

# BRITISH TELECOMMUNICATIONS PLC

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## Scotland - Northern Ireland (Scot-NI) 3 and 4 Replacement Cables

Technical Appendix E - Navigation Risk Assessment

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## DOCUMENT RELEASE FORM

### British Telecommunications Plc

**P2302\_R5150\_Rev0**

Scotland - Northern Ireland (Scot-NI) 3 and 4 Replacement Cables

Technical Appendix E - Navigation Risk Assessment

Author/s

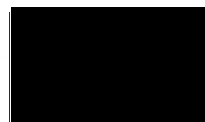
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Rev No	Date	Reason	Author	Checker	Authoriser
Rev 0	21/09/2020	Original Issue	CCA	APA/PD	APA
Rev 0 Update 1	16/10/20	Address client comments	CCA	PLD/ AP	ALF
Rev 0 Update 2	13/11/2020	Address client comments	CCA	PLD/ AP	ALF

Intertek Energy & Water Consultancy Services is the trading name of Metoc Ltd, a member of the Intertek group of companies.

## SUMMARY

Intertek Energy & Water (Intertek) have been commissioned by Global Marine Systems Ltd (GM) to conduct a Navigation Risk Assessment (NRA) for the installation and operation of two Scotland – Northern Ireland fibre optic cables (SCO - NI 4 and SCO - NI 3) in UK waters.

The scope of work of this NRA is to identify and assess potential risks to shipping and navigation arising from the installation of the cables and related infrastructure (e.g. external cable protection), that will exist during the operational life of both SCO – NI routes.

A review of data including anonymised Automatic Identification System (AIS) data, incident data vessel density grids, existing infrastructure, navigational features, and anchoring along the SCO – NI routes have been carried out to define existing shipping and navigation baseline. In summary:

- Most vessels operating across the SCOT-NI-3 route were Fishing and Cargo vessels accounting for 11% and 31% respectively.
- Across the SCOT-NI-4 route, most vessels operating were that Cargo, Fishing and Passenger vessels accounting for 22%, 29% & 19% respectively with a notable increase in fishing in May
- The firth of Clyde is consistently fished and coincides with transecting the northern end of SCOT-NI-4 (KP10 to KP30)
- The SCOT-NI Cable Routes do not cross any Traffic Separation Schemes (TSS)
- Although rock placement is not planned as part of the project, there is a possibility additional protection could be requested by third party cable owners at power cable crossing locations. As such, these areas have been assessed for worst case in the event that additional protection could be requested. All waters are navigable after rock placement at crossing locations and any changes to water depth will be less than 5% (the stated MCA maximum for changes to water depth).
- Marine Accidents (including false alarms, hoaxes and personal injury) are around 40 and 32 per year for the SCOT-NI-3 and SCOT-NI-4 Routes respectively. Machinery failures account for a large portion of the dataset and make up 27% (11 per year) and 21% (7 per year) of the incidents across SCOT-NI-3 and SCOT-NI-4 respectively.

Hazards to shipping and navigation during the marine campaign works (cable installation) have been identified across the SCOT – NI 4 and 3 routes and risk control measures such as best practice and, in consultation with stakeholders, embedded mitigation have been proposed to reduce the hazards to As Low As Reasonably Practicable (ALARP).

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## ABBREVIATIONS

**AIS**

Automatic Identification System

**ALAPR**

As Low As Reasonably Practicable

**BMH**

Beach Manhole

**BT**

British Telecommunication Plc

**BU**

Branching Unit

**EEZ**

Exclusive Economic Zone

**EMODnet**

European Marine Observation and Data Network

**HM**

Her Majesty

**GM**

Global Marine

**IRL**

Ireland

**IoM**

Isle of Man

**km**

Kilometre

**NRA**

Navigation Risk Assessment

**nm**

Nautical Mile

**MAIB**

Marine Accident Investigation Branch

**MCA**

Maritime and Coastguard Agency

**MHWS**

Mean High Water Springs

**mm**

Millimetre

**MMO**

Marine Management Organisation

**MLV**

Main Lay Vessel

**OREI**

Offshore Renewable Energy Installations

**PLIB**

Post Lay Inspection Burial

**PLN**

Port Letter Number

**PLGR**

Pre Lay Grapnel Run

**RC**

Route Clearance

**ROV**

Remotely Operated Vehicle

**RNLI**

Royal National Lifeboat Institution

**RYA**

Royal Yachting Association

**SCOT-NI**

Scotland to Northern Ireland

**SOLAS**

Safety of Life at Sea

**UK**

United Kingdom

**UKHO**

United Kingdom Hydrographic Office

**VHPM**

Vessel Hours Per Month

# 1. INTRODUCTION

## 1.1 Background

Global Marine Systems Ltd (GM) has been contracted to install the Scotland to Northern Ireland 3 (Scot-NI 3) and Scotland to Northern Ireland 4 (Scot-NI 4) fibre optic cables on behalf of British Telecommunications plc (BT) which will link Scotland to Northern Ireland. The existing BT telecommunication cables crossing the Irish Sea (Scotland to Northern Ireland 1 and 2) are critical telecommunications infrastructure and are nearing the end of their functional life, as such the SCOT-NI 3 & 4 systems are to be installed to maintain telecommunication services. Telecommunication cables provide essential services and connectivity which is of vital importance as the demand for data and communication increases and our reliance on the resilience of this critical infrastructure has been brought sharply into focus during the Covid-19 pandemic.

The offshore cable routes spanning the Irish Sea are presented in (**Figure 1-1: P2302-LOC-001-B**). Within the Irish Sea the SCOT-NI 3 & 4 cable corridors are approximately 42km and 85km long, respectively and are referred to as the project or project area.

## 1.2 Aim of this report

The purpose of this NRA is to identify potential risk to shipping and navigation arising from the installation of the two fibre optic cables and related infrastructure e.g. external cable protection, that will exist during the operational life of the fibre optic cables. The study will examine potential effects on shipping activities including fishing and recreational activities, or navigational features.

The assessment forms part of the SCO-NI 3 and SCO-NI 4 submarine fibre optic cable systems. This document has been drafted following consultation with the Maritime and Coastguard Agency (MCA) to support the marine licence applications to Marine Scotland Operations Licencing Team (MS LOT) and the Department of Agriculture, Environment and Rural Affairs (DAERA).

Where relevant, any limitations related to the baseline conditions, data sources or scientific understanding / interpretation within the process of assessing the effects have been highlighted.

This NRA covers marine operations that are being carried out during cable installation.

## 1.3 Data sources

As per Regulation 19 of Chapter V, Safety of Navigation, of the Annex to the International Convention for the Safety of Life at Sea (SOLAS V), 1 July 2002, an AIS must be installed and operated on: all ships of 300 gross tonnage and upwards engaged on international voyages; cargo ships of greater than 500 gross tonnage not engaged on international voyages; all passenger vessels irrespective of size and fishing vessels greater than 15m. In recent years, AIS has increasingly been installed by other maritime users on smaller craft, including yachts, fishing vessels, and pleasure craft, making it a robust and reliable indicator of marine traffic.

Baseline conditions for this NRA have been established by undertaking a desktop review of published information and available reports for the project in relation to shipping, fishing and navigation. The data sources used to inform the baseline description and assessment include the following:

- EMODnet vessel density maps of European waters, 2019 (Ref 1);
- Admiralty charts (FindMaps 2018) (Ref 2).
- Royal Yachting Association (RYA), 2019 (Ref 3)
- MMO Fishing Data, 2016 (Ref 4)

- Marine Traffic (Ref 5)
- RNLI Incident Data (ref 6)
- Marine Accident Investigation Branch (MAIB) (ref 7)

### 1.3.1 EMODnet data

The EMODnet (ref 1) vessel density maps have been created from Automatic Identification System (AIS) data, collected by coastal stations and satellites. They provide the total ship presence time for 14 individual ship categories (as given in **Table 1-1**) for every month of 2019 on a 1km grid that follows the EEA / Inspire standards.

**Table 1-1 EMODnet Ship Category Descriptions**

EMODnet Ship Category	AIS Ship Type Description
Other	Wing in ground (WIG), Diving ops, Other, Spare, Diving Ops, Reserved
Fishing	Fishing
Service	Pilot vessel, Search and Rescue vessel, Port Tender, Anti-pollution equipment, Medical Transport
Dredging or underwater operations	Dredging or underwater ops
Sailing	Sailing
Pleasure craft	Pleasure craft Category A to B
High-speed craft	High-speed craft
Tug and towing	Towing, Tug
Passenger	Passenger Category A to B
Cargo	Cargo Category A to B
Tanker	Tanker Category A to B
Military and law enforcement	Military ops, Law Enforcement
Unknown	Unknown

Source: EMODnet (2019)

The ship category 'unknown' does not have relevant details in the raw AIS data and therefore cannot be assigned to a relevant category.

For the RYA dataset, AIS data from recreational vessels was used to determine the density per unit area of boating in UK coastal waters, to give a picture of the most utilised routes and areas by leisure boaters. The AIS data covers the UK coastal region, including the Channel, and the Irish Sea, currently utilising data from May to September of 2014 and 2017 (ref 2).

Intertek has analysed the 2019 EMODnet dataset that was recently released (March 2020) has been processed using the following stages:

- Collation of AIS data.
- Extraction of all recreational vessels identifying themselves as Sailing or Pleasure Craft.
- Verification of any vessel over 24 m in length using external databases, while those under 24 m were assumed to be recreational.
- Removal of vessels with a Port Letter Number (PLN), as these were assumed to be fishing vessels.
- Removal of vessels with the strings 'survey', 'fish'.

All charted data is presented in Vessel Hours Per Month (vhpm). For this report, the intensity is defined as per the classifications in **Table 1-2** below.

**Table 1-2 VHPM Intensity Classification**

VHPM range	Intensity Classification
200 - <500	Very High
100 - 200	High
20 - 100	Medium to High
10- 20	Medium
5-10	Low
0-5	Very Low

### 1.3.2 RNLI data

RNLI incident call out data (ref 6) documents marine incidents between 2008 and 2019. For this assessment, the assigned classifications have been further grouped to so the data can be visualised and assessed clearly. **Table 1-3** below details the applied grouping.

**Table 1-3 Applied grouping**

RNLI Data Classification	Intertek Grouping for Assessment
Vessel abandoned derelict or adrift	Abandoned Vessel
Vessel abandoned, derelict or adrift	
Capsize	Capsize
Collision	Collision
Collision with object on surface	
Collision with other craft	
Collision with rocks	
Collision with submerged object	
Criminal activity	
Hit by craft	
Equipment failure	Equipment failure
Fire	Fire on board vessel
Fire / Explosion	
Fouled propeller / impeller	Fouled Propeller
Leaks / Swamping	Leak & Swamping
Machinery failure	Machinery failure
Man overboard	Man overboard
Adverse conditions	MetOcean Conditions
Blown / Swept out to sea	
Currents	
Cut off by tide	
Flooding	

RNLI Data Classification	Intertek Grouping for Assessment
High winds	
In danger of being carried away by tide	
In danger of drowning	
Overcome by crashing waves	
Rip current	
Stranded	
Stranding / Grounding	
Stranding or grounding	
Stuck in mud	
Sudden wave	
Swamping	
Aircraft crashed	Other
Aircraft thought to be in trouble	
Ambulance or doctor call	
Animal in trouble	
Attempting recovery of item	
Attempting rescue of a casualty	
Attempting rescue of an animal	
Attempting to evade police	
Cause (other)	
Marine Debris or Object	
Medical condition	
Missing or overdue	
Motor vehicle in the sea	
No service	
Open channel VHF	
Other	
Risk taking behaviour	
Safety Cover	
Signal blocking VHF channel	
Slippery or uneven surface	
Sporting injury	
Stepped to edge e.g. to take photo or look at the scene	
Thought to be in trouble	
Trapped in motor vehicle	
Unexploded bomb / mine	
Unknown	
Unsure of position (lost)	
Cliff collapsed	Personal Incident

RNLI Data Classification	Intertek Grouping for Assessment
Dementia senility or other similar condition	
Disability	
Exhaustion / fatigue / cold	
Fear of drowning	
Fell from height on craft (e.g. rigging or mast)	
Footing gave way	
Human error	
Ill crewman on vessel	
Illness	
Injured	
Person ill	
Person in distress	
Person Injured	
Person missing	
Person on shoreline in difficulty	
Person recovery	
Person to be taken ashore	
Person to be taken ashore from a vessel	
Fishing gear snagged on underwater obstruction	Snagging
Steering failure	Steering Failure
Cargo shifted	Vessel Distress
Gas leak	
Out of fuel	
Sail failure / dismasting	
Vessel overdue	
Vessel thought to be in trouble	
Vessel unsure of position	Vessel Dragging Anchor
Vessel dragging anchor	
Sinking / Sunk	Vessel Sinking or Sunk
Darkness or poor visibility	Visibility

### 1.3.3 Cable desktop study

The cable route desktop study (ref 8) was used to inform this assessment which included (among other things) a review of the risk identification and assessment of anthropogenic hazards to the cable such as fishing and ship's anchors.

## 1.4 Study area

This NRA covers the Marine components of the proposed Scotland to Northern Ireland cable route corridors (SCO-NI3 & SCO-NI 4) through the North Channel of the Irish Sea. For ease of reference, the assessment has been split into two study areas corresponding to the different marine cable routes

corridors. The study areas have been defined as 10km either side of the proposed cable route corridors.

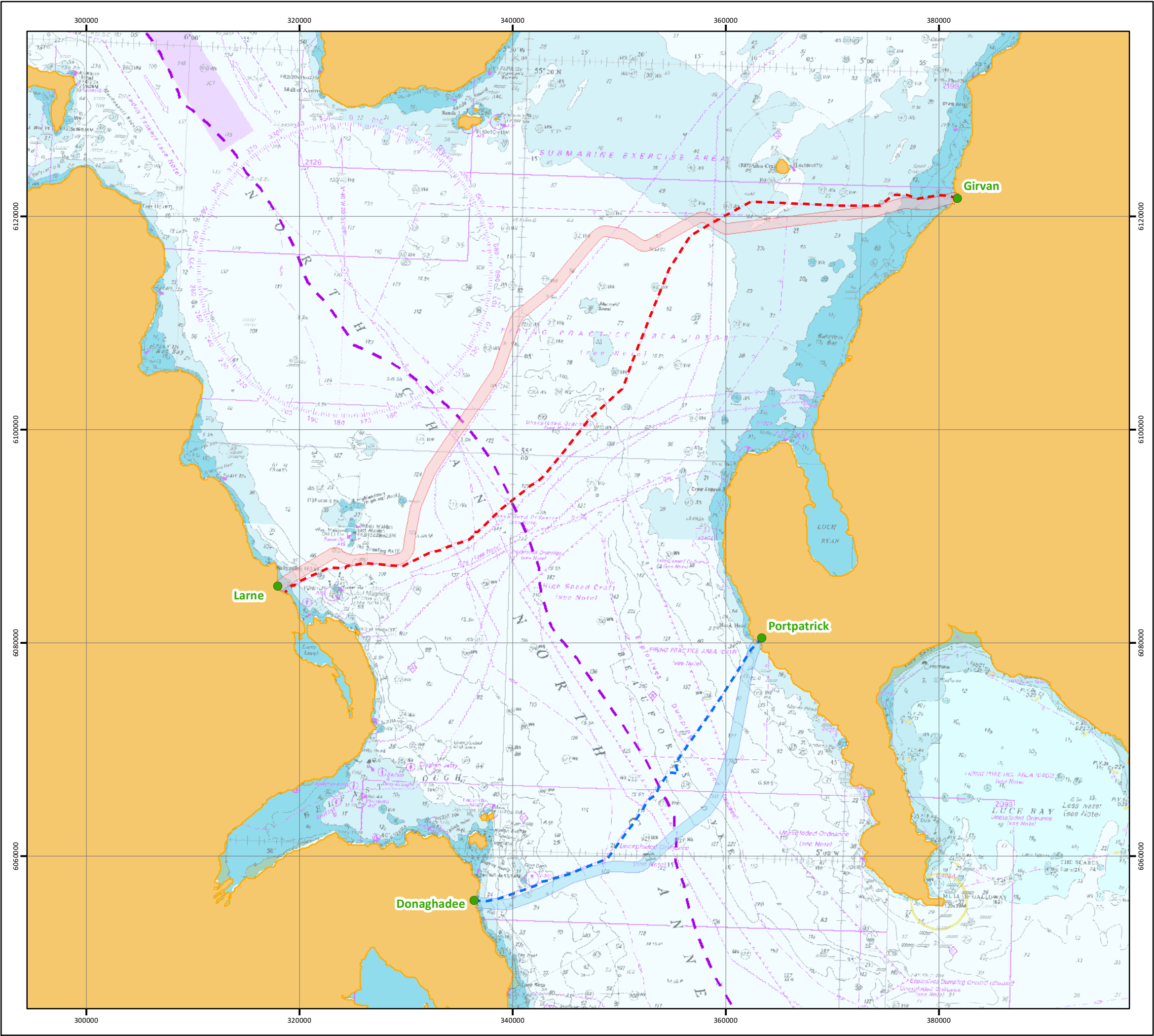
Kilometre points (KPs) have been assigned to the route using the Scottish landfalls as KP0.

- **SCOT-NI-4** - KP0 at MHWS, Girvan, Scotland to MHWS, Larne, Ireland
- **SCOT-NI-3** - KP0 at MHWS, Portpatrick, Scotland to MHWS, Donaghadee, Ireland

These are shown in **Figure 1-1** (P2302-LOC-001).

All AIS data and navigational features dataset presented in this report are limited to the area of the assessment.

The defined study area shall be known as the **SCO-NI Routes** or **Proposed Development**.



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

LOCATION OVERVIEW  
Route Options

Drawing No: P2302-LOC-001

B

Legend

- BMH Location
- Existing SCOT-NI1
- Existing SCOT-NI2
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit



NOTE: Not to be used for Navigation

Date	19 November 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; ESRI; GEBCO; MarineFind;
File Reference	J:\P2302\Mxd\01_LOC\ P2302-LOC-001.mxd
Created By	Chris Dawe
Reviewed By	Chris Carroll
Approved By	Paula Daglish



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## 1.5 Consultation

**Table 1-4** summarises the relevant aspects of the consultation responses, specific to shipping and fishing navigation for the SCO-NI Routes.

**Table 1-4 Consultation responses**

Stakeholder	Date	Objective
<b>Statutory stakeholders - Scotland</b>		
Marine Scotland (MS)	Consultation letter 04/06/2020 Meeting 24/06/2020	A meeting was set up give an overview of the project and to outline the proposed approach to the marine license application. The focus was on gathering feedback on the proposed marine environmental appraisal (MEA).
Crown Estate Scotland (CES)	Consultation letter 04/06/2020 Phone call 08/07/2020	Intertek sent Crown Estate Scotland a letter of introduction to the approach to the environmental assessment stage of the project on 4th June. Intertek subsequently received a conflict check for the project.
Northern Lighthouse Board (NLB)	Consultation letter 09/06/2020 Response received 10/06/2020	No comments
Maritime and Coastguard Agency (MCA)	Consultation Letter 11/06/2020 Response received 19/07/2020	Request for an NRA to be submitted to the MCA for approval. The NRA should seek to accurately identify specific hazard scenarios and detail how the operator would mitigate these risks to ALARP – As Low as Reasonably Practicable.
Scottish Fishermen's Federation (SFF) and Scottish White Fish Producers Association (SWFPA)	Consultation letter SFF 07/07/2020 Meeting with Seagard 31/07/2020	<b>Meeting between Seagard and Malcolm Morrison (SFF) and Femke de Boer (SWFPA)</b> SOCT-NI-4 cable route may impact the scallop and nephrops fisheries in the region. SFF and SWFPA have experienced major issues with other projects, particularly with safety measures regarding cable burial and rock dumps. Specifically, they would like to see proof that an area is safe to fish in after installation, such as an overtrawlability survey (desk-based study is not good enough).
Scottish Fishermen Organisation (SFO)	Consultation letter 30/07/2020	No response
Clyde Fishermen's Association (CFA)	Consultation letter 07/07/2020 Meeting with Seagard 31/07/2020	<b>Meeting between Seagard and Elaine Whyte, Tommy Finn, Kenneth Macnab and Alistair Roberts</b> Prawn trawlers operate in water from 20 m depth out to the deeper, rocky ground by Mermaid Bank; some creel fishers also operate in the region (just before last cable turn SW to Larne). It would be greatly appreciated to arrange to have the client supply the proposed cable area in a coordinate format (simple lat long or dms) so that fisheries can load that into their maps and actually see how much overlap occurs with their fishing grounds. Approximately 20-25 trawl boats in the organisation and 1-2 creel boats may be impacted during the cable installation process.

Stakeholder	Date	Objective
		Better communication prior to project implementation. It would be helpful to incorporate fishermen's feedback on cable lay plans to avoid areas where burial will not be possible. There has been a situation before where an NtM regarding a cable repair was only sent out 3 hours prior and not all parties were able to be alerted in this time frame.
West Coast Regional Inshore Fisheries Group (WCRIFG)	Consultation letter 07/07/2020 Meeting with Seagard 30/07/2020	<b>Meeting between Seagard and Simon MacDonald</b> Clyde is primarily a creel fishing region, though there is also an active scallop fishery in the area. Issue NtM going forward as these are very easy to forward out to associated stakeholders. Timescales have been reasonable so far and advance warning is much appreciated, but it would also be useful to have a NtM go out once work is completed in order to keep all stakeholders informed.
Girvan Inshore Fishermen's Group (GIFG) and Ayrshire Coast Crab and Lobster Fishermen's Association (ACCLFA)	Consultation letter 07/07/2020 Meeting with Seagard 28/07/2020	<b>Meeting between Seagard and Clifford Wilson (GIFG) and Ronnie Geddes (ACCLFA)</b> In order to streamline FLO/client/fishery communications, have a contact sheet of key contacts in the region so that if pots need to be moved, the client can contact fishers directly when necessary. Also implement a designated VHF channel for these project comms.
Scottish Creel Fishermen's Federation (SCFF)	Consultation letter 07/07/2020 Meeting with Seagard 05/08/2020	<b>Meeting between Seagard and Alistair Sinclair (SCFF)</b> It was determined that fishermen are not likely to be directly impacted by the cable installation project.
Communities Inshore Fisheries Alliance (Cifascot)	Consultation letter 09/07/2020	Consultation letter distributed across members.
SB Fish	Consultation letter 07/07/2020	Meeting invite Seagard 27/07/2020 Follow-up Seagard 03/08/2020. No response
<b>Statutory stakeholders - Northern Ireland</b>		
The Crown Estate (TCE)	Consultation letter 04/06/2020 Phone call 08/07/2020	Intertek sent The Crown Estate a letter of introduction to the project and the approach to the Marine Environmental Assessment on 4th June. As no response had been received Intertek followed up with a call to discuss the project, MEA and information required to progress lease discussion. TCE advised to liaise with current seabed assets within 12nm. This will be included on the proximity check (received 08/07/20).
Department of Agriculture, Environment and Rural Affairs (DAERA)	Consultation letter 04/06/2020 Meeting 22/06/2020	Consultation meeting was set to give an overview of the project and to outline the proposed approach to the marine license application.
DAERA and DAERA Fisheries	Meeting with Seagard 29/07/2020	<b>Meeting between Seagard and Mark McCaughan, Joe Breen, Charmaine Beer and Trevor McQuoid</b> Suggested that very few fishers are likely to be impacted by this cable installation; most of the impact (if any) would be due to have the cable lay vessel present in a region. Some static pots may be displaced, but there is likely to be a good deal of grandstanding, particularly out of Larne and Donaghadee. Previous projects and

Stakeholder	Date	Objective
		<p>developments have offered a pot removal fee as well as a lobster organization enhancement fee to keep particularly valuable reproductive individuals in the wild.</p> <p>Significant scallop dredging in the proposed cable areas - need to achieve deep burial and protect cables as much as possible.</p>
DAERA Fisheries Division	Consultation letter 07/07/2020 Response received 08/07/2020 Additional information 05/08/2020	<p>Data held by DAERA for larger vessels relates to Fisheries management and is recorded by ICES sub rectangle in the same format that is held by Marine Scotland. Smaller inshore fishing vessels make a manual return.</p> <p>DAERA does not record AIS but fishing vessels over 12 metres are compelled to operate with Vessel Monitoring System or VMS. Agri Foods and Biosciences Institute (AFBI) provide DAERA with Annual fish stock data, summary VMS pictures such as fishing heat maps, and also provide detailed marine habitat surveys and detailed seabed mapping.</p>
Commissioners of Irish Lights	Call to ask for contact details 04/06/2020	Consultation letter 04/06/2020. No response Follow-up email 30/06/2020 Follow-up email 10/08/2020
<b>Other Stakeholders</b>		
The Royal Yachting Association Scotland (RYAS)	Consultation letter 14/07/2020 Invitation PAC event 28/07/2020 Response received 30/07/2020	RYAS stated the project is unlikely to pose a risk to recreational craft and that any inconvenience is only temporary. Approximately 20% of recreational craft transmit an AIS signal and that most movements are in the five months from May to September
The Royal Yachting Association Northern Ireland (RYANI)	Consultation letter 14/07/2020 Response received 29/07/20	Cable installation projects rarely pose a risk to recreational craft and that any clear notifications through the likes of Notices to Mariners during the proposed works would ensure the best mitigation to allow recreational boaters to make informed decisions. There are no specific concerns for the landfall at Larne. There is a local club in Larne Lough, whose activity is mainly confined to the lough itself. Furthermore, there are no anchorages in the proposed Donaghadee area. Recreational activity does take place in the vicinity of Donaghadee Harbour, with a local club and small marina operating in the vicinity. The area proposed, south of Donaghadee is mainly used by recreational craft in transit.

## 1.6 Guidance and methodology

This report has been prepared in accordance with current guidance below:

- International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA) – MSC-MEPC.2/Circ.12/Rev.2

Whilst not necessarily directly applicable to telecommunications cables, consideration to linear cables in relation to offshore renewable structures has been considered using:

- Maritime and Coastguard Agency (MCA) MGN 543 (Merchant and Fishing) Safety of Navigation Offshore Renewable Energy Installations (OREIs) – Guidance on United Kingdom (UK) Navigational Practice, Safety and Emergency Response (MCA 2016) and industry best-practice
- Marine Guidance Note “Offshore Renewable Energy Installations (OREIs) - Guidance to Mariners operating in the vicinity of UK OREIs”
- Methodology for Assessing the Marine Navigational Safety Risks & Emergency Response of Offshore Renewable Energy Installations

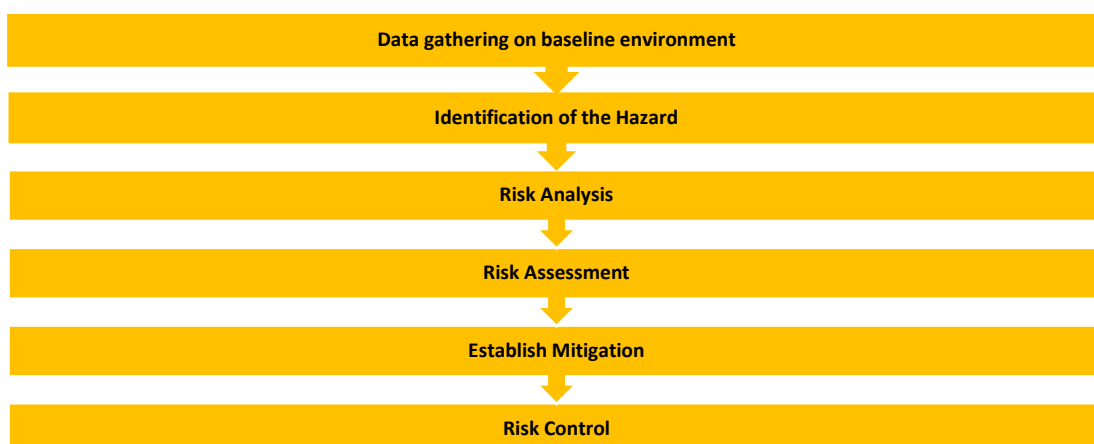
Where applicable, further consideration has been given to:

- Port Marine Safety Code (PMSC) (Dept. for Transport & Maritime and Coastguard Agency Nov 2016)
- Guide to Good Practice on Port Marine Operations (GtGP) (Dept. for Transport & Maritime and Coastguard Agency Feb 2018)

The assessment has been informed by the above guidance which states that the assessment stage should follow a clear progression; from the characterisation of the hazard, the risk that hazard has on, in the case of this assessment, the existing shipping baseline and the steps & risk controls that are in place to reduce the overall impact of the hazard to As Low As Reasonably Practicable (ALARP).

The assessment process involves the following main steps presented in **Figure 1-2**. In carrying out these assessments, Intertek has addressed, as far as reasonably possible, the construction phase of the Proposed Development.

**Figure 1-2 Assessment Steps**



For the purposes of this document the definition of “Hazard”, “Risk” and “Maximum Displacement” are detailed below.

- Hazard** - A potential source of marine incidences & collisions to the existing baseline of other marine users

- **Risk**- The probability of suffering harm, loss or displacement and is a measure of the probability and consequence of a hazard.
- **Maximum Displacement** – defined as the maximum number of vessels affected and duration of displacement during the installation operations, as a result of the installation operations.

The steps presented in **Figure 1-2** are described in more detail below.

### 1.6.2 Data gathering on baseline environment

To assess the potential effects resulting from the Proposed Development it is necessary to establish the current shipping conditions and features that exist along and near the Proposed Development. A 10km buffer is applied around the Proposed Development to ensure that all shipping patterns and navigational features are captured.

The analysis shall include:

- Potential accidents resulting from navigation activities (MIAB & RLNI)
- Navigation activities affected by the Proposed Development
- Proposed Development structures that could affect navigation activities, such as external protection installed on the seabed
- Proposed Development phases that could affect navigation activities
- Other structures and features that could affect navigation activities
- Vessel types involved in navigation activities
- Conditions affecting navigation activities
- Human actions related to navigation activities for use in hazard identification (if possible)

### 1.6.3 Identification of the hazard

The hazard identification phase seeks to build on the work of the data gathering and identify known hazards expected to be encountered as a result of the marine operations and presence of project vessels.

The hazards have been identified in relation to where the Proposed Development may make it more likely that existing vessels will deviate from the COLREGS, either as an intended or unintended action.

This may include any effects which the Proposed Development might have on existing vessels such as vessels giving appropriate clearance to cable operations when undertaking cable installation and obstruction to the light and sound signals made by vessels and navigational aids in particular circumstances.

The approach used for hazard identification comprises a combination of both creative and analytical techniques, the aim being to identify all relevant hazards. Where relevant, consultation has been undertaken with stakeholders to help to identify hazards. The creative element is to ensure that the process is proactive and not confined only to hazards that have materialized in the past.

## 1.6.4 Risk analysis

The risk analysis introduces the concept of risk in a qualitative way in order to prioritise the hazards identified during the hazard identification process, and assess their impact on navigational safety

Risk is the combination of frequency and consequence which are defined in **Table 1-5** and **1-6** below. The definitions below have been developed using the IMO guidelines which includes effects on human safety and ships, however this assessment also focuses on displacement of existing vessels and this is the most likely consequence of the proposed development.

**Table 1-5 Frequency of a hazard**

Value	Description	Definition
1	Extremely Remote	Likely to occur once in the lifetime of the project (25 years)
2	Remote	Likely to occur once per year
3	Probably	Likely to occur once per month
4	Very Probable	Likely to occur once per week
5	Frequent	Likely to occur once per day

**Table 1-6 Consequence of a hazard**

Value	Description	Definition		
		Effects on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
1	Minor	Single or minor injuries	Single local equipment damage	Temporal displacement of vessel (hours)
2	Significant	Multiple minor injuries	Multiple local equipment damage	Temporal displacement of vessel (days)
3	Severe	Multiple or severe injuries	Non-severe ship and equipment damage	Temporal displacement of vessel (weeks)
4	Serious	Single fatality or multiple severe injuries	Severe damage to ship and equipment	Temporal displacement of vessel (months)
5	Catastrophic	Multiple fatalities	Total loss of ship and equipment	Permanent displacement of vessels

Risk prioritisation is an important part of the process, the greater the potential of a hazard, the greater the need to ensure that there are mitigation measures in place to control the risk.

## 1.6.5 Risk assessment

IMO Guidelines above define a hazard as “something with the potential to cause harm, loss or injury” the realisation of which results in potential accidents and, in this case, vessel displacement. The potential for a hazard to be realised can be combined with an estimated (or known) consequence of outcome. This combination is termed “risk”. Risk is therefore a measure of the frequency and consequence of a hazard. One way to compare risk levels is to use a matrix approach.

Having established the frequency and consequence of the hazard, a risk assessment can be carried out using a risk matrix, adapted from the guidance above, presented in **Table 1-7**.

**Table 1-7 Risk Matrix**

		Consequence				
		Minor	Significant	Severe	Serious	Catastrophic
Frequency	Extremely Remote	1	2	3	4	5
	Remote	2	4	6	8	10
	Probably	3	6	9	12	15
	Very Probable	4	8	12	16	20
	Frequent	5	10	15	20	25

At the low end of the scale, frequency is extremely remote and consequence minor; risk can be said to be negligible. At the high end, where hazards are defined as frequent and the consequence catastrophic, then risk is intolerable.

The result of using this matrix approach is to ensure that the level of risk is reduced to ALARP for the effects that the Proposed Development has on the baseline shipping environment. This is undertaken prior to any mitigation. Best Practice and Project Specific Mitigation will then be applied to generally reduces the effects to ALARP.

Definitions of the risk levels are provided in **Table 1-8** below.

**Table 1-8 Definitions of risk levels with respect to vessel displacement**

Score	Classification	Definition
1-2	Negligible	A hazard which causes noticeable changes in the navigation environment but without effecting its sensitivities. Generally considered as insignificant.
3-4	Minor	A hazard that alters the character of the navigation environment in a manner that is consistent with existing baseline. Hazards are generally considered as minor and adequately controlled by best practice and legal controls. Opportunities to reduce hazards further through mitigation may be limited and are unlikely to be cost effective.
5-9	Moderate	A hazard which, by its frequency and consequence alters the aspect of the navigation environment. Generally considered as Moderate but effects are those, considered to be tolerable. However, it is expected that the hazard has been subject to feasible and cost-effective mitigation and has been reduced to As Low As Reasonably Practicable (ALARP) and that no further measures are feasible.
10-14	Major	An effect which, by its frequency and consequence alters most of the aspects of the navigation environment. Generally regarded as unacceptable prior to any mitigation measures being considered.
15-25	Intolerable	Regarded as unacceptable prior to any mitigation measures being considered.

### 1.6.6 Establish mitigation

The risk assessment includes a review of existing hazards and their associated mitigation measures. As a result, new mitigation measures (or changes to existing mitigation measures) may be identified for consideration, both where there are gaps in existing procedures and where mitigation need to be enhanced.

Care should be taken to ensure that any new hazards created as a result are themselves identified and managed. The overall risk to the existing baseline during this stage will allow recommendations to be made to enhance safety.

Mitigation measures are the actions or systems proposed to manage or reduce the potential negative effects identified. Mitigation measures are sometimes confused with measures taken to ensure legal compliance, which can be similar. Legislation is often designed to ensure effects to the environment are minimised.

A standard hierarchical approach to identifying mitigation requirements has been used to inform the NRA:

- **Avoid or Prevent:** In the first instance, mitigation should seek to avoid or prevent the adverse effect at source for example, by routing the marine cables away from a hazard.
- **Reduce:** If the effect is unavoidable, mitigation measures should be implemented which seek to reduce the significance of the hazard.
- **Offset:** If the hazard can neither be avoided nor reduced, mitigation should seek to offset the hazard through the implementation of compensatory mitigation.

Mitigation measures fall into two categories: mitigation which forms part of the Proposed Development design which are referred to as **Best Practice Mitigation**; and mitigation which is part of the construction of the Proposed Development, which is referred to as **Project Specific Mitigation**.

### 1.6.7 Risk control

The aim of assessing the Proposed Development operations on the existing shipping baseline is to reduce risk As Low As Reasonably Practicable (ALARP).

The risk assessment is repeated taking into consideration the application of Best Practice and Project Specific Mitigation. This determines the risk level of the hazard with mitigation applied. When the risk assessment is carried out after mitigation is applied, the resulting risk level is referred to as ALARP.

Risks that have been assessed as **Major** or above after considering mitigation will normally require additional analysis and consultation to discuss and possibly further mitigate hazards where possible. Where further mitigation is not possible a residual hazard may remain.

## 2. PROJECT DESCRIPTION

### 2.1 Installation overview

#### SCOT-NI-3

The SCOT-NI-3 submarine cable has a total length of approximately 42km and links Portpatrick, Scotland to Donaghdee, Northern Ireland.

A route clearance and Pre-Lay Grapnel run (PLGR) will be carried out along the marine section of the route prior to any installation works.

Cable installation works will commence at the Donaghdee, Northern Ireland, landfall, the cable will be floated ashore from the Main Lay Vessel (MLV) into an existing Beach Manhole (BMH). Between the BMH and Low Water Mark (LWM) the cable will be buried to a target depth of 2.0m below the seabed by means of a cable trench.

Seaward of the LWM, the cable will be buried to a depth of 1.0m by simultaneously lay and burial by plough before reaching the other landfall, where shore end pull in and burial will finalise the cable installation at Portpatrick, Scotland.

#### SCOT-NI-4

The SCOT-NI-4 submarine cable has a total length of approximately 85km and links Girvan, Scotland to Larne, Northern Ireland

A route clearance and Pre-Lay Grapnel run (PLGR) will be carried out along the marine section of the route prior to any installation works.

Cable installation works will commence at the Larne, Northern Ireland, landfall, the cable will be floated ashore from the Main Lay Vessel (MLV) into an existing Beach Manhole. Between the BMH and Low Water Mark (LWM) the cable will be buried to a target depth of 2.0m below the seabed by means of a cable trench.

Seaward of the LWM, the cable will be buried to a depth of 1.0m by simultaneously lay and burial by plough before reaching the other landfall, where shore end pull in and burial will finalise the cable installation at Girvan, Scotland.

#### Post lay inspection and burial (PLIB)

Where cable burial by plough is not practical (shallow waters) and where the cable is surface laid at known crossing locations then cable may be subject to Post Lay Inspection and Burial (PLIB) by jet trenching.

#### Cable lifetime

Following installation, the cable is expected to be operational for at least 25 years.

### 2.2 Subsea route development

The marine cable route and project design are developed and refined through two main stages:

- Marine cable route study (ref 6) – detailed review of all factors affecting the routing of the cable, including physical, environmental, socioeconomic, and regulatory aspects; and
- Marine cable route survey – surveys of the inshore and offshore sections of the route.

A cable route study was produced to inform pre-survey route planning and marine cable route survey. It provides comprehensive and accurate information for cable engineering, system installation and identification of constraints during the 25-year design life of the SCOT-NI Cable Routes.

Global Marine achieve this using customised GIS technology known as GeoCable™. The combination of all information sources into one system provides a clear picture of the locations and combinations of risks to the cable and the options available to avoid or mitigate the risk. Alternatively, routing of cables into areas likely to maximise protection through burial can also be considered. Final planning using MakaiPlan™ allows accurate infill slack values to be inserted into the Rout Position List (RPL), based on the expected morphology of the seabed to improve cable lay planning (ref 6).

The primary rationale for cable route engineering is to avoid areas likely to pose a threat to system security. Shipping and fishing density are considered when determining the threats to system security, and high-density areas such as shipping lanes have been avoided. Sometimes risks cannot be avoided due to the additional cable length required resulting in excessive cost, or other constraints present which take priority. In these cases, the route normally seeks areas conducive to burial as the primary protection measure or an increase in armouring protection is specified if within deployment depth limitations. Where neither is possible the route usually tries to limit the length of cable over which the risk is present (ref 6).

Existing BMH's which service SCOT-NI-1 & 2 has been a key factor in selecting the final landing points from the sites located during the site visit, to minimize the relatively expensive and disruptive terrestrial works. There is a suite of secondary ducts on both existing cables to the beach and from the BMH to the terminal station (ref 6).

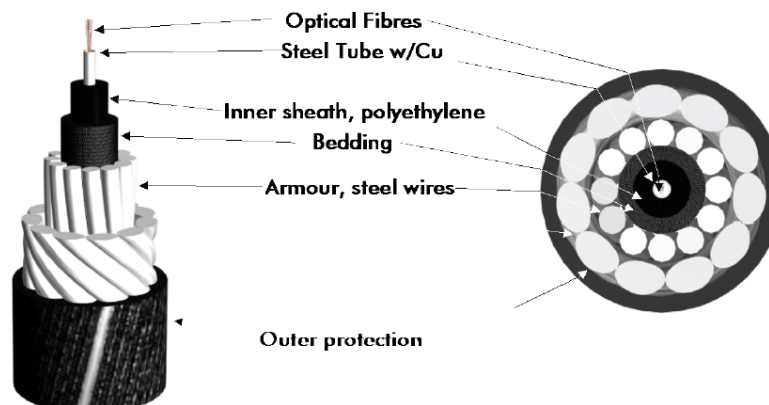
Survey data has been acquired across a 500m wide survey corridor. The marine cable route has been engineered where appropriate to avoid potential hazards, reduce impact to sensitive seabed habitats and users such as disruption to marine resources and operations, and secure long-term protection of the cable. The finalisation of the route followed consultation with key stakeholders and the results of detailed marine surveys carried out between April and June 2020.

## 2.3 Subsea fibre optic cable

The cable types to be used for Scot-NI 3 and 4 are armoured fibre optic cables, which are a resilient cable type suitable for installation within the Irish Sea (Figure 2-1). The cable system will be an 'unrepeated system' (a cable system with no power supply to the cable due to the short overall length). The cable itself is between 25mm (single armour) and up to 46mm (rock armour) in diameter, depending on the level of cable armouring required. The optical fibres are contained within a gel filled stainless steel tube. This is surrounded by a polyethylene insulation layer. The construction of this core provides protection against water penetration and hydrogen. The core is further protected by layers of steel wire and an outer polypropylene yarn.

The main design function of the cable is to protect the optical fibre transmission path over the entire service life of the system, including laying, burial, and recovery operations.

**Figure 2-1 Example of double armour fibre optic cable**



## 2.4 Project schedule

### 2.4.1 SCOT-NI-4 and SCOT-NI-3 cable routes

Cable installation/route preparation for the relevant routes are scheduled to commence in the 3rd quarter 2021 and be complete by the end of the year. Following installation, the cables are expected to be in service and operational for at least 25-years.

The exact timing of the landfall works will be dependent upon the offshore works, marine licensing and onshore permits and conditions. One mobilisation for both cable installations is planned.

A high-level indicative summary of the installation schedule is detailed in **Table 2-1** below. This is subject to change and does not take into account weather down time or other unforeseen events.

**Table 2-1 Planned cable installation schedule**

Installation activity	Estimated timescale SCOT-NI-3 Route	Estimated timescale SCOT-NI-4 Route	Comments
Pre-installation works Route clearance and PLGR	1-2 days	2-3 days	RC/PLGR operation to be completed in September 2021 prior to cable installation
Pre-installation ROV survey	2 days	4 days	N/A
Offshore installation, Simultaneous lay and burial by plough.	3-4 days	7-8 days	N/A
Offshore installation, post-lay inspection and burial (PLIB)	3-4 days	7-8 days	PLIB at locations where plough burial was not performed such as crossing existing infrastructure and in shallow waters (less than 13m WD)
Offshore installation, Surface lay	1 day	0.5 days	Where conditions are unsuitable for simultaneous lay and burial by plough
External protection material at cable crossings (if applicable)	1-2 days per crossing	1-2 days per crossing	Pre-lay rock placement a possibility as some crossings.
Surface lay at cable crossings	0.5 days per crossing	0.5 days per crossing	N/A
Shore-end tie-in and burial between LWM & BMH	1 days for cable pull in and up to 4 days post lay burial nearshore	1 days for cable pull in and up to 4 days post lay burial nearshore	To start and follow the offshore cable installation.

## 3. MARINE CAMPAIGN WORKS

This section describes the offshore Marine Campaign works that are being carried for the installation, of the SCOT-NI-3 & 4 cable routes.

### 3.1 Pre-installation works

#### 3.1.1 Route clearance

Prior to the start of marine cable installation, it is essential to ensure the cable route is clear of debris or obstructions that may hinder the installation works.

##### 3.1.1.1 PLGR

A pre-lay grapnel will be towed along the cable routes to clear any seabed debris and to prepare the route centreline for cable installation. It is typically carried out a few days before cable installation. This can be undertaken by the main lay vessel, or by a separate PLGR vessel of a suitable size to manage the tensions and any debris recovery operations.

PLGR speeds are typically up to 1500m/hour (36km per day), but rates may decrease depending on how much debris needs to be cleared across the SCOT-NI Routes.

##### 3.1.1.2 Out of Service (OOS) cable removal

Out of Service (OOS) cables have been identified during the Desk Top Study on the route and verified during survey operations. These will be cleared and made safe in accordance with ICPC recommendations. Prior to installation activities commencing, the vessel will move to position of each OOS cable, deploy the grapnel/ROV and start recovery and clearance activities.

Route clearance operations shall include cutting existing Out of Service (OOS) cable, recovering the parted cable ends, streaming each parted end back along the original OOS cable and then lowering each OOS cable end to the seabed using a slip line. This procedure for clearing the OOS cable is intended to ensure a clear passage for the burial operation and to minimize the chances of the OOS cable being fouled or hooked by other seabed users. Chain or clump weights will be used as cable end anchors to secure cable ends in place and minimize risk of fastening to fishing gear, in accordance with International Cable Protection Committee (ICPC) recommendations – No.1 (ref 9).

Route clearance operations will run along the proposed centre line of the cable. In the event that the charted OOS cable is not found at the specified crossing location, additional crossing lines may be undertaken, and a de-trenching grapnel used.

As with PLGR operations, a range of cable recovery tools will be available for use, typically, Flatfish cutting grapnel, de-trencher and Gifford, together with the necessary rigging equipment.

In summary, route clearance operations shall include:

- Cutting the existing OOS cable at the cable route intersection;
- Recovering each end of the cut cable;
- Weighting the cable ends with clump weights or chain; and
- Lowering the weighted end to the seabed on slip ropes and laying each end back on the original OOS cable route.

##### 3.1.1.3 Route clearance contingencies

Following detailed engineering and findings from the Marine Route Survey further route preparation operations and micro-rerouting maybe required. There is currently no plan for any boulder re-positioning activity on either the Scot-NI 3 or Scot-NI 4 cable routes however, it may be necessary to

re-locate a limited number of targeted boulders from the cable route to allow adequate burial to be achieved during cable installation. If required, this will be undertaken using a crane on the MLV or ancillary support vessel to lift and relocate a boulder to a new position – and will simply be a minor relocation to move the obstruction from the line of the cable route and boulders will not be removed from the seabed. Boulder picking is typically conducted via a grab and can operate in currents up to 3 knots

## 3.2 Cable lay and installation

The areas of highest vessel traffic are associated with the Port of Larne, Belfast and Bangor which are placed outside of the SCOT-NI Routes, however the Larne anchorage is in fairly close proximity (2.5km) to the SCOT-NI-4 Route and but marine operation are not thought to have an impact on the anchorage there.

For the SCOT-NI-3 Route, it is expected that the maximum displacement of existing vessels during the project lifetime will occur while carrying out the cable installation in the shipping lanes associated with ferry crossings (identified in Section 3.1.3), leading out of Belfast and Larne Port and between KP36 and KP40 where recreational shipping is present.

For the SCOT-NI-4 Route, it is expected that maximum displacement of existing vessels will occur during cable installation in the areas that are heavily fished, between KP5 and KP30.

As a worst case the maximum area for disruption would be 3.75km wide by 36km long per 24-hour period.

Fishermen would be requested to clear grounds ahead of the vessel. Depending on the sediment type and the estimated rate of progression the amount of time they would need to be out of an area will vary.

All project vessels will display the required navigational lights and signals. Notice will be given to sea users in the area via Notices to Mariners, Kingfisher Bulletins and navigational warnings broadcast by VHF/NAVTEX. Attention will be paid to ensuring the following organisations receive the notifications:

- Maritime and Coastguard Agency (MCA),
- Local mariners and fishermen's organisations
- UK Hydrographic Office (UKHO)
- HM Coastguard
- Marine Scotland
- DAERA

Procedures to minimise disruption near high density shipping areas will include, for example, avoidance of anchoring near busy areas when project vessels are waiting on weather. Installation vessels will have passage planning procedures, holding positions (e.g. if waiting on weather), traffic monitoring (e.g. radar, AIS, and visual), means of communication with third-party vessels, and emergency response plans in the event a third-party vessel approaches on a collision course.

These restrictions may cause disruption to shipping activity in the area by requiring alteration of planned/designated routes, such as those to/from the Larne. This will apply to both commercial shipping (e.g. freighters, tankers, passenger vessels) and non-commercial vessels (e.g. recreational craft and fishing vessels).

It is expected that the maximum displacement that will occur during cable installation in the shipping lanes, identified between KP20 to KP25 and KP30 to KP35 for SCOT-NI-3 and between KP10 to KP30 for SCOT-NI-4, is where that area is consistently fished.

### 3.2.1 Installation vessels

The cable lay operation will be undertaken on a 24-hour basis. It is anticipated that the following vessels could be required for cable installation, however it is unlikely that all vessels described below will be required at once:

- DP2 Main lay and burial vessel (MLV) – undertakes cable lay and burial
- Ancillary support vessel – a dedicated ancillary vessel to assist the MLV
- Tug(s) - A tug may be required to support the MLV and/or the Ancillary support vessel due to the high currents that may be experienced across the work site.
- Shore end support vessels - e.g. RIBS – will support the lay and burial vessel during cable pull-in operations and possibly some cable lay/burial;
- Guard vessel(s) can be used to protect areas of exposed cable and could be used in support of the cable ship which will have limited manoeuvrability. The vessels are typically small to increase manoeuvrability around the larger vessels during sensitive operations. Suitably experienced fishing vessels (locally based or sourced through a guard vessel supplier) can be used in this role; and;
- Rock placement vessel - No rock protection has been proposed for the Project. However, a rock placement vessel is included as a potential contingency (dependant on the outcome of 3rd party crossing agreements).

### 3.2.2 Cable lay techniques

The installation techniques being considered for the Proposed Development are:

- Simultaneous lay and burial by plough – in this operation the vessel will tow the burial equipment creating effectively a single large installation spread. The cables are fed into the plough directly and the cables are buried as the vessel progresses along the route.
- Surface Lay - Where conditions are unsuitable for plough burial, the cable will be surface laid. This could be where the seabed is rocky, in areas of hard seabed where plough burial is not achievable and at the crossing locations

The sea surface footprint of a cable installation spread will incorporate that of the “vessels restriction in its ability to manoeuvre”. Typically, a large cable installation vessel will be up to 150m in length and other vessels will be requested to remain a “safe” distance from the operation, typically 1 nautical mile (NM).

Cable installation operations will be performed on a 24-hour basis to maximise efficient use of suitable weather conditions and vessel and equipment time; and minimise the presence of the cable lay spread in navigation channels, fishing grounds or other sensitive areas.

### 3.2.3 Cable lay and burial progress rates

The temporal effect of the spread will be dependent on the slowest moving element, usually the cable burial spread. Base case progress rates for straight line fibre optic cable laying without allowance for operational delays or stoppages would be in the order of:

**Simultaneous lay & burial by plough – 600 m/hr**

**Surface Lay where plough is not feasible – 2000m/hr**

The base case progress rates above would be reduced in practice once operational constraints are factored in for lay initiation, cable end laydown, seabed conditions, weather delays, tidal current delays, alter courses, cable crossings, micro-routing around obstructions etc.

In general cable laying around alter course positions and in proximity to physical obstructions and features such as navigation marks will require little if any speed reduction.

As a worst case (in relation to maximum area for disruption) a cable plough could progress at approximately 600m/hour (14.4km per day). However, realistic speeds dependent on soil conditions, are more usually ~12km/day. Existing vessels will be requested to remain at least 1NM from project vessels whilst they are engaged in cable installation activities. This is due to the cable lay vessel's limited ability to manoeuvre whilst undertaking operations.

**Therefore, as a worst case the maximum area for disruption would be 3.7km wide by 14.4km long per 24-hour period. The more likely area would be 3.7km wide and ~12km long per 24-hour period.**

### 3.2.4 Cable crossings external protection

Standard procedures for a telecom cable crossing an existing asset is for it to be surface laid across the asset over an agreed 'no trenching zone' and a cable protection sleeve such as Uraduct shall be applied. Protection measures, such as rock, are to be considered if requested by third party asset owners, or if risk to cable/safety is perceived.

If external protection is required, it is usually carried out by a specialist vessel in addition to the MLV. There are 7 cable crossings (2 on SCOT-NI-3 and 5 on SCOT-NI-4, with 2 crossings co-located) across the SCOT-NI Routes which may require external protection.

External cable protection may be used as a contingency measure (most likely to be used at the 2 Western Link power crossings or Scot-NI 3 and Scot-NI 4). Standard fibre-optic crossings use a cable protection sleeve such as Uraduct which is post-lay buried.

**Cable Crossing progress rates – 1-2 Crossings per day.**

The exclusion area surrounding the vessel engaged in crossing installation and cable protection is up to 1NM (1852m), however the exclusion area will be almost stationary at the crossing location during this period.

### 3.2.5 Cable crossings surface lay

Where cable crossings do not require external protection or any pre-lay medium then the plough will be recovered to the vessel and cable surface laid (typically for 500m) across the crossing.

**Plough and equipment recovery and deployment at crossing location – 3-4 hours**

**Surface lay progress rates 2000m/hr. The exclusion area surrounding the vessel is the same as for plough burial, except the progress rates are quicker, reducing potential disruption timescales.**

#### 3.2.5.1 Post-Lay inspection and Burial (PLIB)

PLIB will be carried out at existing infrastructure crossings and where plough burial was not performed. A Burial Assessment Study (BAS) is yet to be carried out, however, based on internal review of preliminary survey information GM anticipate the that:

- SCOT-NI-4 will have 23km of surface lay and
- SCOT-NI-3 of surface lay 7km.

The main lay vessel will carry out the PLIB operations and will be equipped with a remotely operated vehicle (ROV) to bury sections of cable which cannot be buried by the plough (i.e. at cable crossings). It will also bury final splice operations at any joint and branching unit locations

**PLB (Post Lay Burial) progress rate - 200m/hr.**

**PLI (Post Lay Inspection) progress rate - 400m/hr and**

**Burial operations between MLW to MLV – 2 to 4 days at each landing. The exclusion zone surrounding the MLV is assumed to be the same as for other installation operations at worst case.**

### 3.2.6 Cable pull in/shore landing

The preferred and most common type of Shore End is a Direct Landing. The vessel takes station and floats the cable to the beach. When the shore team are satisfied the vessel then commences the main lay to sea.

The cable installation vessel will effectively be immobile during the cable pull in and may require the use of guard vessels to direct existing vessel traffic around the operations, as shown in **Figure 3-1**.

As a worse case, and including factors such as weather, cable pull in operations may take up to 2 days. Four cable pull ins are planned for the SCOT-NI Cable routes:

- SCOT-NI-3 – Donaghdee, Northern Ireland
- SCOT-NI-3 – Portpatrick, Scotland
- SCOT-NI-4 – Larne, Northern Ireland
- SCOT-NI-4 – Girvan, Scotland

**Figure 3-1 Example of cable pull-in operations**



**Cable Pull in Progress Rates – 1 day per landfall**

### 3.2.7 Proposed Integral cable protection

Where the proposed cables cross existing power and telecoms cables, high density polyethylene protection (HPDE) Uraduct® a synthetic material will be fitted to the cable as integral protection. Uraduct® is a well-established anti- abrasive method of cable protection which will be applied 50m either side of the in-service cable crossings (100m in total per crossing). This will provide separation between the installed cable and existing asset. Once installed the Uraduct ® is approximately 94mm in diameter. Post lay burial will be undertaken to bury the cable to a target depth of 1m if possible following surface lay, subject to the burial status of the crossed assets.

Articulated pipe (AP) will be fitted from the end of the BMH duct to the 10m water depth contour. The maximum external diameter will be approximately 150mm. The length of installed AP may have to be extended beyond the 10m contour in the event that seabed conditions prevent/ limit burial. The AP will provide additional protection and stability to the cable in areas where it may move during storm conditions.

### 3.2.8 Contingency external cable protection/stabilisation

In areas where cable burial is not possible due to seabed conditions, remedial protection may be required to help protect both the cable and other seabed users. This following section details what measures may be required to achieve this.

#### Rock bags

Rock bags are typically installed on top of the cable and are sized to suit each scenario. As the current velocities rarely exceed 1m/sec across the proposed Scot NI 3 and 4 cable routes, the expected rock bags will be a maximum of 4Te.

The size and weight of the rock bags will ultimately be dependent on the findings of the CBRA and post installation survey results.

#### Rock berms

Rock placement may be a contingency cable protection required at cable crossings to provide additional protection to existing assets. No rock placement is currently planned, however, may be required subject to crossing agreements (currently being discussed).

In the event of cable suspensions occurring along the route, rock may be placed instead of or in addition to rock bags to help mitigate these suspensions. The requirement for such mitigation will only be known following post installation ROV survey operations.

#### Mattresses

Mattresses are typically installed on top of a cable to reduce the effects of scour and to increase protection above an asset where burial is not achieved. Mattresses are also often used as a pre lay (and possibly post lay) medium at crossing locations.

## 3.3 Change in water depth

In the event rock berms are used for the purposes of additional external cable protection, they will generally be up to 1 to 2 m high. The UK Maritime and Coastguard Agency (MCA) require that any contingency cable protection works must ensure existing and future safe navigation is not compromised. Generally, they are prepared to accept a maximum of 5% reduction in surrounding depth referenced to chart datum (CD) if the depth reductions do not compromise safe navigation. However, the presence of the rock berm in water depths less than 40m has the potential to change the chart datum by more than 5%.

At this moment in time there are no planned rock berms at the crossing locations, however, as a worse case, if a 2m rock berm is assumed at each crossing location none of the crossing positions exceed the 5% MCA requirement.

No external protection is currently proposed for the SCOT-NI- cable routes.

**Table 3-1** lists out the crossing locations and highlights the change in water depth as a result of placing a 2m rock berm on the seabed.

**Table 3-1 Potential Rock Berms at Crossing Locations (Assuming Worse Case)**

Cable Section	Crossing	Water Depth (m)	Pre-Lay Rock Berm height (m)	Post-Lay Rock Berm height (m)	Rock Berm Installation tolerance (m)	Total Height (m)	Change in water depth (%)
SCOT-NI-3	Western HVDC Link	147	+0.5	+1.0	+0.5	2.0	1.3
	Hibernia Atlantic	134	+0.5	+1.0	+0.5	2.0	1.5

Cable Section	Crossing	Water Depth (m)	Pre-Lay Rock Berm height (m)	Post-Lay Rock Berm height (m)	Rock Berm Installation tolerance (m)	Total Height (m)	Change in water depth (%)
SCOT-NI-4	Lanis	50	+0.5	+1.0	+0.5	2.0	4
	SCOT-NI-2	50	+0.5	+1.0	+0.5	2.0	4
	Sirius North	60	+0.5	+1.0	+0.5	2.0	3.3
	Western HVDC Link	59	+0.5	+1.0	+0.5	2.0	3.4
	Hibernia Atlantic	130	+0.5	+1.0	+0.5	2.0	1.5

## 4. EXISING BASELINE DESCRIPTION

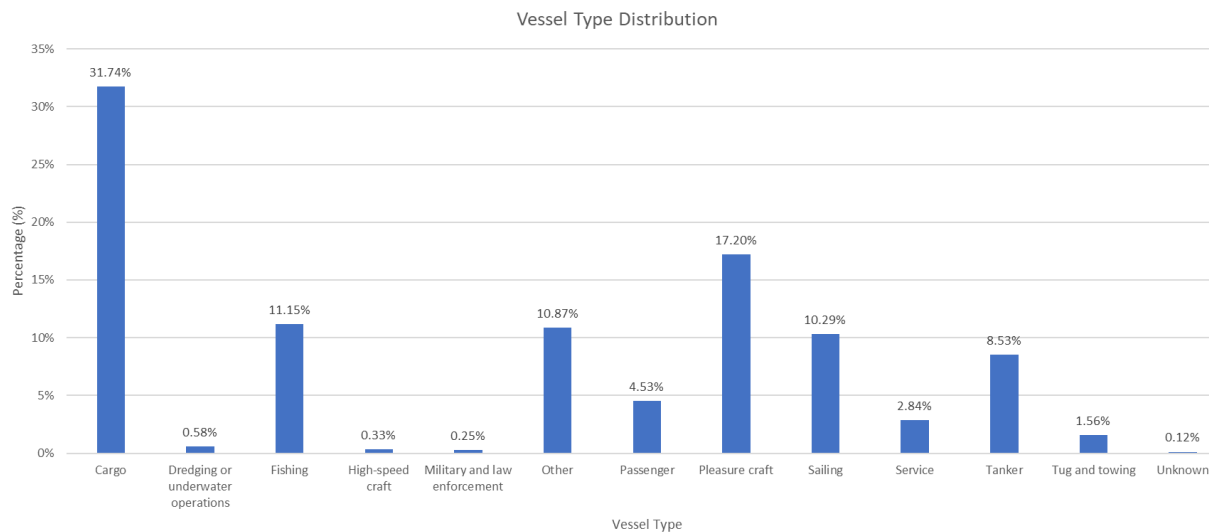
### 4.1 SCOT-NI-3 Route

#### 4.1.1 Shipping Overview

12 months of AIS data from Jan to December 2019 (ref. 1) were analysed to examine the types of shipping occurring near the SCOT-NI-3 cable route and the typical patterns of vessel activity.

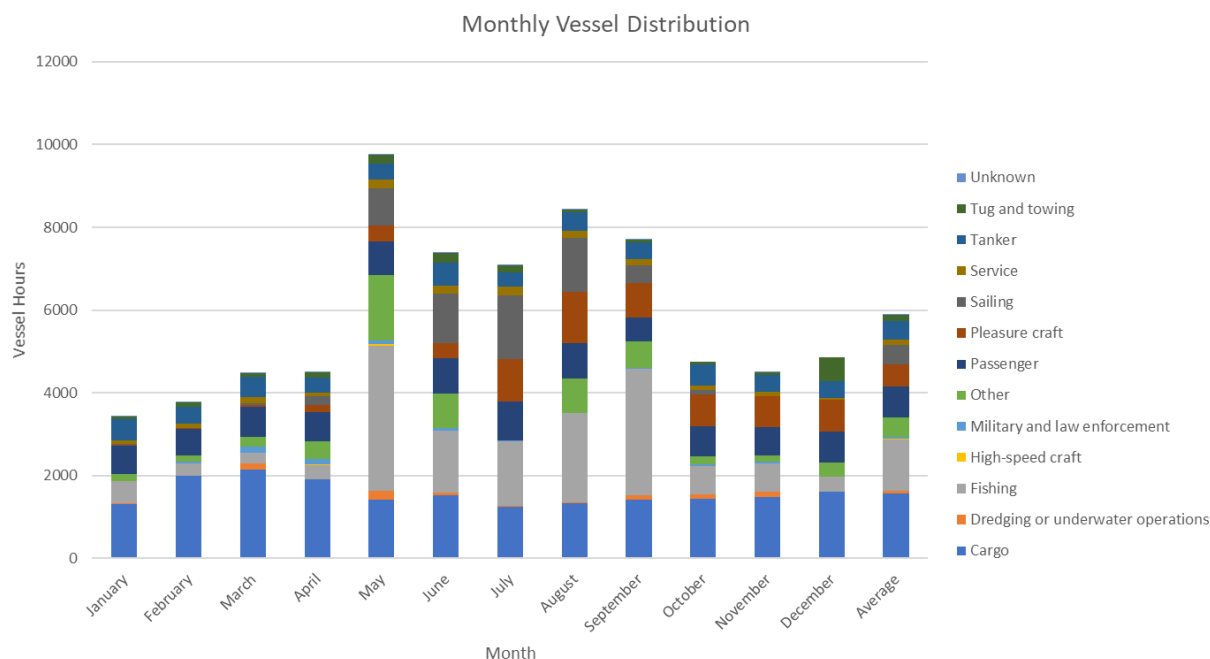
A total vessel density of 31670 hours per month were recorded across the SCOT-NI-3 route in 2019. The percentages of the vessel categories are presented in **Figure 4-1**. Fishing vessels make up 11% of the data while Cargo vessels make 31%. The percentage of fishing vessels are a lot lower across the SCOT-NI-3 route than SCOT-NI-4.

**Figure 4-1 Vessel Distribution Across SCOT-NI-3 Route**



Seasonal distribution of the vessel traffic has been analysed in full and the busiest months are observed in from May to September. It should be noted that in August there is an abundance of 'Other' vessels while the previous month, July, has none. This may indicate an anomaly in the AIS data sourced publicly from EMODnet. No other anomalies have been observed in this data. **Figure 4-2** highlights the seasonal changes.

**Figure 4-2 Seasonality Changes in Vessel Traffic Across SCOT-NI-3 Route**

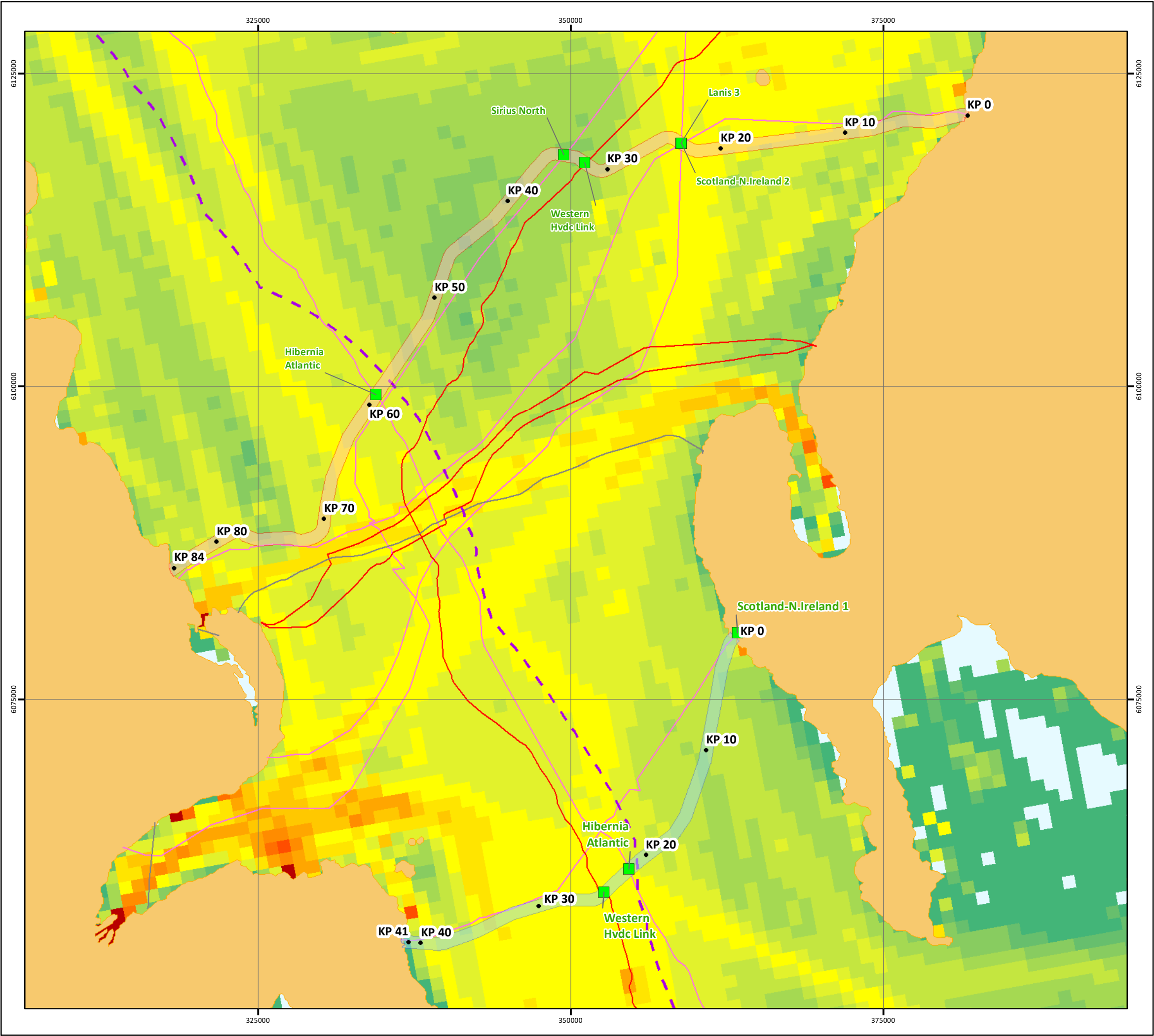


The vessel density across the SCO-NI-3 Route is generally Low and between 5 and 10 vhp. Low to medium (5-10 vhp) AIS intensities are also observed and largely confined to the Irish territorial waters (from KP20 to KP40) where patterns in vessel traffic can be correlated with Belfast port and shipping lanes leading out from the port to the south east.

From KP0 to ~KP20 the vessel traffic density is very low (0-5 vhp) where vessel traffic isn't associate with shipping lanes and is away from Belfast ports.

The SCOT-NI-3 Route crosses two undesigned shipping lanes which lead in and out of Belfast port at approximately KP20 to KP25 and KP30 to KP35.

**Figure 4-3** (P2302-SHIP-014-A) highlights the shipping patterns (monthly) across the SOCT-NI-3 Route. Also annotated on the figure are the third-party crossing locations.



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

AIS VESSEL DENSITY - SCOT-NI3 & 4  
Average Monthly Vessel Density  
All Vessels

Drawing No: P2302-SHIP-014

A

Legend

- KP
- Crossing Location
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- - Scotland/Northern Ireland Adjacent Waters Limit

Pipeline

— Active

Cable

- Power
- Telecom

2019 Vessel Density

Vessel Hours (per km²)

- 0
- < 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- 100 - 200
- 200 - 500
- > 500



NOTE: Not to be used for Navigation

Date	16 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	EMODnet; GEBCO; ESRI; OGA; KISCA; Marine Regions
File Reference	J:\P2302\Mxd\08_SHIP\ P2302-SHIP-014.mxd
Created By	Chris Carroll
Reviewed By	Chris Dawe
Approved By	Paula Daglish



0 2.5 5 7.5 10 km

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#### 4.1.2 Navigational Features and Anchorages

There are a number of navigational features in the vicinity of the submarine cable route and within the study area associated with navigation buoys, wrecks, obstructions and subsea cables. All of these features have been avoided, or the distance minimised through, during the route selection and development process.

There are two marinas, one in Donaghdee (Copelands Mariner), Ireland and one in Portpatrick, Scotland. These are approximately 2km and 1km from the route corridor and are associated with areas of very high vessel density seen in the EMODNET data. The routes have avoided these areas in the route selection process.

While the port of Belfast and Bangor Marina are over 25km and 10km away and outside the study area, most high-density vessel traffic is associated with vessels entering and exiting the port and marina. Belfast and Larne ports are also associated with passenger ferry routes, which are included in the EMODNET dataset. The following ferry routes are crossed by the SCOT-NI-3 route:

- Belfast to Liverpool
- Belfast to Douglas
- Larne to Fleetwood

There are two cable crossings on the SCOT-NI-3 Route, these are as follows:

- Western Link HVDC cable and;
- Hibernia Atlantic Telecom Cable

No other navigational features have been identified on the admiralty charts within the vicinity of the cable route

No designated anchorage areas are present

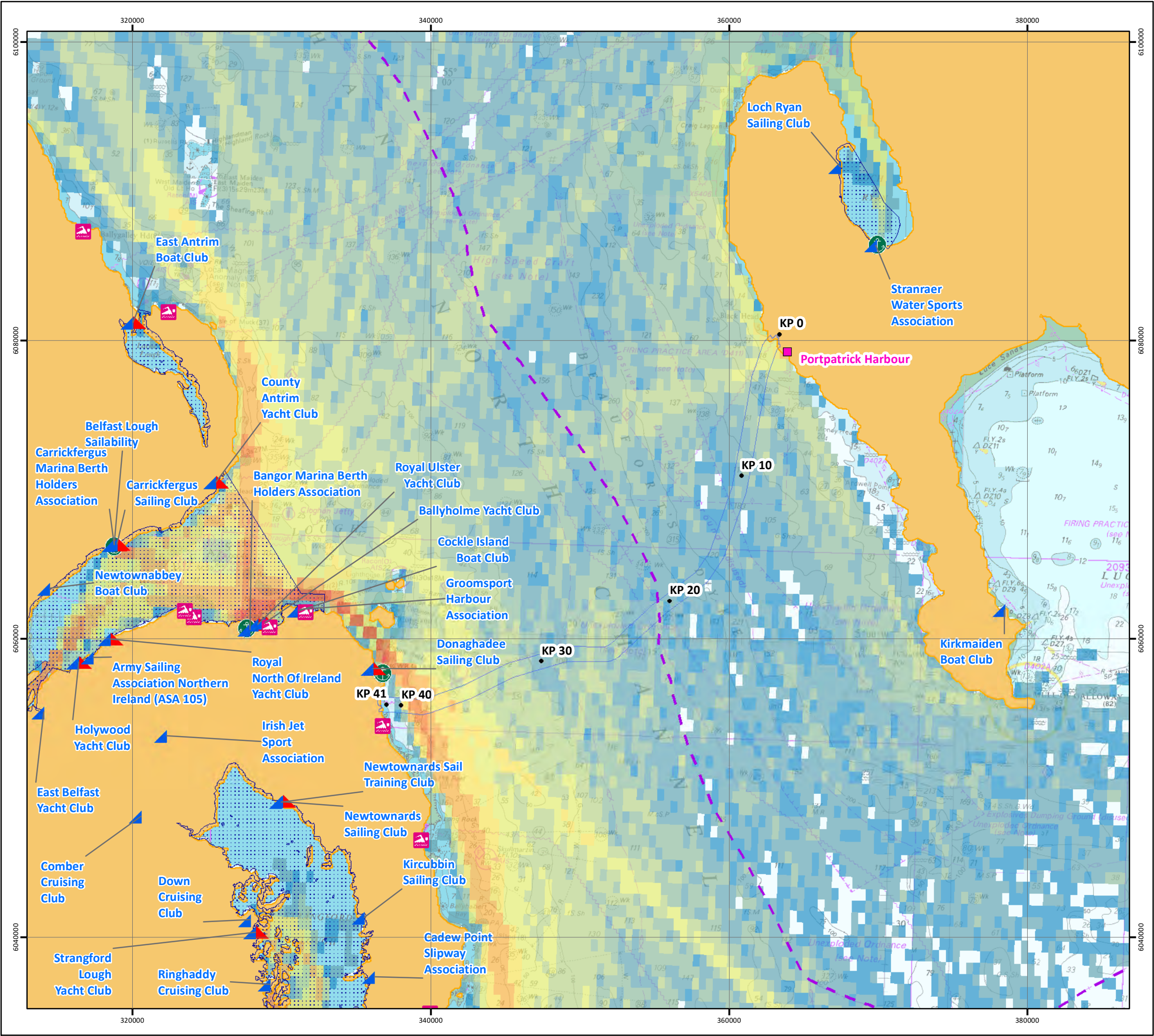
Aggregate extraction sites and dumping grounds have been avoided in the during the route selection process.

#### 4.1.3 Royal Yachting Association (RYA)

RYA clubs, training centres, marinas as well as the RYA AIS data are illustrated in **Figure 4-4** (P2302-3-REC-001-A). The figure also presents a heat map of the recreation boating activity across the SCOT-NI-3 Route. There is one marina, one RYA training centre and one RYA club associated with Copelands Marina (Donaghdee)

The RYA AIS intensity is Low to Moderate across the SCOT-NI Route with the high-density areas confined to the Irish coastline, from KP36 to KP40, with the highest intensity extending down from Bangor Marina. There are some areas of moderate AIS intensity on the Scotland side, associated with Portpatrick and along the coastline

Due to the higher levels of AIS intensity from KP36 to KP40 across the SCOT-NI-3 Route, it has been assessed that there is likely to be some interaction between recreational vessels during the survey, and installation campaigns.



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES  
RECREATION - SCOT-NI3  
Designated Bathing Waters and  
Royal Yachting Association Recreational Boating

Drawing No: P2302-3-REC-001

A

Legend

• KP

SCOT-NI3 Proposed Cable Corridor

Scotland/Northern Ireland Adjacent Waters Limit

Portpatrick Harbour

Designated Bathing Water

**RYA UK Coastal Atlas of Recreational Boating**

RYA Club

RYA Training Centre

Marina

General Boating Area

**AIS Intensity (Recreational Yachting)**

Intensity

Low

High

NOTE: Not to be used for Navigation

Date	16 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	RYA; EEA; ESRI; GEBCO; MarineFind
File Reference	J:\P2302\Mxd\09_REC\ P2302-3-REC-001.mxd
Created By	Chris Dawe
Reviewed By	Chris Carroll
Approved By	Paula Daglish

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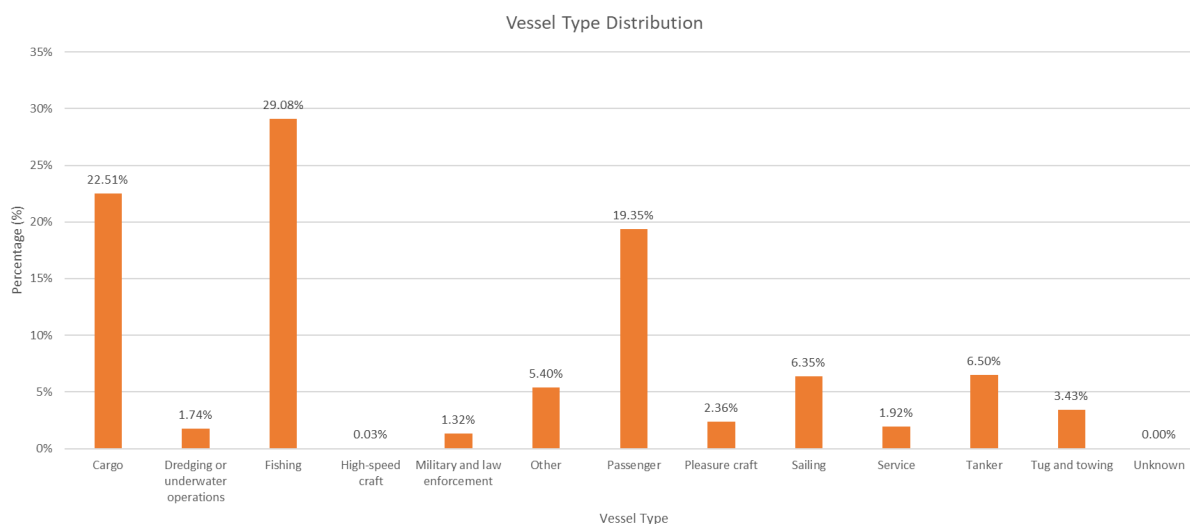
## 4.2 SCOT-NI-4 Route

### 4.2.1 Shipping Overview

12 months of AIS data from Jan to December 2019 (ref. 1) were analysed to examine the types of shipping occurring near the proposed submarine cable routes and the typical patterns of vessel activity.

A total vessel density of 42239 hours per month were recorded across the SCOT-NI 4 Route in 2019. The percentages of the vessel categories are presented in **Figure 4-5**. Cargo, Fishing and passenger vessels make up most of the dataset (22%, 29% & 19% respectively).

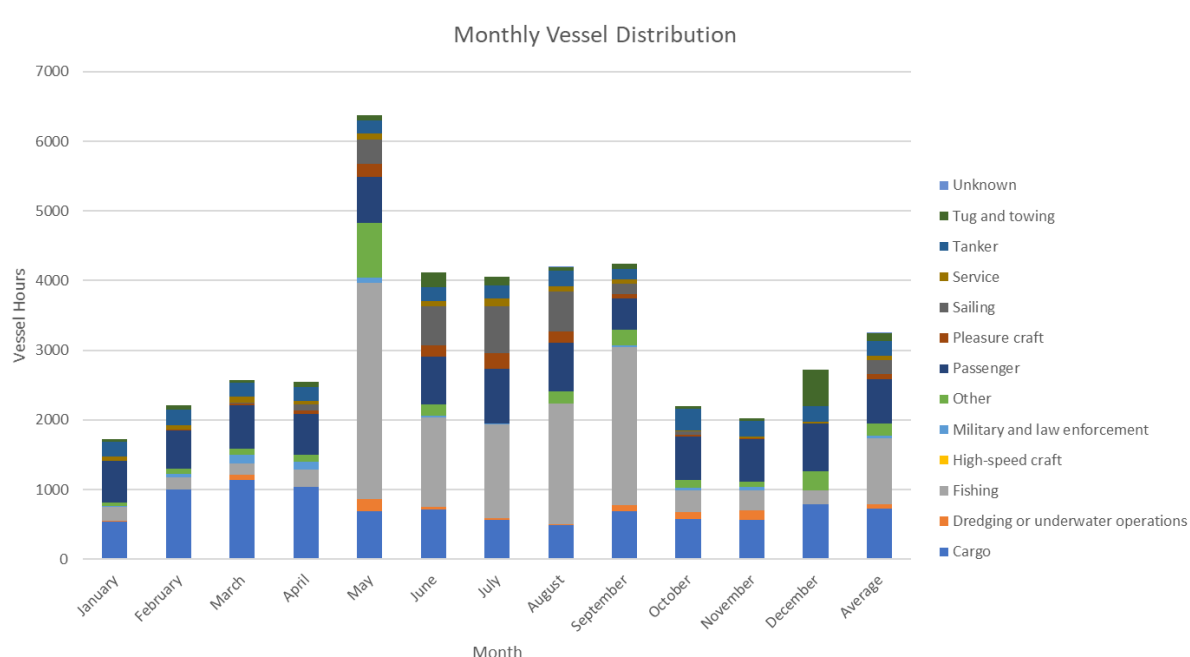
**Figure 4-5 Vessel Distribution Across the SCO-NI-4 Route**



Seasonal distribution of the vessel traffic has been analysed in full and the busiest period is between May and September with the busiest month being May with fishing unusually high during this month.

It should be noted that in August, the same anomaly of combining July's 'Other vessels' are present within the data. No other anomalies have been observed. **Figure 4-6** highlights the seasonal changes in. May to September appear to be the busiest which typically aligns with fairer weather needed for marine campaign works.

**Figure 4-6 Seasonality Changes in Vessel Across the SCOT-NI-4 Route**



The vessel density across the SCOT-NI-4 Route is observed to be generally a lot lower than SCOT-NI-3 and between 0 and 5 vhrpm. There are some concentrations of Low (5 to 10 vhrpm) AIS intensity associated with some shipping lanes where the SCOT-NI-4 route minimises the distance through them. There is one area of medium (10-20 vhrpm) AIS intensity associated with fishing patterns observed between KP 10 and KP30. **Figure 4-7** (P2302-SHIP-4-014-A) highlights shipping patterns within the Irish Sea. Also annotated on the figure are the third-party crossing locations.

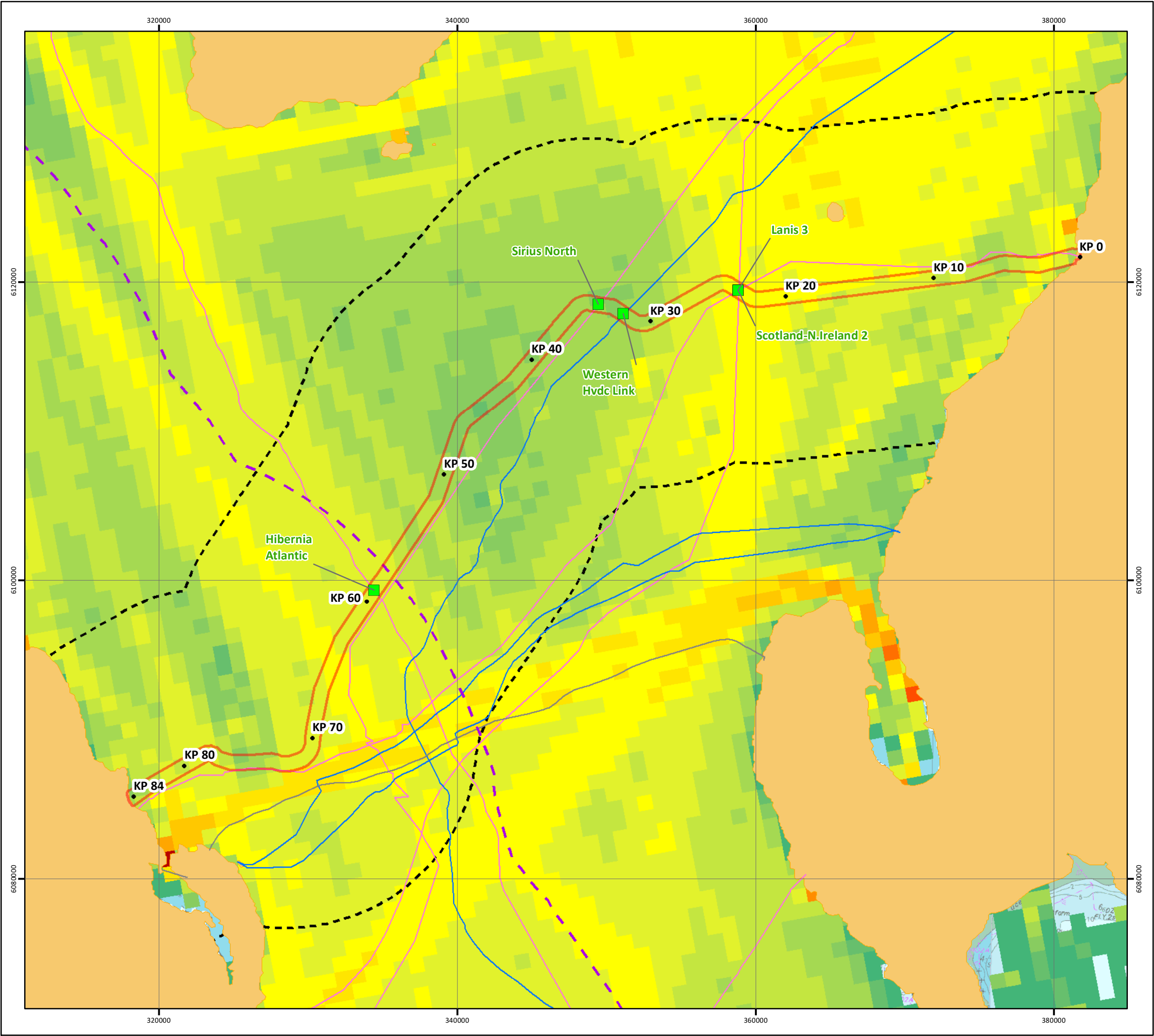
There is one ferry route which intersects the SCOT-NI-4 Route and two which run just to the south of route near KP72 within the Irish Sea which are included in the EMODNET dataset. These are as follows:

- Larne to Troon (intersects)
- Belfast to Stranraer (within vicinity of route)
- Larne to Cairnryan (within vicinity of route)

No other navigational features have been identified on the admiralty charts within the vicinity of the SCOT-NI-4 route

No designated anchorage areas are present across the route. However, one anchorage area is allocated 2.5 km south of Scot-NI 4 (see section 4.2.2).

Aggregate extraction sites and dumping grounds have been avoided in the during the route selection process.



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

AIS VESSEL DENSITY - SCOT-NI4  
Average Monthly Vessel Density  
All Vessels

Drawing No: P2302-4-SHIP-014	A
------------------------------	---

**Legend**

- KP
- Crossing Location
- ▭ SCOT-NI4 Proposed Cable Corridor
- - - Scotland/Northern Ireland Adjacent Waters Limit

Pipeline

- Active

Cable

- Power
- Telecom

10km Area of Interest

2019 Vessel Density

Vessel Hours (per km<sup>2</sup>)

0
< 0.05
0.05 - 0.1
0.1 - 0.2
0.2 - 0.5
0.5 - 1
1 - 2
2 - 5
5 - 10
10 - 20
20 - 50
50 - 100
100 - 200
200 - 500
> 500

NOTE: Not to be used for Navigation

Date	16 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	EMODnet; GEBCO; ESRI; MarineFind; OGA; KISCA; Marine Regions
File Reference	J:\P2302\Mxd\08_SHIP\ P2302-4-SHIP-014.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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## 4.2.2 Navigational Features and Anchorages

There are a number of navigational features in the vicinity of the submarine cable route and within the study area associated with navigation buoys, wrecks, obstructions and subsea cables. All of these features have been avoided, or the distance minimised through, during the route selection and development process.

There are five cable crossings on the SCOT-NI-3 Route (two of which are co-located), these are as follows:

- Western Link HVDC cable and;
- Hibernia Atlantic Telecom Cable
- Sirius North Telecom Cable and;
- Scotland – Northern Ireland 2 Telecom Cable co-located with;
- Lanis Telecom Cable

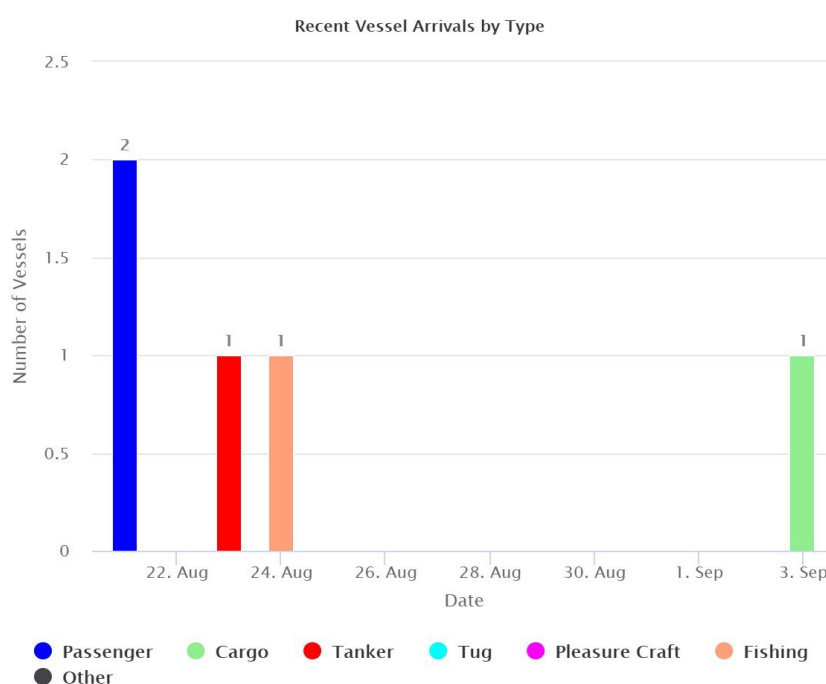
There are two cardinal marker buoys approximately 2km to the south of the SCOT-NI-4 Route (North and South Hunter) highlighting rock outcrop. It is worth noting as existing vessels may be displaced by this obstruction and potentially create pinch points before and after this point.

East Maiden lighthouse is situated 2km to the north of the route at KP75 and has been avoided during the route selection process. Again, it is worth noting as existing vessels may be displaced by this obstruction and potentially create pinch points before and after this point.

One anchorage area associated with the Port of Larne is observed ~2.5km offshore and ~2.5km south of the SCOT-NI-4 Route and is designated for vessels waiting for berthing.

An indication of the anchorage usage can be found on the marine traffic website (ref 5) and highlighted in **Figure 4-8** below.

**Figure 4-8 Vessel Arrivals between 22nd August and 3<sup>rd</sup> September 2020 at Larne Anchorage**



Furthermore, there is a Pilotage station (annotated on admiralty chart) 2km from the SCOT-NI-4 Route which may be associated with the anchorage area described above where vessels drop anchor to await pilot boarding.

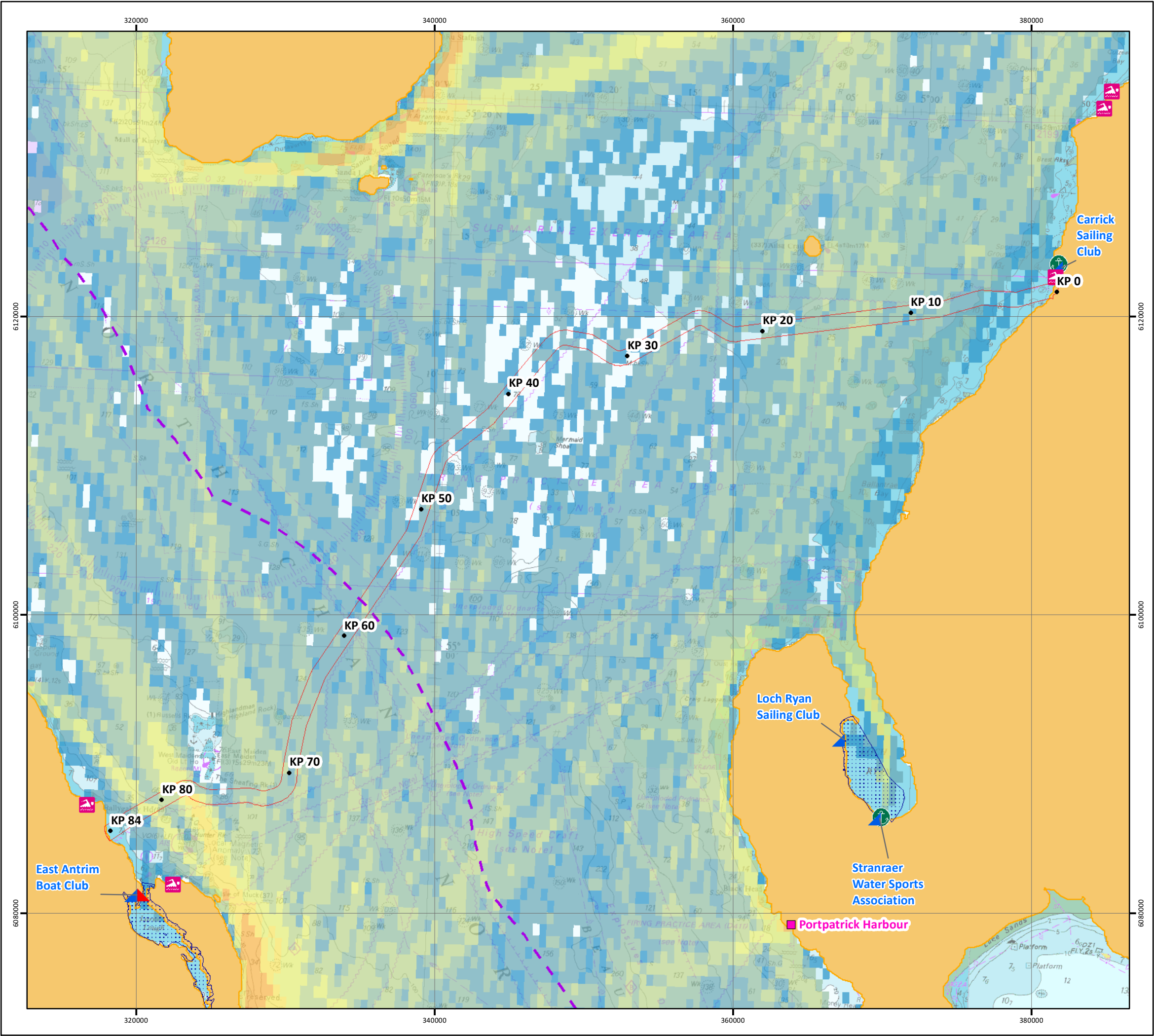
There are no further marked designated anchorage areas within the study area.

Aggregate extraction sites and dumping grounds have been avoided in the during the route selection process.

#### 4.2.3 Royal Yachting Association (RYA)

RYA clubs, training centres, marinas as well as the RYA AIS data and the SCOT-NI-4 Route are illustrated in **Figure 4-9** (P2302-4-REC-001-A). The figure also presents a heat map of AIS data of the recreation boating activity across the SCOT-NI-4 Route. One RYA club, one training centre and a general boating area are located near the Irish landfall and associated with Larne Port, approximately 4km south of the SCOT-NI-4 Route which is unlikely to be affected during the cable installation process. However, there is an area of moderate AIS intensity leading from Belfast port, which transect the SCOT-NI-4 Route at KP79 and KP81.

There is also one RYA club and one marina approximately 2km to the North of the SCOT-NI-4 Route associated with Girvan port and again is unlikely to be affected. The AIS intensity associated with this part of the route is also Low to Negligible.



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES  
RECREATION - SCOT-NI4  
Designated Bathing Waters and  
Royal Yachting Association Recreational Boating

Drawing No: P2302-4-REC-001A

Legend

- KP
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- Portpatrick Harbour
- Designated Bathing Water
- RYA UK Coastal Atlas of Recreational Boating
  - RYA Club
  - RYA Training Centre
  - Marina
  - General Boating Area
- AIS Intensity (Recreational Yachting)

Intensity
  - Low
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - High

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Date	16 October 2020
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## 4.3 Fishing Overview

Many different fishing gears and fishing methods are used by commercial fisheries. Each gear type is used for specific activities and different gears can have very different impacts on the marine environment and cable security. This assessment will identify the areas of fishing in relation to the SCOT-NI Routes which may be disrupted during the offshore marine campaigns. Further details of fishing gear types can be found in the cable routing desk top study (ref 9)

Fishing intensity can be found in **Figure 4-10** (P2302-FISH-008-A) demonstrating that generally the total fishing effort is consistently present across both SCOT-NI Routes. By analysing the seasonality, it can be seen that fishing is more intense from May to September and more notably a significant increase in the month of May.

**Appendix A.2.** shows fishing intensity by season. The most distinct area where fishing is more intense is in the Firth of Clyde, between KP10 to KP30 across SCOT-NI-4, where there is a consistently fished area year-round, though towards the south of this area the intensity does vary by season. Both cables largely avoid this area, however Scot-NI 4 unavoidably enters it due to the location of its landfall at Girvan. Further south in the North Channel, there are other hotspots, though these are not consistently present across all seasons. The largest of these appears only in autumn. A smaller patch of activity appears towards the middle of the channel and is present throughout the year but varies in extent and intensity. Scot-NI 3 avoids this hotspot, passing south of it even at its largest extent during autumn (ref 9).



## 4.4 Marine Accident data

This section reviews maritime incidents that have occurred in within 10km of the of the SCOT-NI-Routes across the Northern Irish Sea. The analysis is intended to provide a general indication as to whether the area of the proposed development is currently a low or high-risk area in terms of maritime incidents. If it were found that the propose development resided in a high-risk area for incidents, this may indicate that the development could add to the existing maritime safety risks in the area.

The most recently available 10 years of data from RNLI and the last 5 MIAB annual reports have been analysed. It is noted that the same incident data could have been recorded by both sources.

### 4.4.1 RNLI

The most recent ten-year period available of RNLI data (collected between 2008 and 2019) has been plotted spatially and analysed across the SCOT-NI Routes.

The dataset is a condensed Return of Service data from RNLI callouts across the United Kingdom and the Republic of Ireland. It is worth noting that there are records present that have not been spatially adjusted to their exact locations but does give an indication of the number of marine incidences in the area (ref 6).

A total of 486 and 382 launches over a 10km buffer across for SCOT-NI-3 and SCOT-NI-4 respectively, all to unique incidents, were recorded by the RNLI (excluding hoaxes and false alarms). This corresponds to an average of around 40 and 32 incident per year for SCOT-NI-3 and SCOT-NI-4, respectively.

Incident type and corresponding years for SCOT-NI-3 and SCOT-NI-4 are presented in **Figure 4-11** and **Figure 4-12** respectively. RNLI categories that are not relevant to this assessment have assigned to the category 'other'.

**Figure 4-11 RNLI Yearly Callouts – SCOT-NI-3**

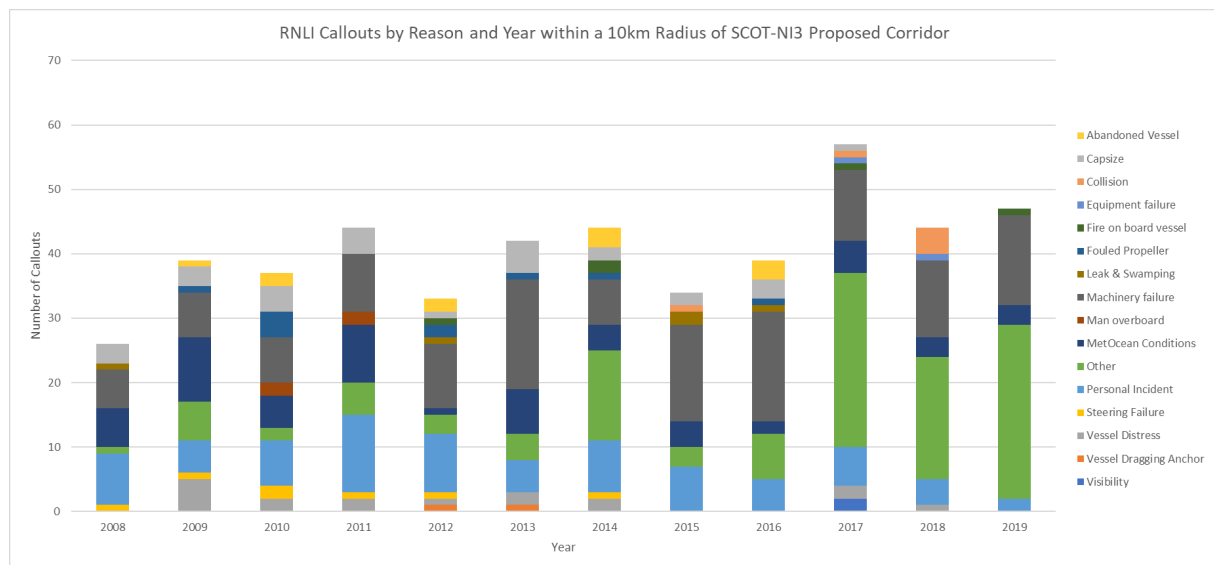
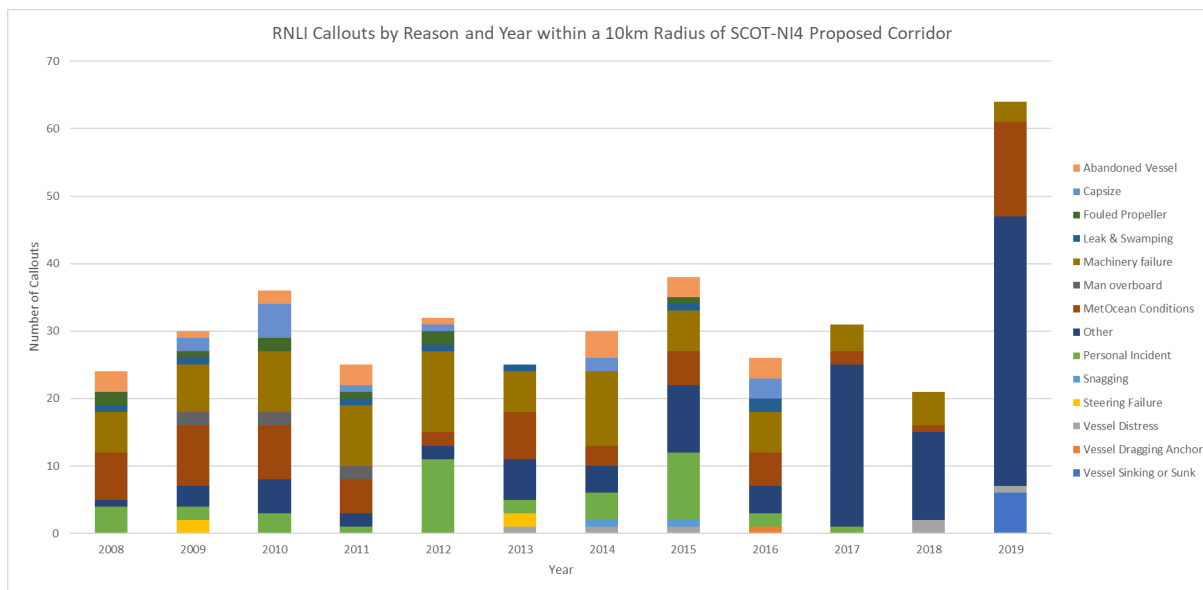


Figure 4-12 RNLI Yearly Callouts – SCOT-NI-4



With the exception of ‘other’, which as mentioned above is not relevant to this assessment, it can be seen that for both SCOT-NI Routes ‘Machinery failure’ account for a large portion of the dataset and make up 27% (11 per year) and 21% (7 per year) of the incidents across SCOT-NI-3 and SCOT-NI-4 respectively. Similarly, collisions only make up 0.1% of the data for SCOT-NI-3 (0.5 collisions per year) and no collisions were recorded across SCOT-NI-4.

Due to the temporal effects of the offshore marine campaign works, and that incidences are largely as a result of engine failure, it is not through that the presence of project vessels will increase the risks to the existing baseline of marine safety.

Figure 4-13 (P2302-RNLI-001) presents the locations of incidences recorded by the RNLI

# SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

ROYAL NATIONAL LIFEBOAT INSTITUTION  
Recorded Incidents between 2008 and 2019

Drawing No: P2302-RNLI-001

A

## Legend

- KP
- Scot/Ni Adjacent Waters Limit
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- 10km Area of Interest

## RNLI Data

RNLI Lifeboat Station

## RNLI Incidents 2008 to 2019

### Reason for Callout

- Abandoned Vessel
- Capsize
- Collision
- Equipment failure
- Fire on board vessel
- Fouled Propeller
- Leak & Swamping
- Machinery failure
- Man overboard
- MetOcean Conditions
- Other
- Personal Incident
- Snagging
- Steering Failure
- Vessel Distress
- Vessel Dragging Anchor
- Vessel Sinking or Sunk
- Visibility

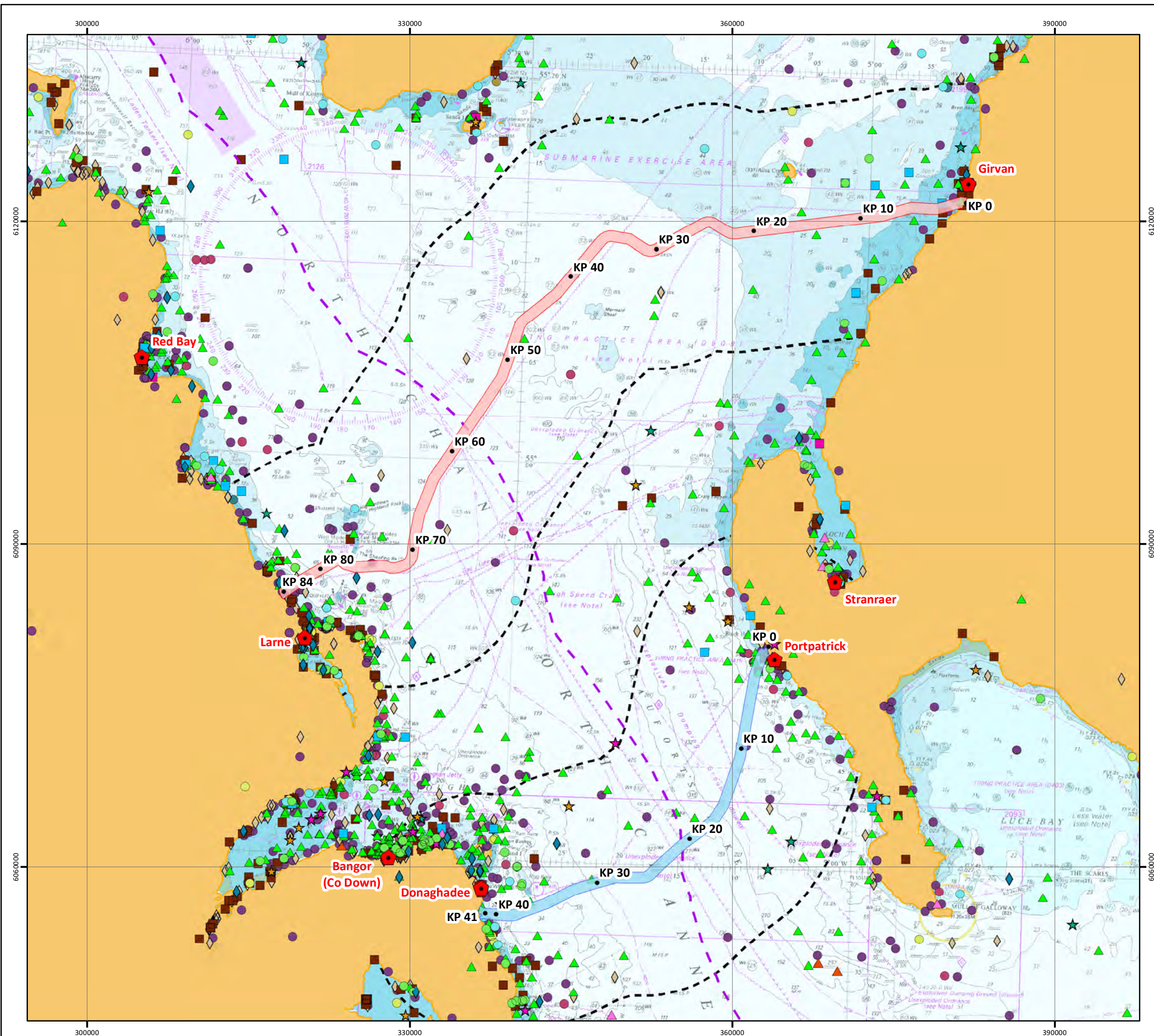


NOTE: Not to be used for Navigation

Date	18 September 2020
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Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; ESRI; GEBCO; MarineFind; RNLI
File Reference	J:\P2302\Mxd\14_RNLI\ P2302-RNLI-001.mxd
Created By	Chris Dawe
Reviewed By	Chris Carroll
Approved By	Paula Daglish



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#### 4.4.2 MAIB

All UK-flagged commercial vessels are required by law to report accidents to MAIB. Non-UK flagged vessels do not have to report unless they are within a UK port/harbour or are within UK 12nm and carrying passengers to or from a UK port. However, the MAIB will always record details of significant accidents of which they are notified by bodies such as the Coastguard. The Maritime and Coastguard Agency, harbour authorities and inland waterway authorities also have a duty to report accidents to the MAIB (ref 7).

The last 5 years of annual MAIB reports from 2014 to 2019 have been analysed to determine if any accidents have occurred within Irish sea. The findings have been summarised below as:

- **2019:** No incidents or accidents relating to vessels at sea within the vicinity of the cable routes
- **2018:** 14<sup>th</sup> Dec – Close quarters incident between the UK registered ro-ro ferry Stena Superfast VII and a submerged Royal Navy submarine in the Irish Sea  
  
18<sup>th</sup> Dec - Cargo shift of freight vehicles on the Bahamas registered ro-ro passenger ferry European Causeway during heavy weather while on passage from Larne, Northern Ireland, to Cairnryan, Scotland
- **2017:** 10<sup>th</sup> Dec – Grounding of the cargo vessel Ruyter on Rathlin Island, Northern Ireland (20km outside of study area)
- **2016:** 3<sup>rd</sup> Aug – A crew member received serious injuries on board the fishing vessel Sea Harvester in the Firth of Clyde while recovering fishing gear
- **2015:** 15 Apr – There was a collision between a dived Royal Navy submarine and the fishing vessel Karen in the Irish Sea  
  
29<sup>th</sup> July – The fishing vessels Silver Dee and Good Intent collided in the Irish Sea. The Silver Dee flooded, and her crew evacuated to the Good Intent before their vessel sank
- **2014:** 22<sup>nd</sup> Jan – The fishing vessels Sapphire Stone and Karen collided in the Firth of Clyde resulting in the sinking of the Karen. The crew abandoned to a life raft and were successfully rescued

A total of seven marine incidents were reported across the SCOT-NI Routes, corresponding to an average of 1.4 incidences a year. In terms of yearly variations, this fluctuates between one or two incidences per year and it can be seen that in 2019 there were no incidents or accidents reported by MAIB.

It is worth mentioning that two of the incidences relate to fishing vessels in the Firth of Clyde, which is an area that is continuously fished (with an increase in May) throughout the year.

## 5. HAZARD IDENTIFICATION

Marine operations and their associated hazards have been identified and listed in **Table 5-1**. A hazard has been assigned to each aspect of the marine operation including the zone of influence, resulting in a worst-case assessment. The zones of influence are also presented in the table below.

**Table 5-1 Marine Operations and Identified Hazards – Shipping and Navigation**

Project Phase	Operation	Hazard Identified	Receptor	Zone of Influence
Route Clearance	Pre-Lay Grapnel Run			3.7km wide x 36km along centreline (in any 24-hour period)
Installation	Shore End Operations (cable pull in)	<ul style="list-style-type: none"> <li>Displacement of vessels due to avoidance of project vessels</li> <li>Vessel Collision</li> </ul>	Project vessels, Commercial shipping, recreational boating and fishing vessels	3.7km wide x 14.4km along centreline (in any 24-hour period)
	Cable lay and burial	<ul style="list-style-type: none"> <li>Project vessels blocking navigational features</li> <li>Fishing interaction with Surface laid cable</li> </ul>		3.7km wide x 14.4km along centreline (in any 24-hour period)
	Offshore installation, post-lay inspection and burial (PLIB)	<ul style="list-style-type: none"> <li>Accidental anchoring on surface laid cable</li> <li>Extreme weather conditions</li> </ul>		3.7km wide x 2km at crossing and burial locations
	Surface Laid cable			3.7km wide x 48km along centreline (in any 24-hour period)
Operation	Additional external cable protection	<ul style="list-style-type: none"> <li>Additional cable protection, Rock berm (if applicable) and Change in water depth</li> </ul>	Commercial shipping, recreational boating, fishing vessels	Worst case external cable protection footprint: Rock Berm footprint up to max 2m high, 90m long and 15m wide

## 6. RISK ANALYSIS

The descriptions and definitions in the below risk analysis takes into consideration the applied mitigation needed to reduce the hazards to ALARP.

### 6.1.1 Displacement of vessels due to the avoidance of project vessels

Existing vessels may have to re-route around or reduce speed on approach to the project vessels which may causing a disturbance in the existing shipping patterns.

The presence of the project vessels will add an additional hazard for mariners to be aware of, which will potentially make them more vigilant when navigating through the area. There is ample 'sea room' for existing shipping to manoeuvre around the project vessels.

Since the project vessels will be moving along at the rate of cable lay (speed is dependent on installation method used), any disruption will be temporary and short term in any one location. As shipping will have to make minor diversions to avoid the project vessels, their frequency has been assessed as **Probable**.

The Consequence has been assessed as **Minor** because it will be very short-term, temporary and acceptable alternatives for route planning are available for shipping traffic to easily manoeuvre around project vessels.

### 6.1.2 Vessel collisions

Existing vessels may have to re-route around project vessels which may create pinch points and alter the rate of encounters. Therefore, there is the potential for vessel-to-vessel collisions to occur as a result from existing shipping avoiding the marine operations, particularly across shipping lanes, near fishing grounds and at landfall areas.

Vessels will be operating in compliance with international shipping standards therefore vessel masters will be competent and adept at navigating in unfamiliar waters.

The probability of a vessel to vessel collision is **Extremely Remote** but the consequence could be **Catastrophic**.

### 6.1.3 Project vessels blocking navigational features

Project vessels have the potential to block key navigational features such as anchorages or leading lights for vessels on approach to ports.

While the SCOT-NI-4 Route does not intersect any anchorage areas it is 2.5km away from the anchorage associated with the Port of Larne. Some displacement of vessels may occur and consideration to existing vessels anchoring at the Larne anchorage may need to be carried out for the pull in operations.

However, these effects are temporary and the SCOT-NI Routes do not enter any port authority areas, so the probability is expected to be **Remote** and consequence **Significant**

### 6.1.4 Fishing interaction with surface laid cable

Fishing vessel gear will have the potential to interact with the SCOT-NI Cable Routes where the cable is surface laid, or burial is not achieved to below the fishing trawl board depths.

Once established, appropriate mitigation is needed to ensure the cable is suitably protected against the type of fishing (i.e. scallop and clam dredging) and anchoring in the area. While it is advised in The Mariners Handbook and as per ESCA standard industry guidelines that fishing should be avoided across subsea cables, it is assumed that fishing may occur across the cable once installed.

It is noted that a cable burial assessment is usually carried out and submitted to the MCA prior to installation, as full details of the cable route and additional protection measures are not normally finalised at the time of the NRA.

The project may have guard vessels during cable installation operations. If required, the Scot-NI project aims to incorporate local mariners into the role of guard vessels. This will provide a knowledgeable, local crew, many of whom have successfully completed work as guard vessels on similar projects in the past in addition to encouraging community involvement with the project.

During the installation phase, there will be a designated FLO. With these services in place, there will be a FLO monitoring body present during the installation process. The project FLO can disseminate information to the guard vessels regarding seasonal variations in fishing patterns

The probability of a fishing gear interacting with the cables is **Remote**, but the consequence could be **Significant**.

#### 6.1.5 Accidental anchoring on surface laid cable

Vessel anchors will have the potential to interact with the SCOT-NI Cable Routes if deployed where the cable is surface laid, or burial is not achieved to below the anchor penetration depths. However, it is very unlikely that an anchor will be deployed offshore in deeper waters and away from designated anchorage areas. The probability of an anchor deployment on a surface laid cable has been determined to be remote but still remains in the event of an emergency or accidental deployment of an anchor.

As identified above, the project may have guard vessels during cable installation operations. The Scot-NI project aims to incorporate local mariners into the role of guard vessels. This will encourage community involvement with the project, but will also provide a knowledgeable, local crew, many of whom have successfully completed work as guard vessels on similar projects in the past.

The probability of a ships anchor interacting with the cables are **Extremely Remote**, but the consequence could be **Significant**.

#### 6.1.6 Extreme weather conditions

A long-range weather forecast is usually monitored hourly when conducting marine operations which mitigates the risk of encountering any adverse or extreme weather conditions. However, the project vessels may need to shelter in port if weather exceeds working limitations. This would mean seeking shelter before the weather reaches the limitations of the vessel and its crew, however during the cable lay process this could mean cutting and buoying the cable in a situation that is too dangerous to continue working.

The probability of project vessels encountering extreme weather is **Remote**, but the consequence is likely to be **Minor**

## 7. RISK ASSESSMENT

In this risk assessment the hazard has been ranked by expected risk, based on the estimated frequency and consequence with no mitigation measures applied creating a 'Inherent Risk' to the project. The exercise was repeated with compliance mitigation (**Table 7-1**) and industry best practice (**Table 7-2**) measures which results in a residual risk allowing the hazards to be reduced to ALARP. No hazards more than a moderate risk are present as identified in the risk assessment.

### 7.1 Risk Control

#### 7.1.1 Compliance Mitigation

The Compliance measures included in **Table 7-1** below are required to be undertaken to meet environmental and health and safety legislation.

**Table 7-1 Compliance Mitigation**

ID	Embedded mitigation
COMP 1	Project vessels will comply with the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs) – as amended, particularly with respect to the display of lights, shapes and signals.
COMP 2	The dropped object procedure will be followed, and any dropped objects must be reported to the relevant authority (MS LOT or DAERA) using the dropped object procedure form, within 24 hours of the project becoming aware of an incident.
COMP 3	'As-laid' co-ordinates of the cable route will be recorded and circulated to the UK Hydrographic Office (UKHO), KIS-ORCA service and any other relevant authorities. Cables will be marked on Admiralty Charts and KIS-ORCA charts (paper and electronic format). An update will be distributed to stakeholders following the completion of installation.

#### 7.1.2 Best Practice Mitigation

The Best Practice project mitigation relevant to shipping is provided in **Table 7-2** below. When undertaking the assessment, it is assumed that these measures will be complied with; either as a matter of best practice or to ensure compliance with statute.

**Table 7-2 Best Practice Mitigation**

ID	Embedded mitigation
BP1	Early consultation with relevant contacts to notify of impending activity.
BP2	Notice to Mariners will be published to inform sea users via Notices to Mariners, Kingfisher Bulletins and MCA and UKHO. Vessels will be requested to remain at least 1NM away from cable vessels during installation operations.
BP3	Guard Vessels may be deployed as required to ensure that cable installation proceeds as safely and efficiently as possible.
BP4	Appropriate cable protection to be installed as applicable along the cable route including over crossed assets if required.
BP5	An onshore Fishing Liaison Officer (FLO) will be provided for the project. The FLO will follow the Fishing Liaison Mitigation Action Plan (FLMAP). The FLO will continue in this role during installation process.
BP6	The UKHO will be informed of installation activities in order to issue Maritime Safety Information (MSI) broadcasts as appropriate.
BP7	Guidance provided by the UKHO and International Convention for the Safety of Life at Sea (SOLAS) recommend that fishing vessels should avoid trawling over installed seabed infrastructure (UKHO

ID	Embedded mitigation
	2020). Vessels are advised in the Mariners Handbook not to anchor or fish (trawl) within 0.25NM of cables.
BP11	If cables are buoyed off whilst the vessel departs the area, buoy positions will be notified to the NTM distribution list including Kingfisher and 0.25NM clearance will be requested.

## 7.2 Risk Assessment

**Table 7-3 to 7-9** presents the risk assessment conducted on the marine operations and associated hazards. All hazards have reached a risk level tolerable to the project through the ALARP process.

## 7.2.1 Route Clearance (Including PLGR & OOS Cable Removal)

**Table 7-3 Risk Assessment – Route Clearance**

Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
	Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
		Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Presence of Project vessels	3	1	1	2	3	3	6	COMP 1, BP1, BP2, BP3, BP5 BP6, BP11	3	1	1	1	3	3	3
Vessel collision	2	5	5	3	10	10	6		1	5	5	2	5	5	2
Project vessels blocking navigational features	3	1	1	2	3	3	6		1	1	1	1	1	1	1
Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2

## 7.2.2 Shore End Operation – Cable pull in

**Table 7-4 Risk Assessment – Shore end Operations**

Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
	Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
		Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Presence of project vessels	4	1	1	3	4	4	12	COMP 1, BP1, BP2, BP3, BP5 BP6, BP7, BP11	4	1	1	2	4	4	8
Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	1	2	2	1
Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2

### 7.2.3 Cable Lay and Burial

**Table 7-5 Risk Assessment – Cable Lay and Burial**

Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
	Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
		Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Presence of Project vessels	3	1	1	3	3	3	9	COMP 1, COMP 3, BP1, BP2, BP3, BP5 BP6, BP7, BP11	3	1	1	1	3	3	3
Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2

## 7.2.5 Post Lay Inspection and Post Lay Burial

**Table 7-6 Risk Assessment – Post Lay Inspection and Post Lay Burial**

Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
	Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
		Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Presence of project vessels	3	1	1	3	3	3	9	COMP 1, COMP 3, BP1, BP2, BP3, BP5 BP6 BP7, BP11	2	1	1	2	2	2	4
Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	1	2	2	1
Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2

## 7.2.6 Surface Lay

**Table 7-7 Risk Assessment – Surface Lay**

Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
	Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
		Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Presence of project vessels	4	1	1	3	4	4	12	COMP 1, COMP 3, BP1, BP2, BP3, BP4 BP5 BP6, BP7, BP11	4	1	1	2	4	4	8
Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
Fishing interaction with Surface laid cable	3	2	2	2	6	6	6		1	2	2	2	2	2	2
Accidental anchoring on surface laid cable	3	2	2	2	6	6	6		1	2	2	2	2	2	2
Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2

## 7.2.7 Additional External Cable Protection (at crossing locations and where burial is not achieved)

**Table 7-8 Risk Assessment – Additional External Cable Protection**

Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
	Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
		Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Presence of project vessels	3	1	1	3	3	3	9	COMP 1, COMP3, BP1, BP2, BP3, BP4 BP5 BP6, BP7, BP11	2	1	1	2	2	2	4
Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	1	2	2	1
Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
Change in water depth	1	2	2	2	2	2	2		1	2	2	1	2	2	1

## 8. CONCLUSIONS

### 8.1 SCOT-NI-3

The overall vessel density across the SCOT-NI-3 Route is generally consistent across the Irish Sea and observed to be very low (0-5 Vessel Hours Per Month (vhpm)) with localised areas of medium (5-20 vhpm) density associated with shipping patterns related to shipping lanes, likely used by ferries and cargo/tanker vessels leaving and entering ports.

The intensity of recreational boating is also very low across the SCOT-NI-3 Route with a slight increase in intensity associated with the coastal areas as a result of ports, harbours and anchorage areas. The SCOT-NI-3 route does not cross any official Traffic Separation Schemes nor interfere with significant navigational features.

The Irish Sea is extensively fished (as evident in vessel landing and AIS data) and several hot spots are observed within the vicinity of the SCOT-NI-3 Route. However, fishing vessels are largely confined to the Firth of Clyde, an area north of the SCOT-NI-3 route and therefore unlikely to interact significantly with any marine campaign works.

### 8.2 SCOT-NI-4

The overall vessel density across the SCOT-NI-4 Route is observed to be very low (0-5 vhpm) with low (5-10 vhp) intensities at the shipping lanes and medium intensities at the heavily fished areas (10-20 vhp). Navigational features noted on the Admiralty charts need to be considered which may divert creating a slight pinch point for larger vessels entering the port of Larne.

Larne Anchorage is approximately 2.5km from the SCOT-NI-4 cable route, but its usage has been observed to be low. Some vessels that are on approach to anchor may be displaced.

The intensity of recreational boating is also very low across the SCOT-NI-4 Route and crosses one or two well-travelled lanes between KP79 and KP81. The SCOT-NI-3 route does not cross any official Traffic Separation Schemes nor interfere with significant navigational features.

Fishing is present across the entire SCOT-NI-4 route; however, it is largely confined to the Firth of Clyde, an area that intersects and extends north of the SCOT-NI-4 Route. As evident in the catch and AIS data this area is busiest between May and September with a notable substantial increase of activity in May therefore the existing fishing vessels are likely to interact with the marine campaign works during these months.

### 8.3 Risk Assessment

The risk assessment has identified that all identified hazards have been reduced to ALARP and, with the relevant best practice measures applied, no hazards exist that are above a moderate risk level. The greatest risk to the existing baseline has been assessed as vessel collision, either by project vessels interacting with the existing shipping or vice versa however due to all vessels operating in compliance with COLREGs the frequency has been assessed as extremely remote, lowering the overall risk rating.

## REFERENCES

1 AIS data. EMODNET (2017, 2018 & 2019)

2 Admiralty charts, <http://wmsgateway.findmaps.co.uk/wms/IntertecMetocCharts?>

3 Royal Yachting Association (RYA) Data for 2019

4 Marine Mammal Observation (MMO) fishing data, 2017

5 Marine Traffic, [www.marinetraffic.com](http://www.marinetraffic.com)

6 Royal National Lifeboat Institution incidents 2010 to 2019. <https://data-rnli.opendata.arcgis.com/datasets/rnli-returns-of-service?geometry=-46.917%2C50.370%2C36.711%2C59.196>

7 Marine Accident Investigation Branch (MAIB) annual reports 2011 to 2019. <https://www.gov.uk/government/collections/maib-annual-reports>

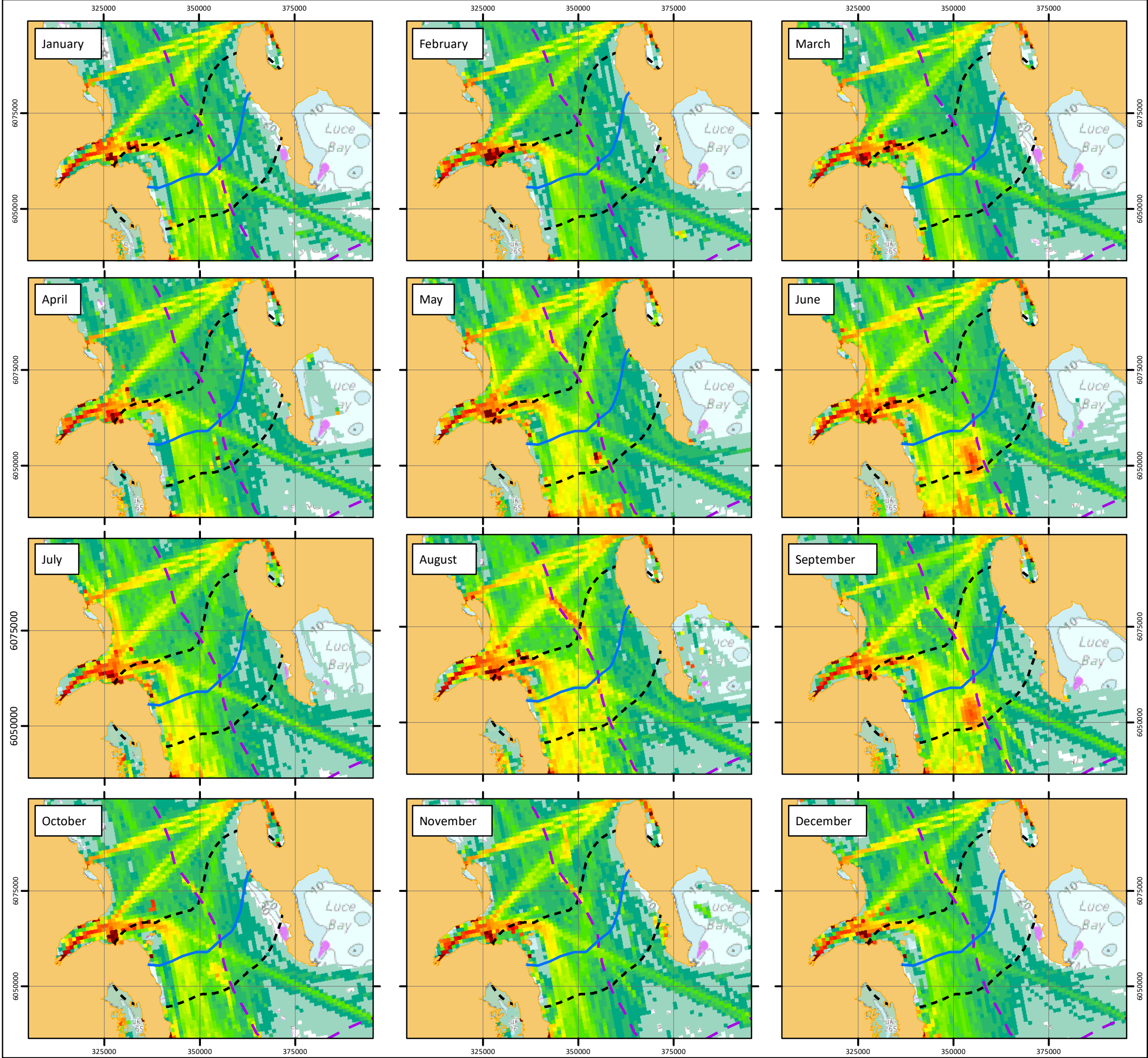
8 Cable Routing Desk Top Study, ref: 2668-GMSL-G-RD-0001

9 ICPC Recommendation No. 1 Management of Redundant and Out of Service Cables, 2016

# APPENDIX A

## Vessel Charts

## A.1 SEASONAL VARIATION: ALL VESSELS



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

AIS VESSEL DENSITY - SCOT-NI3  
Monthly Vessel Densities  
All Vessels

Drawing No: P2302-3-SHIP-013

A

Legend

SCOT-NI3 Submarine Cable Route

Scotland/Northern Ireland Adjacent Waters Limit

10km Area of Interest

2019 Vessel Density

Vessel Hours (per km²)

100

10

0

N

W

E

S

NOTE: Not to be used for Navigation

Date	04 September 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	EMODnet; UKHO; GEBCO; ESRI; MarineFind
File Reference	J:\P2302\Mxd\08_SHIP\ P2302-3-SHIP-013.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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Global Marine

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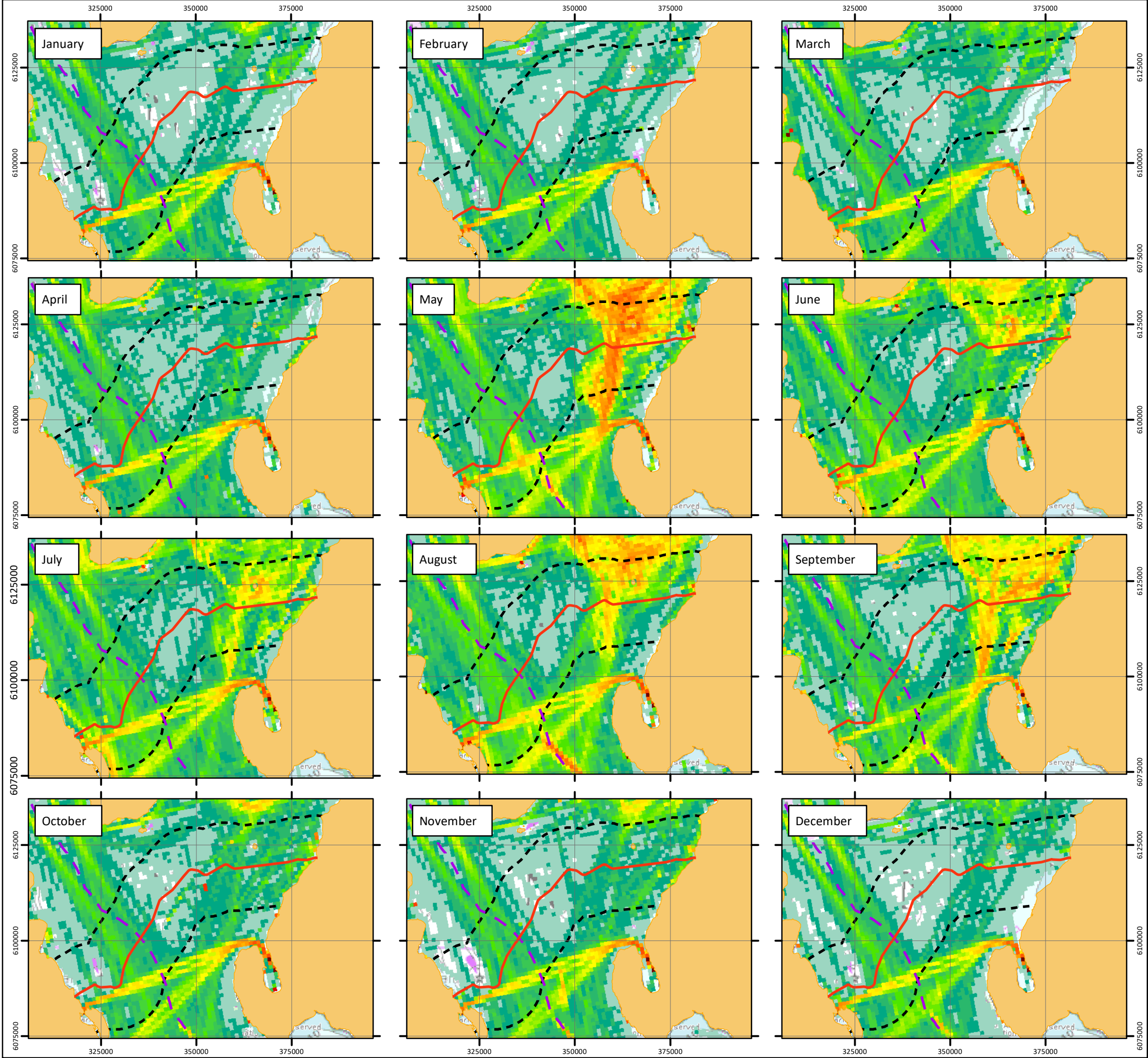
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SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

AIS VESSEL DENSITY - SCOT-NI4  
Monthly Vessel Densities  
All Vessels

Drawing No: P2302-4-SHIP-013

A

Legend

SCOT-NI4 Submarine Cable Route

Scotland/Northern Ireland Adjacent Waters Limit

10km Area of Interest

2019 Vessel Density

Vessel Hours (per km²)

100

10

0

N

W

E

S

NOTE: Not to be used for Navigation

Date	04 September 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	EMODnet; UKHO; GEBCO; ESRI; MarineFind
File Reference	J:\P2302\Mxd\08_SHIP\ P2302-4-SHIP-013.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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0

10

20

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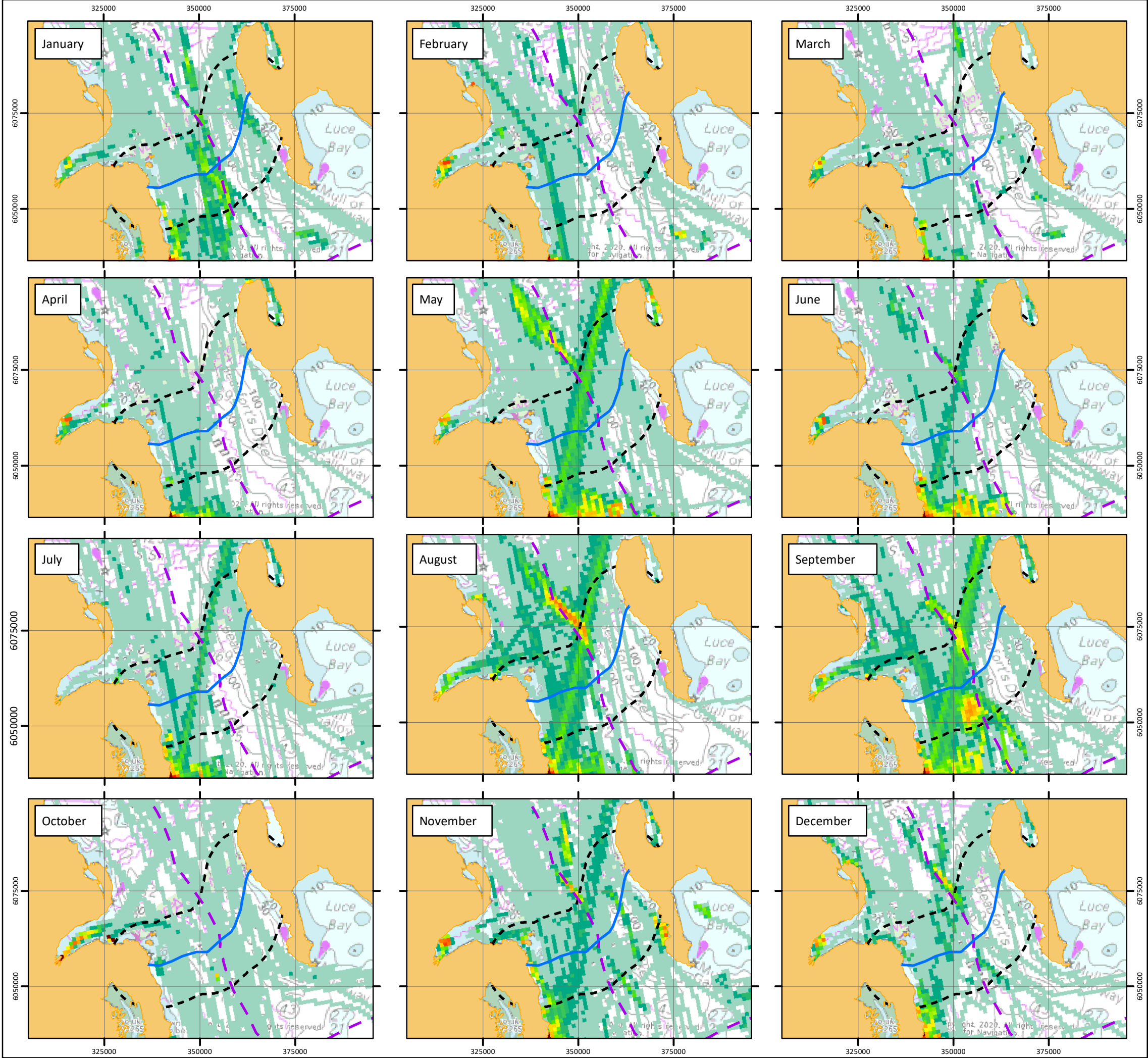
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km

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## A.2 SEASONAL VARIATION FISHING VESSELS



SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

AIS VESSEL DENSITY - SCOT-NI3  
Monthly Vessel Densities  
Fishing Vessels

Drawing No: P2302-3-SHIP-001

A

Legend

SCOT-NI3 Submarine Cable Route

Scotland/Northern Ireland Adjacent Waters Limit

10km Area of Interest

2019 Vessel Density

Vessel Hours (per km<sup>2</sup>)

100

10

0

N

W

E

S

NOTE: Not to be used for Navigation

Date	04 September 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	EMODnet; UKHO; GEBCO; ESRI; MarineFind
File Reference	J:\P2302\Mxd\08_SHIP\ P2302-3-SHIP-001.mxd
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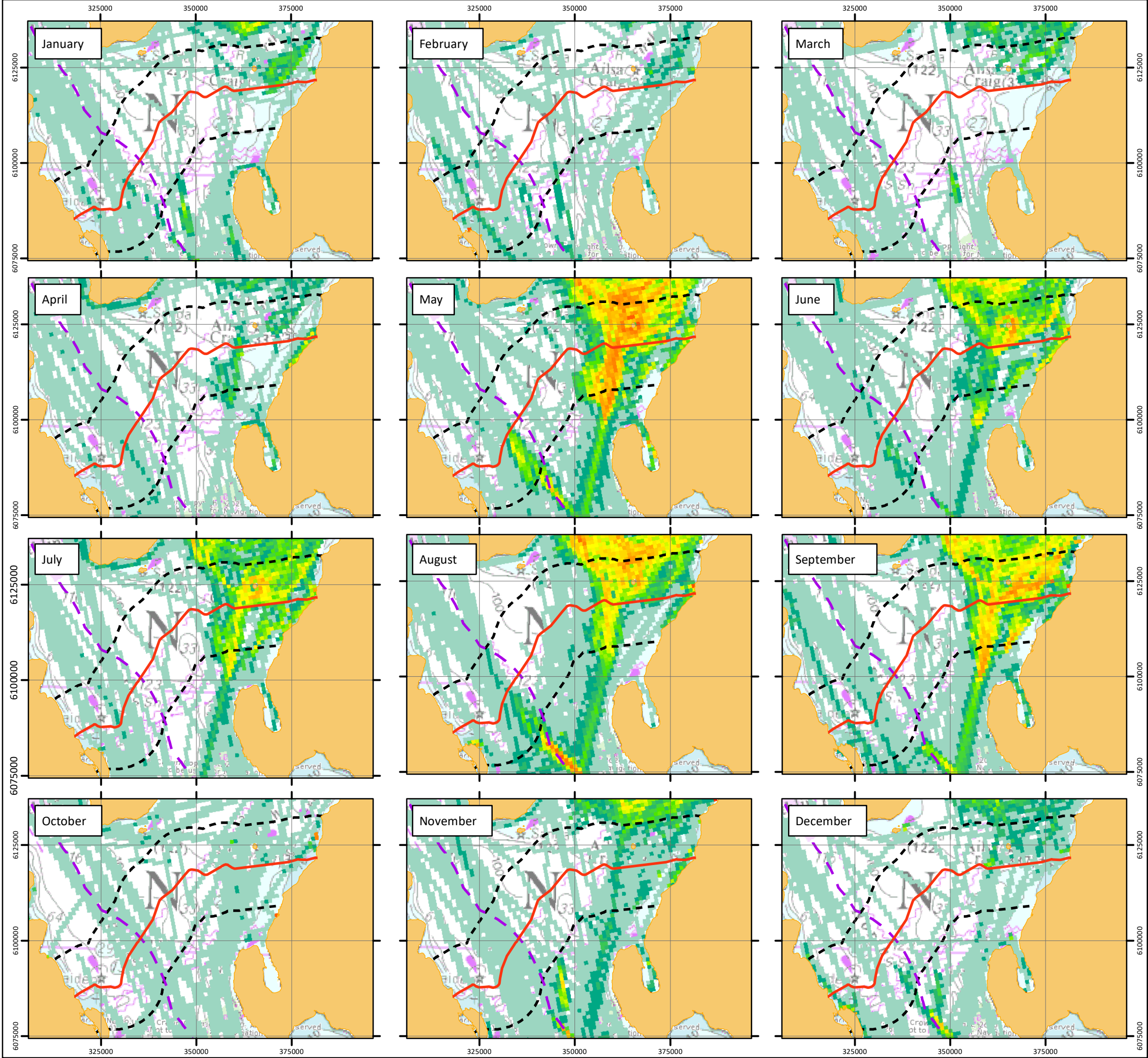
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SCOTLAND - NORTHERN IRELAND  
TELECOMMUNICATION CABLES

AIS VESSEL DENSITY - SCOT-NI4  
Monthly Vessel Densities  
Fishing Vessels

Drawing No: P2302-4-SHIP-001	A
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**Legend**

- SCOT-NI4 Submarine Cable Route
- Scotland/Northern Ireland Adjacent Waters Limit
- 10km Area of Interest
- 2019 Vessel Density
- Vessel Hours (per km<sup>2</sup>)

100  
10  
0

NOTE: Not to be used for Navigation

Date	04 September 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	EMODnet; UKHO; GEBCO; ESRI; MarineFind
File Reference	J:\P2302\Mxd\08_SHIP\ P2302-4-SHIP-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
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