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Youghal Strand Core 2002
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CL4008
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CL4009a
CA 3009
CA 3008
CL4003
CL4010
CL4040

Legend

- Auger
- Test pit
- Test pit and auger
- Machine test pit
- Youghal Strand Core 2002
- Exposed peat
- Cable Route
- 500m wide CSC

N

0 0.05km

Coordinate System: WGS 1984 UTM Zone 29N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -9.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

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PROJECT TITLE
Celtic Interconnector

FIGURE TITLE
Auger and test pit locations

DRAWN BY	RLF	PROJECT NO	770617	FIGURE NO.
CHECKED BY	MTW	DATE	22/05/2019	1
APPROVED BY	MTW	SCALE@A3	1:1,600	

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CL4003
CL4010
CL4040

Legend

- Auger
- Test pit
- Test pit and auger
- Machine test pit
- Youghal Strand Core 2002
- Exposed peat
- In phase peat extent (indicative)
- Quadrature peat extent (indicative)
- Auger survey peat extent (indicative)
- Cable Route
- 500m wide CSC

N

0 0.05km

Coordinate System: WGS 1984 UTM Zone 29N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
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PROJECT TITLE
Celtic Interconnector

FIGURE TITLE
Possible peat extents on Claycastle beach

DRAWN BY	RLF	PROJECT NO	770617	FIGURE NO.
CHECKED BY	MTW	DATE	22/05/2019	2
APPROVED BY	MTW	SCALE@A3	1:1,600	

recorded following standard procedures (Table 2) (Cotswold Archaeology 2017; Munsell 2018; Tucker 2011).

3.3. Augers **CL4002**, **CL4003** and **CL4011** were drilled in areas where the peat was exposed in order to provide a full sedimentary sequence. Three environmental bulk samples were taken from the top, middle and bottom of the peat in each of these auger cores (nine samples in total). All samples were placed into sealable plastic bags and labelled using CA's standard procedures (Cotswold Archaeology 2017).

3.4. 31 small TPs (**CL4004**, **CL4006**, **CL4007** to **CL4010**, **CL4013**, **CL4014**, **CL4016** to **CL4023**, and **CL4025** to **CL4040**) were dug by hand in locations where unstable sediments prevented the use of the hand auger. The TPs were recorded following standard procedures as above (Table 2). All TPs were backfilled as soon as recording had been completed.

3.5. At the time of the survey, the local authority was undertaking groundworks just to the front of the boardwalk on the beach. The opportunity was therefore taken to examine the excavation. This TP was mechanically excavated through drier sand to c. 2.7m.

4. RESULTS

4.1. The auger logs from **CL4002**, **CL4003** and **CL4011** provide a full sedimentary sequence. The lowermost unit comprised grey (2.5Y 5/1) loose fine silt to medium sand deposit (the GREY SAND) with occasional bivalve shell fragments. This unit was overlain by a reddish-black (2.5Y 2.5/1) spongy fibrous silty peat deposit containing identifiable plant material. The well-preserved wood fragments and herbaceous plant remains indicate the presence of woodland and / or reed swamp communities in the past (see Delahunty 2002). The PEAT deposits recorded in these auger cores range in thickness from 0.85m to 1.20m. Overlying the PEAT was a brown (10YR 5/3) to yellowish brown (10YR 5/4) fine to coarse sand (the SAND) with occasional rounded gravel and cobbles of different lithology.

4.2. The majority of the TPs show that the SAND tends to become more coarse and gravelly lower down in the deposit. The SAND coverage in the areas of exposed peat, has probably been eroded by tidal action. Across the entire surveyed area, the SAND ranged in thickness from 0.05m to c. 2.70m. Nine bulk samples were taken from the three auger cores for possible palaeo-environmental analysis. No remains

suggesting prehistoric human activity were encountered in the areas of exposed peat.

4.3. It is worth noting that the depth of SAND coverage increased in the landward TPs and auger holes. In test pit **CL4041**, the SAND deposit was c. 2.70m deep (Fig. 3), and no peat was recorded. It corresponds with data obtained from the trial pit log **CL-TP1** and borehole log **CL-BH2**, where the PEAT deposit was covered by c. 0.90m to c. 2.50m of the SAND sediments respectively. In borehole **CL-BH1**, situated next to the car park, the peat was recorded under 4.50m deep deposits of beach sand (IAC Archaeology 2019).

Figure 3 Test pit CL4041

Table 2 Auger and test pit logs

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4001	0-0.40	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Very few very coarse gravel (30 to 60mm).		Auger. End at 0.90m due to side collapse.
	0.40-0.70	GRAVELLY SAND	10YR 5/4 Yellowish brown	Coarse sand with gravel and cobbles (2 to 150mm, moderately sorted, well rounded).		
	0.70-0.90	GRAVELLY SAND	10YR 5/4 Yellowish brown	Coarser than unit above. Common cobbles (60 to 200mm) and few (<3%) bivalves shell fragments.		
CL4002	0-1.20	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. From c. 0.75m more humified, pseudo fibrous plant material, less wood visible. More compact at the bottom. Intense organic odour.	<1> 0-0.20; <2> 0.70-0.80; <3>1.00-1.20	Auger
	1.20-1.30	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose. Very few wood fragments (possibly contamination form above).		

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4003	0-0.05	SAND	10YR 5/3 Brown	Fine to coarse loose sand.	<4> 0-0.15; <5> 0.60-0.70; <6>0.80-.90	Auger
	0.05-0.90	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. From c. 0.80m more humified, pseudo fibrous plant material. More reddish (2.5R 2.5/4 dark red) in colour and more compact towards the bottom. Intense organic odour.		
	0.90-1.00	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose. Few (<4%) bivalve shell fragments.		
CL4004	0-0.70	SAND	10YR 5/3 Brown	Fine to coarse loose sand. More gravelly towards bottom. Well rounded pebbles and cobbles (20-180mm).		Test pitted to c. 050m and augered to 0.90m. Abandoned due to sides collapsing.
CL4005	0-1.00	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Very few gravel, well rounded (20 to 60mm). More gravelly with depth.		Auger. End at 1.10m due to side collapse and gravel hard to drill.
CL4006	0-0.20	SAND	10YR 5/3 Brown	Fine to coarse loose sand.		Test pitted to c. 030m and augered to 0.60m. Abandoned due to sides collapsing.
	0.20-0.60	GRAVELLY SAND	10YR 5/4 Yellowish brown	Coarse sand with gravel and cobbles (2 to 150mm, moderately sorted, well rounded).		

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4007	0-0.40	SAND	10YR 5/3 Brown	Fine to coarse loose sand. More gravelly towards bottom. Well rounded pebbles and cobbles (20-180mm).		Test pit to c. 0.50m and auger. Stopped at 1.20 due to sides collapse.
	0.40-1.10	GRAVELLY SAND	10YR 5/4 Yellowish brown	Coarse sand with gravel and cobbles (2 to 150mm, moderately sorted, well rounded). Few (<4%) bivalve shell fragments.		
	1.10-1.20	SAND	10YR 5/4 Yellowish brown	Fine to coarse loose sand. Few very coarse gravel (30 to 60mm).		
CL4008	0-0.20	SAND	10YR 5/3 Brown	Fine to coarse loose sand.		Test pit to c. 0.50m and auger. Stopped at 0.50 due to obstruction (possibly a large cobble).
	0.20-0.50	GRAVELLY SAND	10YR 5/3 Brown	Coarse sand with gravel and cobbles (2 to 150mm, moderately sorted, well rounded). Loose.		
CL4009	0-0.40	SAND	10YR 5/3 Brown	Fine to coarse loose sand.		Test pit to c. 0.60m and auger. Stopped at 0.70 due to sides collapse.
	0.40-0.70	GRAVELLY SAND	10YR 5/3 Brown	Coarse sand with gravel and cobbles (2 to 150mm, moderately sorted, well rounded). Loose.		
	0.70-0.72	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4009a	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit to c. 0.30m and auger. Stopped at 1.10 due to obstruction.
	0.30-1.10	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4010	0-0.20	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Auger location abandoned due to high tide.
CL4011	0-1.30	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.	<7> 0-0.30; <8> 0.50-0.60; <9> 1.10-1.30	Auger
	1.30-1.35	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4012	0-0.20	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Auger. Stopped at 0.50 due to sides collapse.
	0.20-0.50	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4013	0-0.50	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Common well rounded pebbles and cobbles (20-180mm).		Test pit.
CL4014	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0-0.60	GRAVELLY SAND	10YR 5/3 Brown	Coarse sand with gravel and cobbles (2 to 150mm, moderately sorted, well rounded). Loose.		
CL4015	0-0.80	GRAVELLY SAND	10YR 5/3 Brown	Coarse sand with gravel and cobbles (2 to 180mm, moderately sorted, well rounded). Very few shell fragments (<2%). Loose.		Test pit. Loose sediments and sides collapse.

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4016	0-0.25	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.25-0.60	GRAVELLY SAND	10YR 5/3 Brown	Coarse sand with gravel and cobbles (2 to 180mm, moderately sorted, well rounded). Loose.		
CL4017	0-0.10	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.10m		Line of test pits dug by hand to establish presence of the peat towards North. Line started c. 10m from the peat exposure zone. Due to loose sediments and water, no augering was possible.
	0.10+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4018	0-0.25	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.25m		
	0.25+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4019	0-0.40	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.40m		
	0.40+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4020	0-0.60	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. NO Peat **NO** recorded under 0.60m		

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4021	0-0.65	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.65m		
	0.65+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4022	0-0.20	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.20-0.60	GRAVELLY SAND	10YR 5/4 Yellowish brown	Coarse sand with gravel and cobbles (2 to 180mm, moderately sorted, well rounded). Loose.		
CL4023	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Stopped due to loose sediments and sides collapse.
	0.30-0.35	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4024	0-0.07	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit and auger. Taken to test the peat presence. Stopped due to sides collapse.
	0.07-0.75	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4025	0-0.13	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.13m		Line of test pits dug by hand to establish presence of the peat. Due to loose sediments and water, location CL4024 was selected for augering.
	0.13+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4026	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.30m		
	0.30+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4027	0-0.45	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.45m		
	0.45+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4028	0-0.60	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. **Peat** under 0.60m		
	0.60+	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4029	0-0.40	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
CL4030	0-0.50	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.50-0.52	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4031	0-0.40	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. Few very coarse gravel (30 to 60mm).		Test pit. Loose sediments and sides collapse.

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4032	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.30-0.33	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4033	0-0.50	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. Few very coarse gravel (30 to 60mm) and cobbles (64-150mm) more common with depth.		Test pit. Loose sediments and sides collapse.
CL4034	0-0.50	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. Few very coarse gravel (30 to 60mm) and cobbles (64-150mm) more common with depth.		Test pit. Loose sediments and sides collapse.
CL4035	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. Few very coarse gravel (30 to 60mm) and cobbles (64-150mm) more common with depth.		Test pit. Loose sediments and sides collapse.
	0.30-0.35	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4036	0-0.60	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. Few very coarse gravel and cobbles (20 to 100mm).		Test pit and auger. Loose sediments and sides collapse.
	0.60-0.65	PEAT	2.5Y 2.5/1 Reddish black	Silt with spongy fibrous plant remains and wood fragments. Intense organic odour.		
CL4037	0-0.40	GRAVELLY SAND	10YR 5/4 Yellowish brown	Coarse sand with gravel and cobbles (2 to 180mm, moderately sorted, well rounded). Loose.		Test pit. Loose sediments and sides collapse.

Auger/Test Pit No.	Depth [m]	Unit	Colour	Description	Sample	Comments
CL4038	0-0.60	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.60-0.65	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4039	0-0.20	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.20-0.30	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4040	0-0.30	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose.		Test pit. Loose sediments and sides collapse.
	0.30-0.35	GREY SAND	2.5Y 5/1 Grey	Silty fine to medium sand. Loose.		
CL4041	0-2.70	SAND	10YR 5/3 Brown	Fine to coarse loose sand. Loose. Pebbles and cobbles more common with depth (20-180mm, rounded, <7%).		Machine trial pit

4.4. The peat deposit was not recorded beyond the location of auger holes **CL4002** and **CL4036** (towards the north-east). This concurs with the geophysical survey results which appear not to have detected the presence of peat to the north-east of the proposed cable route (see Fig.3). Owing to the loose nature and the depth of the overlying sandy deposits in this area, it was not possible to achieve any considerable depth with either the hand auger or the TPs.

4.5. The lowermost GREY SAND deposit was recorded in all the TPs in the south-east area of the survey (**CL4009**, **CL4032**, **CL4039**, **CL4038**, **CL4035**, **CL4040**). In these TPs, the GREY SAND was directly overlain by c. 0.3m to 0.4m of the SAND unit so the PEAT unit appeared to be absent. This implies that the peat does not extend into the sea beyond this point. The intertidal geophysical survey did not extend beyond this point as this was the low water point.

5. CONCLUSIONS

5.1. Apart from the exposed areas, the peat is overlain by a fine to coarse sand which becomes more coarse and gravelly with depth. The thickness of the overlying sand ranges from 0.05m to c. 2.70m with the depth of sand coverage increasing on the landward side of the beach. The peat was recorded primarily in the area to the west of the proposed cable route but was not encountered in the north-east of the survey area. The presence of peat in this area, however, cannot be discounted as it may be more deeply buried, although the observation of sand lying directly over the grey sand, which is found below the peat elsewhere on the beach suggests that the peat may be absent from these areas. The peat deposit recorded in the auger cores range in thickness from 0.85m to 1.20m. According to previous investigations, the thickness of the peat across the site varies from 0.40m (**CL-TP1**) to 1.45m (**CL-TP2**). The peat does not appear to extend beyond the most seaward locations investigated during this survey.

5.2. This survey has fulfilled the aims outlined in the method statement and no further work is anticipated. This is the final report on the issued licence and a summary account will be submitted to www.excavations.ie in fulfilment of the licence conditions.

6. REFERENCES

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Celtic Interconnector

Volume 3D2 – Appendix 15E

Marine Archaeology Written Scheme of Investigation

June 2021

Co-financed by the European Union
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Tionscadal Éireann
Project Ireland
2040

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Report for

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Wood

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Table of Contents

1 Introduction

1.1 Purpose of this document

This Written Scheme of Investigation (WSI) sets out mitigation procedures in respect of known and potential archaeological remains and deposits of geoarchaeological interest that may be affected by the construction of the proposed Celtic Interconnector Project within the Irish Territorial Waters (TW) and Exclusive Economic Zone (EEZ) and the UK EEZ.

This WSI identifies aims of the marine investigations, the generic methodologies and relevant standards of the offshore mitigation strategy referenced in the Environmental Impact Assessment Report (EIAR) and Environmental Report (ER). It conforms to current best practice as set out by guidance from the relevant national regulators, The National Monuments Service (NMS) and Historic England (HE), and the relevant guidance from the appropriate national professional bodies, the Institute of Archaeologists of Ireland (IAI) and Chartered Institute for Archaeologists (CIfA), as appropriate.

The results of previous phases of consultation on the development proposals and the approach and findings of the assessment with the relevant regulators has been taken into account in producing these proposals for mitigation, and further consultation will be undertaken with the Cork Heritage Officer, the Underwater Archaeology Unit of the National Monuments Service, and Historic England to agree the provisions set out prior to the commencement of any investigative or construction work.

This WSI excludes archaeological investigation of deposits of geoarchaeological significance above LAT at Claycastle. Any works carried out in mitigation of disturbance of these deposits would be carried out under licence from the NMS to standards set out and agreed through the licensing process.

This WSI also excludes geoarchaeological investigations within the marine zone, which would be carried out under the terms of an Offshore Project Environmental Remains Strategy that would be agreed with the relevant national regulators.

1.2 Structure

This WSI sets out the project background and geographical scope (Section 1), aims and objectives of archaeological works (Section 2), roles and responsibilities (Section 3), archaeological background (Section 4), followed by scope and standards for archaeological mitigation (Section 5) of Marine Archaeological Remains (Section 5.4). Initial Archaeological Exclusion Zones (AEZ) are identified (Section 5.5). A Protocol for Archaeological Discoveries (PAD: Section 5.6) is set out. Procedures in respect of statutorily designated remains (Section 6) and for archaeological reporting and archival (Section 7) are set out.

1.3 Project Overview

The Celtic Interconnector Project is a joint project being developed by Réseau de Transport d’Electricité (RTE) and EirGrid and is being supported by the European Union’s Connecting

Europe Facility (CEF). It is also a European Union Project of Common Interest (PCI) and a designated e-Highway 2050 project.

The project involves the construction of an electrical circuit between Ireland and France using High Voltage Direct Current (HVDC) technology, the global standard for the transfer of electricity over long distances using underground technology. The interconnector would have a capacity of 700MW (equivalent to the power used by approximately 450,000 homes) and measures approximately 575km in length. The longest spatial element of the Celtic Interconnector would be the submarine circuit which would measure approximately 497km out of the total 575km. The interconnector would form a link between County Cork on the south coast of Ireland and the coast of Brittany in North West France (Nord-Finistère).

The main elements of the interconnector are illustrated in Figure 1.1 and consist of:

- A submarine circuit, approximately 497km in length placed on or beneath the seabed between France and Ireland. The submarine circuit will pass though the territorial waters of Ireland and France and through the Exclusive Economic Zones (EEZs) of Ireland, the UK and France, as shown in Figure 1.2;
- The cable route within the UK EEZ passes approximately 30km to the west of the Isles of Scilly and approximately 75km to the west of Land's End on the UK mainland
- A landfall point where the submarine circuit comes onshore, in France and Ireland;
- A HVDC land circuit between the landfall point and a converter station, in France and Ireland;
- A converter station, to convert the electricity from HVDC to High Voltage Alternating Current (HVAC), which is used on the respective transmission grids in each country;
- A HVAC land circuit between the converter station and the connection point to the grid, in France and Ireland. This circuit is proposed using underground technology;
- A connection point to an existing substation on the transmission grid, in France and Ireland; and
- A fibre optic cable would also be laid along the entire route for operational control, communication and telemetry purposes. It is important that logos, references to the EU, Project Ireland 2040 and EU disclaimers are appropriately included in all key publically facing documentation.

Figure 1.1: Celtic Interconnector Project Elements

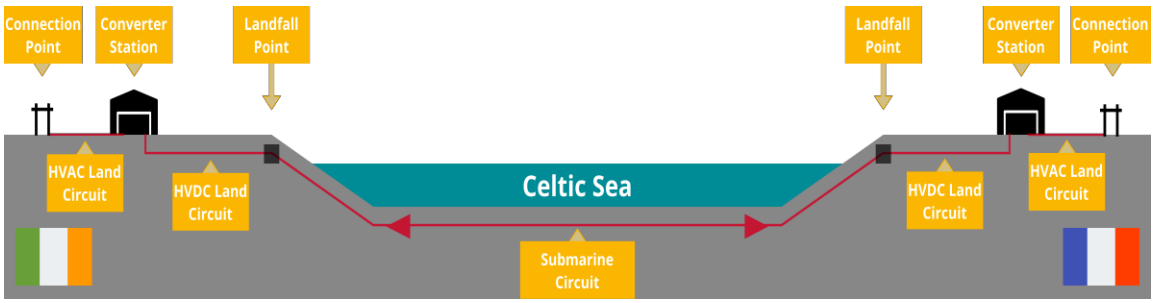
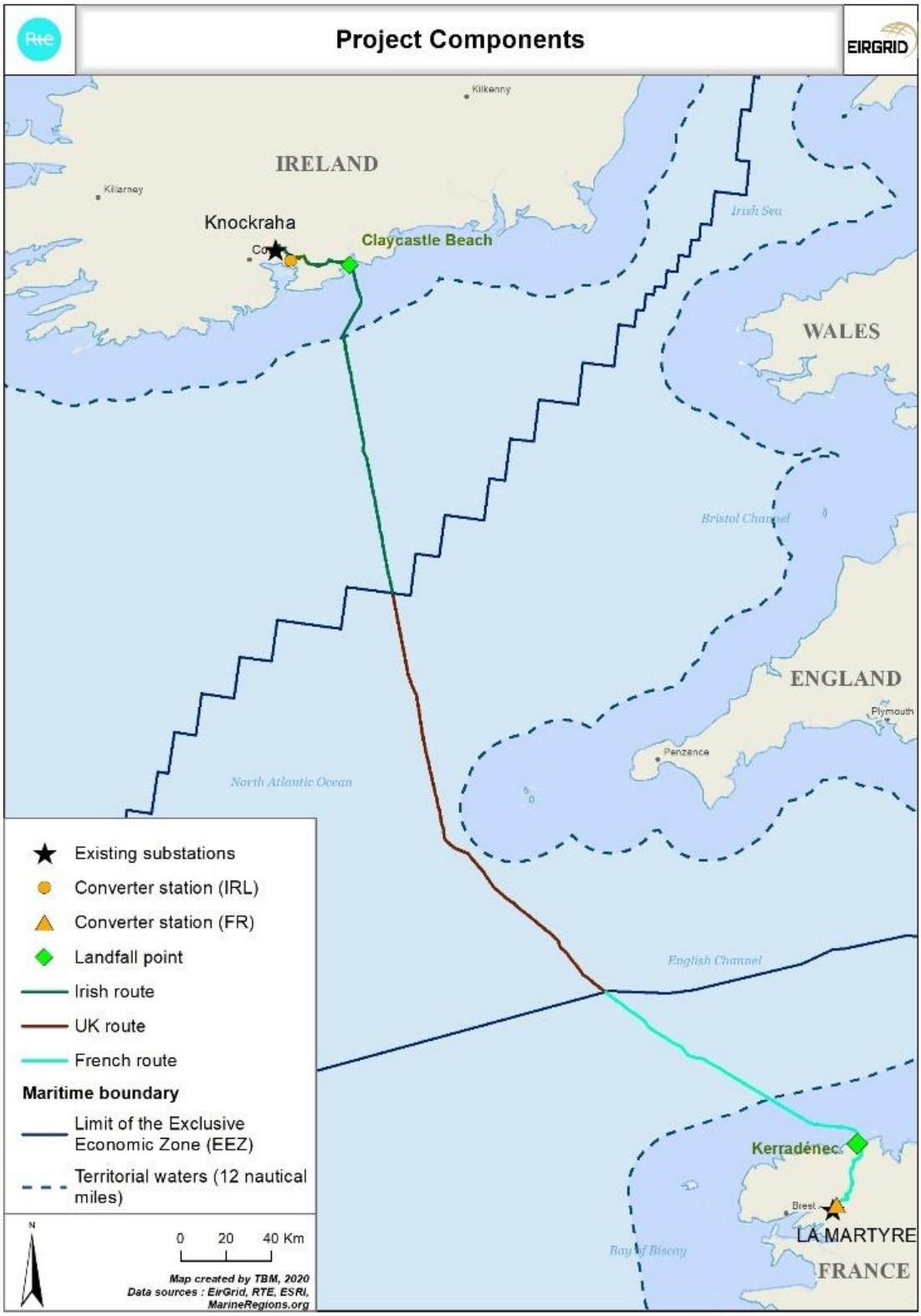


Figure 1.2: Celtic Interconnector Submarine Cable Route Map



1.4 Geographical scope

This Outline WSI applies to the marine elements of the Celtic Interconnector within Irish TW and EEZ and the UK EEZ, focusing on a corridor extending 500m to either side of the proposed cable route centreline.

Mitigation works within the French EEZ and Terrestrial Waters, and within the Irish and French terrestrial zones are provided for elsewhere and do not form part of the scope set out in this Outline WSI.

2 Aims and Objectives

2.1 Aim

The overarching aim of the WSI is to set out the scope and standards for the archaeological mitigation referenced in the EIAR / ER (**Volume 3D Part 1 Chapter 11 Historic Environment and Volume 4 Chapter 11 Historic Environment**).

2.2 Objectives

The objectives of this Outline WSI are as follows:

- To provide for archaeological investigation of areas of potential or confirmed archaeological interest that may be affected by the proposed development;
- To provide for archaeological analysis and interpretation of geophysical survey work carried out in advance of any construction or clearance operations;
- To identify the position and extent of Archaeological Exclusion Zones (AEZs) intended to protect known and potential areas of archaeological interest;
- To provide for avoidance of or mitigation of damage to archaeological remains identified during surveys and the construction period; and
- To set out reporting and licencing requirements for survey, mitigation and observations of archaeological material.

3 Roles and Responsibilities

3.1 Project roles and responsibilities are defined as set out at Table 3.1.

Table 3.1: Project Roles and Responsibilities

Roles	Responsibilities
Developer	• Ensure that WSI is implemented and that any relevant statutory or regulatory requirements and processes are met; • Procure appropriate archaeological support; • Ensuring that any necessary licences or permissions are in place before work commences; • Provide relevant project information as appropriate; and Identify Nominated Contacts for the Protocol for Archaeological Discoveries.
Retained Marine Archaeologist*	• Advise the Developer on interaction with consultees/regulators and specialist contractors; • Monitor the implementation of the agreed WSI, in particular, where delivery of the WSI is divided into discrete lots or where specialist contractors subcontract aspects of the WSI, ensuring that all aspects of the WSI are in scope; • Confirm to the client that any licences required for archaeological works are in place, and that archaeological works required out as a condition of other licences/consents are in place; • Advise on the reporting of findings in line with the PAD; • Monitor compliance with any established AEZs; • Ensuring that any statutory or regulatory requirements are appropriately considered and allowed for in archaeological works; • Where necessary, coordinate reporting of results of investigation or archaeological discoveries so that findings in the UK EEZ which inform understanding of findings in Irish Waters and vice versa are appropriately considered; and • SQEP – The Retained Marine Archaeologist of works must have an appropriate level of qualification and experience in managing and monitoring Marine Archaeological and Geoarchaeological workscopes.
Specialist Contractors (and Sub-Contractors)	• Implement all relevant aspects of the WSI covered by the appointed scope of works; • Produce method statements for the appointed workscope for approval by the relevant regulators; • Securing and holding any relevant excavation, diving or survey licences for archaeological work;

Roles	Responsibilities
	• Ensure that all project staff and subcontractors understand the requirements of the WSI; • Obey all relevant statutory and policy requirements; • Respect constraint maps and AEZs; • Inform the appointed archaeologist(s) of any environmental constraint or matter relating to health, safety and welfare of which they are aware that is relevant to the archaeologists' activities; and • SQEP – All archaeological contractors should have an appropriate level of experience for their project role and archaeological scope, and where works are carried out in Irish Territorial Waters and EEZ must be eligible to hold the necessary licence for excavation or survey.

*The Retained Marine Archaeologist would normally be independent of any appointed contractors, but this role may be filled by an organisation also appointed as a specialist contractor if required.

3.2 Liaison with Regulators

Key Regulators are identified as follows:

- Cork County Heritage Officer (From MHWS to LAT at Claycastle);
- Underwater Archaeology Unit (From MHWS at Claycastle to the UK/Irish Median); and
- Historic England (From the Irish/UK Median to the UK/French Median).

Additional Stakeholders include those providing archaeological support within the Irish Terrestrial Zone and the French EEZ. Communication with these stakeholders will be required, as appropriate, to ensure that applicable findings from these areas can be fed into planning, implementation, and reporting of the works set out in this WSI.

The Retained Marine Archaeologist will establish and maintain a register of stakeholders including client and construction contractors, archaeological contractors, regulators, and other relevant interested parties, including telephone and email contact details for key individuals.

During the Project, communication with the regulators will be undertaken via the Retained Marine Archaeologist in line with a reporting schedule to be agreed with relevant stakeholders. This reporting schedule should consider the need for milestone-based reporting and periodic reporting. Key project milestones may include, but not necessarily be limited to:

- Approval of contractor method statements and licence applications;
- Notification of commencement of works;
- Periodic reporting during works;

- Notification of features identified in surveys;
- Notifications of discoveries through the PAD;
- Notification of completion of fieldwork;
- Periodic updates during post-excavation reporting; and
- Submission of post-excavation reporting.

Method Statements, and any applicable licence applications, for archaeological works will be submitted to the relevant Regulator(s) and Archaeological Curator(s) sufficiently in advance of the planned commencement of works to allow for sufficient time for the review and any amendments to be completed and agreed.

4 Baseline Summary

4.1 Previous archaeological work

Previous archaeological work is summarised at **Table 4.1**.

Table 4.1: Desk based studies

Study	Scope and Key Findings
Ireland-France Celtic Interconnector, Marine archaeology desk-based assessment. (Headland Archaeology 2014)	Marine Archaeology baseline study aiming to: • Assess the nature of the cultural resource in this area; • To outline the archaeological potential of the marine environment; • To aid in the identification of seabed anomalies that may be discovered during the proposed; geophysical survey; and • Inform and propose mitigation for sites that may be impacted by the proposed geotechnical survey. Results: • Identification of recorded potential wrecks and obstructions; and • Identification of potential for survival of deposits of geoarchaeological interest within the intertidal and marine zones.
Ireland-France Celtic Interconnector: Archaeological Review of Geophysical Survey Data (Headland Archaeology 2015)	Review of geophysical (side scan, seismic (pinger) and magnetometer) and bathymetric (MBES) data, in order to identify sites or features of archaeological potential, and to characterise the marine environment in terms of prehistoric landscape potential and significance. Identified three medium potential anomalies and 40 low potential anomalies in proximity of the Cable Survey Corridor (CSC).
Celtic Interconnector – Feasibility Study, Stage 1 Geoarchaeological Assessment of Vibrocore Logs. (Wessex Archaeology 2016)	Geoarchaeological assessment of vibrocore logs from Irish TW and EEZ. Identified locations where deposits of geoarchaeological interest survive.
Celtic Interconnector Project Marine archaeology desk-based assessment (Cotswold Archaeology 2017)	Marine archaeology baseline survey of the revised offshore routes related to the Ballinwinning, Claycastle and Redbarns landfalls. Identified one potential wreck within the Cable Study Corridor (CSC) and areas of geoarchaeological interest.

Study	Scope and Key Findings
Celtic Interconnector Project Marine archaeological impact assessment for proposed ground investigation surveys. (Cotswold Archaeology 2018)	Assessment of the potential effects of proposed ground investigation works at Ballinwinning, Redbarn and Claycastle and within Irish TW.
Archaeological review of foreshore walkover, and foreshore and offshore geophysical survey data. (Cotswold Archaeology 2018)	Walkover and geophysical surveys of potential landfalls at Claycastle and Redbarns and associated cable routes, with a further walkover survey at a potential landfall at Ballinwinning. Identified potential archaeological features within the foreshore at Claycastle and Redbarns and potential features of geoarchaeological interest and one potential wreck within the marine zone.
Archaeological monitoring as part of the Celtic Interconnector Project, Claycastle & Summerfield/ Clonard East/ Ballycrenane, County Cork. (IAC Archaeology 2018)	Archaeological monitoring of ground investigation at Claycastle, Ballinwinning and Ballycroneen. No archaeological remains were observed at Ballinwinning or Ballycroneen, but buried peats were observed at Claycastle.
Celtic Interconnector Project, Marine Archaeology and Cultural Heritage Report. (Cotswold Archaeology 2019)	Consolidates previous reporting, focusing on the final agreed route. Sets out archaeological baseline for the entire route between Irish and French landfalls, identifying areas of geoarchaeological and archaeological interest.
Celtic Interconnector Project Geoarchaeological Assessment. (Cotswold Archaeology 2019)	Assessment of samples recovered from Claycastle and Redbarns beaches identified estuarine deposits and a potential submerged forest in near shore and intertidal areas of Claycastle Beach.
Celtic Interconnector Project Claycastle Beach, Youghal, Co. Cork, Ireland Geoarchaeological assessment of auger and test pit logs. (Cotswold Archaeology 2019)	Report on augering and test pitting at Claycastle beach. Identified buried peats within the proposed cable route.

4.2 Marine Archaeological remains

The estuary of the River Blackwater forms a natural harbour at Youghal, which is recorded as having been formed by exceptional tidal conditions in the early 9th century AD, and which has been in use throughout the historic period. The approach to the harbour appears to be marked by a concentration of recorded losses and obstructions, and while the cable route passes to the south and west of the principal concentration of recorded wrecks, desk-based assessment has noted the presence of a number of recorded and potential wreck sites. The proposed cable route passes through an area to the south-west of the principal routes into and out of the harbour. As the route moves further into the Celtic Sea, it enters an area historically used for access to the Atlantic ports of Ireland, England, Wales, and France and for access to the English Channel, and while recorded and potential wrecks and obstructions become more sparsely distributed, the potential that such features may be affected will remain.

There are no formally designated wrecks within the CSC or wider study area. Previously recorded losses and geophysical anomalies assessed as of medium archaeological potential (no high potential anomalies that cannot be correlated to recorded losses have been noted within the CSC or wider study area) in Irish Territorial Waters and EEZ are summarised at Table 4.2 and within the UK EEZ are summarised at Table 4.3.

Irish TW and EEZ

Table 4.2: Recorded losses, obstructions and geophysical anomalies suggestive of potential wrecks within the CSC

ID	Name	Classification	Place of Loss	Date of Loss	Lat	Long	Source
W10966	Unknown	Unknown	Unknown	Unknown	50.74167	-7.35833	UKHO
W11319	Unknown	Unknown	Celtic Sea	Unknown	51.6625	-7.82817	UKHO Eoghan Kieron
HA2041	Unknown	Medium potential magnetic and sidescan anomaly	Unknown	Unknown	51.40426	-7.69868	Headland Archaeology 2015
HA2051	Unknown	Medium potential magnetic and bathymetric anomaly	Unknown	Unknown	51.4032	-7.70485	Headland Archaeology 2015 (also recorded by Osiris as M61)

ID	Name	Classification	Place of Loss	Date of Loss	Lat	Long	Source
HA2052	Unknown	Medium potential sidescan anomaly	Unknown	Unknown	51.40356	-7.70513	Headland Archaeology 2015
HA2067	Unknown	Medium potential sidescan anomaly	Unknown	Unknown	50.85182	-7.40951	Headland Archaeology 2015
HA2082	Unknown	Medium potential sidescan anomaly	Unknown	Unknown	51.21056	-7.61294	Headland Archaeology 2015
HA5000	Unknown	Medium potential magnetic anomaly	Unknown	Unknown	51.68806	-7.84895	Headland Archaeology 2015 (also recorded by Osiris as M37)

UK EEZ

Table 4.3: Recorded losses, obstructions and geophysical anomalies suggestive of potential wrecks within the CSC

ID	Name	Category	Lat	Long	Comments
21629	Gadsby	Non-dangerous wreck	49.4256667	6.1348333	Recorded as dead wreck of British merchant vessel sunk by the submarine U-39, 33 miles SSW of Wolf Rock. There were no casualties.
21689		Foul ground	49.5481347	6.4544994	Identified as fisherman's fastener first recorded 1977
21646		Foul ground	49.4609236	6.2253535	Identified as fisherman's fastener first recorded 1977
			Easting	**Northing**	
S176		Sonar anomaly	672053.90	5503708.40	Possible wreckage identified in sidescan

ID	Name	Category	Lat	Long	Comments
					sonar survey; measures 7.7m x 4.2m x 1.9m. Appears close to reported wreck 21754 (wreck of British merchant vessel sunk by submarine U-29, 10 miles south of St Mary's, Scilly) and may be related.
M205		Magnetic anomaly	659168.20	5510438.70	Part of a cluster of anomalies possibly representing minor wreckage
M206		Magnetic anomaly	659201.90	5510363.20	Part of a cluster of anomalies possibly representing minor wreckage
M207		Magnetic anomaly	659242.20	5510264.90	Part of a cluster of anomalies possibly representing minor wreckage
M208		Magnetic anomaly	659263.20	5510217.20	Part of a cluster of anomalies possibly representing minor wreckage

No previously identified marine archaeological remains would be affected by the proposed scheme, and it is considered unlikely that marine archaeological remains would be affected by the proposed scheme.

5 Proposed Mitigation

5.1 Introduction

In-principle, mitigation measures for the Proposed Development have been set out in Volume 3D1, Chapter 11 and Volume 4, Chapter 11 of the EIAR / ER. This mitigation comprises a combination of avoidance measures and archaeological investigation in addition to a Protocol for Archaeological Discoveries.

In advance of any archaeological survey or mitigation, the archaeological contractor(s) will produce either an application for the appropriate licence (Irish TW and EEZ) or detailed method statements (UK EEZ) for the archaeological works identified. These Licence applications and/or Methods Statements will detail:

- The scope of the relevant works;
- Relationship to survey and construction programme and survey timetable;
- Archaeological aims and objectives of works;
- Investigation methodology including sampling and finds policies and arrangements for immediate conservation, storage and processing of archaeological material;
- Provisions and timetable for post-investigation processing, assessment and analysis of archaeological material;
- Reporting;
- Provision for reasonable monitoring by local and national regulators; and
- Health, safety, and welfare.

Licence Applications and/or Method statements will be agreed with the Retained Marine Archaeologist in advance of submission to the relevant regulators in sufficient time to allow for regulatory comments and any required revisions to be actioned in advance of the start of works, having regard to response times set out by regulators.

5.2 Marine Archaeological Remains

Review of Marine Geophysical Surveys

Marine geophysical surveys have been undertaken along the entire cable route, with specialist archaeological interpretation carried out of the results of survey within Irish TW and EEZ. Further geophysical surveys are likely to be undertaken as part of the detailed design of the proposed cable route.

Existing geophysical survey data for the UK EEZ and any newly acquired survey data should be reassessed in line with English Heritage (2013) Marine Geophysics Data Acquisition, Processing and Interpretation to ensure that potential archaeological remains can be better characterised and that the AEZ identified at Section 5.5 of this Outline WSI are appropriate.

This process may result in the identification of new AEZ or the modification of existing AEZ. Any modifications to the stated AEZ will be agreed with the relevant national regulator.

The scope and methods of any proposed marine geophysical survey carried out for non-archaeological purposes (e.g.: UXO survey or engineering) will discussed with the Retained Marine Archaeologist to ensure that the requirement to gather archaeological information is appropriately considered. Advice will consider:

- available details of sites and / or anomalies identified in previous desk-based and geophysical survey;
- archaeological potential of areas where no existing sites and/ or anomalies are yet known;
- types of survey and specifications and settings of geophysical equipment to be used;
- survey specifications, including spacing and orientation of lines and cross lines;
- any potential requirement for an on-board archaeological geophysicist during survey; and
- requirements for post-processing, interpreting, and archiving resulting data.

Where further surveys are required to confirm the results of geophysical survey for archaeological purposes (usually only in areas of archaeological interest where impact cannot be avoided), the scope and methods of survey would be agreed with the relevant national regulator.

The results of further geophysical interpretation will be reported in line with requirements for report set out at Section 7 of this Outline WSI.

Archaeological assessment of ROV survey data

The scope and methods of any proposed ROV video/drop down camera survey carried out to investigate obstructions identified in geophysical survey or during the course of clearance/construction activities will be discussed with the Retained Marine Archaeologist to ensure that the requirement to gather archaeological information is appropriately considered. Advice will consider:

- potential requirements for survey licencing by the National Monuments Service;
- details of AEZ and/or geophysical anomalies within the development area;
- types of survey and specifications and settings of imaging equipment to be used;
- the provision of guidance on the types of sites and finds that are anticipated and which would require investigation, and the level of recording required;
- any requirements for review of data recovered from the survey; and
- the potential requirement for an on-board archaeological geophysicist to advise on image capture during survey.

An archaeological method statement would be prepared for any such survey, including archaeological objectives and requirements, and setting out any specific technical requirements to allow for meaningful archaeological results. In Irish waters, this method statement would be a requirement of the licencing process where licencing is required.

Reporting of the archaeological assessment will be required in a timely fashion to support any decision-making on further actions. The format and timetable for reporting shall be set out in any methods statement, to reflect the scope of survey and the equipment used.

The results of these surveys will be used to confirm or modify existing or establish new AEZ, in consultation with the relevant national regulator.

5.3 Archaeological Exclusion Zones

AEZ have been established in respect of all observed geophysical anomalies of demonstrable or suspected anthropogenic origin within the cable survey corridor and are shown at Appendix B. The standard practice in this case is to identify a 100m AEZ around known wrecks or high potential geophysical anomalies, and a 50m exclusion zone around other obstructions or wreckage. These AEZs are defined to encompass the full observed extent of any archaeological remains and a buffer to ensure that these remains will not be affected by the proposed works.

Further AEZs will be defined where anomalies or observations of archaeological material not previously identified are made during the pre-construction surveys or during construction work. The scale and location of such further AEZs will be confirmed with the relevant national regulator.

Further survey work may suggest that established AEZs are not appropriate, either due to anomalies being identified as having non-archaeological origins, or more accurate locations and extent of archaeological material being identified. In these cases, amendments to the established AEZ will be agreed with the relevant national regulator.

Construction work would not normally take place within a defined AEZ, and it is anticipated that any detailed design would have regard to established AEZ. Where works within an AEZ cannot be avoided, further investigation will be required in line with provisions for archaeological review of geophysical and ROV survey as set out at Section 5.4.

Table 5.1 Proposed AEZ within the CSC (Irish TW and EEZ: See also Appendix B maps 1-7)

ID	Name	Classification	Lat	Long	AEZ
W10966	Unknown	Unknown; identified as demasted brig of unknown date (Cotswold Archaeology 2019)	50.74167	-7.35833	100m
W11319	Unknown	Unknown	51.6625	-7.82817	n/a

ID	Name	Classification	Lat	Long	AEZ
HA2041	Unknown	Medium potential magnetic and sidescan anomaly	51.40426	-7.69868	50m
HA2051	Unknown	Medium potential magnetic and bathymetric anomaly	51.4032	-7.70485	50m
HA2052	Unknown	Medium potential sidescan anomaly	51.40356	-7.70513	50m
HA2067	Unknown	Medium potential sidescan anomaly	50.85182	-7.40951	50m
HA2082	Unknown	Medium potential sidescan anomaly	51.21056	-7.61294	50m
HA5000	Unknown	Medium potential magnetic anomaly	51.68806	-7.84895	50m
CA8	Unknown – same as W11319	Unknown	51.66145		n/a
			Easting	**Northing**	
CA1001	Unknown – confirmed location of CA8/W11319	High potential bathymetric and magnetic anomaly. Probable wreck site measuring 91.4m long by 7.3m high	580911	5724197	100m
CA1002	Unknown	Medium potential magnetic anomaly – probable metallic debris	580878	5750872	50m
CA1003	Unknown	Medium potential – magnetic anomaly and small rounded reflector	586418	5738751	50m
CA1005	Unknown	Medium potential anomaly. Bathymetric high close to two magnetic anomalies	580536	5723787	50m
CA1011	Unknown	Medium potential magnetic anomaly with associated small reflector probable metallic debris	580567	5723726	50m

Table 5.2 Proposed AEZ within the CSC (UK EEZ: See also Appendix B maps 8-12)

ID	Name	Category	Lat	Long	AEZ
21629	Gadsby	Non-dangerous wreck	49.4256667	6.1348333	100m
21689		Foul ground	49.5481347	6.4544994	50m
21646		Foul ground	49.4609236	6.2253535	50m
			Easting	Northing	
S176		Sonar anomaly	672053.90	5503708.40	50m
M205		Magnetic anomaly	659168.20	5510438.70	50m
M206		Magnetic anomaly	659201.90	5510363.20	50m
M207		Magnetic anomaly	659242.20	5510264.90	50m
M208		Magnetic anomaly	659263.20	5510217.20	50m

It is not anticipated that any disturbance would arise to the remains identified above where the works respect the defined AEZ.

5.4 Protocol for Archaeological Discoveries

General

While it is not anticipated that previously unknown sites or material would be observed during the construction of the proposed development, measures are required to mitigate any impact on archaeological remains and to ensure that relevant statutory responsibilities are met. The scope of 'archaeological remains' includes any submerged prehistoric material, human remains, shipwreck material or aviation material, and material which either falls within the definitions set out in the statutes above or could reasonably be considered to fall within these categories.

Archaeological material does not include modern material with limited informative, cultural or historic value, such as chance loss of cargo or fishing gear, and the Protocol for Archaeological Discoveries (PAD) does not supplant any other requirements to report wreckage, salvage or other loss under other statutory provisions (i.e. those covering environment, safety, navigation, and wreck, salvage or other property rights), and advice on these issues should be taken from appropriately qualified specialists.

The PAD sets out a protocol for action where archaeological remains are observed during survey or construction out with an agreed scheme of archaeological works.

Where unexpected archaeological remains are observed during the conduct of an established archaeological investigation, the responsibility for reporting to the client will be with the appointed specialist archaeological contractor in line with any agreed method statements.

This PAD supplements, and does not supersede, any requirements to report marine wreckage for navigational, wreck or other statutory/guidance/best practice purposes.

This PAD provides for a four-step process:

1 Reporting of potential archaeological material to the Retained Marine Archaeologist;

2 Provision of archaeological advice and, where required definition of temporary exclusion zones (TEZ) and archaeological investigation of identified features/material;

3 Where appropriate, establishment of new or revision of existing AEZs; and

4 Reporting of findings.

All relevant project staff show be briefed on the need for and operation of the PAD to ensure that they are aware of the PAD, can recognise finds of archaeological potential, and understand their responsibilities in respect of this material. Where appropriate, a copy of the PAD should be appended to any written work instructions for reference during works. This applies to any project staff involved in survey or intrusive clearance and construction works, primarily:

- UXO survey(s);
- Prelay grapnel runs, and other clearance works;
- Cable ploughing; and
- Other works with potential for the discovery of material on the seabed and/or recovery of material to the surface.

Reporting potential archaeological material to the Retained Marine Archaeologist

Any observation of archaeological material or material which appears to be of archaeological origin is to be reported to the Retained Marine Archaeologist at the earliest opportunity.

In general, archaeological material should not be handled or deliberately recovered from the seabed without seeking advice from the Retained Marine Archaeologist, but where archaeological material is inadvertently recovered during operations, site staff should:

- Record the location at which the material was found;
- Handle material with care and no more than is necessary to allow for its safe storage;
- Not attempt to clean material or remove encrustations;
- Take photographs and/or video to inform Retained Marine Archaeologist advice;
- Store material in a safe place where it will not be inadvertently lost or broken; and
- Seek advice from the Retained Marine Archaeologist.

Finds of ordnance or other dangerous or controlled materials are to be treated within established protocols for those materials in precedence to any archaeological recording, and while these materials should be reported to the Retained Marine Archaeologist, the provisions of the PAD shall not apply unless these materials have been rendered safe or safe systems of work have been established.

Material should be stored in a condition as close as possible to the conditions from which it was recovered. Waterlogged material should be kept damp and in a dark place where possible.

Where potential archaeological remains are identified in advance of intrusive construction work (e.g., geophysical survey or drop-down video) the location and nature of the anomaly should be reported to the Retained Marine Archaeologist so that an appropriate TEZ can be established, and the observation recorded for archaeological purposes. The works should, where reasonably practicable, considering the nature and importance of the find and the nature of the works, deviate round the identified anomaly.

Where potential remains are identified during or after site clearance or intrusive construction work, deviation of the route is unlikely to represent an appropriate mitigation, and the location at which potential archaeological remains were observed should be reported. Where possible, any remains should be recovered to the vessel so that the nature of the remains can be determined, and work should cease or move to an alternate location while further advice is sought from the Retained Marine Archaeologist.

Provision of archaeological advice

The Retained Marine Archaeologist will arrange for appropriate identification of any material recovered, and, where appropriate, will advise on any temporary restrictions to operations within the vicinity of the find, and the establishment of any TEZ that may be necessary to allow for protection of archaeological remains, pending consultation with the appropriate national regulators.

Where further construction or other intrusive works are required within the vicinity of archaeological material, further investigative survey may be required to fully understand the nature and extent of archaeological remains. The Retained Marine Archaeologist will advise on the scope of such survey and will agree proposals for survey with the relevant national regulator.

The Retained Marine Archaeologist will advise the client on reporting requirements for archaeological purposes, and on potential requirements for route deviation, amendments to working practices or support to further investigation, recording, moving, storage and/or analysis of archaeological material, and will inform the relevant national regulators, agreeing any further actions with the client and relevant national regulator.

Where heritage-based licensing is required for further survey, investigation or recovery and analysis of archaeological material, any such licence will be obtained by the relevant specialist contractor undertaking the proposed work.

Revision or establishment of AEZ

Where archaeological remains are identified and mitigation cannot be achieved by either recovery and recording or movement of these remains or, in the case of remains identified in advance of construction works, the Retained Marine Archaeologist will agree the location and scale of any required AEZ with the relevant national regulators. While this would

normally require the extension of existing or establishment of new AEZ, it may be appropriate to move, amend or remove existing AEZ where survey identifies that these have not been appropriately defined.

Reporting of findings

Further to initial reporting of findings to the appropriate national regulator by the Retained Marine Archaeologist, any reporting of identification and analysis of archaeological material will be carried out in line with the general provisions for reporting set out at Section 7 of this Outline WSI, except where superseded by requirements of any formal licence required for those works.

6 Procedures in respect of statutorily protected remains

6.1 General

Any reporting of archaeological material observed during the proposed works shall be made by the Retained Marine Archaeologist, except where reporting is required as a condition of specific archaeological licencing, in which case the named person/organisation in that licencing shall carry out any reporting, ensuring that the Retained Marine Archaeologist is informed.

All artefacts identified from material recovered will be retained, processed, and recorded in accordance with the CIfA Standard and guidance for the collection, documentation, conservation, and research of archaeological material (CIfA 2014) and/or the IAI Code of Conduct for the Treatment of Archaeological Objects in the context of an archaeological excavation (IAI 2006).

The initial processing and storage of soil samples and other ecofactual material will be carried out in accordance with Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (English Heritage, 2011) and Geoarchaeology: using earth sciences to understand the archaeological record (Historic England, 2015) and/or Environmental Sampling: Guidelines for Archaeologists (IAI 2007).

The Methods Statements for each stage of work will identify appropriate named specialists or, where required, licence holders, and will set out:

- Procedures for conservation assessment;
- Procedures for temporary storage, processing and recording of archaeological material;
- A retention and discard policy; and
- Procedures for selection of material for further assessment and analysis.

It is not anticipated that human remains will be present within the CSC, given the prevailing conditions, which are not favourable for the preservation of human remains, and the absence of evidence for wrecks within the working areas. However, in that excavation of human remains is closely governed by statute in both the UK and Ireland, provision must be made in any methods statements for intrusive archaeological works for actions to be taken in the event of human remains being observed or recovered.

6.2 Archaeological Material

Irish TW and EEZ

The National Monuments Amendment Act 1994 sets out that all archaeological objects are the property of the Irish State. As such, procedures for reporting discoveries of archaeological material, its recovery, analysis and storage are required as part of the

process of licencing archaeological investigations, and procedures in respect of archaeological material recovered in Irish TW or EEZ will be set out in the detailed methods statements required by this Outline WSI.

UK EEZ

Archaeological artefacts that have come from a ship are considered to be 'wreck' for the purposes of the Merchant Shipping Act 1995, and the Receiver of Wreck must be notified within 28 days of recovery.

Arrangements for agreeing reasonable access for study of archaeological material and/or transfer of title of that material to an appropriate receiving museum must be agreed with the lawful owner and/or the Receiver of Wrecks. This is particularly important where analysis of material could be destructive, and such analysis must not take place without appropriate lawful authority.

Any items which are recovered which could be deemed as Treasure[1] will be subject to the provisions of the Treasure Act 1996 . Such material shall normally be removed from site to a secure location as soon as is reasonably practicable and is compatible with appropriate archaeological investigation and recording.

In addition to the statutory authorities the Marine Antiquities Scheme should be informed.

6.3 Human remains

General

The Archaeological Contractor will have available within the team or on call an appropriately qualified and experienced osteo-archaeologist to assist the recovery, storage and processing of any human remains.

Irish Territorial Waters and EEZ

It is a legal obligation under the Coroner's Act 1962 and the National Monument Acts to notify the Garda Siochana and the National Museum of Ireland where human remains are unexpectedly or accidentally identified. Where it is established that the remains are not recent, they are considered to be archaeological artefacts under the National Monuments (Amendment) Act 1994, which sets out the legal definition of an archaeological object to include 'ancient human remains.

[1] Treasure is as defined by the Treasure Act 1996 and the Treasure (Designation) Order 2002. In brief, Treasure comprises any metal object, other than a coin, of at least 10 per cent by weight of gold or silver at least 300 years old. A prehistoric object is Treasure where any part of it is precious metal, or where two or more metallic objects come from the same find.

Two or more coins from the same find are Treasure provided they are at least 300 years old and contain 10 per cent gold or silver (more than ten coins containing less than 10 per cent of gold or silver are Treasure). Objects found with Treasure would also comprise Treasure. As finds may have become scattered since they were originally deposited, an object would be part of the 'same find' as another object or coin if it is found in the same place as, or had previously been together with, the other object.

Until such time as the National Museum of Ireland makes a decision on the future retention and care of human remains, the licensed site director has responsibility for their excavation, post excavation care and analysis, and any further works must be carried out under the terms of an excavation licence.

Where appropriate, any Method Statements produced in line with the Outline WSI above will set out clear and specific proposals for the appropriate reporting, recording, excavation, analysis, and storage of human remains.

UK EEZ

In the event of human remains being encountered, the Retained Marine Archaeologist will be informed to allow formal reporting to the national regulator as appropriate. Where appropriate, the Archaeological Contractor will arrange receipt of any necessary licencing to enable the legal removal of any human remains encountered in the works.

Military Remains

The 1986 Protection of Military Remains Act (PMRA) applies to any aircraft which have crashed while in military service and to certain wrecks of vessels which were wrecked while in military service within UK waters. PMRA makes it an offence to disturb, move or unearth military remains which have been designated.

There are no designated protected areas or controlled sites within the CSC, and there are no records of military vessels or aircraft having been lost within the Order limits.

Where remains of military aircraft are observed during archaeological investigation or construction work, intrusive work should cease, and the site be secured while consultation with the Ministry of Defence is undertaken.

It should be noted that the PMRA also applies to aircraft or vessels lost in British military service throughout the world, and the procedures set out below may also apply to where such remains are present out with the UK EEZ.

Where remains of military vessels or aircraft lost in service of nations other than the UK or Ireland are identified, due regard should be given to any requirement to report such discoveries to the relevant national regulator of the nation in the service of which the vessel or aircraft was lost.

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7 Post-Excavation and Reporting

7.1 General

Proposals for reporting of each phase of archaeological work will be set out in the relevant detailed methods statements. These will set out:

- Reporting timetable;
- Reporting process and any requirement for periodic, interim or assessment reporting;
- Provisions for publication or wider dissemination; and
- Archival of physical, paper and/or digital material.

7.2 Reporting of pre-construction surveys

The results of any pre-construction surveys will be necessary to inform project planning and the detail of mitigation requirements and to support consultation with the relevant national regulators. It is therefore important that they are reported in a sufficiently timely manner to inform these purposes. The detailed method statements for these phases of work will set out an agreed timescale for reporting, considering the potential for abbreviated interim or headlines reporting where appropriate, to ensure that the value of the surveys can be realised.

7.3 Post-Fieldwork Reporting

Post-fieldwork reporting may fulfil a number of purposes, and regard must be had to these in setting out the detailed methods statements, which should consider the relevant requirements at the completion of each stage of work.

All stages of post-fieldwork reporting may not be appropriate for all archaeological works, and therefore, any licence applications or detailed methods statements will set out an appropriate format and timetable for the presentation of reporting, having regard to the works completed, the findings of those works and the need to provide an appropriate level of descriptive text, catalogue data, site photography/images, survey data, and maps/plans/charts at each stage.

Reporting stages would normally comprise:

- Fieldwork Completion Reporting:
    - This type of reporting would normally take the form of a summary note, representing a very brief summary sufficient to confirm the completion of fieldwork; provide a scope and timetable for detailed reporting; and signpost any significant findings to inform research and development management pending the production of the full report.
- Assessment Reporting:

- For more complex interventions, or those producing results which require significant post fieldwork analysis, assessment reporting may be required to provide a rapid summary of the material recovered during the fieldwork and to allow costed recommendations to be made for the final reporting;
- Assessment reporting is a summary document rather than a detailed record. As such, the level of specialist work and reporting will be sufficient to allow recommendations for detailed work to be made and justified;
- Any Assessment reporting should present: a project and archaeological introduction; a statement of archaeological background and research aims; an interim statement on the results of fieldwork and a summary of the site archive and work carried out for assessment;
- The Assessment reporting will set out the Potential of the Data to meet the research aims of the project and a summary statement of the significance of the data to support recommendations for final reporting.;
- Supporting information will normally include: illustrations at appropriate scales; tabulated data and/or appended specialist reports; and index, references and disclaimers;

- Any requirement for and scope/format of archive or publication reporting will either be specified within the licence application or detailed methods statement, or as a recommendation of the Assessment reporting:
  - Publication Reporting could comprise reporting in a peer-reviewed journal or monograph and supplement or replace full archive reporting, depending on circumstances, and would be used to set out particularly significant findings of the fieldwork, normally focusing on specific aspects that relate to active research; and
  - Popular reporting would be used to report on particularly significant or interesting results of the fieldwork, supporting wider project engagement and communications. This reporting could include press releases and internet or social media posts as well as more formal reports.

7.4 OASIS

For works within the UK EEZ, the relevant contractor must complete the online OASIS form at http://ads.ahds.ac.uk/project/oasis/. Once a report has become a public document, the OASIS form will be validated, placing the information into the public domain on the OASIS website. The archaeological contractor must indicate that they agree to this procedure within the detail method statement submitted to the Retained Marine Archaeologist for approval.

7.5 Permanent Archival and Storage

Relevant recipient museums will be identified in any licence applications or detailed methods statements, along with an agreed discard/retention policy and an outline content of the

archive, considering that the works will generate paper records, graphics, artefacts, ecofacts, and digital data.

Before the commencement of fieldwork, contact should be made with the relevant recipient Museum(s) and/or Archive(s) to make the relevant arrangements for cataloguing and receipt of physical, paper, and digital archives as appropriate to that survey. Particular attention should be given to the need to identify an appropriate archive for digital data and that format of digital archive is agreed in advance of submission.

The archaeological contractor will confirm that arrangements for the format, packaging, content and receipt of archaeological material and site archives, including any requirement for security copies have been agreed with the relevant recipient museum or archive before the commencement of fieldwork.

Licence applications and detailed methods statements for each phase of work shall set out an agreed timetable for the deposition of the archive with the recipient museum or archive and shall confirm that the archive has been submitted in a satisfactory form to the receiving museum on completion of works.

8 Conclusion

This document supports the EIAR and is intended for further development post consent with the relevant authorities.

The survey work undertaken to date has revealed a limited amount of locations of archaeological interest within the area of the proposed development, and appropriate AEZ have been defined to ensure the protection of those remains.

The measures provided in this document in addition to the provision of AEZ will be undertaken in collaboration and agreement with the relevant authorities prior to and during the construction of the proposed development.

9 References

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Institute of Archaeologists of Ireland Code of Conduct for the Treatment of Archaeological Objects in the context of an archaeological excavation. (http://www.iai.ie/wp-content/uploads/2016/03/IAI-Code-of-Conduct-for-the-Treatment-of-Archaeological-Objects.pdf).

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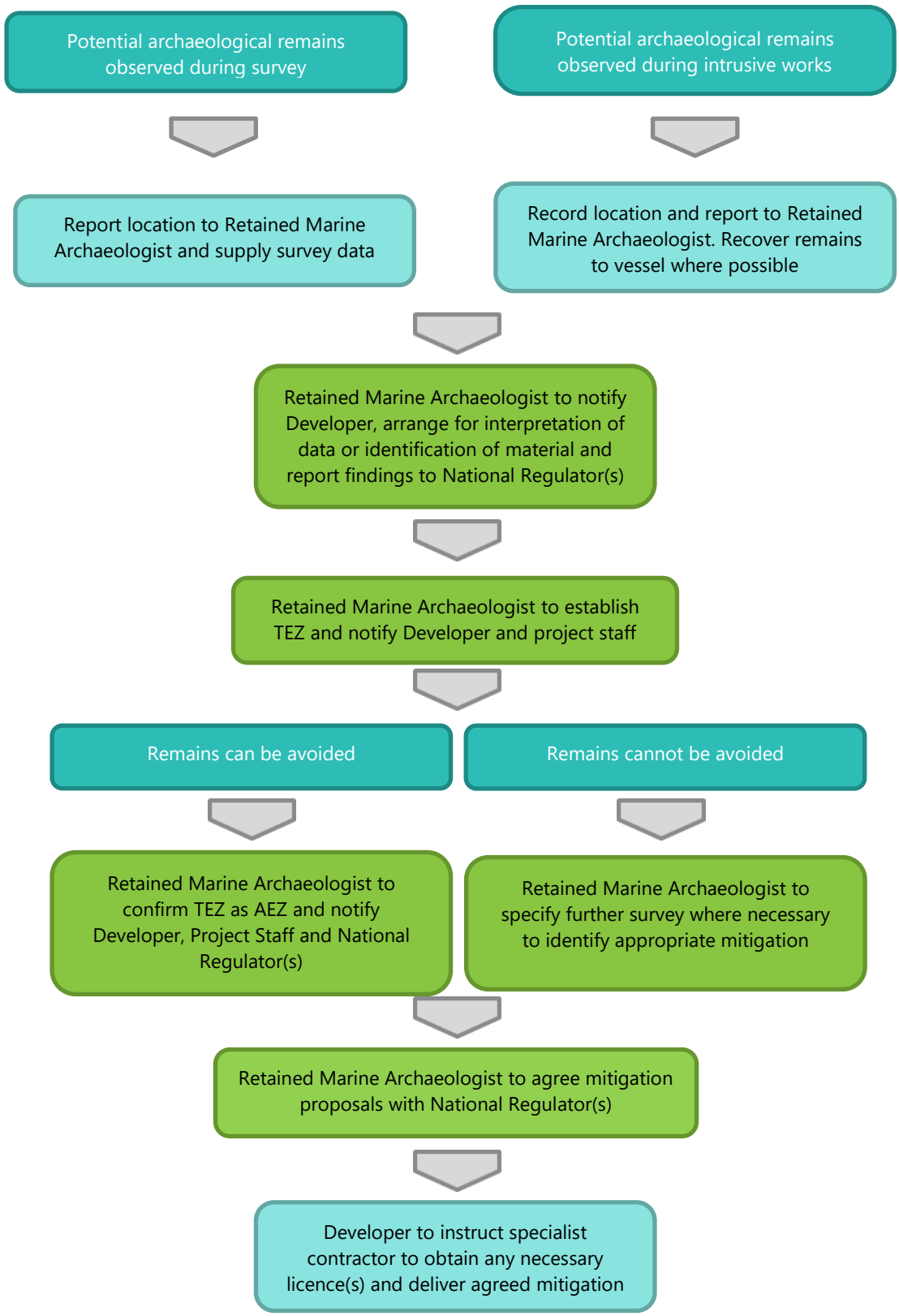
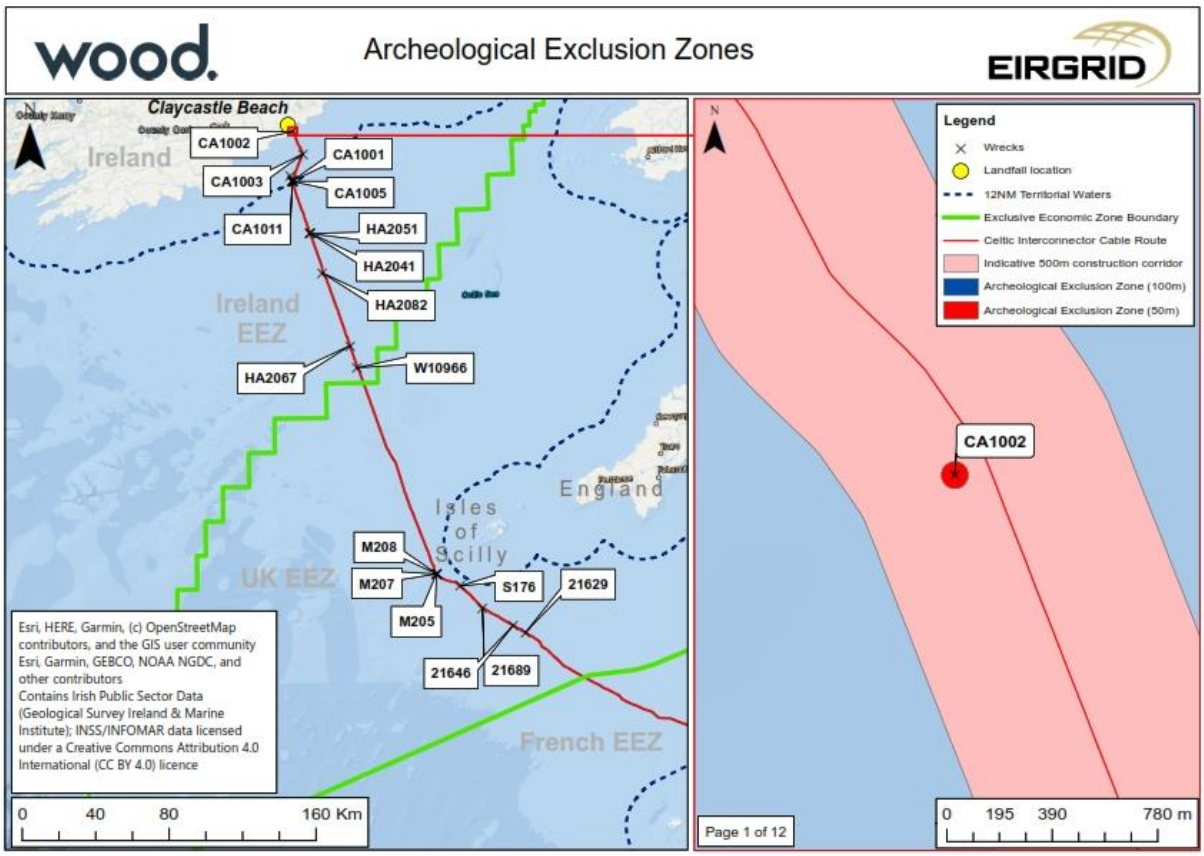
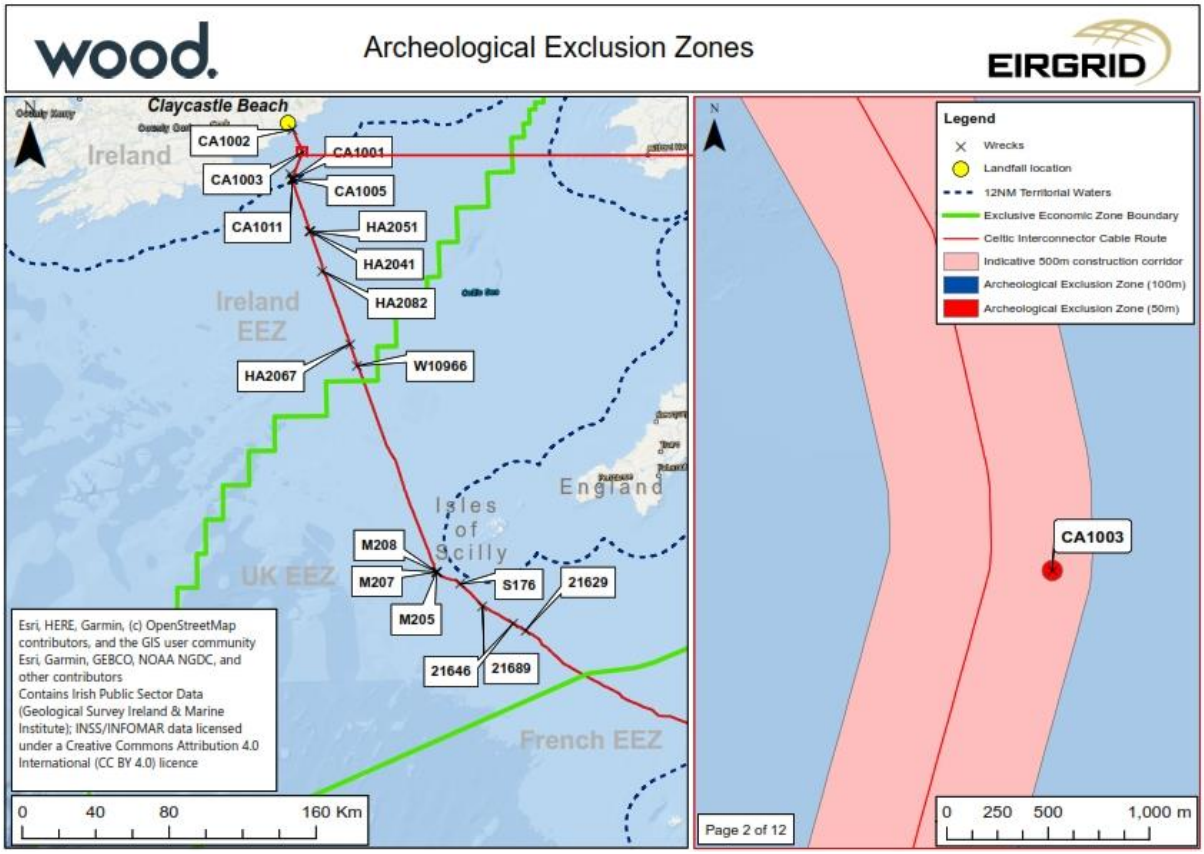
10 Appendix A: PAD Flow Diagram



11 Appendix B: Plans of AEZ

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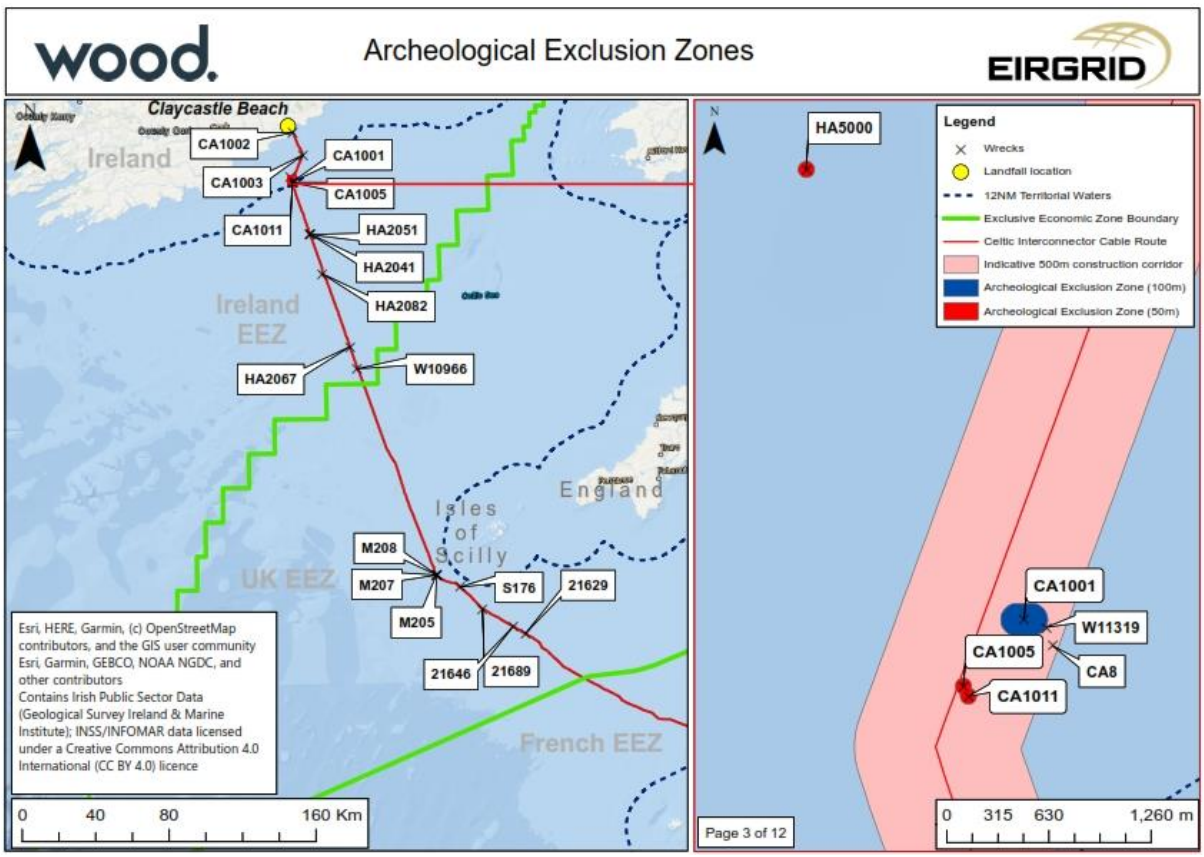
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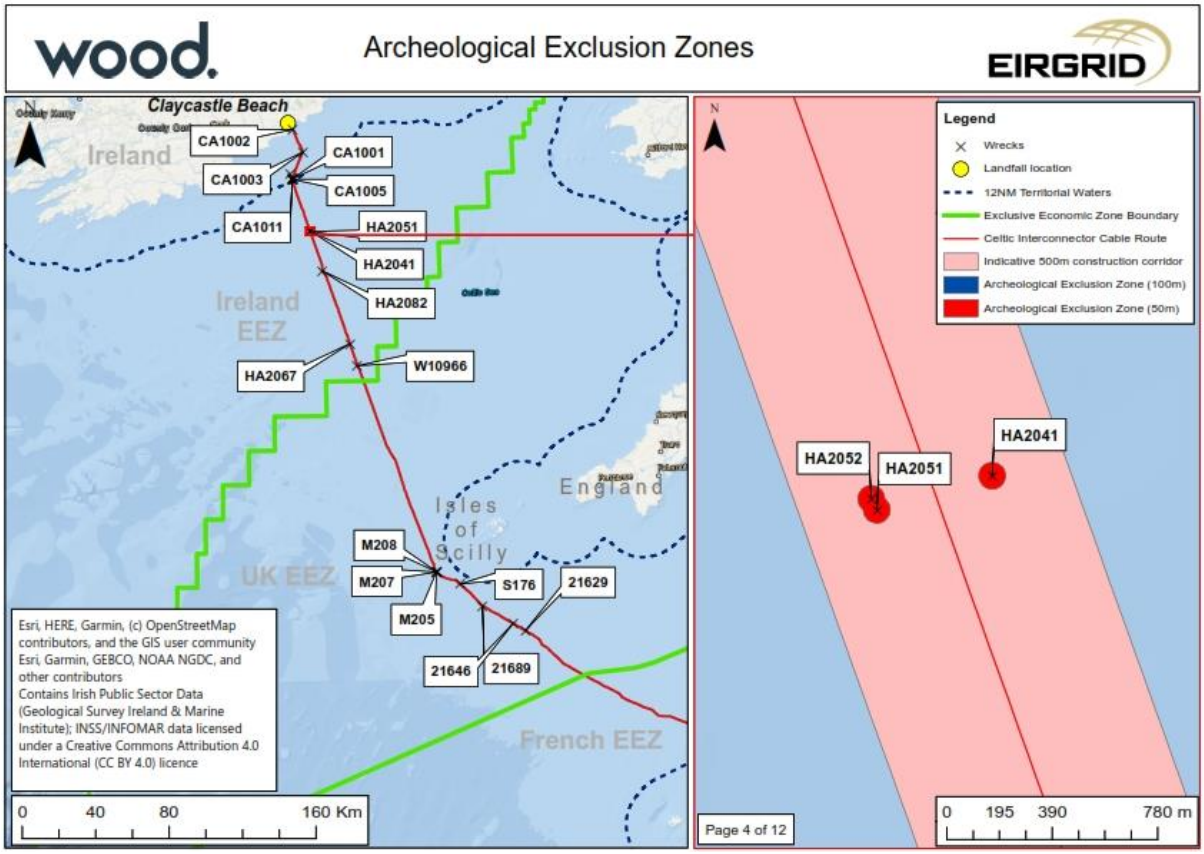
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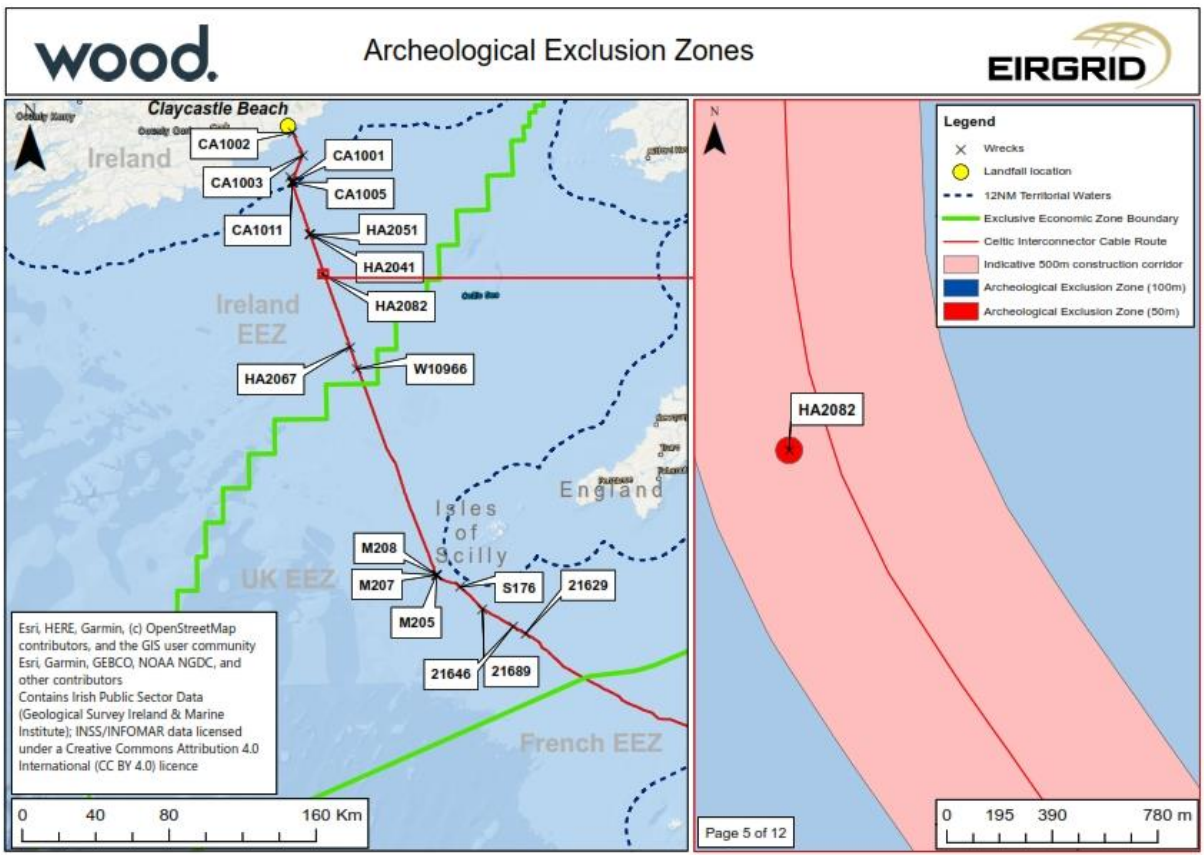
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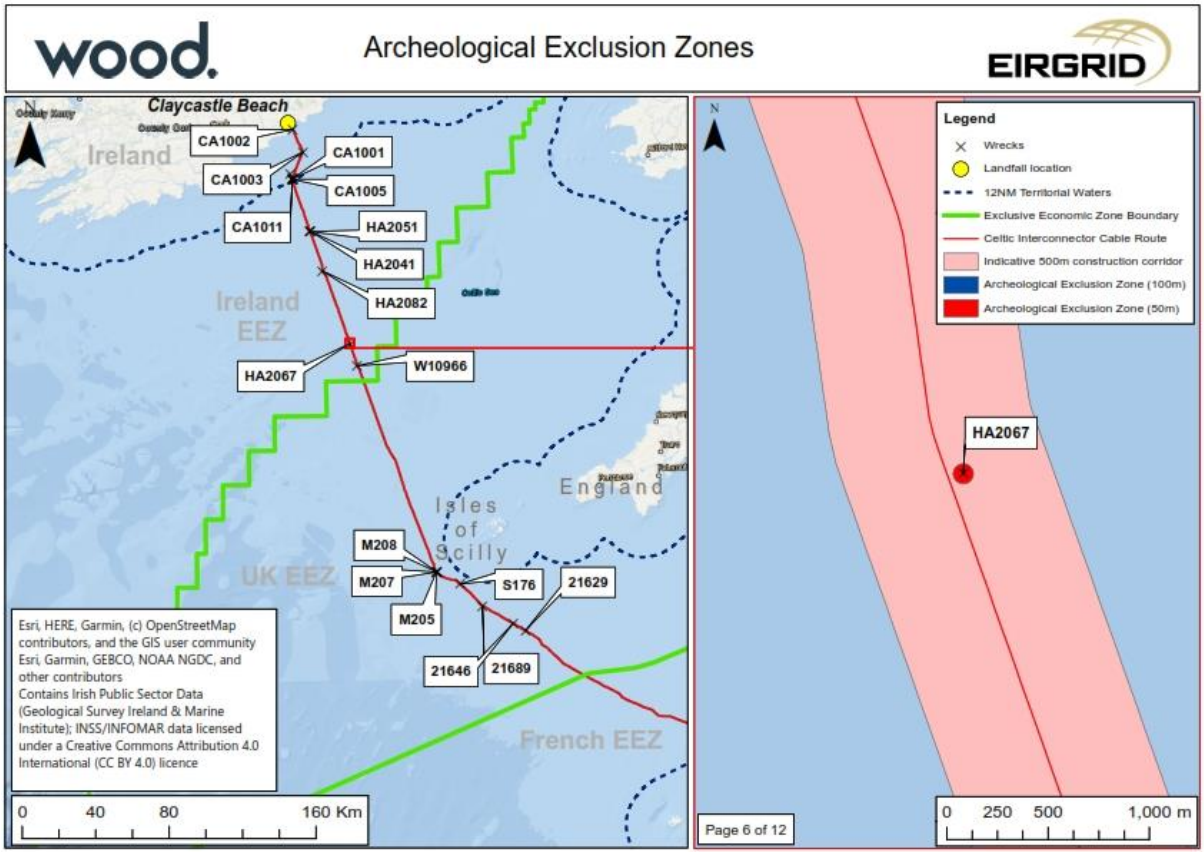
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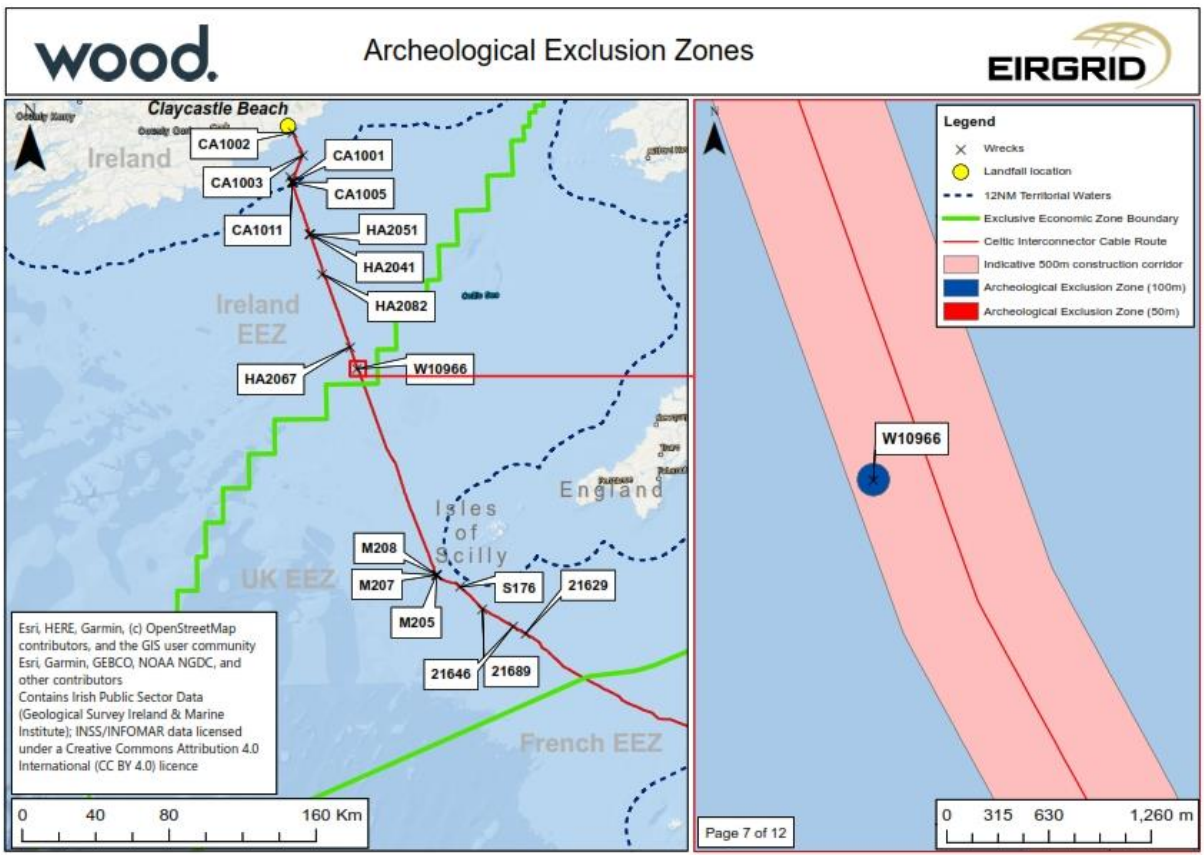
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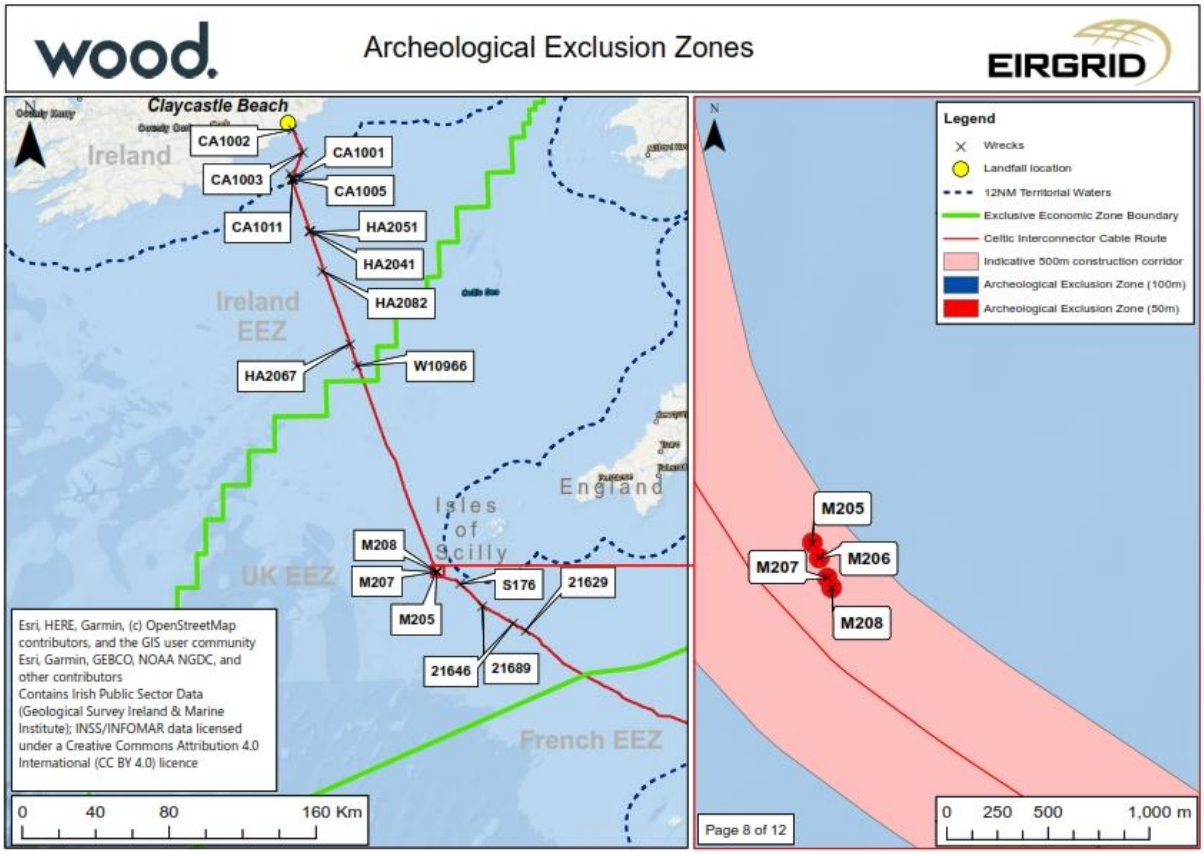
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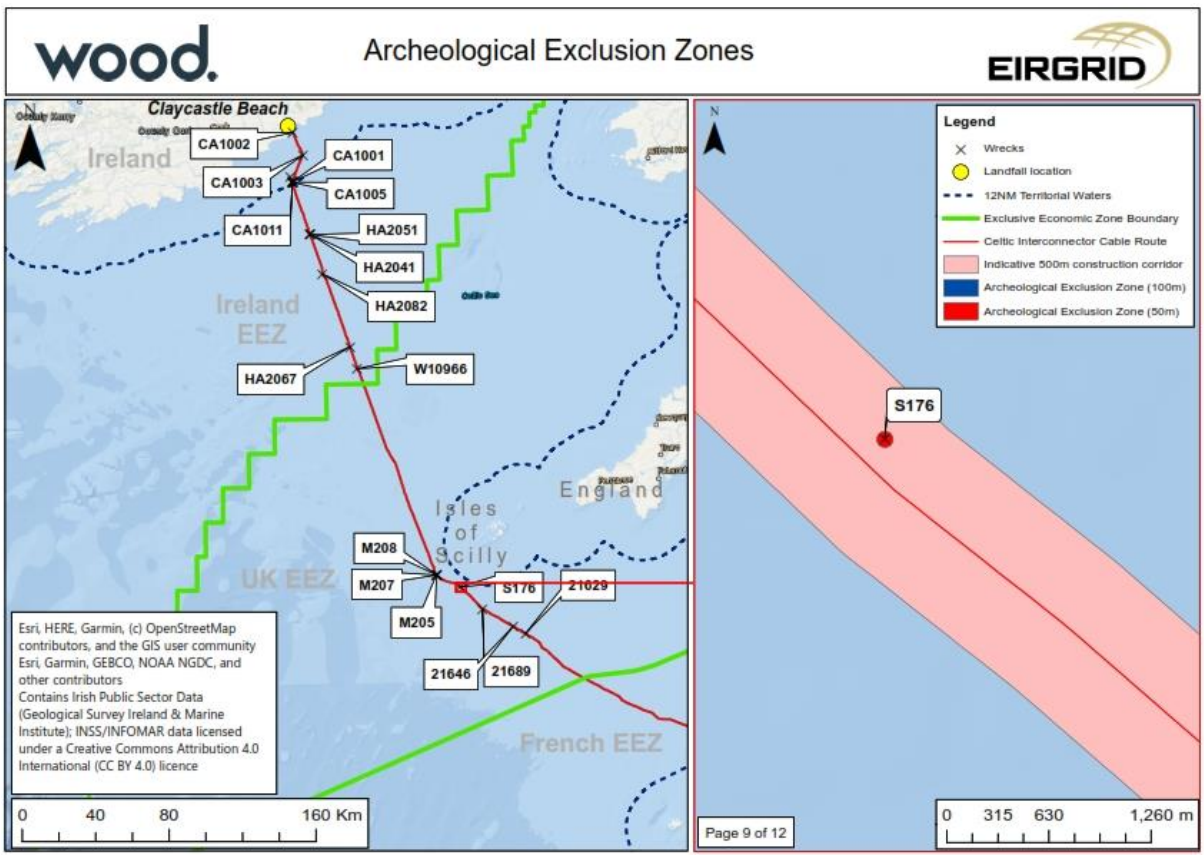
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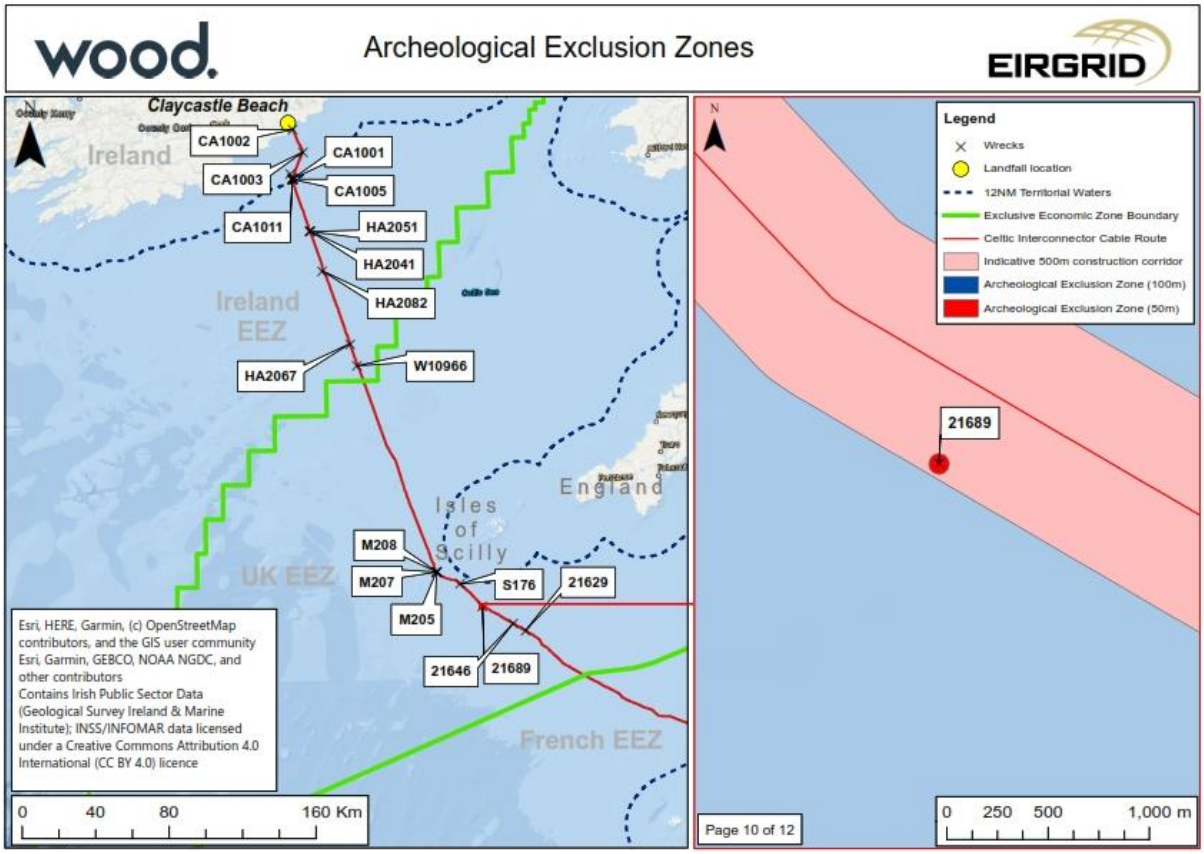
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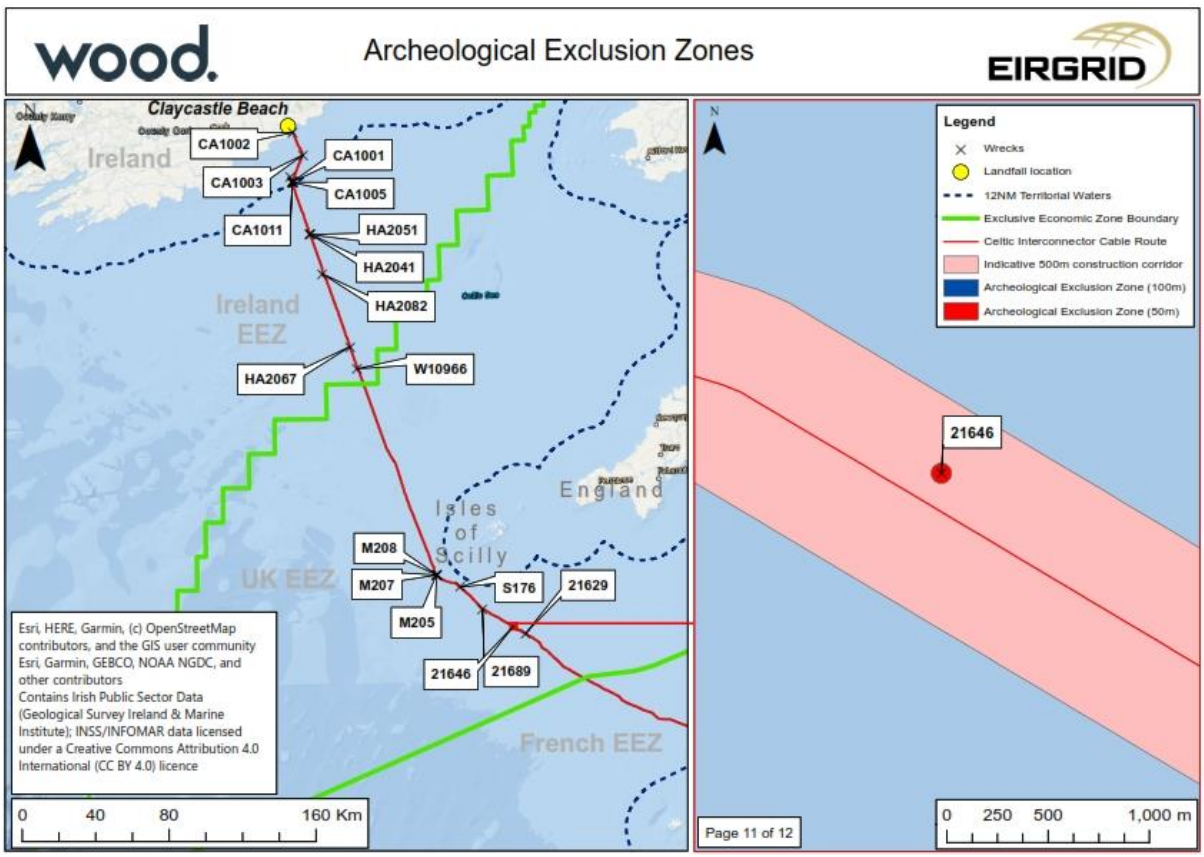
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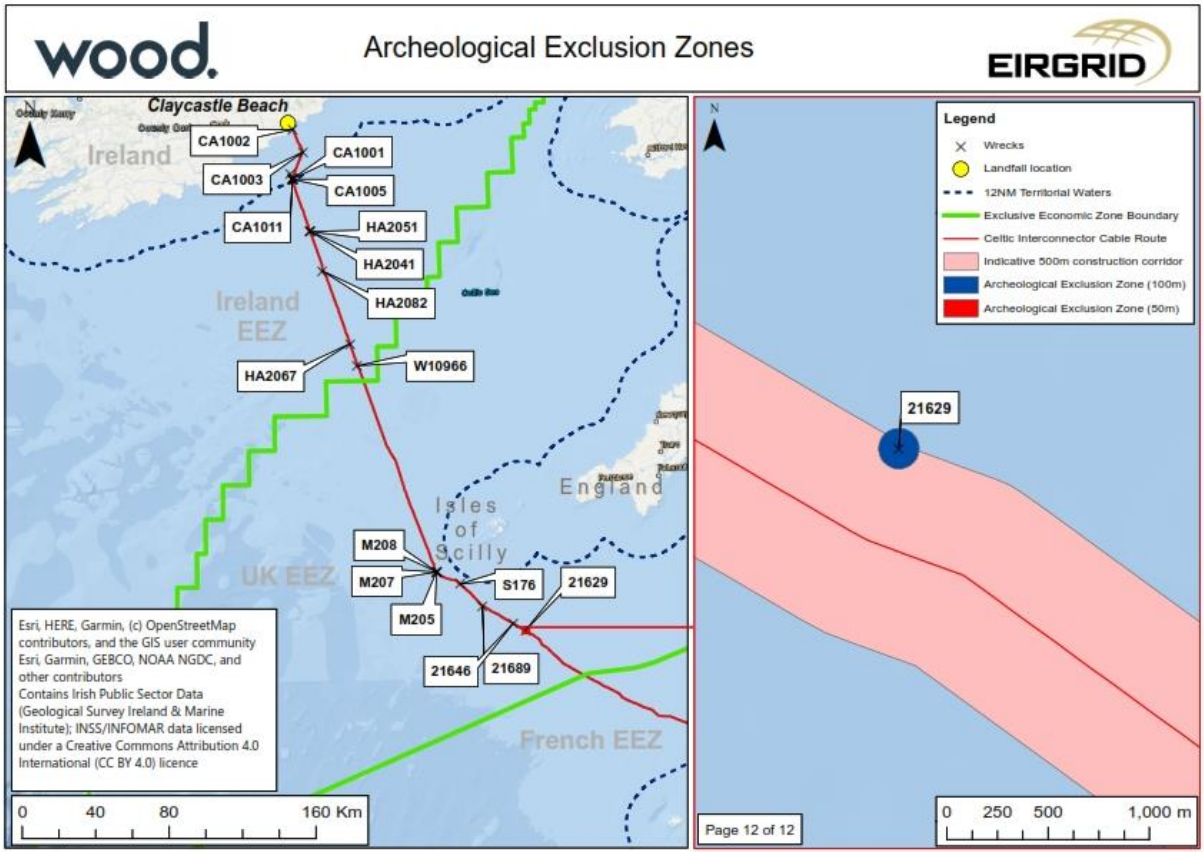
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Celtic Interconnector

Volume 3D2 – Appendix 18A

Shipping and Fishing Cable Risk Assessment

June 2021

Co-financed by the European Union
Connecting Europe Facility

Tionscadal Éireann
Project Ireland
2040

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Celtic Interconnector Shipping and Fishing Cable Risk Assessment

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Revision Number	Date	Summary of Change
00	15 Jan 2016	Draft of Cable Risk Assessment
01	29 Jan 2016	Final Combined Issue based on Part 1 and Part 2 Report Comments
02	12 Feb 2016	Revision of Combined Issue based on Client Comments
03	29 Feb 2016	Revision based on Additional Comments
04	1 April 2016	Final Issue

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Abbreviations

AIS	-	Automatic Identification System
DWT	-	Dead Weight Tonnage
EU	-	European Union
HVDC	-	High Voltage Direct Current
IACS	-	International Association of Classification Societies
IMO	-	International Maritime Organisation
KP	-	Kilometre Point
MMSI	-	Maritime Mobile Service Identity
MOD	-	Military of Defence
nm	-	Nautical Mile
RTE	-	Réseau de transport d'électricité
SAR	-	Search and Rescue
SOLAS	-	Safety of Life at Sea
TSS	-	Traffic Separation Scheme
VHF	-	Very High Frequency
VMS	-	Vessel Monitoring System

1. Introduction

1.1 Summary

Anatec Ltd were commissioned by Réseau de transport d'électricité (RTE) to undertake a Cable Risk Assessment of the Celtic Interconnector, running between the Irish and French coasts. The Celtic Interconnector is a joint project between RTE and EirGrid. At the time of writing the project is in the feasibility stage, with a final decision on whether the project will proceed expected in mid-2016.

The Cable Risk Assessment consists of a review of the surrounding navigational features relevant to the proposed cable route, an analysis of the nearby shipping and fishing, and a quantitative assessment of the risk to the proposed cable from anchors, foundered vessels, and fishing gear. The analysis in this assessment is based on 12 months of Automatic Identification System (AIS) data.

1.2 Objectives

The objectives of the Cable Risk Assessment are as follows:

1. Review the navigational features in the vicinity of the proposed cable route;
2. Assess the shipping in the vicinity of the proposed cable route;
3. Identify the anchoring activity near the proposed cable route;
4. Assess the fishing activity in the vicinity of the proposed cable route;
5. Estimate the risk to the proposed cable from vessels dragging anchor;
6. Estimate the risk to the proposed cable from vessels dropping anchor in an emergency;
7. Estimate the risk to the proposed cable from foundering vessels; and
8. Estimate the fishing interaction frequency across the proposed cable route

2. Project Overview

2.1 Cable Summary

The proposed Celtic Interconnector consists of an HVDC (High Voltage Direct Current) power cable running between the southern Irish coast, east of Cork, and the northern French coast, west of Roscoff, a subsea cable route approximately 265 nautical miles (490km) in length. A general overview of the proposed cable route is presented in Figure 2.1.

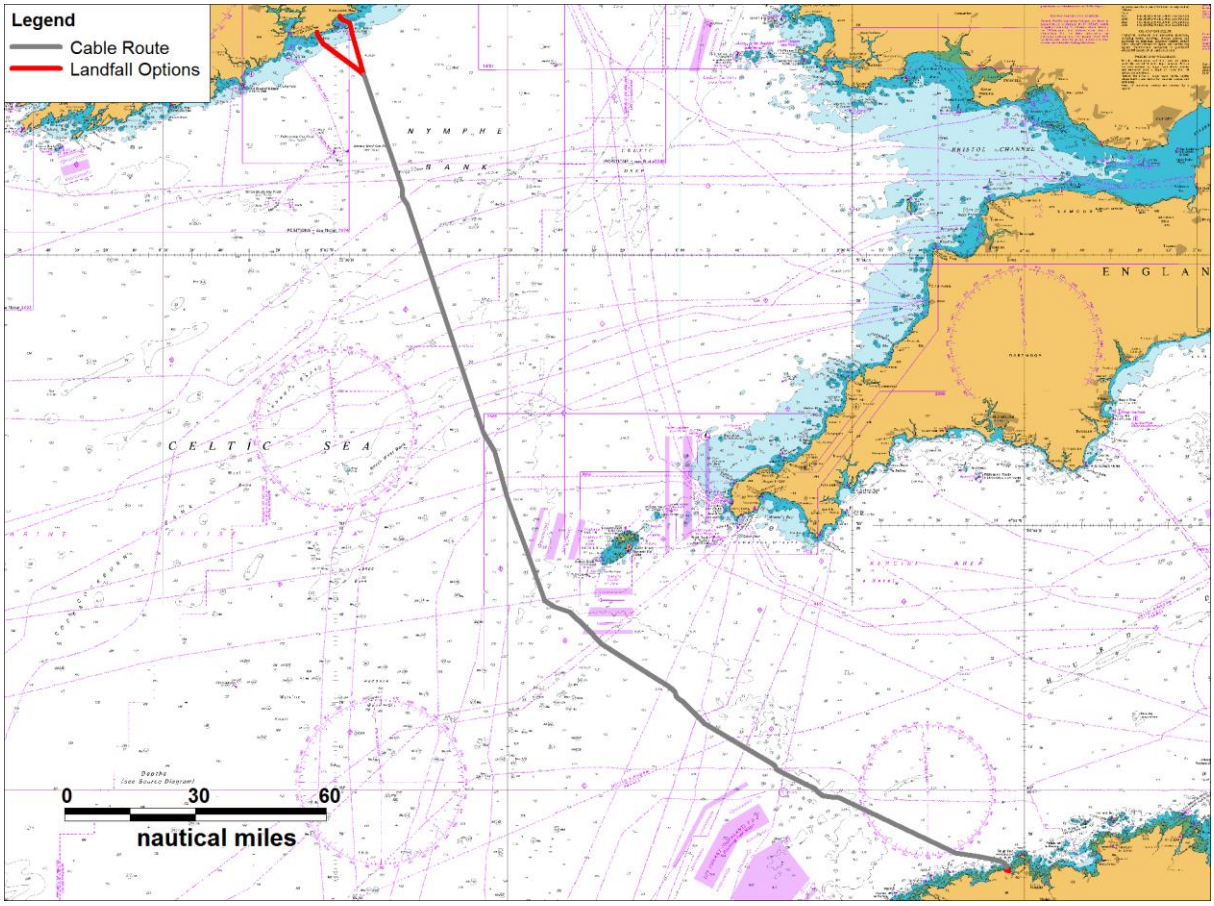

Figure 2.1 Proposed Cable Overview

At the time of writing there are three proposed landfall options at the French end of the cable route (Port Neuf, Kerradenec, and Moguériec), and two at the Irish end of the route (Ballycroneen and Ballinwilling Strand). The French and Irish landfall options are presented in Figure 2.2 and Figure 2.3 respectively. It is noted that this report considers two out of the three French landfall options; Port Neuf and Kerradenec. The third option landing at Moguériec has not been assessed, but is included in Figure 2.2 for reference.

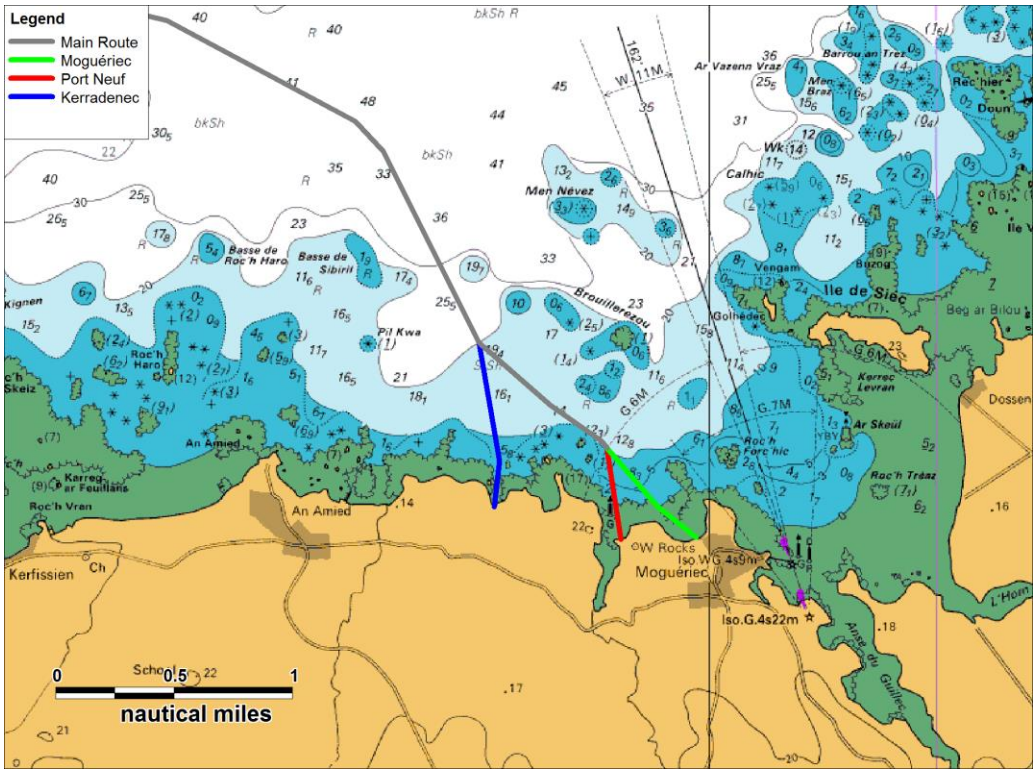

Figure 2.2 Landfall Options on France

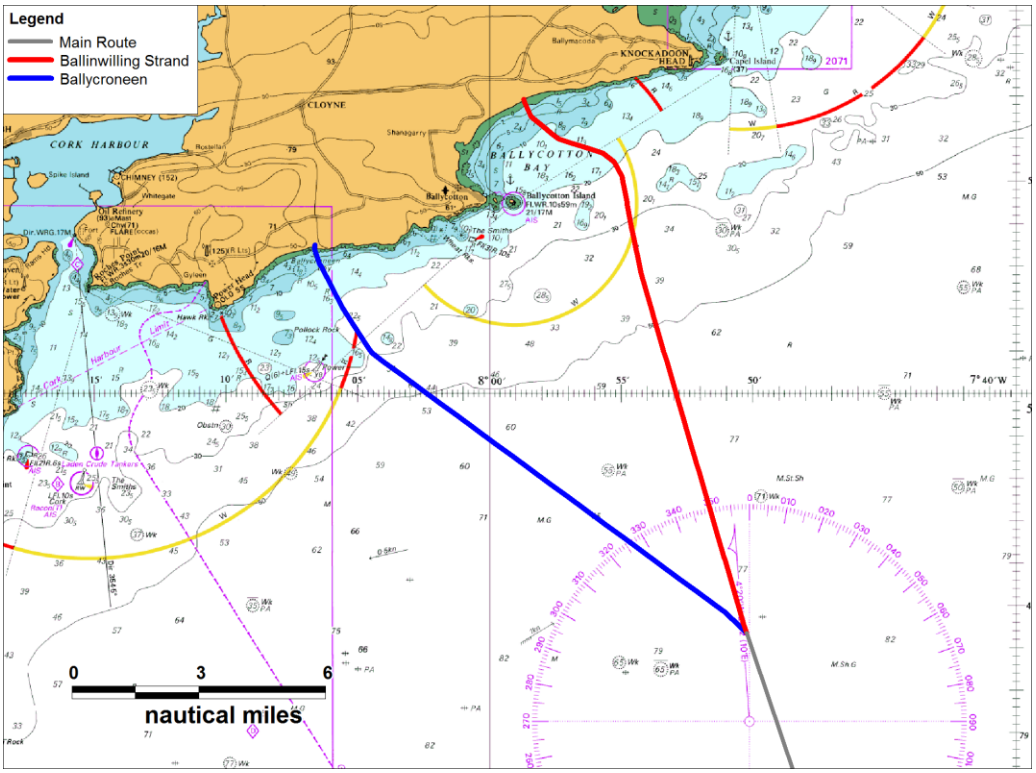

Figure 2.3 Landfall Options on Ireland

2.2 Study Area

The chosen study area consisted of a 5 nautical mile (nm) buffer of the proposed route extended to 10nm at the landfalls to ensure anchoring activity was comprehensively identified within the analysis. The area near the Isles of Scilly was also extended to include the Traffic Separation Schemes (TSS) east of the cable. The study area encompassing the proposed cable route is presented in Figure 2.4. It is noted that while the Moguériec French landfall option has not been assessed in this report, it is included in the study area.

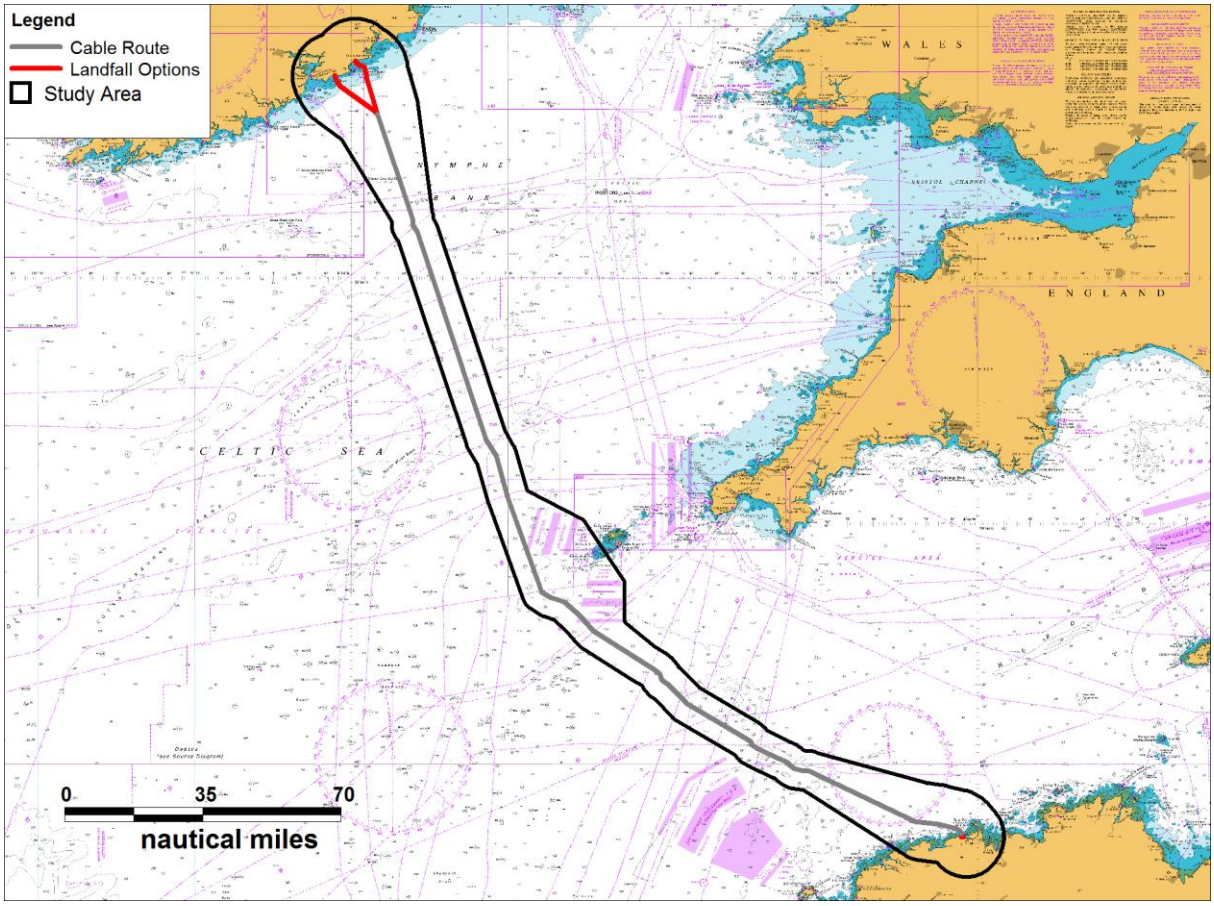

Figure 2.4 Cable Risk Assessment Study Area

3. Data Sources

3.1 Introduction

The shipping analysis has been based on 12 months of AIS data, collected via both satellite and terrestrial receivers. This section presents a description of AIS data, including its limitations.

3.2 Carriage Requirements

Regulation 19 of SOLAS Chapter V (carriage requirements for shipborne navigational systems and equipment) sets out the navigational equipment to be carried on board ships, according to ship type. In 2000, the International Maritime Organisation (IMO) adopted a new requirement (as part of a revised Chapter V) for ships to carry AIS. AIS is a system by which ships send data concerning their position and identity on two individual VHF channels to the shore and other vessels, at very frequent intervals. The data is transmitted automatically via VHF to other vessels and coastal stations/authorities.

The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage (GT) and upwards engaged on international voyages, cargo ships of 500 GT and upwards not engaged on international voyages and passenger ships irrespective of size built on or after 1 July 2002. It also applies to ships engaged on international voyages constructed before 1 July 2002, according to the following timetable:

- Passenger ships, not later than 1 July 2003;
- Tankers, not later than the first survey for safety equipment on or after 1 July 2003; and
- Ships, other than passenger ships and tankers, of 50,000 GT and upwards, not later than 1 July 2004.

An amendment adopted by the Diplomatic Conference on Maritime Security in December 2002 states that ships, other than passenger ships and tankers, of 300 GT and upwards but less than 50,000 GT, will be required to fit AIS not later than the first safety equipment survey after 1 July 2004 or by 31 December 2004, whichever occurs earlier. Ships fitted with AIS shall maintain AIS in operation at all times except where international agreements, rules or standards provide for the protection of navigational information.

As of the 31st May 2014, all EU fishing vessels of length 15m and above are required to carry AIS equipment. Prior to this, from the 31st May 2013, all fishing vessels of length 18m and above were obliged to carry AIS.

A proportion of smaller fishing vessels and recreational craft carry AIS but this is voluntary and they may not broadcast continuously.

It should be taken into consideration when viewing the proceeding analysis that activity from smaller vessels is likely to be under-represented, particularly in the case of fishing and

recreational vessels due to the carriage requirements described above. However, it can be assumed that the vessels that do transmit provide an indication of the overall activity and behaviour of these vessels. In addition, the main risk to the proposed cable is likely to be from larger vessels, carrying heavier anchors or fishing gear.

3.3 AIS Sources

The bulk of the following analysis has been based on a data set consisting of a total of 12 months of AIS data providing very good coverage of the area of interest, collected in two consecutive years, during the following periods:

- 1st April to 30th September 2014
- 1st May to 31st October 2015

This ensured the data was as up-to-date as possible, which is vital considering the dynamic nature of shipping and fishing activity, and that it spans different seasons. It is noted that spring, summer and autumn are covered, but winter months are not. A review of seasonal variations has been undertaken in Appendix A (Ref i), and summarised in Section 5.8, in which winter traffic is assessed within the study area using alternative data sources.

To help ensure comprehensive coverage of the area of interest, a combination of satellite and terrestrial (land-based) data has been used. The reporting interval between position reports for a given ship is typically a few seconds up to three minutes, depending on its speed and navigational status (less frequent for anchored and moored vessels). Increases in reporting interval (i.e., longer gaps between positions) were occasionally noted farther offshore (i.e. farther from the coastal AIS receivers), however, the majority of vessels in these areas were typically steaming on passage on steady courses, and therefore the less frequent average reporting interval will not significantly affect accuracy in these areas.

Additional terrestrial AIS data were available covering shorter time periods and / or discrete sections of the area of interest. These data have been used to validate the core (main) data set.

4. Navigational Features

This section identifies and describes the key navigational features in the vicinity of the proposed Celtic Interconnector cable route.

4.1 Ports

The Irish, UK, and French ports in the vicinity of the proposed cable are presented in Figure 4.1, Figure 4.2, and Figure 4.3 respectively.

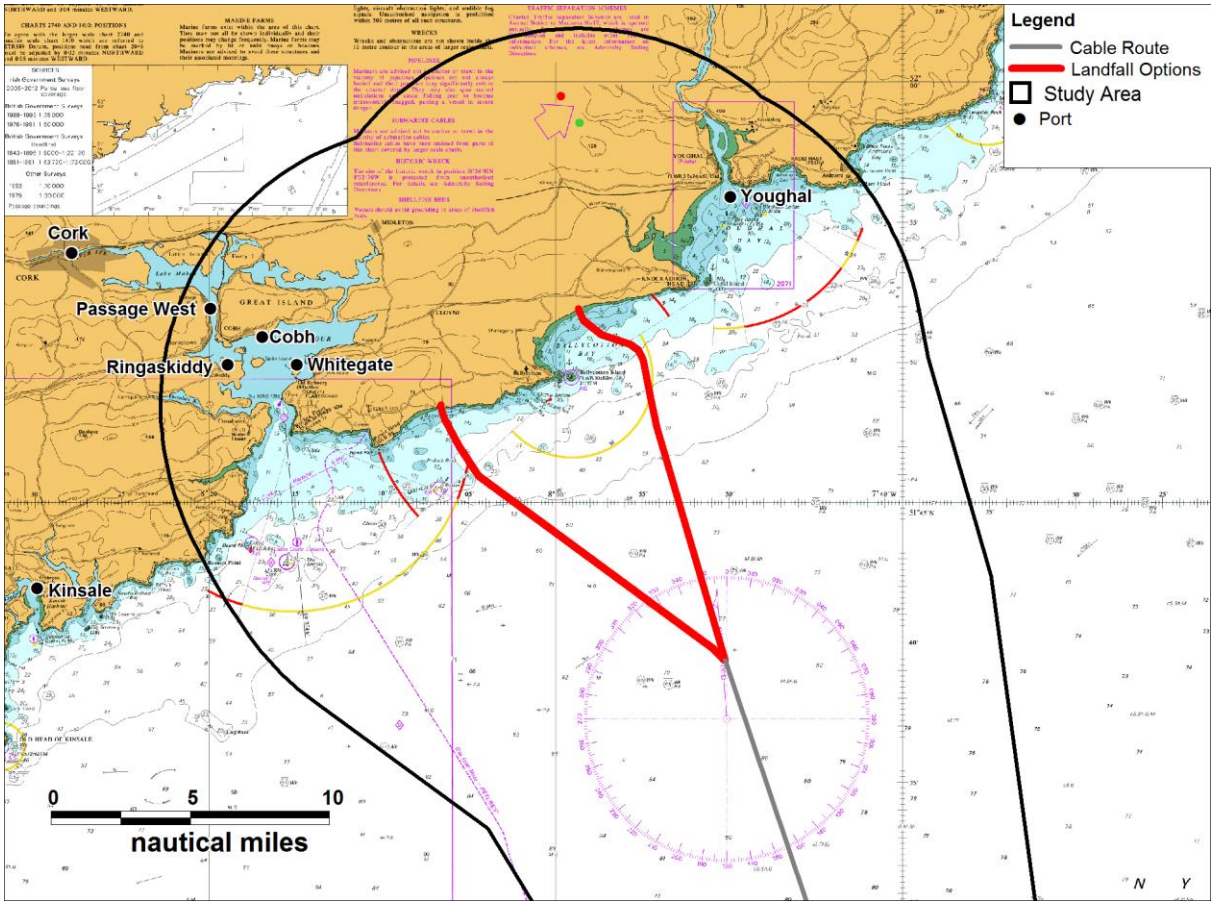

Figure 4.1 Ireland Ports

The most significant Irish port near the route is Cork, with limits encompassing Cobh, Passage West, Ringaskiddy and Whitegate. It is a deep water harbour and can accommodate both large commercial and passenger vessels. The harbour entrance lies 5.7nm to the west of the western route landfall point. Kinsale is a smaller commercial port, located 15nm west of the western route landfall. Youghal harbour is located approximately 6nm to the north east of the eastern route landfall point, and is mainly used by small fishing and recreational vessels.

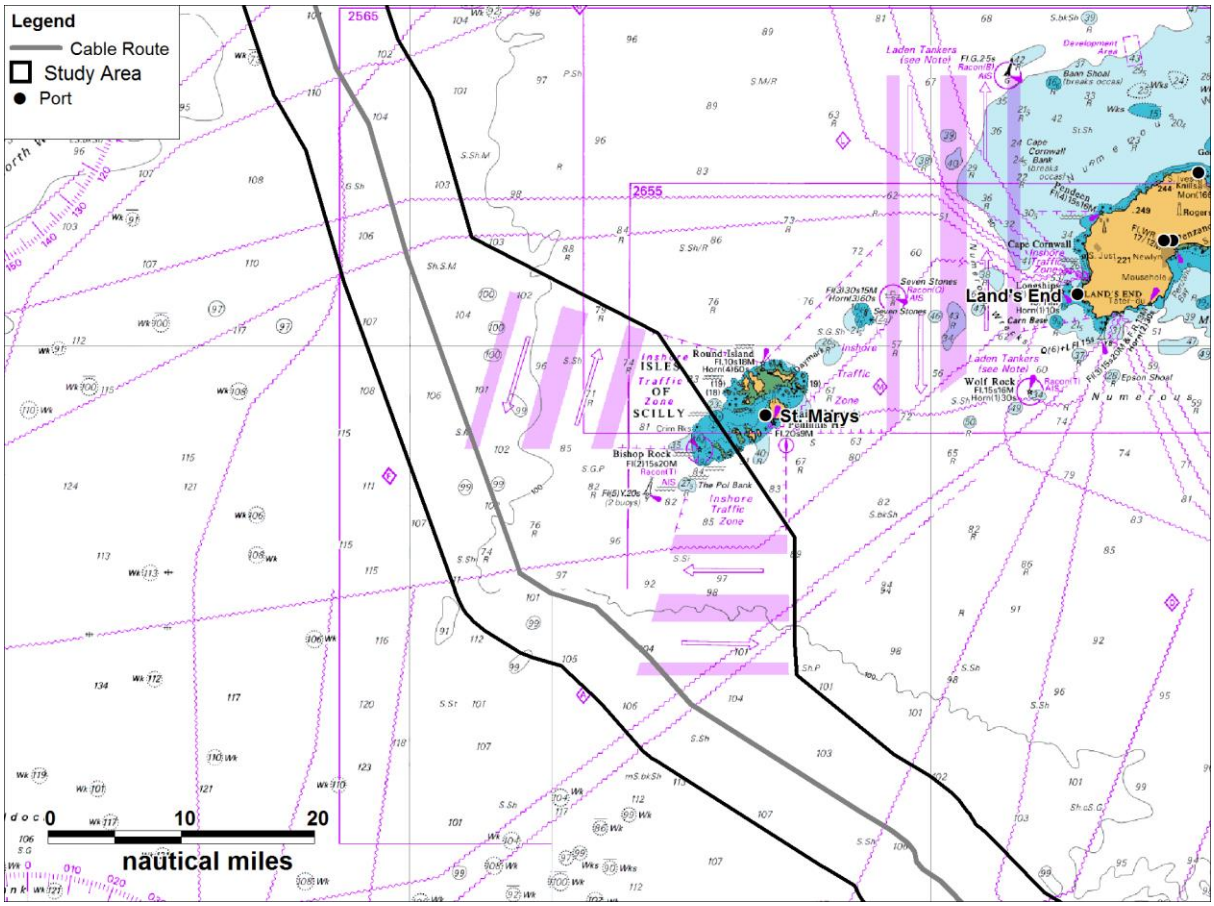

Figure 4.2 UK Ports

The nearest UK port to the route is St. Mary's, on the Isles of Scilly, approximately 18nm from the route. The port caters for yachts, fishing vessels, and passenger vessels. The nearest mainland port is located at Land's End, more than 40nm from the route.

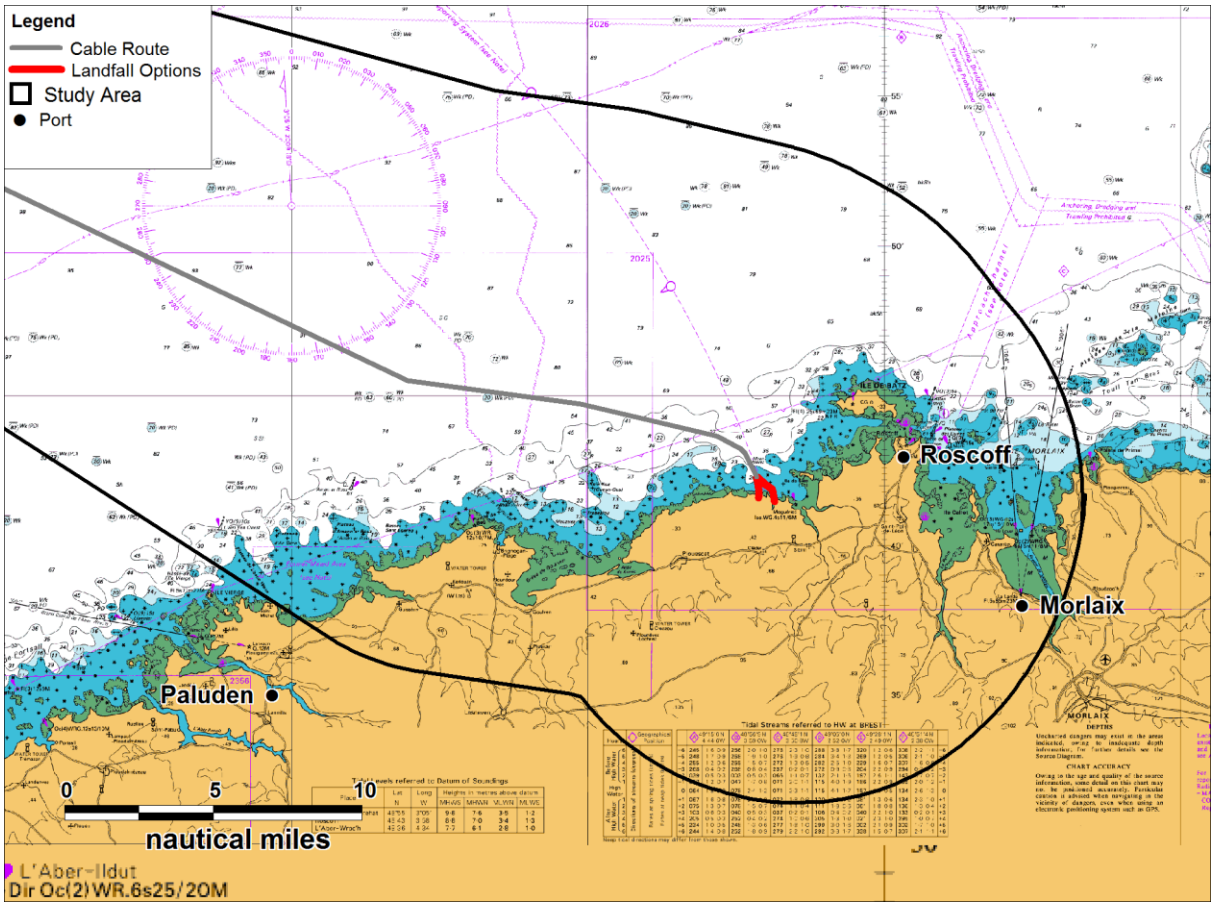

Figure 4.3 French Ports

The port of Roscoff is located 4.6nm to the east of the proposed French landfalls. Equipped with a deep water marina (625 berths), Roscoff also runs ferry services to Cork, and to Plymouth. The port of Morlaix is situated approximately 9nm from the route landfall, and offers 200 berths for vessels with draughts of up to 3m. The small town port of Paluden lies 17nm west of the landfall, outwith the study area.

4.2 Routeing Measures

The IMO routeing measures in place in the vicinity of the proposed cable route are presented in Figure 4.4.

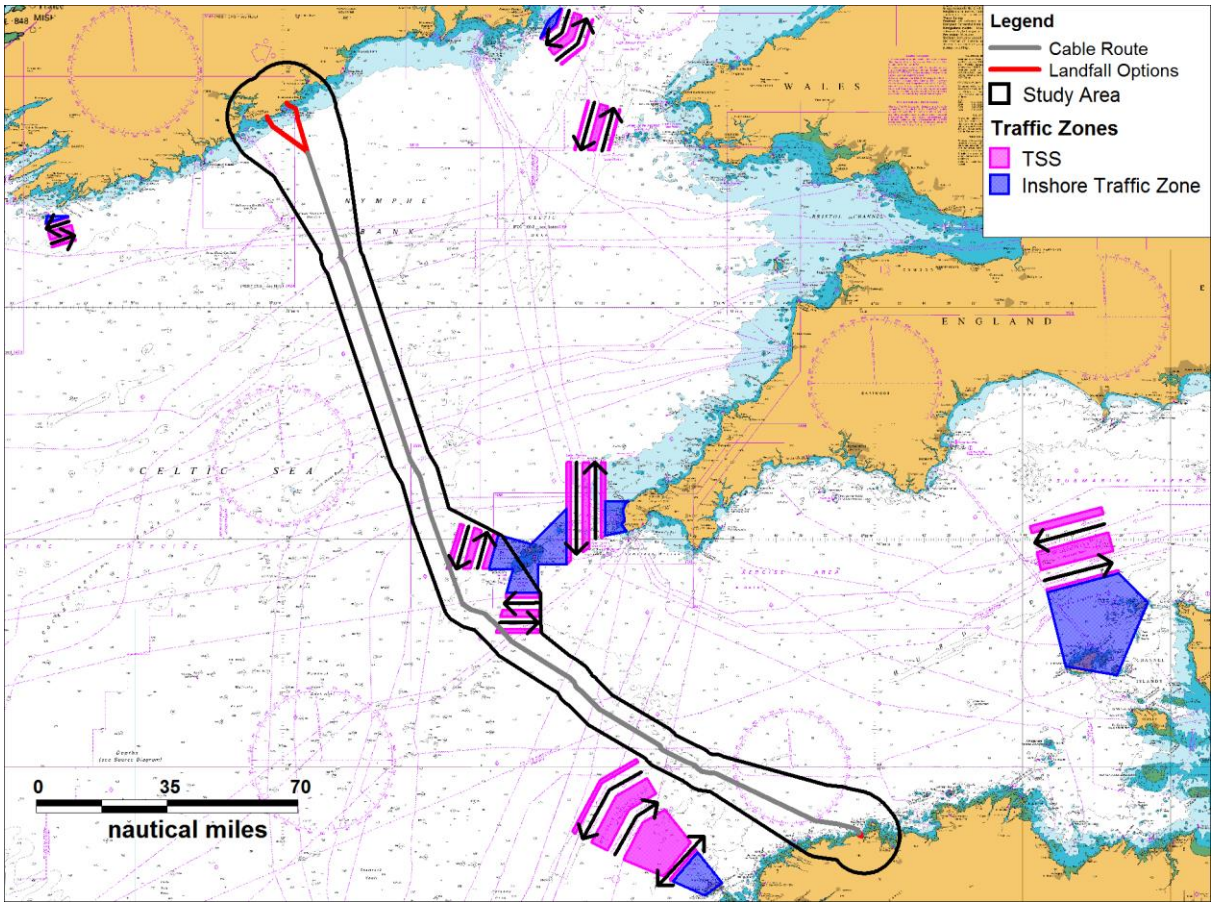

Figure 4.4 IMO Routeing Measures

Traffic Separation Schemes (TSS) are used to separate traffic travelling in opposite directions in busy (or sensitive) areas of shipping. Inshore traffic zones are multi directional, and generally for use by smaller vessels. The West of the Scilly Isles TSS and the South of the Scilly Isles TSS, as well as part of the inshore traffic zones of both, lie within the study area. Traffic lanes associated with other nearby TSS also intersect the route.

4.3 Anchorages

The anchorages identified in the vicinity of the Irish route landfalls are presented in Figure 4.5. Details of the anchorages have been taken from the Pilot Book for the area (Ref ii). Inland anchorages have not been included as they are not relevant to the route.

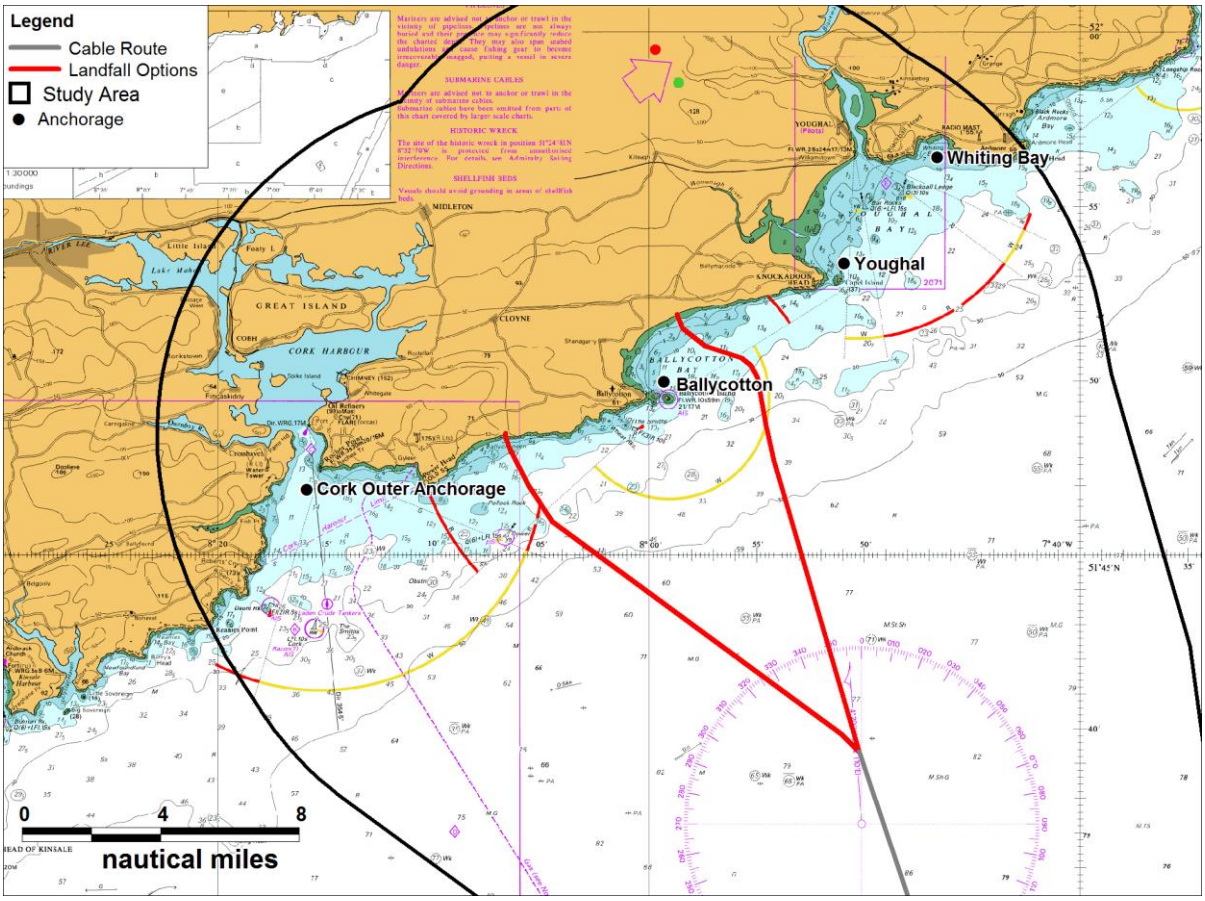

Figure 4.5 Ireland Anchorages

The nearest anchorage in Irish waters to the route is the Ballycotton anchorage, located approximately 1.6nm to the south-west of the proposed eastern landfall option. Anchoring is available here in depths of 13m, where the seabed is composed of sand over mud and clay. Youghal Bay, located 3.7nm to the north east of the proposed eastern landfall option, offers temporary anchorage suitable only in moderate weather. Whiting Bay, located 8nm to the northeast of the proposed eastern landfall option also offers anchorage, however use should be avoided in adverse weather conditions. The Cork outer anchorage, 6nm to the west of the proposed western landfall option, is recommended for temporary use only in depths of 17 to 18m over sand.

Within UK waters, the Isles of Scilly offer various anchorages, the nearest being approximately 20nm to the east of the route, outwith the study area.

The Channel Pilot Book (Ref iii) states that there are no anchorages or harbours suitable for large vessels on the French coast between Le Four and Les Héaux-de-Bréhat, which covers the coastal boundaries of the study area. The Pilot Book also states that small crafts and yachts can find shelter in many of the small coastal ports or creeks, however local knowledge

may be required. A review of Admiralty Charts showed the nearest charted anchorage to be approximately 8nm from the route landfalls, within the Baie de Morlaix, as presented in Figure 4.6. It is noted that any vessels anchored here are extremely unlikely to interact with the route due to land in between the anchorage and the route.

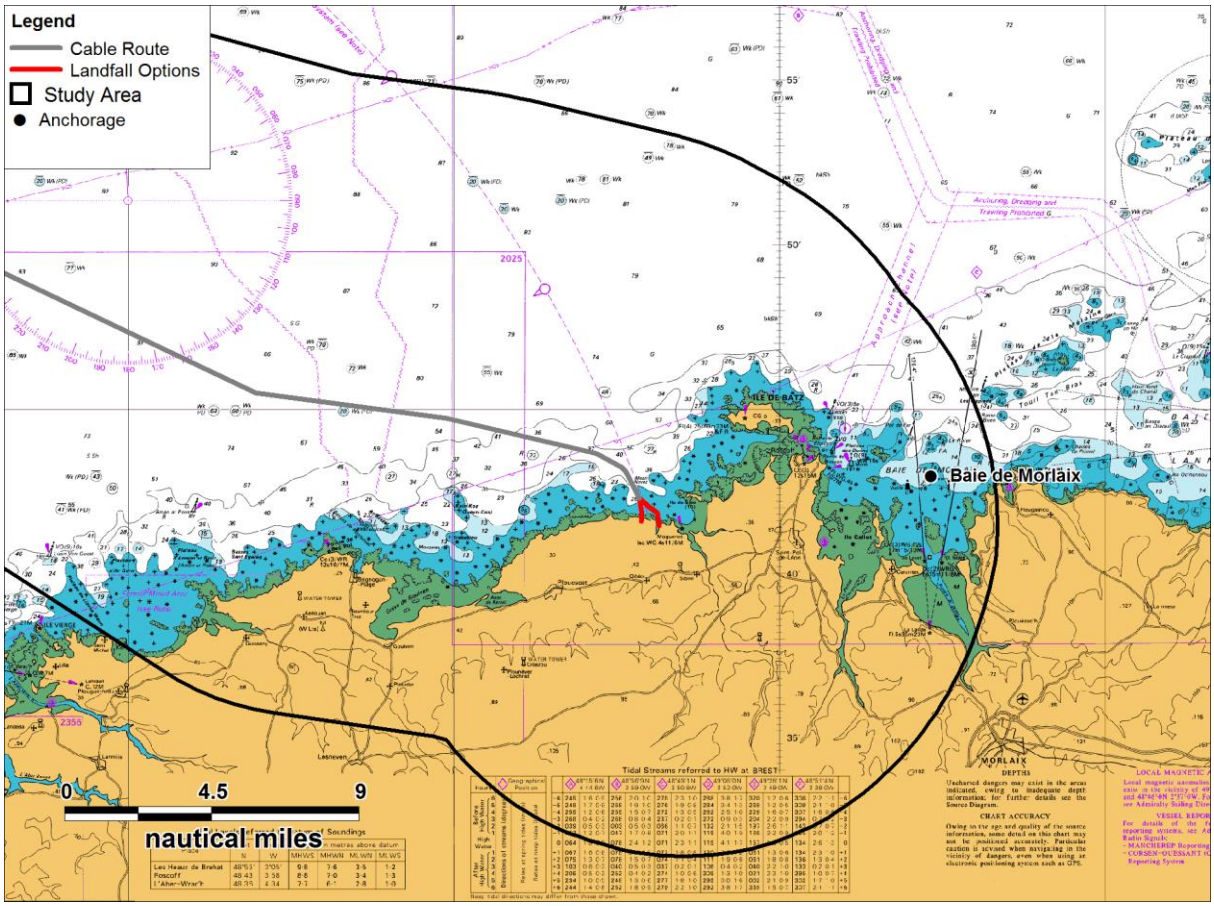

Figure 4.6 Roscoff Anchorage

4.4 Offshore Renewable Energy Developments

The location of the renewable energy developments in the vicinity of the proposed Celtic Interconnector are presented in Figure 4.7. It is noted that the locations presented represent the approximate centre point of the sites rather than their full extents.

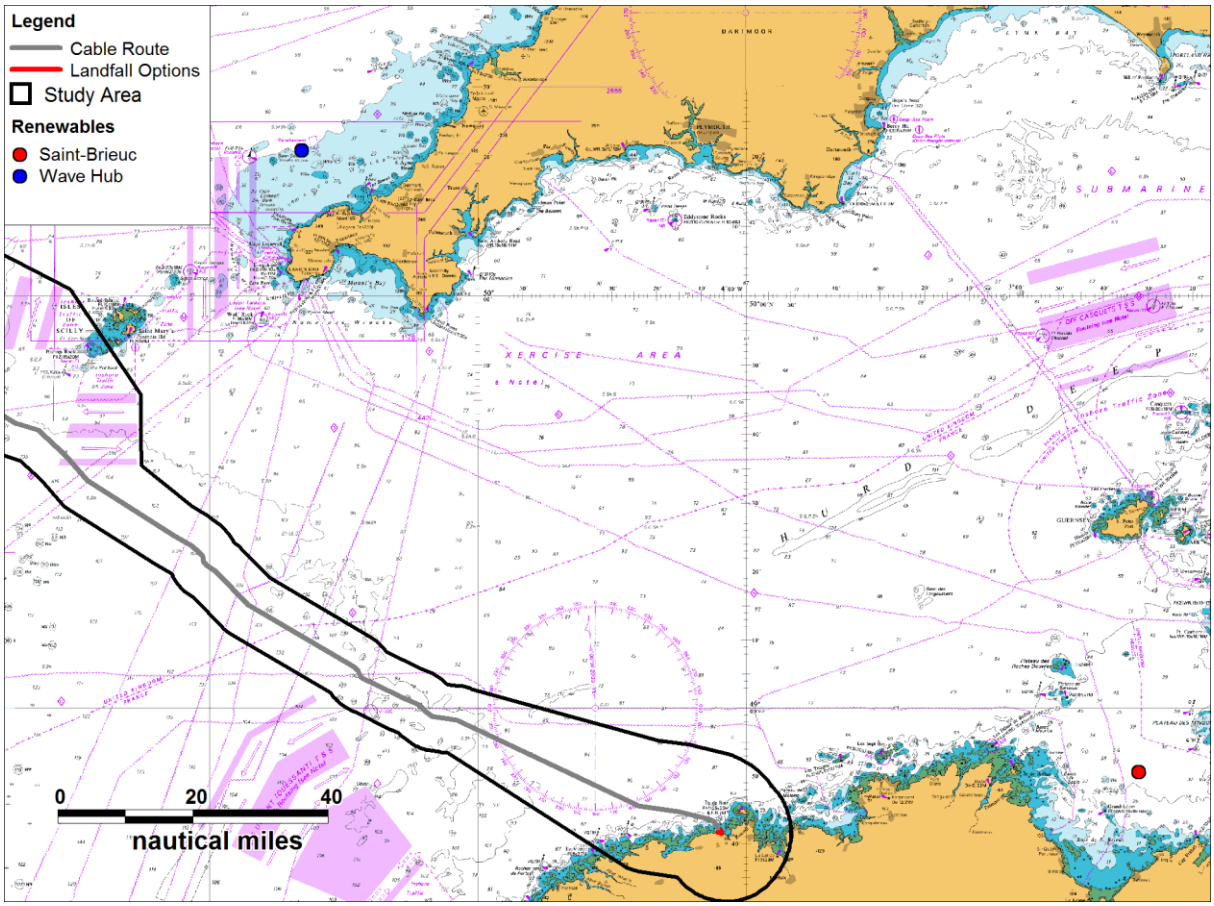

Figure 4.7 Renewable Energy Sites in the vicinity of the proposed Celtic Interconnector

Wave Hub is a fully commissioned demonstrator site, with four berths for testing and developing wave technology. The site is located approximately 55nm to the north east of the route at its closest point. The Saint-Brieuc wind farm is located approximately 60nm to the east of the French landfall, and is in the consenting process. The proposed site covers an area of 102km^2 and can house up to 62 turbines.

4.5 Oil and Gas

The oil and gas infrastructure in the vicinity of the proposed Celtic Interconnector is presented in Figure 4.8.

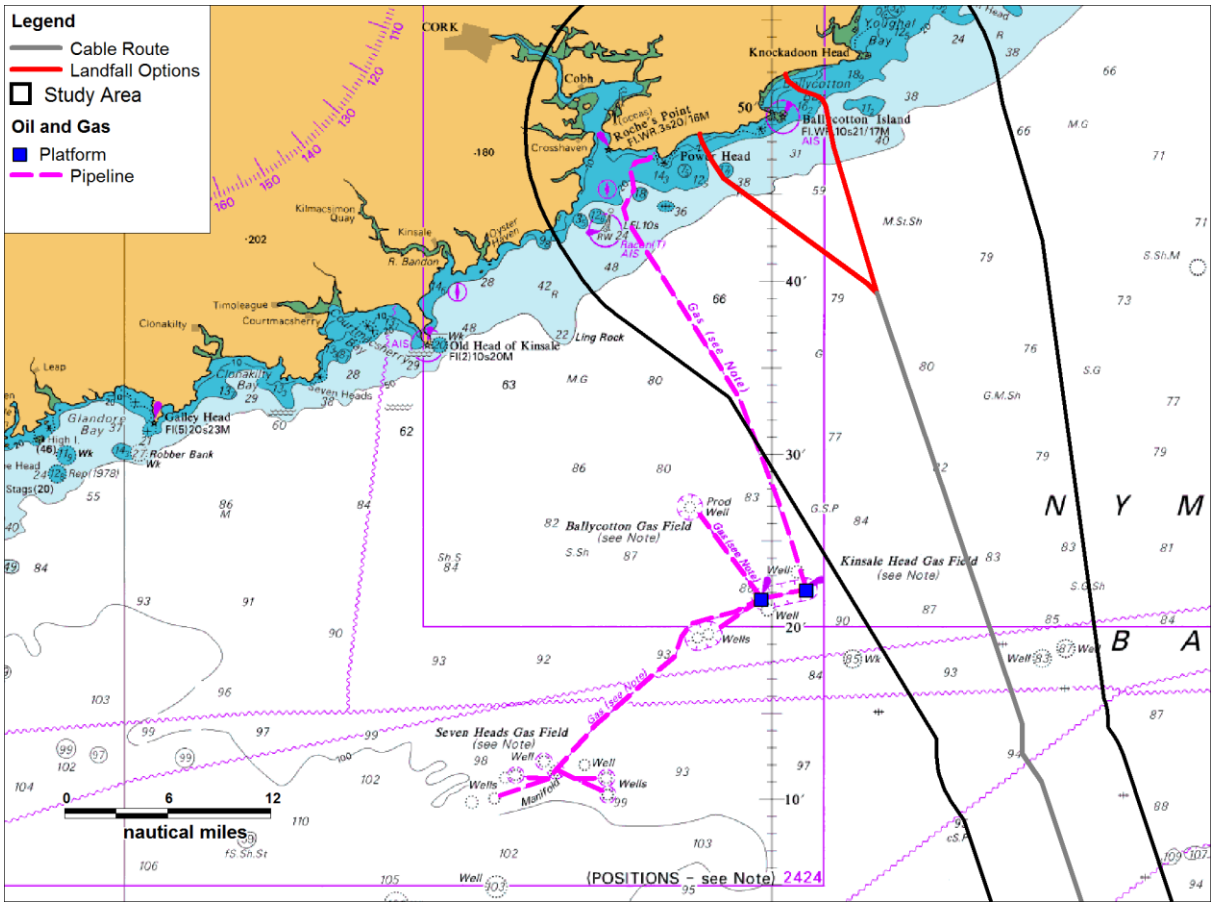

Figure 4.8 Oil and Gas Infrastructure in the vicinity of the proposed Celtic Interconnector

There are two platforms installed at the Kinsale Gas Field, with the easternmost located approximately 9nm west of the route. Subsea pipelines connect the wells at the Ballycotton Field (14nm from proposed route) and the Seven Heads Field (23nm from the proposed cable route) to the Kinsale platforms. A pipeline then connects the platforms to the shore east of the entrance to Cork harbour, at a point approximately 2.7nm west of the proposed western cable landfall point.

No oil and gas infrastructure was identified near the proposed cable route in UK or French waters.

4.6 Military Practice Areas

The UK Ministry of Defence (MOD) practice and exercise areas are presented in Figure 4.9.

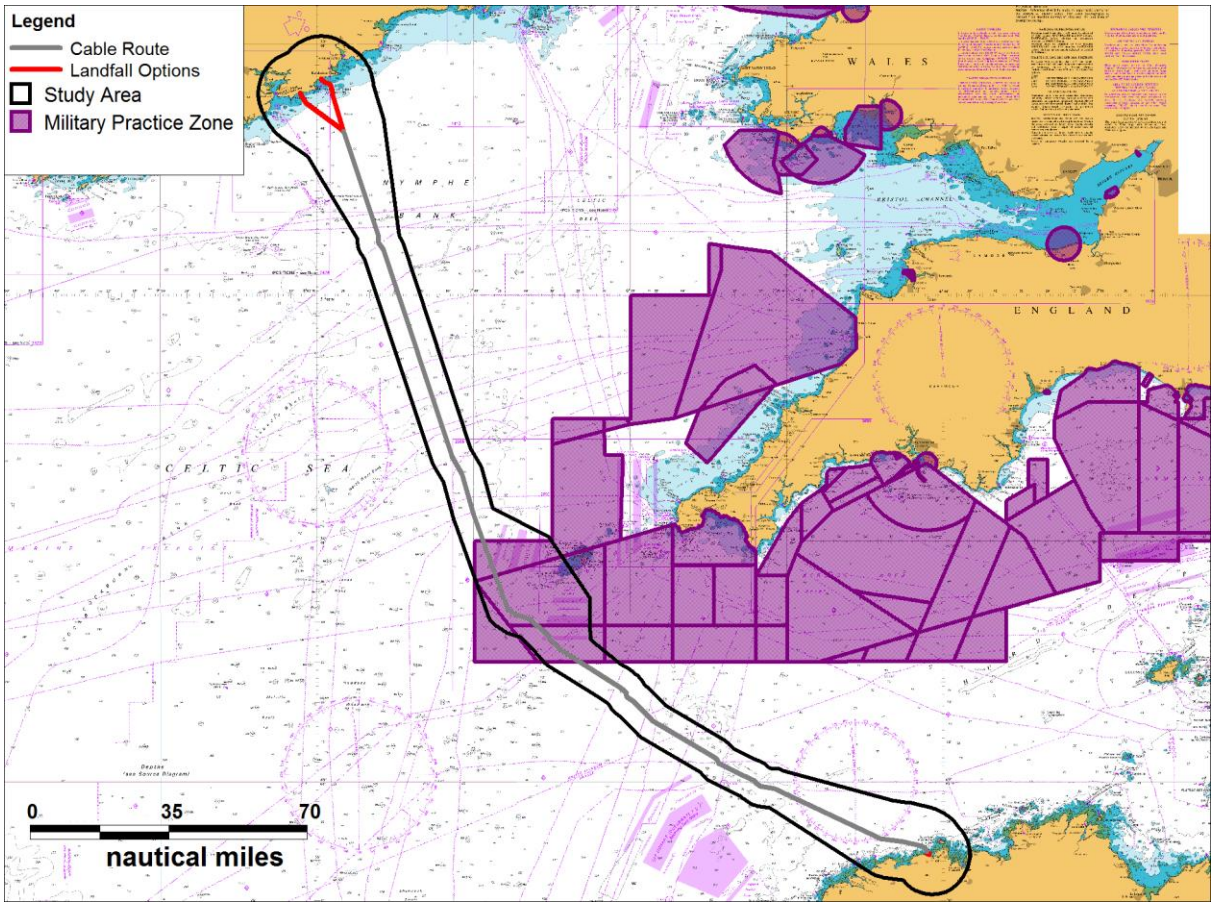

Figure 4.9 Military Practice Zones (UK MOD)

The zones intersecting the route detail their activities as submarine and aircraft practice areas.

Precise military practice and exercise areas were not available outside of UK waters, however the Irish Coast Pilot Book (Ref ii) states that submarine exercises occur in the southern part of the Celtic Sea, to the west of the route.

4.7 Other Cables

Admiralty Charts were used to identify and map the subsea cables intersecting the study area. Survey results provided by RTE and EirGrid were used to identify cables which were in-service at the time of writing. The identified cables are presented in Figure 4.10. (Note: This only depicts cables which intersect the proposed Celtic Interconnector; not all cables within the charted area are shown. Uncharted out-of-service cables have not been included.)

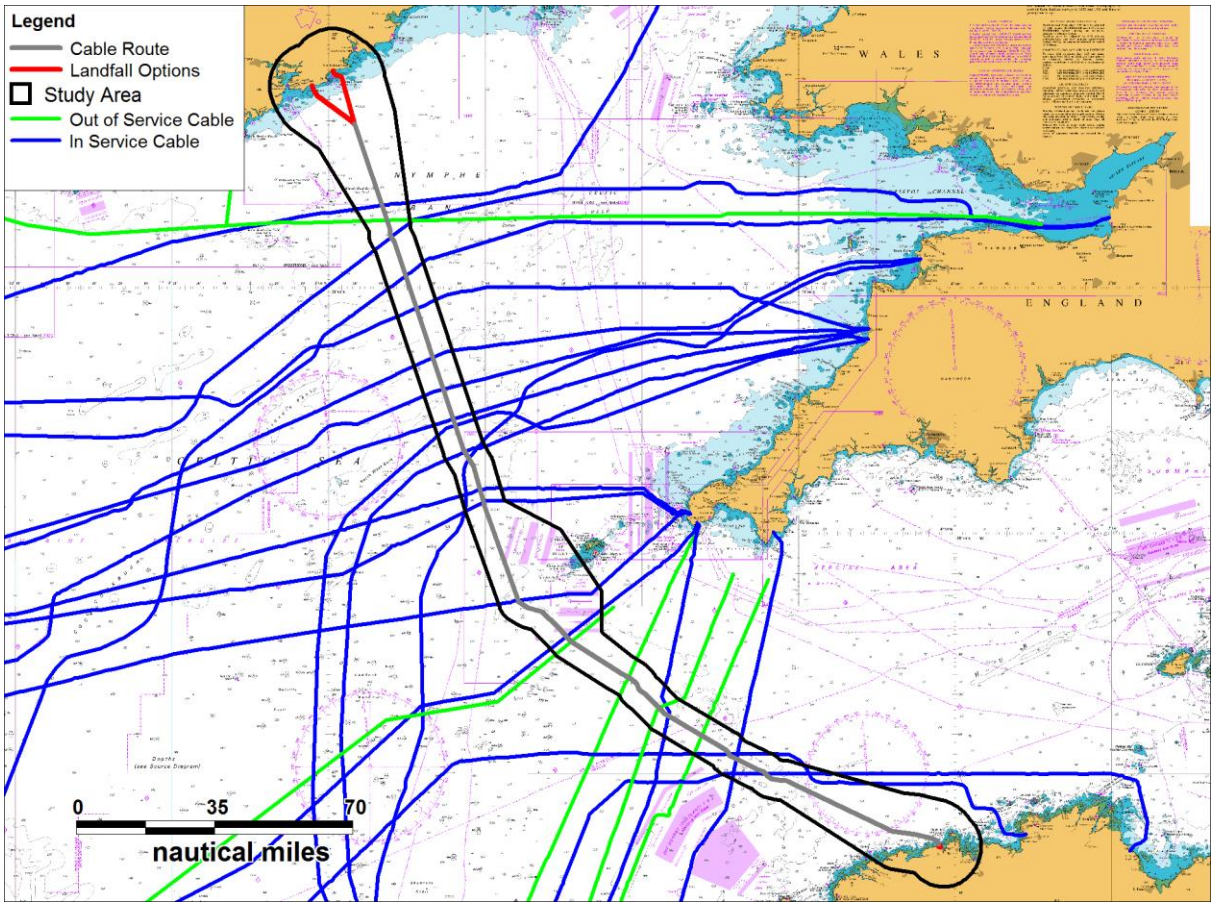

Figure 4.10 Subsea Cabling intersecting Study Area

A total of 18 in-service subsea cables crossed the proposed Celtic Interconnector route, the majority of which were telecoms cables between the UK and other worldwide destinations.

5. Shipping Analysis

5.1 Introduction

This section presents analysis of the AIS shipping data. Assessments of vessel numbers, types, sizes, and densities are provided below. As discussed in Section 3 an AIS data set consisting of 12 months of AIS data collected via both satellite and terrestrial receivers was considered to provide consistent and up-to-date coverage of the study area.

In order to validate the AIS data used in the shipping analysis, additional AIS data collected via terrestrial receivers covering discrete sections of the study area have been used for comparison. The full validation assessment is available in Appendix A (Ref i), and a summary is provided in Section 5.8.

5.2 Vessel Numbers

The monthly vessel counts recorded in the AIS data (based on unique vessels per day) are presented in Figure 5.3. (Note, October 2014 and April 2015 are outside the study period.)

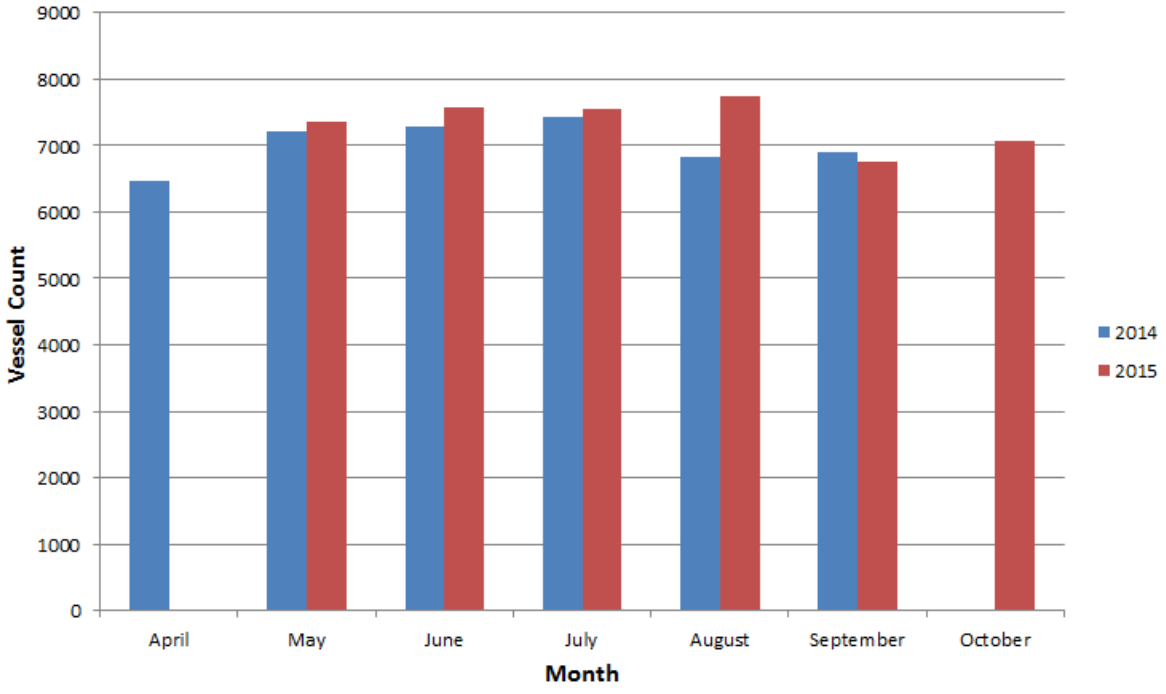

Figure 5.1 AIS Data Monthly Counts

An average of 243 unique vessels were recorded per day within the study area. The busiest day was the 20th August 2015, when 422 vessels were recorded within the study area. The tracks recorded on this day are presented in Figure 5.2.

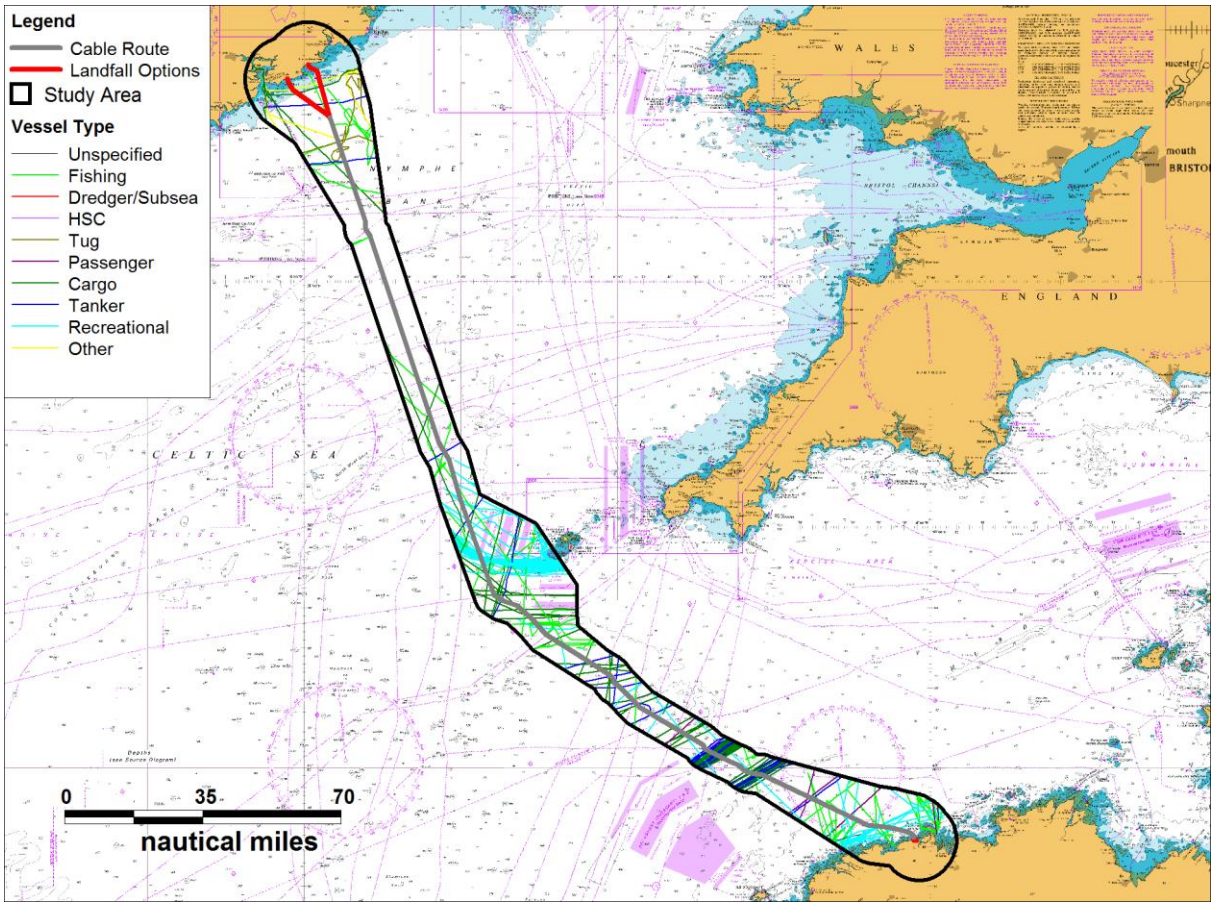

Figure 5.2 Busiest Day – 20th August 2015

5.2.1 Vessel Types

The AIS data colour-coded by vessel type is presented in Figure 5.3.

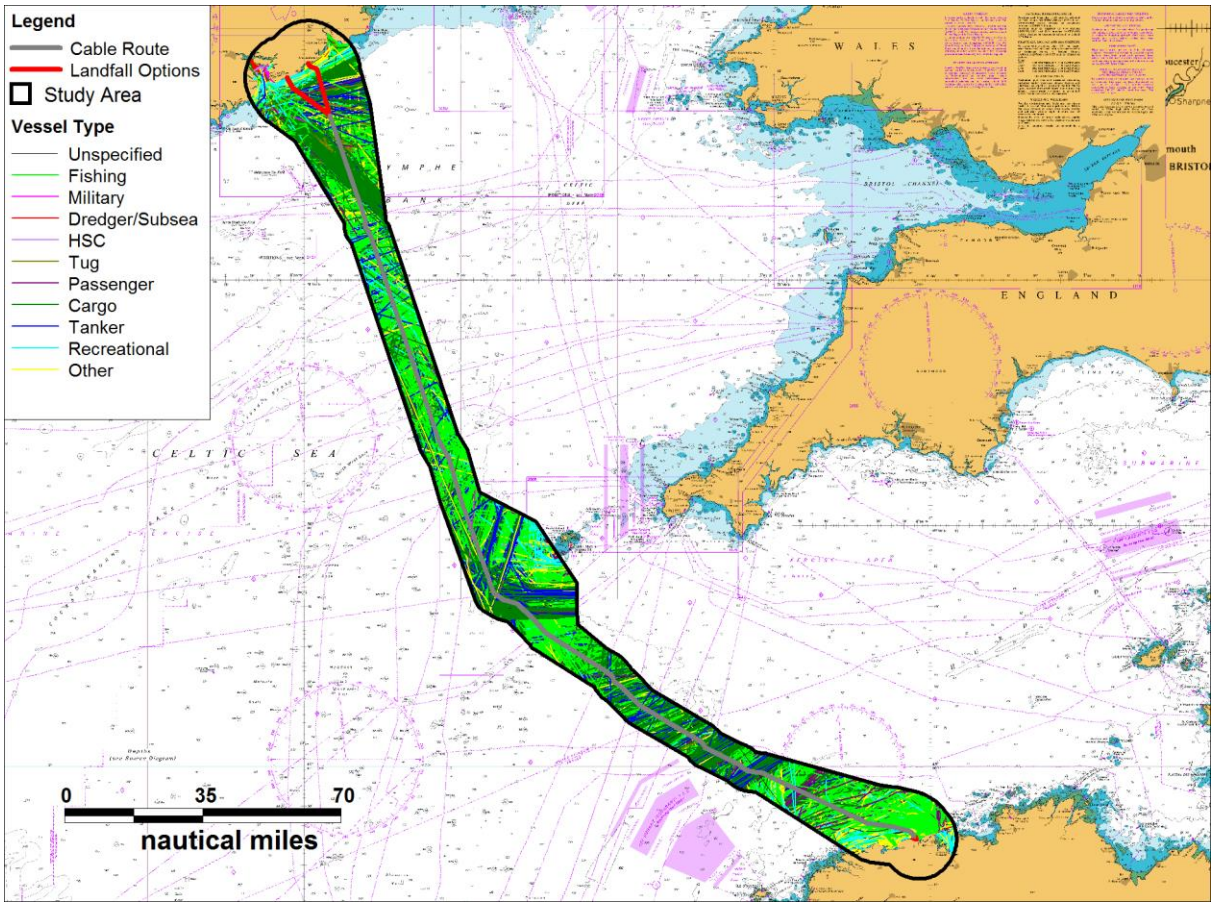

Figure 5.3 AIS Data by Vessel Type

Commercial (tanker and cargo) activity was observed using the shipping routes associated with the Isles of Scilly TSS, and the other TSS within the English Channel either side of the study area. Significant commercial activity associated with the Port of Cork was also noted within the data. Fishing activity was present throughout the study area, a detailed analysis of which is available in Section 7. Zoomed in plots of the AIS data by vessel type are presented in Figure 5.4, Figure 5.5, and Figure 5.6.

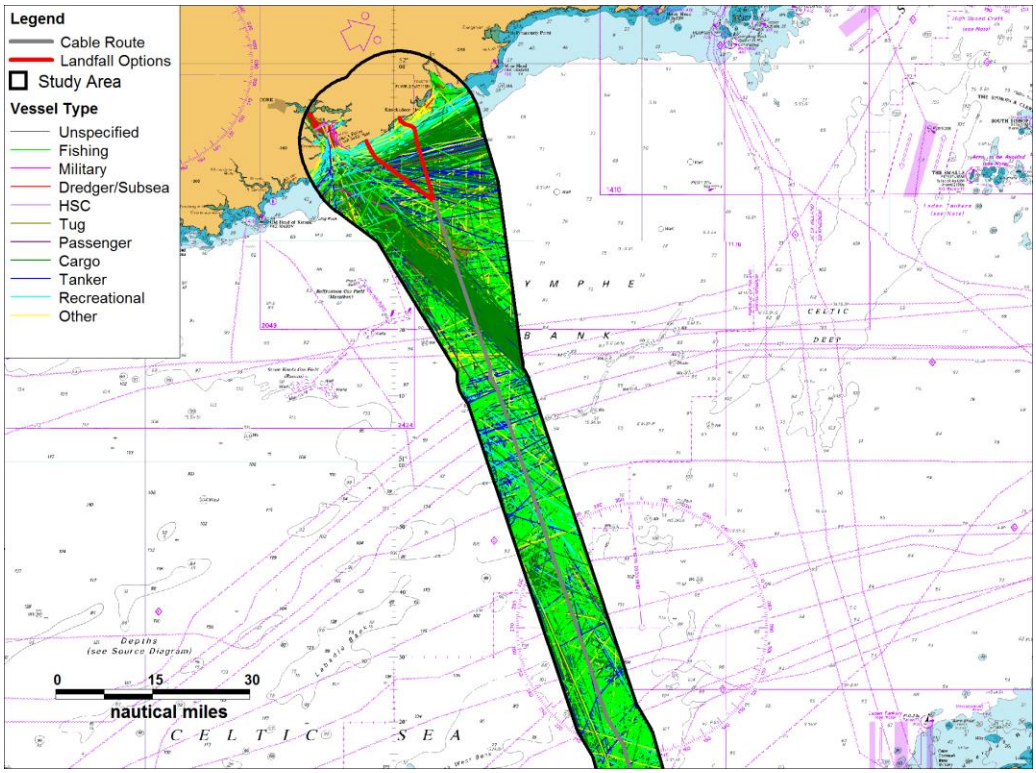

Figure 5.4 AIS Data by Vessel Type – Ireland

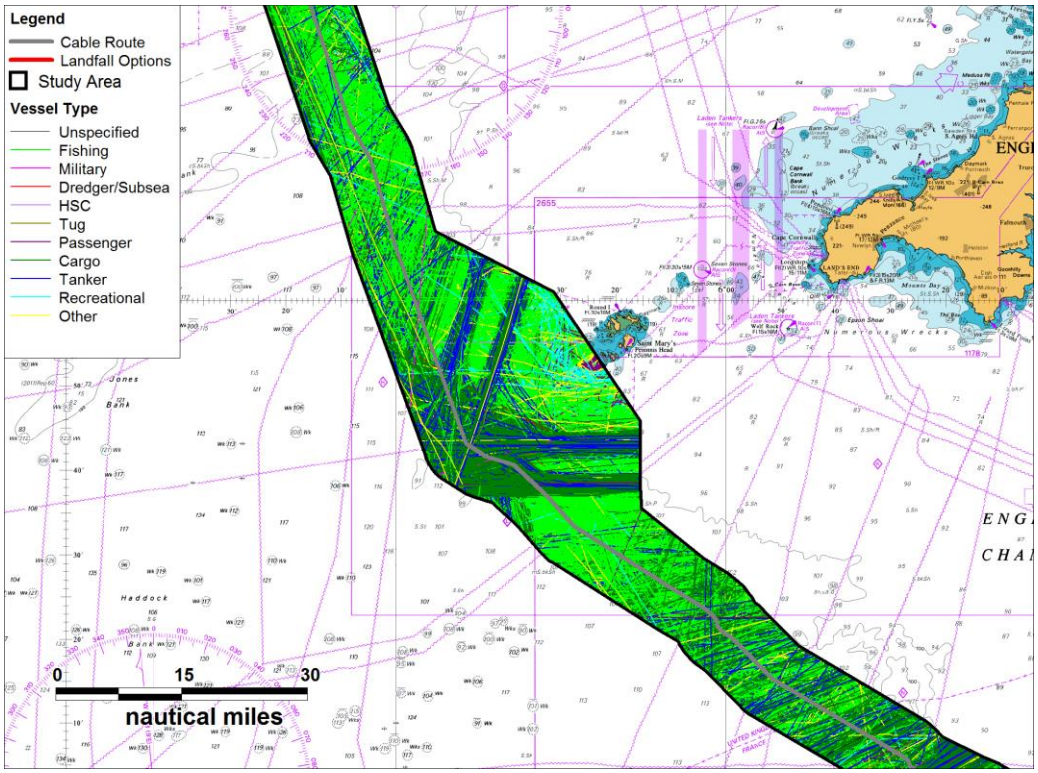

Figure 5.5 AIS Data by Vessel Type – UK

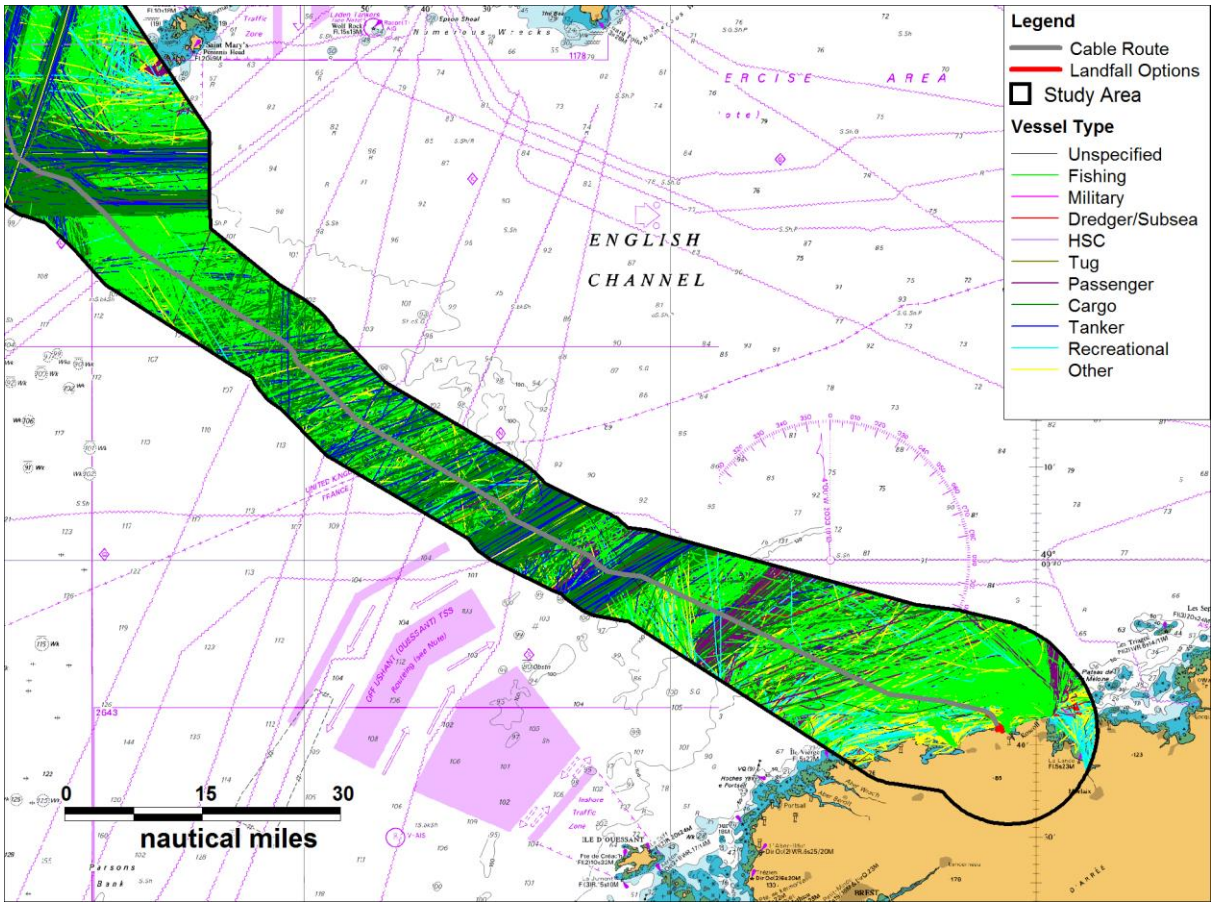

Figure 5.6 AIS Data by Vessel Type – France

The distribution of vessel types within the AIS data is presented in Figure 5.7.

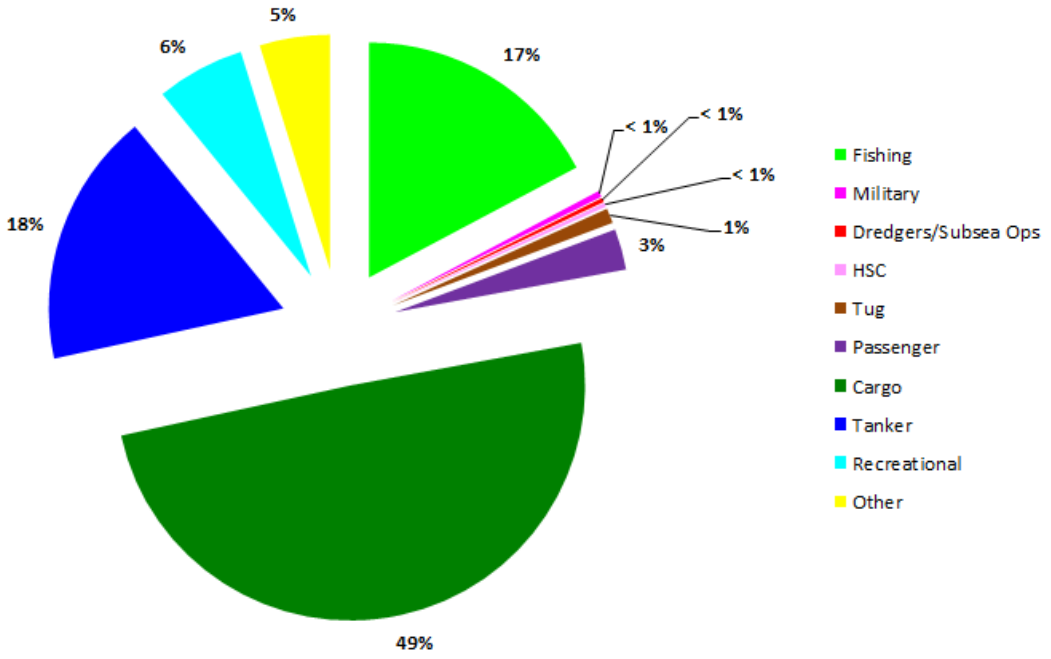

Figure 5.7 AIS Vessel Type Distribution

The majority of vessels within the study area were commercial (49% cargo vessels and 18% tankers). These vessels were observed using the shipping routes associated with the English Channel, and the Scilly Isles TSS (see Section 4.2), and on passage between Ireland (Cork) and the UK. Approximately 17% were fishing vessels. A detailed fishing analysis is presented in Section 7. Recreational vessels accounted for 6%, and "Other" vessels (mainly pilot vessels) accounted for 5%.

5.3 Vessel Sizes

The AIS data colour-coded by vessel length is presented in Figure 5.8.

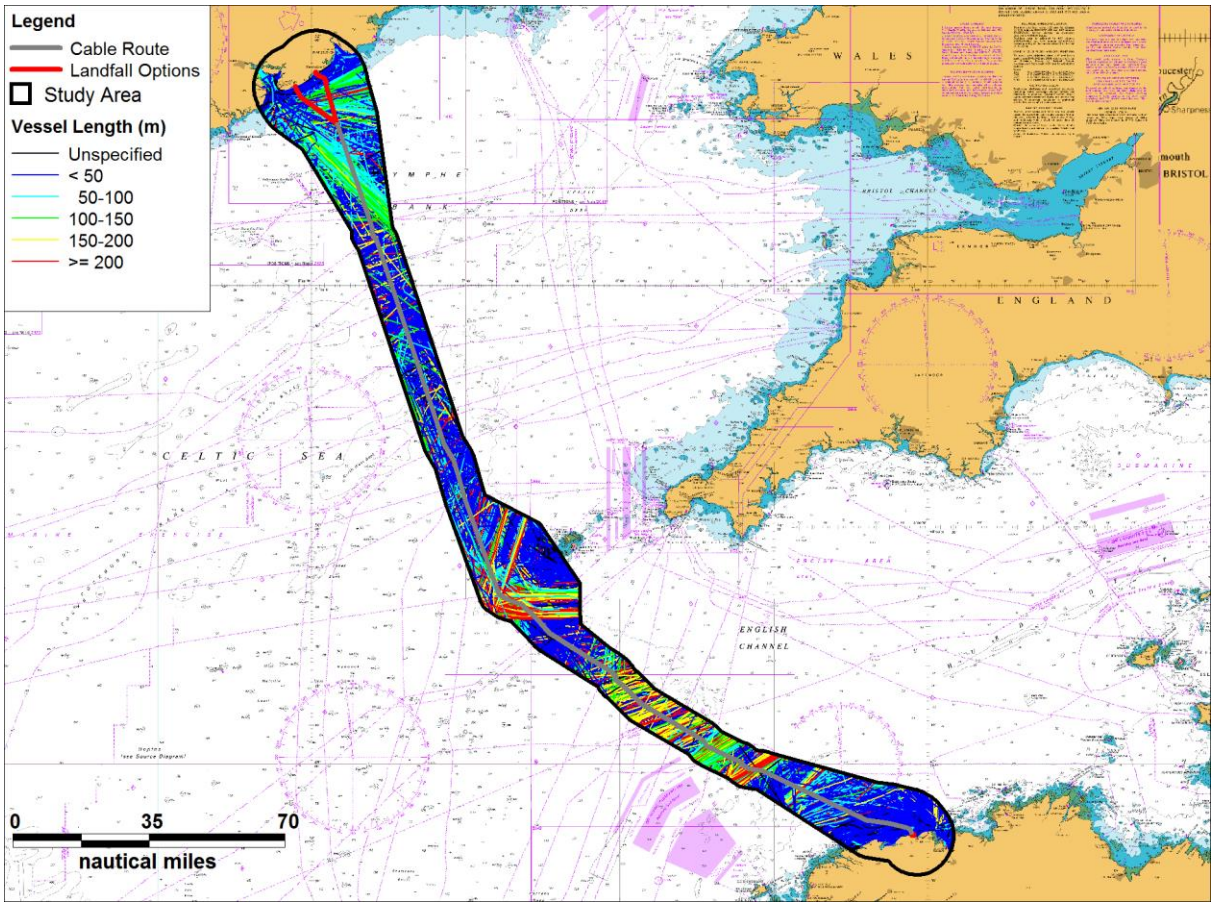

Figure 5.8 AIS Data by Vessel Length

Larger vessels were observed using the lanes associated with the TSS in the study area, and on passage to and from Cork. Smaller vessels (<50m) dominated the other sections of the study area.

Figure 5.9 presents the distribution of vessel lengths within the study area, excluding 3% of vessels that did not broadcast length information.

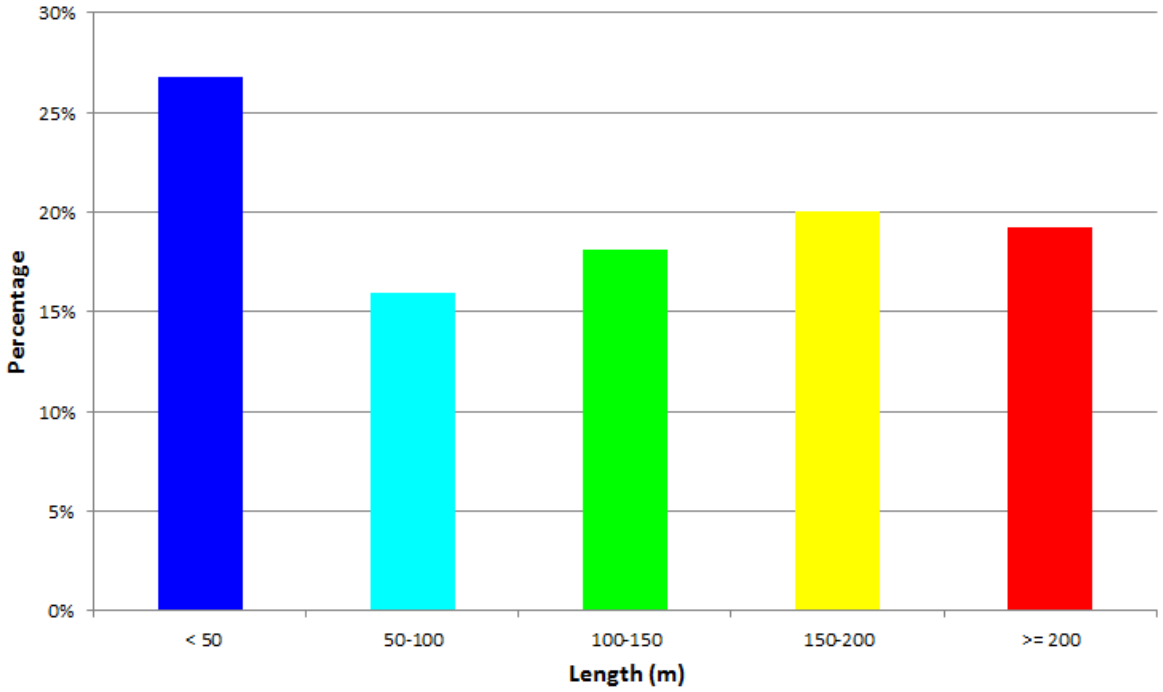

Figure 5.9 AIS Vessel Length Distribution

Approximately 27% of vessels were less than 50m in length. These smaller vessels were mainly fishing and recreational vessels. Vessels greater than 200m in length accounted for 19%. The average length recorded within the data was 131m, and the greatest length recorded was 400m, from seven container vessels utilising the traffic lanes within the English Channel.

The AIS data colour-coded by vessel draught is presented in Figure 5.10.

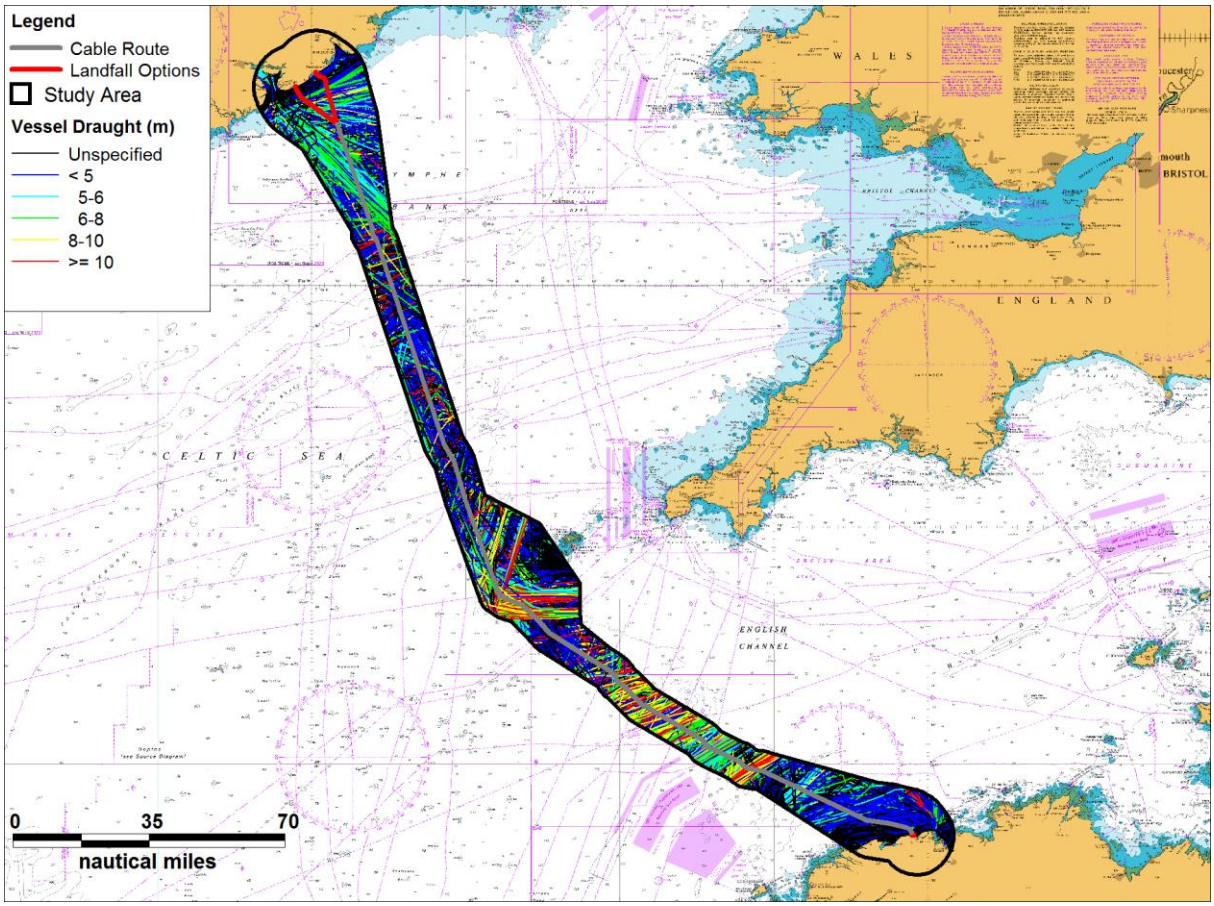

Figure 5.10 AIS Data by Vessel Draught

The areas used by vessels with the deepest draughts corresponded to areas where there were vessels over 200m in length.

Figure 5.11 presents the distribution of vessel draughts within the study area, excluding 19% of vessels that did not specify a draught.

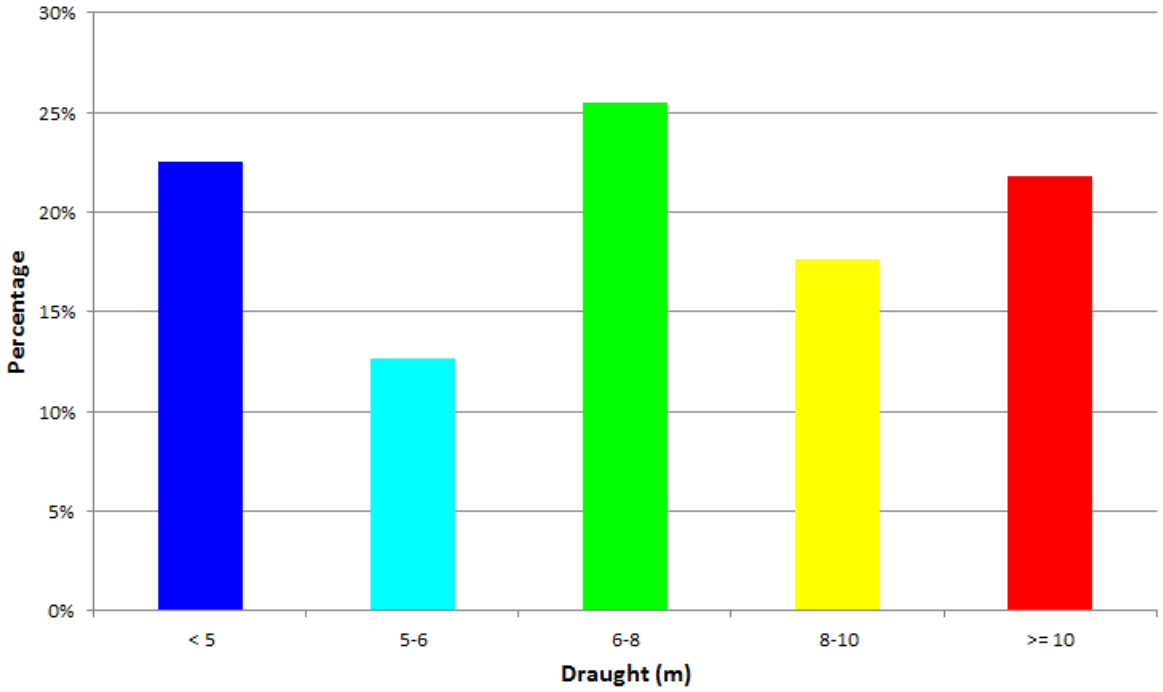

Figure 5.11 AIS Vessel Draught Distribution

Approximately one quarter of vessels transmitted a draught of between 6 and 8m. Vessels with draughts of less than 5m, and vessels with draughts of greater than 10m accounted for 22% each. The average draught recorded over the study period was 7.7m. The maximum recorded draught was 25.5m from the *HS Carmen*, a 237m tanker.

The AIS data colour-coded by vessel Dead Weight Tonnage (DWT) is presented in Figure 5.12. This is not broadcast on AIS but has been researched separately by Anatec based on the ship identify information. Vessels with no DWT information have been placed into a category by approximating a DWT based on their length and type (where length/type information were both available). The vast majority of the remaining vessels (2% of the total) were fishing, unspecified, or "Other" vessels, and have therefore been assumed to be in the smallest size category.

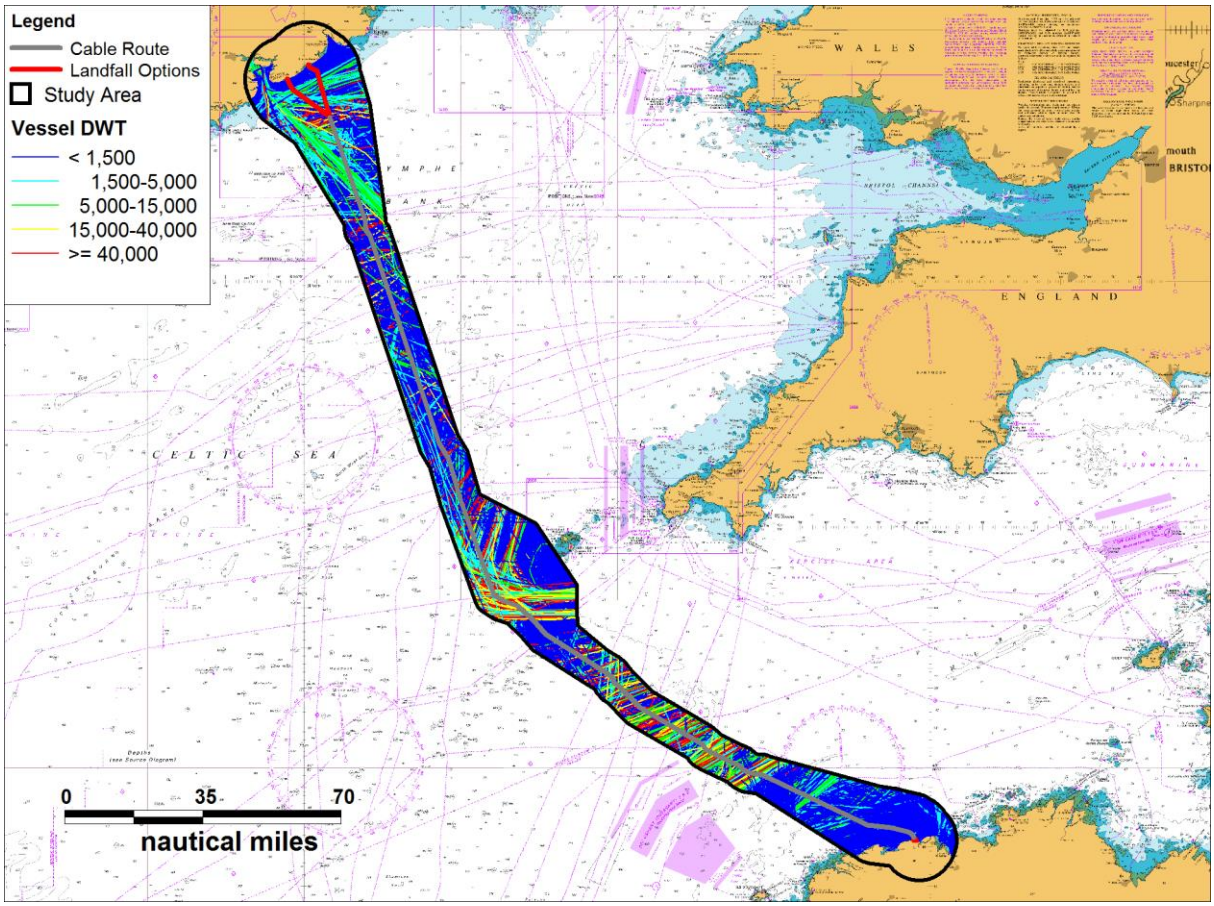

Figure 5.12 AIS Data by Vessel DWT

Figure 5.13 presents the distribution of vessel DWT in the study area.

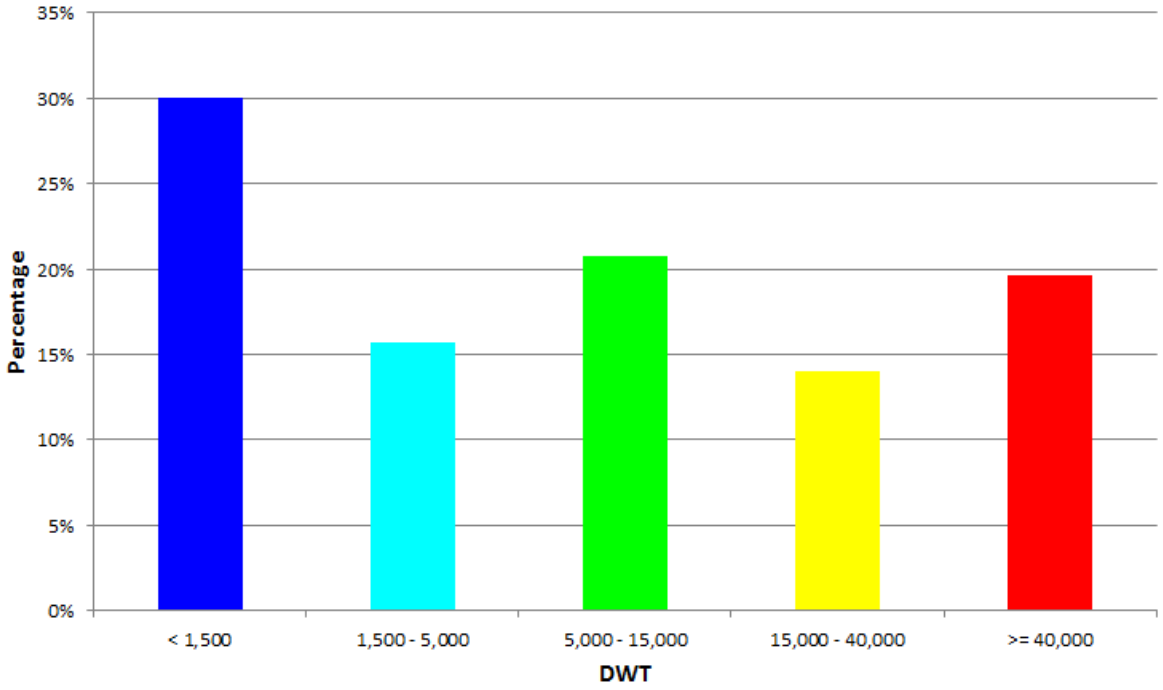

Figure 5.13 AIS Vessel DWT Distribution

Approximately 30% of vessels were of less than 1,500 DWT. One-fifth were vessels of greater than 40,000 DWT. The average DWT during the study period was 23,116, and the maximum was 400,694 DWT, from the *Vale Saham*, a 360m ore carrier (based on vessels with confirmed DWT only).

5.4 Vessel Speed

The AIS data colour coded by vessel speed is presented in Figure 5.14. Note, the presented speeds are average speed per track.

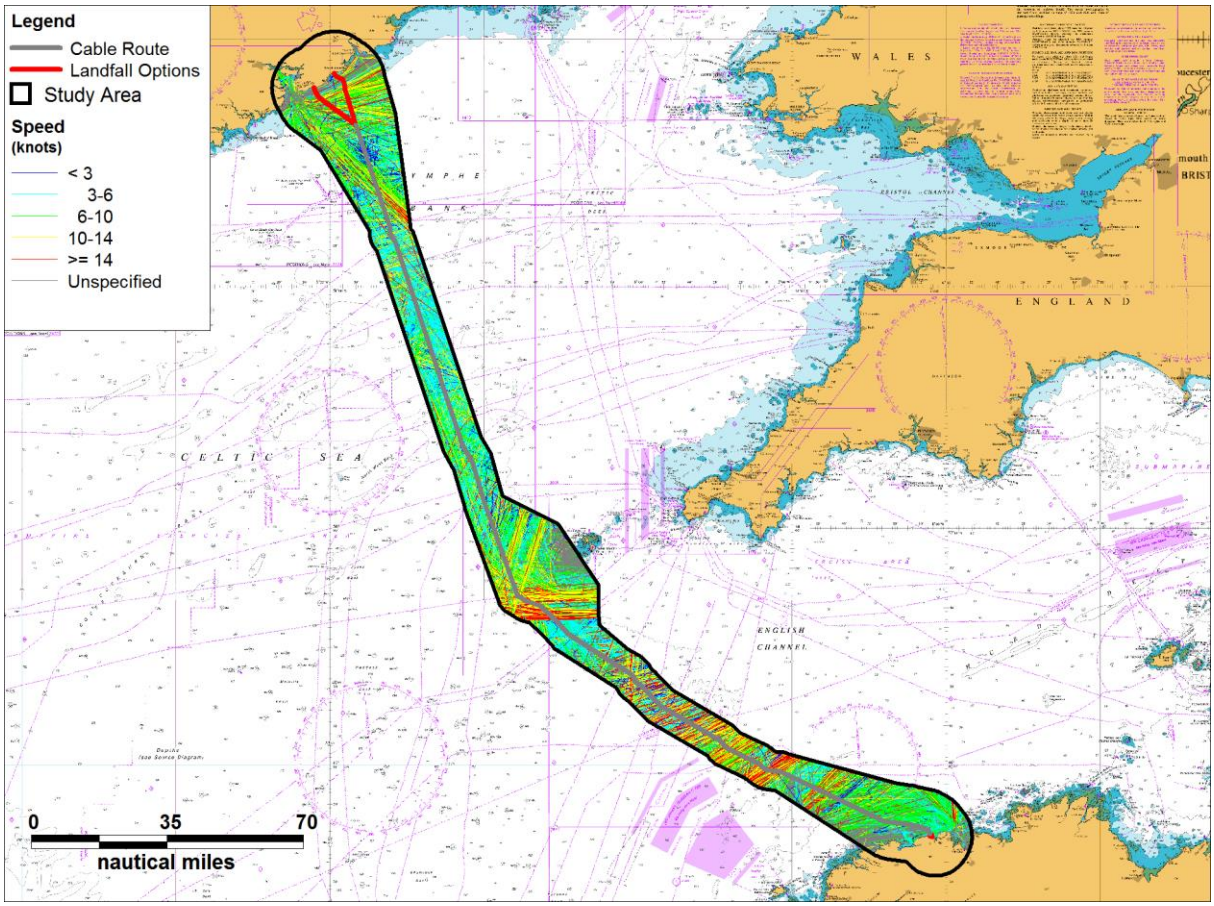

Figure 5.14 AIS Data by Vessel Speed

It is seen that the traffic travelling at speeds of greater than 10 knots was generally comprised of commercial and passenger vessels using the traffic lanes associated with the nearby TSS, or associated with Cork.

The distribution of vessel speed by vessel type and size is presented in Figure 5.15.

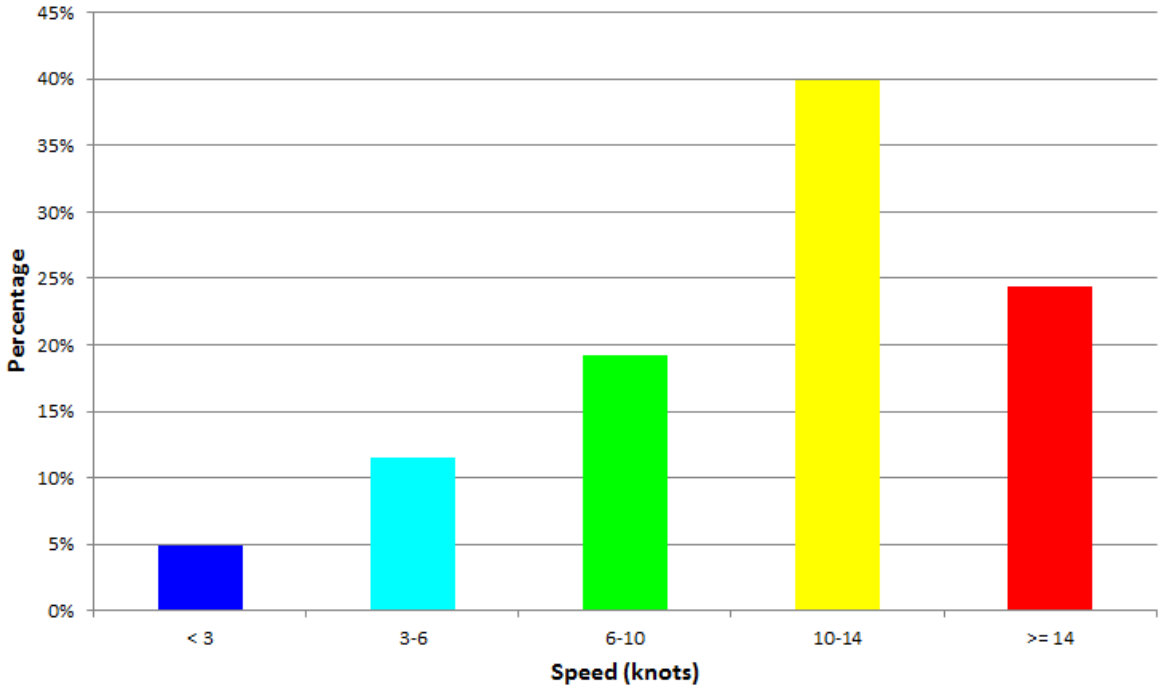

Figure 5.15 Distribution of Vessel Speed

The majority of vessels (64%) were travelling at a speed of above 10 knots, suggesting they were on passage. The average speed recorded within the data was 11.1 knots. The distribution of average speed by vessel type and size is presented in Table 5.1. Cargo vessels, tankers, and fishing vessels accounted for the majority (84%) of traffic, and have therefore been presented individually. All other vessel types have been grouped into the "Other" category.

Vessel Type	Average Speed (knots)				
	< 1,500 DWT	1,500 - 5,000 DWT	5,000 - 15,000 DWT	15,000 - 40,000 DWT	>= 40,000 DWT
Cargo	9.6	9.7	13.1	14.0	14.5
Tanker	11.8	10.6	11.9	12.6	12.1
Fishing	5.1	11.0	12.3	n/a	n/a
Other	6.9	9.9	17.1	14.4	15.0

Table 5.1 Average Speed by Vessel Type and Size

5.5 Vessel Density

The 12 months of AIS data was used to estimate the ship density within the study area, based on the number of track intersects per cell of a 250 x 250m grid. The results are presented in Figure 5.16.

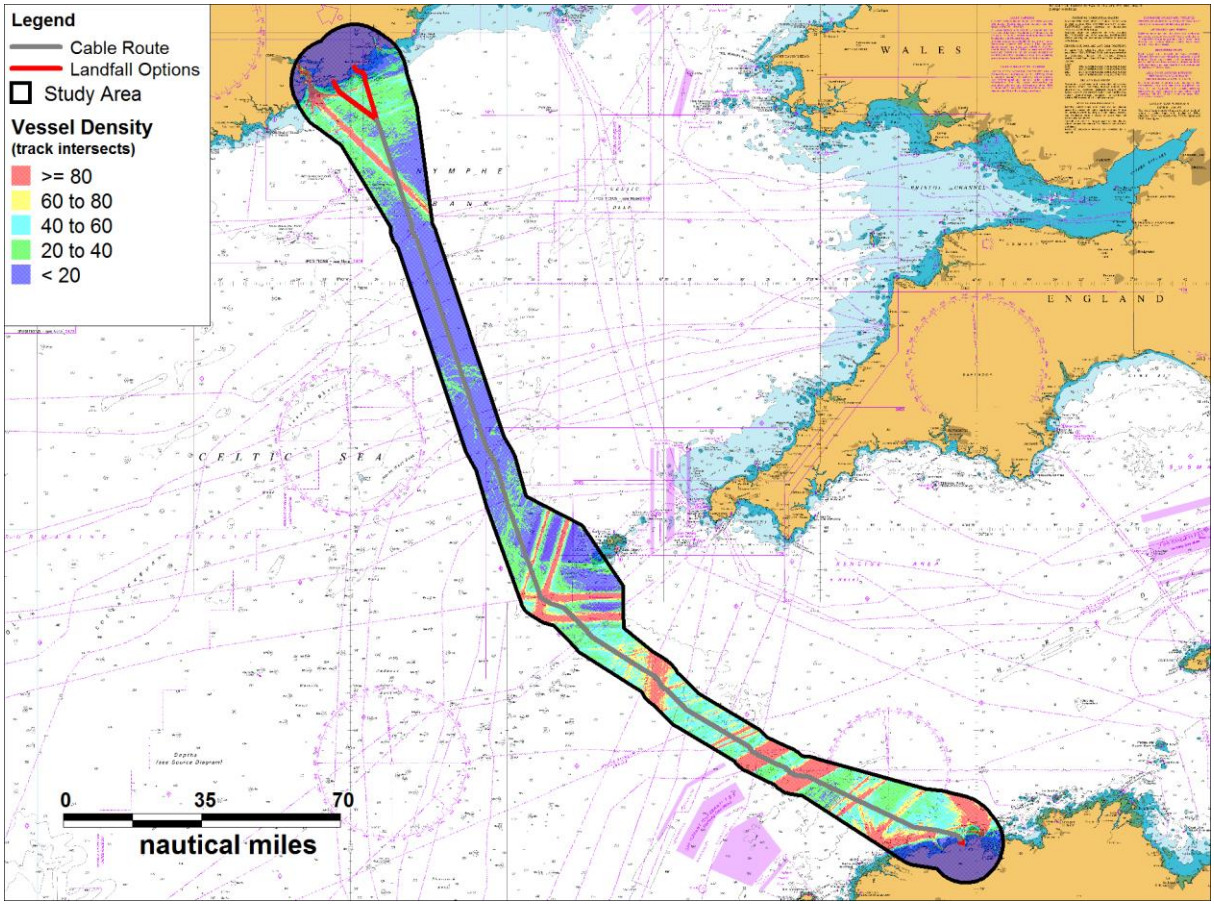

Figure 5.16 AIS Vessel Density

The highest density areas were caused by traffic utilising the lanes associated with the Isles of Scilly and Channel TSS. High density was also seen from the routes used by vessels associated with Cork, and with Roscoff and other French ports. In general, the density was higher in the section of route within southern UK and French waters than in the Celtic Sea.

Detailed plots of the density results are presented in Figure 5.17, Figure 5.18, and Figure 5.19.

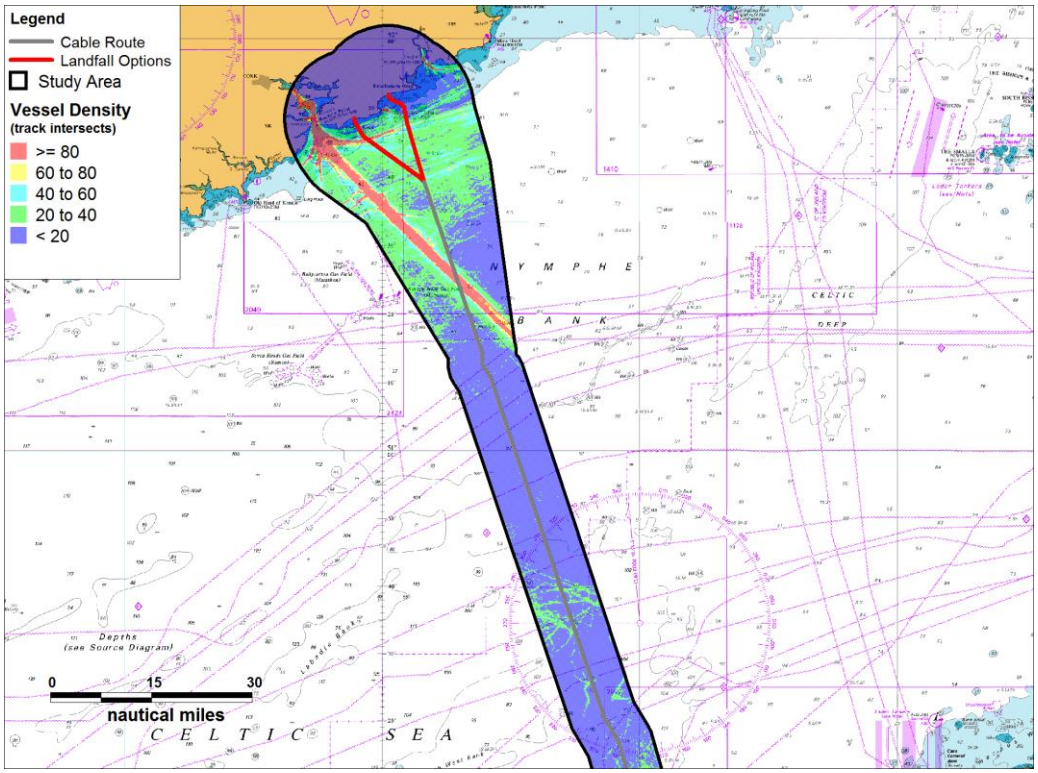

Figure 5.17 AIS Vessel Density – Ireland

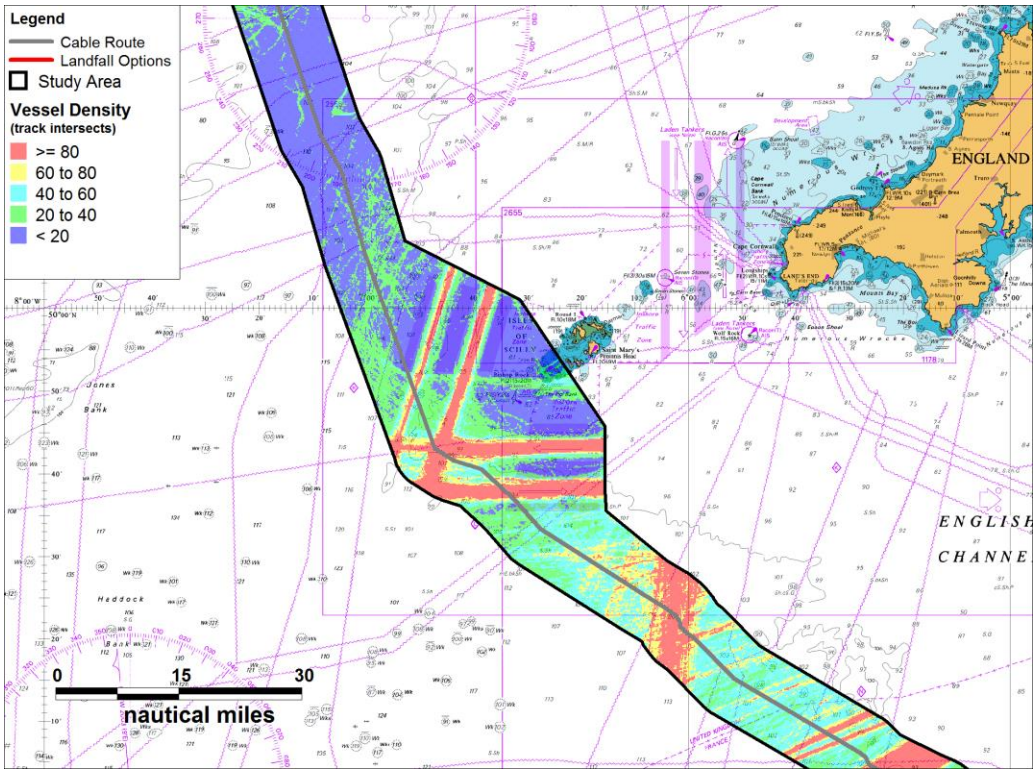

Figure 5.18 AIS Vessel Density - UK

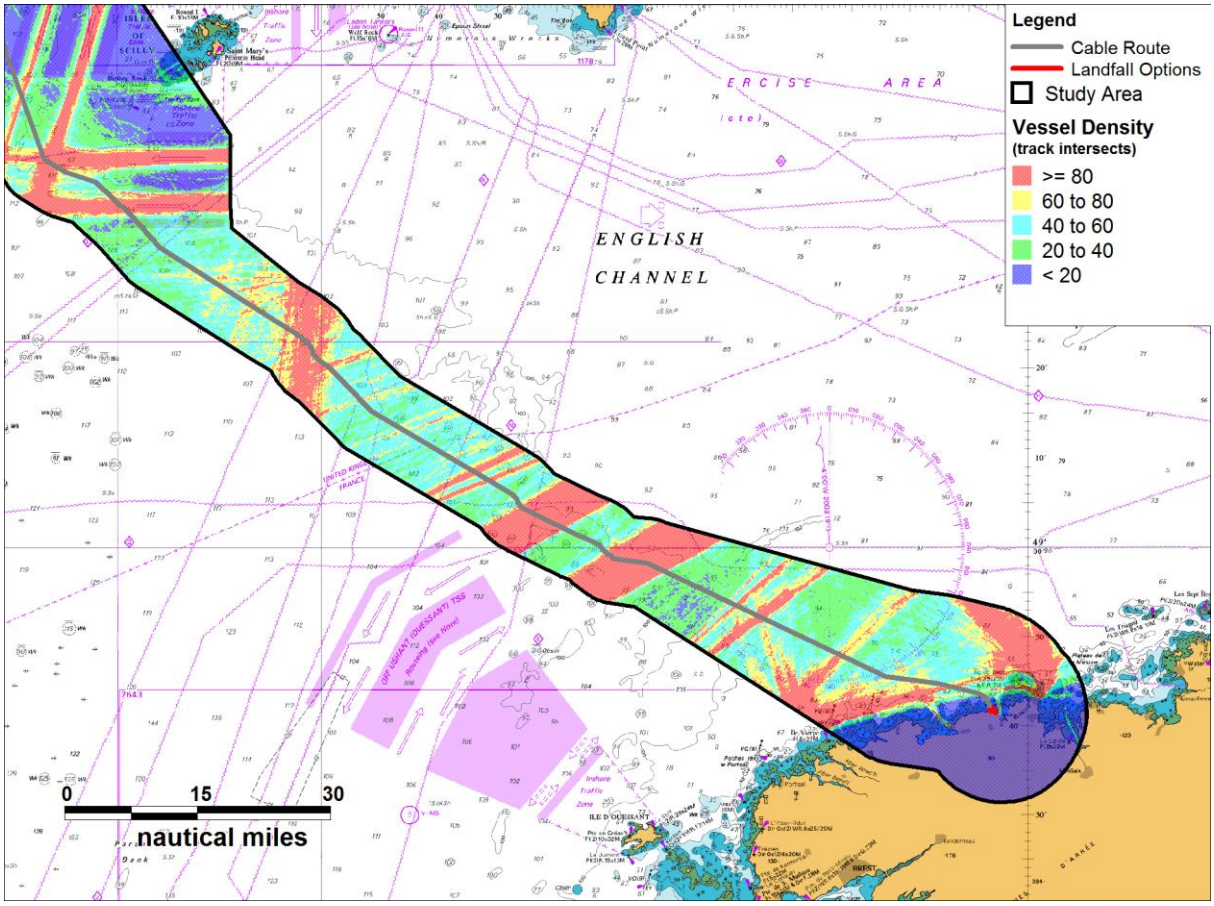

Figure 5.19 AIS Vessel Density – France

5.6 Dredging/Survey Work

As part of the shipping analysis, the AIS data was examined to determine if any unusual shipping activity occurred during the 12 months which could affect the proposed cable. This involved studying the AIS tracks from vessel types that could be engaged in activities other than steaming on passage, anchoring, mooring or fishing. The identified tracks, consisting of survey/research work, and dredging, are presented in Figure 5.20

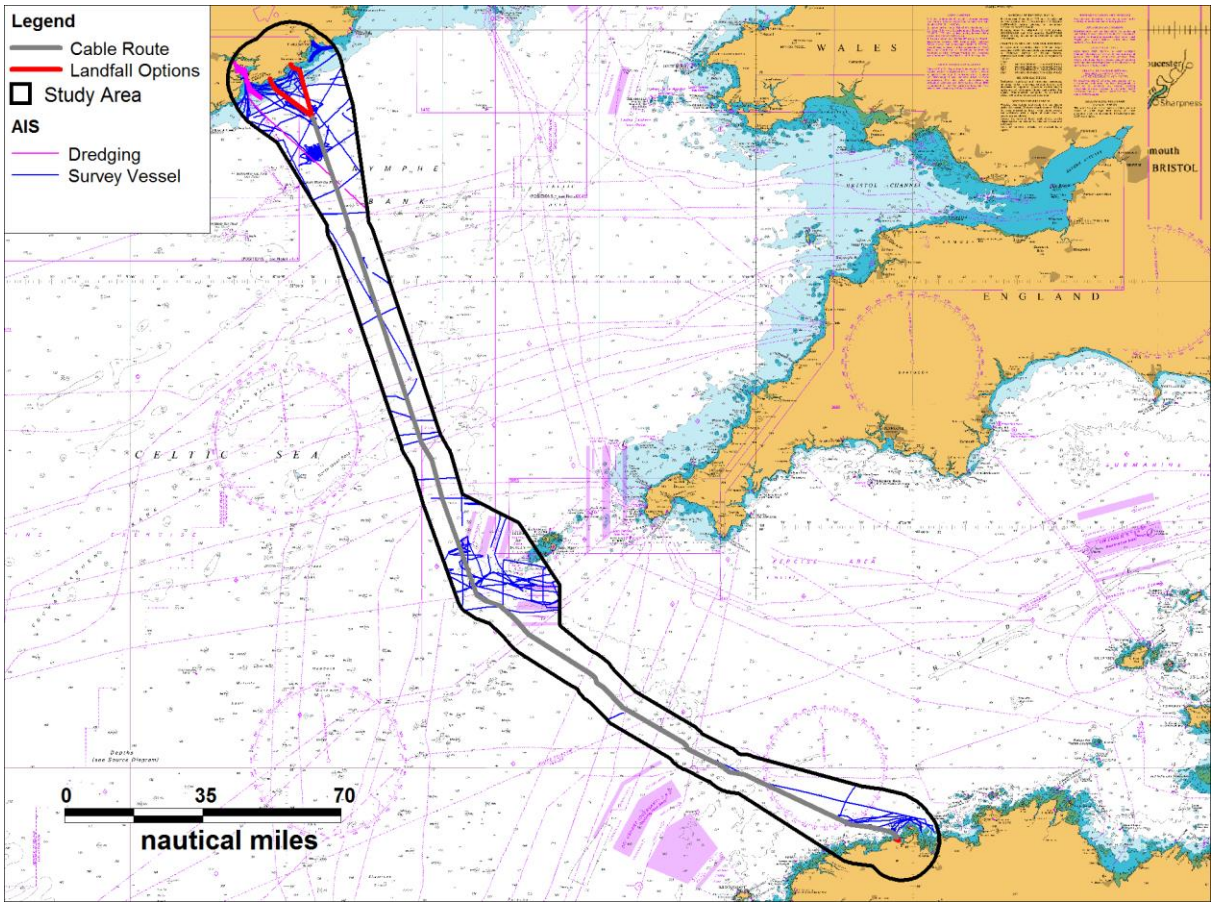

Figure 5.20 Dredging and Survey Work

The only dredging observed within the study was within the vicinity of Cork harbour during September 2014. This area is dredged every three years to maintain the Cork shipping channel. It is noted that no dumping activity was observed within the study area.

Some survey work undertaken within the study area was clearly related to the proposed Celtic Interconnector, however additional work was identified over the route approximately 18nm from the Irish coast. Survey work over a cable intersecting the proposed Celtic Interconnector was also noted within the study area occurring approximately 37nm south of the Irish coast. Work was also observed in Youghal Bay and west of the Isles of Scilly.

The following vessels performing work related to the proposed Celtic Interconnector have been filtered out of the risk modelling performed in the Cable Risk Assessment:

- Proteus;
- MV Chartwell;
- Ernest Shackleton;
- Bibby Tethra;

- MV Lia.

5.7 Cable Crossings

An analysis of the size distribution of vessels crossing the route per Kilometre Point (KP) of the proposed cable was undertaken. It is noted that the KPs for the main route are defined such that they run from north to south, meaning the first KP begins at the Irish landfall point at Ballinwilling Strand, as illustrated in Figure 5.21. The analysis was also performed on the additional Irish landfall option at Ballycroneen, and for the Port Neuf and Kerradenec landfalls on France.

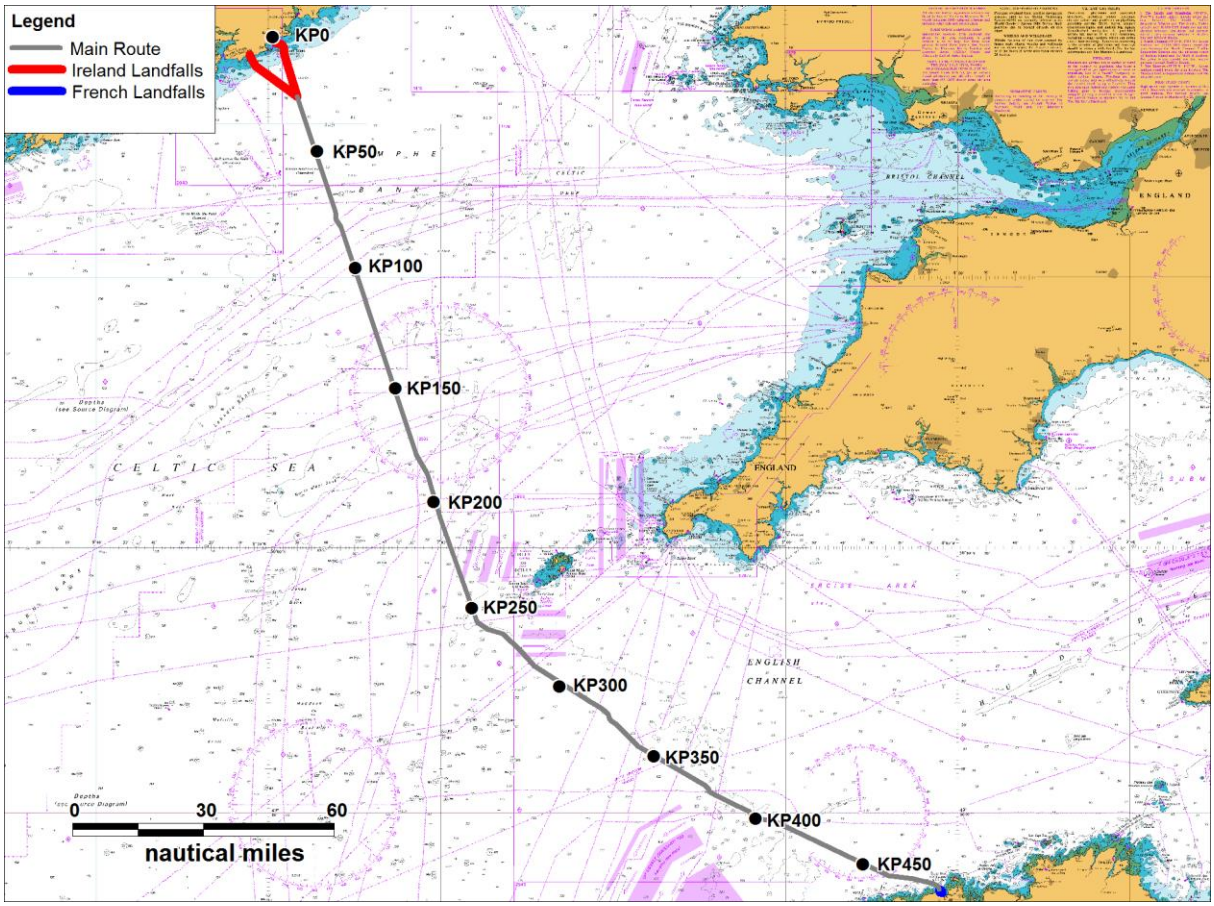

Figure 5.21 Cable Crossing Analysis Subsections

Each section of the route was divided into 1km sections (i.e. KPs). The results of the assessment provide the total number of vessel track intersections per KP and the percentage distribution by size. It is noted that each track is only counted once per KP. The results were broken down into six size categories, as presented in Table 5.2.

Size Category	DWT Range
1	< 1,500
2	1,500 – 5,000
3	5,000 – 15,000
4	15,000 – 40,000
5	40,000 – 100,000
6	>= 100,000

Table 5.2 DWT Size Categories

A summary of the results is presented in Table 5.3 for the main route and Table 5.4 for the landfall options. These provide the number of cable crossings and distribution by size per 50km for the main route and for each of the landfall options. As discussed above, the KPs for the main route are defined such that they run from north to south, meaning the first KP begins at the Irish landfall point at Ballinwilling Strand. The results for the first 50km of the main route therefore include the Ballinwilling landfall, which is also presented separately in Table 5.4 for comparison with the other landfall options.

Cable Route Section	Cable Crossings Per Year	% Distribution of Vessel Track Intersections					
		Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Main Route – KP 0-50	3,139	54%	17%	15%	5%	7%	1%
Main Route – KP 50-100	2,294	46%	20%	21%	7%	5%	1%
Main Route – KP 100-150	920	67%	13%	10%	3%	6%	1%
Main Route – KP 150-200	1,133	74%	10%	3%	3%	5%	5%
Main Route – KP 200-250	2,286	45%	20%	13%	8%	5%	9%
Main Route – KP 250-300	7,768	30%	8%	11%	21%	24%	6%
Main Route – KP 300-350	7,862	29%	15%	19%	17%	16%	4%
Main Route – KP 350-400	23,502	8%	18%	29%	19%	16%	10%

Cable Route Section	Cable Crossings Per Year	% Distribution of Vessel Track Intersections					
		Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Main Route – KP 400-450	22,614	15%	20%	27%	16%	13%	9%
Main Route – KP 450-487	3,393	83%	7%	9%	0%	0%	0%

Table 5.3 Cable Route Intersections, Vessel Size Distribution, Main Route

Cable Route Section	Cable Crossings Per Year	% Distribution of Vessel Track Intersections					
		Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Ballinwilling Strand	1,887	46%	19%	19%	7%	7%	2%
Ballycroneen	2,055	50%	17%	18%	6%	7%	2%
Port Neuf	1	100%	0%	0%	0%	0%	0%
Kerradenec	6	100%	0%	0%	0%	0%	0%

Table 5.4 Cable Route Intersections, Vessel Size Distribution, Landfall Options

Table 5.5 and Table 5.6 present this information in the form of number of vessel tracks crossing each cable route section for each size category.

Cable Route Section	Cable Crossings Per Year	Number of Vessel Track Intersections					
		Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Main Route – KP 0-50	3,139	1,699	548	469	172	211	40
Main Route – KP 50-100	2,294	1,058	456	485	151	113	31
Main Route – KP 100-150	920	612	118	92	30	57	11
Main Route – KP 150-200	1,133	841	115	33	31	53	60
Main Route – KP 200-250	2,286	1,023	455	294	193	116	205
Main Route – KP 250-300	7,768	2,325	629	819	1,618	1,882	495
Main Route – KP 300-350	7,862	2,252	1,192	1,504	1,355	1,253	306

Cable Route Section	Cable Crossings Per Year	Number of Vessel Track Intersections					
		Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Main Route – KP 350-400	23,502	1,823	4,234	6,837	4,425	3,792	2,391
Main Route – KP 400-450	22,614	3,411	4,490	6,205	3,536	2,980	1,992
Main Route – KP 450-487	3,393	2,830	253	308	0	2	0

Table 5.5 Number of Cable Route Intersections per Vessel Size, Main Route

Cable Route Section	Cable Crossings Per Year	% Distribution of Vessel Track Intersections					
		Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Ballinwilling Strand	1,887	863	357	364	130	141	32
Ballycroneen	2,055	1,034	354	366	129	140	32
Port Neuf	1	1	0	0	0	0	0
Kerradenec	6	6	0	0	0	0	0

Table 5.6 Number of Cable Route Intersections per Vessel Size, Landfall Options

5.8 AIS Validation

Three auxiliary AIS data sets were used to provide comparison with the core data set analysed in the above sections. The purpose of this additional assessment was to validate the core data set for use in the Shipping Analysis, and to highlight any areas where factoring is required in the Cable Risk Assessment. The full assessment is available in Appendix A (Ref i), and a summary is provided below.

A density analysis showed that the core AIS data set provided the best overall coverage of the study area, however the auxiliary data provided better coverage in some coastal areas over limited periods. A monthly count analysis showed similar results between the core and secondary data sets, with the core data recording higher counts in most cases.

A seasonal analysis showed that vessel activity was lower in winter than in summer for all vessel types within UK waters. An assessment of Irish waters showed an increase in fishing activity during winter when compared to summer, and a marginal increase in cargo vessels. Within French waters, with the exception of a marginal increase in cargo vessels, vessel activity was higher in summer for all types. It was concluded that summer vessel traffic levels were similar to or greater than those in winter, with the exception of fishing near the Irish landfalls. This has been accounted for in the fishing assessment.

6. Anchoring Analysis

6.1 Introduction

Vessels can transmit their navigation status via AIS, however they do not always do so accurately. All AIS tracks from vessels within the AIS data that transmitted their navigation status as 'At Anchor' were checked to ensure their behaviour matched that of an anchored vessel. AIS tracks from vessels which transmitted a navigation status other than 'At Anchor' were used as input to Anatec's Speed Analysis model. The program uses a predefined set of parameters to detect any tracks that may be from an anchored vessel based on their speed and course. This output is then manually checked, and any tracks that can be confirmed as coming from an anchored vessel are added to the tracks from the first step.

6.2 AIS Anchoring

A general overview of the tracks identified as coming from an anchored vessel within the 12 months of AIS data presented in Section 5 are presented relative to the route in Figure 6.1.

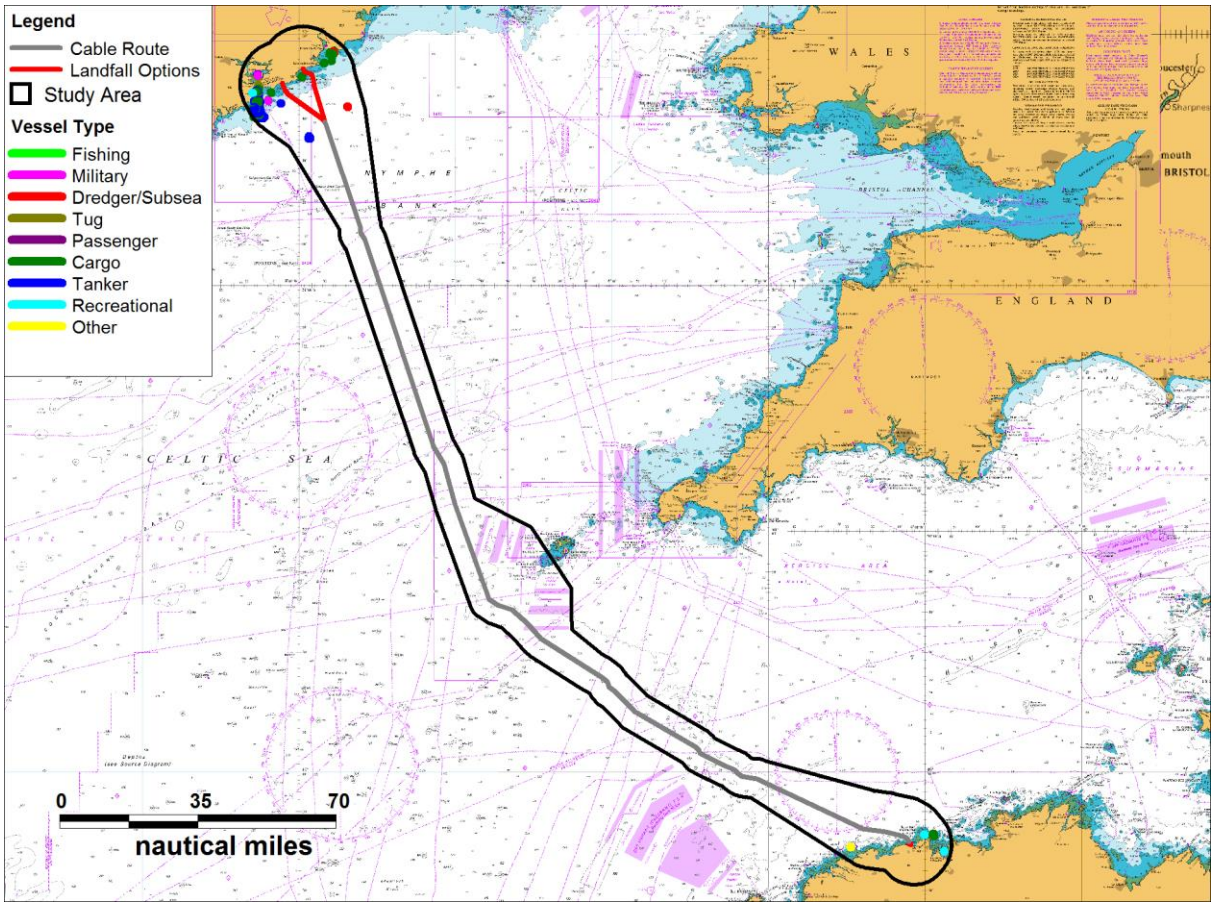

Figure 6.1 General Overview of AIS Anchoring

The majority of anchoring within the study area occurred within Irish waters, with the most significant activity occurring in the Cork Outer Anchorage. Some anchoring activity was also noted in French waters, most of which was associated with vessels outside Roscoff. Detailed plots of the Irish and French anchoring are presented in Figure 6.2 and Figure 6.3 respectively.

No anchoring was observed within UK waters in the study area. Anchoring was noted as occurring just outside the study area in the vicinity of the Isles of Scilly, however the closest occurred more than 20nm from the route.

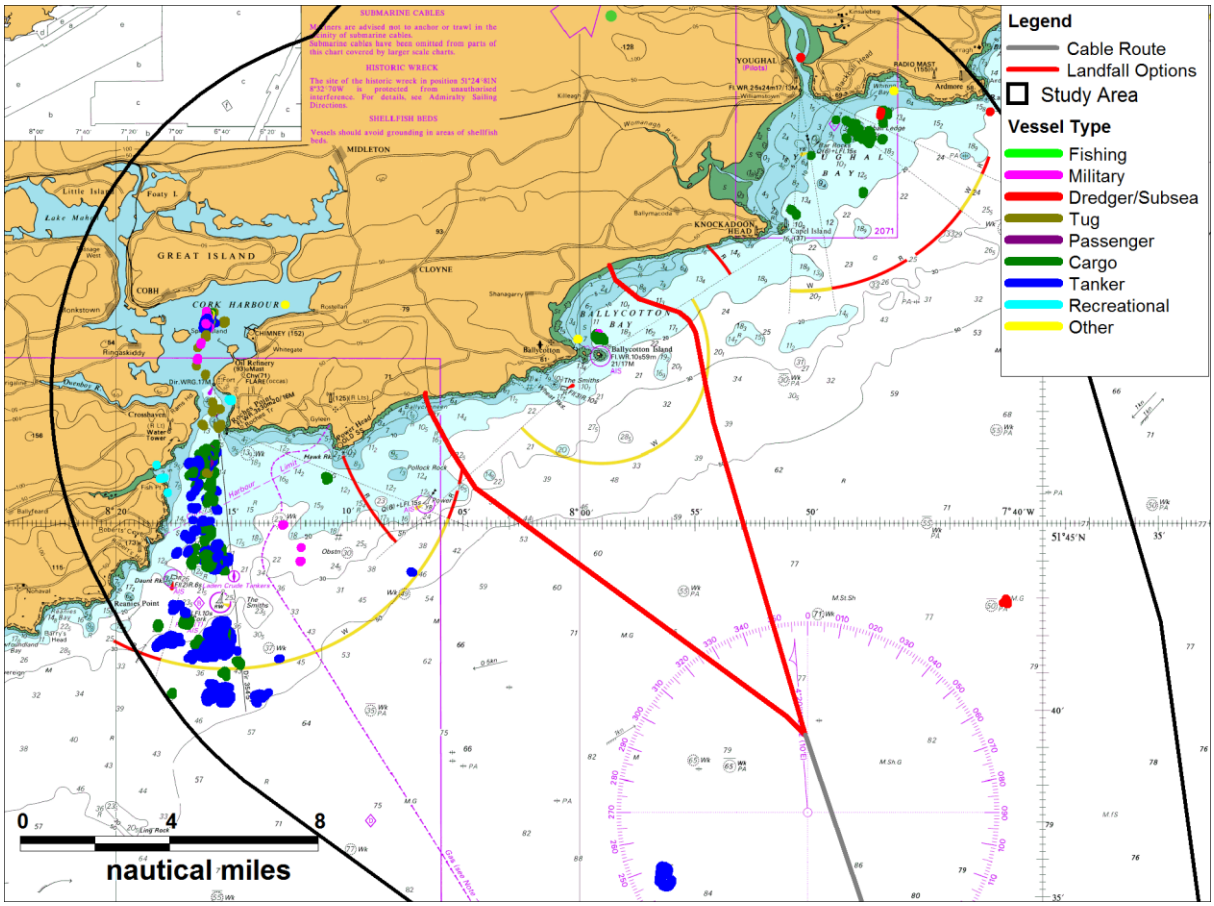

Figure 6.2 AIS Anchoring – Irish Waters

The majority of anchoring within Irish waters was from cargo vessels and tankers using the Cork Outer Anchorage. A military vessel was also noted anchoring within this area. The nearest anchoring to the western cable landfall from vessels entering or leaving Cork was a tanker, approximately 2.8nm from the proposed cable route, however it is noted that with the exception of one cargo vessel (3.2nm) and the military vessel (4.6nm at its closest) all other vessels anchoring in or near the Cork anchorage did not anchor closer than 7nm to the route.