route can be seen in Table 3.

Table 2. *Proximity to designated sites of conservation importance*

Code	NATURA 2000 Site	Distance
Special Areas of Conservation		
Offshore		
002267	Southern Canyons cSAC	Route passes through site
Special Protection Areas		
N/A	None	N/A

There are limited data currently available in relation to the detailed conservation objectives of this cSAC. As outlined in the Site Synopsis '*The ecology of the Southern Canyons is understandably complex. There are areas of hard rocky substrate and areas of muddy or sandy sediment. Along the top of the canyon systems, sediment is the dominant substrate. In the canyons, depending on slope, it grades away to bedrock. Bottom currents also play a strong role in the type of fauna observed. Marine snow flushes through the canyons providing a rich food resource for various invertebrates and vertebrates. This material forms from degradation and flocculation of phytoplankton and excreta in the productive shelf waters. In areas where muddy sediments dominate, there was evidence of pteropod mollusc burrows and occasional emergent sea fans (Distichoptilum) and soft corals (Anthomastus). An extensive field of sea pens, including Pennatula sp. and Kophobelemnon sp., interspersed with bamboo coral Acanella (both fir tree and bushlike forms) also occurs. In coarse sand, which can form quite prominent sand ridge features due to the action of bottom currents, the fauna include Swiftia, Desmophyllum, large barnacles, sea pens, and ophiuroids. Where there was sufficient anchoring, fauna consists of clumps of live Desmophyllum and occasionally Madrepora. Octocorals or soft corals included a lot of clavulariids and canthogorgia. The echinoid Cidaris is abundant over sand with some prominent anemones and occasional errant hermit crabs and galatheid crabs. The numerous fish species include elasmobranchs, grenadiers, orange roughy and eels*.'

As previously outlined in the Site Synopsis '*An extensive offshore survey of this site was completed in 2019 using the RV Celtic Explorer and the Holland I ROV. This survey was completed by a team of internationally recognised deep sea ecologists. A total of 50 dives were completed during this leg of the survey. The canyon systems cutting into the continental shelf were formed by sediment erosion events that scoured deep canyons with flanking* *escarpments. The thalwegs of these canyons exit thousands of meters deep into the abyssal plains below. The SAC boundaries have been designed to encompass this unique habitat, which is exceptional in a European context.*'

5.1 Potential for adverse effects on Southern Canyons cSAC

During the initial baseline assessment of the route, discussions took place in relation to sensitive habitats/designations that may be present along the proposed cable route. At the time of these assessment the Southern Canyons cSAC was not designated. Designation of this cSAC did not take place until November 2022. The proposed route is considered to be the optimal route for a fibre optic cable from an ecological and logistical perspective and avoids the areas that would be considered to be sensitive within the cSAC. It is important to note that despite the lack of designation during the route planning, the marine survey allowed for the fine routing of the cable to avoid boulders, where possible, areas of bedrock reef for ploughing. No bedrock was noted along the route within Irish waters in the marine survey.

As can be seen from the data in figures 16 to 24 burial of the cable is within a relatively flat sediment based area between 156m & 264m and 550m & 1500m. Outside these areas the cable will be surface laid which will have minimal impact. Localised impacts would be foreseen in the vicinity of the plough burial areas. Figures 18 & 19 details the route with side scan where burial is proposed within the cSAC consists of relatively flat features as outline in table 1 (i.e. between 550m at the end of the escarpment to 1470m). The location of the Sea Rover 2019 dives (Appendix I) in seen in Figure 25.

As outlined in Carter *et al.* (2009) (UNEP-WCMC) '*On the continental shelf, burial to c.1 m depth in soft to firm sediment typically leaves a ploughed strip, c.0.3 m wide, in which the cable is entirely covered. However, burial in consolidated substrates may result in only partial closure of the furrow, with displaced sediment deposited at the furrow margins (NOAA, 2005). The skids that support the plough can also leave their footprint on the seabed, particularly in zones of soft sediment (Chapter 3). Potential effects are increased sediment compaction and the disruption of marine fauna. Overall, the disturbance strip produced by the plough-share and skids in direct contact with the seabed ranges from c.2 m to c.8 m wide, depending on plough size*.'

Due to the nature of the burial using a sled, if dropstones or localised boulders in these areas are encountered it would be expected that the sled would move these features aside but would not be expected to bury or alter the level of reef habitat available. If boulders are encountered, localised damage to epifauna may occur if present at the face of the boulder to the plough. It should be noted that the route avoids a parallel ridge (noted in side scan) where numerous trawl scars and sonar contacts were noted. As seen in Figures 19 and 20 the route therefore avoids the vast majority of sonar contacts e.g. boulders classed as reef within the cSAC. It should be noted that a substantial number of trawl scars are noted within the cSAC across the areas that ploughing will take place. These appear on the raised ridge to the west of the proposed route and also indicate a sedimentary based habitat with potential for boulders on the ridge, which is being avoided by the ploughing. Informar sediment samples along the route are seen in Figures 26 & 27. These indicate that habitats in the vicinity of the cable within the cSAC are sand on the top of the continental slope and clay down the slope. and the location of the historic coral records in the vicinity of the cable route and cSAC are seen in Figures 38-41. Detailed processed data of 2 Africa survey data within Irish EEZ is seen in Appendix III.

As seen in Figures 28-33, EUSEAMAP, MSFD and Infomar habitat maps have limited data within the Southern Canyons cSAC and primarily rate the area in general habitat terms according to depth range, as unclassified or simply seabed. Figure 35 and 35 note the offshore geology morphology and geologic features, while Figure 35 shows the bathymetric outline of the canyons down the continental slope. Coral records are seen in Figures 37-41. These are primarily associated with canyons and mound features that allow for increased current speeds and clear ground for settlement rather than sediment based seabed where ploughing is proposed.

Modelled Bottom currents within the Southern Canyons cSAC are seen in Appendix IV. The results from the analysis conclude that bottom currents throughout the Southern Canyon Special Areas of Conservation pose minimal if any risk of significant sediment movement or smothering during the installation of the 2 Africa cable system. As a result, it would not be expected that currents would result in extensive plumes of sediment. These effects are summarised in Table 3.

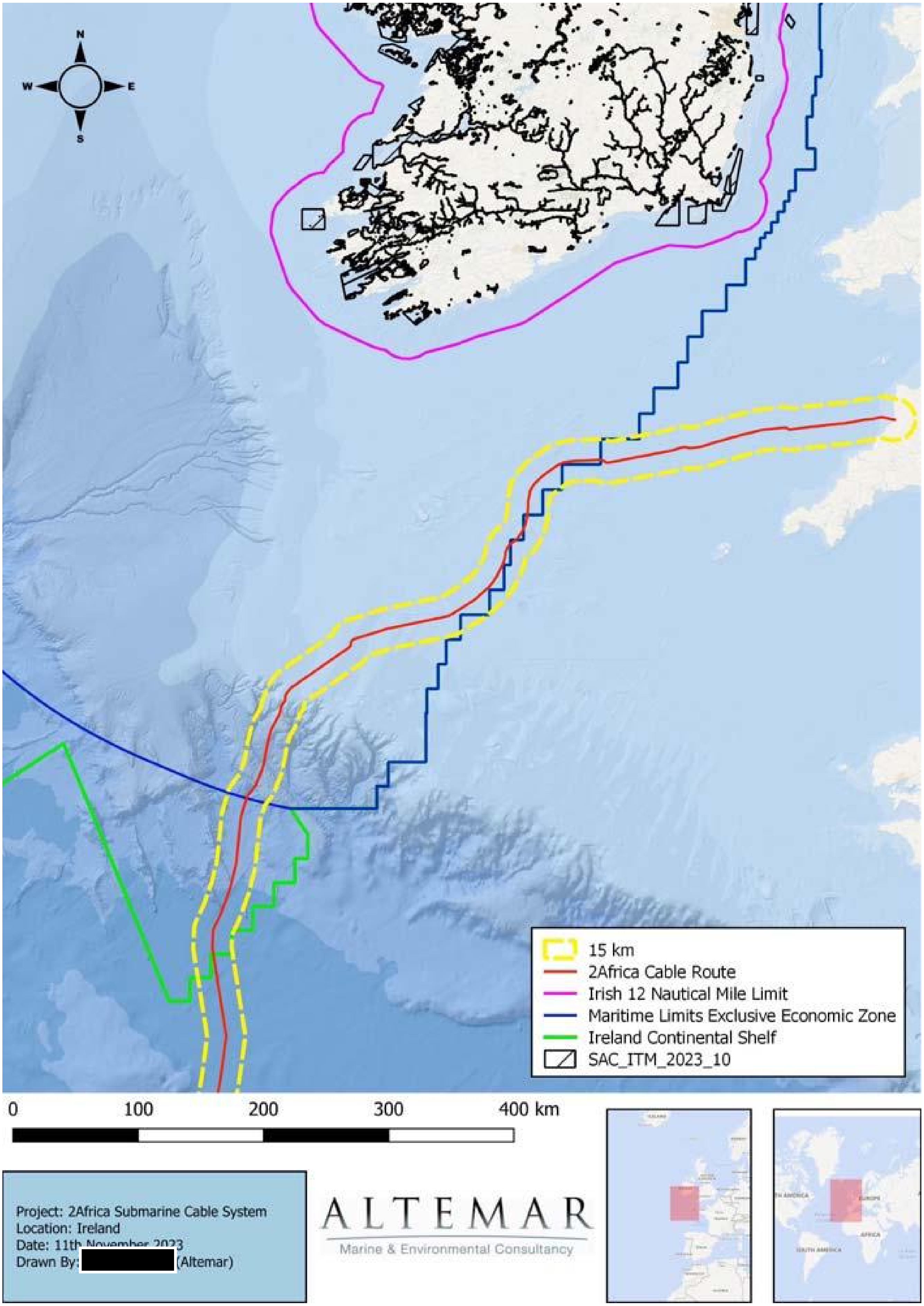

Figure 13. *Special Areas of Conservation located within 15km of the proposed cable route*

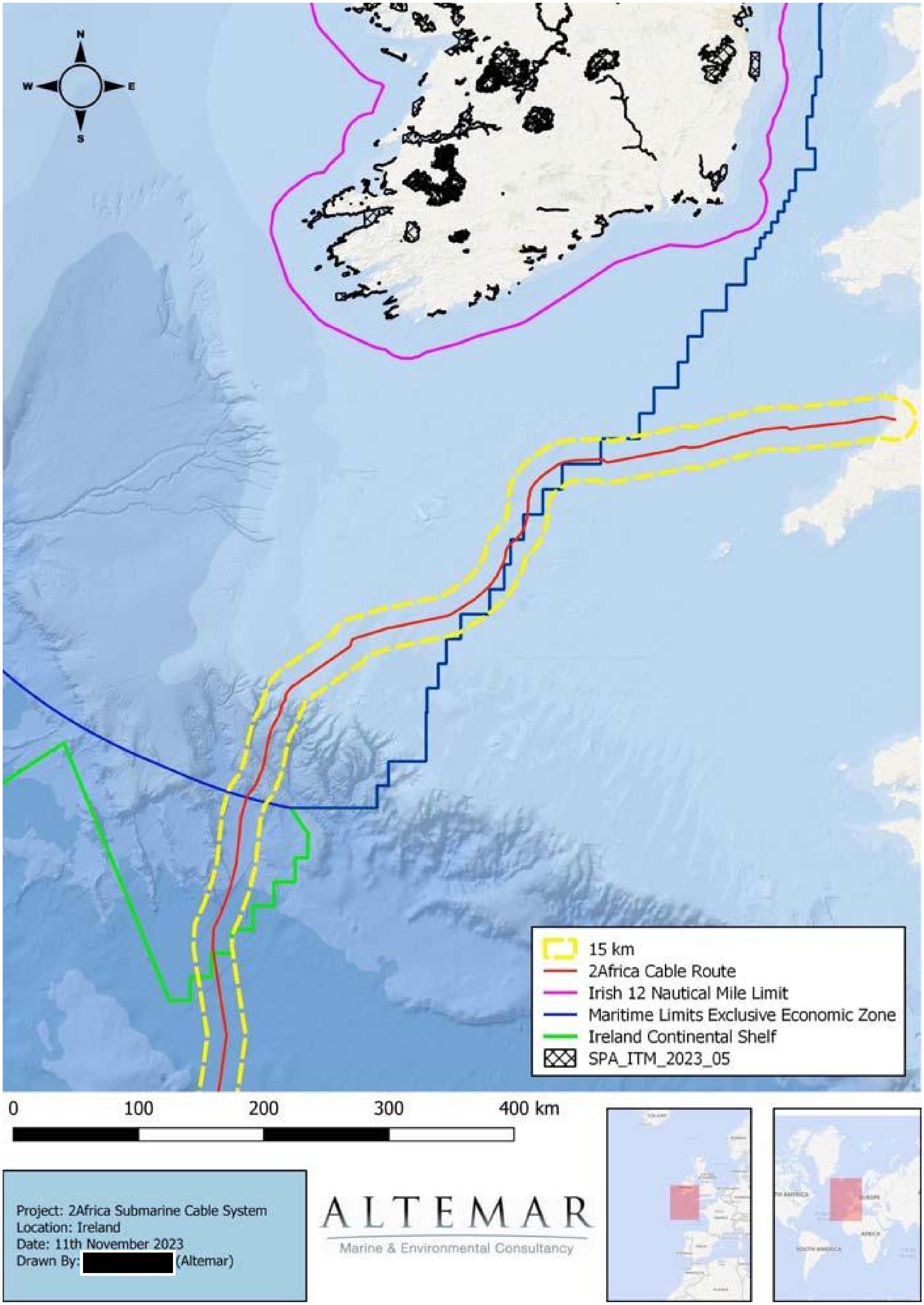

Figure 24. *Special Protection Areas located within 15km of the proposed cable route*

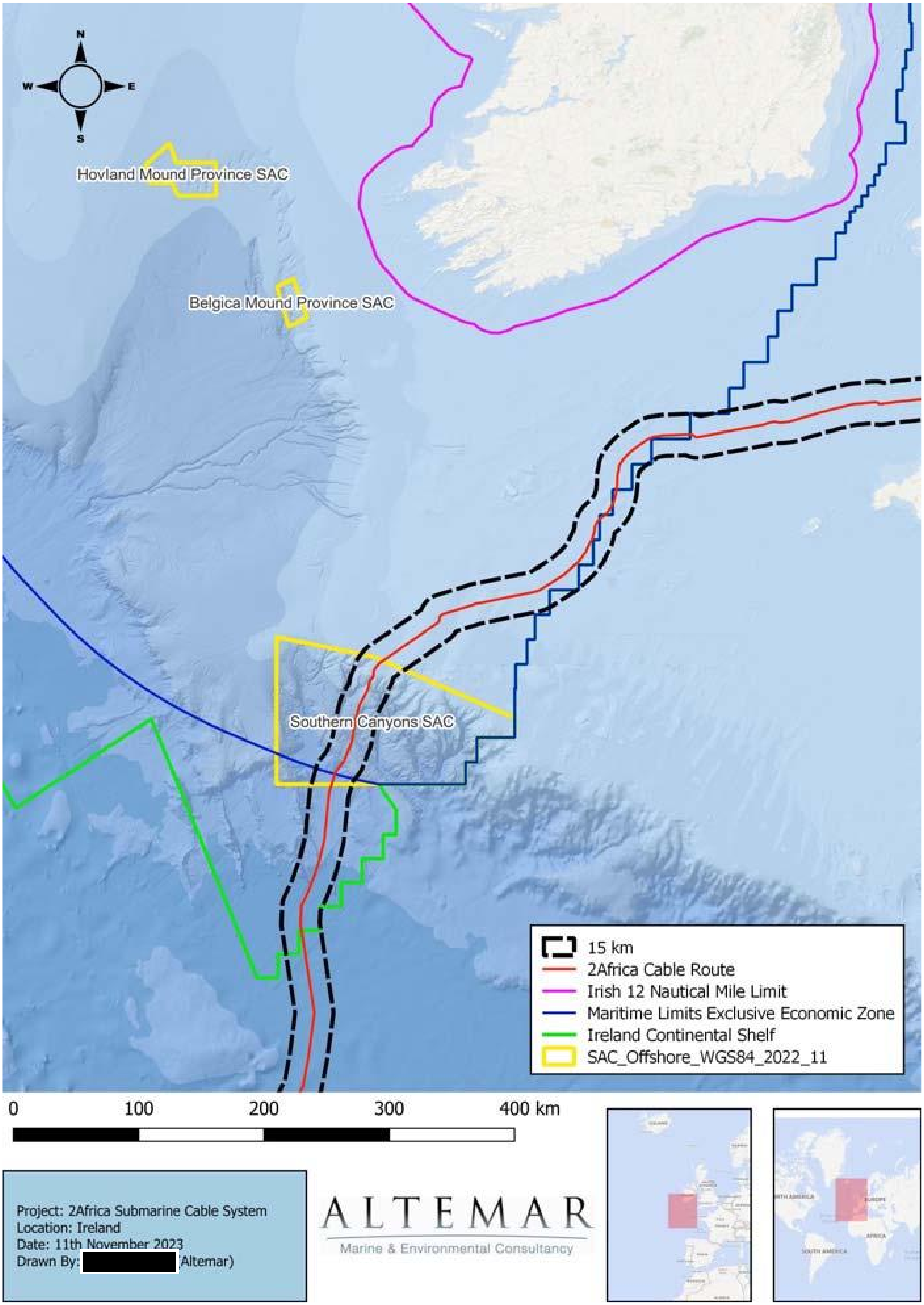

Figure 35. *2Africa cable route in relation to the Irish EEZ, Designated Irish Continental Shelf, and Offshore SACs*

Table 3. Initial screening of NATURA 2000 sites within 15km

NATURA 2000 Site	Name	Screened In/Out	Conservation Objectives, Features of Interest and potential for significant effects.
Special Areas of Conservation			
IE 002278	Southern Canyons cSAC	**IN**	**Objective:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected: 1170 Reefs It should be noted that the designation of this cSAC is recent and the First Order Site-specific Conservation Objectives were prepared on the 09/03/2023. As outlined in the Site Synopsis "*An extensive offshore survey of this site was completed in 2019 using the RV Celtic Explorer and the Holland I ROV. This survey was completed by a team of internationally recognised deep sea ecologists. A total of 50 dives were completed during this leg of the survey. The canyon systems cutting into the continental shelf were formed by sediment erosion events that scoured deep canyons with flanking escarpments. The thalwegs of these canyons exit thousands of meters deep into the abyssal plains below. The SAC boundaries have been designed to encompass this unique habitat, which is exceptional in a European context.*" "*The ecology of the Southern Canyons is understandably complex. There are areas of hard rocky substrate and areas of muddy or sandy sediment. Along the top of the canyon systems, sediment is the dominant substrate. In the canyons, depending on slope, it grades away to bedrock. Bottom currents also play a strong role in the type of fauna observed. Marine snow flushes through the canyons providing a rich food resource for various invertebrates and vertebrates*." **Potential for significant effects** The proposed cable laying route passes through this offshore cSAC. The priorities of the route selection are to provide burial to 1500m to ensure longevity of the cable and to result in minimal impacts on sensitive ecosystems. As a result the route selection has prioritised routing away from Reef habitat along the cable route and within the Southern Canyons cSAC (Figures 19 & 20). Both plough burial and surface lay installation works will be carried out in this cSAC. As demonstrated in Figure 17 and Table 1, the proposed 2Africa cable will be buried via plough burial in this cSAC from 156m to 264 water depth and from 550m to 1470m (Table 1). At depth below 1470m, the cable will be installed via surface lay where no burial is involved. The cable will be surface laid across the canyon seen in Figure 17. Given that main lay works in this cSAC will involve plough burial and surface lay, there is the potential for significant effects on reef habitats within this offshore cSAC in the absence of mitigation. Out of an abundance of caution it is considered that, in the absence of mitigation measures, there may be potential for impact on the qualifying interest of this cSAC through disturbance and the physical impact on the qualifying interest of this cSAC. Mitigation measures are required to ensure that there are no impacts on reefs. Further information is required to determine the potential for adverse effects on this cSAC. **Natura Impact Statement Required**

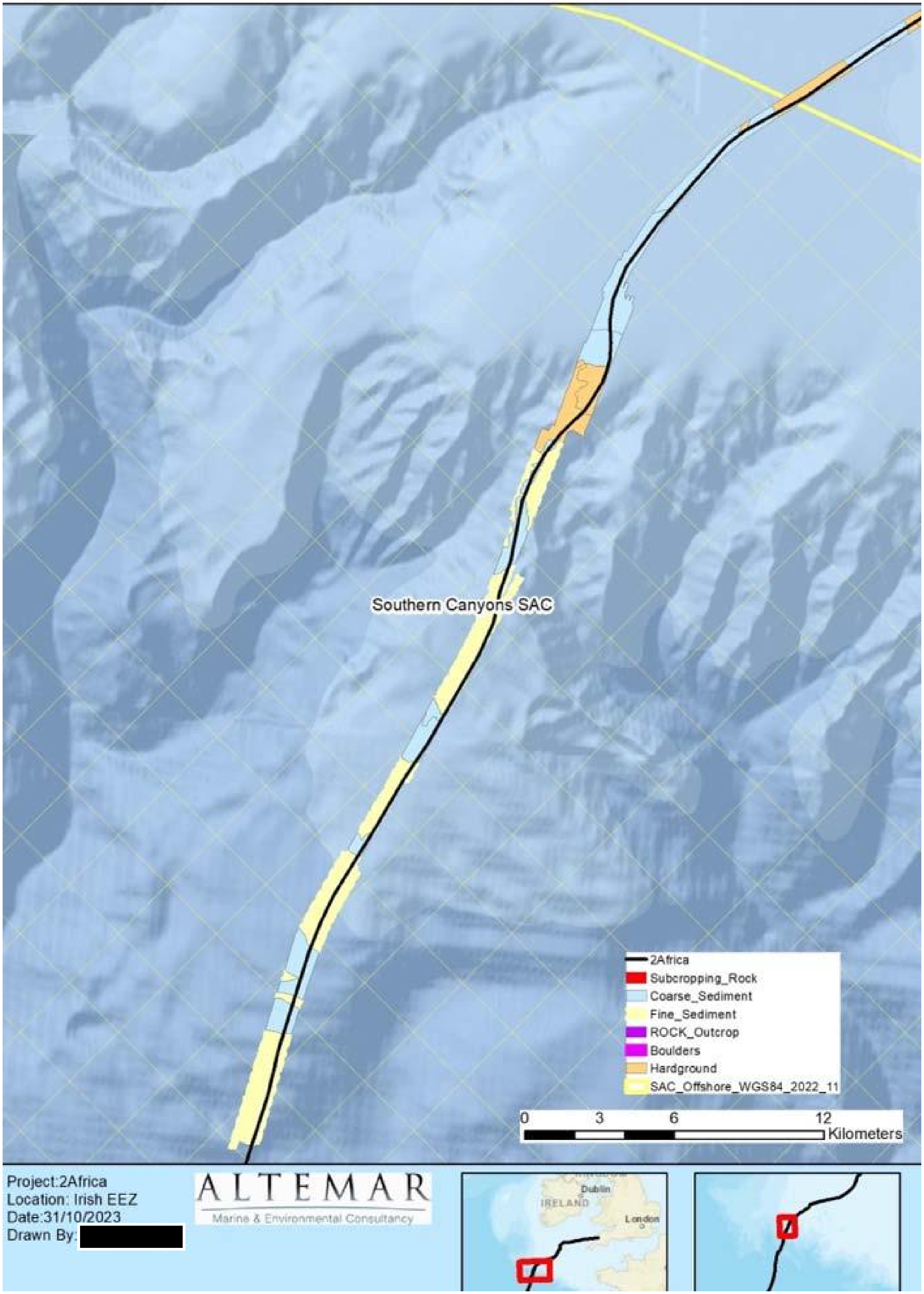

Figure 46. *Habitats noted based on 2Africa Marine survey in Southern Canyons SAC down to 1500m (burial depth)*

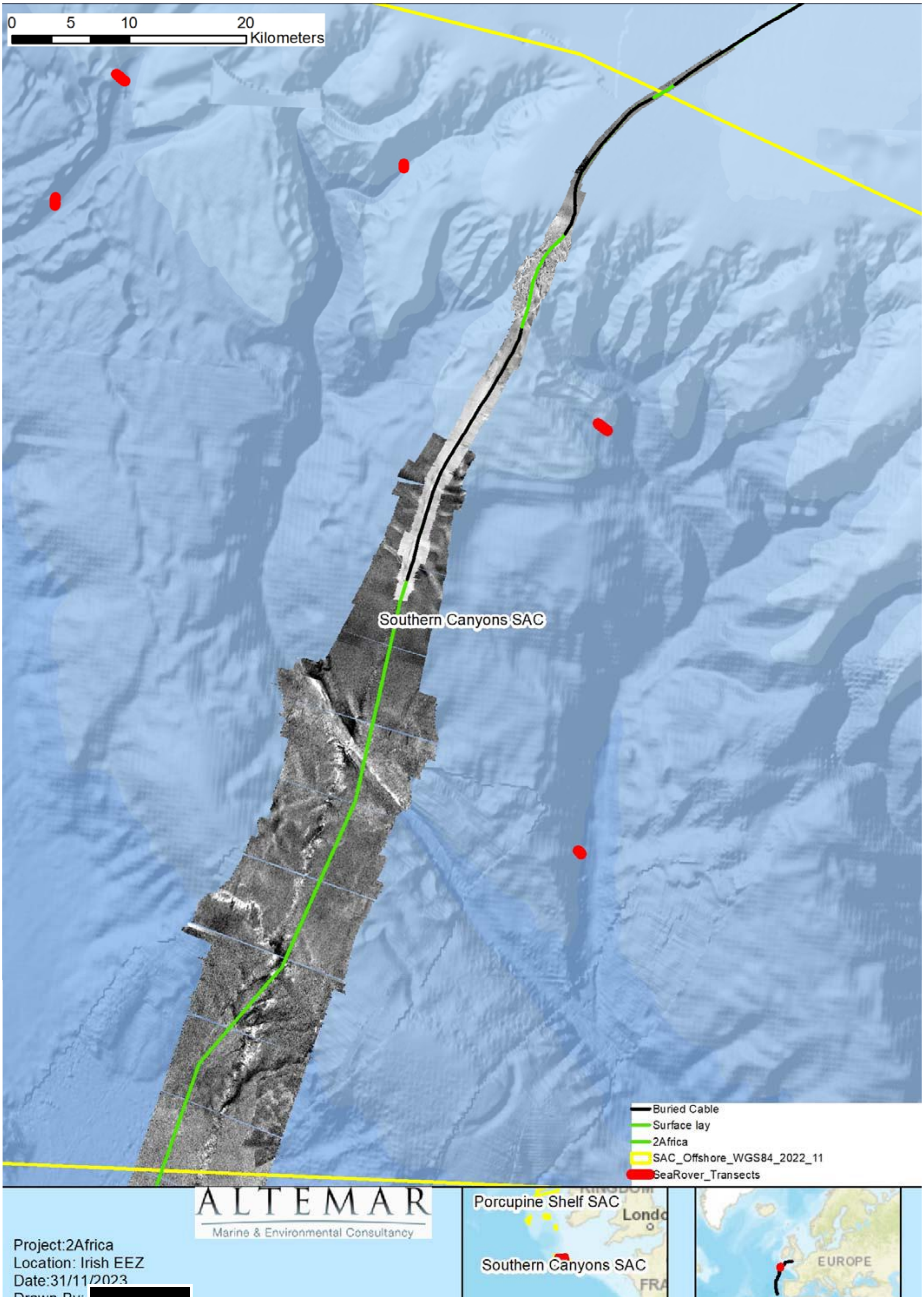

Figure 57. *Cable burial and surface lay, sidescan sonar and backscatter in Southern Canyons SAC.*

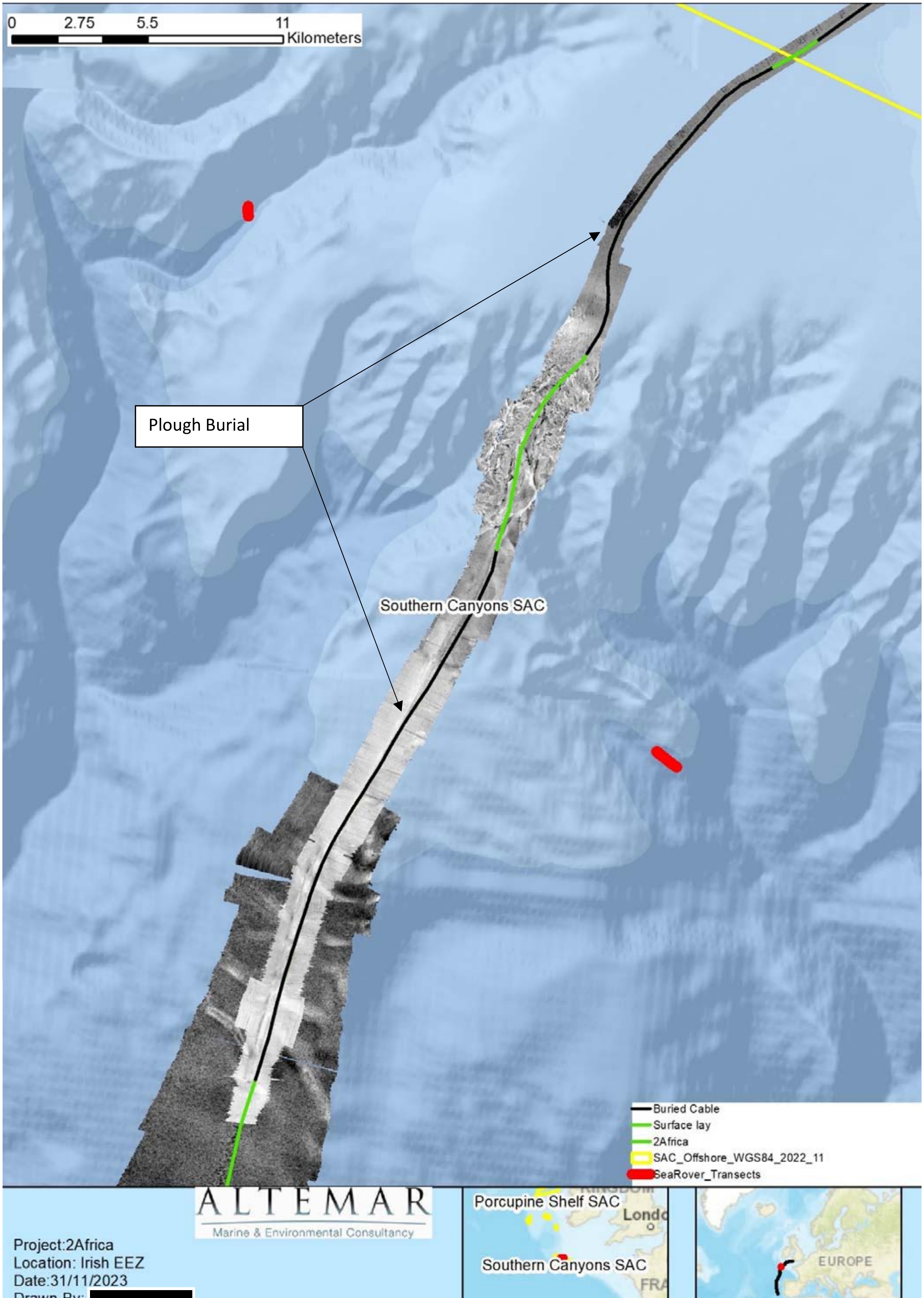

Figure 68. *Cable burial and surface lay, sidescan sonar and backscatter in Southern Canyons SAC.*

Figure 79. *Sidescan, trawl marks (blue) and sonar contacts (e.g. boulder) in the Southern Canyons SAC.*

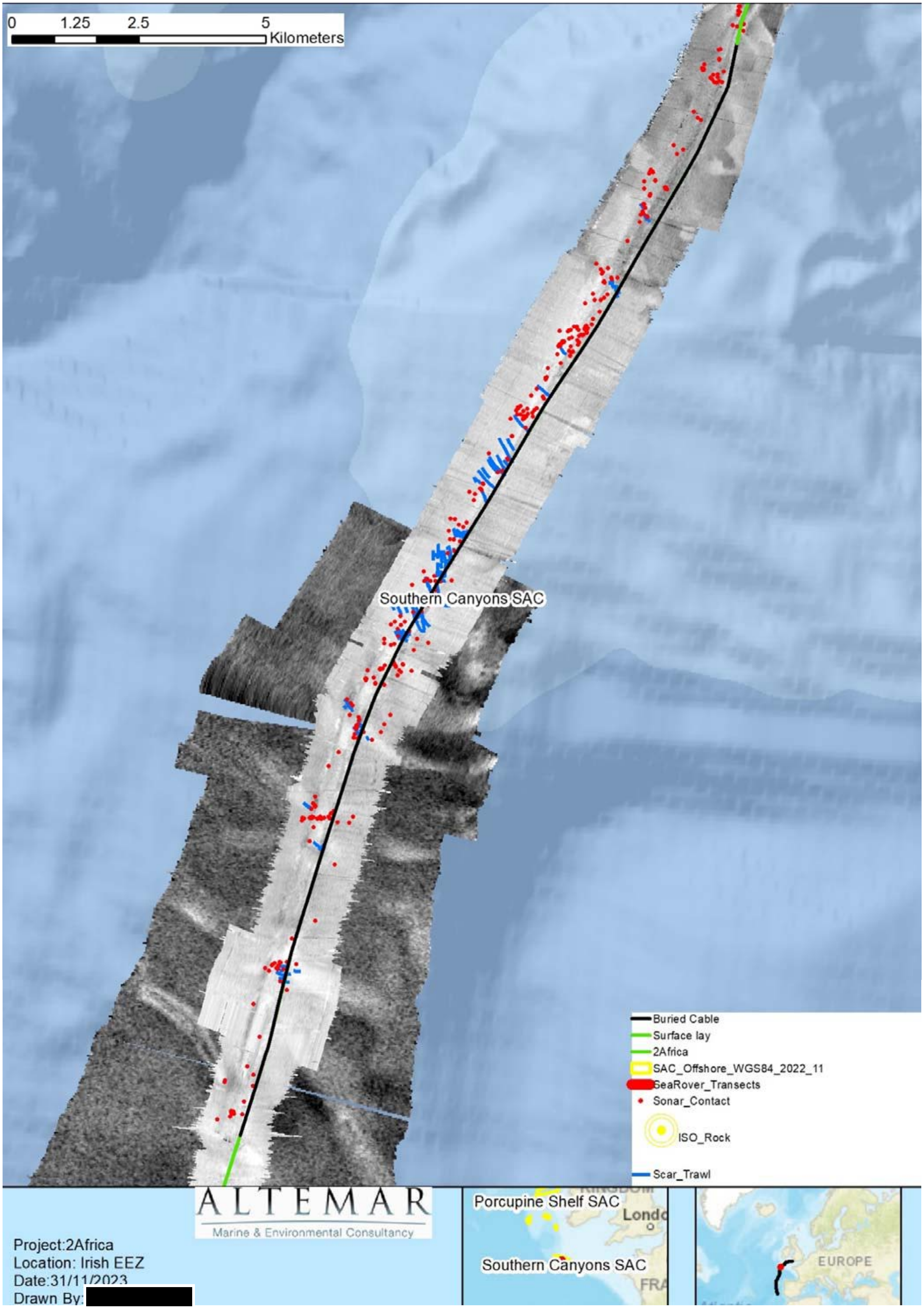

Figure 20. *Sidescan, trawl marks (blue) and sonar contacts (e.g. boulder) in the Southern Canyons SAC..*

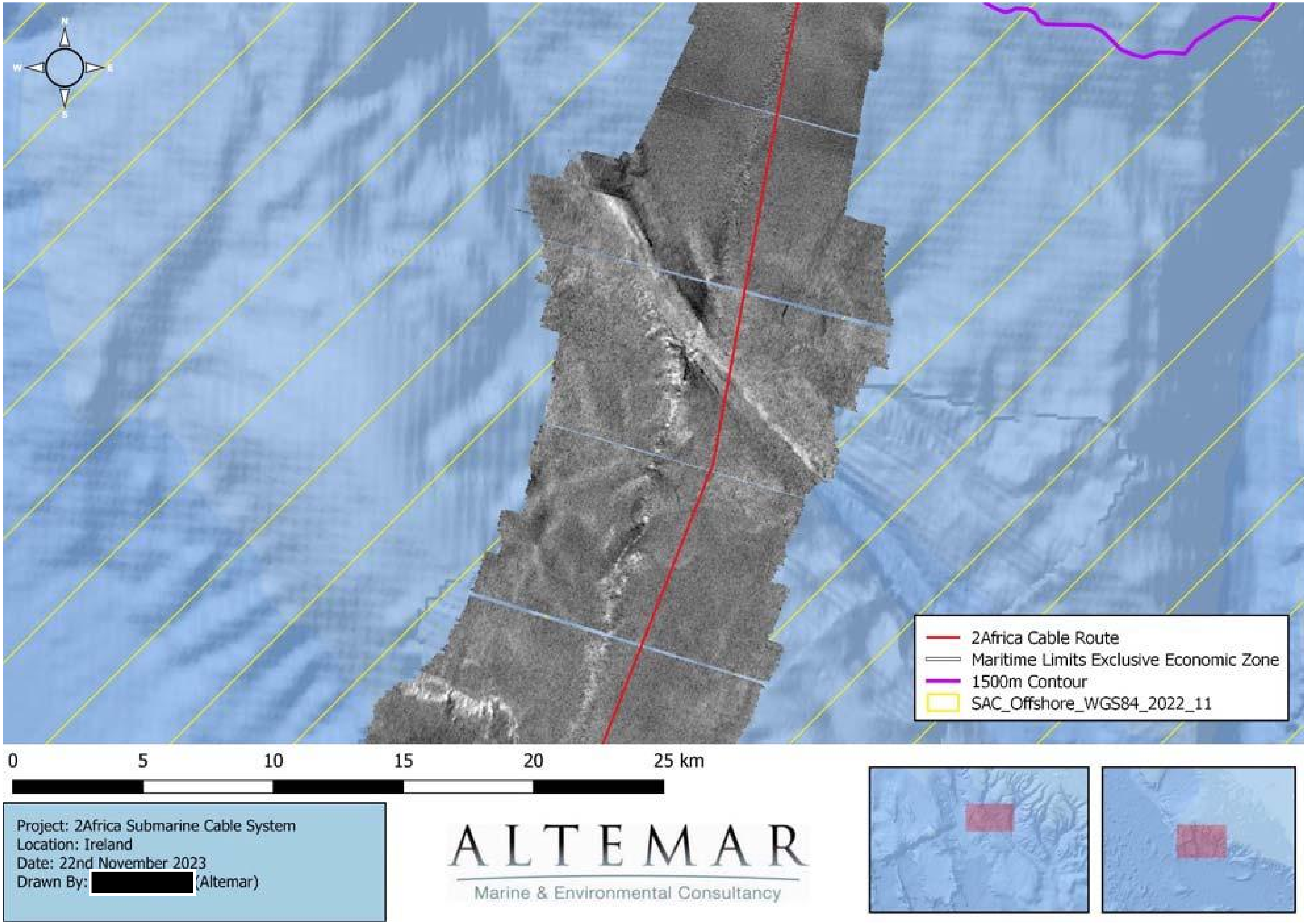

Figure 21. *Surface lay 2Africa cable route and backscatter in deeper portion of cSAC)*

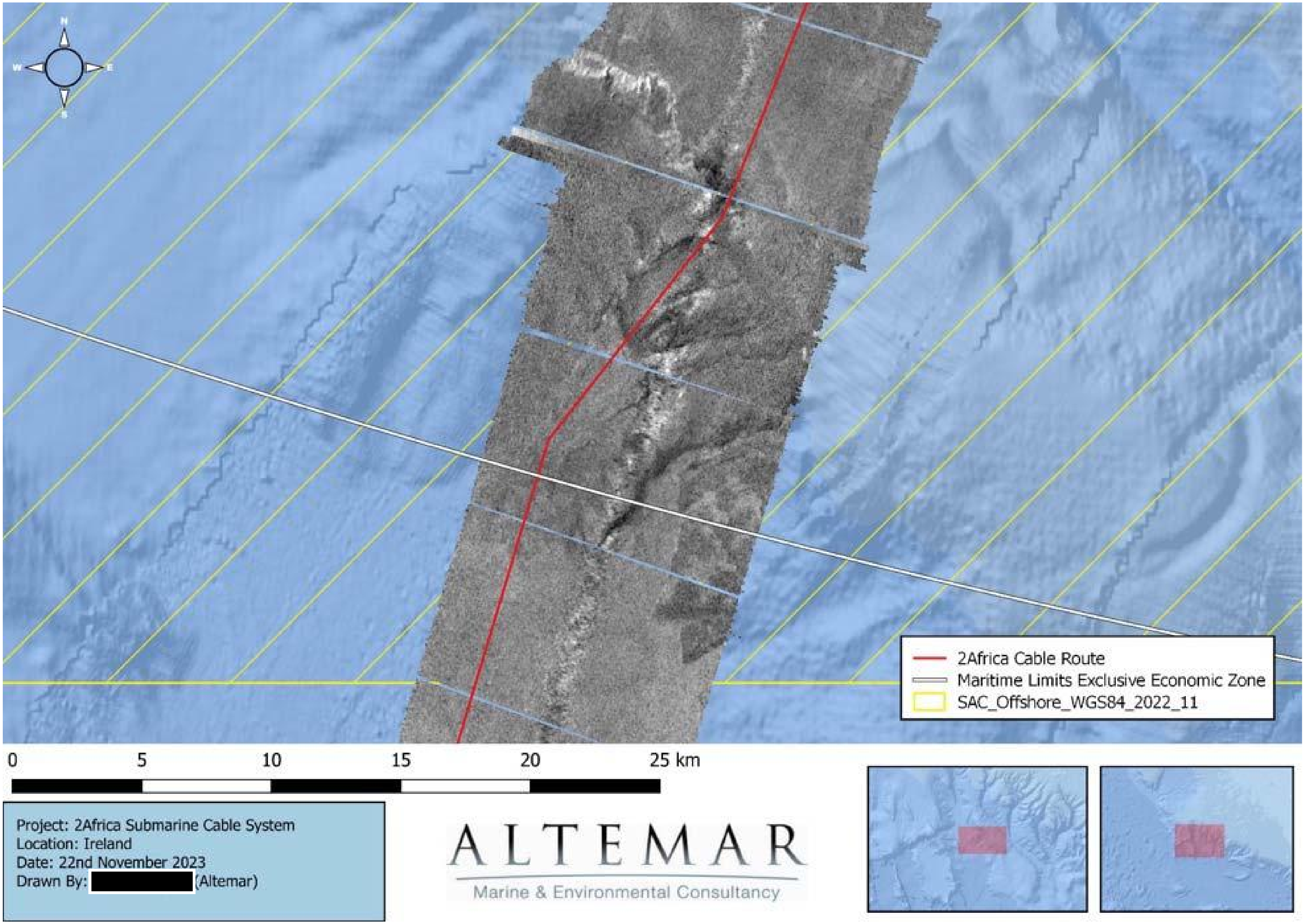

Figure 22. *Surface lay 2Africa cable route and backscatter in deeper portion of cSAC*

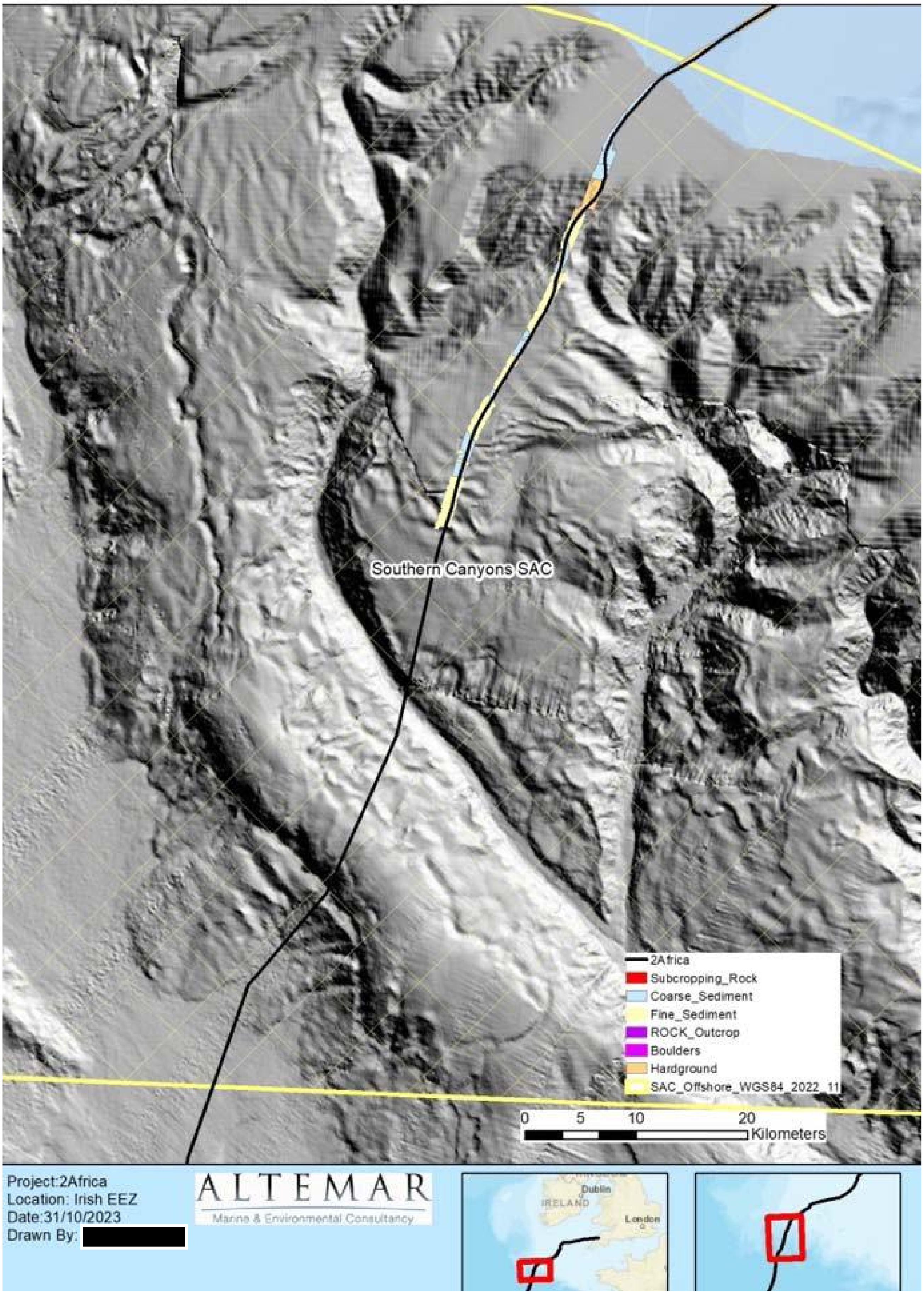

Figure 23. *Surface lay 2Africa cable route and shaded relief in deeper portion of cSAC)*

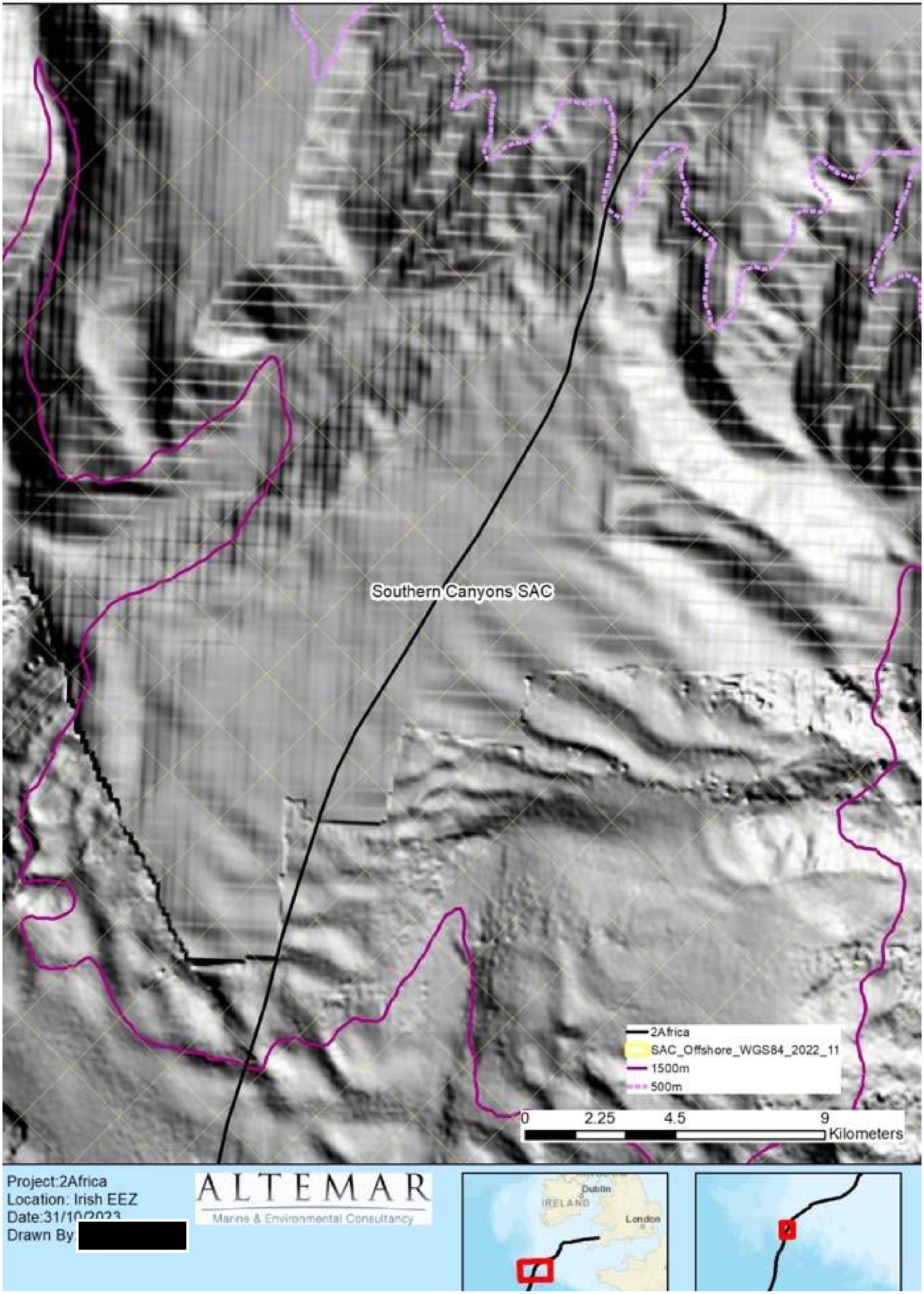

Figure 24. *Proposed cable route through Southern Canyons SAC (Informar Shaded Relief)*

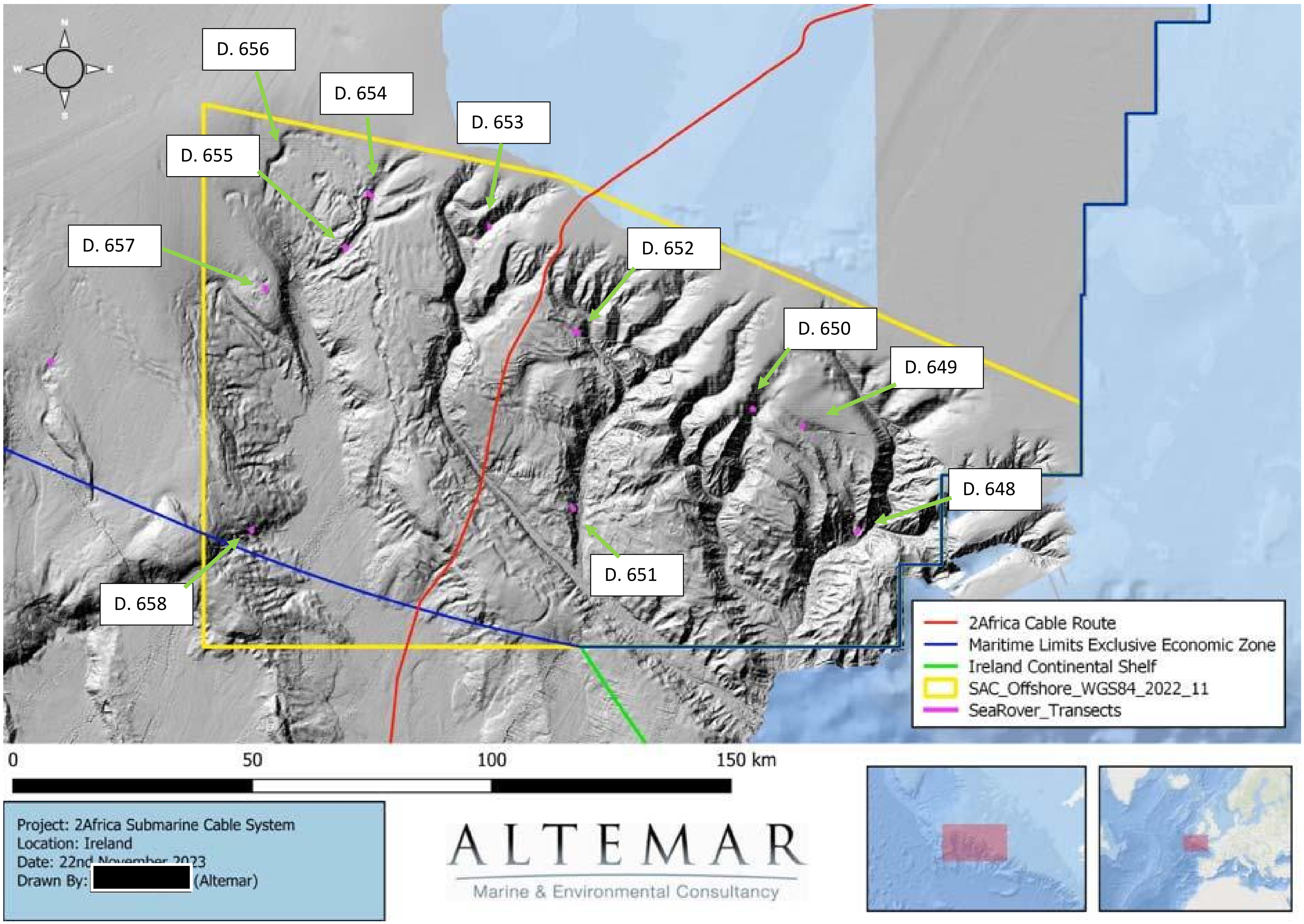

Figure 25: Position of offshore fibre optic route in relation to the Irish EEZ, Designated Irish Continental shelf, Offshore SAC's, SeaRover 2019 Dives (Infomar Shaded Relief).

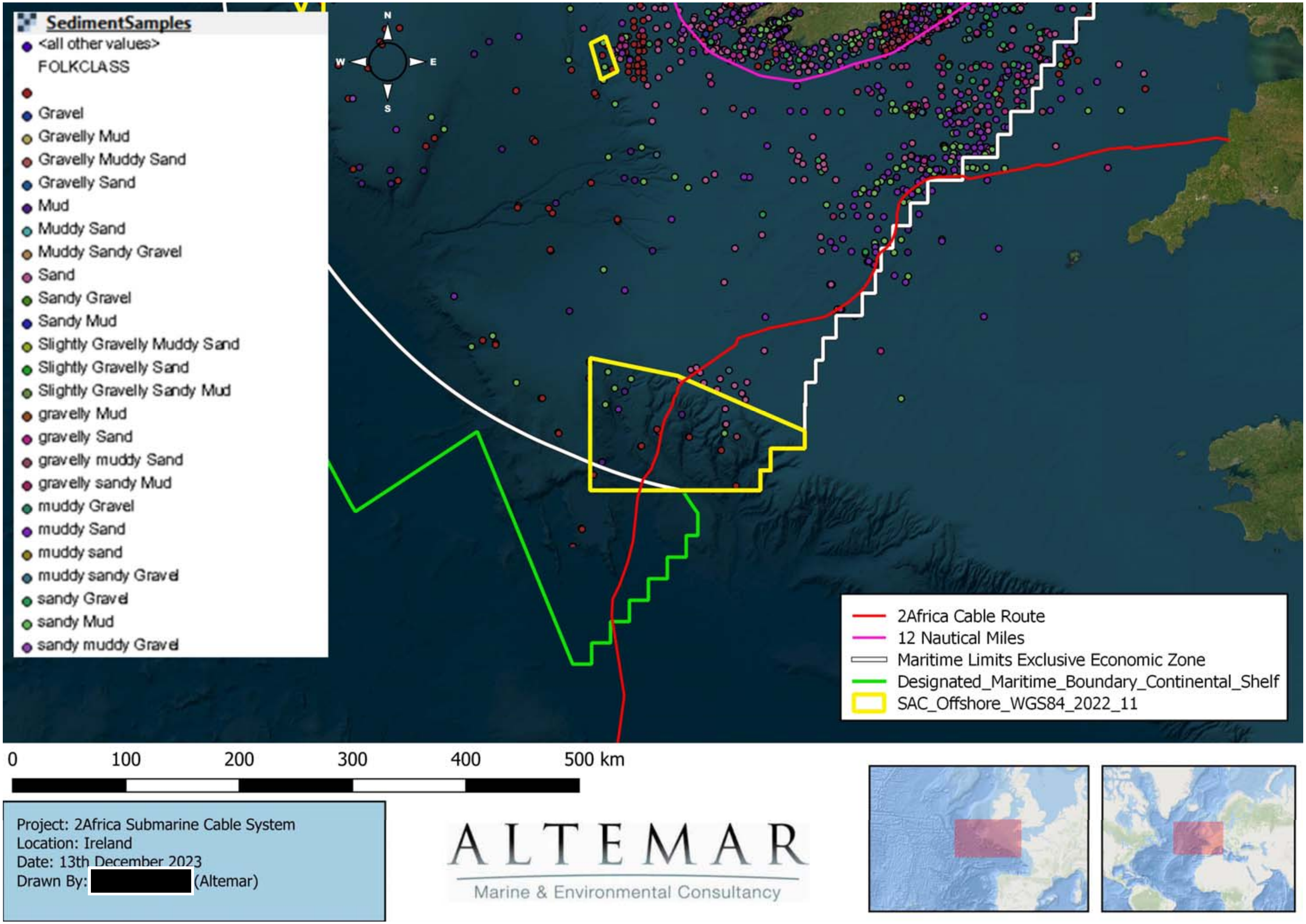

Figure 26. *Informar sediment samples on the proposed cable.*

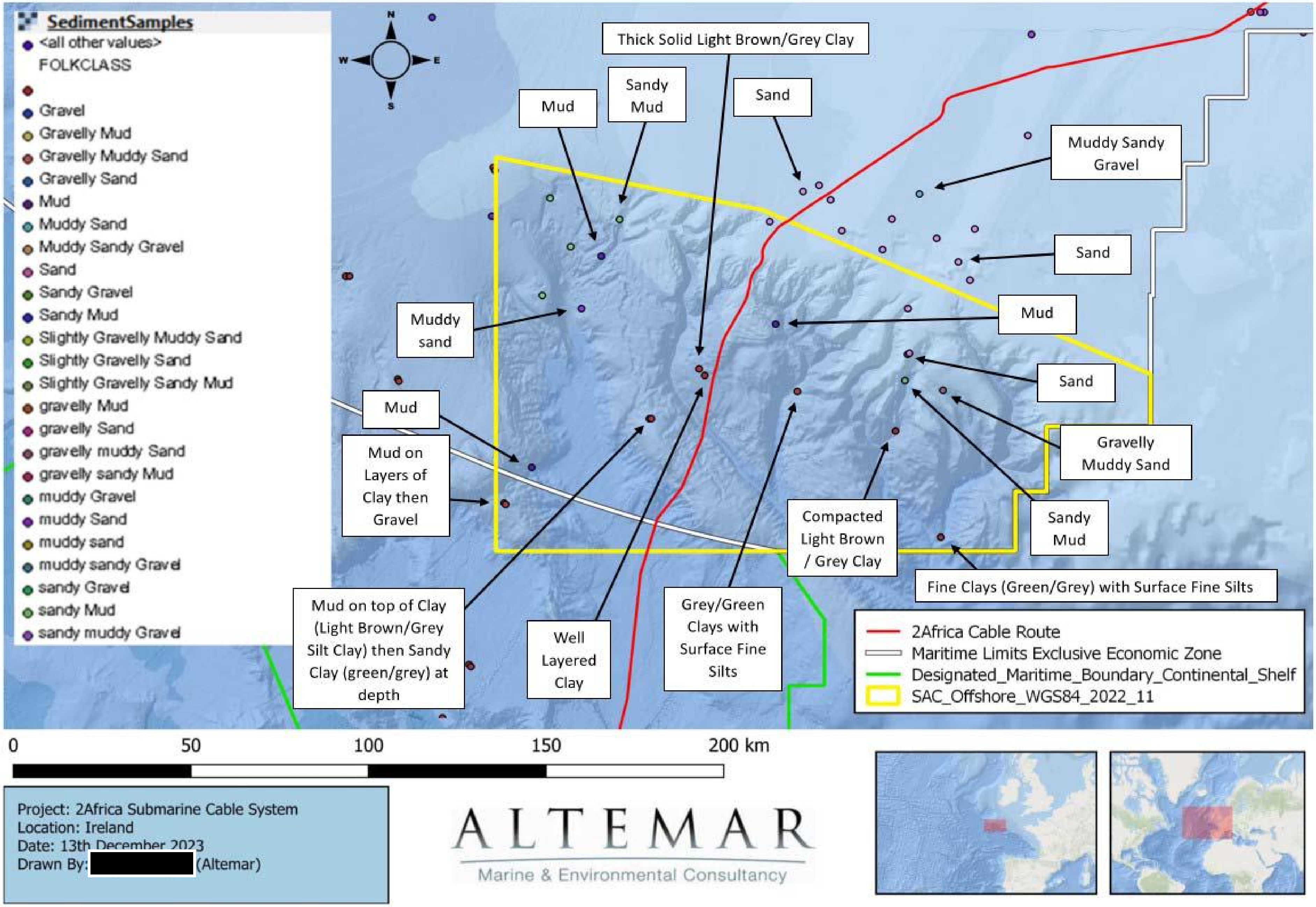

Figure 27. Informar sediment samples on the proposed cable route within the Southern Canyons cSAC

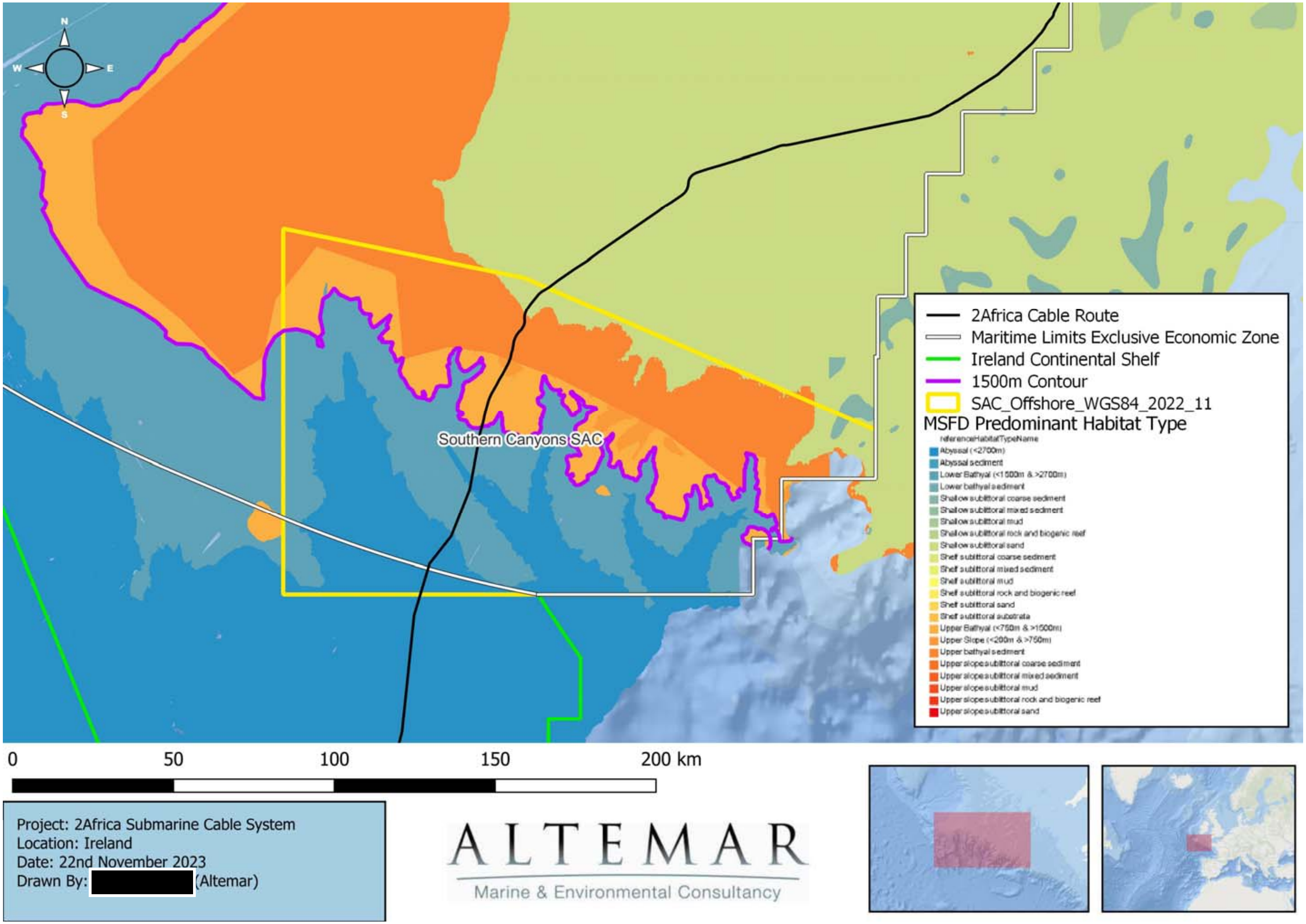

Figure 28. MSFD Predominant Habitat Types

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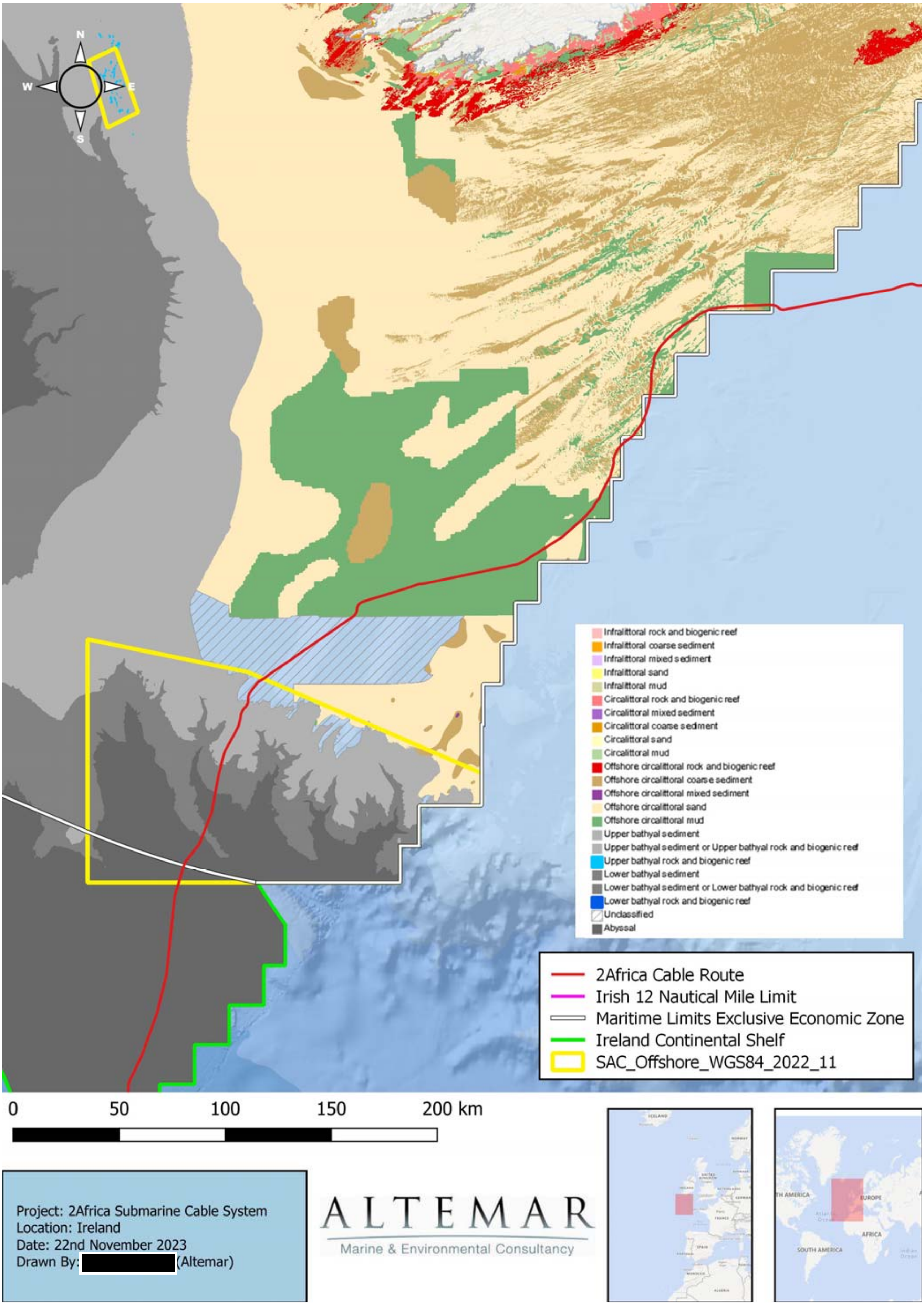

Figure 29. MSFD Benthic Boad Habitat Types along the proposed cable.

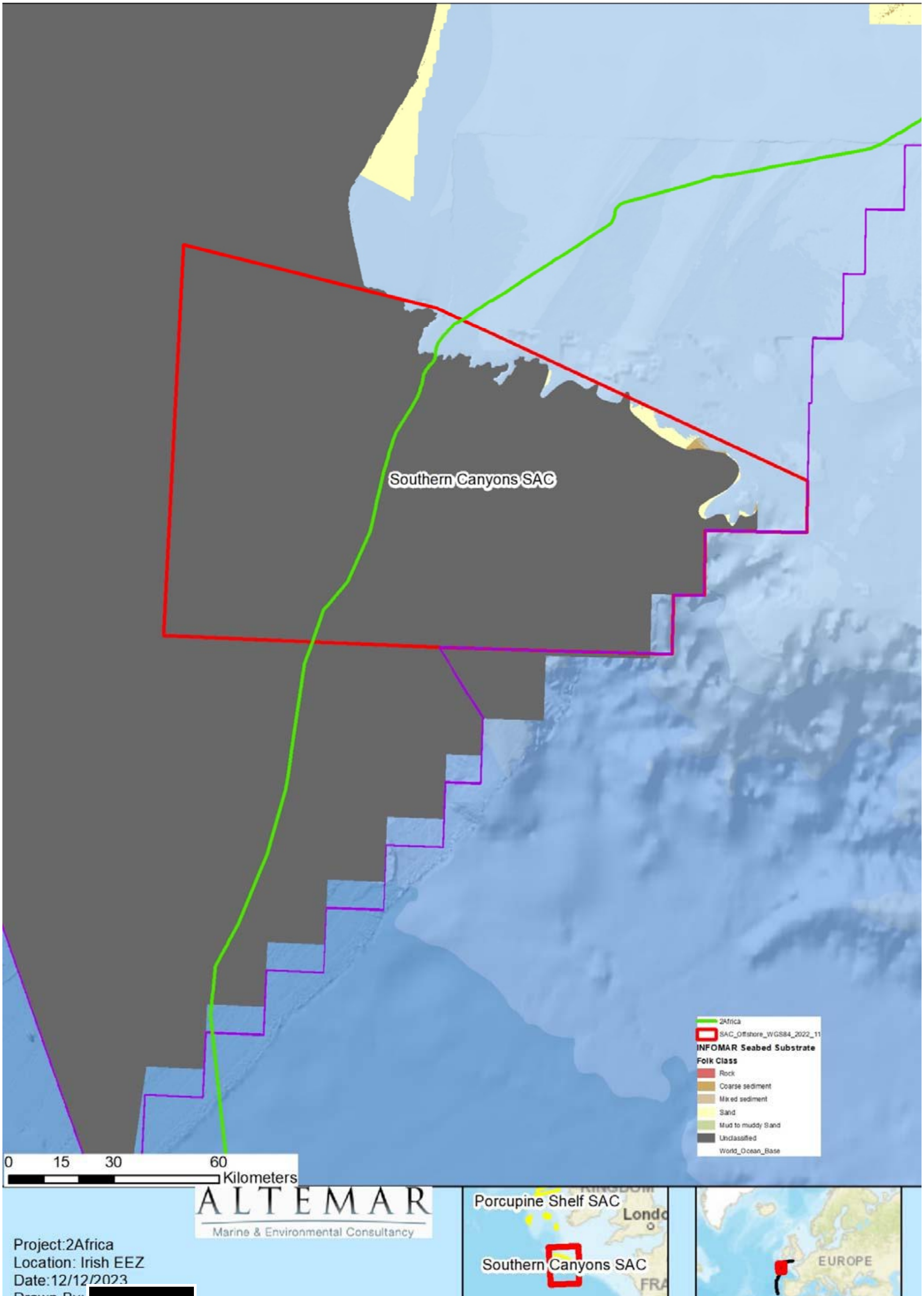

Figure 30. Informar Seabed Substrate.

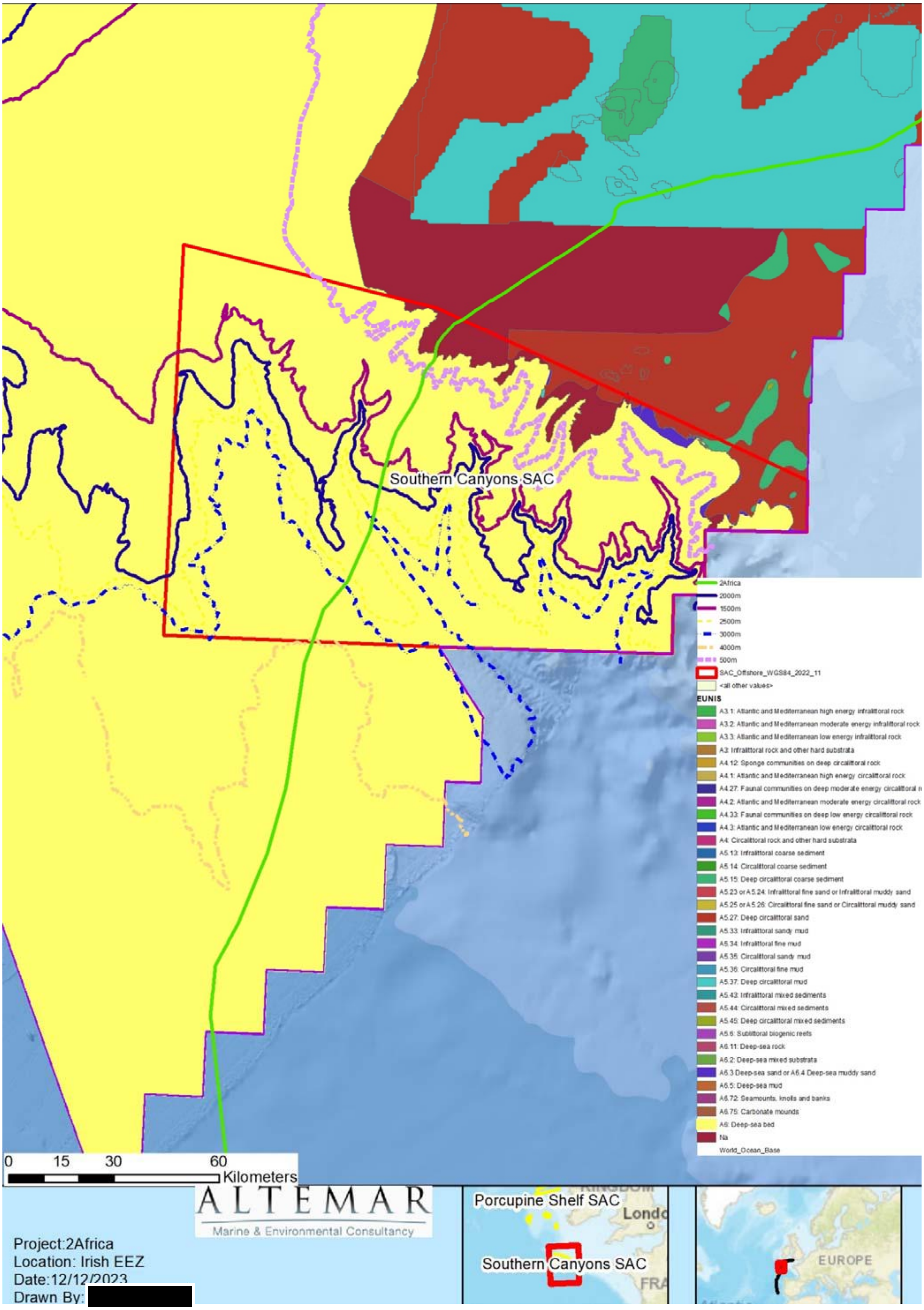

Figure 31. EUSEAMAP Eunis Classification within the cSAC.

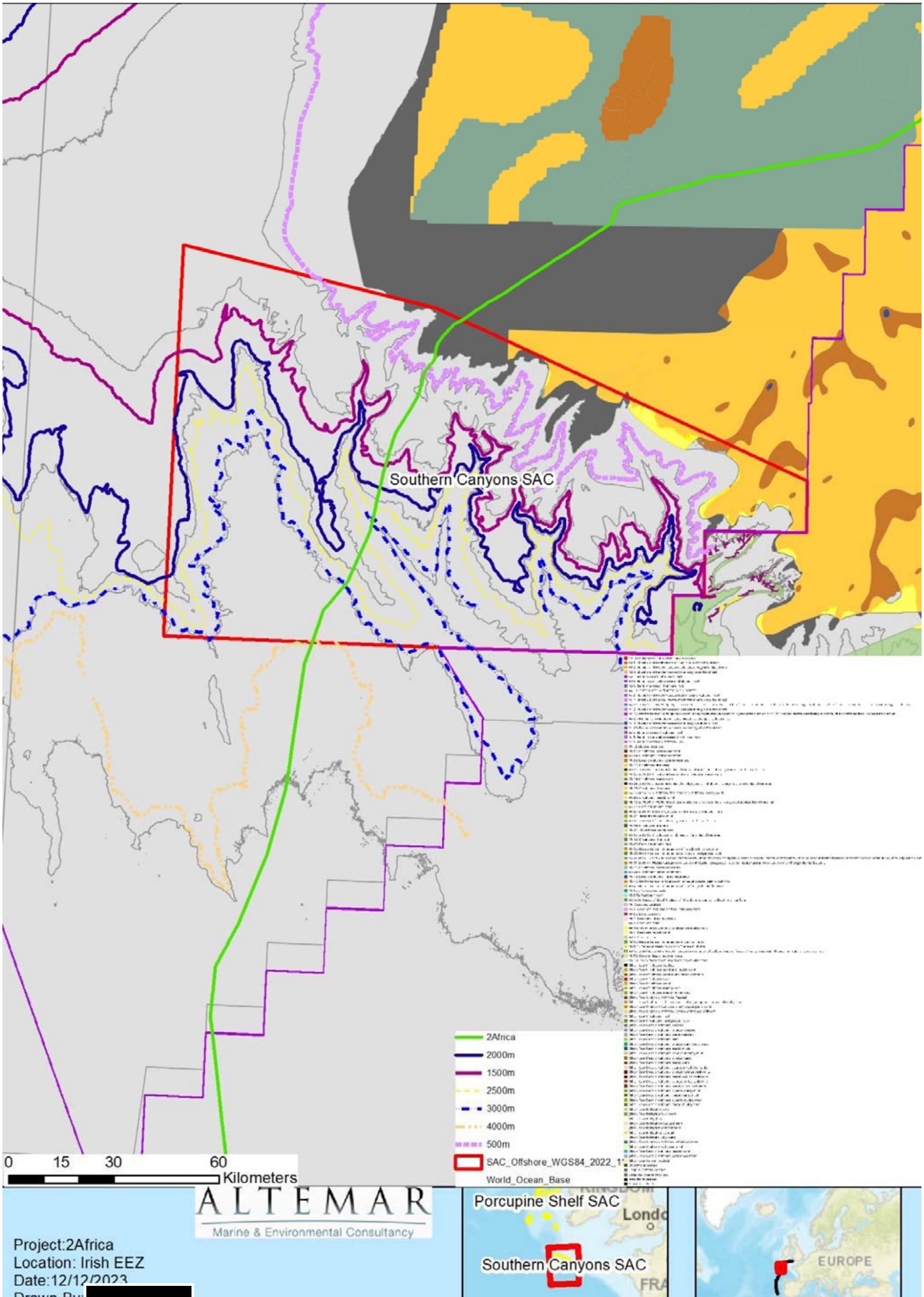

Figure 32. EUSEAMAP broadscale predictive habitat and seabed contours.

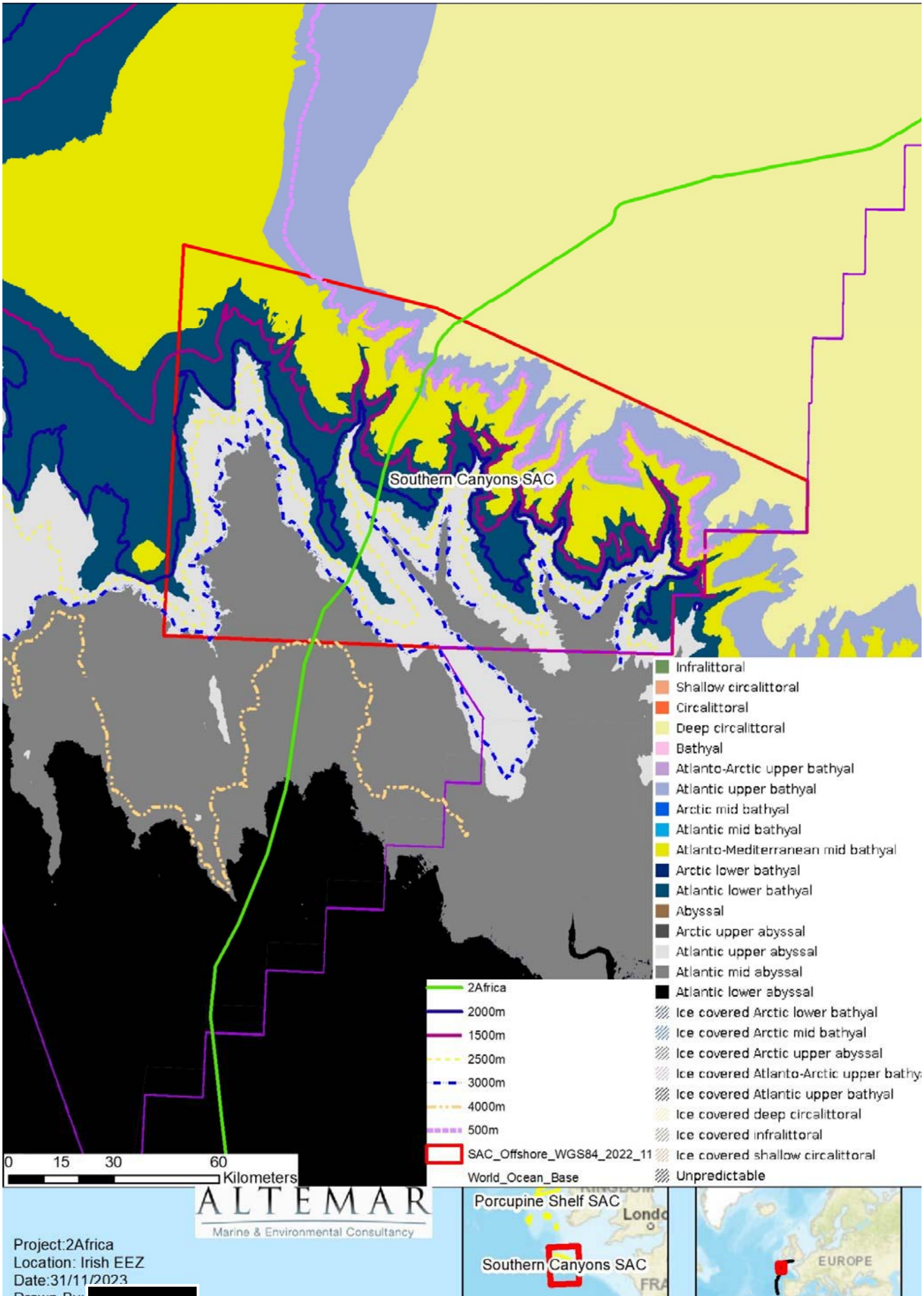

Figure 33. EUSEAMAP Biozone Habitat Descriptor and contours.

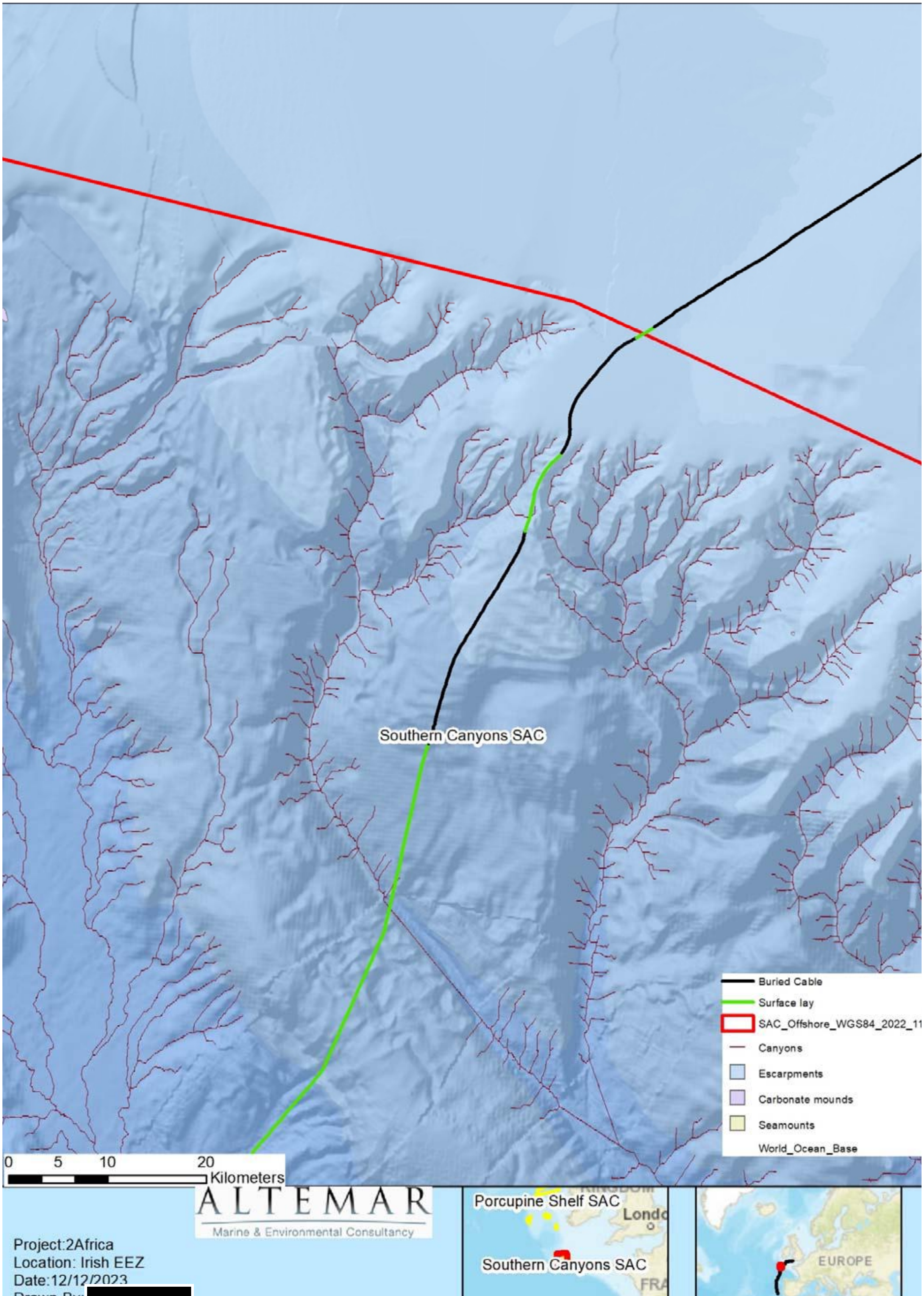

Figure 34. Irish Marine Atlas Offshore Geology-Morphology.

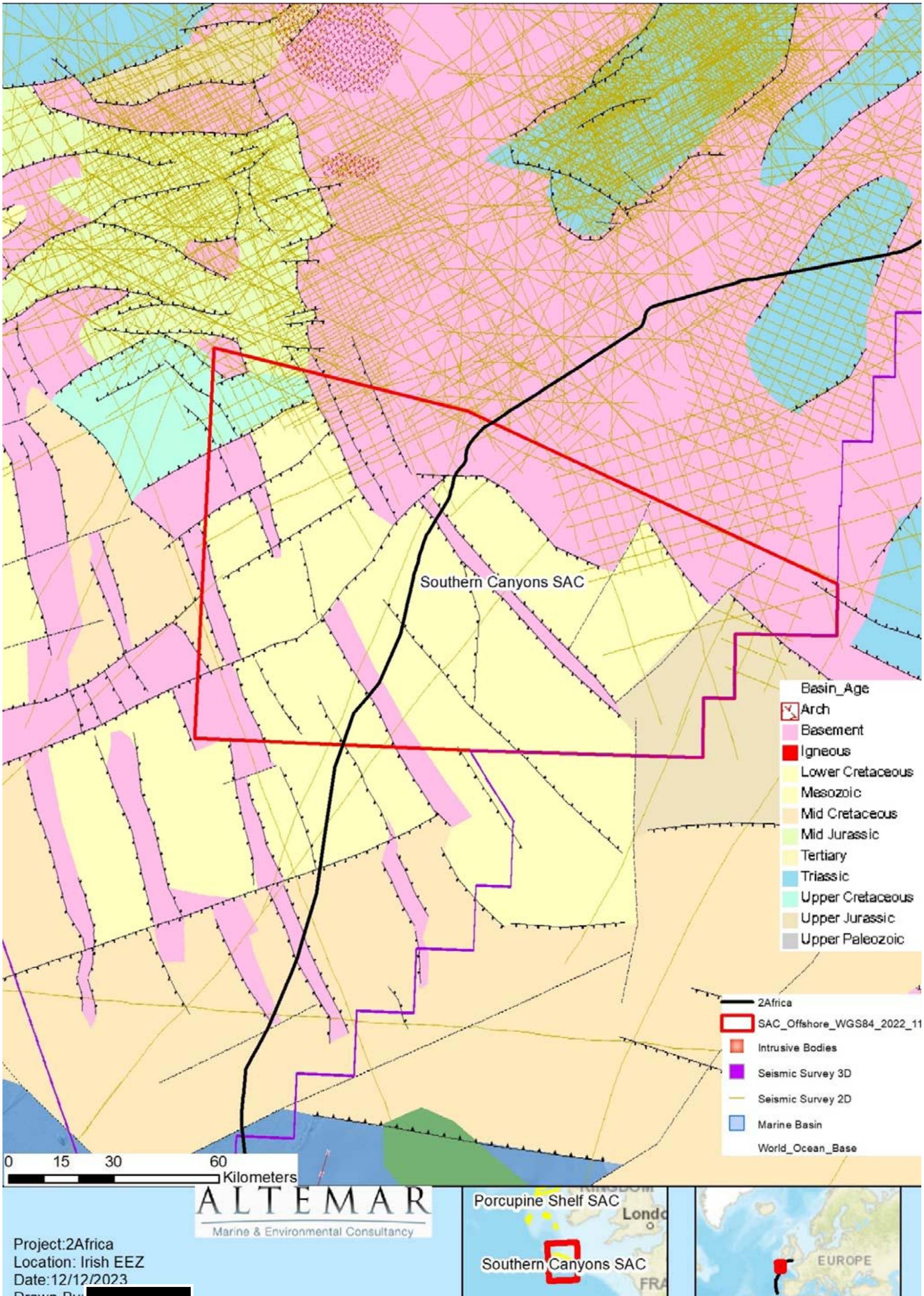

Figure 35. Irish Marine Atlas Offshore Geology-Geologic Features.

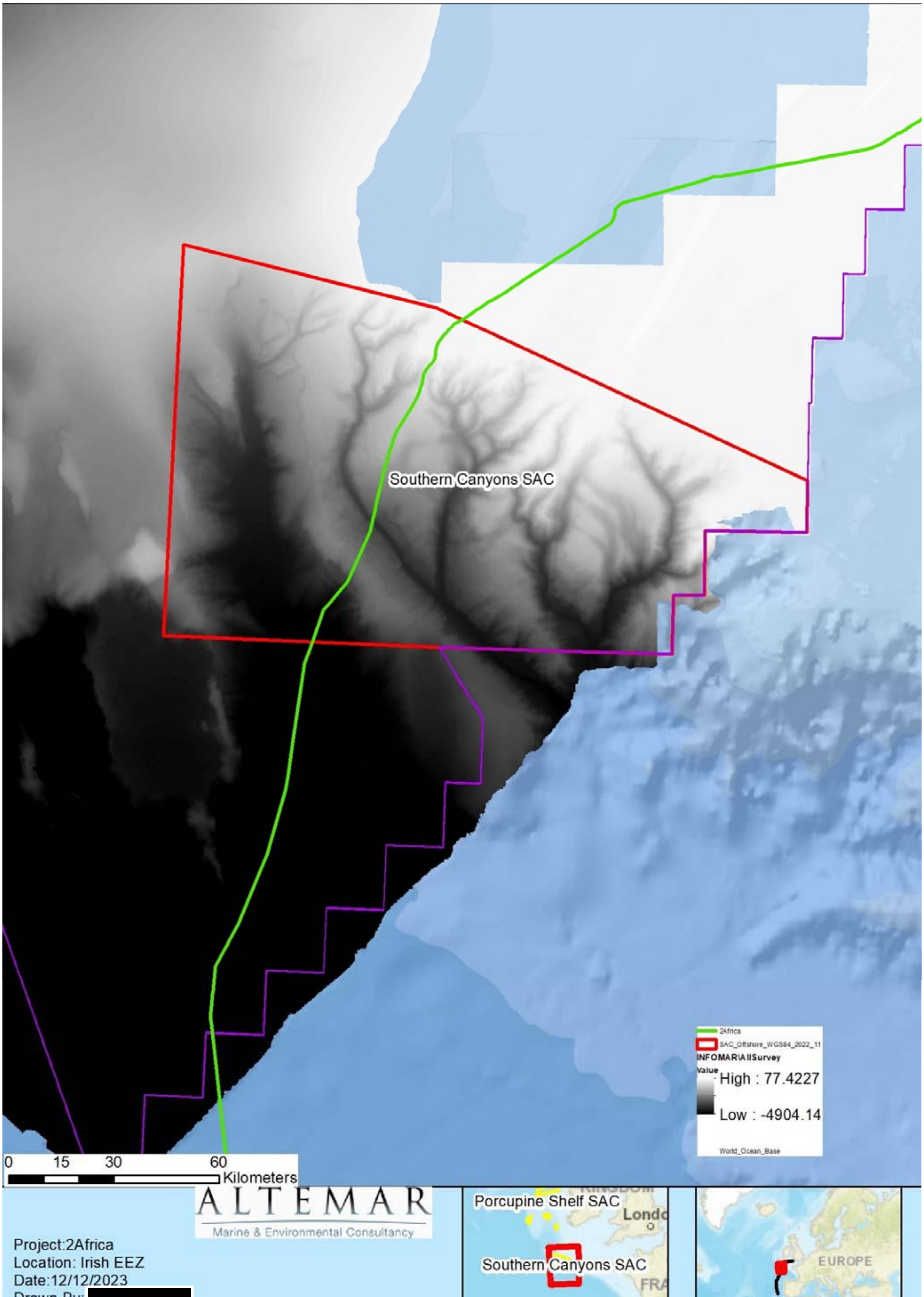

Figure 35. Infomar bathymetry of the Southern Canyons cSAC.

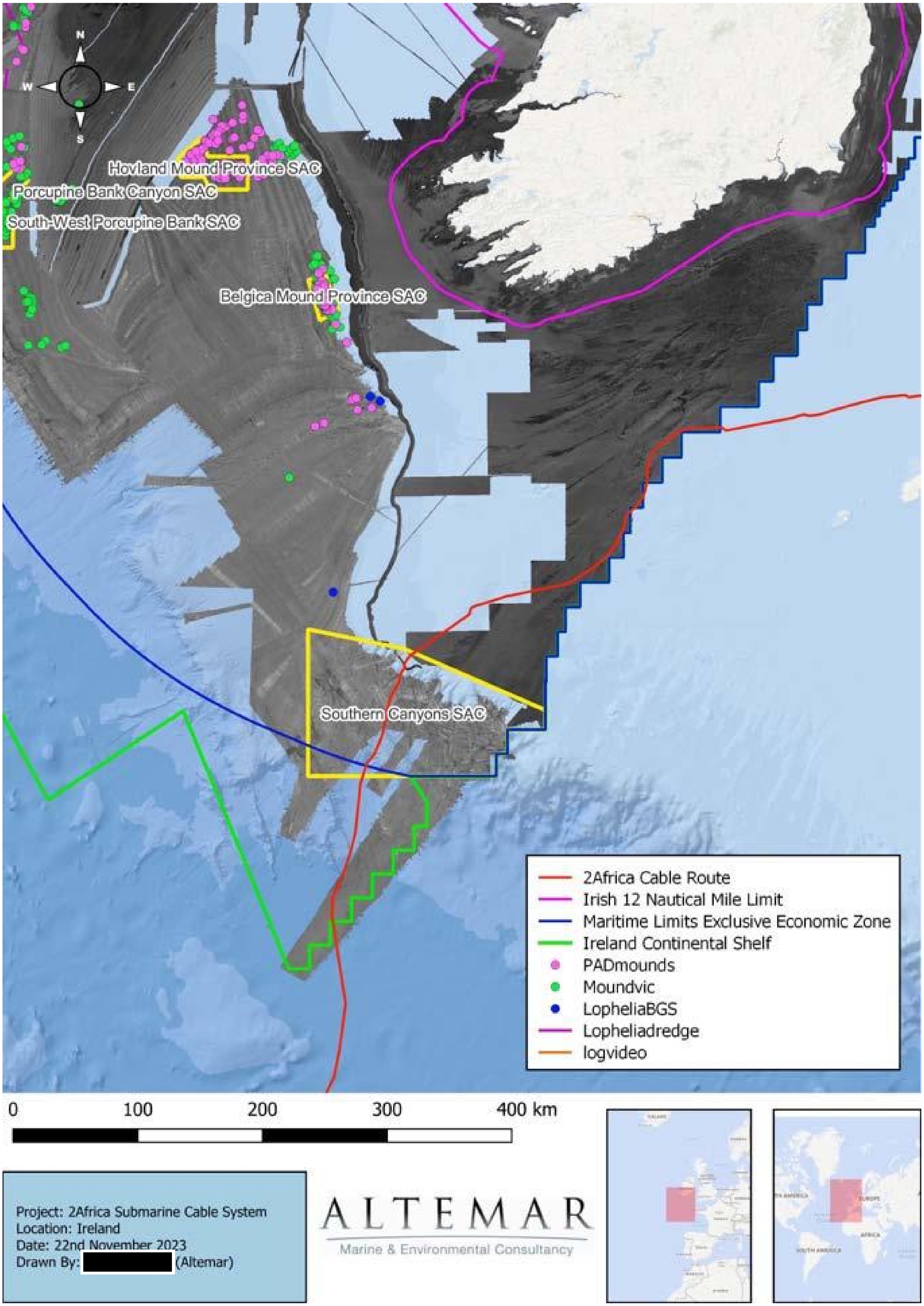

Figure 37: Position of offshore fibre optic route in relation to the Irish EEZ, Designated Irish Continental shelf, Offshore SAC's, carbonate mounds or potential biogenic reefs in the offshore area (Infomar Backscatter).

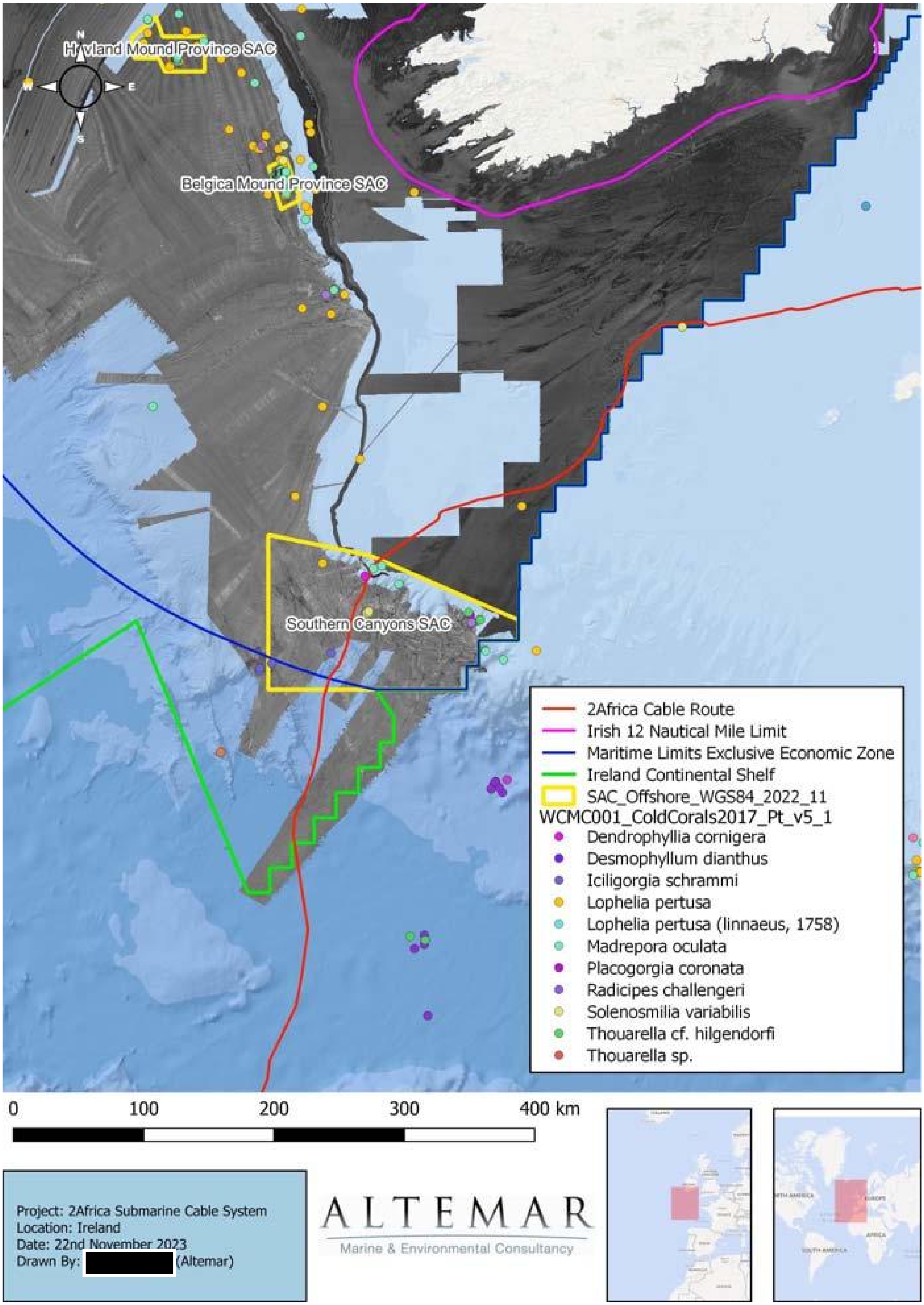

Figure 38. Position of offshore fibre optic route in relation to the Irish EEZ, Designated Irish Continental shelf and Offshore SAC's (Cold Corals 2017 data) (INFOMAR Backscatter)

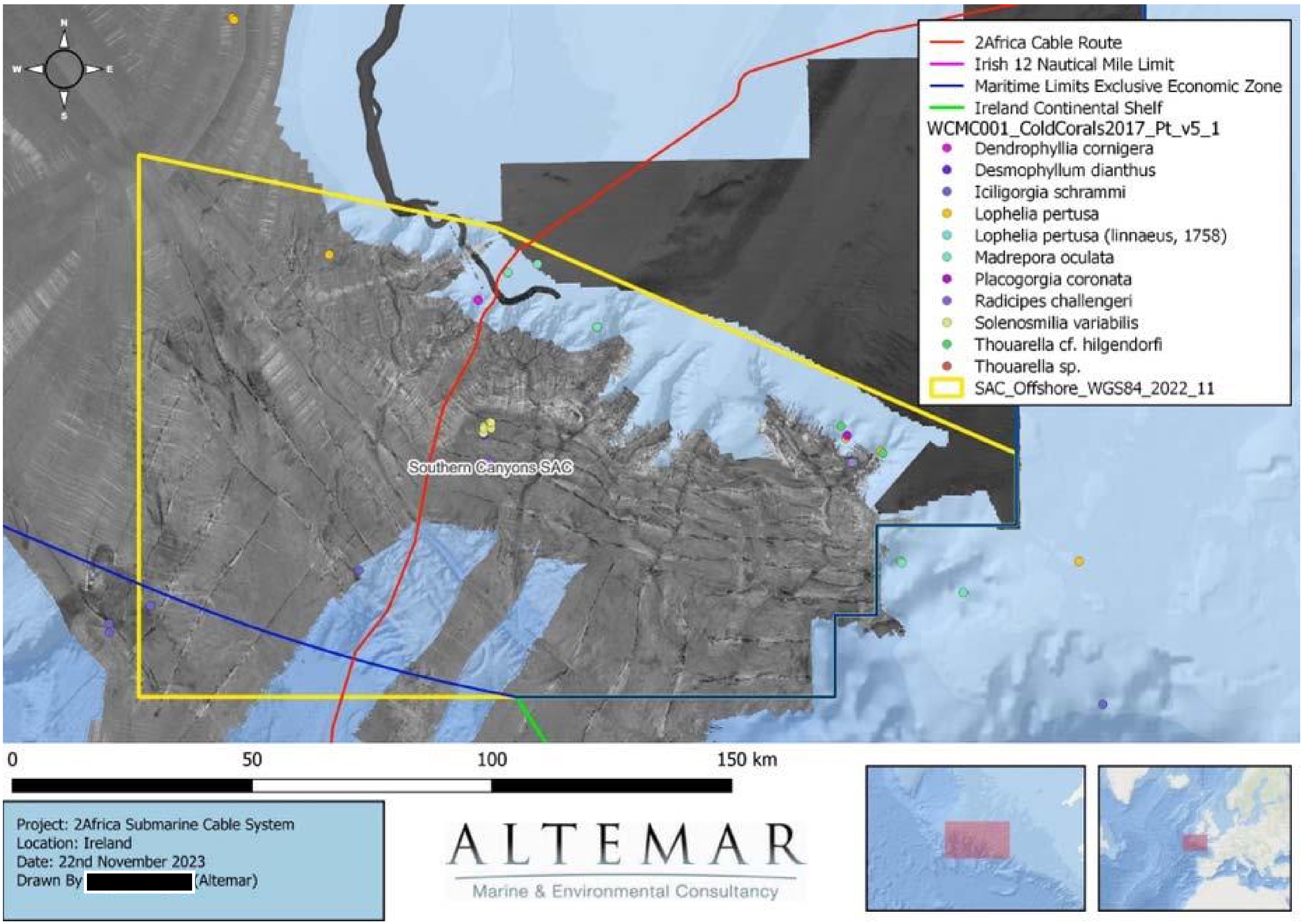

Figure 39. Proposed location of the fibre optic cable route in relation to SAC's, carbonate mounds or potential biogenic reefs in the offshore area (Infomar Backscatter) (Cold Corals 2017 data)

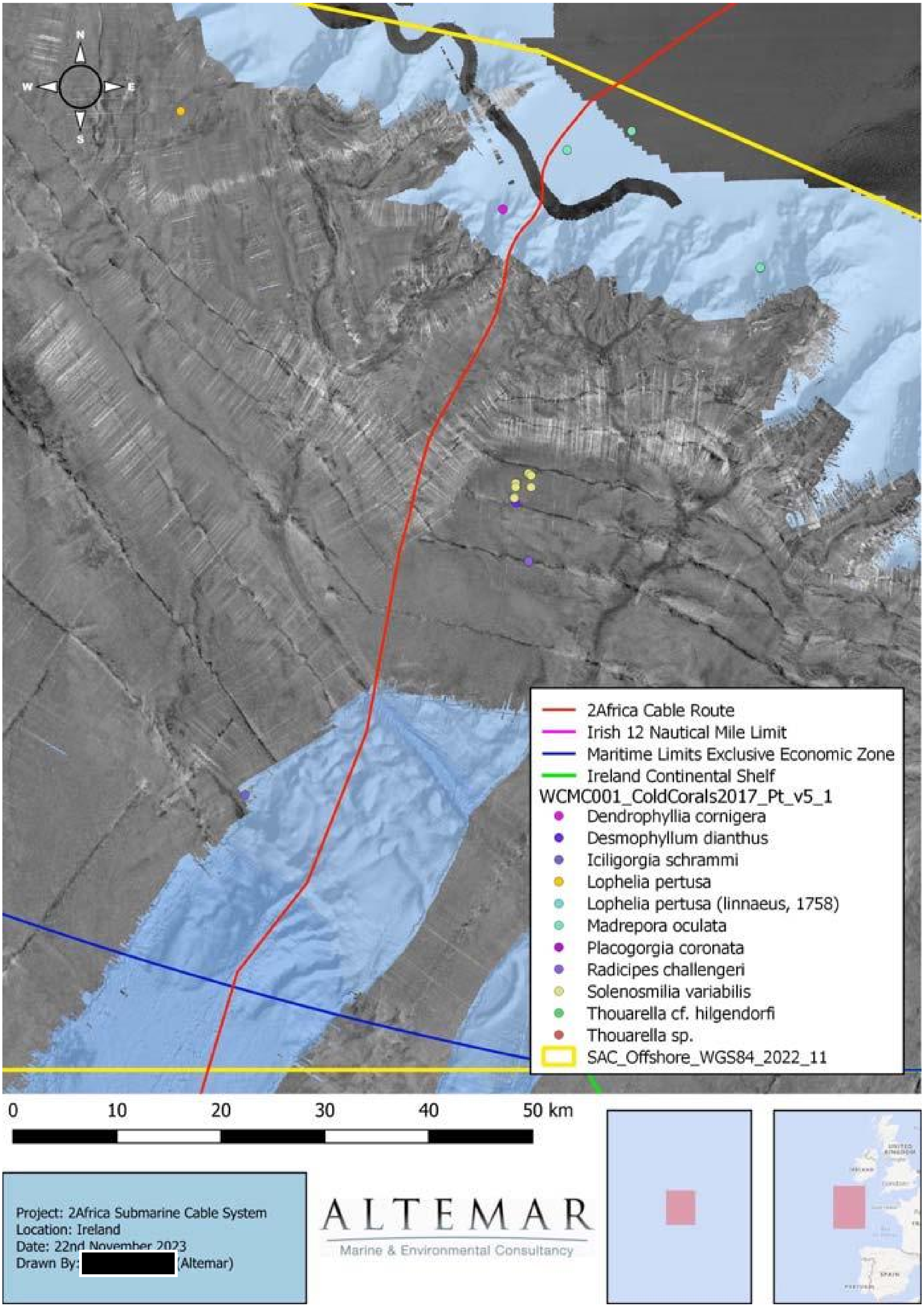

Figure 40. Proposed location of the fibre optic cable route in relation to SAC's, carbonate mounds or potential biogenic reefs in the offshore area (Infomar Backscatter) (Cold Corals 2017 data)

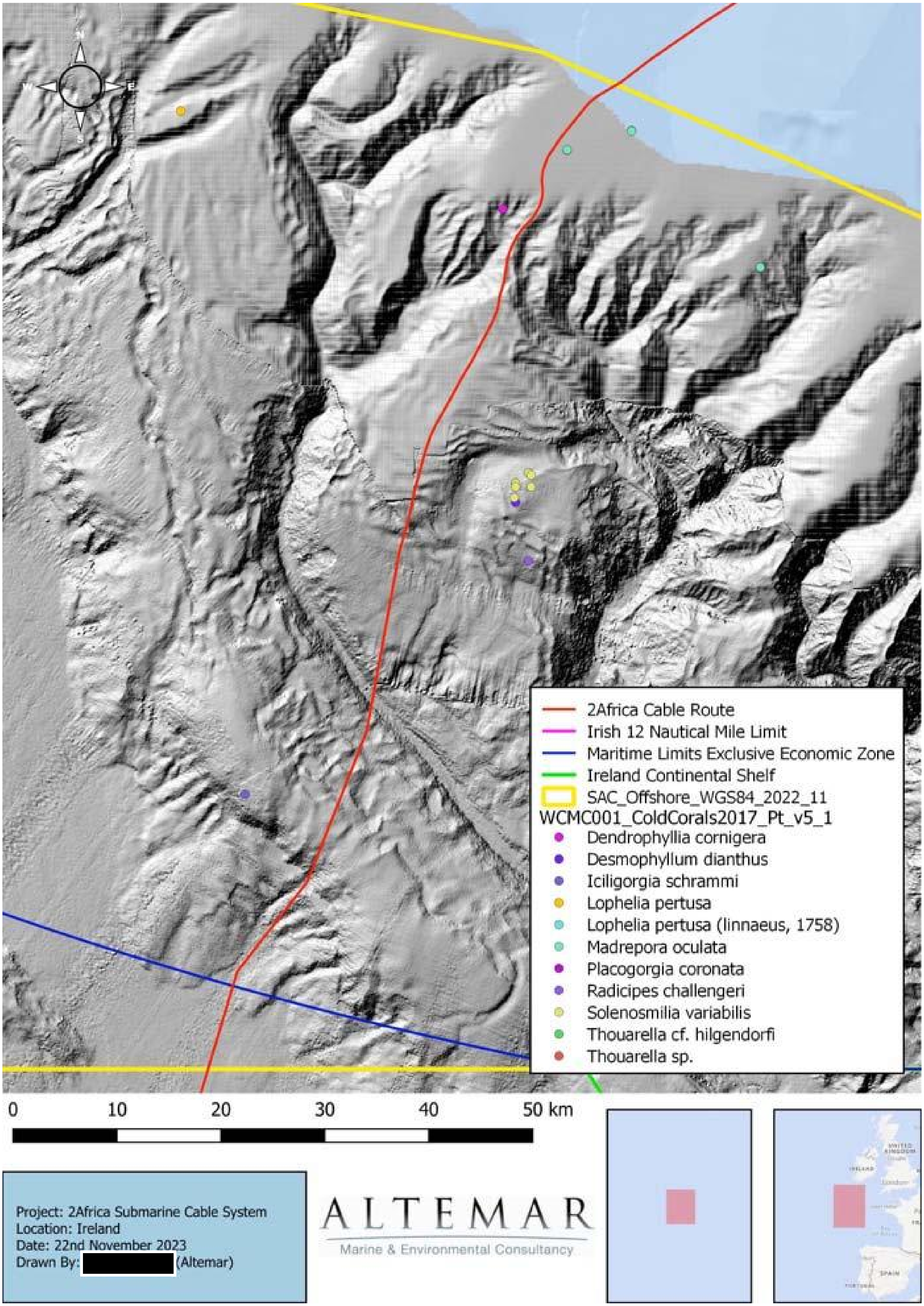

Figure 41. Proposed location of the fibre optic cable route in relation to SAC's, carbonate mounds or potential biogenic reefs in the offshore area (Infomar Shaded Relief) (Cold Corals 2017 data)

6. Marine Mammals

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

Ireland also has two species of seals, the Common Seal (or Harbour Seal) and the Grey Seal. Whilst both species haul out on land for key stages of their life history, the majority of their time is spent in the marine environment. In Ireland, the 1992 EC Habitats Directive as transposed by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) requires that both seal species and all cetaceans occurring in Ireland are maintained at favourable conservation status. Under Article 12 of the Directive, all cetaceans should receive strict protection within the Exclusive Economic Zone. Under Article 4 of the Directive, Special Areas of Conservation (SACs) must be proposed for the following species:"

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

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

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

Marine mammals are afforded protection under the Habitats Directive. The proposed project has the potential to introduce noise into the marine environment and mitigation measures are required to protect marine mammals. Figure 25 shows all cetacean species and Figure 26 shows monthly activity trends, in the vicinity of the proposed cable route, 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 Fin Whale (Balaenoptera physalus), Long-finned pilot whale (*Globicephala melas*), and common dolphin (*Delphinus delphis*). Harbour porpoise (*Phocoena phocoena*) and minke whale (*Balaenoptera acutorostrata*) were noted over 50km from the proposed cable route. Beaked whales (*Ziphiidae*) are a family of odontocete cetaceans that typically live in deep offshore waters and perform long, deep dives in search of their prey (Quick *et al.,* 2020; Hooker *et al.,* 2019). Due to their preference for deep waters and given that they perform long, deep dives, beaked whales are difficult to study and little information is available on their distribution and population structure (Rogan et al., 2017). Studies indicate that the distribution of these species is associated with steep continental slope habitats in the Northeast Atlantic and have been recorded in northwestern areas of Ireland's offshore waters[3]. Beaked whales are sensitive to anthropogenic noise (Barile et al., 2021), and their diving and hunting behaviours can be impacted by increased underwater noise. Beaked whale species recorded in Irish waters include Cuvier's beaked whale (*Ziphius cavirostris*), Sowerby's beaked whales (*Mesoplodon bidens*), True's beaked whales (*Mesoplodon mirus*), and Northern bottlenose whale (*Hyperoodon ampullatus*).

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

[3] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-mammals/abundance-distribution-cetaceans/abundance-and-distribution-cetaceans/

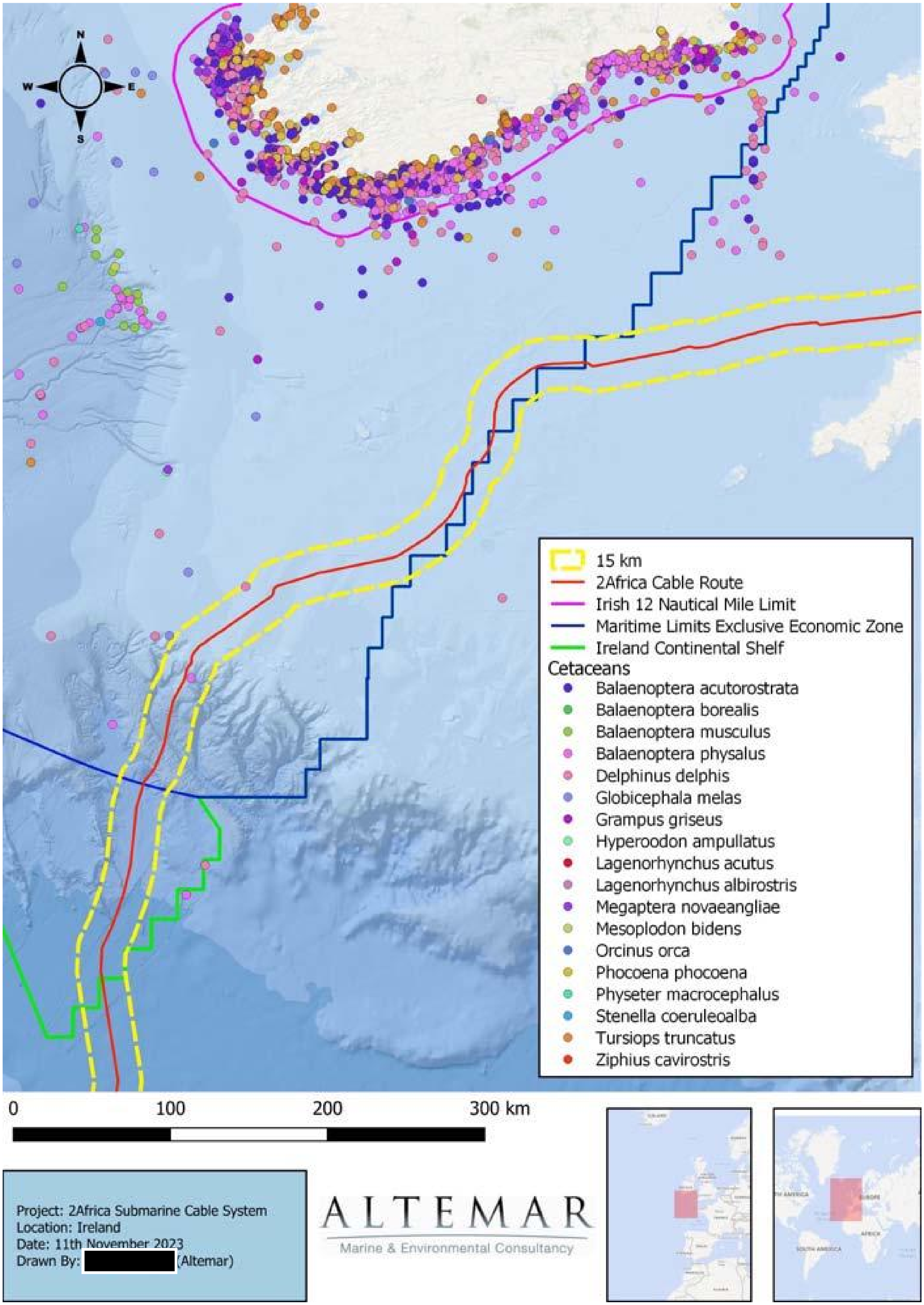

Figure 42. *Recorded cetaceans species sightings (IWDG)*

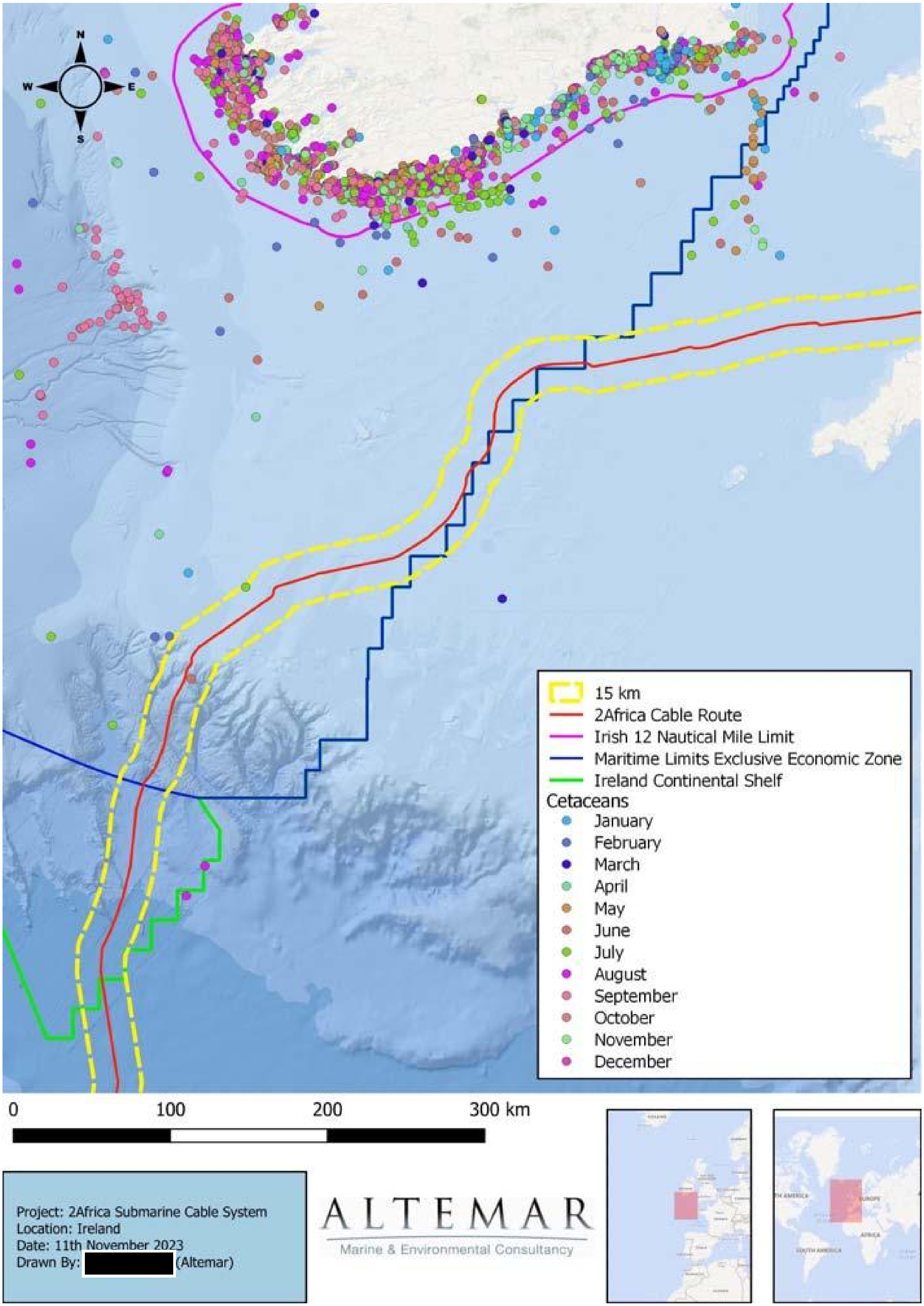

Figure 43. *Recorded cetaceans species sightings (IWDG) during the 12 months of the year*

6.1. Additional information on species/habitats

Harbour Seals and Grey Seals

As can be seen from Figure 27, the proposed cable route is not in the vicinity of resting, moulting or breeding sites. 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 cable route outside key activity areas, the cable laying teams will need to be cognisant of this and take into account due diligence in relation to seal disturbance when deploying and recovering equipment.

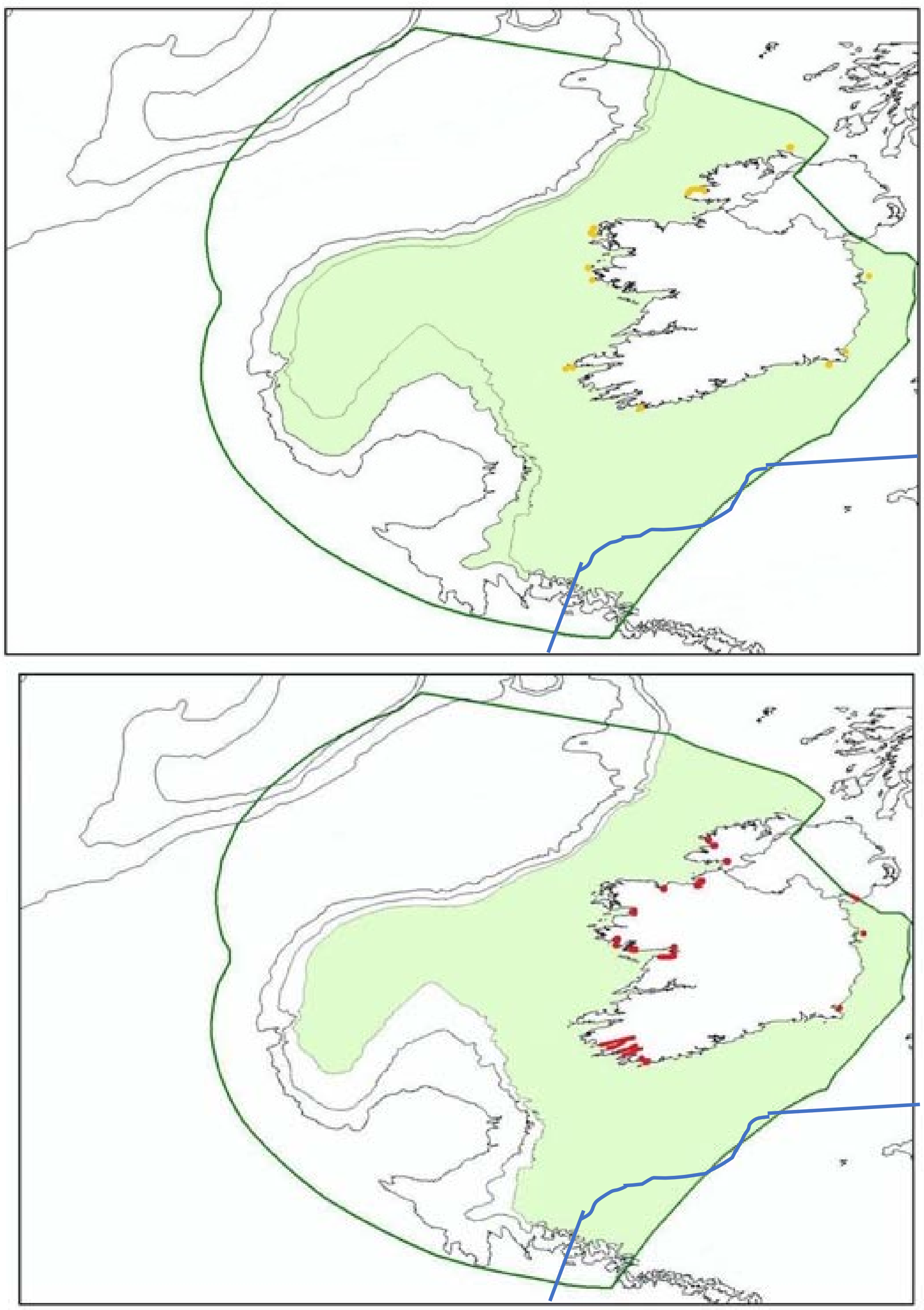

Figure 44. Harbour seal (red) and grey seal (yellow) distribution (green) and haul-out sites in the inshore area. (NPWS). Proposed cable route (approx..) is the blue line.

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.

The proposed cable lay would be expected to impact on marine mammals primarily through the emission of noise due to the vessel and acoustics from the USBL (Ultra Short Baseline) equipment. A USBL is a method of underwater acoustic positioning. It is used to track subsea targets such as ROVs/plough. USBL positioning is used from shallow to deep waters (down to 10,000m and more) and its accuracy is proportional to the distance, typical from 1-2% of the slant distance for basic equipment and up to 0.06% for the ultimate USBL systems.

USBL positioning is suitable for a wide range of applications, including subsea asset tracking, subsea structure placement, LBL array calibration, UXO survey, IMR (Inspection, Maintenance and Repair) For metrology and sub-decimetric deep water applications LBL solutions will be more suitable.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*."

Southall *et al*. (2019) outlined in their publication "*Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects*" revised the marine mammal hearing groups, which are seen in Table 5.

Table 5. *Marine Mammal Functional Hearing Groups and Estimated Functional Hearing groups Proposed by Southall et al. (2019)*

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

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018) outlined the hearing groups of marine mammals including the generalised hearing range of these cetacean groups (Table 6). They also noted that "*Exposures exceeding the specified respective criteria level for any exposure metric are interpreted as resulting in predicted temporary threshold shift (TTS) or permanent threshold shift (PTS) onset*." The onset of PTS on marine mammals was also outlined in NOAA 2018 (Table 7). The updated figures for PTS and TTS for are outlined in Table 8.

Table 6. Hearing Groups of Marine Mammals (NOAA, 2018)

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

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

Table 7. Onset of PTS in Marine mammals

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

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

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

Table 8. Southall *et al.* (2019) TTS- and PTS-onset thresholds for marine mammals exposed to impulsive noise: SEL thresholds in dB re 1 µPa^{2}s under water and dB re (20 µPa)^{2}s ; and peak SPL thresholds in dB re 1 µPa under water.

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

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 have an auditory bandwidth within 200 Hz to 180 kHz. Pinnipeds in water are thought to have an auditory bandwidth of between of 75 Hz to 75 kHz and from 75 Hz to 30 kHz in air (Southall et al. 2007)."

The proposed USBL equipment and the noise frequency emissions are seen in Table 9. The low frequencies emitted from the equipment (18-36 kHz) are below the auditory range of the high and very high frequency cetaceans but are within the hearing range of low frequency cetaceans that would be seen on the cable route.

Table 9. Details of the proposed types of geophysical equipment which emit sound

Equipment Type	Typical Source Pressure Level (dB re 1 µPa @ 1 m)	Potential for auditory injury?	Typical Frequency Range (kHz)
USBL System (Transducers)	< 220	Potential risk	18-36
USBL Beacons (Transponders)	< 206	Potential risk	18-36

The noise emitted from a USBL is above the TTS- and PTS-onset threshold injury levels indicated by Southall *et al.* (2019), negative impacts may be foreseen if Low Frequency Cetaceans are close enough to the equipment to receive sound levels above this indicative threshold.

The operations would comply with the NPWS (2014) "*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*". These guidelines would be deemed adequate to mitigate the negative impacts of the proposed works. Marine mammals in the vicinity of the vessel during start up procedures would be given ample time to leave the site with the due to the slow launch/recovery procedures of the subsea plough outlined in the guidelines. In addition, vessel speeds are extremely slow which would give marine mammals ample opportunity to move from the area.

The Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing

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

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

The difference in nomenclature between NOAA 2018 and Southall (2019) is that NOAA (2018)[4] classified cetaceans as Low-frequency (LF) cetaceans (baleen whales), Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales) and High-frequency (HF) cetaceans (true porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchus cruciger & L. australis) while Southall reclassified these groups to Low-frequency cetaceans, High-frequency cetaceans, Very high-frequency cetaceans. As outlined in Southall (2019) "*The distinction between HF and VHF cetacean groups (as opposed to mid- and high-frequency) reflects the regions of best hearing sensitivities within these groups, often including frequencies approaching or exceeding 100 kHz; these frequencies would be more appropriately described within marine bioacoustics as high to very high. Further, as discussed in more detail below, a number of anatomical and sound production properties suggest a potential distinction of very low-(VLF) and LF cetaceans among mysticetes. Some evidence also suggests a potential segregation of mid-frequency (MF) and HF cetaceans in addition to the distinction of HF and VHF cetaceans*." This is in effect a relabelling of Mid-Frequency (MF) Cetaceans and High-Frequency (HF) Cetaceans to High-frequency cetaceans and Very high-frequency cetaceans respectively. It should be clearly noted that the PTS values within the updated groups were identical between NOAA, 2018 and Southall 2019 and it was in effect a renaming of the groups.

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

Based on these data it is concluded that an underwater source noise level of 220dB (which the proposed main lay will not exceed) does not result in injury hazards once a minimum separation distance of 12 metres is maintained between the source of the noise and a cetacean. Equally there is no behavioural response once a minimum separation distance of 70 metres is maintained between the source of the noise and a cetacean. The proposed survey guidelines (DAHG, 2014) require a 1000m distance between the vessel and cetaceans prior to the commencement of vessel operations.

The operations would comply with the NPWS (2014) "*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*"http://www.npws.ie/sites/default/files/general/Underwater_sound_guidance_Jan_2014.pdf. These guidelines would be deemed adequate to mitigate the negative impacts of the proposed works. Cetaceans in the vicinity of the vessel during start up procedures would be given ample time to leave the site with the soft start procedures outlined in the guidelines. It should be noted that the vessel will be operating at a very slow speed on a 24 hour basis with a MMO on board. It is considered that due to the fact that the ship will be operating on this basis, a MMO will be onboard operating to MMO guidance procedures, it will be providing significant time for cetaceans to leave the area. In addition, vessel speeds are extremely slow which would give marine mammals ample opportunity to move from the area.

[4] NOAA 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. NOAA Technical Memorandum NMFS-OPR-59 April 2018.

7. In combination effects

As outlined by (OSPAR, 2012) "*Cumulative effects, the combined effect of more than one activity, may reinforce the impacts of a single activity due to temporal and/or spatial overlaps*". The potential for in-combination effects within the ZoI that may occur as a result of the proposed project, during and post works were assessed. It should be noted that no terrestrial works are proposed on the island of Ireland. The proposed cable installation works within the Irish EEZ are located exclusively in the offshore subtidal, 127km from the Irish shoreline at its nearest point.

7.1 UK Natura 2000 Sites

MARA licencing in Ireland relates to licence applications out to the Irish EEZ limit. In order to assess the potential trans-boundary effects details of designated sites within UK waters were investigated. The Marine Protected Areas (MPA's), SAC's and SPA's within UK waters are seen in Figures 45-47. As a consequence of Brexit, from 1st January 2021, previously designated UK sites are no longer part of the Natura 2000 network but have designation as SAC's and SPA's and protection under UK law. The licencing within the UK territorial sea is covered by a permitting licence system managed by the Marine Management Organisation (MMO)[5], Marine Scotland and Natural Resources Wales, depending on UK jurisdiction. The cable routes within UK waters are subject to this UK permitting process and the potential impacts on designated sites are subject to a separate application process assessed by UK authorities. Because the proposed cable system passes through UK waters and UK designated sites, mitigation measures will be implemented to protect the qualifying interests of the UK designated sites. It should be noted that a marine mammal observer will be in place within Irish waters.

For the UK element of the proposed cable lay to proceed, it has been be approved by UK authorities and the reporting concludes that following the implementation of appropriate mitigation the proposed project would not adversely affect the integrity of UK designated sites, alone or in combination with other projects. For this overall project to take place it requires permitting both within UK and Irish waters. Licencing was granted in UK waters in 2023. The nearest UK designated site to the proposed cable route within the Irish EEZ limit is Greater Haig Fras Offshore MPA, located 0.8 km from the Irish EEZ (within UK waters). Given the distance from the proposed route within the Irish marine area to UK designated sites, the project would not adversely affect the integrity of UK designated sites. These sites have been previously assessed under UK licencing permissions and no in-combination effects would be foreseen.

7.2 Irish Projects

The potential impacts of the proposed cable laying are Temporary (i.e. Effects lasting less than a year) and primarily to occur during the brief construction period (with the presence of boats, machinery and personnel in the vicinity of the works) as sediments redistribute over the cable. Impacts on infauna would be deemed to be temporary (i.e. Effects lasting less than a year).

Foreshore licence applications in vicinity of the 2Africa Cable are seen in Table 4. The foreshore applications were assessed for potential in-combination effects with the proposed cable.

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

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

[5] L/2023/00095/1

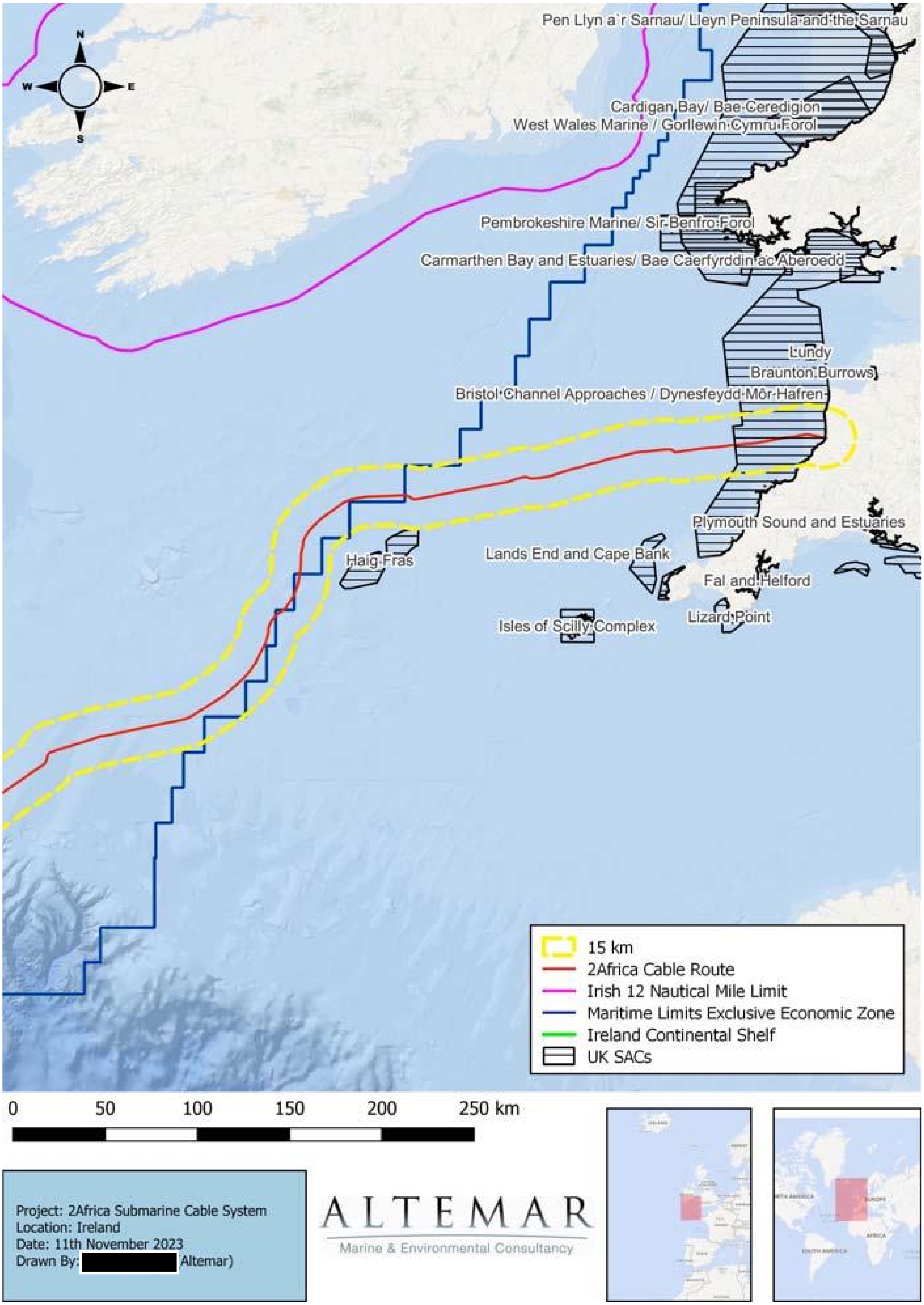

Figure 45. *UK SACs located within 15km of the proposed cable route*

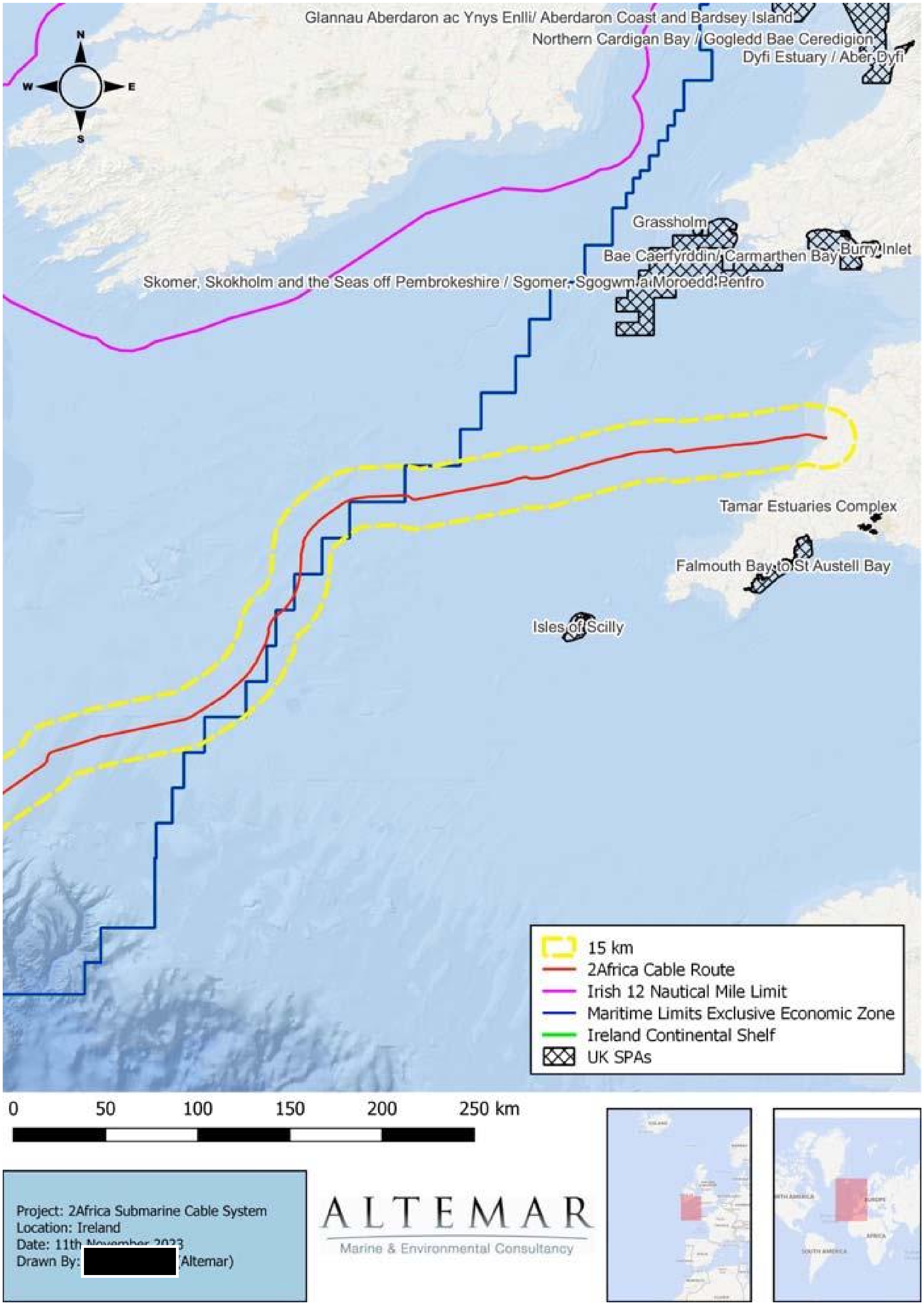

Figure 46. *UK SPAs located within 15km of the proposed cable route*

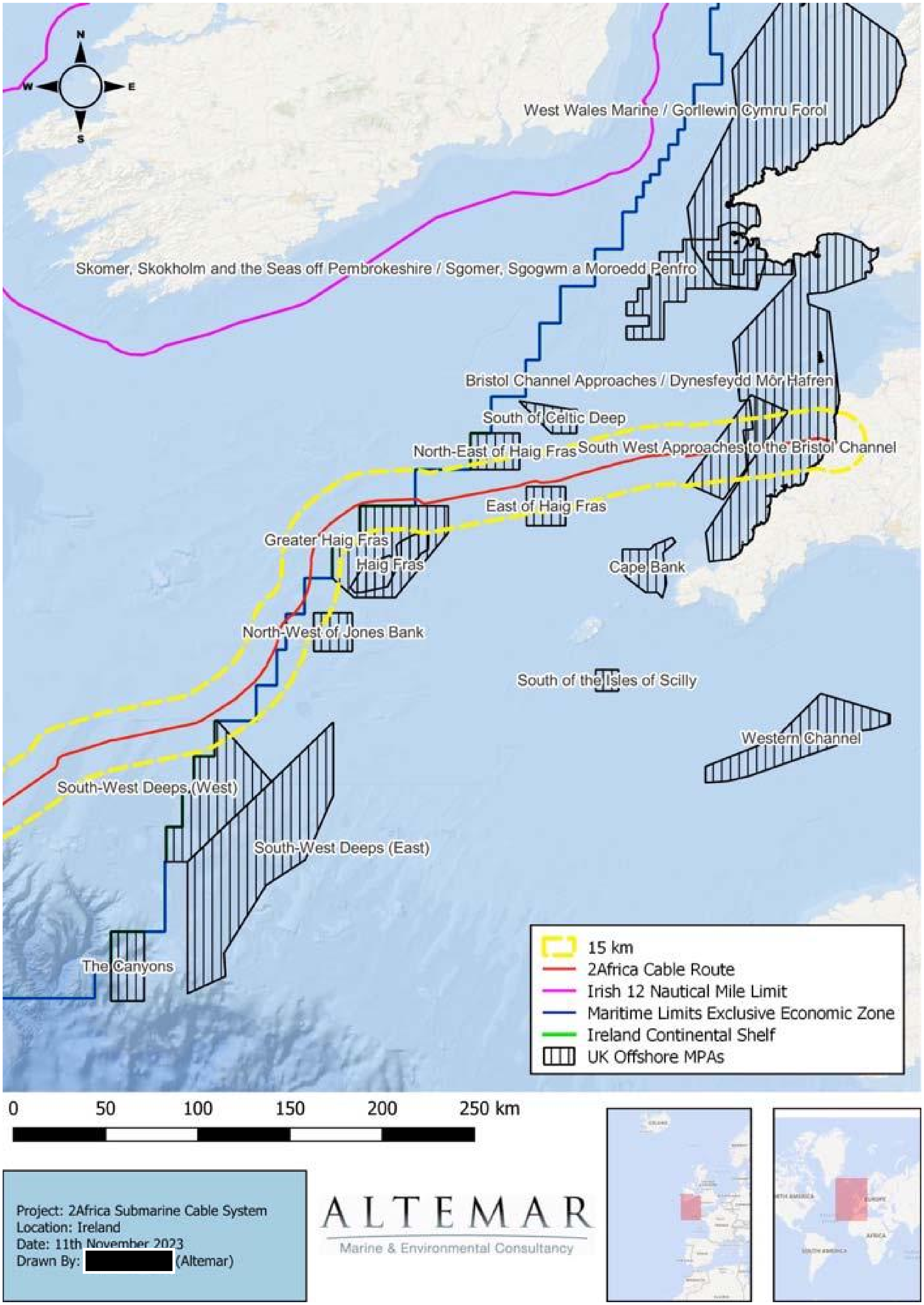

Figure 47. *UK Offshore Marine Protected Areas (MPAs) located within 15km of the proposed cable route*

Table 9. *Foreshore licence applications (Accessed 01/12/23)*

Reference	Title	Year	Location	Activity	Status
FS007621	Péarla Offshore Wind Limited – Site Investigations for Export Cable Corridor for a proposed Offshore Wind Farm Project	2022	Off County Waterford	Site Investigations	Applied
FS007575	Kinsale Offshore Wind Limited Site Investigations for Export Cable Corridor for proposed Offshore Wind Farm	2022	Off County Cork	Site Investigations	Consultation
FS007488	Celtic Offshore Renewable Energy Site Investigations for proposed Offshore Wind Farm	2022	Off Counties Waterford and Wexford	Site Investigations	Applied
FS007471	Floating Cork Offshore Wind Limited Site Investigations for proposed Offshore Wind Farm	2022	Off County Cork	Site Investigations	Applied
FS007464	Bore Array Ltd., Site Investigations for Bore Array Offshore Wind Farm	2022	Off County Wexford	Site Investigations	Applied
FS007445	Blackwater Offshore Wind – Marine Surveys	2022	Wexford	Marine Surveys	Applied
FS007436	Voyage Offshore Array Limited Site Investigations for proposed Offshore Wind Farm	2022	Off Counties Waterford and Wexford	Site Investigations	Applied
FS007431	Tulca Offshore Array Limited Site Investigations for proposed Offshore Wind Farm	2022	Off County Cork	Site Investigations	Applied
FS007384	Celtic Horizon Offshore Wind Farm Limited Site Investigations for proposed Offshore Wind Farm	2021	Off Counties Wexford and Waterford	Site Investigations	Applied
FS007374	Mainstream Renewable Power Ltd.	2021	Off County Wexford	Site Investigations	Consultation
FS007361	Beaufort Sub-sea Fibre Optic Cable System	2022	Off Wexford Coast	Installation of Sub-sea Fibre Optic Cable	Consultation
FS007354	Kinsale Offshore Wind Ltd, Site Investigations for the proposed Kinsale Project offshore wind farm	2022	Off County Cork	Site Investigations	Consultation
FS007318	RWE Renewables Ireland East Celtic Ltd., Site Investigations for proposed East Celtic Offshore Wind Park	2021	Off Counties Wexford and Waterford	Site Investigations	Applied
FS007232	DP Energy – Latitude 52 Offshore Windfarm Ltd.	2021	Off Counties Wicklow and Wexford	Site Investigations	Applied
FS007135	ESB Wind Development Ltd. Site Investigations at Loch Garman Offshore Wind	2021	County Wexford	Site Investigations	Consultation
FS006916	EirGrid Celtic Interconnector Electricity Cable	2021	Co. Cork	Installation of Subsea Cable	Determination

8. Mitigation Measures & Monitoring

Minor short-term impacts may result as a consequence of the project, but these are believed not to be at the scale to impact on the integrity of the Natura 2000 sites, species or the Site Specific Conservation Objectives. However, following the precautionary principle, 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, including marine mammals offshore.

Mitigation measures are proposed including having an MMO present on the cable laying vessel to ensure marine mammals are not disturbed by the proposed works. The cable route would see invertebrate mortalities in the vicinity of the subtidal plough burial areas. However, during surface lay these effects would be expected to be extremely limited. These effects would be limited in nature and would be short term.

Pre cable laying mitigation

Route Planning

A strict route selection process was carried out to assess the optimal route within the Irish EEZ, taking into account the lowest environmental impact and highest resource efficiency on the basis of sound and comparable data. This included addressing engineering issues as well as environmental concerns which included assessing existing infrastructure.

The proposed cable route passes through an offshore Natura 2000 site of conservation significance (cSAC[1]). The conservation significance of the features of interest of the Natura 2000 sites was assessed. The route was deemed to be the optimal route of satisfying conservation significance (within the designated site) the optimal from an engineering perspective and for the stability and longevity of the cable. The cable route has been selected to avoid habitats of significant ecological interest since the routeing avoids areas of steep relief and harder substrates e.g. reef. This routeing of the cable is then strictly adhered to during the ploughing and surface lay processes. In the unlikely event that significant route alterations are required during the cable installation within the Southern Canyons cSAC, the on-call marine biologist/project ecologist, will be consulted prior to any route amendments being made. It is important to note that burial within the cSAC is limited to between 550 metres water depth (mwd) and 1470mwd, across a mud plain, in additional to smaller area of between 156mwd and 264mwd. There will be no burial down the shelf between 264mwd and 550mwd and deeper than 1470mwd.

Construction phase mitigation measures

Subtidal

Mitigation impacts are primarily concerned with the cable laying 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 cable laying phase. Repairing the cable may involve several scenarios, such as 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 will be implemented:

1. During all cable operations within Irish waters, the cable lay vessel will be operating at idle /minimal wake speeds which reduces potential collision risk with marine mammals and turtle species. Surface lay operations will typically not exceed 7,500 meters/hour (~4 knots). Plough operations will typically not exceed 400 meters/ hour (~0.22kn) and PLIB / ROV activity will typically not exceed 200 meters / hour (0.1 kn) (note no PLIB / ROV activity anticipated with Irish waters).
2. A MMO will be onboard the vessel at all times in Irish waters to implement standard NPWS marine mammal mitigation measures. “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” (NPWS, 2014) will be applied to ensure noise introduced into the marine environment have minimum effect. Plough launch, seabed ploughing and plough recoveries will be conducted in consultation with the MMO.
3. 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 or other Annex IV species e.g. marine turtles, to ensure that project anthropogenic noise is minimised.

4. Sufficient resources will be made immediately available on the vessel to deal with accidental oil spills, including hydraulic hoses bursting etc. and reported to the on board MMO and the onshore marine biologist.
5. Ballast water discharges from project vessels will be managed under the International Convention for the Control and Management of Ships' Ballast Water and Sediments standard (International Maritime Law: Ballast Water Management Convention).
6. The cable route along the continental slope traverses a primarily sedimentary habitat, that possibly contains minor reef e.g boulder areas. The cable route has been meticulously engineered, as outlined in the pre-lay mitigation, to avoid burial attempts in habitats such as steep relief and harder substrates, that may contain ecologically sensitive species. This route engineering is undertaken in accordance with the mitigation hierarchy and is to also ensure the security of the cable and avoid potential damage to laying equipment. It is also in the projects interest to ensure burial in sediment where possible, down to 1500m. The planned route will be strictly followed as to do otherwise could result not only in suboptimal cable burial but also result in impacts on sensitive habitats. Monitoring of vessel movements, via automatic identification system (AIS), will be carried out by the on-call marine biologist/project ecologist. It is important to note that no ploughing will occur in areas where the bedrock reef is at the surface, whether in large bedrock areas or where small bedrock outcrops emerge through the sediment. In such areas, the cable will be surface laid. Localised disturbance is anticipated in the slope area near the cable route. It's important to note that the plough is equipped with an underwater camera, aiding in obstacle avoidance. The proposed approach for surface laying over bedrock areas if encountered, involves lifting the plough off the seabed and continuing to lay the cable on the surface. Burial recommences once the bedrock is clear. However, based on the marine survey no bedrock was noted in the proposed ploughing area within the Southern Canyons cSAC. In the unlikely event that significant route alterations are required during the cable installation within the Southern Canyons cSAC, the on-call marine biologist/project ecologist, will be consulted prior to any route amendments being made.

Post-lay Monitoring

Given the location of the cable, buried in marine sediments or laid across reef areas, physical monitoring of the cable would pose an impact on the marine environment. Underwater cables by their nature are passive on/within the seabed. It is not expected that the cable will move, deteriorate or impact on marine habitats over time, unless impacted by anthropogenic /storm influence. As outlined by Carter et al. (2009) '*Unless a cable fault develops, the seabed may not be disturbed again within the system's design life.*' Problems, if they arise would be expected to result in a loss of signal and subsequent location of the break/damage and repair. The optical fibres and electrical supply in the cable are monitored 24hours a day from the terminal station, as this is a fundamental function of the cable.

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. A MMO will be present during cable laying to minimise any impact on marine mammals.
b. A marine biologist/ecologist will be in daily contact with the lay vessel within the Southern Canyons cSAC. An ecological clerk of works report will be prepared and submitted to NPWS within 2 month of the vessel leaving Irish waters.
c. Daily reports will be submitted to the project ecologist during works in the Southern Canyons cSAC.

[1] Candidate Special Area of Conservation

9. Adverse effects on the conservation objectives of Natura 2000 sites likely to occur from the project (post mitigation)

The conservation objectives of Natura 2000 sites in the zone of influence of the proposed works in addition to the marine mammal activity were assessed. Given the minor and localised nature of the works, no impacts beyond the zone of influence. In the absence of mitigation, the project could have the potential to cause minimal localised disturbance to Reefs [1170] within Southern Canyons cSAC in addition to marine mammals during the cable main lay periods. A robust series of mitigation measures are outlined that will see ecological supervision of all aspects of the works on the subtidal works within Southern Canyons cSAC and Irish waters. A land based marine biologist will be on call and MMO will be on board during all vessel works.

In conclusion, no adverse effects are likely on the features of interest or the site specific conservation objectives of Natura 2000 sites with the zone of influence of the proposed cable laying operations associated with the proposed fibre optic cable routing within Irish waters, individually or in combination with other plans or projects. However, mitigation measures and construction phase controls have been put in place. The proposed project, alone or in combination with other plans or projects will not adversely affect the integrity of the European sites.

Trans-boundary effects

The potential impact footprint of the proposed cable lay is very small with localised temporary non-significant impacts only seen during main lay operations. No operational impacts are foreseen unless the cable is damaged and repair will involve localised disturbance of the cable and reburial of the cable with ROV. Removal of the cable if/when required will be subject to an additional licencing process. The cable is not expected to have any transboundary ecological or environmental impacts. The UK element of the project has been approved under UK licencing in UK Territorial Seas.

10. Natura Impact Statement Conclusions

This NIS assess the potential for adverse effects from the installation and operation of the proposed 2Africa submarine cable system within the Irish EEZ. The planned cable will extend from Widemouth Bay in Cornwall to a number of countries in Europe, Africa, and the Middle East. Potential impacts on Natura 2000 sites and marine mammals are outlined. No adverse effects on, the integrity of the Southern Canyons cSAC, water quality, or marine mammals are foreseen from the installation or operation of the proposed project. No Natura 2000 sites, conservation objectives or qualifying interests will be compromised as a result of the proposed works based on the successful implementation of the mitigation measures that will be put in place. All other Natura 2000 sites were screened out during AA Screening.

This report presents a Natura Impact Statement for the proposed laying of a marine fibre optic cable. It outlines the information required for the competent authority to screen for appropriate assessment and to determine whether or not the proposed development, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites conservation objectives, will adversely affect the integrity of the European site. On the basis of the content of this report, the competent authority is enabled to conduct an Appropriate Assessment and consider whether, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites conservation objectives, will adversely affect the integrity of the European site.

The proposed project will not adversely affect the integrity of the Natura 2000 site.

10.1 Data used for the NIS

NPWS site synopses and Conservation objectives of sites within 15km were assessed. The most recent SAC and SPA boundary shapefiles were downloaded and overlaid on baseline oceanic mapping. A detailed desktop assessment was carried out including multiple datasets including marine Institute, Informar, MSFD, EUSEABED Mapping.

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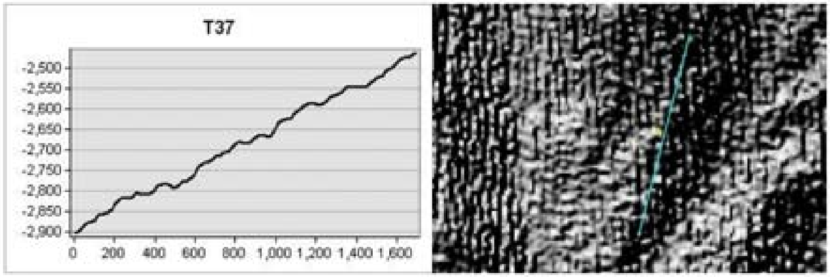
Appendix I – Vessel Specifications

Technical Specifications

DESCRIPTION / POSITIONING	Three state-of the art vessels, highly powerful for long stretch cable installation and burying in the harchest conditions. Duplex DP and Integrated Control System
OWNER	ALDA MARINE SERVICES S.A.S.
OPERATOR	LOUIS DREYFUS ARMATEURS S.A.S.
SHIP MANAGER	LOUIS DREYFUS ARMATEURS S.A.S.
FLAG	French
CONSTRUCTION YEAR	2002
LENGTH, OVERALL	140.36 m
BREADTH	23.40 m
DRAUGHT	8 m (summer draught)
DEADWEIGHT	9820 mt
ACCOMMODATION	Single cabins: 60, double cabins: 5
CABLE TANK CAPACITY	
main cable tank	2 x 2500 tonnes (max cap each tank: 3500 tonnes), 2 x 1500 m^3
spare cable tank	2 x 250 tonnes, 2 x 150 m^3
REPEATER STORAGE	2 x 100
CABLE MACHINERY	1 Linear Cable Engine – DOWTY 21 Wheels pair, 1 Drum Engine – DOWTY 6T DOHB / 28T Drum, 2 Transporter – DOWTY 2 Wheels Pairs, 1 Stern Hauler – DOWTY 2 Wheels Pairs
TYPE OF PLOUGH	1 SMD HD3 Plough – burial in all soils (including fractured rocks). Max burial: 3 m
CABLE LAYING SOFTWARE	MakaiLay
DYNAMIC POSITIONING	DP2 BV PDY MATAR Alstom
TRANSIT SPEED	15 knots
BOLLARD PULL	100 tonnes
POWER GENERATION	4 x 4320 kW MAK + 1 x 1360 kW MAK
THRUSTERS	2 x Lips 1500 kW Bow Thrusters 1 x Lips 720 rpm - 1500 kW AZ Fore Thruster 2 x Lips 1500 kW Aft Thrusters
PROPULSION	2 electrically driven fixed pitch propellers. Output 4000 kW each. Propeller diameter: 3700 mm. Max propeller speed: 146 rpm

Appendix II Sea Rover Dives and cetacean distributions

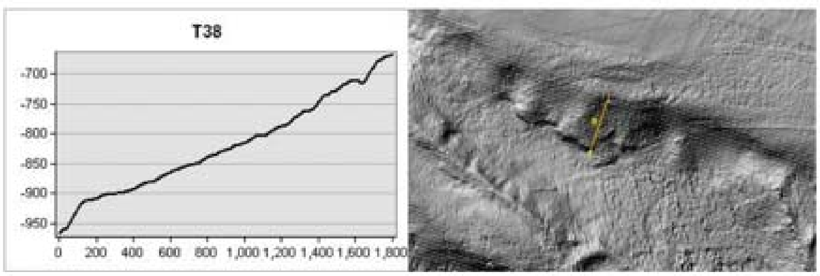
Transect 37 – Dive 648



P1. Water Depth: 2924m. **Feature:** Slope with occasional terraces and cliffs

'*Seafloor is of soft sediment on a steep slope with occasional terraces and cliffs. Conspicuous fauna is sparse and includes small tubes, foraminiferans, occasional ophiuroids and echinoids. Burrows are also noted. Further upslope the sea pen Distichoptilum is common along with the soft coral Anthomastus. Burrows are present, with some containing galatheid crabs.*'

Transect 38 – Dive 649

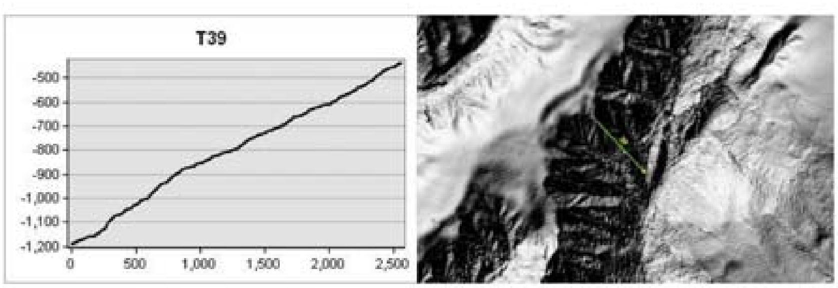


P2. Water Depth: 950m. **Feature:** Slope

Of note: Corals *Desmophyllum*, occasionally *Madrepora* and monofilament fishing line.

'*The bottom current is very strong and the seafloor is subject to scour, with development of wave forms throughout. Initially the substrate is pebbly, moving into ground dominated by coral rubble. Towards the top of the slope the substrate is sand. Fauna consists of clumps of live Desmophyllum and occasionally Madrepora. There are a lot of Clavulariidae octocorals and a single Acanthogorgia. The echinoid Cidaris is abundant, some anemones and hermit crabs also observed. The crinoid Koehlermetra porrecta is dense in places. Monofilament fishing line was observed towards the end of the dive.*'

Transect 39 – Dive 650

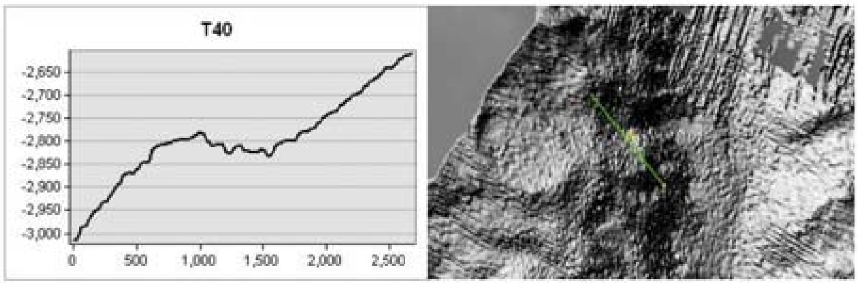


P1. Water Depth: 1184m. **Feature:** Slope with escarpment

Of note: Escarpments with coral (*Lepidisis* and *Madrepora*)

'*Unusual geology here in the form of large rounded pillars. The substrate is largely an overlay of fine sediment on carbonate rock. Larger outcrops, both carbonate and igneous, are also present. About midway through the dive a series of escarpments occur, first as small ridges then as very large vertical escarpments. Along the escarpments the biodiversity is rich and include the corals Lepidisis and Madrepora, crinoids and anemones. Orange roughy and octopuses are observed.*'

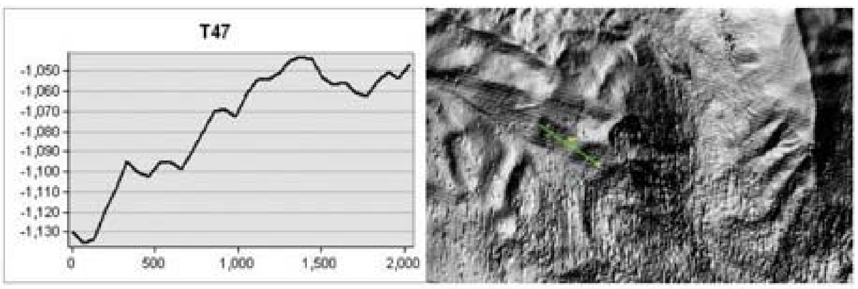
Transect 40 – Dive 651



P1. Water Depth: 3000m. **Feature:** Slope, depth

'*Soft sediment throughout the dive. Numerous burrows and occasional pteropod shells are present. The main faunal components are worm tubes and holothurians. Occasional sea pens, echinothuiroids and elpidiids occur. The soft coral Anthomastus is observed as are some decapods and fish including grenadiers and scabbards. One or two cup corals observed; attempts made to collect one failed. No cores taken for technical reasons*.'

Transect 41 – Dive 652 (nearest to the proposed cable route in Canyon to the east)

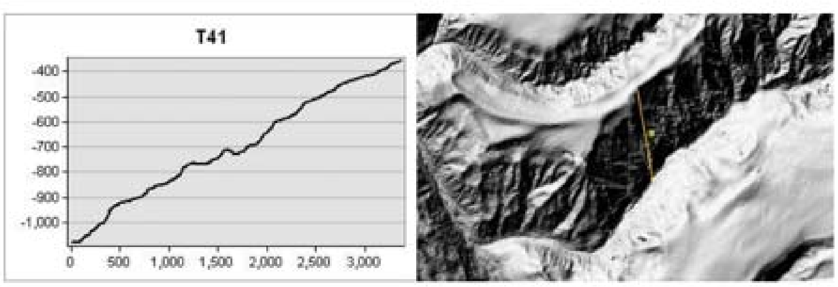


P1. Water Depth: 1115 m. **Feature:** Unknown area

Of note: Corals *Desmophyllum pertussum* and *Madrepora oculata*

'*The seafloor is mainly soft sediment with some boulders. An area of coral reef is present with intermittent coral rubble followed by more soft sediment. The main faunal components are anemones and foraminifera. Sea pens, eels and fish are observed on the soft sediment. Glass sponges, the corals Desmophyllum pertussum and Madrepora occulata and crinoids are observed on boulders. An unknown anthozoan was collected. On the biogenic reef some gorgonian corals are observed which could not be identified*.'

Transect 42 – Dive 653

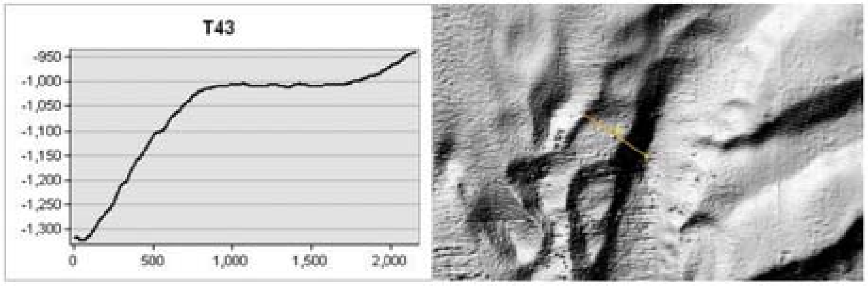


P2. Water Depth: 1074m**. Feature:** Unknown area

Of note: Fishing nets, rubbish

'*The seafloor consists of ridges covered in coarse sand and sediment waves with occasional rocks. Towards the end of the dive, the topology becomes quite mountainous with towering shoulders of sediment containing many burrows. The fauna includes large barnacles, Swiftia, Desmophyllum, a variety of sea pens including Kophobelemnon and Pennatula are noted as are some ophiuroids. Numerous fish include Lepidion eques and eels. Much fishing gear is observed, entangled on rocks and much rubbish is also observed. Visibility is very poor due to suspended sediment in the water, possibly as a result of nearby trawling activity which was apparent on the radar*.'

Transect 43 – Dive 654

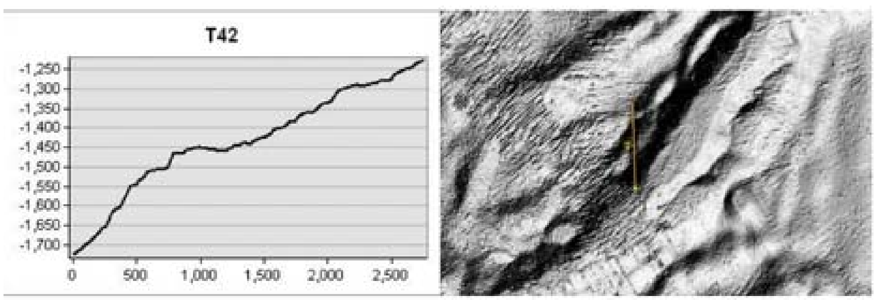


P2. Water Depth: 1328m**. Feature:** Slope

Of note: Sea pen field, fishing gear, plastic rubbish

'*An initial gentle incline with mixed sediment becomes more steep and meets vertical carbonate cliffs. The cliffs host only sparse epifauna. At the top of the cliffs there is a gentle to moderate slope with fine sediment containing some burrows. Occasional sparse cobbles and boulders are observed throughout the area. An extensive field of sea pens including Pennatula sp. and Kophobelemnon sp. occur, and the bamboo coral Acanella (both fir tree and bush-like forms) are recorded amongst the sea pens. Some fishing gear as well as plastic rubbish is observed on this dive. Dolphins (possibly common dolphins) were observed on the surface as the ROV was being deployed*.'

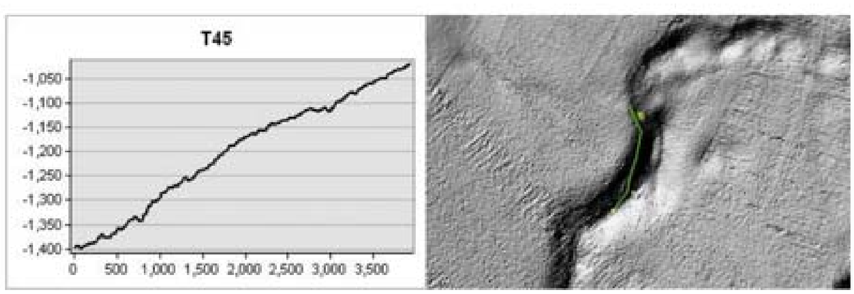
Transect 42 – Dive 655



P2. Water depth: 1735m. **Features:** Slope

'*A lot of marine snow over a very muddy, steep slope. Two Hyalonema sponges are observed, and one was sampled for zooanthids. Fauna are generally scarce and include seapens, cerianthids and occasional small sea stars. Fish (also scarce) include eels, grenadiers, some orange roughly and a cartilaginous fish*.'

Transect 45 – Dive 656

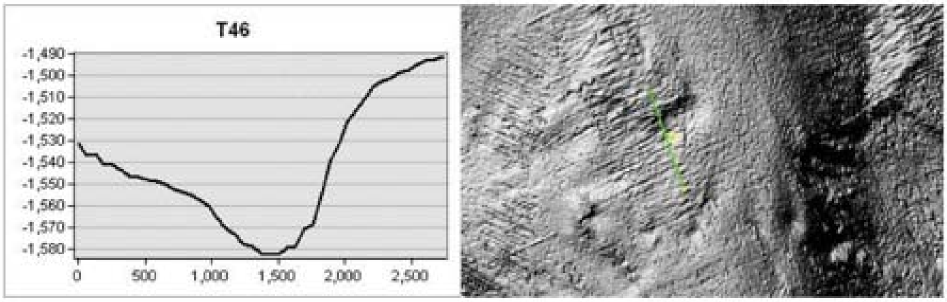


P1. Water depth: 1393m. **Features:** Ridge

Of note: Bamboo coral stalks, marine litter, fishing line and net

'*Seafloor is initially soft, sandy sediment. Boulders, large basalt rocks and carbonate terraces are present towards the end of the dive. Bare stalks of bamboo corals are present on these rocks. Sea pens and cerianthids are abundant with evidence of coral rubble. Occasional Hyalonema sponges, stalked crinoids and the octocoral Umbellula sp. are observed. A Hyalonema specimen (with zooanthids on its stalk) and a large Anthomastus sp. were sampled*.'

Transect 46 – Dive 657

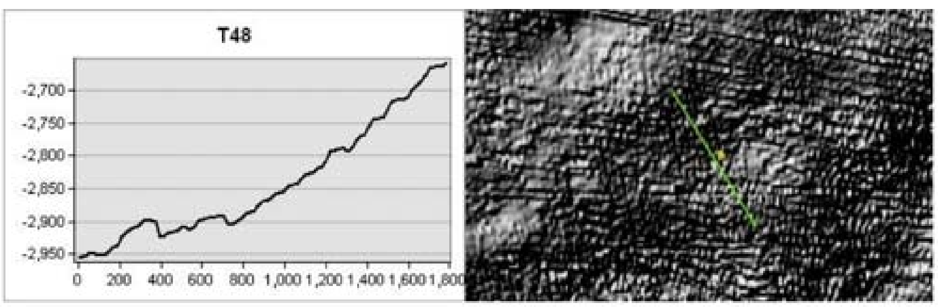


P1. Water depth: 1516m – 1537m. **Feature:** Downhill slope.

Of note: Abundant and diverse fish species

'*The seafloor consists of soft muddy bottom with many burrows and varying morphology, on a gentle slope. There is very little marine snow and limited current. Epifauna is scarce and consists mainly of cerianthids and very small sea pens (possibly Anthoptilium). Fish species included eels, grenadiers, a Bathypterios sp. and a chimerid. An enormous stalked hexactinellid (Hyalonema – like), the head of which was at least 30 cm across was observed*.'

Transect 48 – Dive 658



P1. Water depth: 2900m. **Feature:** Gentle, muddy slope

'*The seafloor is a soft muddy bottom on a gentle slope with frequent burrows. Epifauna is sparse and includes a variety of holothurians and the octocoral Radicipes sp.. Flocculent material, most likely marine snow is observed. Litter identified included plastic and metal*.'

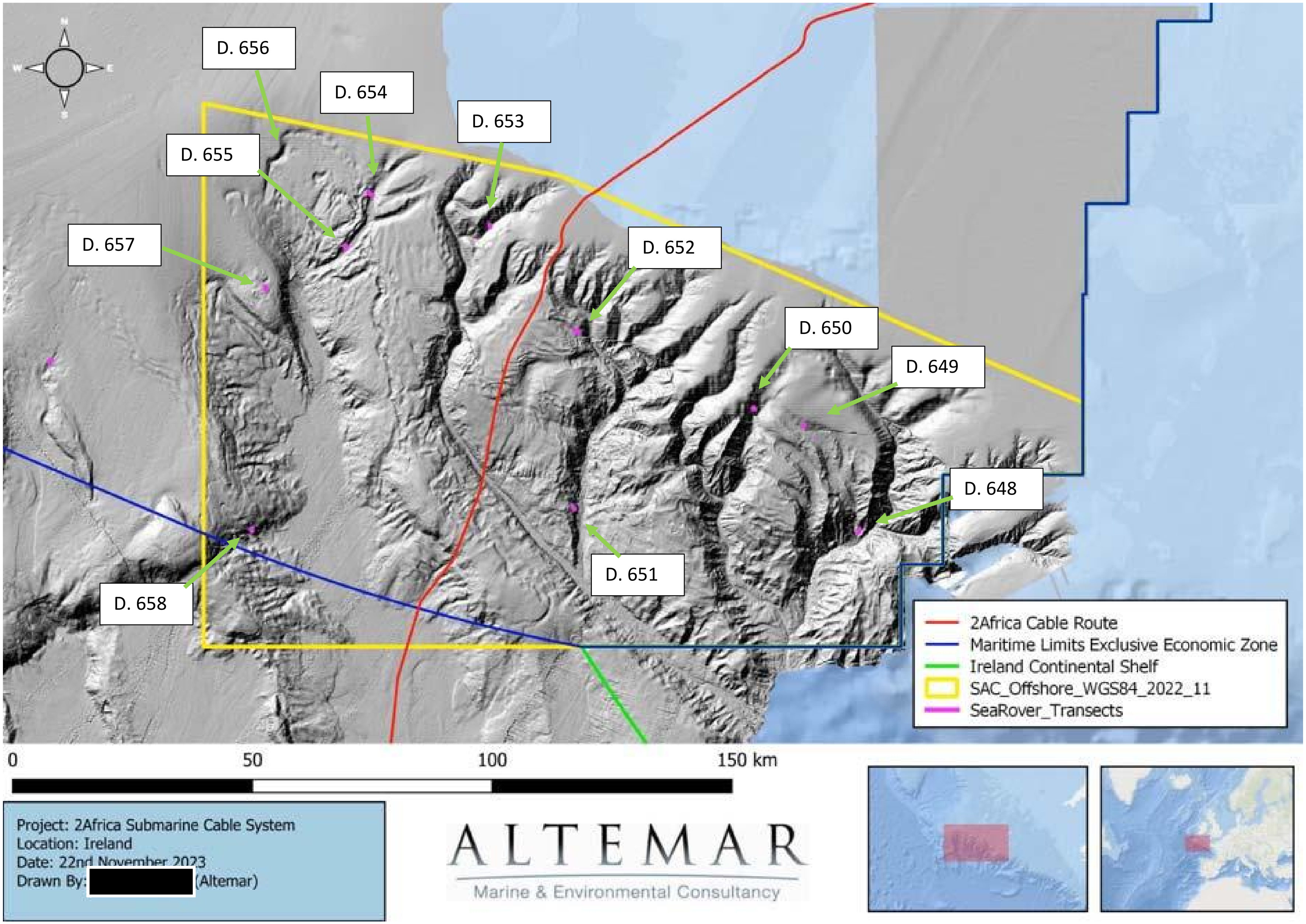


Figure APII-1: Position of offshore fibre optic route in relation to the Irish EEZ, Designated Irish Continental shelf, Offshore SAC's, SeaRover 2019 Dives (Infomar Shaded Relief)

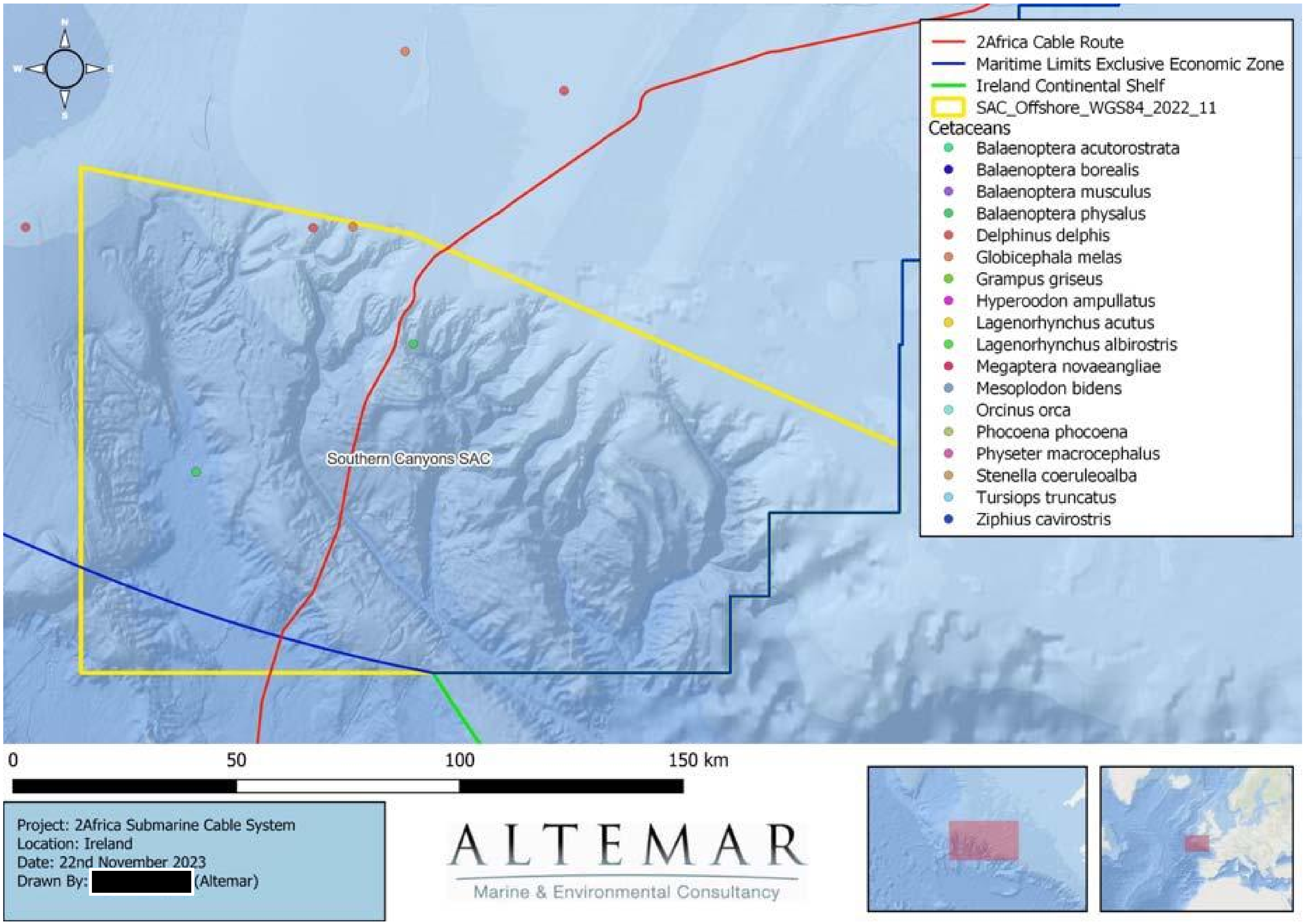


Figure APII-2. Recorded Cetacean sightings in Southern Canyons SAC

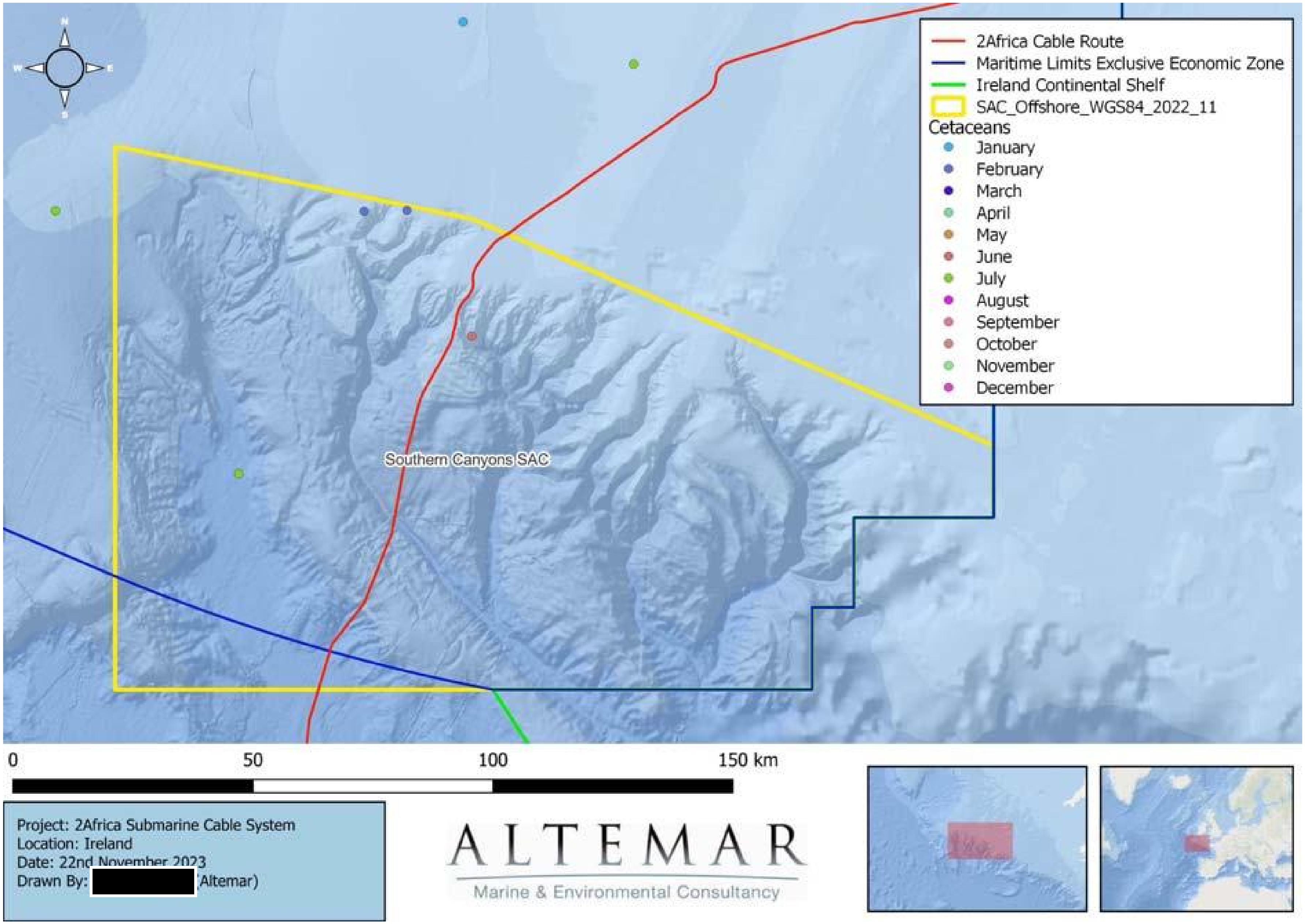
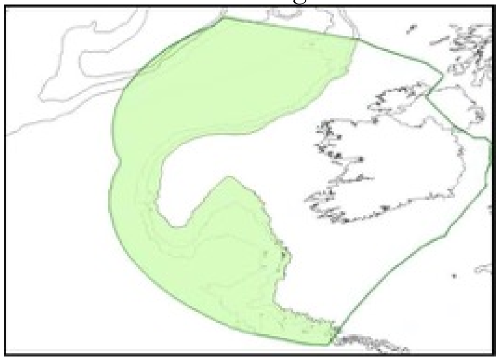
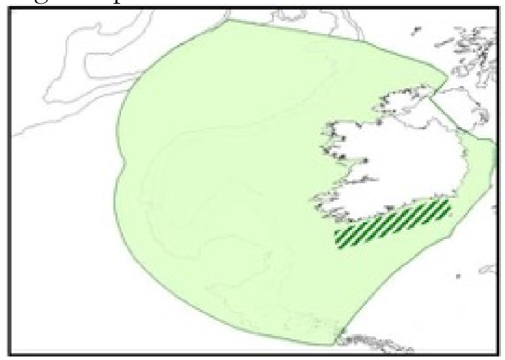


Figure APII-3. Recorded Cetacean sightings (Month) in Southern Canyons SAC.

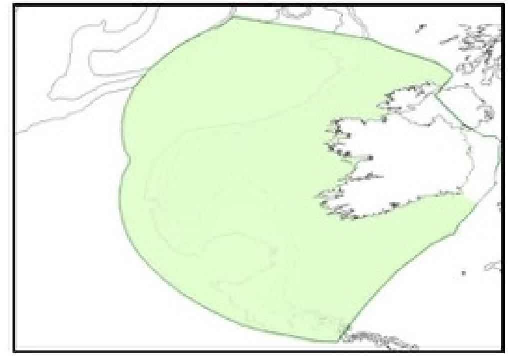
= Cetacean habitat = High number of records v) = Vagrant species



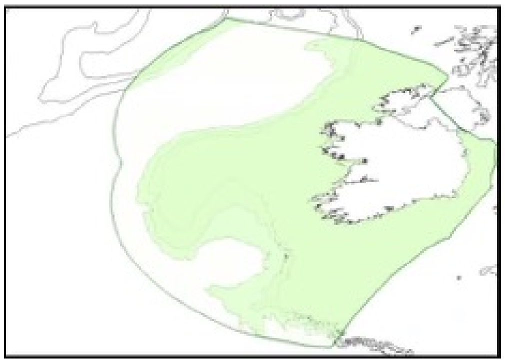
Blue whale



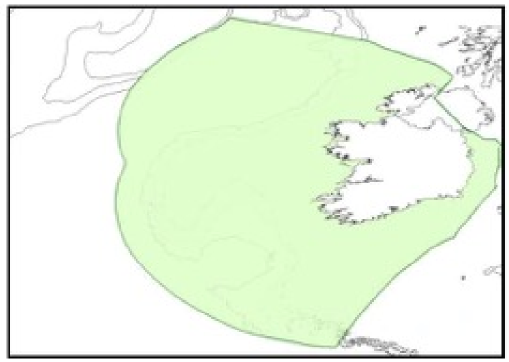
Fin whale



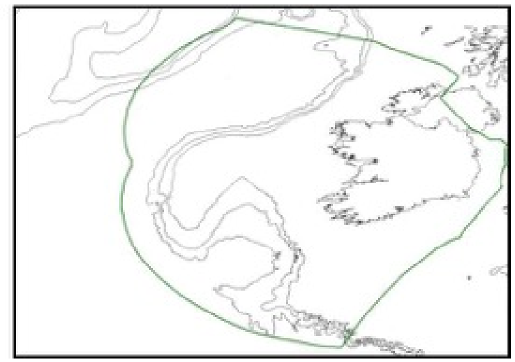
Sei whale



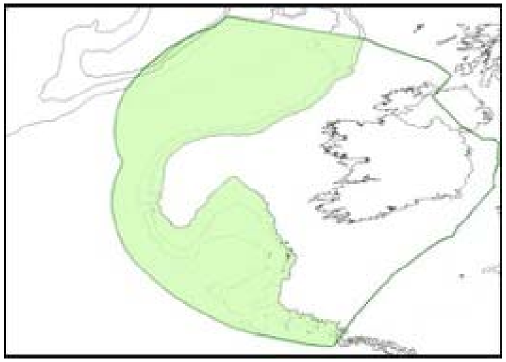
Minke whale



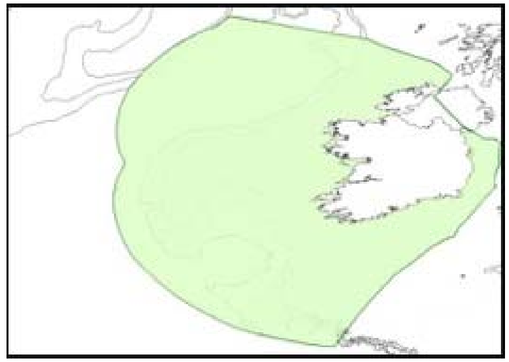
Humpback whale



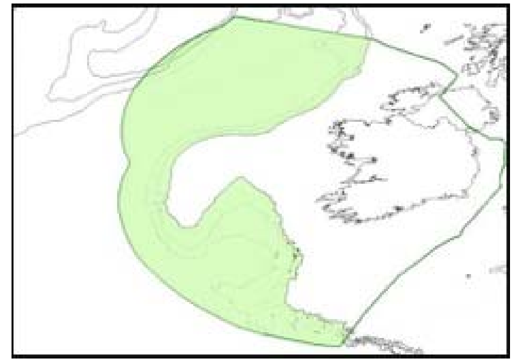
Northern right whale (v)



Sperm whale

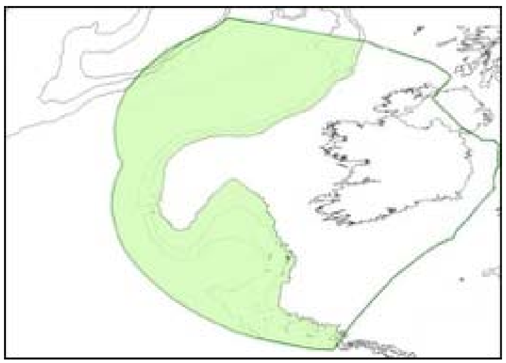


Northern bottlenose whale

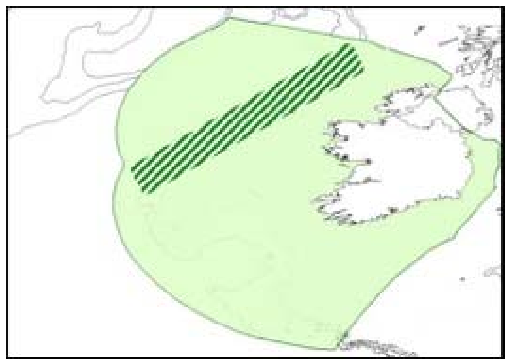


Sowerby's beaked whale

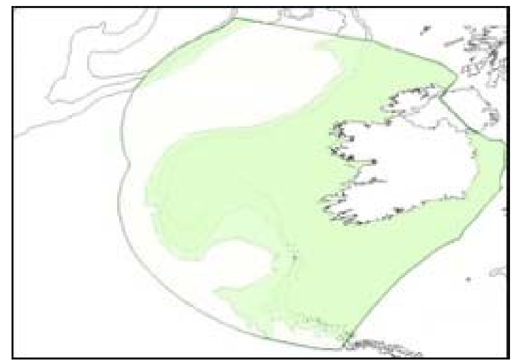
Figure APII-10. Distribution of Cetacean species in the Irish EEZ (Source NPWS).



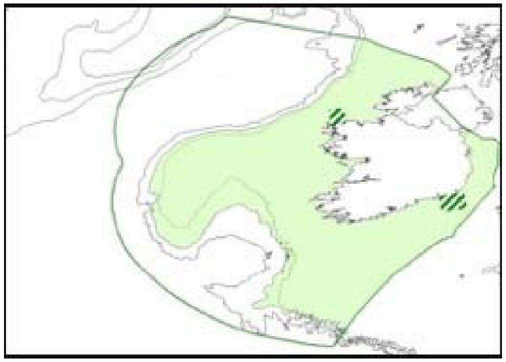
Cuvier's beaked whale



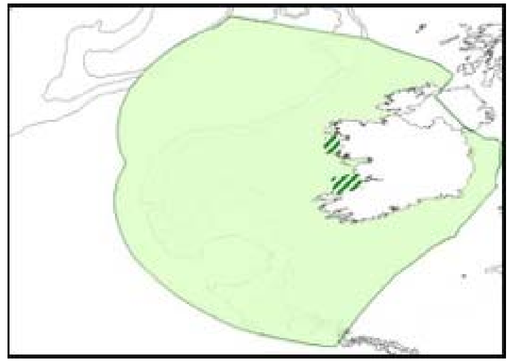
Long-finned pilot whale



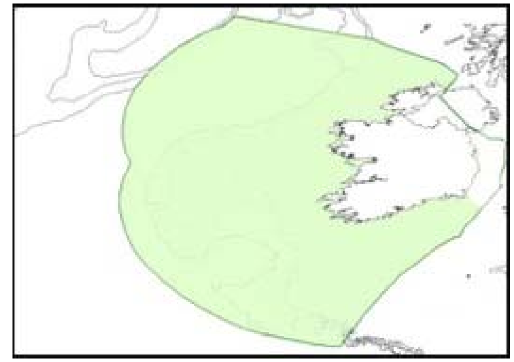
Killer whale



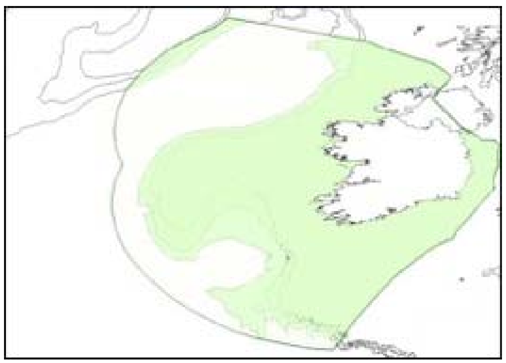
Risso's dolphin



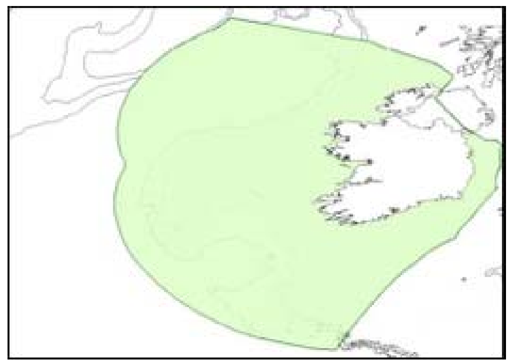
Bottlenose dolphin



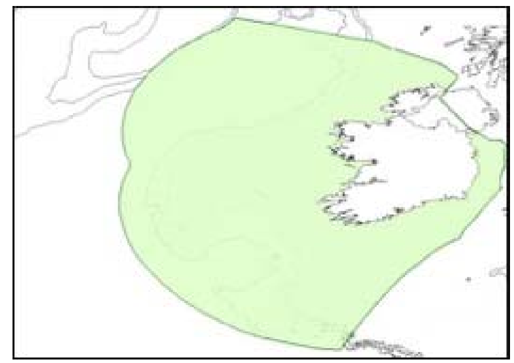
Atlantic white-sided dolphin



White-beaked dolphin

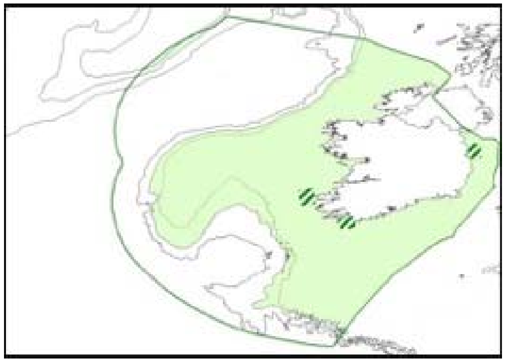


Striped dolphin

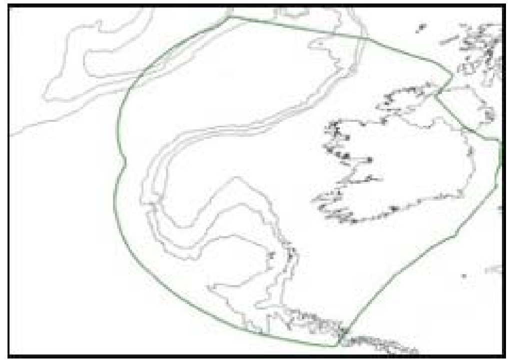


Short-beaked common dolphin

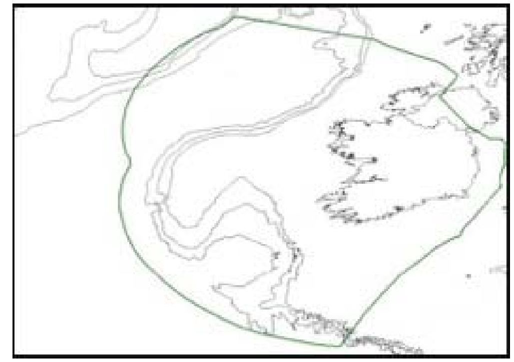
Figure APII-10. Distribution of Cetacean species in the Irish EEZ (Source NPWS) (contd.).



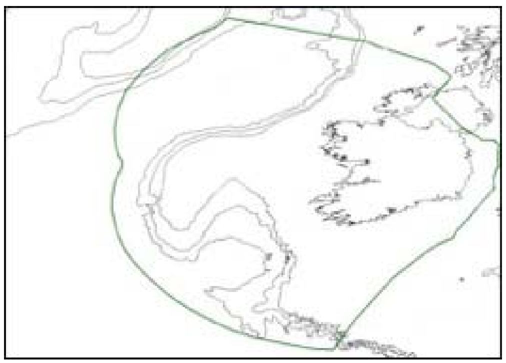
Harbour porpoise



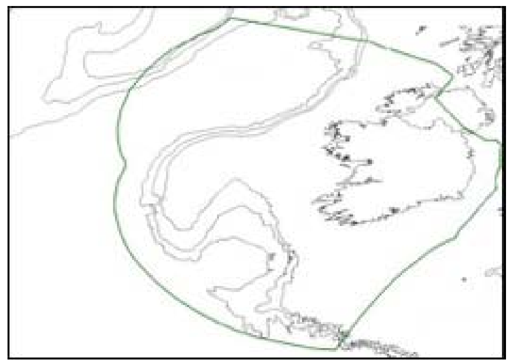
False killer whale (v)



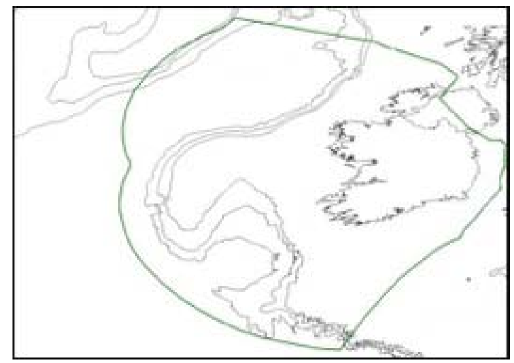
Gervais' beaked whale (v)



True's beaked whale (v)



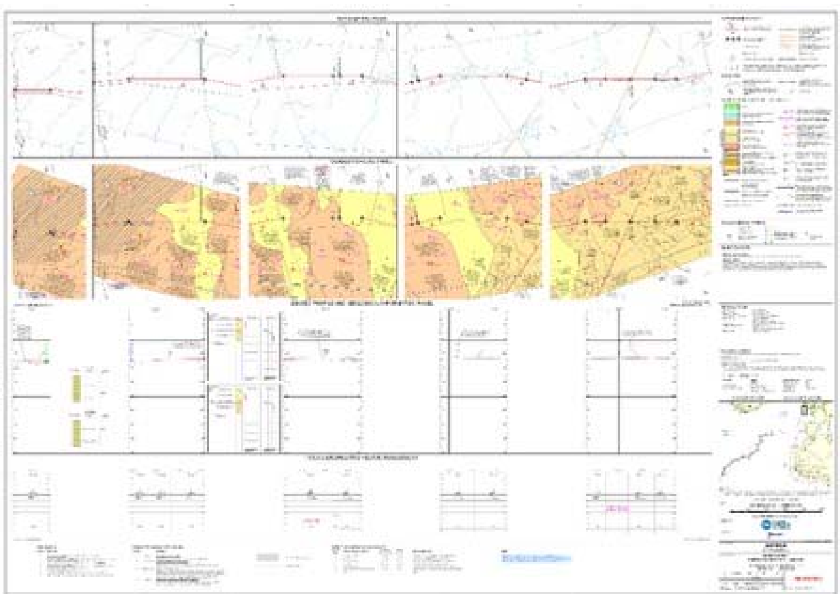
White whale (v)

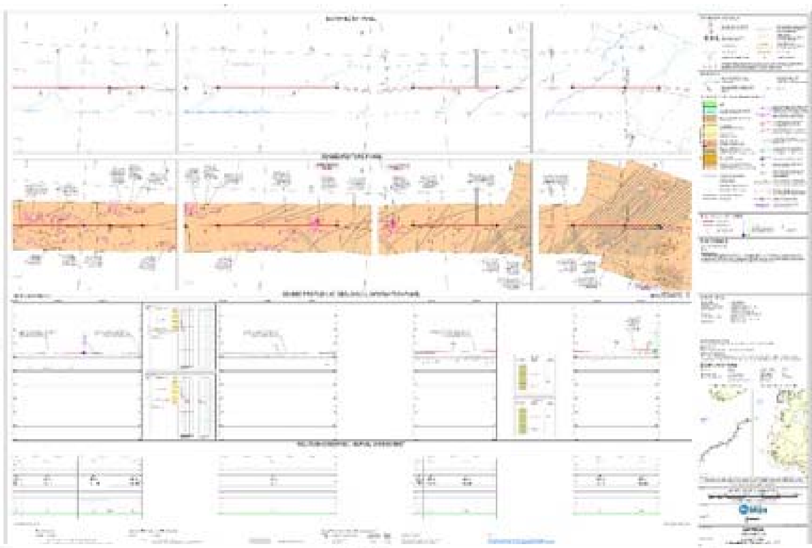


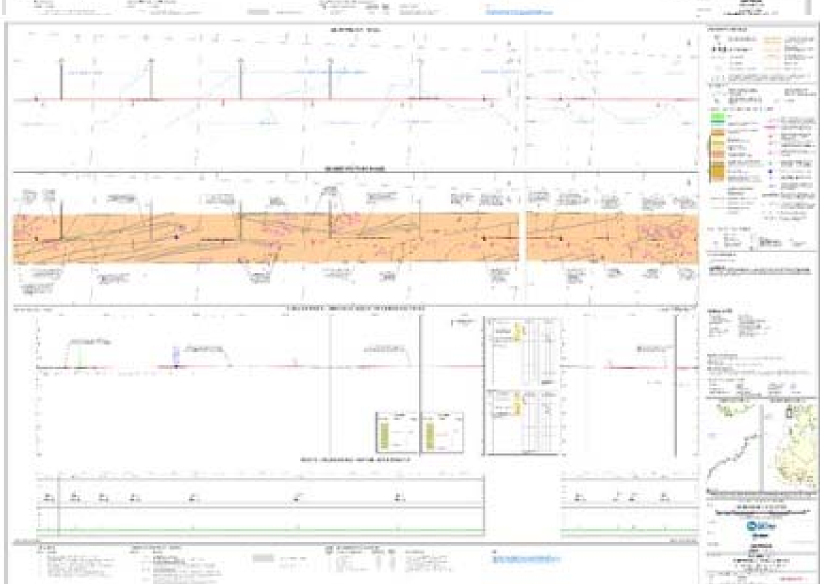
Pygmy sperm whale (v)

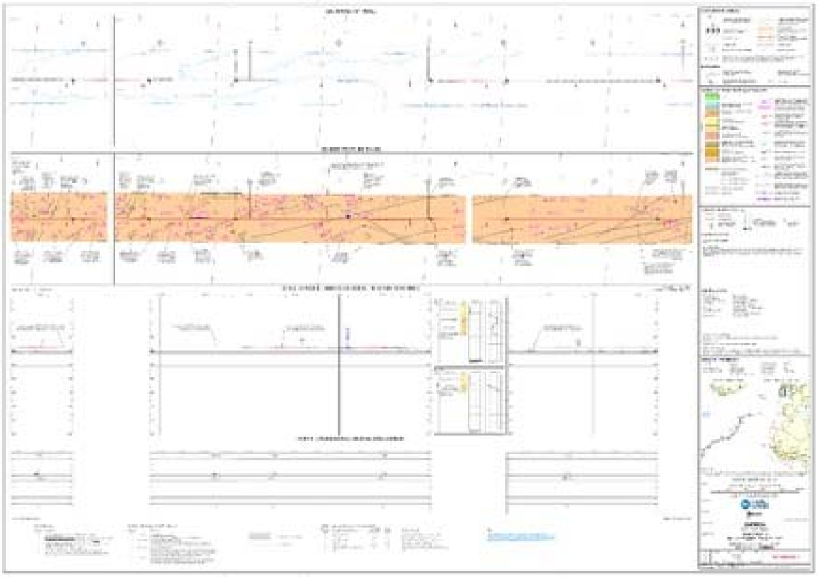
Figure APII-10. Distribution of Cetacean species in the Irish EEZ (Source NPWS) (contd.).

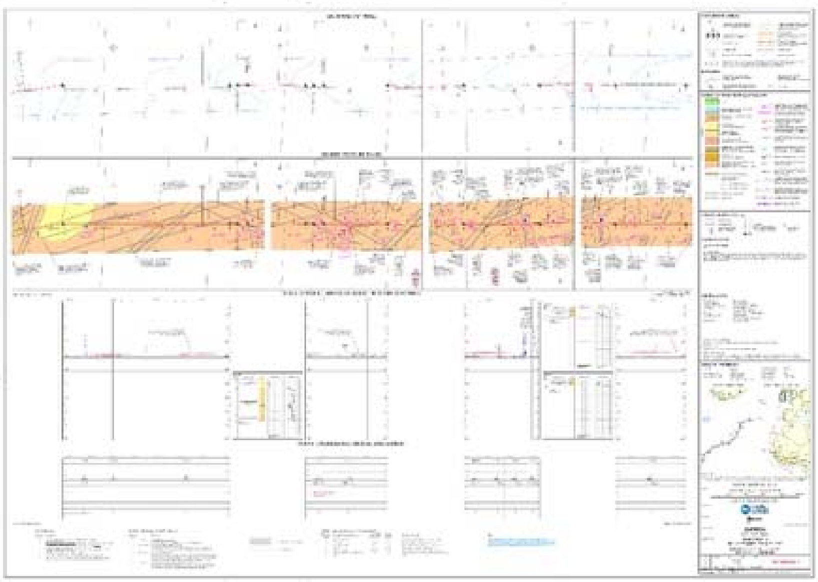
Appendix III Detailed imagery of 2 Africa survey data within Irish EEZ.

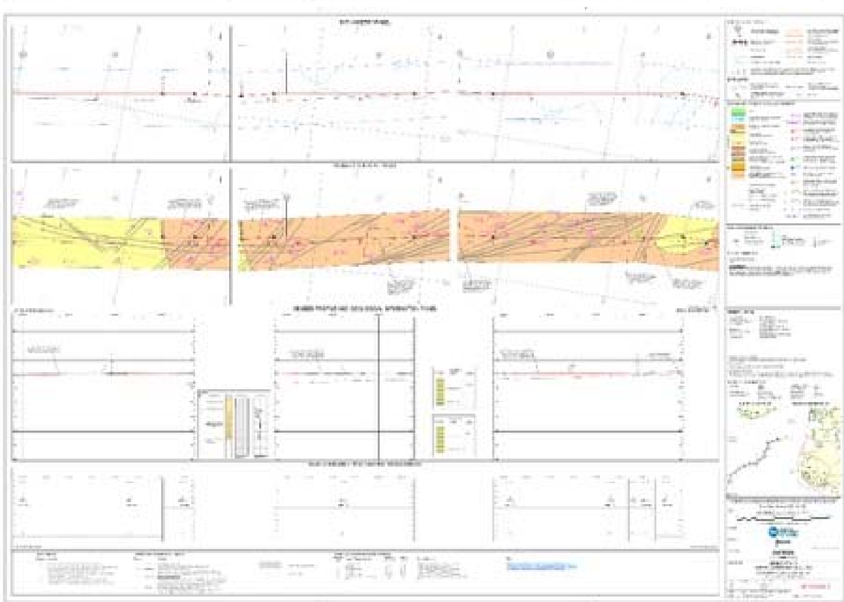


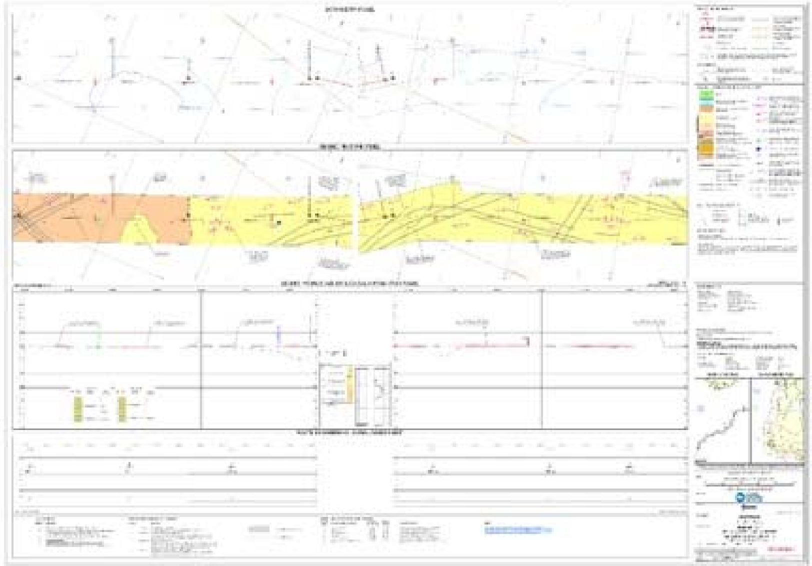


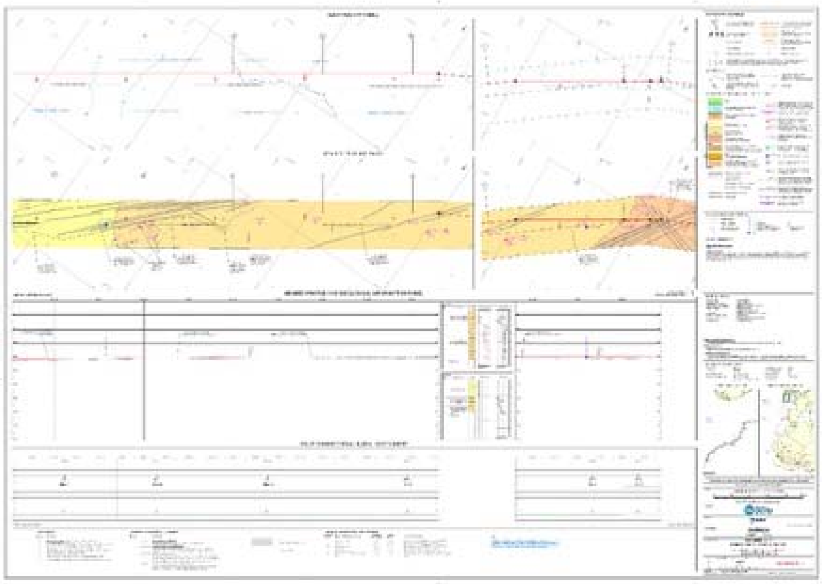


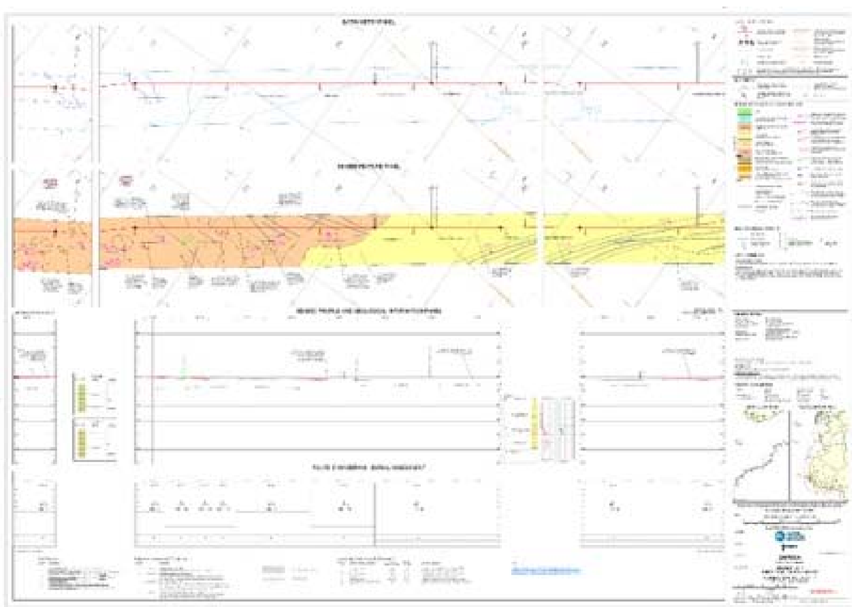


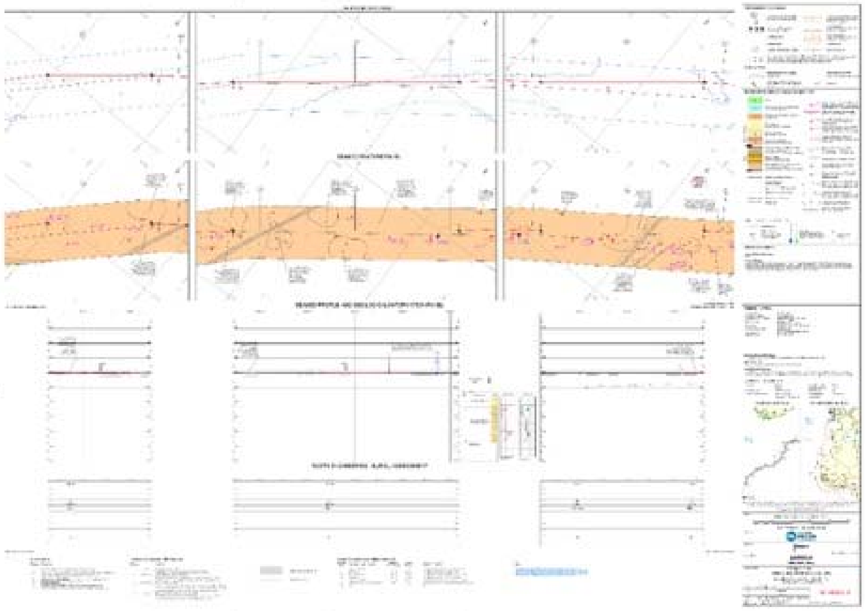


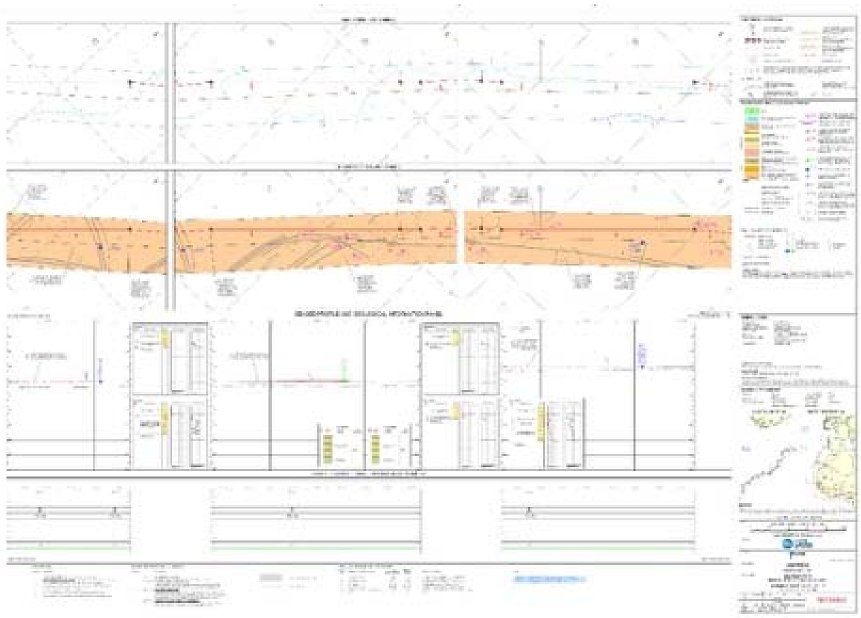


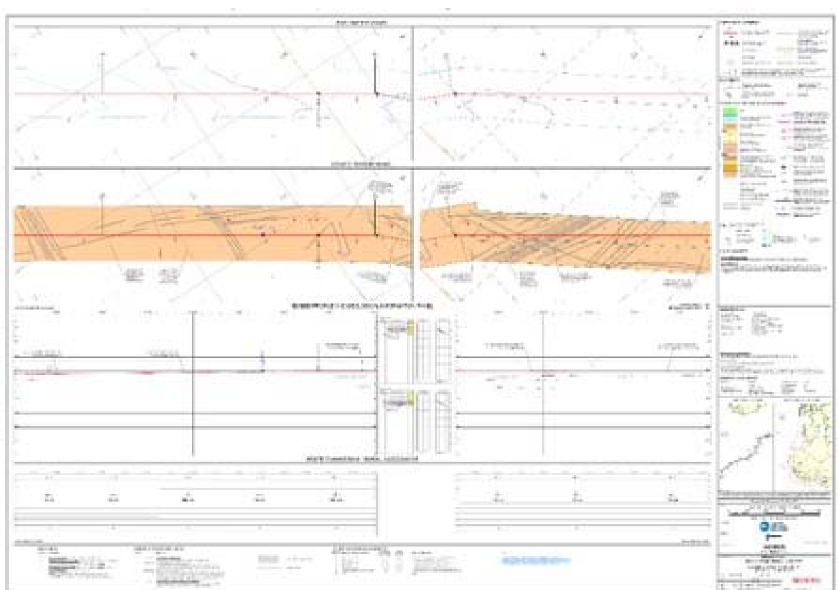


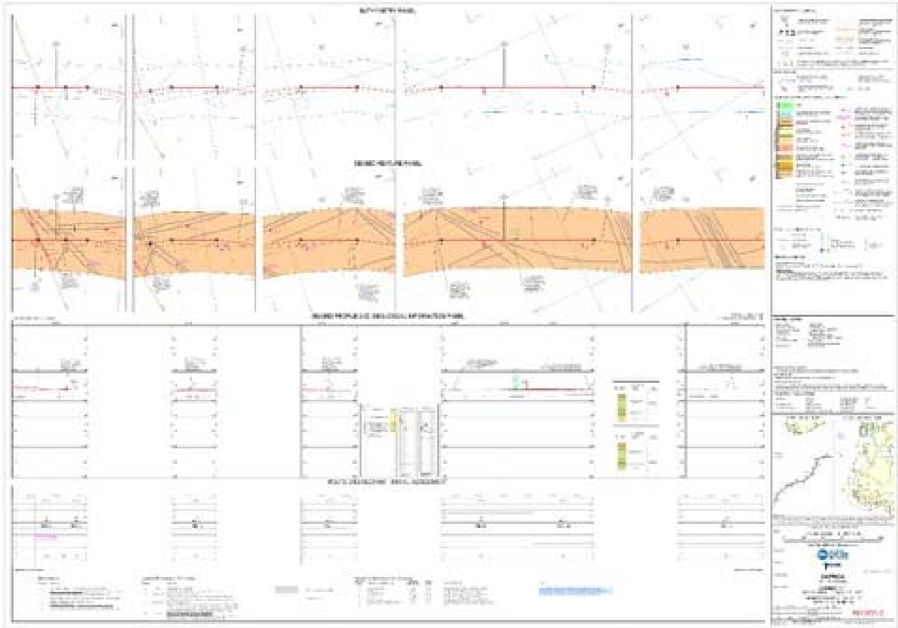


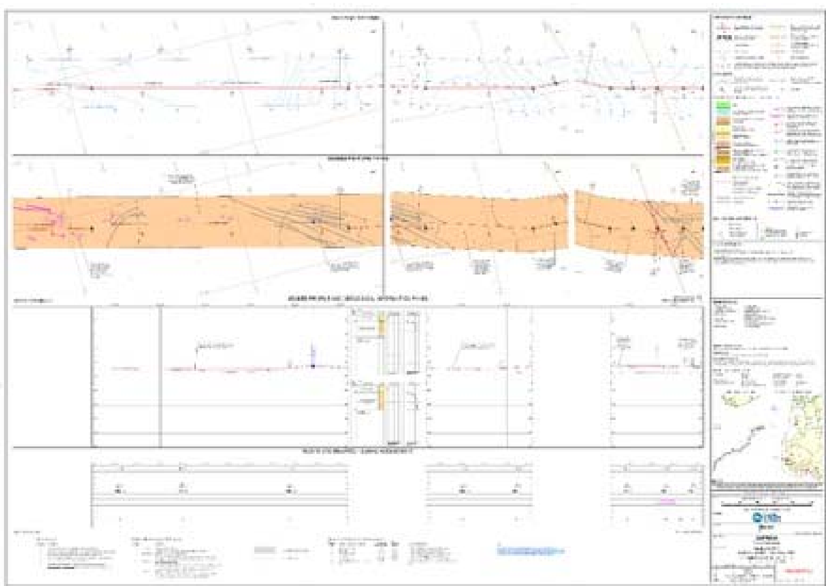


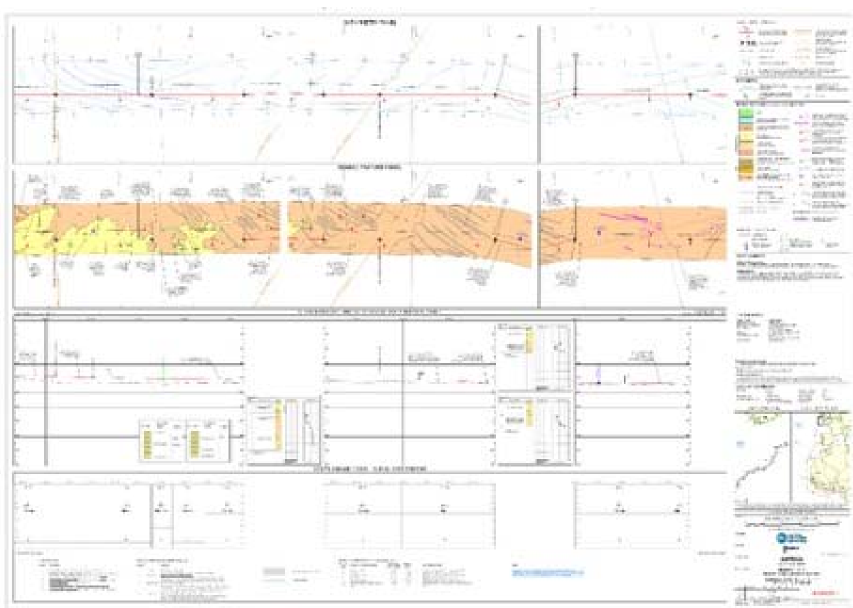


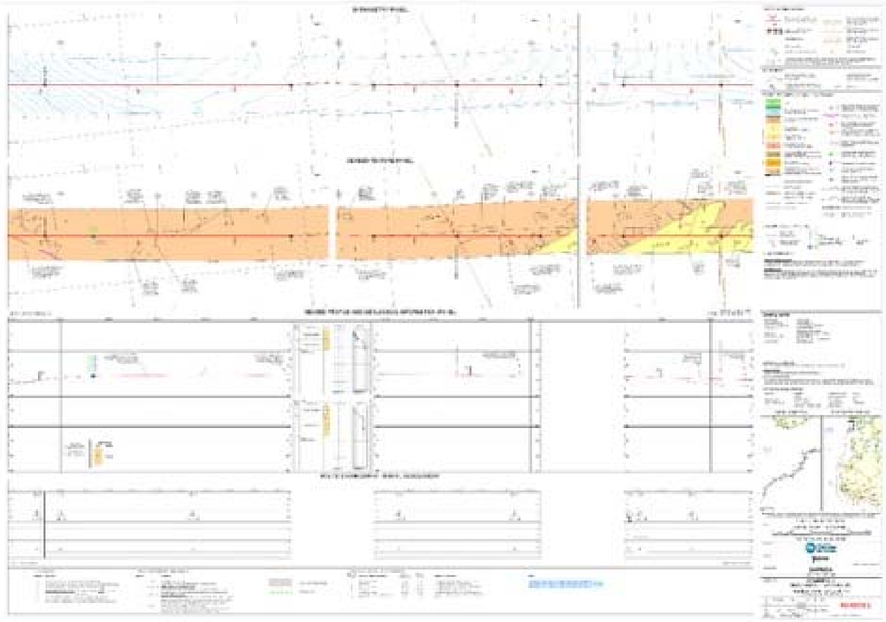


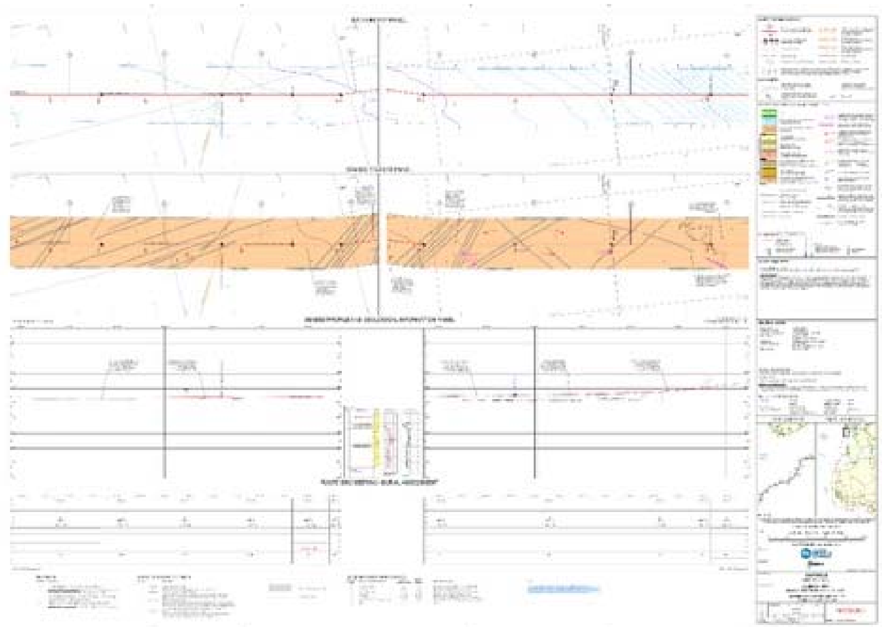


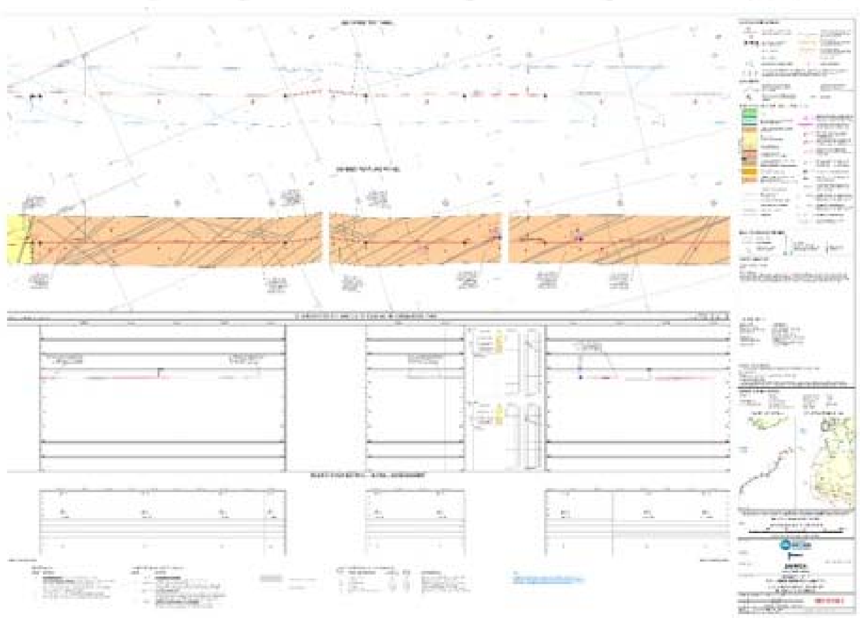


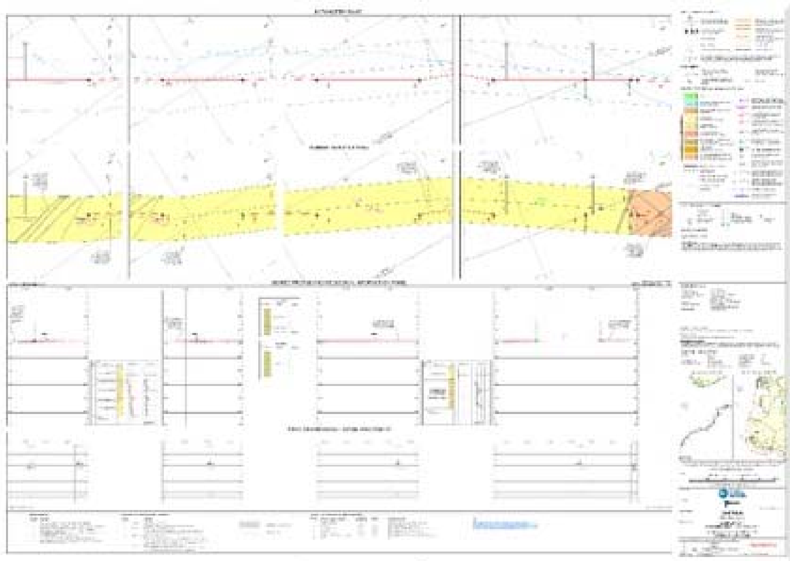


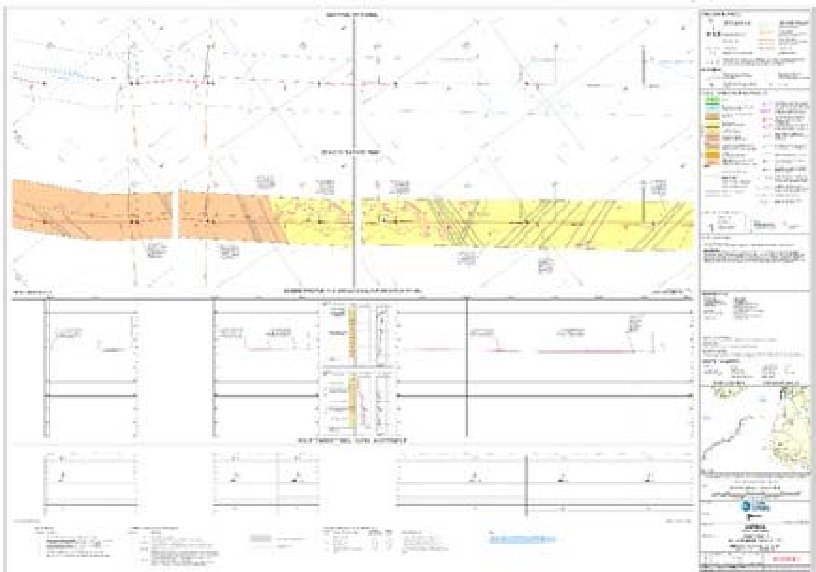


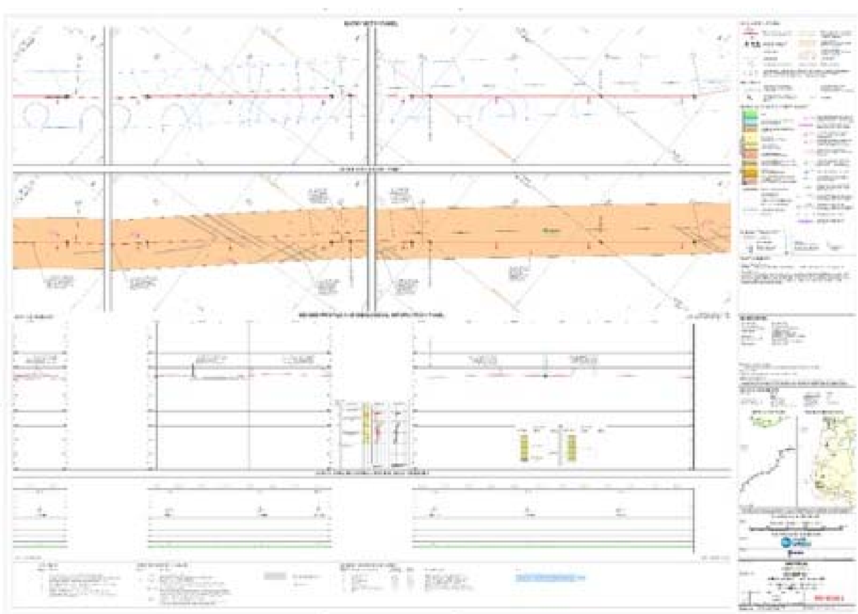


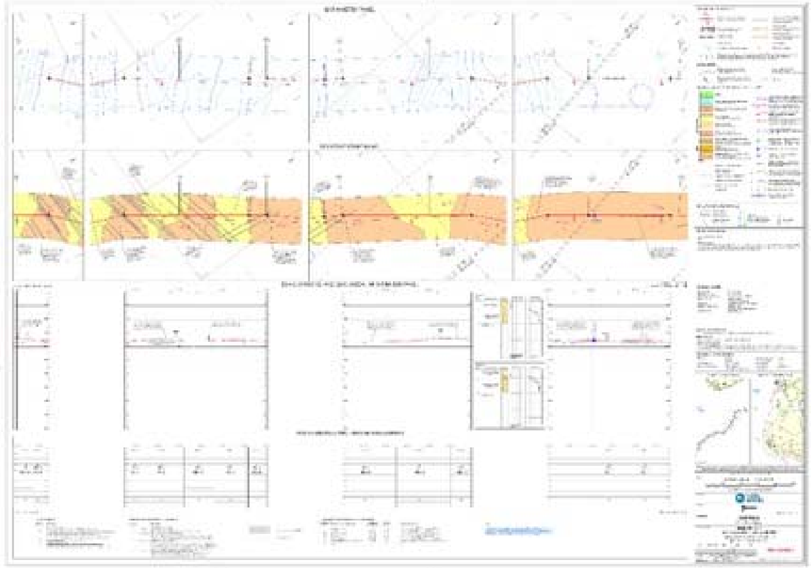


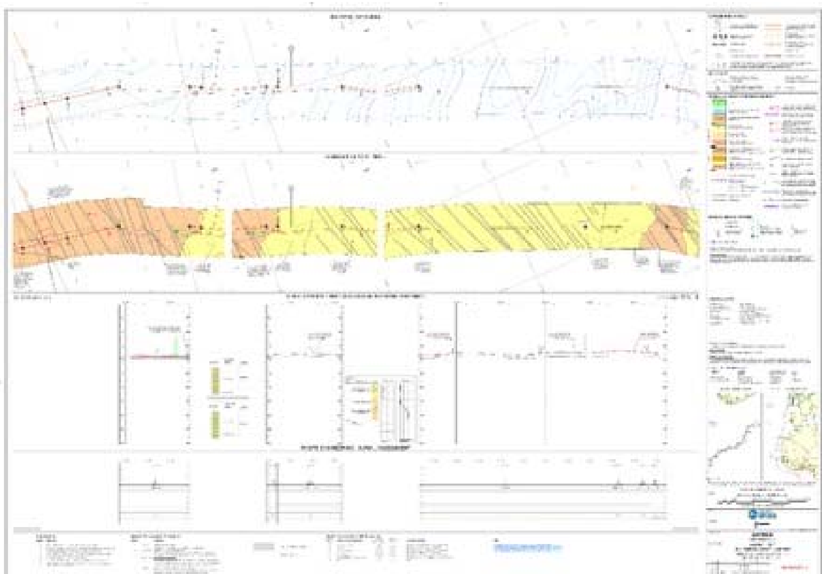


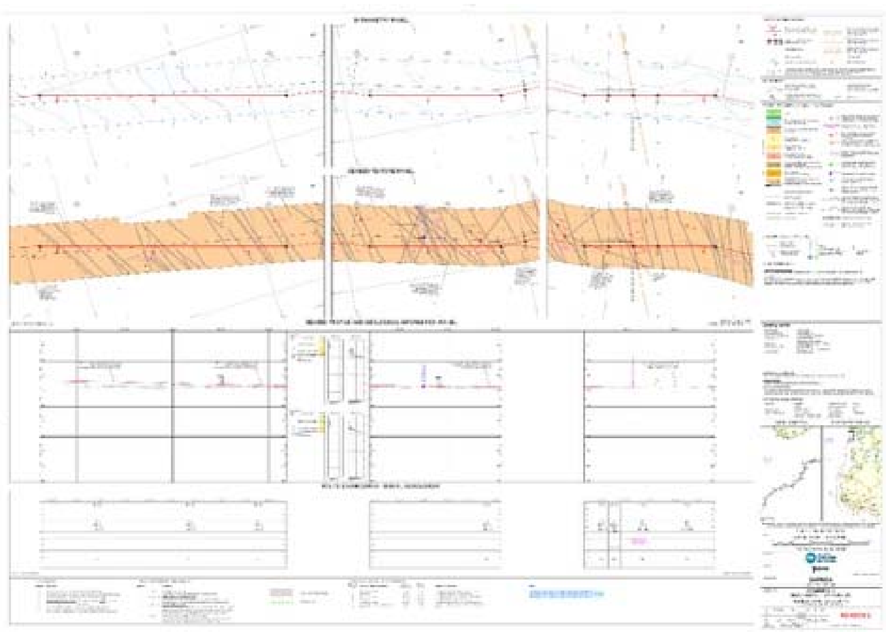


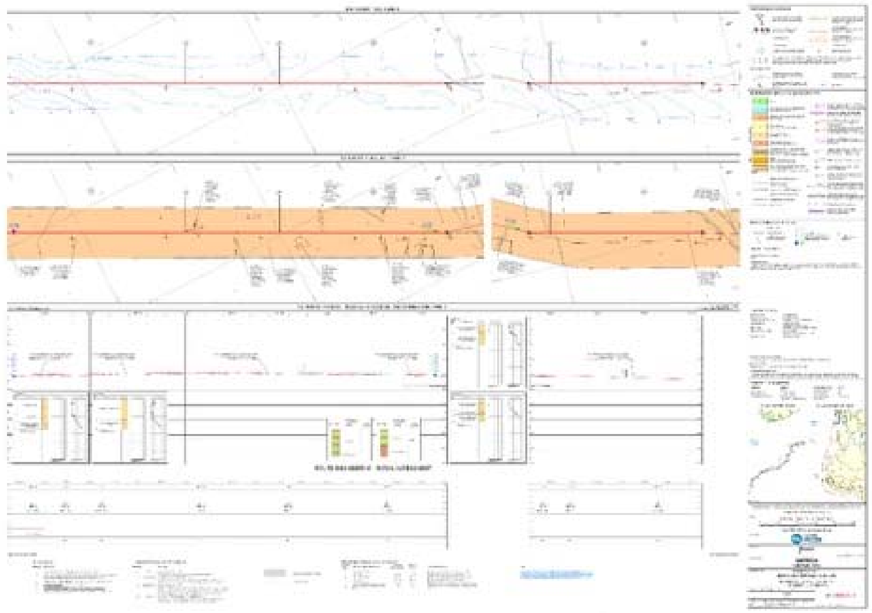


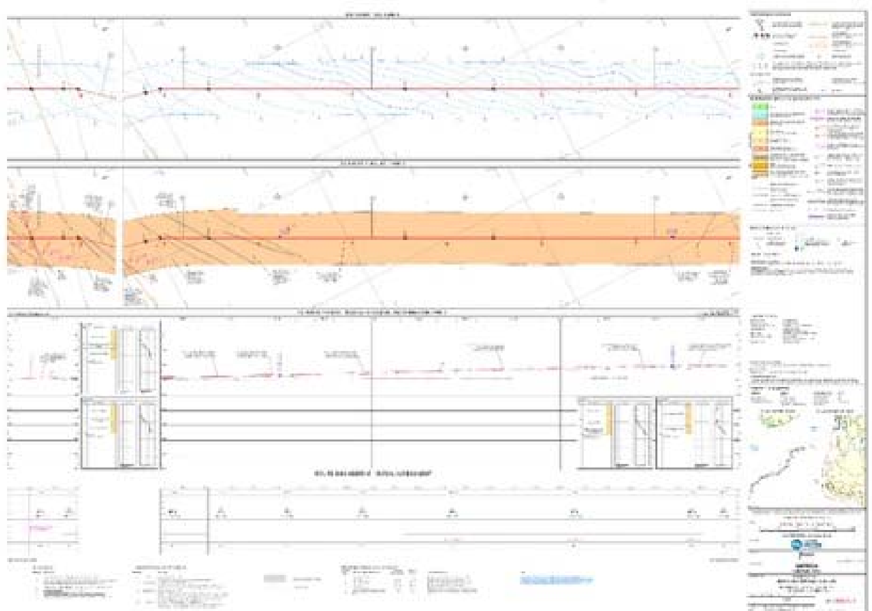


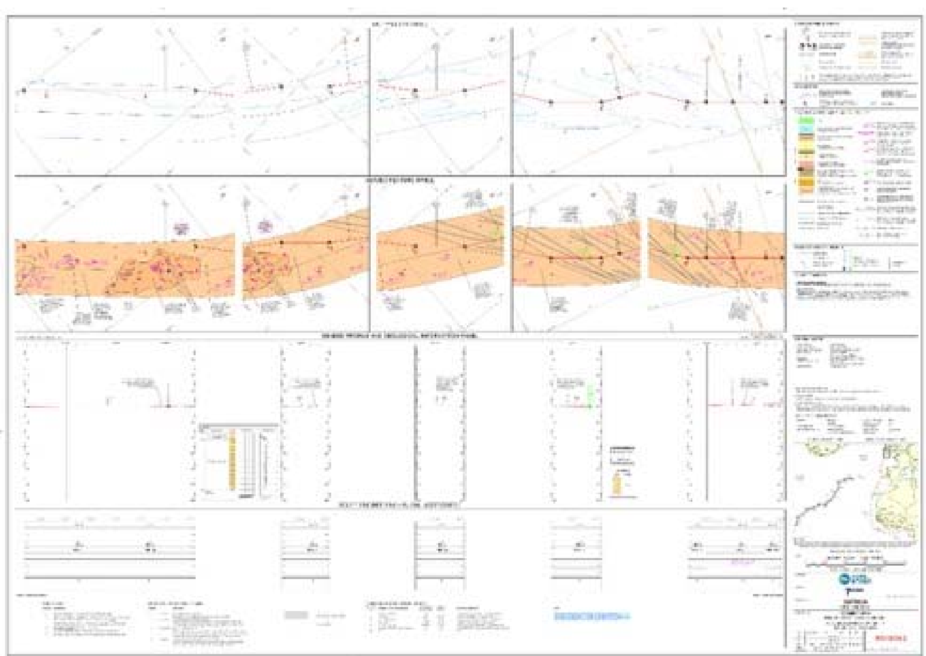


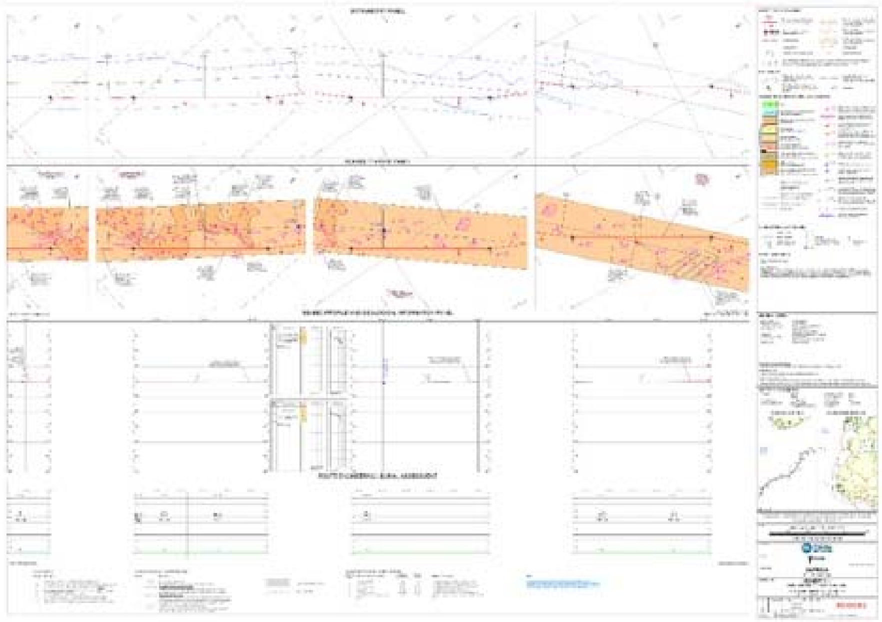


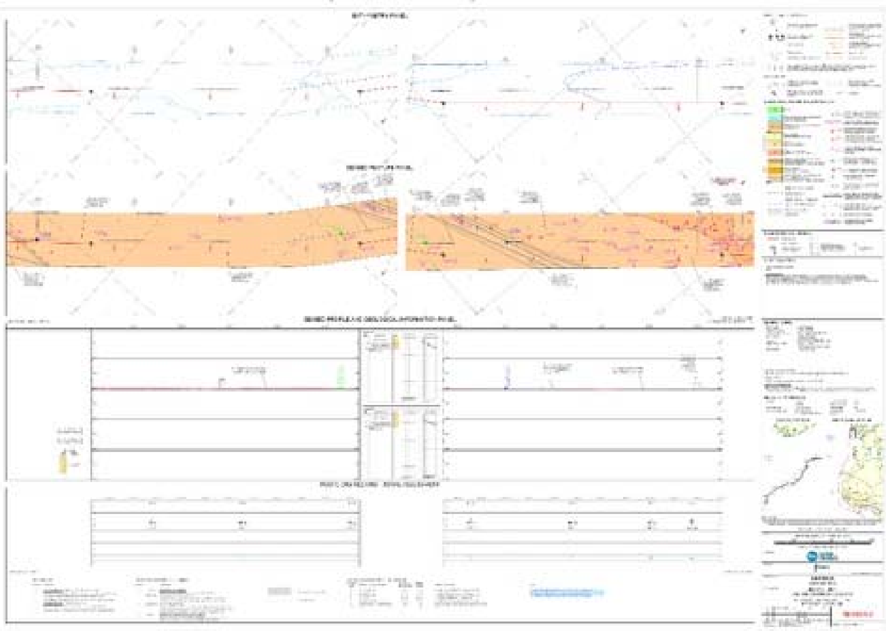


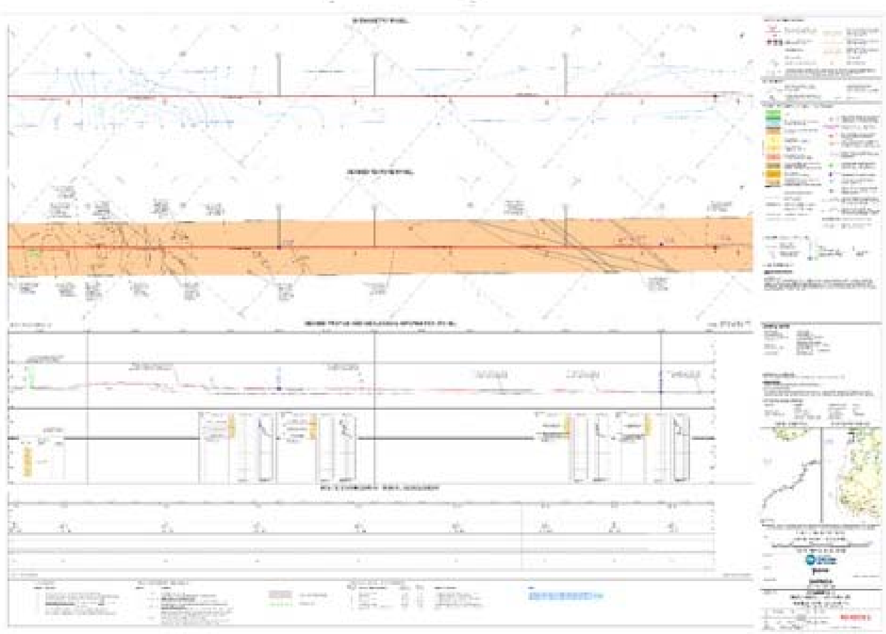


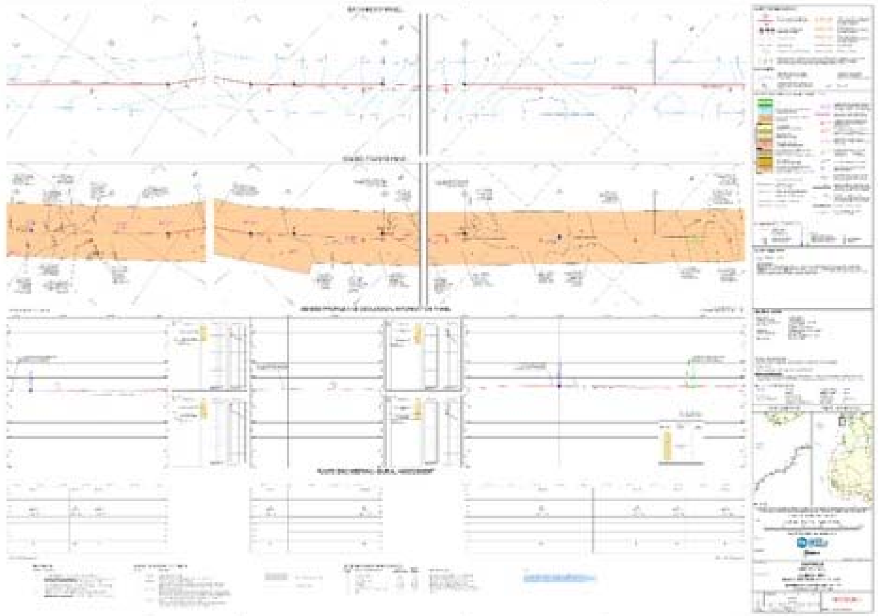


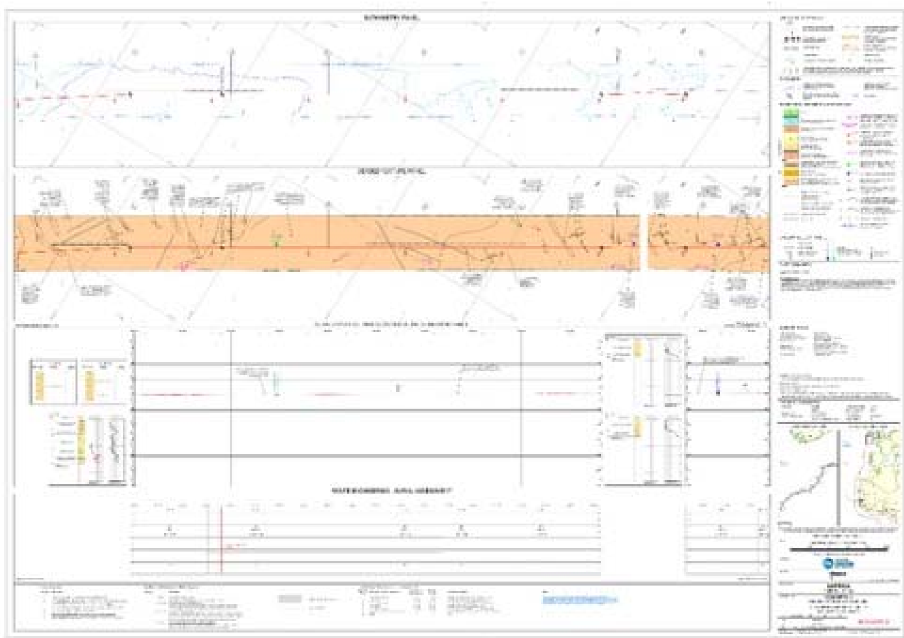


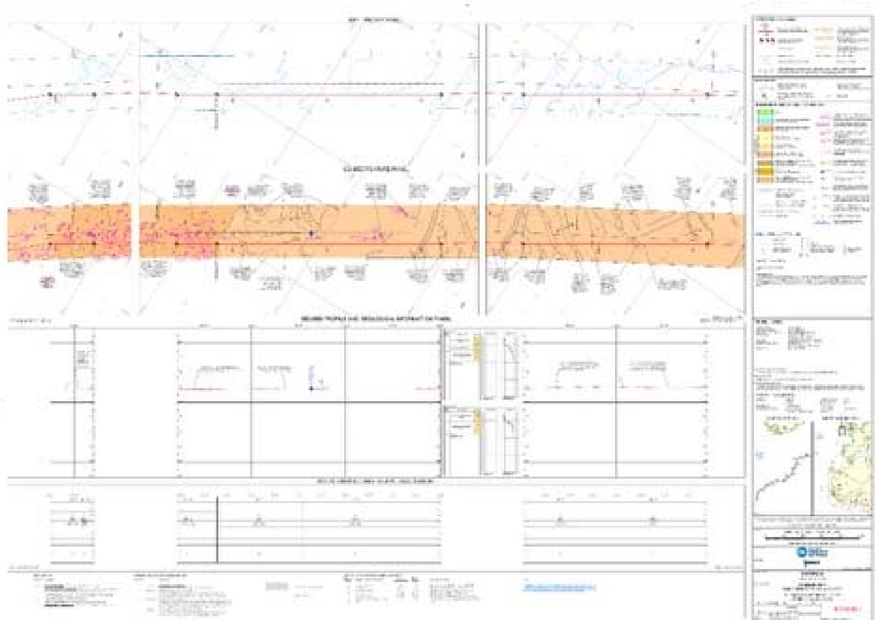


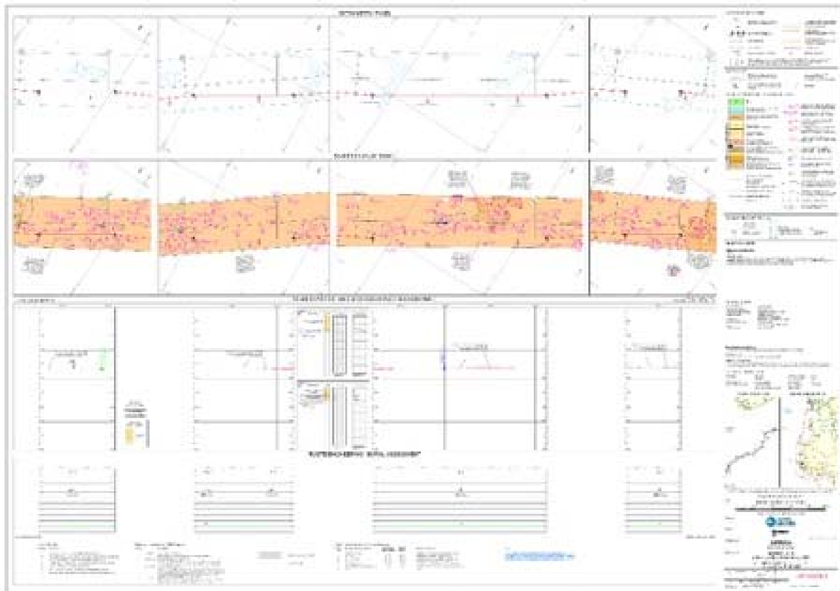


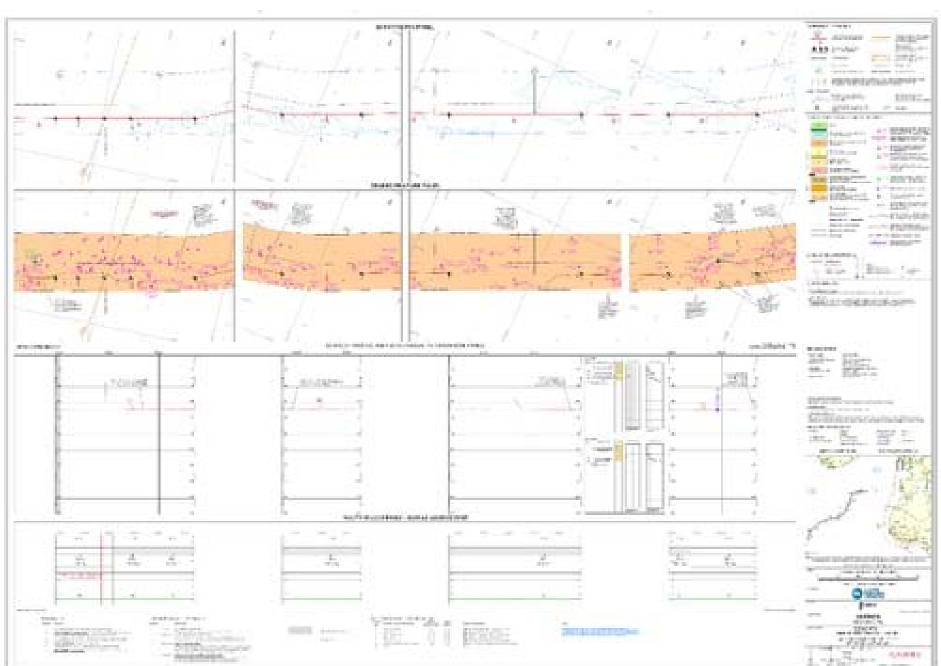


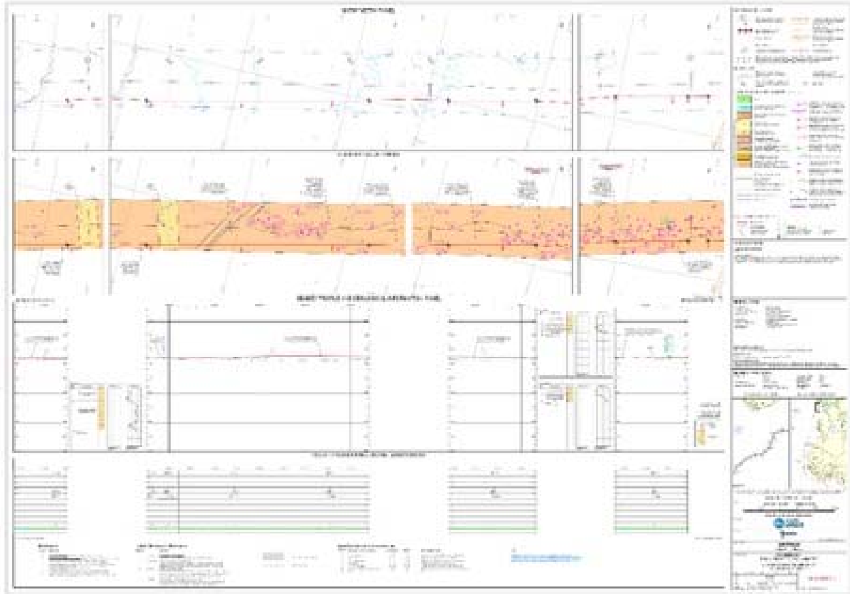


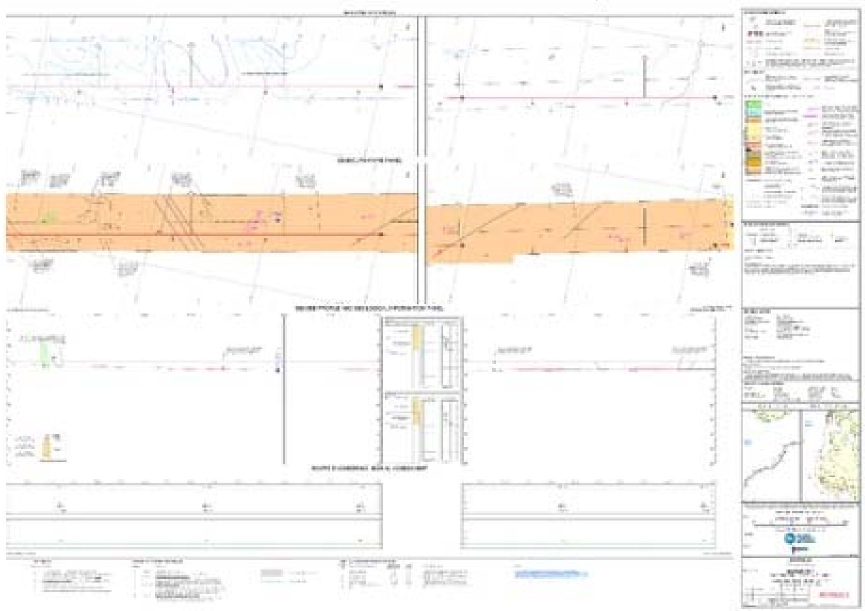


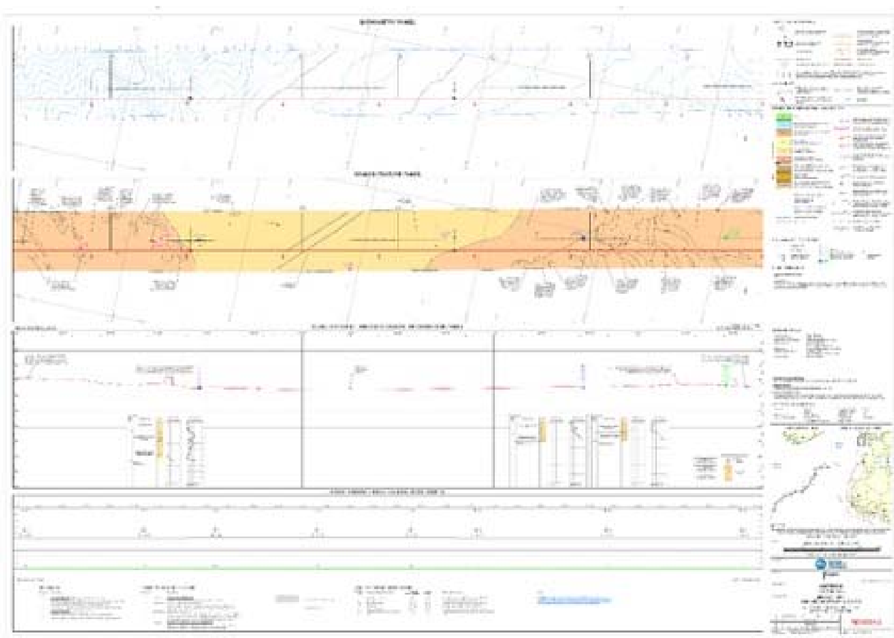


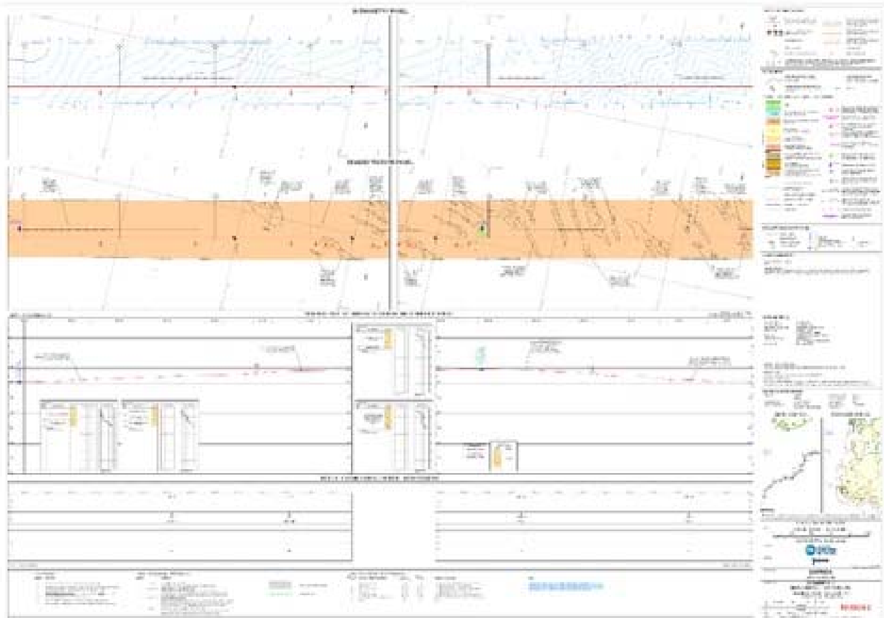


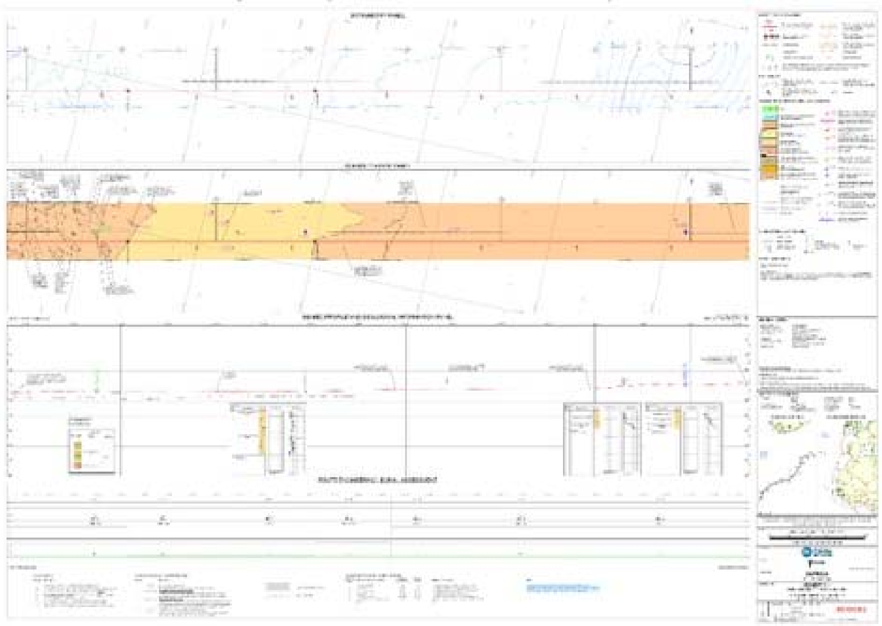


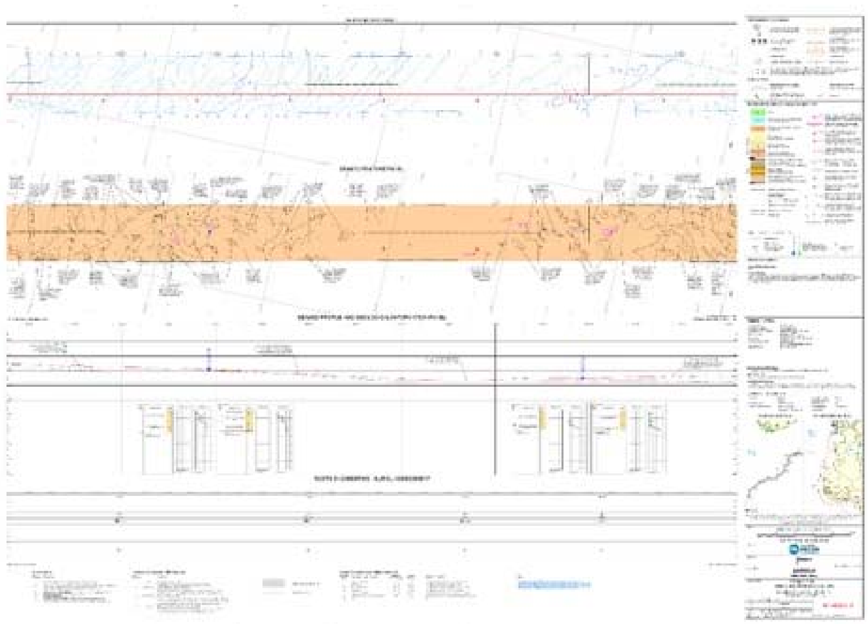


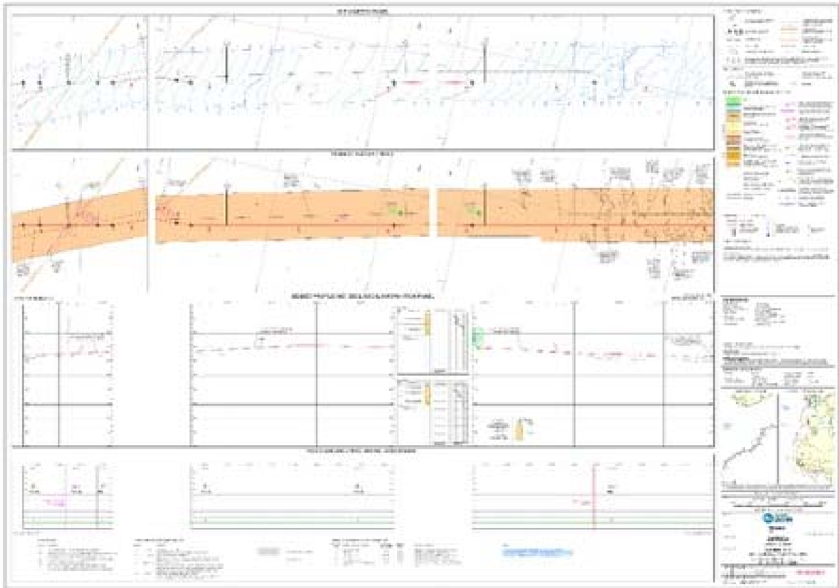


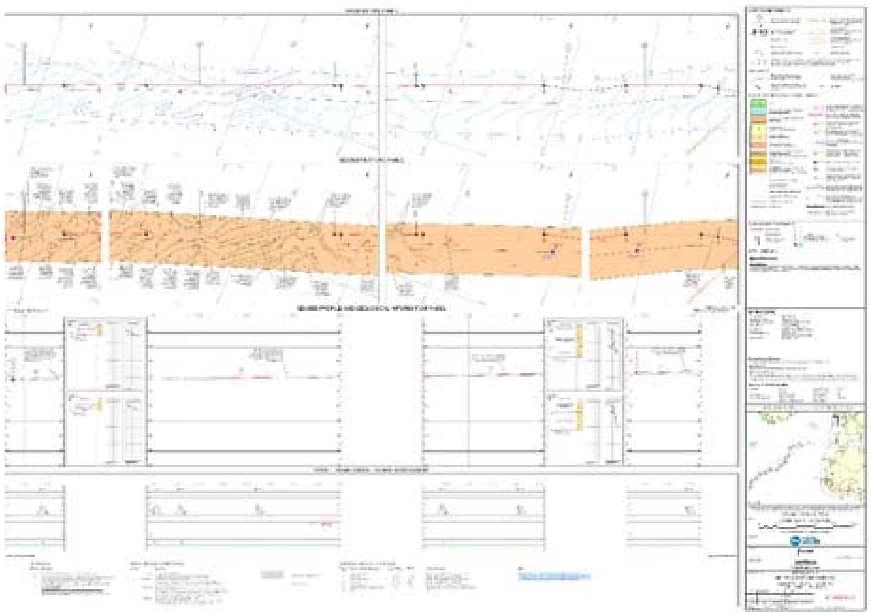


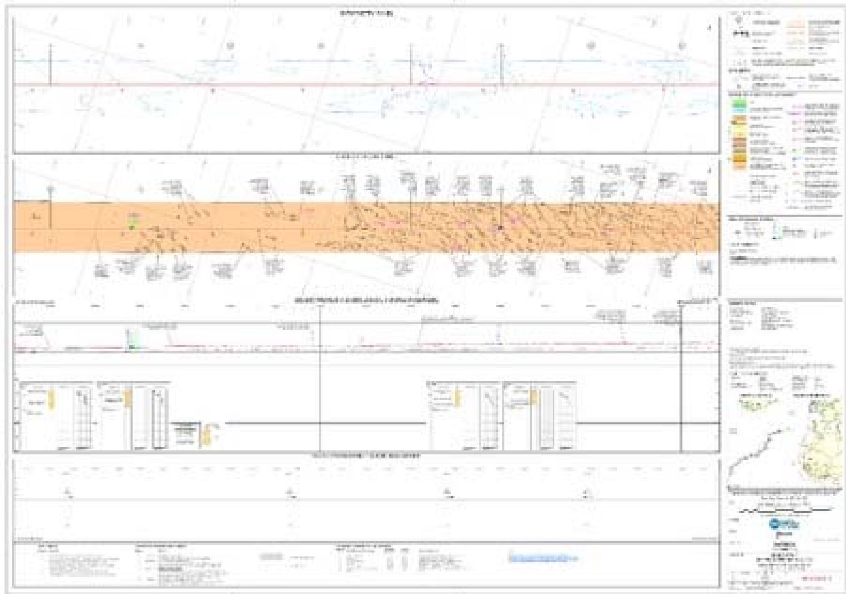


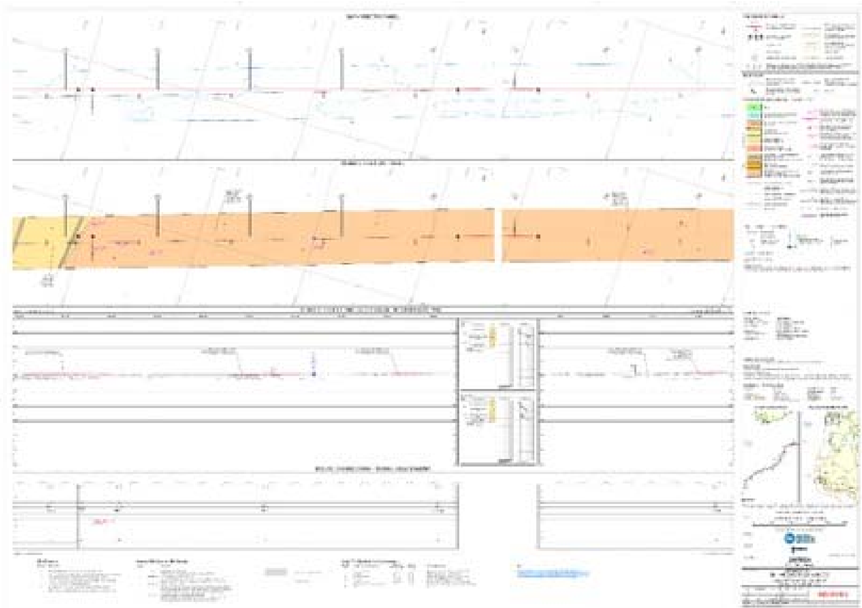


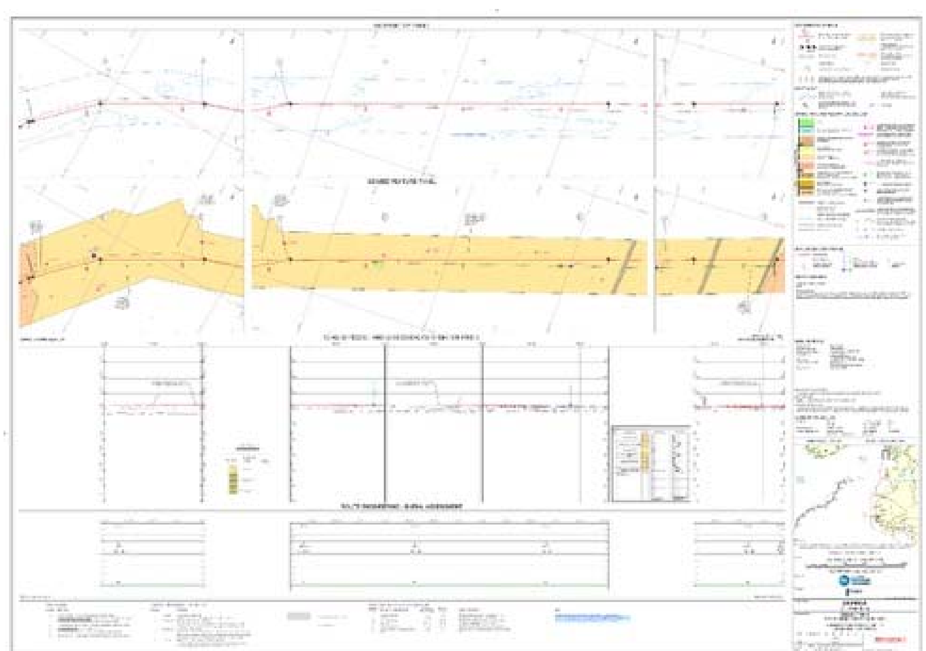


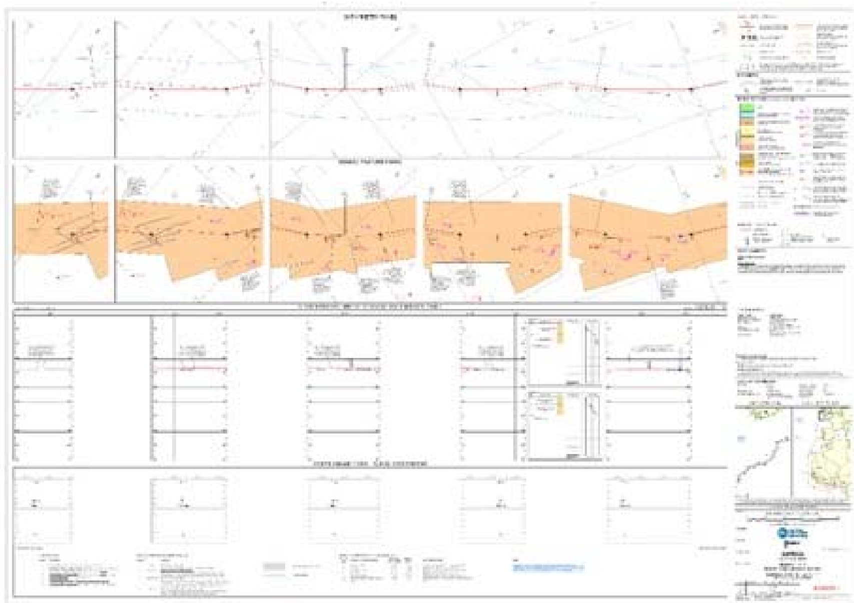


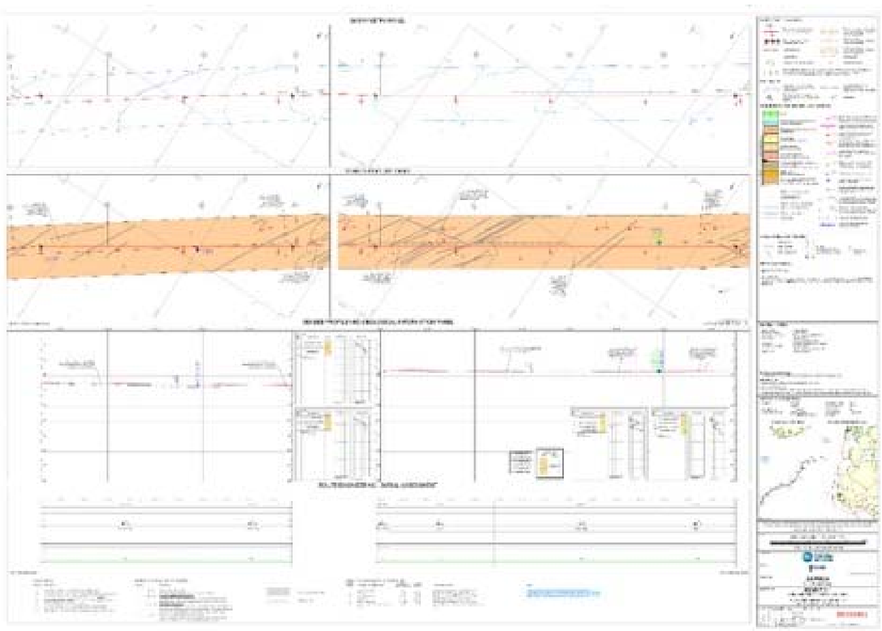


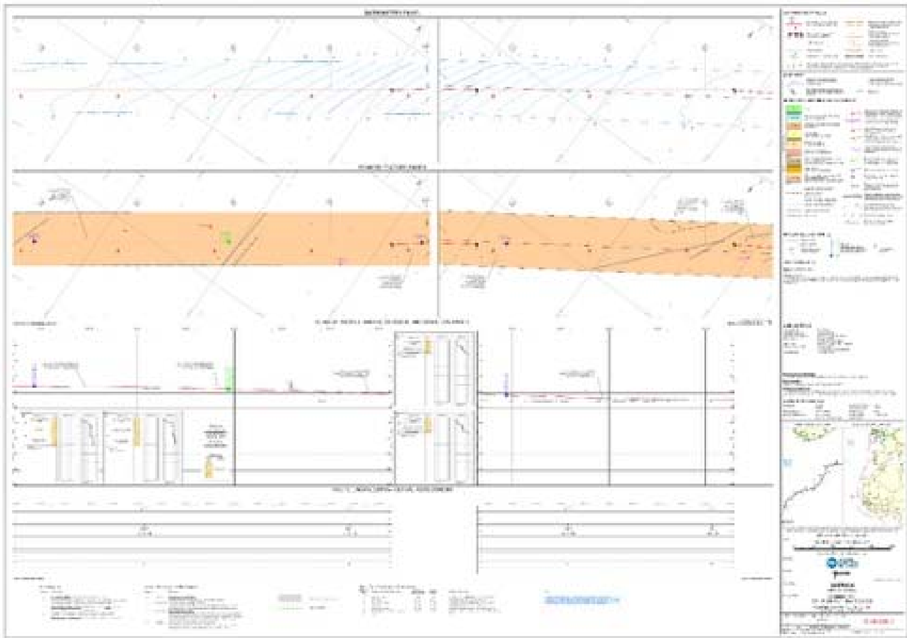


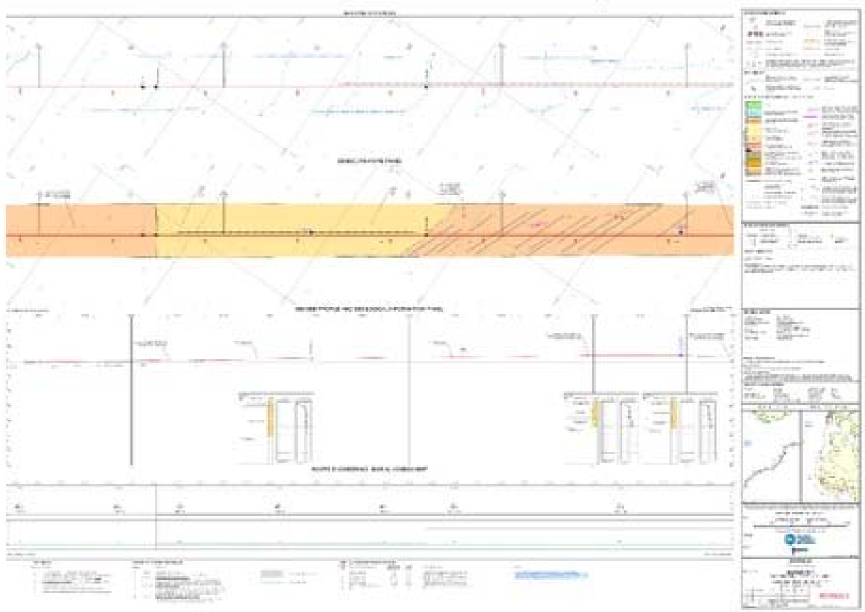


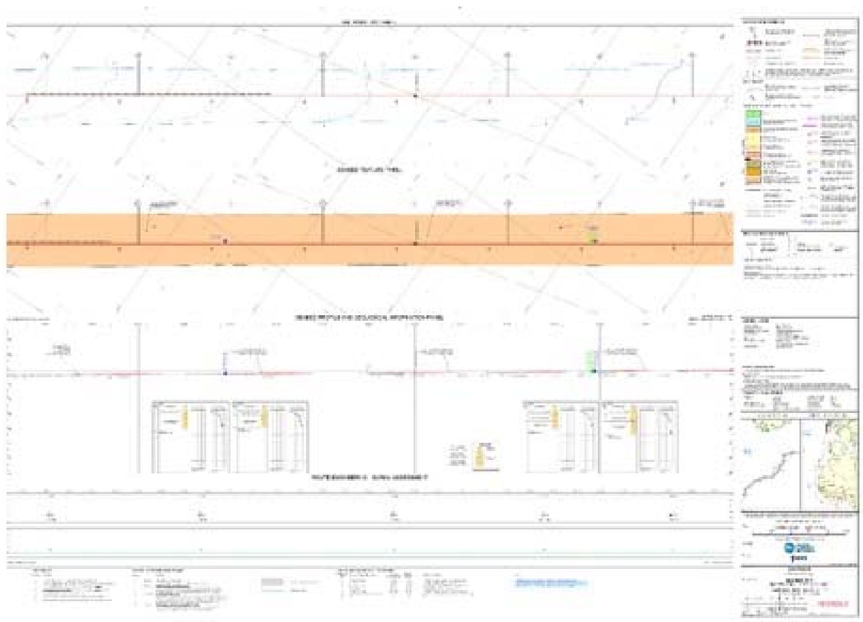


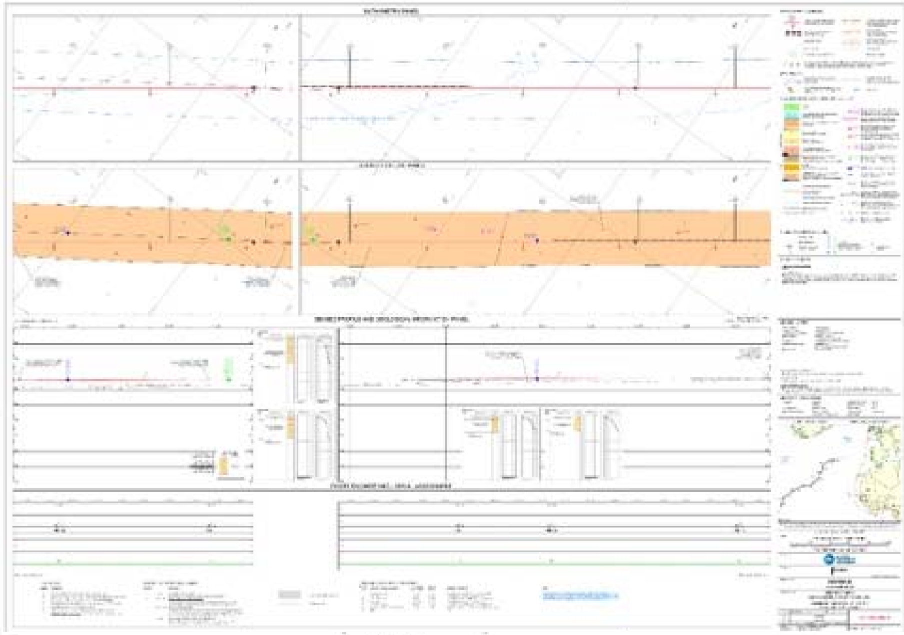


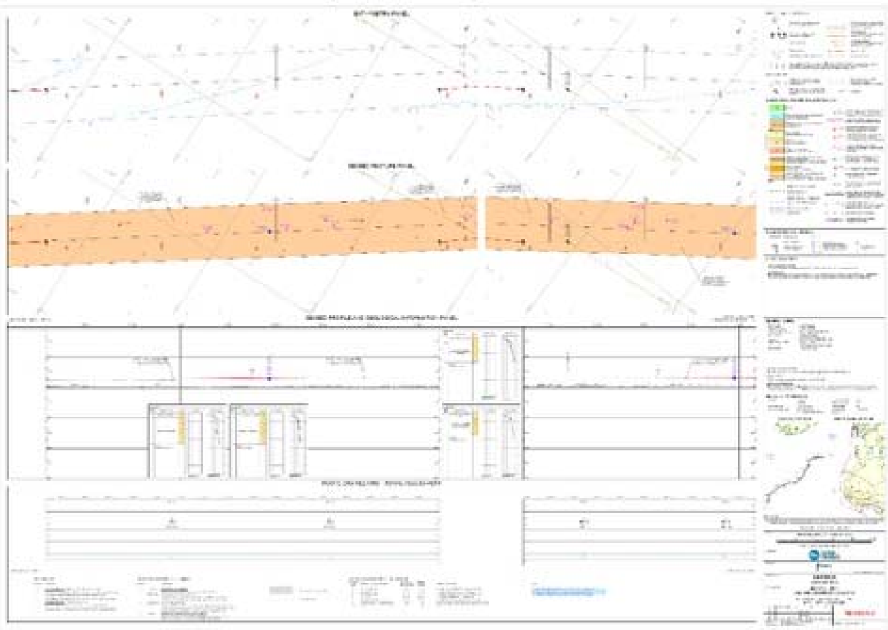


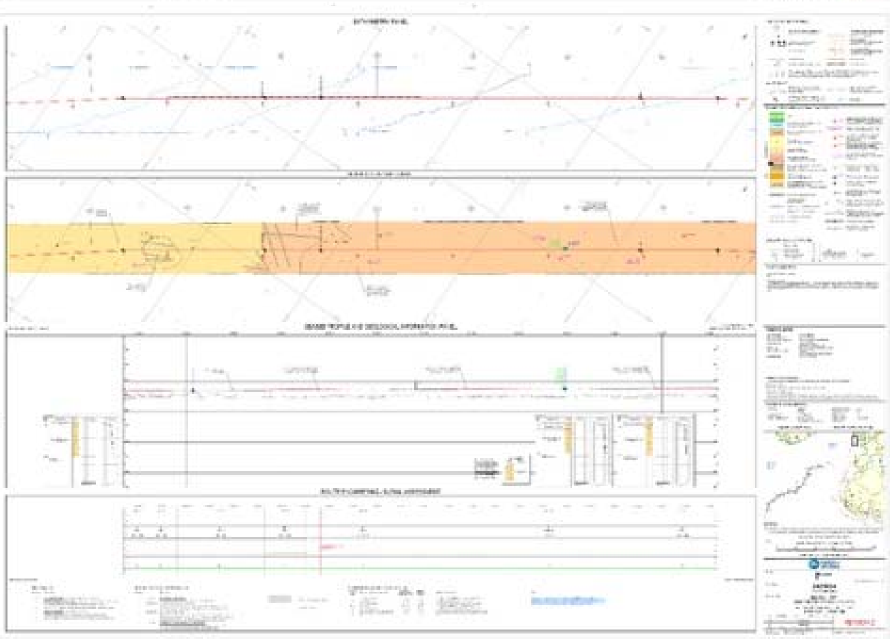


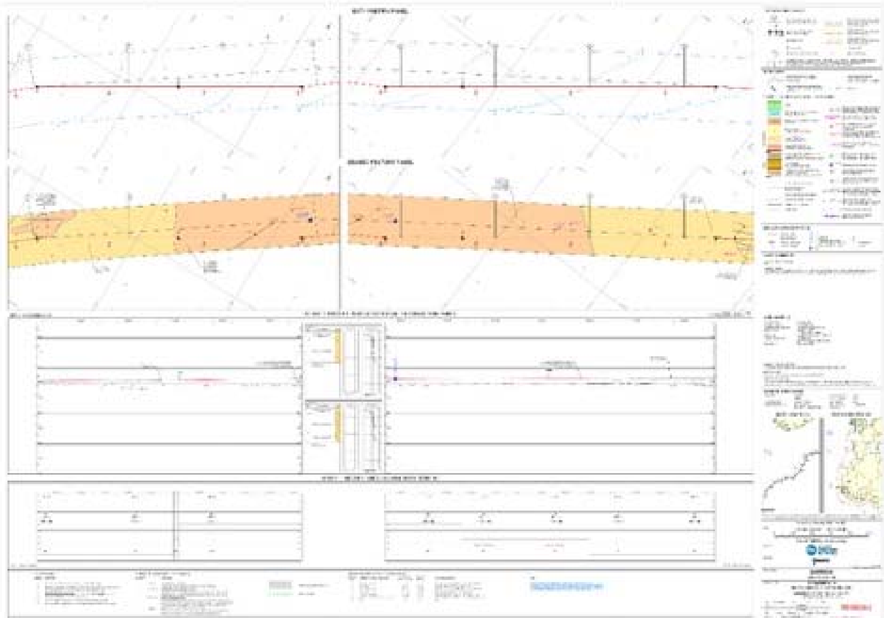


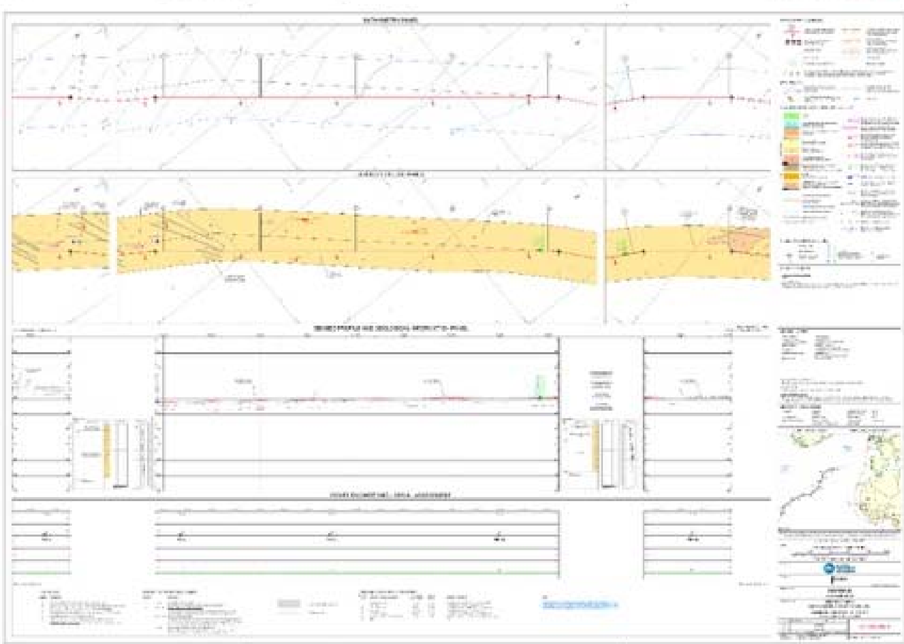


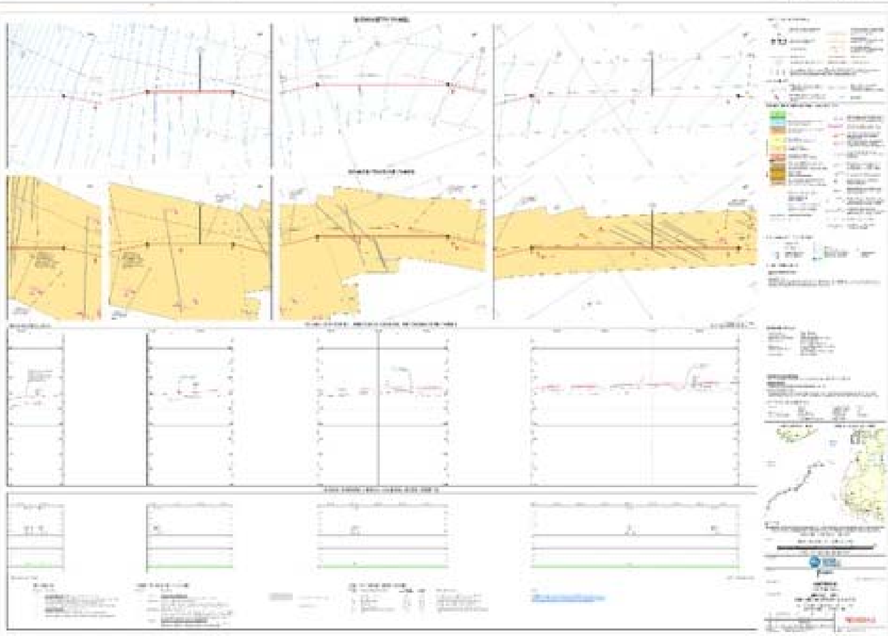


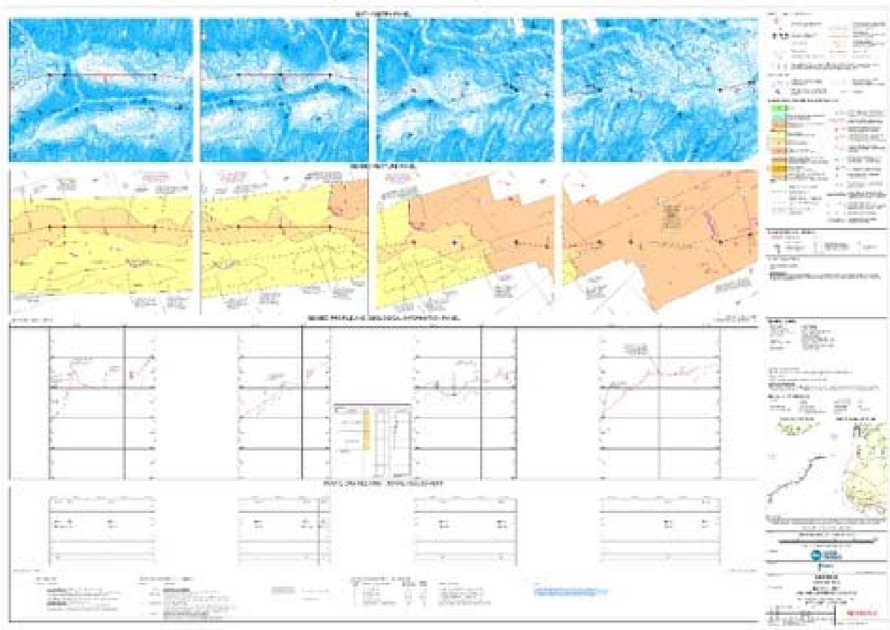


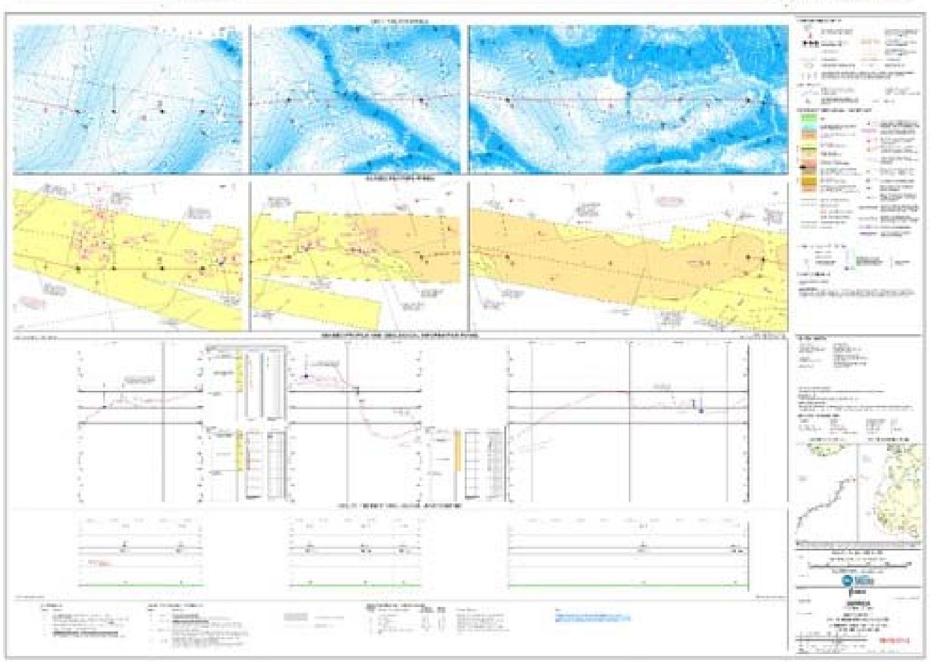


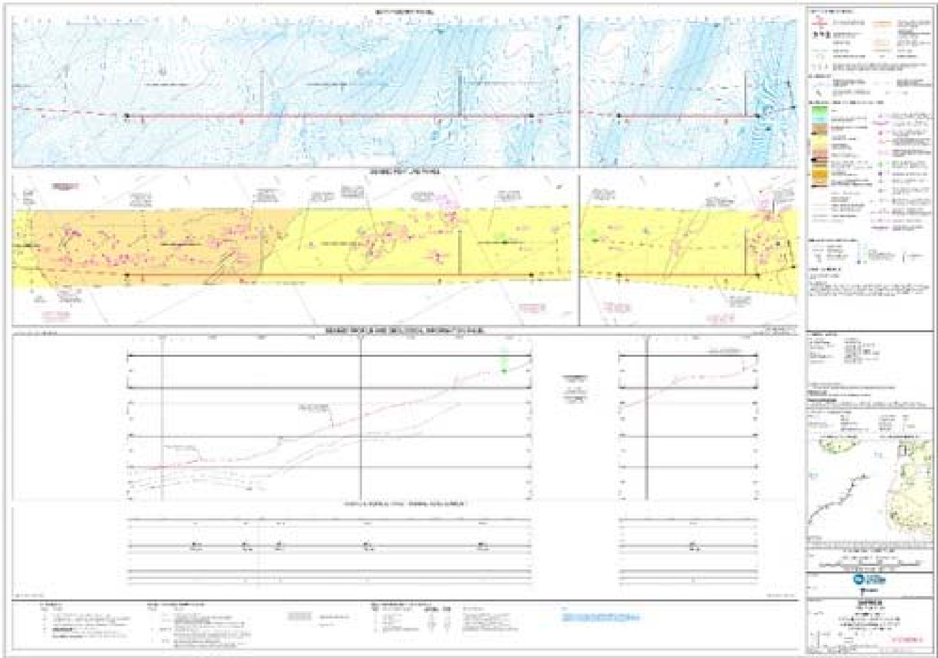


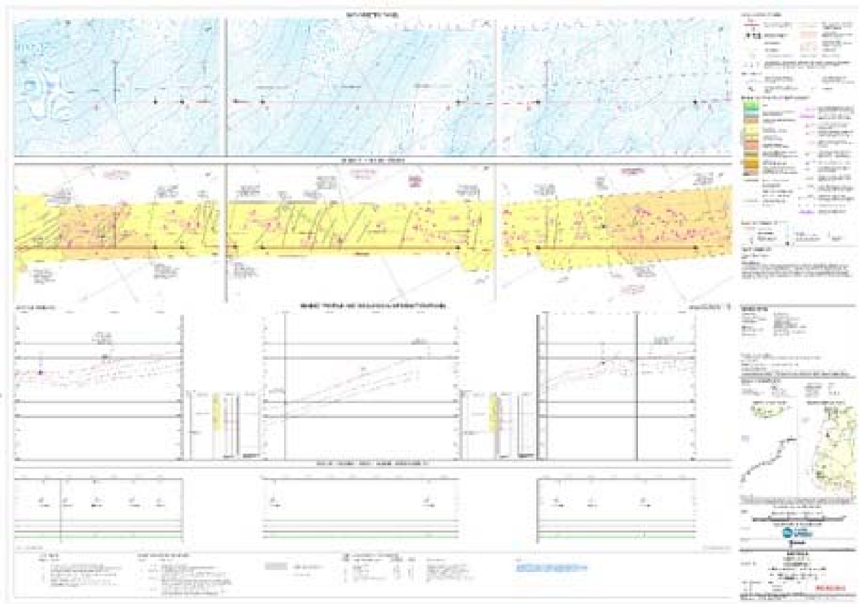


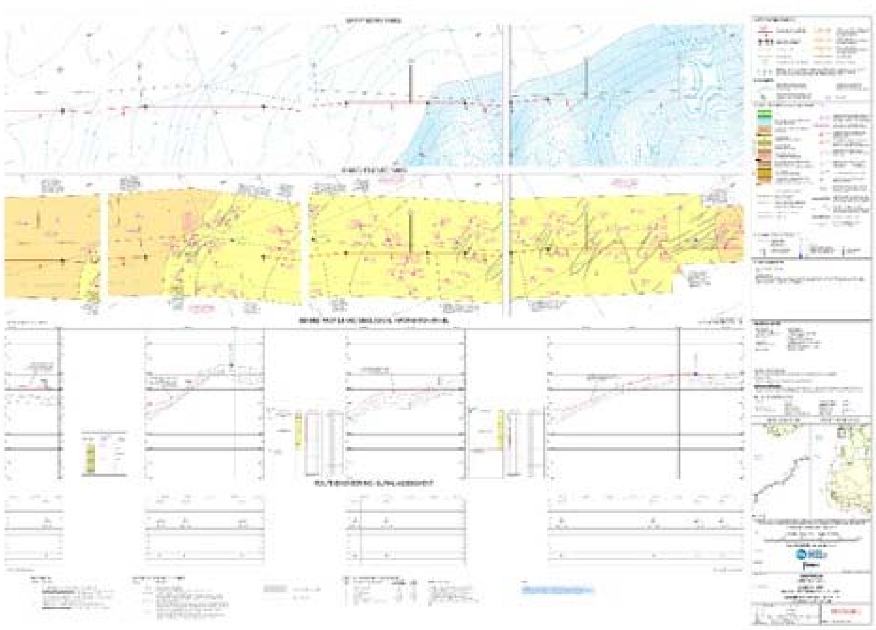


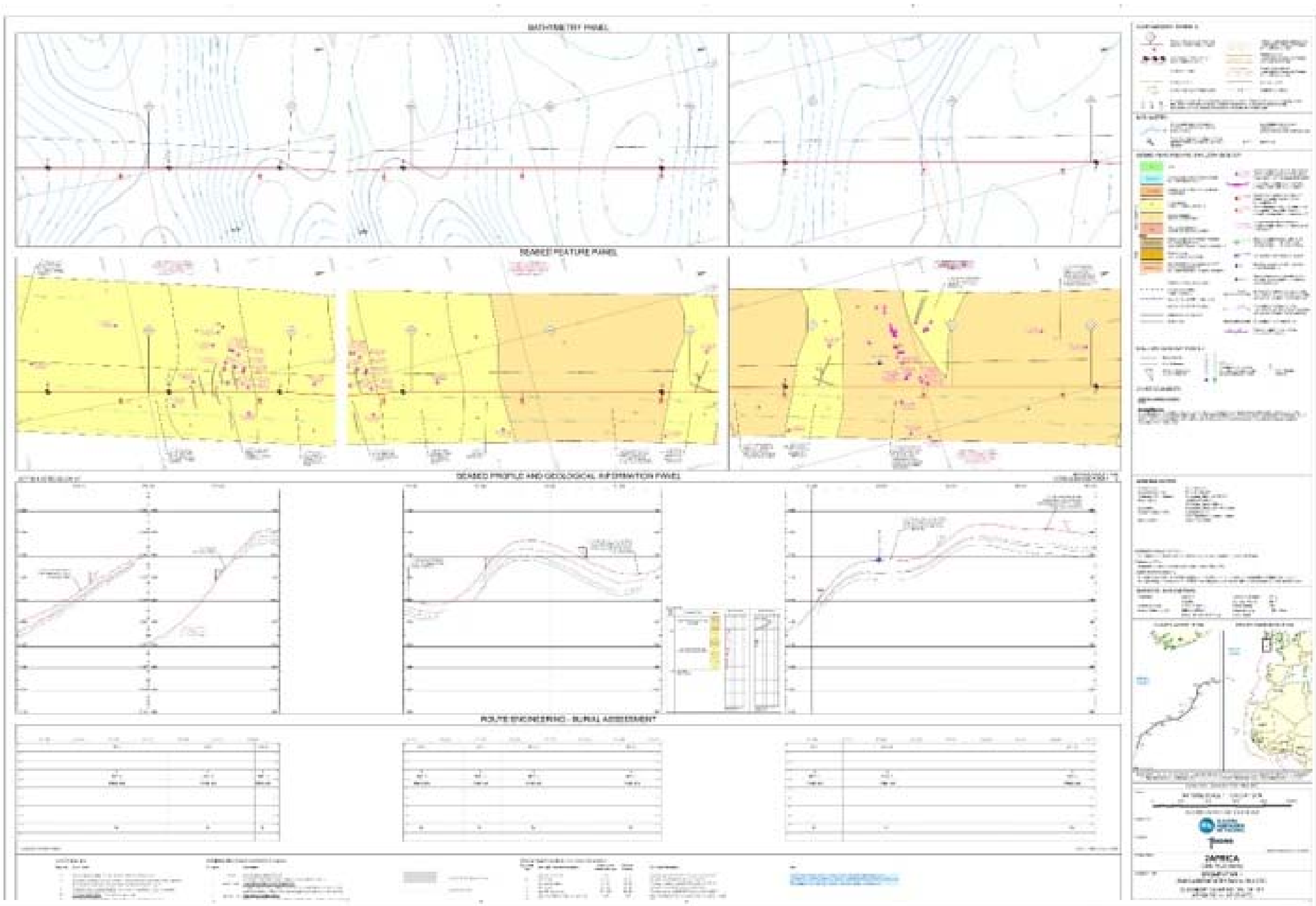








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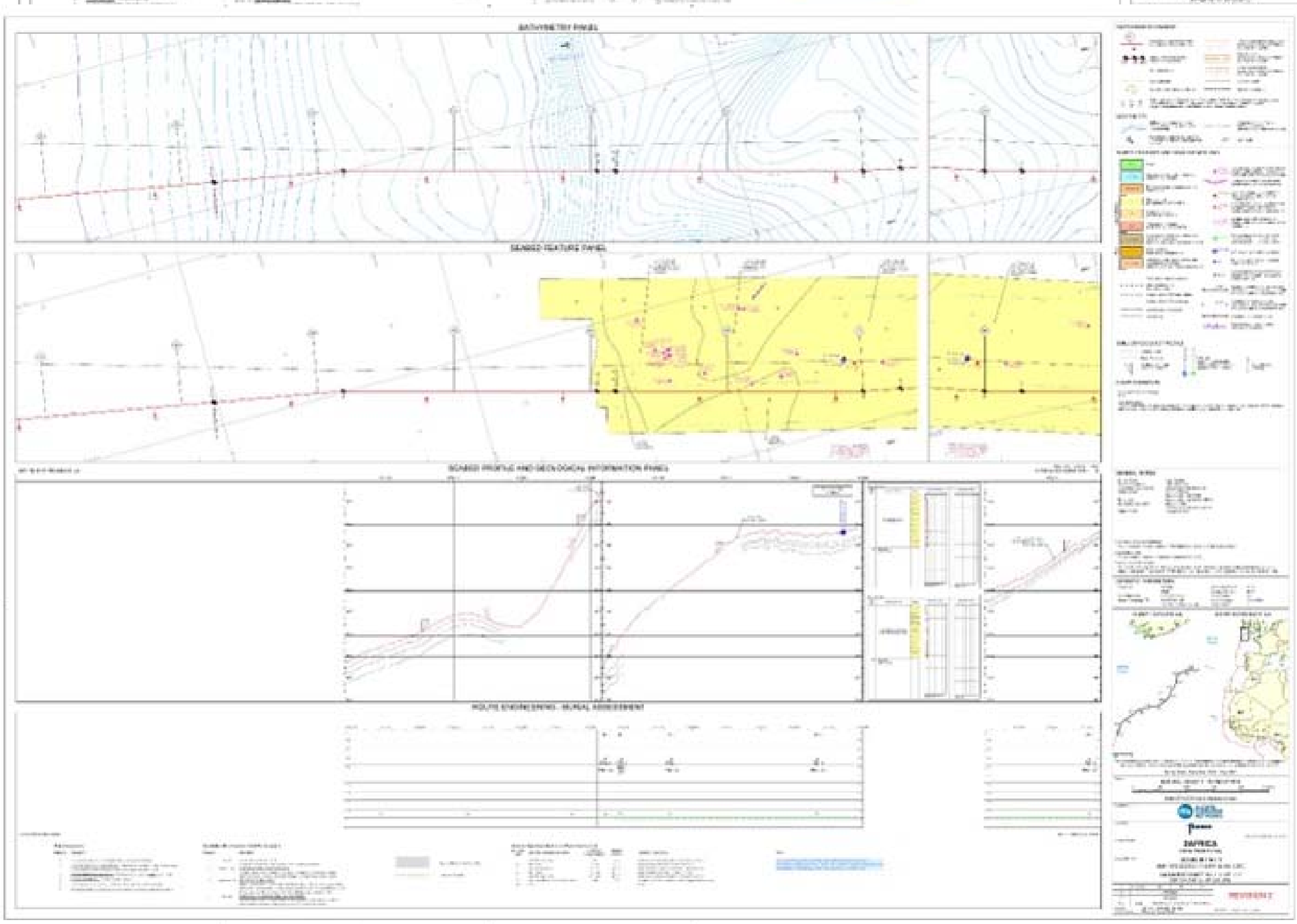
ROUTE ENGINEERING - BURIAL ASSESSMENT
2AFRICA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Appendix IV. Modelled Bottom currents within the Southern Canyons cSAC

ALCATEL SUBMARINE NETWORKS

Bottom Currents in Southern Canyon Special Area of Conservation

Introduction

To investigate potential sediment movement and smothering risk during the installation of the 2Africa cable system, Metocean Analytics tool was used to determine and analyse bottom currents. As shown in Figure 1, 3 points were investigated along the 2 Africa West route as it passes through the Southern Canyon SPAC. The results of the study are presented below.

Figure 1 - Overview of the study area showing the 5 points investigated.

Average Annual Bottom Currents

The average annual bottom currents of all 3 points were determined and results are presented in Table 1. Results show that on average, bottom currents across all 3 points are 0m/s.

Point No.	Average Bottom Current (m/s)
1	0
2	0
3	0

Table 1 - Table showing annual average bottom currents (m/s) at all 5 points.

Probability Distribution of Current Speeds

The probability distribution of current speeds at each point was also investigated using Met Ocean Analytics. Results are shown in the below figures.

Point 1:

As shown in Figure 2, at the beginning of the Irish shelf break, bottom currents between 0.05m/s and 0.1m/s are most likely to be present, with a predicted occurrence of 49.77% annually. The highest predicted current at Point 1 is between 0.2m/s and 0.25m/s, however probability of these speeds occurring are insignificant and only predicted to be seen 0.58% across the year.

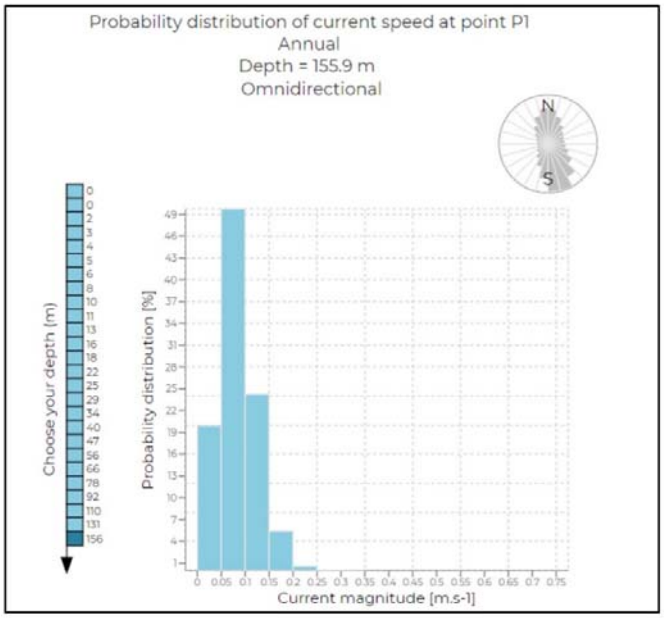

Figure 2 - Probability Distribution of Bottom Currents at Point 1

Point 2

As the 2Africa route drops off the shelf break and begins to enter the Southern Canyon, bottom currents drop further. As seen in Figure 3, currents between 0.00m/s and 0.05m/s are most prominent current speed present and are predicted to occur 44.6% of the year. Following this, speeds between 0.05m/s and 0.1m/s make up another 36.83%, resulting in currents below 0.1m/s accounting for 81.43% of the annual distribution. The highest speed predicted is between 0.25m/s and 0.3m/s, however this only accounts for 0.19% of the distribution and therefore poses insignificant risk.

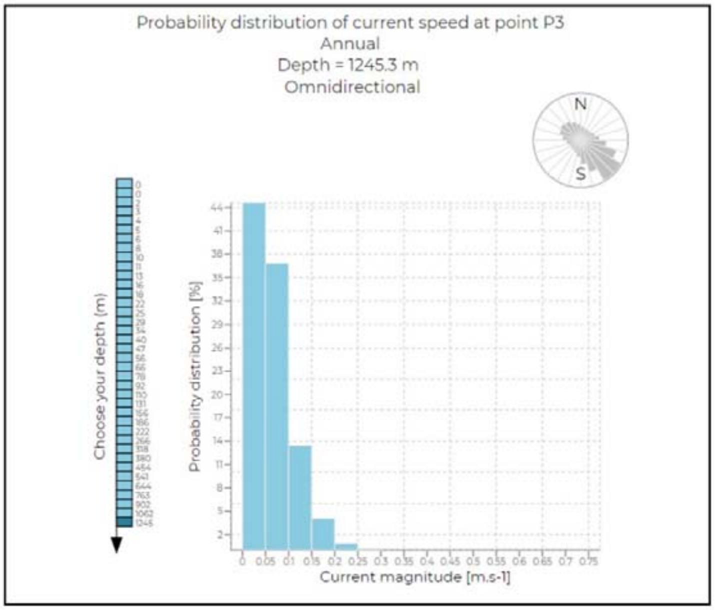

Figure 3 - Probability Distribution of Bottom Currents at Point 2

Point 3

Towards the bottom of the shelf, as represented by Figure 3, the distribution of bottom currents moves even further to the left, whereby 93.27% of bottom currents are predicted to be between 0m/s and 0.05m/s. The remaining 6.37% are predicted to be between 0.05m/s and 0.1m/s.

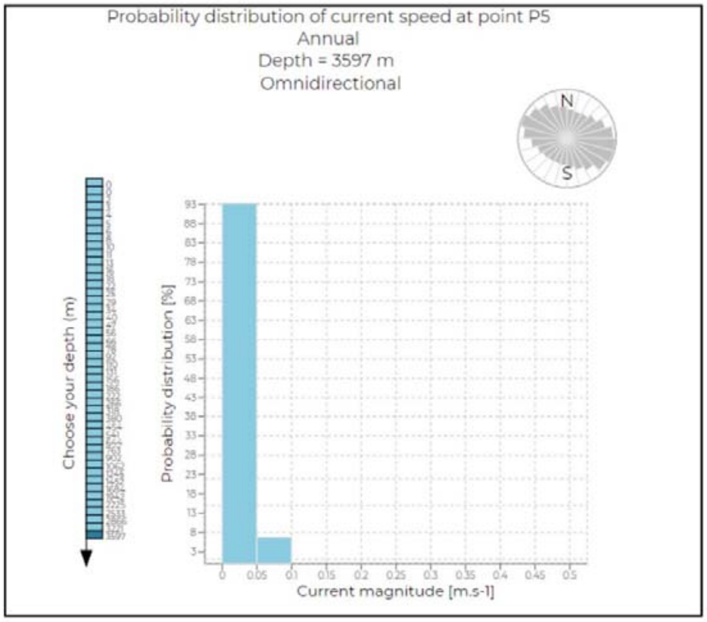

Figure 4 - Probability Distribution of Bottom Currents at Point 3

Conclusion

The results from the analysis conclude that bottom currents throughout the Southern Canyon Special Areas of Conservation pose minimal if any risk of significant sediment movement or smothering during the installation of the 2 Africa cable system.