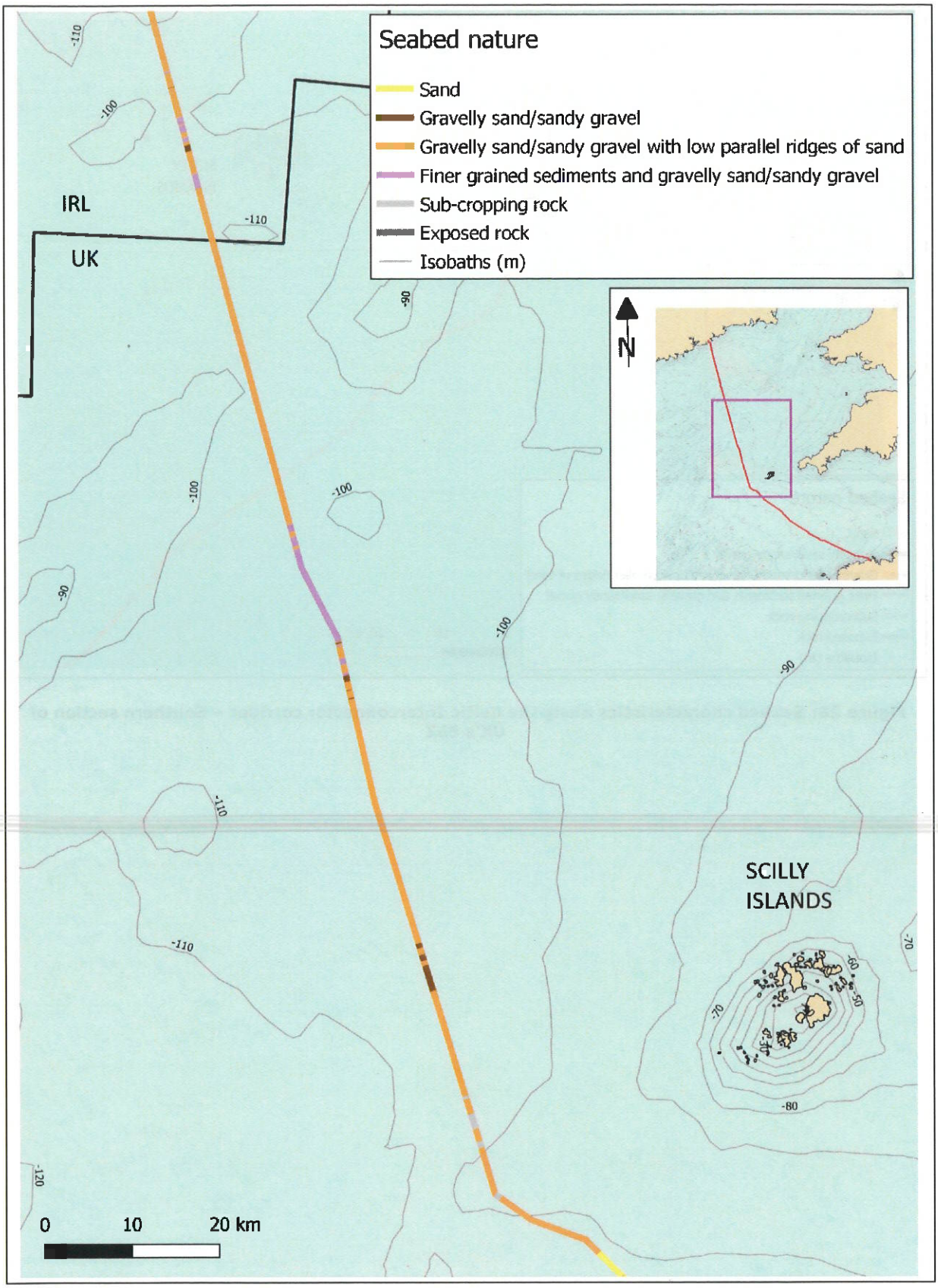


Figure 27: Seabed characteristics along the Celtic Interconnector corridor – Northern section of UK's EEZ

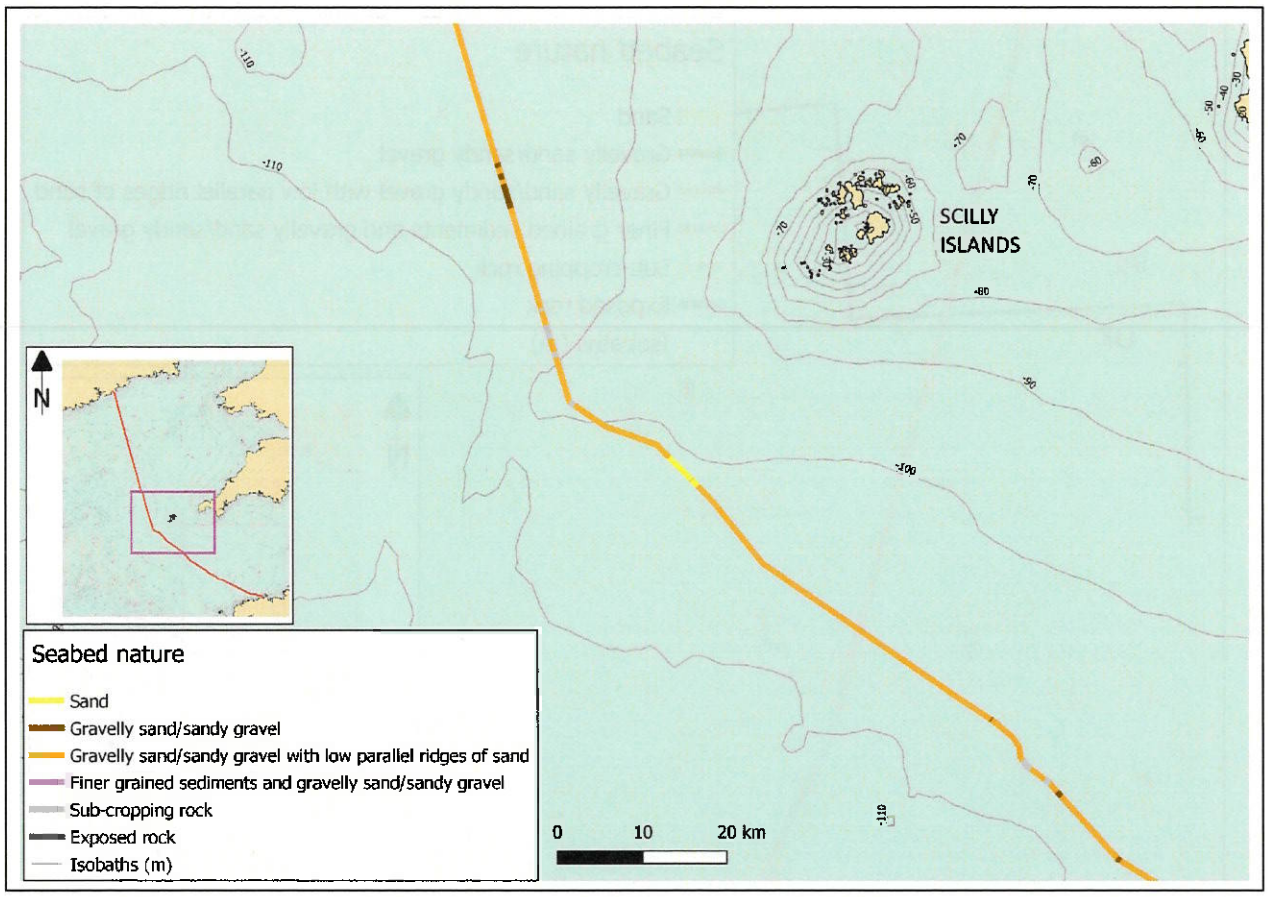


Figure 28: Seabed characteristics along the Celtic Interconnector corridor – Southern section of UK's EEZ

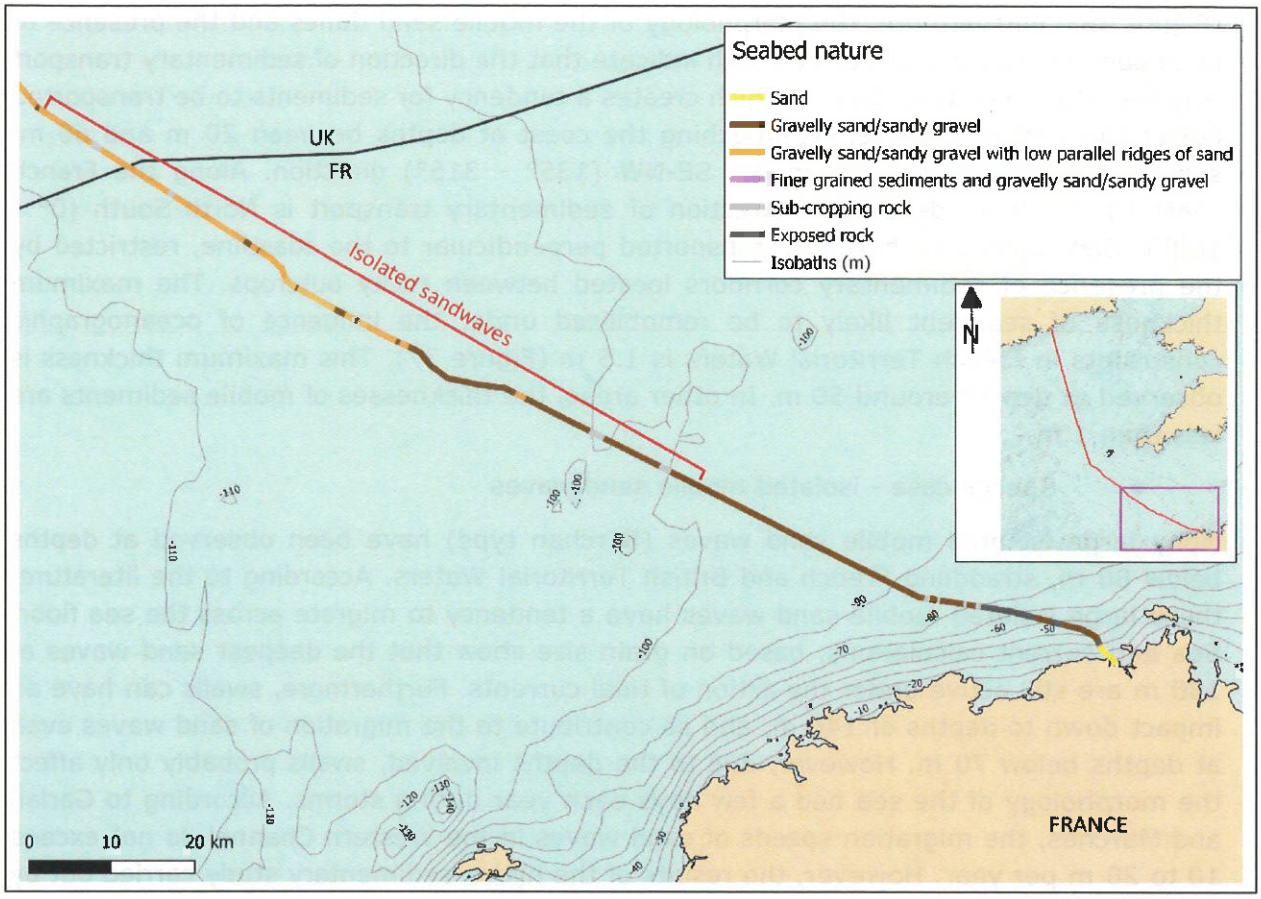


Figure 29: Seabed characteristics along the Celtic Interconnector corridor – France's EEZ

6.3.1.6 Sediment dynamics

To a depth of approximately 15 m near the Irish landfall point, the direction of sedimentary transport is generally north to south (Figure 30). Sediments are transported downwards between rocky outcrops. Between depths of 15 m and 80 m in Irish Territorial Waters, the direction of sedimentary transport is oriented in the 45° - 225° direction, usually parallel to the isobaths and generally characterised as coastal drift. Below depths of 80 m, sedimentary motion follows an ENE-WSW (67° - 247°) direction, transporting sediments along the main axis of the Celtic Sea. Figure 31 illustrates sedimentary thicknesses which may be impacted by sediment remobilisation within the cable corridor in Irish Territorial Waters. Thicknesses remains relatively low, most often below 1 m.

At the approaches to the Isles of Scilly in UK EEZ, sediments move gradually moving along an East-West axis (90° - 270°, Figure 32). Moving south from the Isles of Scilly, the direction of sedimentary transport returns to East North East (ENE)-WSW (67° - 247°), transporting sediment along the main axis of the English Channel (Figure 34). In UK EEZ, it appears that the maximum thickness of sediments which may potentially be subject to remobilisation is 1.5 m, these appear in the most southerly section (Figure 35). Off the coast of the Isles of Scilly the thickness of sediments that could be mobilised is generally less than 1 m.

At depths below 80 m in French territorial waters the direction of sedimentary transport is 67° - 247° (ENE-WSW), the currents flow along the main axis of the English Channel

(Figure 36). Furthermore, the morphology of the mobile sand dunes and the presence of polarised sedimentary structures both indicate that the direction of sedimentary transport is in the WSW direction (247°), which creates a tendency for sediments to be transported out of the English Channel. Approaching the coast at depths between 20 m and 60 m, sedimentary transport turns in the SE-NW (135° - 315°) direction. Along the French coast (0 to -20 m deep), the direction of sedimentary transport is North-South (0° - 180°). Sediments are therefore transported perpendicular to the coastline, restricted by the presence of sedimentary corridors located between rocky outcrops. The maximum thickness of sediment likely to be remobilised under the influence of oceanographic constraints in French Territorial Waters is 1.5 m (Figure 37). This maximum thickness is observed at depths around 50 m. In other areas, the thicknesses of mobile sediments are less than 1 m.

- Special case - isolated mobile sand waves

Many large isolated mobile sand waves (Barchan type) have been observed at depths below 80 m, straddling French and British Territorial Waters. According to the literature, these large isolated mobile sand waves have a tendency to migrate across the sea floor. Sea bed current calculations, based on grain size show that the deepest sand waves at 180 m are still active under the action of tidal currents. Furthermore, swells can have an impact down to depths of 140 m, and so contribute to the migration of sand waves even at depths below 70 m. However, due to the depths involved, swells probably only affect the morphology of the sea bed a few days each year during storms. According to Garlan and Marchès, the migration speeds of sand waves in the Western Channel do not exceed 10 to 20 m per year. However, the results of the hydro-sedimentary study carried out by ACRI-IN and OpenOcean for EirGrid and RTE inside the immediate study area indicate that the large isolated mobile sand waves migrate between 0 and 7 m per year.

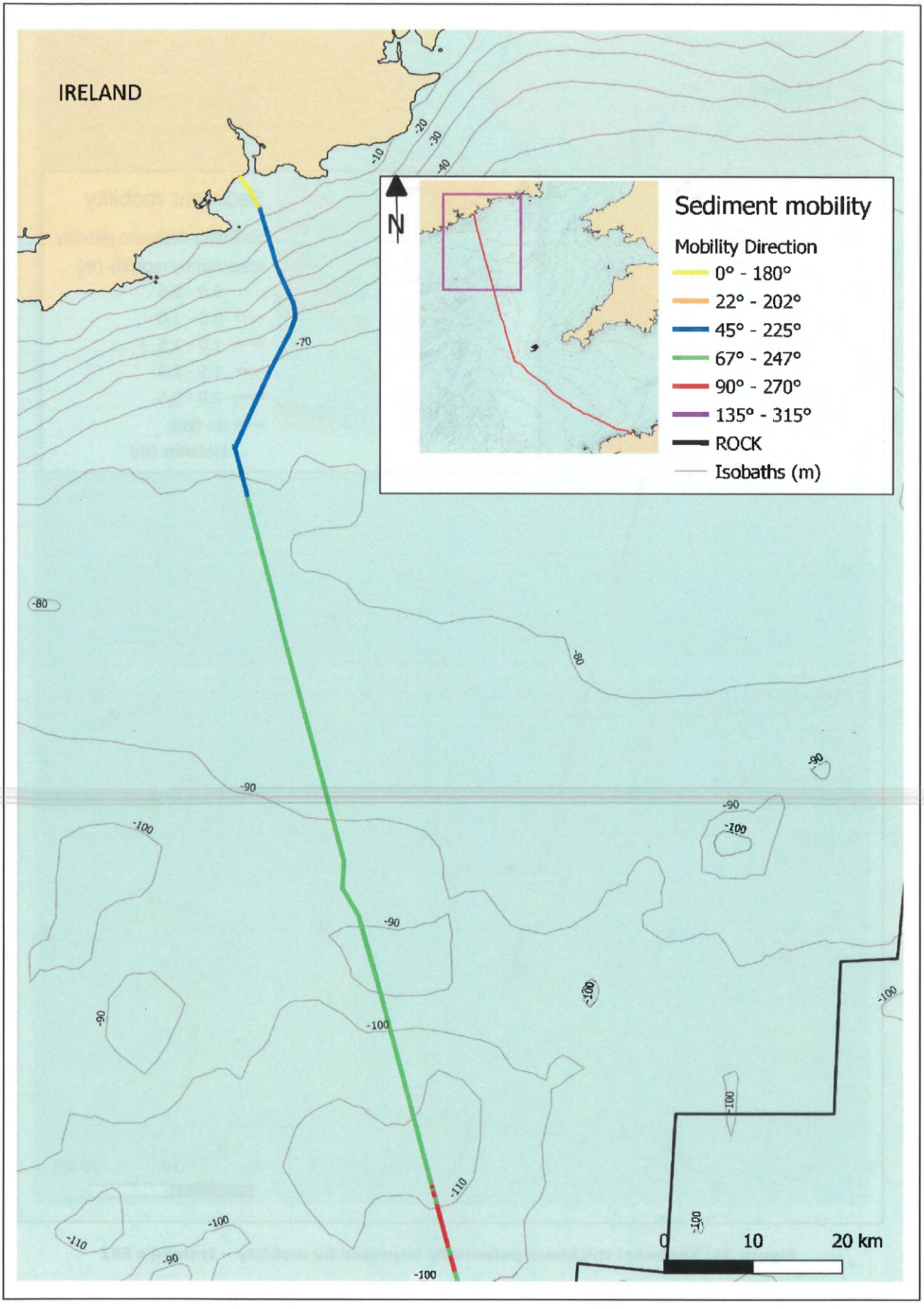


Figure 30: Sediment direction of transport (in degrees) – Ireland's EEZ

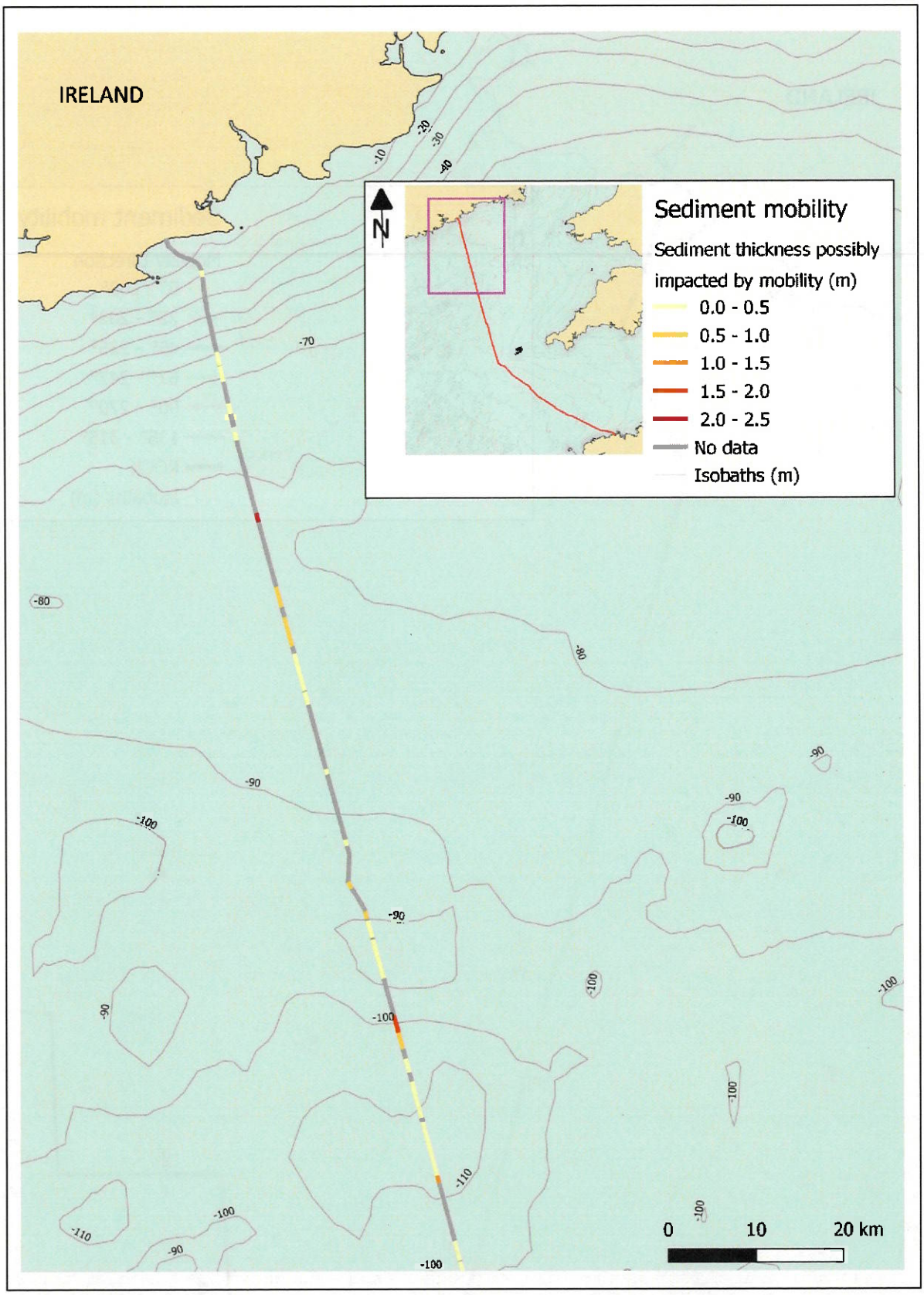


Figure 31: Sediment thickness potentially impacted by mobility – Ireland's EEZ

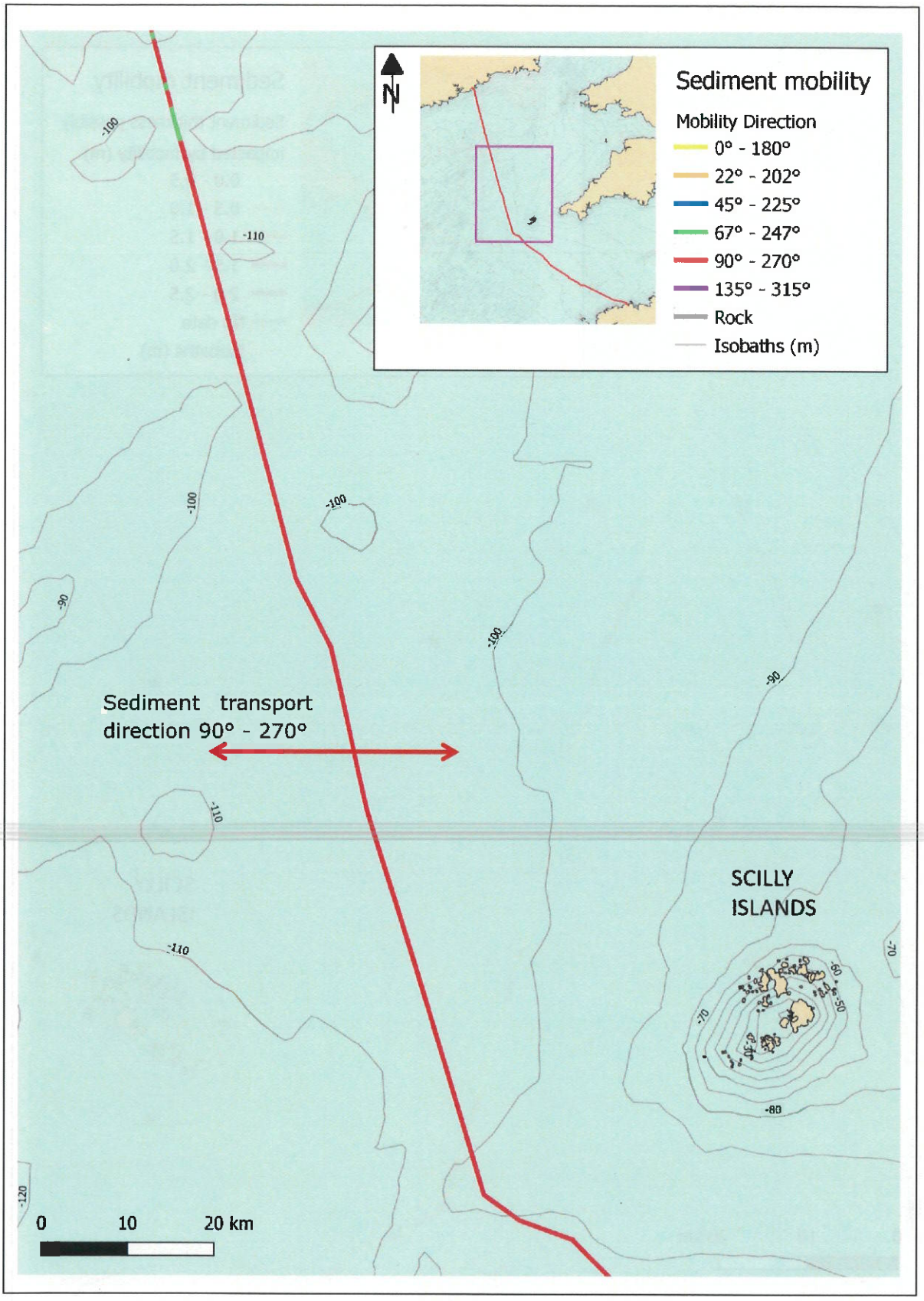


Figure 32: Sediment direction of transport (in degrees) – Northern section of UK's EEZ

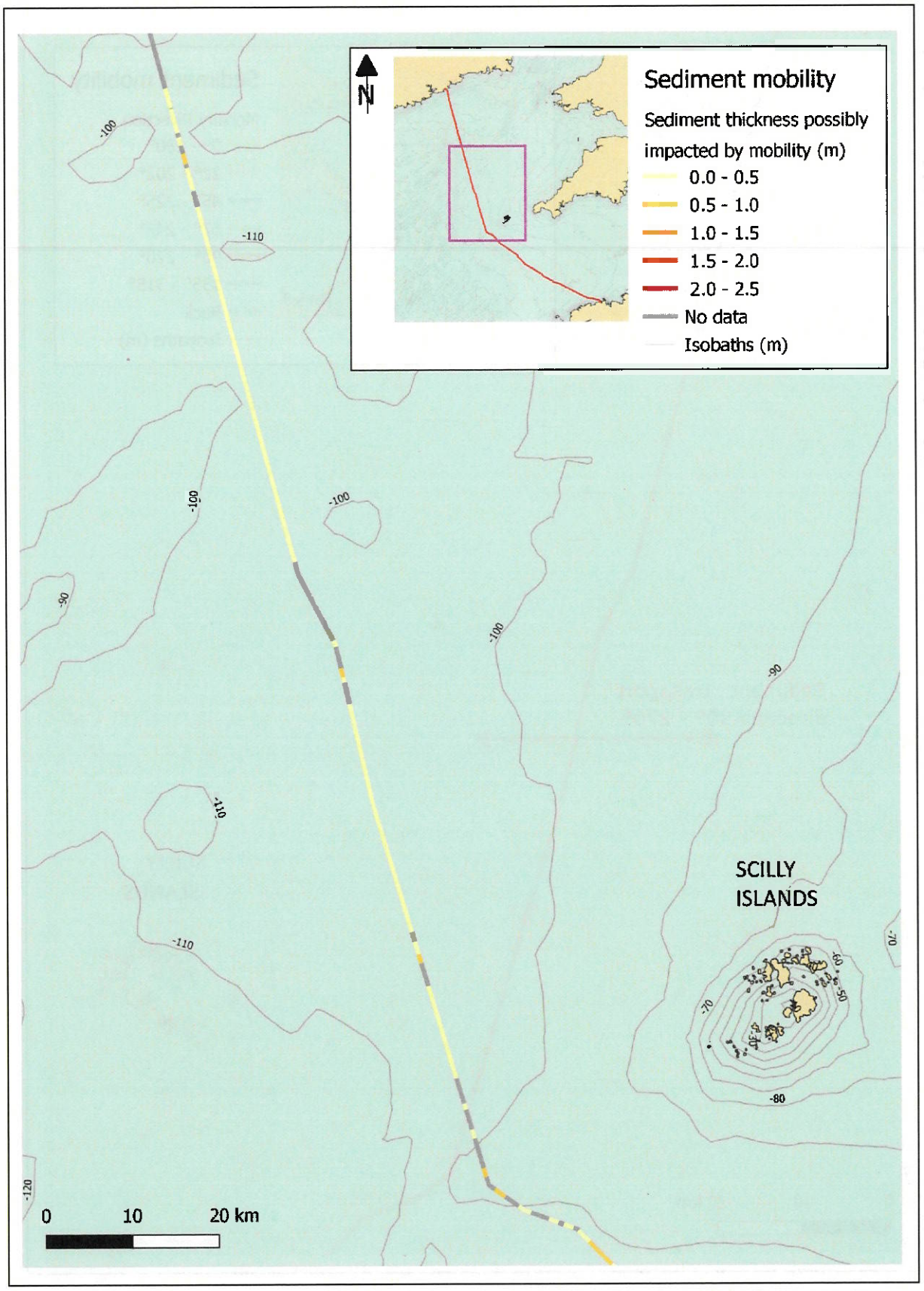


Figure 33: Sediment thickness potentially impacted by mobility – Northern section of UK's EEZ

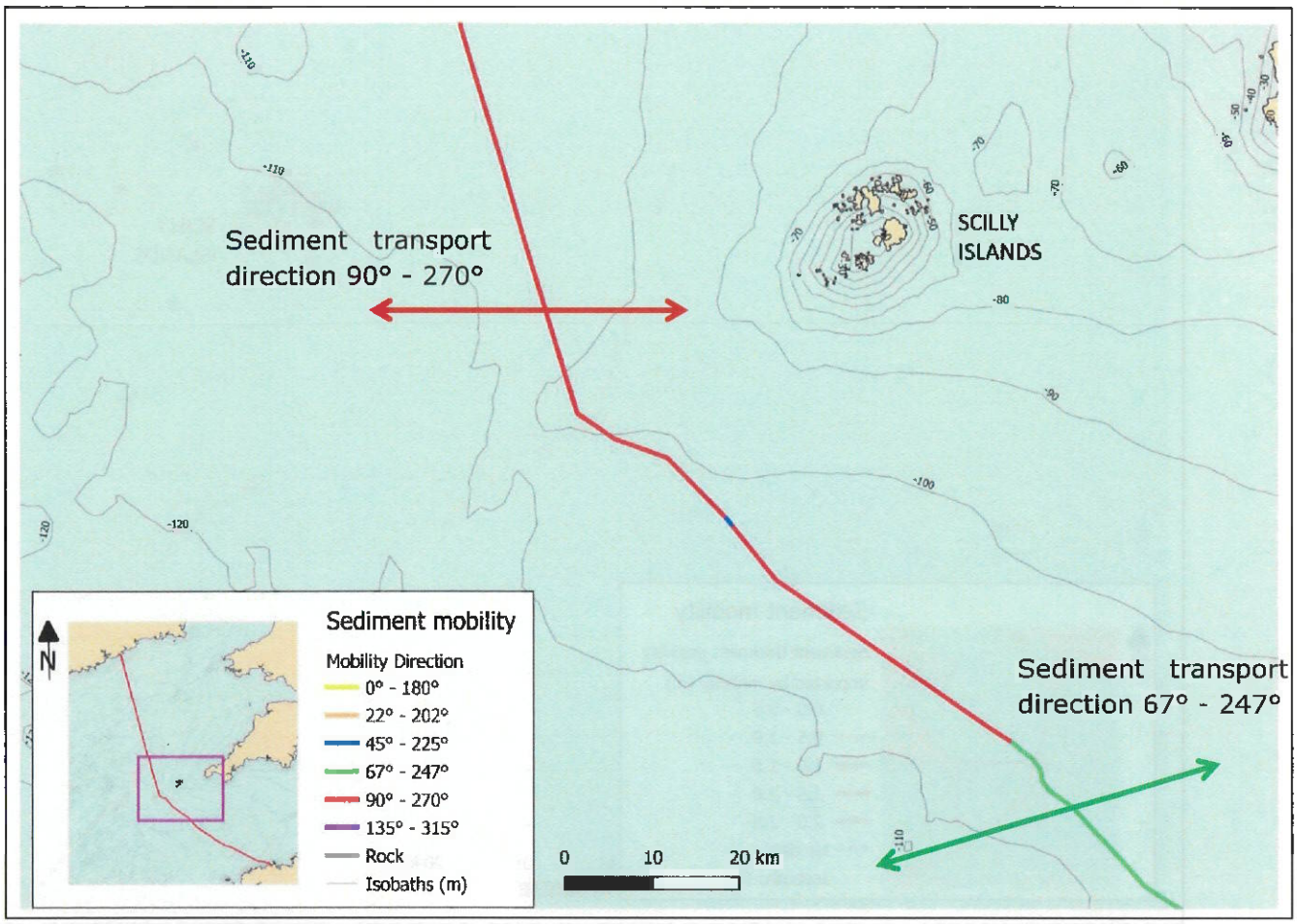


Figure 34: Sediment direction of transport (in degrees) – Southern section of UK's EEZ

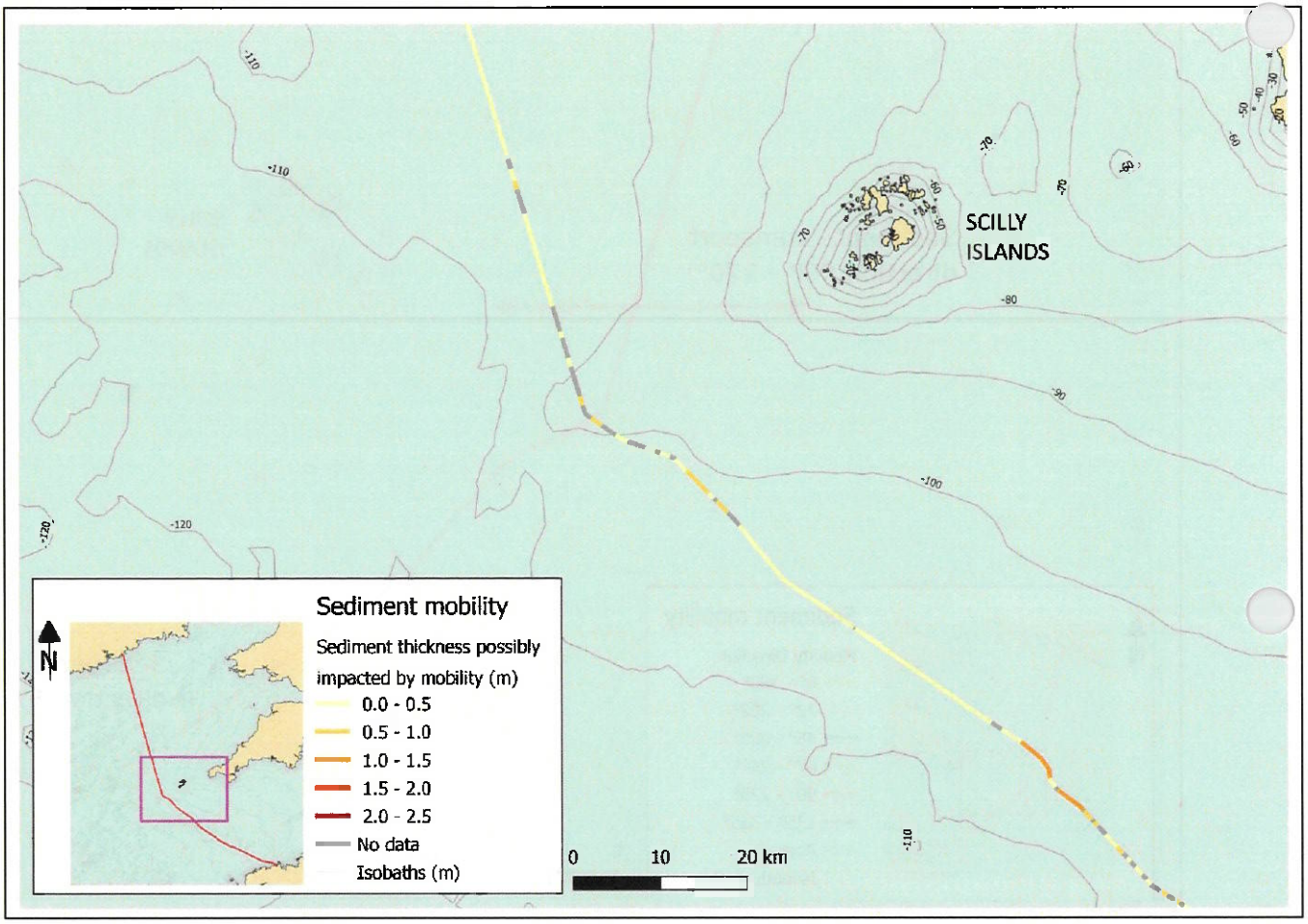


Figure 35: Sediment thickness potentially impacted by mobility – Southern section of UK's EEZ

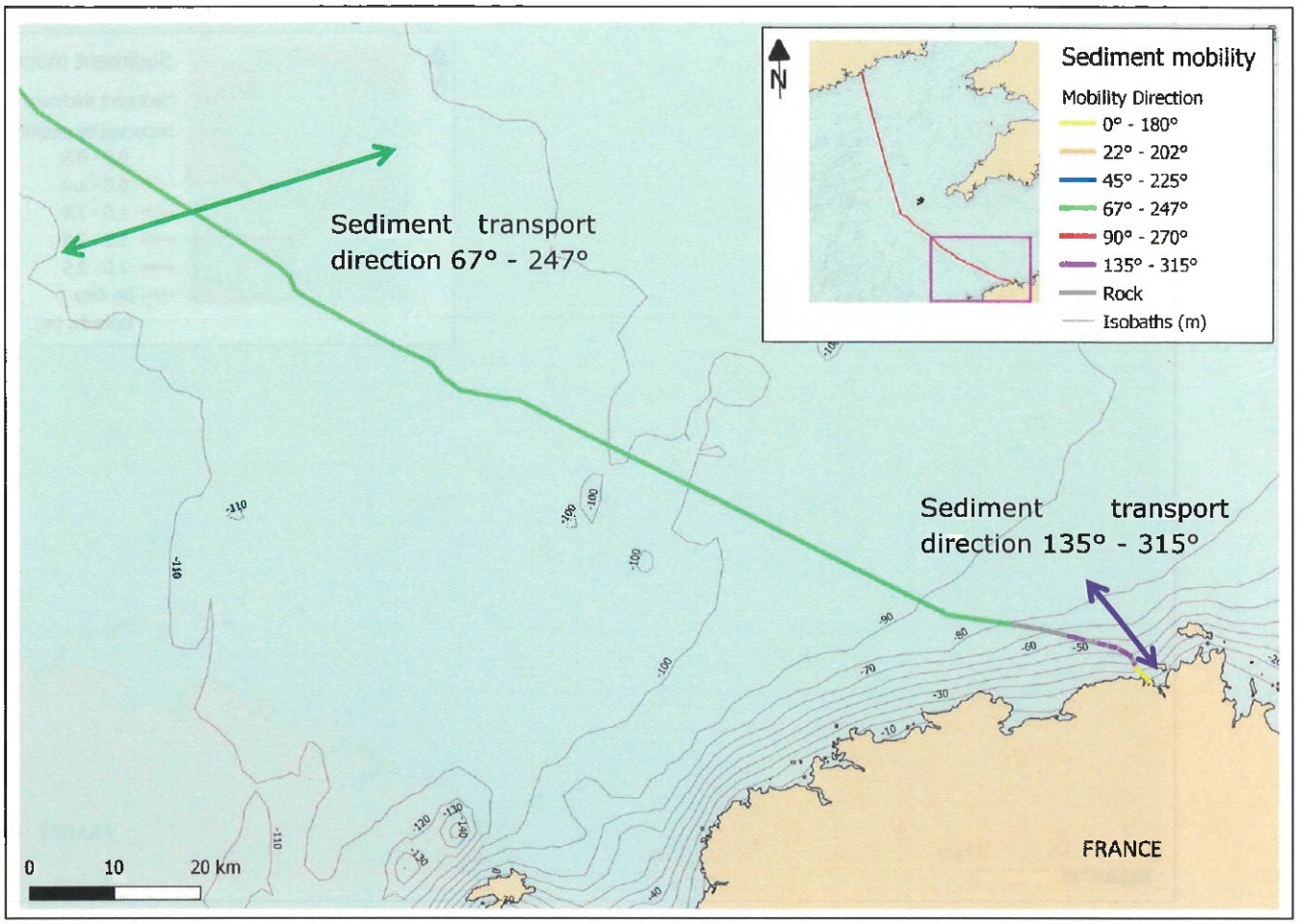


Figure 36: Sediment direction of mobility (in degrees) – France's EEZ

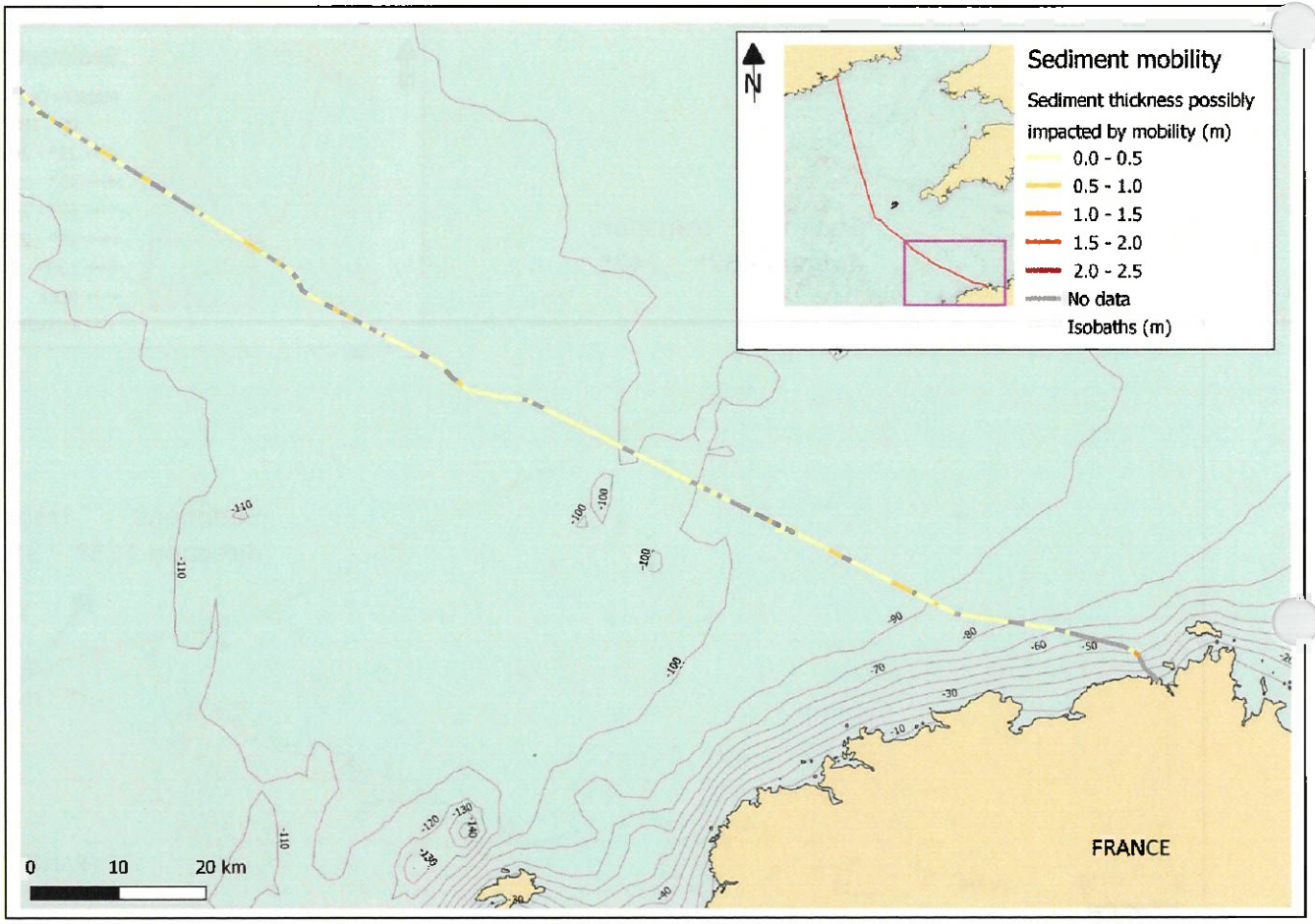
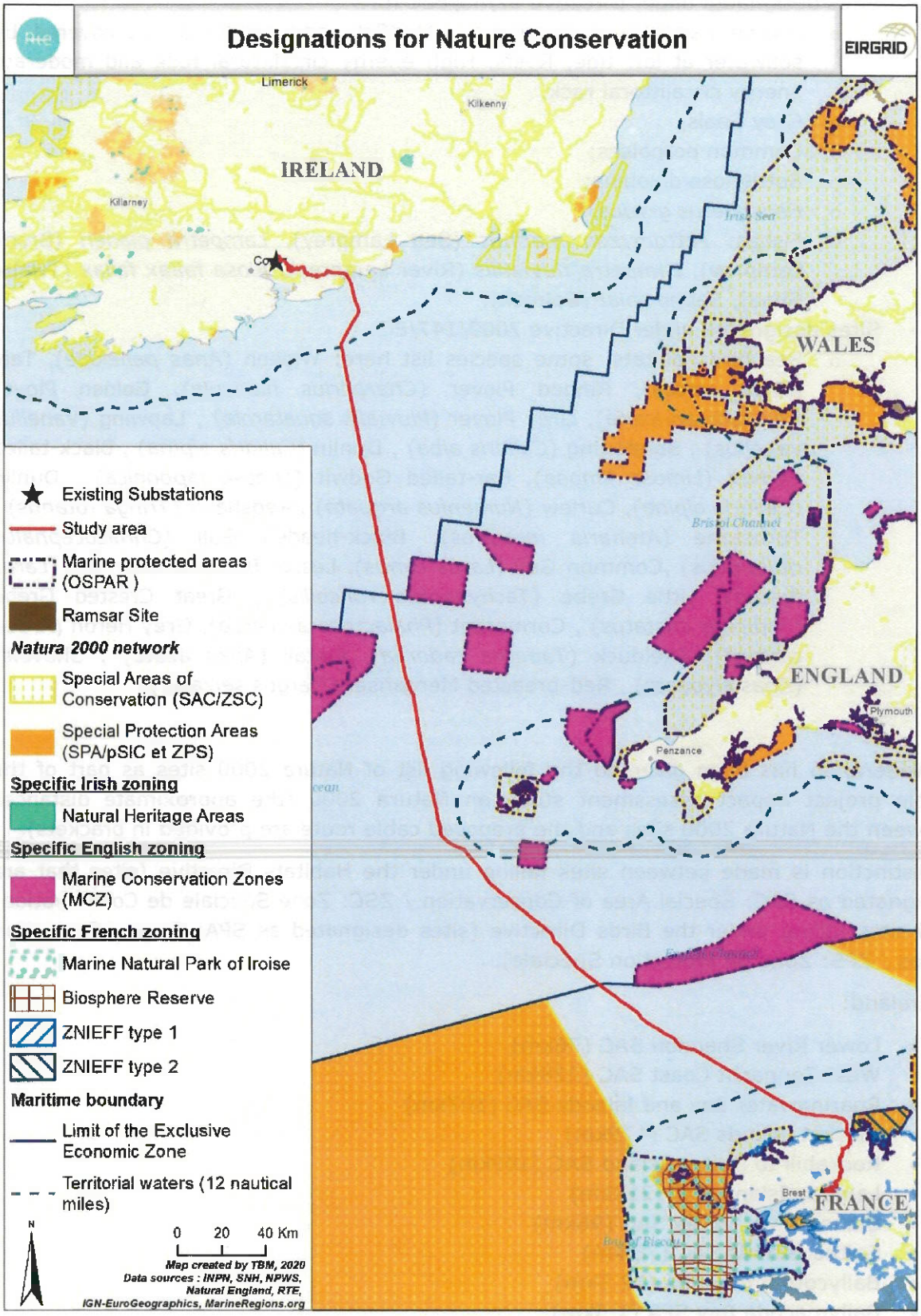


Figure 37: Sediment thickness potentially impacted by mobility – France's EEZ

6.3.2 Biodiversity

The following Map 24 shows all sites designated within the European Natura 2000 protected areas network as well as nationally designated nature conservation sites existing in the maritime territory.

It also shows that the maritime corridor avoids all Natura 2000 sites and other conservation and / or protection zones within the three jurisdictions (Marine Conservation Zones in England, Marine Nature Parks and Biosphere Nature Reserves in France).



Map 24: Locations of all areas designated for nature conservation

Natura 2000 sites are present along the coastlines of all 3 countries and also off the coast of France. These Natura 2000 sites include:

- Sites designated under Directive 92/43/EEC for:
    - Marine habitats as Sandbanks, Mudflats and sandflats not covered by seawater at low tide, Reefs, High energy circalittoral rock and moderate energy circalittoral rock.
    - Grey Seals;
    - Common porpoises;
    - Bottlenose dolphins;
    - *Halichoerus grypus;*
    - Fishes: *Petromyzon marinus* (Sea Lamprey), *Lampetra planeri* (Brook Lamprey), *Lampetra fluviatilis* (River Lamprey), *Alosa fallax fallax (*Twaite Shad*), Salmo salar (*Salmon*).*
- Sites designated under Directive 2009/147/EC:
    - Sea bird habitats, some species list here: Wigeon (*Anas penelope*), Teal (*Anas crecca*), Ringed Plover (*Charadrius hiaticula*), Golden Plover (*Pluvialis apricaria*), Grey Plover (*Pluvialis squatarola)* , Lapwing (*Vanellus vanellus*) , Sanderling (*Calidris alba*) , Dunlin (*Calidris alpina*) , Black-tailed Godwit (*Limosa limosa*), Bar-tailed Godwit (*Limosa lapponica*) , Dunlin (*Calidris alpina*), Curlew (*Numenius arquata*) , Redshank (*Tringa totanus*) , Turnstone (*Arenaria interpres*); Black-headed Gull (*Chroicocephalus ridibundus*) ,Common Gull (*Larus canus*), Lesser Black-backed Gull (*Larus fuscus*), Little Grebe (*Tachybaptus ruficollis*) , Great Crested Grebe (*Podiceps cristatus*) , Cormorant (*Phalacrocorax carbo*), Grey Heron *(Ardea cinerea*), Shelduck (*Tadorna tadorna*), Pintail (*Anas acuta*) , Shoveler (*Anas clypeata*) , Red-breasted Merganser (*Mergus serrator*).

Consideration has been given to the following list of Natura 2000 sites as part of the whole project impact assessment study on Natura 2000 (the approximate distances between the Natura 2000 sites and the proposed cable route are provided in brackets).

A distinction is made between sites falling under the Habitats Directive (sites that are designated as SAC: Special Area of Conservation / ZSC: Zone Spéciale de Conservation) and sites falling under the Birds Directive (sites designated as SPA: Special Protection Areas / ZPS: Zone de Protection Spéciale).

In Ireland:

- Lower River Shannon SAC (76km)
- West Connacht Coast SAC (228km)
- Roaringwater Bay and Islands SAC (107km)
- Blasket Islands SAC (179km)
- Rockabill to Dalkey Island SAC (189km)
- Lambay Island SAC (212km)
- Slaney River Valley SAC (96km)
- Saltee Islands SAC (78 km)
- Ballycotten Bay SPA (12.5km)
- Ballymacoda Bay SPA (1.3km)
- Beara Peninsula (118km)
- Blasket Islands SPA (182km)
- Clare Island SPA (284km)
- Cliffs of Moher SPA (156km)
- Cork Harbour SPA (22km)

- Cruagh Island SPA (31km)
- Deenish Island and Scariff Island SPA (241km)
- Duvillaun Islands SPA (218km)
- Helvick Head to Ballyquin SPA (75km)
- High Island, Inishshark and Davillaun SPA (198km)
- Iveragh Peninsula SPA (266km)
- Kerry Head SPA (221km)
- Lambay Island SPA (225km)
- Magharee Islands SPA (177km)
- Mid-Waterford Coast SPA (104km)
- Puffin Island SPA (175km)
- Saltee Islands SPA (84km)
- Skelligs SPA (183km)
- Stags of Broad Haven SPA (224km)
- The Bull and The Cow Rocks SPA (101km)
- Wexford Harbour and Slobs SPA (294km)

In the UK:

- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC (283km)
- Cardigan Bay / Bae Ceredigion SAC (236km)
- Bristol Channel Approaches / Dynesfeydd Mor Hafren SAC (103km)
- North Anglesey Marine / Gogledd Mon Forol SAC (329km)
- North Channel SAC (410km)
- West Wales marine / Gorllewin Cymru Forol SAC (162km)
- Isles of Scilly Complex SAC (23km)
- Isles of Scilly SPA (27km)
- Pembrokeshore Marine / Sir Benfro Forol SAC (154km)
- Grassholm SPA (172km)
- Skomer, Skokholm and the seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA (109km)
- St Kilda SPA (793km)
- Rum SPA (696km)
- Copeland Islands SPA (461km)

In France:

- ZSC et ZPS Talus du Golfe de Gascogne – Mers Celtiques (24 km)
- ZSC et ZPS Nord Bretagne (74 km)
- ZSC et ZPS Côte de Granit rose- Sept Iles (31 km)
- ZSC et ZPS Baie de Morlaix (2 km)
- ZSC et ZPS Baie de Goulven - Dunes de Keremma (7 km)
- ZSC Guissény (19 km)
- ZSC Abers Côte des Légendes (20 km)
- ZSC Etang du Moulin Neuf (38 km)
- ZSC Rivière le Douron (30 km)
- ZSC Monts d'Arrée centre et Est (13 km)
- ZSC Rivière Elorn (0 km)
- ZSC Tourbière de Langazel (0,9 km)
- ZSC et ZPS Rade de Brest (10 km)
- ZSC Presqu'île de Crozon (26 km)
- ZSC Pointe de Corsen – Le Conquet (40 km)

- ZSC et ZPS Ouessant Molène (45 km)

The results of the SCANS-III programme (2016), the purpose of which was to estimate populations of marine mammals (cetaceans) on the continental shelf of Northern Europe, show that a number of species frequent the waters between France and Ireland. The sizes of the main populations are, in descending order: the common dolphin and the striped dolphin, the harbour porpoise, the bottlenose dolphin and the finback whale.

UK offshore waters are dotted with marine conservation areas. These sites are usually designated to protect marine habitats and their fauna (benthic populations). A large number of fish species have also been documented (including Sea bass, Anglerfish, Haddock, Red gurnard, Flounder, Megrim, as listed within MCZ designations in the vicinity) frequenting these areas. It should also be noted that some marine conservation areas include spawning and feeding grounds (sectors along the maritime border between England and Ireland).

Amphihaline fish species such as Atlantic salmon and European eel as well as marine mammals including seals, dolphins, porpoise and whale species are also present in the waters of the maritime study zone.

Map 25 shows the main types of intertidal and marine habitats present at the project level.

It highlights the three predominant types of habitats (EUNIS typology) for which the official description is indicated:

- A5.15: Circalittoral coarse sediment;

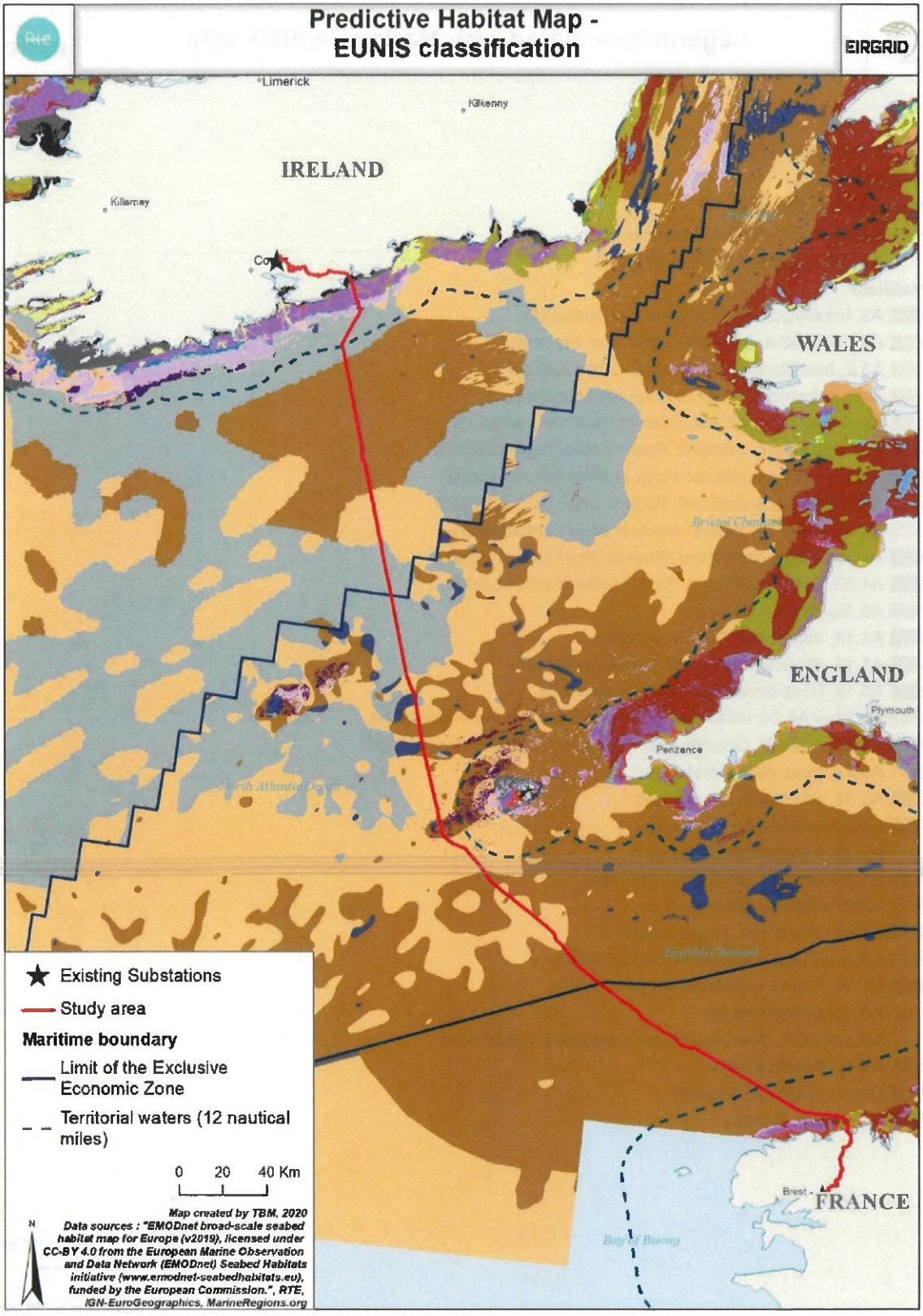
Offshore (deep) circalittoral habitats with coarse sands and gravel or shell. This habitat may cover large areas of the offshore continental shelf although there is relatively little quantitative data available. Such habitats are quite diverse compared to shallower versions of this habitat and generally characterised by robust infaunal polychaete and bivalve species. Animal communities in this habitat are closely related to offshore mixed sediments and in some areas settlement of *Modiolus modiolus* larvae may occur

- A5.27: Deep circalittoral sand;

Offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. Very little data is available on these habitats however they are likely to be more stable than their shallower counterparts and characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms.

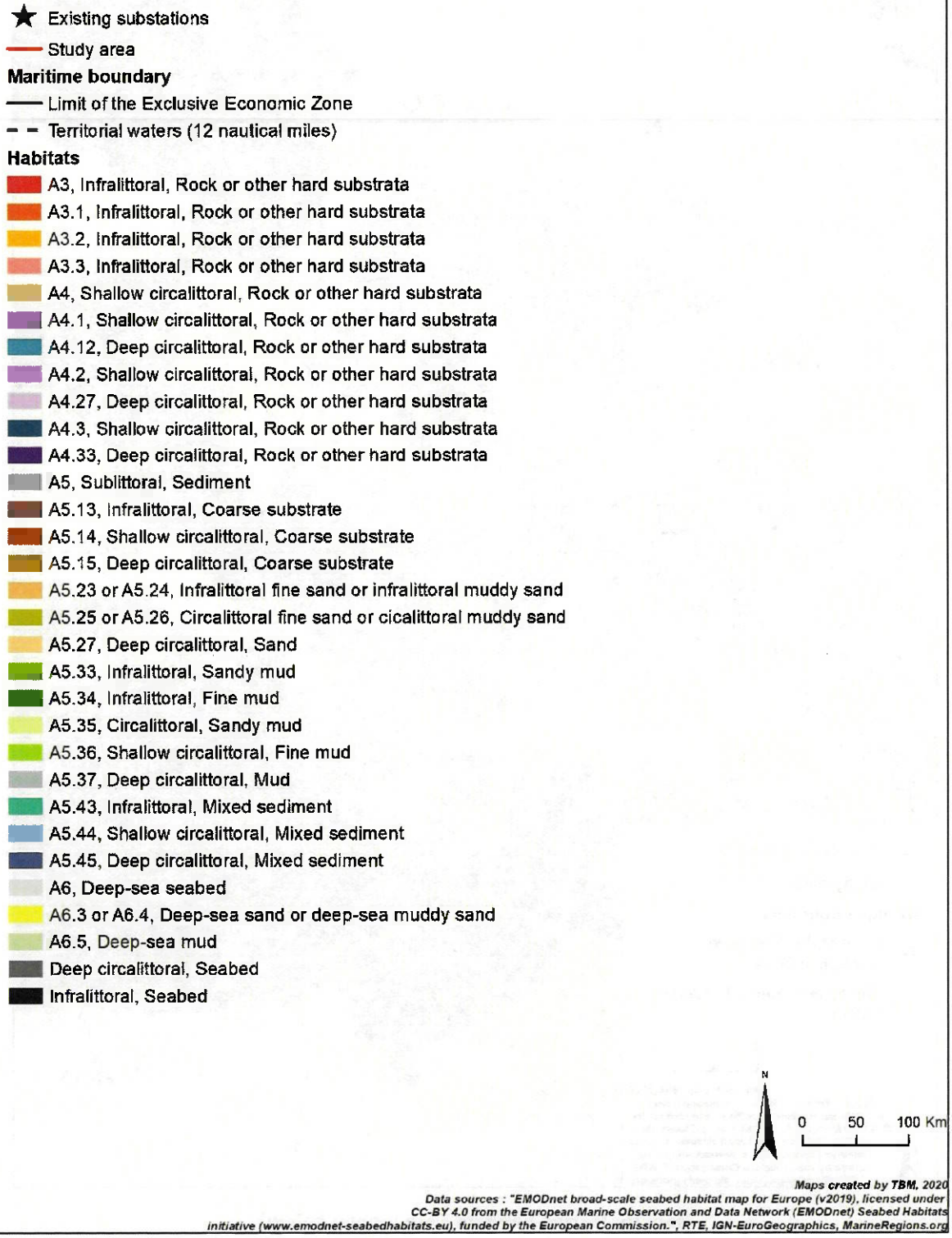
- A5.37: Deep circalittoral mud.

In mud and cohesive sandy mud in the offshore circalittoral zone, typically below 50-70 m, a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as *Thyasira* spp., echinoderms and foraminifera.



Map 25: Marine habitats (see legend below)

Legend associated with Marine Habitats Map



Maps created by TBM, 2020

Data sources : "EMODnet broad-scale seabed habitat map for Europe (v2019), licensed under CC-BY 4.0 from the European Marine Observation and Data Network (EMODnet) Seabed Habitats initiative (www.emodnet-seabedhabitats.eu), funded by the European Commission.", RTE, IGN-EuroGeographics, MarineRegions.org

6.3.3 Human activities

A number of human activities take place in the project's maritime zone.

The following Figure 38 (Anatec, 2016- data from April to September 2014 and May to October 2015) shows shipping densities within the corridor of the identified maritime corridor. It shows that the highest densities are in the Southern section, i.e. in UK and French waters. These high levels appear to be linked to the presence of traffic separation schemes in these sectors.

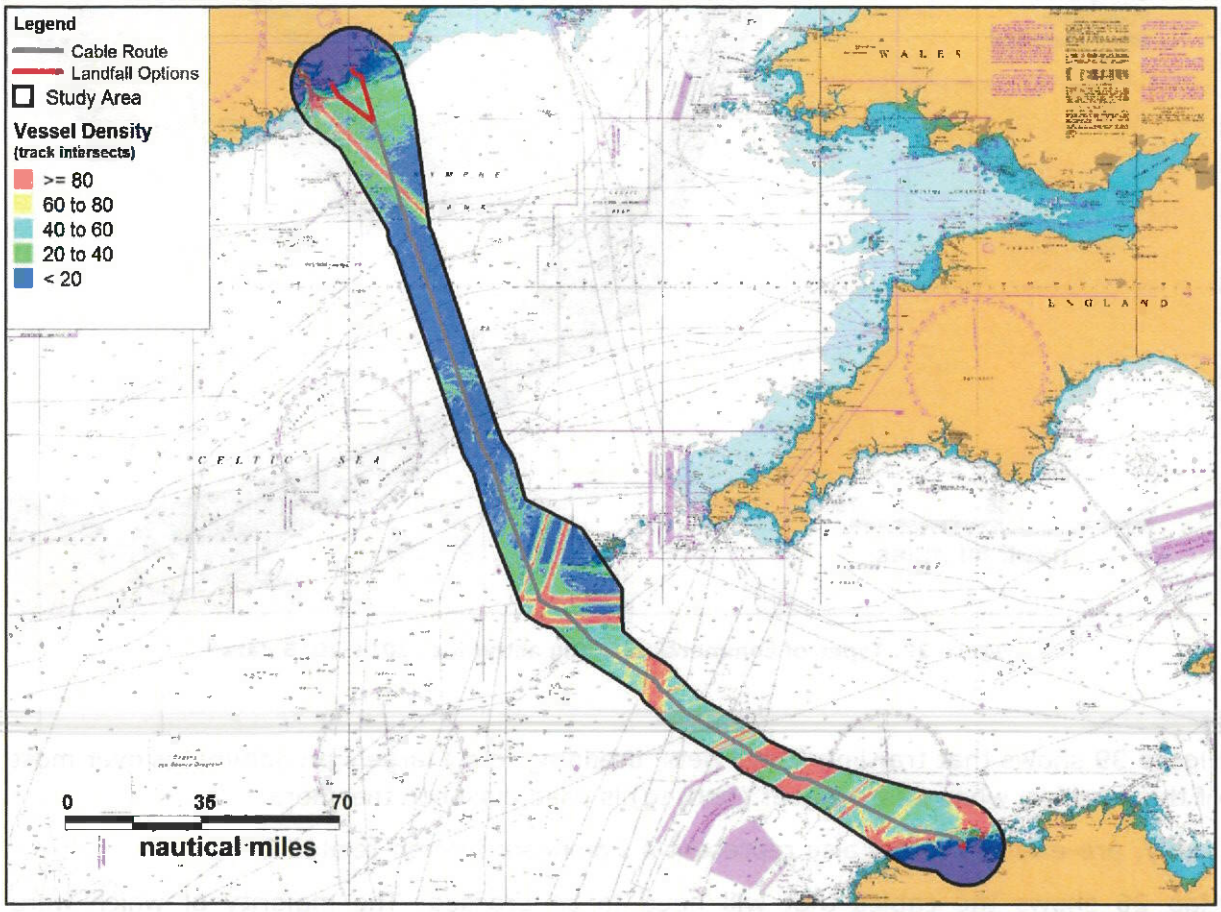


Figure 38: Shipping density (2014-2015 data)

Breaking the analysis down by type of vessel shows that the traffic around the Isles of Scilly in the direction of Cork in Ireland and the central zone of French waters, mainly includes cargo vessels and tankers. Recreational traffic is more concentrated off the coasts of the Isles of Scilly and the coastlines of Ireland and France.

Fishing vessels are present along the entire length of the corridor.

Figure 39 (Anatec, 2016) summarises the types of commercial fishing activities taking place in the corridor.

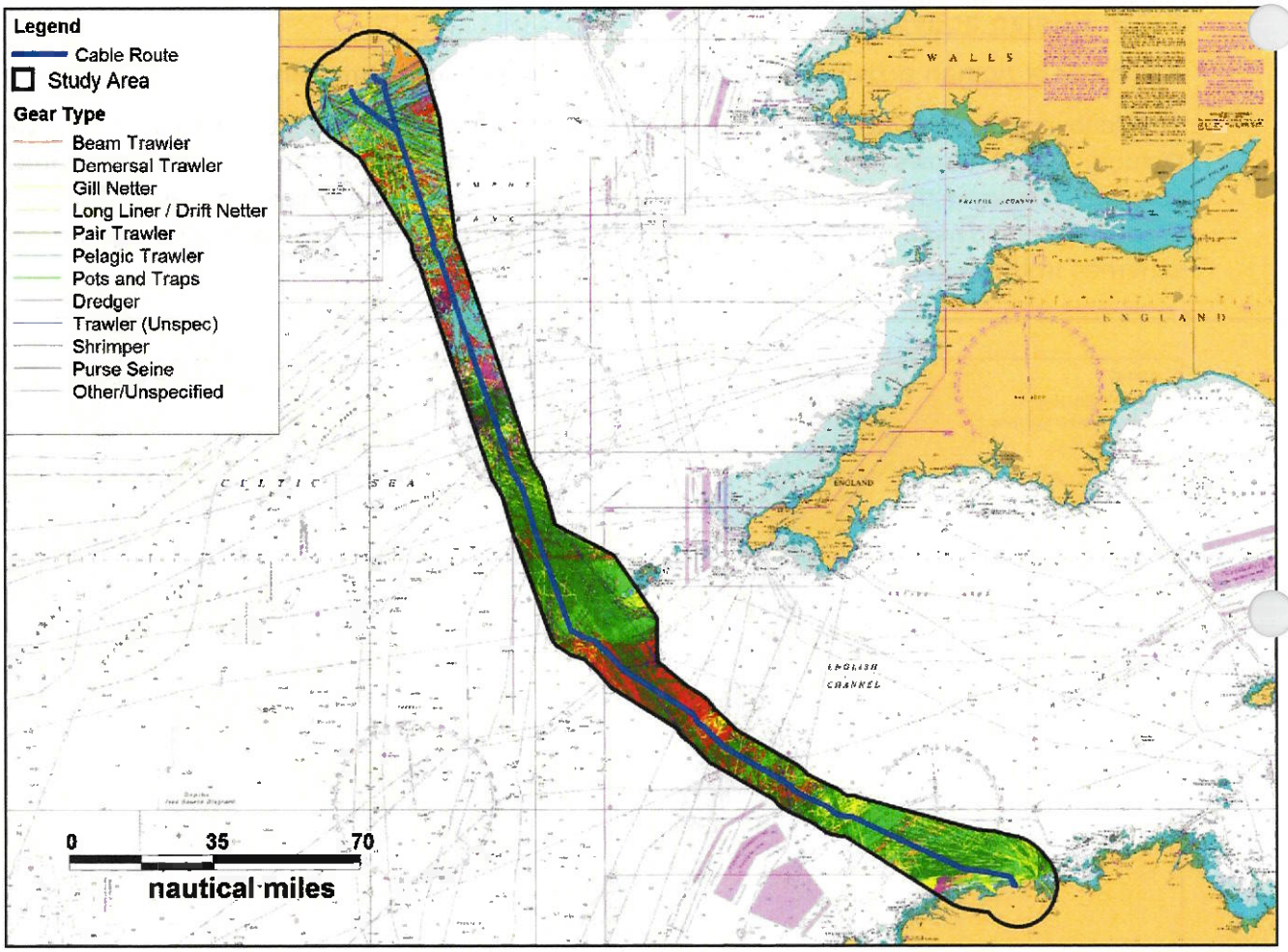


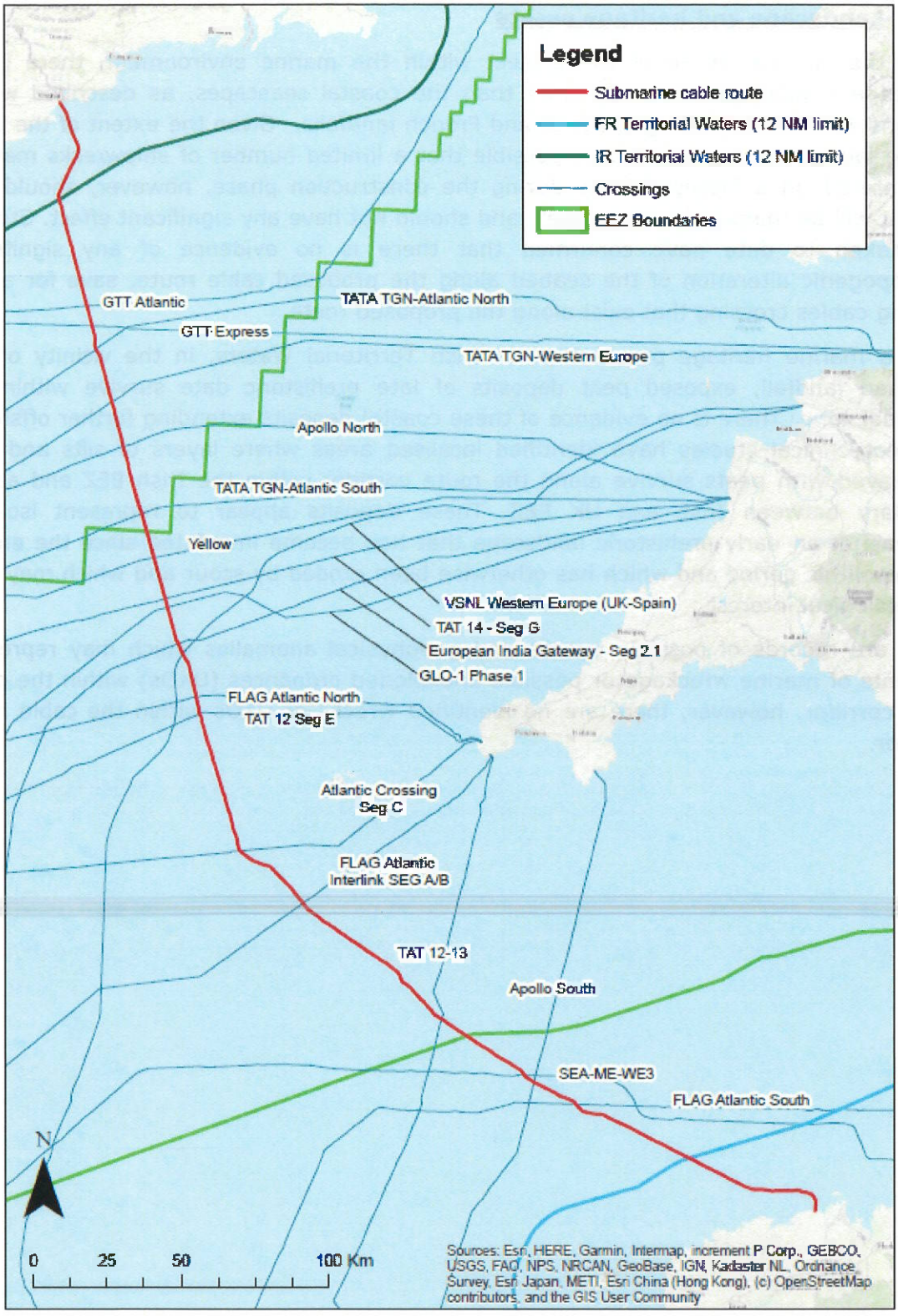
Figure 39: Types of commercial fishing activities (2014-2015 data)

Figure 39 shows that trawling (trawl nets, dredging, etc.) largely predominates over most of the corridor, while passive gear (netting) is used closer to the shore.

Lastly, pre-existing cables also represent a significant human-related factor.

Map 26 shows the cables that will need to be crossed. The majority of which were telecoms cables between the UK and other worldwide destinations.

All necessary crossings between these cables and Celtic Interconnector will be governed by agreements with each of the operators concerned.



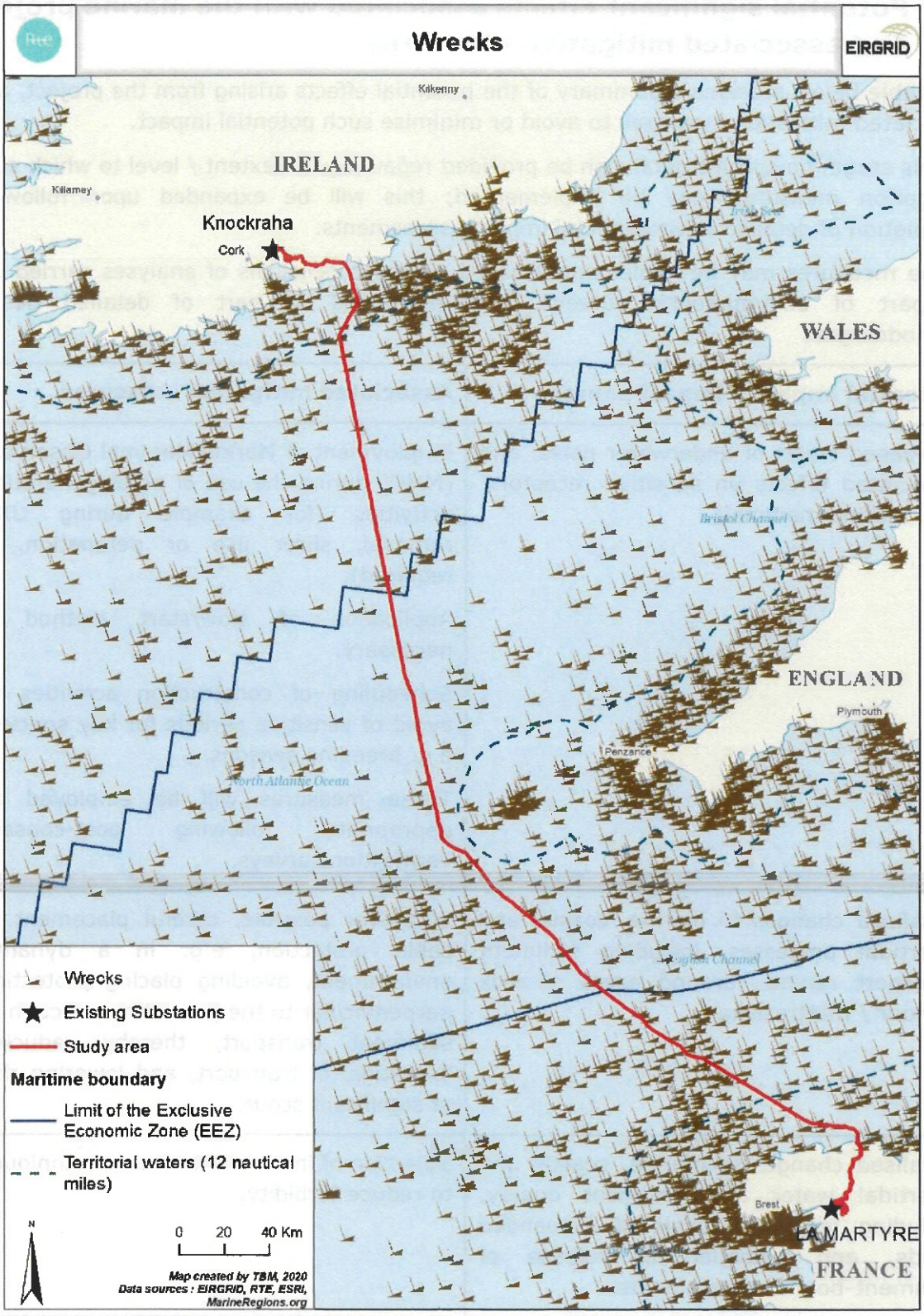
Map 26: Locations of existing cables

6.3.4 Landscape and heritage assets

Given the subsea nature of the project within the marine environment, there is no landscape / seascape baseline, other than the coastal seascapes, as described within Sections 4 and 5, regarding the Irish and French landfalls. Given the extent of the open marine landscape concerned, it is possible that a limited number of shipwrecks may be encountered on a localised basis during the construction phase, however, should this occur it will be managed appropriately and should not have any significant effect. Studies undertaken to date have confirmed that there is no evidence of any significant anthropogenic alteration of the seabed along the proposed cable route, save for a few existing cables crossing that exist along the proposed route.

From a marine heritage perspective, in Irish Territorial Waters, in the vicinity of the proposed landfall, exposed peat deposits of late prehistoric date survive within the intertidal zone. There is no evidence of these coastal deposits extending further offshore, but geotechnical studies have identified localised areas where layers of silts and clay interleaved with peats survive along the route corridor within the Irish EEZ and at the boundary between Irish and UK EEZ. These deposits appear to represent isolated survivals of an early prehistoric landscape that has become inundated since the end of the Mesolithic period and which has otherwise been eroded by scour and which may hold archaeological interest.

There are records of possible wrecks and geophysical anomalies which may represent elements of marine wreckage or possible unexploded ordnances (UXOs) within the cable route corridor, however, there are no identified wrecks or UXOs within the cable route corridor.



Map 27: Location of wrecks

6.4 Potential significant effects associated with the marine project and associated mitigation measures

The table below presents a summary of the potential effects arising from the project, and associated mitigation measures to avoid or minimise such potential impact.

At this stage, no specific detail can be provided regarding the extent / level to which such mitigation measures may be implemented; this will be expanded upon following completion of detailed environmental impact assessments.

These measures may be implemented based on the conclusions of analyses carried out as part of environmental surveys, and developed as part of detailed design methodologies.

Potential impact / impact source	Associated mitigation measures
Increased levels of underwater noise, and associated effects on sensitive receptors, e.g. marine mammals.	Employment of Marine Mammal Observers (MMO) during the use of noise-generating activities (for example during UXO removal, slicer use or detonation, if required). Application of slow/start method if necessary. Scheduling of construction activities to avoid of sensitive periods for key species, e.g. breeding seasons. These measures will be employed as appropriate following post-consent verification surveys.
Localised changes to marine, coastal and intertidal processes, including sediment transport regime, around areas of rock armour / mattressing.	Wherever possible, careful placement of cable protection, e.g. in a dynamic environment, avoiding placing protection perpendicular to the prevailing direction of sediment transport, thereby reducing 'blockage' of transport, and lowering risk of significant scour.
Localised changes to marine, coastal and intertidal water and sediment quality, including increased levels of suspended solids, and potential for release of sediment-bound contaminants.	Selection of installation / burial techniques to reduce turbidity.
Direct loss and / or indirect disturbance of marine, coastal and intertidal ecological features due to disruption of seabed / placement of cable protection.	Selection of appropriate cable protection materials, with sensitivity to the surrounding environment, e.g. use of similar rock types / dimensions as appropriate.

Potential impact / impact source	Associated mitigation measures
Direct loss and / or indirect disturbance of marine communities due to disruption coastal human recreation in coastal areas.	Where possible, construction works can seek to avoid peak recreational season.
Indirect loss of marine, coastal and intertidal communities due to, for example, smothering, or changes in availability of prey resources.	Avoidance where possible of sensitive times of year for construction activities.
Potential for effects on sensitive buried peats within Irish Territorial Waters.	Avoidance where possible, through micro-siting of route through sensitive areas. Collection of additional core samples for recording and analysis will be undertaken in specific peat locations.
Disturbance / disruption of fishing and shipping activities (commercial and recreational).	Issue of regular Notifications to Mariners (NTM) to advise other marine users of planned activities. Liaison with marine user groups, as appropriate, to communicate in relation to proposed schedule of works. Use of further NTM to advise other marine users of any changes to planned activities. Design of rock placement measures
Disturbance / damage to established marine, coastal and intertidal users and infrastructure (e.g. existing cable routes, coastal recreation).	Early engagement with owners / operators of existing cables, and design / implementation of appropriate crossing routes / methods, including installation of cable protection, and consideration of 'buffer' around existing infrastructure to minimise the risk of damage during operational / maintenance works. Liaison with marine user groups, as appropriate, to confirm proposed schedule of works. Issue of regular NTM to advise other marine users of planned activities. Consideration of scheduling construction works around key seasonal activities, where applicable / appropriate.
Introduction of invasive and non-native species (INNS) through use of rock	Adherence to best practice in identifying sources of rock.

Potential impact / impact source	Associated mitigation measures
armouring.	Appropriate cleaning of all cable protection materials prior to use.
Temporary disturbance / loss of intertidal habitat during cable landfall installation.	Wherever possible, avoidance of sensitive times of year for construction activities.

7. Impact assessment

7.1 Maritime transboundary Impact assessment

7.1.1 Descriptions of expected effects during the construction phase

The following table 7 shows the potential transboundary effects expected at sea.

A potential effect is an effect that can reasonably be expected to occur.

Their degree of significance is subsequently specified. A significant effect is an effect which, by its character, magnitude, duration or intensity can potentially alter a sensitive aspect of the environment.

The effects are specified, followed by the subject of said effects.

The transboundary characteristics of each effect are then specified; indicating whether the effect is capable extending into neighbouring territories.

Lastly, a generic analysis of the effects for all three countries is provided. The generic analysis also assesses the effect at the transboundary scale.

The conclusions take into account the mitigation measures referred to in Section 6.4 where potential significant effects are identified.

Table 7: Potential transboundary effects expected at sea during construction phase

Effects	Receptor	Detail	Potential Transboundary effect	Generic effect of the project
Effects associated with work on the seabed	Currents Bathymetry	Temporary alteration of deep currents. Permanent morphobathymetric alteration due to work around underwater dunes.	Potentially transboundary effect during work on the subsea cable. The main potential effects are associated with the sections passing through underwater dunes in English and French waters. Underwater sand waves are located at the marine boundary between those countries.	Levelling of underwater dune ridges (pre-sweeping) would have the immediate effect of altering the morphology and reducing the heights of mobile sand waves. This would likely cause direct and very localised changes in the direction and intensity of currents. However, given the depths of the sand waves (approximately 100 m) and the moderate amount of levelling work required for the project, this should not have a significant effect on the characteristics of existing subsea currents. Pre-sweeping would likely reduce the sediment heights of the underwater sand waves to between 1 and 3 m. The variation in the height of the water column will therefore be in the order of a few percent at most. No likely significant transboundary effects.
	Sediment dynamics	Temporary changes to sediment dynamics.	Potential transboundary effect during work on the subsea cable when trenches must be created. This transboundary effect concerns all 3 jurisdictions.	Trenches will locally interfere with the sediment dynamics and gradually be filled with sediment over time. In general, the direction of transport of sediments over the entire subsea section of the cable is oriented perpendicular to the trench. This will therefore be filled by sediment lying nearby through sediment transport processes. The speed at which the trench is filled will depend on sediment mobility within the area (in the order of a few months). No likely significant transboundary effects.
	Marine habitats Seabed	Permanent loss of habitats due to rock placement or laying concrete mattressing. Permanent long-term habitat changes.	No potential significant transboundary effects Losses will be located perpendicular to the structure.	- The affected habitats are the following: - near the French coast (reduced outline) A4.1, Shallow circalittoral, Rock or other hard substrata A5.25 or A5.26, Circalittoral fine sand or cicalittoral muddy sand A5.14, Shallow circalittoral, Coarse substrate - over the entire corridor (France, Ireland, United Kingdom) - A5.15, Deep circalittoral, Coarse substrate - A5.27, Deep circalittoral, Sand - A5.37, Deep circalittoral, Mud The last three have the largest surface areas both within the project area and overall, as can be seen from the map in Section 6.2.2. In the long term, the mainly sandy environments will become rocky environments on which new species can grow, therefore potentially bringing about a positive, beneficial effect. No likely significant transboundary effect.
		Temporary alteration of marine habitats (cable burial).	Localised effect around the excavated trench. No potential transboundary effect.	Temporary alteration will be a limited as the majority of affected habitats have very large surface areas. In the end, the currents will move sediment back over the work area and local species will recolonise the area. No likely significant transboundary effect.
	Fish	Permanent loss of functional habitat (fish nurseries, spawning grounds) and	Potential transboundary effect. The functional zones occupy significant surface areas.	The marine habitats analysis is valid for the functional fishing zones at the project scale. No likely significant transboundary effect.

Effects	Receptor	Detail	Potential Transboundary effect	Generic effect of the project
		population.	This transboundary effect affects all 3 jurisdictions.	
Effects associated with noise emissions	Marine mammals	The noise generated by the work may cause temporary discomfort for animals nearby, possibly even temporary or permanent hearing loss and displacement.	Potential transboundary effect. Sound and vibration emissions may extend to areas beyond the work site. This transboundary effect affects all 3 jurisdictions.	An acoustic study carried out in France for the project provided the following results: - Audible radius: 22 km (water-jetting); - Behavioural response zone: 3.4 km (water-jetting); - temporary hearing loss zone: 1.5 km (trenching machine); - Permanent hearing loss area: 100 m (trenching machine). Due to the highly mobile nature of marine mammals, it is unlikely that species will remain in the vicinity of works for a period of time that could cause auditory damage and therefore significant effects on marine mammals are unlikely.No likely significant transboundary effect.
	Fish	The noise levels generated by the site may generate temporary discomfort for fish, or even temporary loss of hearing or death.	Potential transboundary effect. Noise emissions will propagate well beyond the area of the construction site. This transboundary effect affects all 3 jurisdictions.	An acoustic study carried out in France for the project provided the following results: - Audible radius: 24 km (water-jetting); - Temporary hearing loss: 230 m (work with support ship); Due to the highly mobile nature of fish, it is unlikely that species will remain in the vicinity of works for a period of time that could cause auditory damage and therefore significant effects on fish are unlikely.No likely significant transboundary effect.
Effects associated with sediment re-suspension	Marine habitats	Temporary damage to marine habitats due to sediment deposition.	Potential transboundary effect. The turbidity may extend to areas beyond the work site. This transboundary effect affects all 3 jurisdictions.	The habitat areas in question are very large in comparison to the project area. The existing marine conditions then appear to move the re-suspended materials to environments which are substantially equivalent in nature. This potential effect does not appear to be significant.
	Water quality / Quality of species and marine habitats / Marine species	Temporary damage to the environment through increased turbidity and the re-suspension of contaminated sediments Temporary disturbances to animals.	Potential transboundary effect. The turbidity may extend to areas beyond the work site. This transboundary effect affects all 3 jurisdictions.	Turbidity, caused by machinery moving over the seabed, the excavation of trenches and the installation of protective structures, will mainly occur when the sediment in the area is loose. The sediments encountered in the corridor do not contain fine particles. We therefore consider that re-suspension will be localised and short in duration (dispersion due to strong tidal currents). This potential effect does not appear to be significant.
Effects associated with occupancy of the water column	Fish	Temporary disruptions to amphihaline fish migration.	Potential transboundary effect. Amphihaline fish migrate from the sea to the rivers in each of the 3 jurisdictions in question	The subsea construction site will be highly localised and continuously changing. Although temporary disturbances of species are possible, the ability of fish to move enables them to avoid these areas. No likely significant transboundary effect.

Effects	Receptor	Detail	Potential Transboundary effect	Generic effect of the project
	Shipping	Temporary disruptions for commercial, private and fishing vessels.	Potential transboundary effect. This mainly affects Ireland and UK (Isles of Scilly traffic separation system).	Disruptions to shipping will be temporary and mainly due to the presence of the construction site (support ship, safety ships) in each sector. This effect will therefore change as the construction work progresses. The most sensitive sectors are those with traffic separation systems as commercial ships are least manoeuvrable here. Other types of vessels and sailing boats are easier to manoeuvre. No likely significant transboundary effect.
Effects associated with accidental pollution	Quality of marine waters	Temporary quality impacts due to accidental pollution of the water following collisions or poor handling of materials at sea (discharges of waste water, hydrocarbons, waste, etc.).	Potential transboundary effect. Accidental spillages could spread to neighbouring Territorial Waters and may affect the coastline. This transboundary effect affects all 3 jurisdictions.	This is a potential effect associated with accidents. The probability of occurrence is low. No likely significant transboundary effect.
	Marine species	Temporary alteration of habitats or even damage or disturbance to certain species.	Potentially transboundary effect. Spillages are likely to spread to neighbouring Territorial Waters and may affect the coastline. This transboundary effect affects all 3 jurisdictions.	This is a potential effect associated with accidents. The probability of occurrence is low. No likely significant transboundary effect.

7.1.2 Descriptions of expected effects during the operational phase

Table 8: Potential transboundary effects expected at sea during operational phase

Effects	Subject	Detail	Transboundary effect	Generic effect of the project
Effects associated with work on the seabed	Currents	Permanent alteration of subsea currents.	No potential transboundary effect. This effect is mainly associated with rock placement operations.	Rock placement will have the effect of permanently reducing the height of the water column by between 1 and 2 m. Given the magnitudes of the subsea currents along the offshore section of the corridor, rock placement operations in deeper areas will not have significant local effects. Minor hydrodynamic disturbances may occur in their immediate vicinity. In sectors with softer substrates, this could indirectly cause local accretion or scouring processes to occur in the vicinity of protective structures. These phenomena will, however, be largely mitigated by the coarse nature of the sediments present. No likely significant transboundary effect.
	Bathymetry	Permanent morphobathymetric alterations caused by the external rock protection.	No potential transboundary effect. Alterations will be localised around the external rock protection.	Rock placement operations will permanently alter the morphology of the sea floor (up to 2 m in height over widths of up to 10 m). In sectors with softer substrates, localised accretion and scouring phenomena induced by local hydrodynamic processes may occur around protective rock placement areas. Variations in the sea floor may induce minor erosion of soft substrates in the vicinity of the protective structures. Localised morphological alterations should not be significant as these phenomena will be largely mitigated by the coarse nature of the sediments present. Furthermore, this scenario will not

Effects	Subject	Detail	Transboundary effect	Generic effect of the project
				arise often as the cable will be buried in mobile sediments wherever possible. No likely significant transboundary effect.
		Temporary morphobathymetric alterations due to burial.	No potential transboundary effect. Localised alterations may occur around natural filling and / or secondary rock protection within the corridor.	Sedimentary coverage along the cable route is generally sufficient for burial in loose sediment. Trenches excavated in loose sediments will be filled either naturally or artificially. The strong currents present in the area will return the site to baseline levels in the short or medium term (order of a few months). No likely significant transboundary effect.
		Permanent morphobathymetric alterations due to work around underwater sand waves.	Potential transboundary effect. Sand waves are present in both English and French waters.	When it will not be possible to avoid sand waves, the initial morphology of the sand waves will be altered by flattening of the ridges. The approximate width of pre-sweeping operations will be between 7 and 8 m at most, the affected thickness will be in the order of a few metres. The trench will have a V-shaped cross-section. The affected volumes will therefore remain relatively low compared to the overall volumes of the dunes. Sediment will continue to be moved by ocean currents throughout the construction phase. Underwater sand waves that are in motion today will still be in motion after completion of the project. Hydrodynamic processes always tend to accrete materials in such a way as to create balanced sand wave morphologies. It therefore seems likely that sand wave reshaping may occur over the medium or long term, their morphological characteristics may be altered. Pre-sweeping (affecting relatively small volumes compared to the overall volume of the dune) does not appear to counter the natural tendency of ridges to regenerate due to hydro-sedimentary processes.
	Sediment dynamics	Permanent sediment transport alterations.	No potential transboundary effect. This effect is mainly associated with rock placement operations.	Rock placement and other protective structures placed on loose and hard bottoms will create obstacles for sediment transport. Local accumulations of sediment are likely to occur along the length of the subsea corridor. These will also be caused by the numerous bands of sandy sediment (assumed to be mobile) that have been observed to cover hard bottoms below depths of 80 m. This will be particularly true near the Isles of Scilly, an area in which the likelihood of surface sediment motion induced by currents is high (70 to 90%), given that the currents accelerate around the islands.
	Commercial fishing	Permanent disruptions in the availability of fishing areas.	No Potential transboundary effect. This effect is mainly associated with rock placement operations.	Fishing vessels, and trawlers in particular, are likely to change their fishing areas due to rock placement work in certain sectors. There will be a greater risk of nets getting caught in these areas. However, the external protection is designed in such a way as to allow trawl nets to pass over them. It will be up to the examining authorities to decide whether fishing can take place around the subsea construction site.
Effects associated with electromagnetic	Marine species	Continuous emission of electromagnetic fields	Potential transboundary effect. This transboundary effect affects all 3	Firstly, electrical fields are not emitted into the environment thanks to the metal armouring around the cables.

Effects	Subject	Detail	Transboundary effect	Generic effect of the project
emissions		generating disturbances for benthic species, fish and marine mammals.	jurisdictions.	Regarding the magnetic field, studies show that its strength decreases rapidly moving away from the cable. Most current studies on this subject are carried out in controlled environments and target specific species (fish, crustaceans). The results are therefore difficult to extrapolate to populations in natural environments. The conclusions only show potential effects on the development of certain species without demonstrating potentially significant effects. To date, based on available information, no likely significant effects are predicted.
Effects of heat emissions	Marine species	Continuous emission of heat into the sediment causing alterations to benthic populations.	Potential transboundary effect. This transboundary effect affects all 3 jurisdictions.	While in operation, the electric current passing through the cable raises the temperature of sediment on a localised basis, the magnitude of this will vary depending on the characteristics of the sea floor and the power running through the cable. When cables are buried, more permeable sediments (larger granule size) are more likely to propagate temperature rises above the cable. Studies to date show that the heating effect could reach a maximum of 2° C at a distance of 80 cm from the buried cable (burial depth is of the order of 1.5 m). Due to its localised nature, this effect is not considered to be significant.

7.2 Terrestrial transboundary impact assessment

Terrestrial works will take place in both Ireland and France.

There will be no transboundary effects due to the distance separating the two countries.

Similarly, terrestrial construction work in Ireland and France will have no transboundary effects in the United Kingdom.

7.3 Transboundary effects on Natura 2000 sites

This Section builds on information contained in Sections 4, 5 and 6 of this JER.

Map 28 shows all existing Natura 2000 sites along the Celtic Interconnector's corridor.

7.3.1 Natura 2000 sites crossed by the project

The project corridor has been defined in such a way that only one Natura 2000 site is crossed. This is the Rivière Elorn SAC (FR5300024) in France.

This site has a total area of 2,395 ha and is designated for a total of 15 species, and 20 habitats:

- Marine habitats (Rade de Brest sector);
- Continental aquatic habitats;
- A series of habitats associated with the river itself: wetland meadows, riparian forests, peat bogs;
- Amphihaline fishes (Sea Lamprey, Brook Lamprey, Hallis shad, Twaite Shad, Atlantic Salmon);
- Freshwater fish (Bullhead);
- One semi-aquatic mammal (European otter);
- One species of bat;
- Insects (Marsh Fritillary Stag Beetle);
- Molluscs (fresh water and land-based): Elona quimperiana, Freshwater pearl mussel,
- Various species of flowers (Sphagnum pylaesii, Killarney fern, Floating water-plantain).

Within the context of the project being led by RTE in France, the Elorn River could be crossed using two methods: corbelling or the use of a sub-structure.

Both methods will significantly mitigate significant effects on the conservation goals of the Natura 2000 site.

A detailed analysis carried out as part of the project's impact assessment showed that there are no expected effects in terms of loss of habitats. Effects involving temporary disturbances to species have been identified (effects related to noise, light and potential pollution), but the planned mitigation measures will prevent significant impacts and maintain the conservation goals of the Natura 2000 site. However, the determination of this matter is within the jurisdiction of the relevant competent authorities for the Habitats Directive.

7.3.2 Other Natura 2000 sites

7.3.2.1 Offshore and onshore Natura 2000 sites

Natura 2000 sites in Ireland, UK and France which are closest to the project's corridor could potentially suffer indirect effects associated with the construction process and during operation.

Indirect effects may include the resuspension of sediment, noise emissions and the risk of accidental pollution.

As was observed in Sections 7.1.2 and 7.1.3, several of these effects are likely to have transboundary consequences. However, following proposed mitigation measures it can be concluded that there will be no significant impacts and the integrity of Natura 2000 sites will not be adversely affected from the project alone. Cumulative effects are described in Section 7.4. The list of Natura 2000 sites is presented in Section 6.3.2.

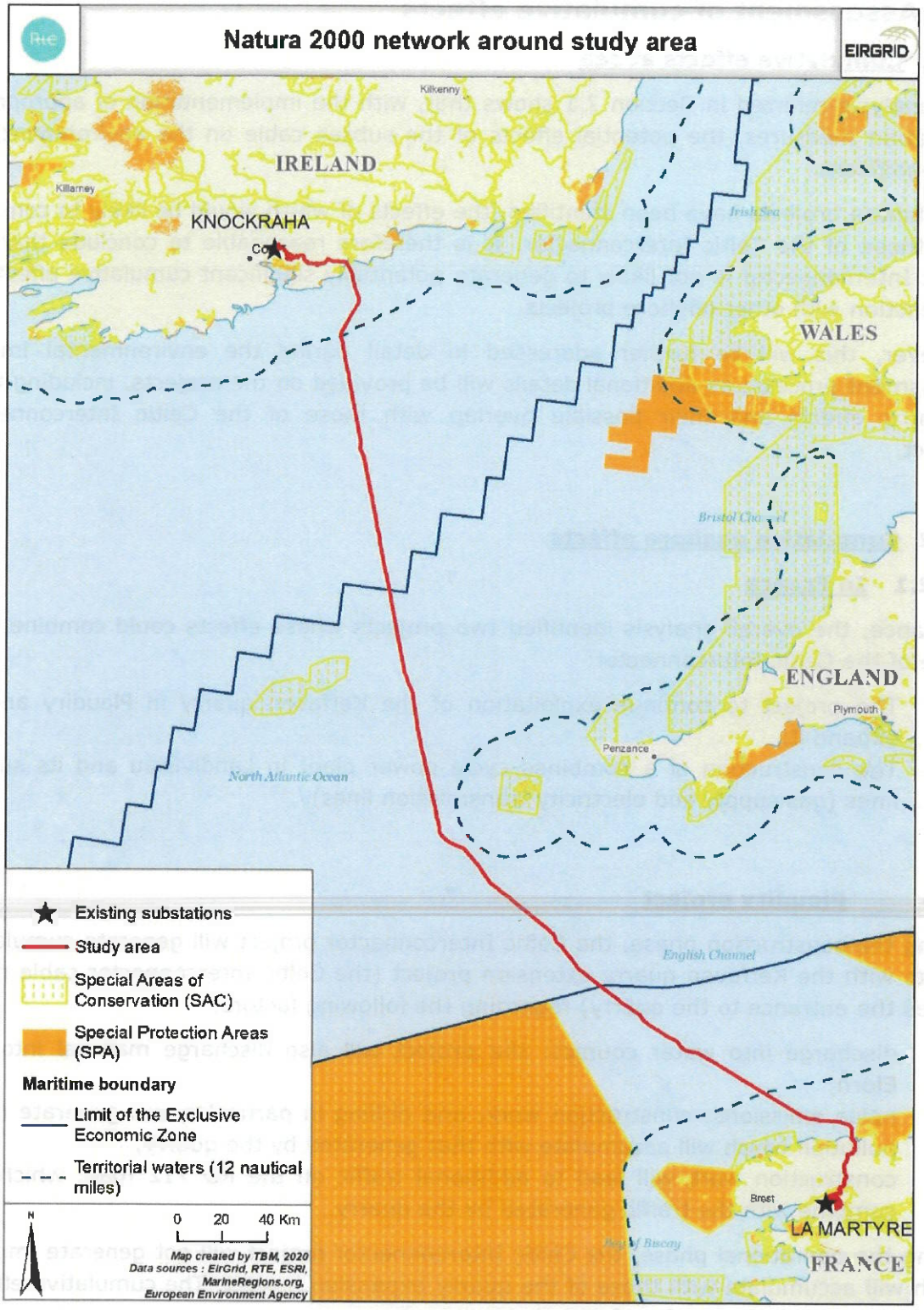
7.3.2.2 Onshore Natura 2000 sites

In Ireland, the Natura 2000 sites closest to the project are the Ballymacoda SPA (4023) located c. 1.7 km to the South-West of the proposed landfall, and the Great Island Channel SAC (1058) and Cork Harbour SPA (4030), located approximately 2.5 km from the converter station site option at Ballyadam. Karst landscapes offer minimal attenuation and allow contaminants to move through groundwater rapidly. It will therefore be assumed that a pollution pathway exists between the site and the EU-protected sites within Cork Harbour.

Following mitigation, it is considered that there is no reasonable scientific doubt as to the absence of effects on Natura 2000 sites. However, the determination of this matter is within the jurisdiction of the relevant competent authorities for the Habitats Directive.

7.3.3 Conclusions

It is considered that the Celtic Interconnector project will not have any significant transboundary effects on Natura 2000 sites. However, the determination of this matter is within the jurisdiction of the relevant competent authorities for the Habitats Directive.



Map 28: Locations of Natura 2000 sites

7.4 Assessment of cumulative effects

7.4.1 Cumulative effects at sea

The analysis referred in Section 7.1 shows that, with the implementation of appropriate mitigation measures, the potential effects of the subsea cable on the environment are not significant.

No offshore projects have been identified, the effects of which would be likely to combine with those of the Celtic Interconnector. It is therefore reasonable to conclude that the Celtic Interconnector is not likely to generate potentially significant cumulative effects in conjunction with other offshore projects.

However, this will be further addressed in detail during the environmental impact assessment process; as additional details will be provided on the projects, including their potential effects and their possible overlap with those of the Celtic Interconnector project.

7.4.2 Cumulative onshore effects

7.4.2.1 In France

In France, the overall analysis identified two projects whose effects could combine with those of the Celtic Interconnector:

- The project to continue exploitation of the Kerfaven quarry in Ploudiry and to expand it;
- The construction of a combined-cycle power plant in Landivisiau and its supply lines (gas supply and electricity transmission lines).

- **Ploudiry project**

During the construction phase, the Celtic Interconnector project will generate cumulative effects with the Kerfaven quarry extension project (the Celtic Interconnector cable route passes the entrance to the quarry) regarding the following factors:

- discharge into water courses: the project will also discharge material into the Elorn;
- noise emissions: construction work, and drilling in particular, will generate noise pollution which will accumulate with that generated by the quarry;
- construction work will lead to additional traffic on the RD 712 road, which will combine with the traffic generated by the quarry.

During the operational phase, the Celtic Interconnector project will not generate impacts which will accumulate with those of the quarry expansion project. The cumulative effects of these two projects are therefore only temporary.

- **Landivisiau project**

According to the available information, construction work for the combined-cycle power plant and its supply lines should be completed by mid-2022, so they should not coincide with work on the Celtic Interconnector project. The two projects should therefore not produce cumulative effects during the construction phase.

With regards to the operating phases of the combined-cycle power plant at Landivisiau and the converter station at La Martyre, the following cumulative effects may arise:

- Landscape impacts: The two sites are too far apart to create cumulative effects for the landscape;
- Hard standing: The two sites will cause soil sealing; runoff from the two projects will be collected and discharged into the Elorn River at a controlled rate following retention. Although there is only one discharge point, the additional flows generated by soil sealing at the two sites will not have either quantitative or qualitative impacts on the Elorn as the flow rates will be controlled and regulated. In addition to this, attenuation areas will reduce chronic pollution and trap accidental spillages;
- Natura 2000: The fact that there will be no impacts on the Elorn Natura 2000 site common to these two projects has been demonstrated in the Natura 2000 impact assessments for each project;
- Flora and Fauna: Quimper snails are present at the site of the power plant, but not that of the converter station.

- **Conclusions**

An analysis of the impacts of these two projects and the avoidance, reduction and compensation measures to be implemented, has shown that the two projects will not create cumulative effects.

7.4.2.2 In Ireland

There is potential for future projects and plans within the zone of impact of activities associated with the project to result in cumulative effects. These and other cumulative effects will be assessed, where appropriate, as part of the EIAR to be submitted with the planning consent application for the Irish onshore and offshore elements of the Celtic interconnector project.