BRITISH TELECOMMUNICATIONS PLC

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

Marine Environmental Appraisal

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Author/s

Various

Project Manager

[redacted]

Paula Daglish

Authoriser

[redacted]

Eric Houston

Rev No	Date	Reason	Author	Checker	Authoriser
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GLOSSARY

AEZ
Archaeological Exclusion Zones

AFBI
Agri-food and Biosciences Institute

AIS
Automatic Identifications System

ALARP
As Low as Reasonably Practicable

ANIFPO
Anglo North Irish Fish Producers Organisation Ltd

AONB
Area of Outstanding Natural Beauty

AP
Articulated Pipeline

ASSI
Area of Special Scientific Interest

AWAC
Armour Wire Anchor Clamp

BAP
Biodiversity Action Plan

BGS
British Geological Survey

BMH
Beach Manhole

BOCC
Birds of Conservation Concern

BP
Best Practice

BT
British Telecommunications Limited

BTO
British Trust for Ornithology

CBRA
Cable Burial Risk Assessment

CD
Chart Datum

CEDaR
Centre for Environmental Data and Recording

CES
Crown Estate Scotland

COLREG
International Regulations for Preventing Collisions at Sea

COMP
Compliance

CSC
Cable Survey Corridor

DAERA
Department of Agriculture Environment and Rural Affairs

DBA
Desk Based Assessment

DDM
Decimal Degrees Minutes

DECC
Department of Energy and Climate Change

Defra
Department for Environment, Food and Rural Affairs

DGMARE
Directorate Generale for Maritime Affairs and Fisheries

DSE
Direct Shore End

DTS
Desk Top Study

EC
European Commission

EIA
Environmental Impact Assessment

EMODnet
European Marine Observation Data Network

EPS
European Protected Species

EU
European Union

EUNIS
European University Information Systems Organization

FAS
Fisheries Activity Study

FEAST
Feature Activity Sensitivity Tool

FLMAP
Fisheries Liaison Mitigation Action Plan

FLO
Fishing Liaison Officer

FOC
Fibre Optic Cable

FRS
Fisheries Research Services

GEN
General Policies

GES
Good Ecological Status

GM
Global Marine

GMG
Global Marine Group

GEN
General Policy

GES
Good Environmental Status

HDPE
High-Density Polyethylene

HER
Historic Environmental Record

HERoNI
Historic Environmental Record of Northern Ireland

HRA
Habitat Risk Assessment

HVDC
High Voltage Direct Current

IAMMWG
Inter-Agency Marine Mammal Working Group

ICG
Intercessional Correspondence Group

ICES
International Council for Exploration of the Seas

ICPC
International Cable Protection Committee

IEMA
Institute of Environmental Management & Assessment

IMO
International Maritime Organisation

INIS
Invasive Non-Indigenous Species

iSPM
Inorganic Suspended Particulate Material

IUCN
International Union for Conservation of Nature

JNCC
Joint Nature Conservation Committee

KP
Kilometre Point

LDP
Local Development Plan

LWM
Low Water Mark

MAIB
Marine Accident Investigation Branch

MarLIN
Marine Life Information Network

MARPOL
International Convention for the Prevention of Pollution from Ships

MBES
Multibeam Echosounder

MCA
International Convention for the Prevention of Pollution from Ships

MCAA
Marine and Coastal Access Act

MCZ
Marine Conservation Zone

MEA
Marine Environmental Appraisal

MHW
Mean High Water

MHWS
Mean High-Water Spring

MLV
Main Lay Vessel

MMO
Marine Management Organisation

MoD
Ministry of Defence

MPA
Marine Protected Area

MPS
Marine Policy Statement

MS-LOT
Marine Scotland Licensing Operations Team

MSFD
Marine Strategy Framework Directive

MSI
Maritime Safety Information

MU
Management Units

NCMPA
Nature Conservation Marine Protected Area

NERC
Natural Environment Research Council

NGO
Non-Governmental Organisation

NI
Northern Ireland

NIEA
Northern Ireland Environment Agency

NIFPO
Northern Ireland Fish Producers Organisation Ltd

NIMM
National Inventory of Marine Mammals

Nm
Nautical mile

NMP
National Marine Plan

NMPi
National Marine Planning interactive tool

NRA
Navigational Risk Assessment

NtM
Notices to Mariners

NTS
Non-Technical Summary

NWPS
National Parks and Wildlife Service

OESEA
Offshore Energy Strategic Environmental Assessment

OOS
Out of Service

PAC
Pre-Application Consultation

PAD
Pressure Activity Database

PAH
Polycyclic Aromatic Hydrocarbons

PCE
Potential Cumulative Effect

PIP
Permits in Principle

PLB
Post Lay Burial

PLIB
Post Lay Inspection and Burial

PLGR
Pre-lay Grapnel Run

PLI
Post-Lay Inspection

PLIB
Post Lay Inspection and Burial

PLSE
Pre-lay shore end

PMF
Priority Marine Feature

pSPA
Proposed Special Protection Area

RBMP
River Basin Management Plans

RC
Route Clearance

RCP
Representative Concentration Pathway

ROV
Remotely Operated Vehicle

RSPB
Royal Society for the Protection of Birds

RYA
Royal Yachting Association

RYANI
Royal Yachting Association Northern Ireland

RYAS
Royal Yachting Association Scotland

SAC
Special Area of Conservation

SBP
Sub-bottom Profiler

Scot-NI
Scotland - Northern Ireland

SEPA
Scottish Environmental Protection Agency

SMRU
Sea Mammal Research Unit

SNCB
Statutory Nature Conservation Bodies

SNH
Scottish Natural Heritage

SNIP
Scotland to Northern Ireland Pipeline

SOLAS
International Convention for the Safety of Life at Sea

SOPEP
Shipboard Oil Pollution Emergency Plans

SPA
Special Protection Area

SSS
Sidescan sonar

SSSI
Site of Special Scientific Interest

TCE
The Crown Estate

TROV
Trenching Remote Operated Vehicle

TSS
Traffic Separation Schemes

UK
United Kingdom

UKBAP
UK Biodiversity Action Plan

UKCP
UK Climate Projections

UKHO
UK Hydrographic Office

UNESCO
United Nations Educational, Scientific and Cultural Organization

USBL
Ultra-Short Baseline

UXO
Unexploded Ordinance

WEBS
Wetland Bird Survey

WFD
Water Framework Directive

WSA
Wider study Area

ZOI
Zone of influence

1. INTRODUCTION

1.1 Purpose of this document

The purpose of this Marine Environmental Appraisal (MEA) is to support the Marine Licence applications being made by British Telecommunication plc (BT) to Marine Scotland Marine Operations Team (MS LOT) and the Department of Agriculture, Environment and Rural Affairs (DAERA), for the installation of replacement submarine telecommunication cables between Scotland and 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. Therefore, in order to maintain telecommunication services, BT is proposing to install replacement Scotland to Northern Ireland 3 and 4 systems. Hereafter, these systems will be referred to as Scot-NI 3 and Scot-NI 4 or the Project Area.

As there are two cables (Scot-NI 3 and Scot-NI 4), BT will submit:

- Two Marine Licence applications to MS LOT under the Marine Scotland Act 2010 (and The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013), for the installation of Scot-NI 3 and Scot-NI 4; and
- Two Marine Licence applications to DAERA under Section 44 of the Marine and Coastal Access Act 2009 (MCAA), for the installation of Scot-NI 3 and Scot-NI 4.

The cables are expected to remain in service for at least 25 years.

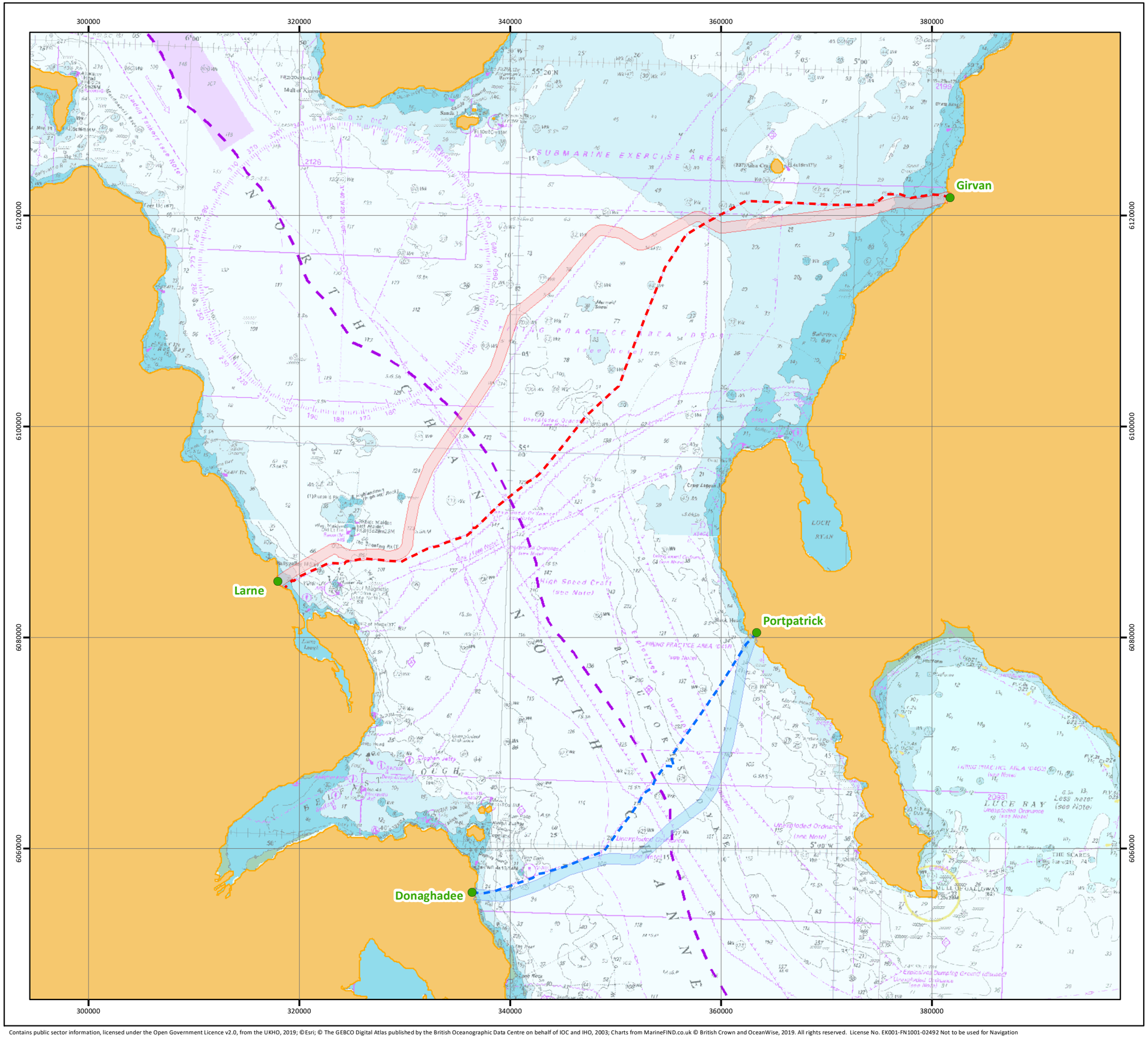
Global Marine Systems Ltd (hereafter referred to as Global Marine (GM) have been sub-contracted by BT to install the Scot-NI 3 and 4 cables. The GM scope of work includes application for the permits in principle (PIP) for the installation of the cables. GM have sub-contracted obtaining the PIP to Intertek..

1.2 Overview of the Project

Telecommunication cables provide essential services and connectivity which is of vital importance as the demand for data and communication increases. The Scot - NI 3 cable application corridor is approximately 42km in length between mean-high water springs (MHWS) Portpatrick, Scotland, and Mean High Water (MHWS) Donaghadee Northern Ireland. Of this approximately 20km is within Scottish territorial waters and 22km is within Northern Irish territorial waters.

The SCOT-NI 4 cable application corridor is longer, with a total length of approximately 85km between MHWS Girvan, Scotland to MHWS Larne (Drains Bay), Northern Ireland. Of this approximately 57.5km is within Scottish territorial waters and 27.5km is within Northern Irish territorial waters.

The Scot-NI submarine cable corridors have been derived following a preliminary Desk Top Study (DTS), consultation with key stakeholders and undertaking a marine survey.



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

N W E S

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

BT Global Marine intertek

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1.2.2 Marine Licensable Activities

The marine licensable activities considered as part of the MEA are as follows:

- Route preparation: pre-lay grapnel run (PLGR) and route clearance (RC);
- Plough burial;
- Surface lay;
- Shore end installation to MHW; and
- Post lay inspection and burial (PLIB),
- Contingency cable protection

Further information on these activities is provided in Section 2 – Project Description.

1.3 Consent requirements and relevant legislation

1.3.1 UK Marine Policy Statement

Prepared and adopted for the purposes of Section 44 of the Marine and Coastal Access Act (MCAA) 2009, the UK Marine Policy Statement (MPS) was published to provide a framework for preparing marine plans and make effective decisions affecting the marine environment (HM Government, 2011). The MPS applies to all UK waters and has been adopted by the UK government and all devolved administrations, including Scotland and Northern Ireland, with all regional and national plans required to conform to the MPS. Specifically in relation to telecommunication cables the MPS states: '..cables are part of the backbone of the world's information and international telecommunications infrastructure, and socially and economically crucial to the UK. Submarine telecommunication cables carry more than 95% of the world's international traffic including telephone, internet and data, as well as many services for the UK's local communities, major utilities and industries.[1]

1.4 Scottish consent requirements and relevant legislation

1.4.1 Marine (Scotland) Act 2010

Installation and operation of submarine cables in Scottish waters requires a Marine Licence under Part 4 of the Marine (Scotland) Act 2010 (Scottish Parliament, 2010).

1.4.2 Marine Licence and supporting information requirements - Scotland

Submarine telecommunication cables do not require an Environmental Impact Assessment (EIA) to be conducted as they are not listed under Schedule A1 or A2 of The Marine Works (Amendment) Regulations 2017 (HM Government, 2017).

This MEA Report presents an overview of the baseline environment and provides an environmental assessment to support the Marine Licence application through consideration of the potential effects of the Project to the marine environment.

1.4.3 The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013

In Scotland, prospective applicants for marine licences for certain activities are required under the marine plan to carry out early stakeholder engagement and public Pre-application Consultation that is appropriate, proportional and meaningful. In addition, the Marine Works and Marine Licensing (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 has made

[1] Reliance on cables has increased with expected capacity growth over the next decades and these figures may now be out of date.

amendments to the Marine Licensing under the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 during the global pandemic.

Due to the Covid-19 global pandemic, the Pre-application Consultation event for the Scot-NI Project was held online and a separate report covering the online event is provided in Appendix B.

1.4.4 Scottish National Marine Plan

Adopted by the Scottish Government in March 2015 (Marine Scotland, 2015), the Scottish National Marine Plan (NMP) establishes policies and objectives to enable the sustainable development and management of Scotland's marine resources, in both Scottish inshore (out to 12nm) and offshore waters (12 to 200NM). The NMP details 21 general policies that are applicable to all future developments and uses within Scottish waters. Relevant policies to this Project include, but are not limited to, the policies set out in Table 1-1. These general policies are supplemented by sector-specific policies, enabling policies and objectives to be targeted at particular industries. With regards to this Project, the most relevant sectoral policy sections have been included in Table 1-1:

Table 1-1 Scottish Marine plan policies considered in the MEA Report

Scottish National Marine plan	Policy Description	Section of MEA Report where addressed
General Policy 1	General planning principle	All Sections; and Section 15 – Mitigation Schedule
General Policy 2	Economic benefit	Section 1 – Introduction
General Policy 3	Social benefit	Section 1 – Introduction
General Policy 5	Climate Change	Section 4 - Physical Processes
General Policy 6	Historic environment	Section 10 – Marine Archaeology
General Policy 9	Natural Heritage	Section 5 – Benthic and Intertidal Ecology Section 6 – Fish and Shellfish; Section 7 – Marine Mammals; Section 8 – Birds; Section 9 – Protected Sites and Species; and Appendix D – Protected Sites Screening Report
General Policy 12	Water quality and resource	Section 4 – Physical Processes
General Policy 13	Noise	Section 6 - Fish and Shellfish; and Section 7 - Marine Mammals
General Policy 15	Planning alignment (marine and terrestrial)	Section 2 – Project Description; and Section 13 - Other Sea Users
General Policy 18	Engagement	All sections; Appendix B - Pre-application consultation Report; and Appendix F - Fishing Activity Study
General Policy 21	Cumulative impacts	Section 14 – Cumulative Effects
Sectoral Policy 6	Sea Fisheries	Section 12 – Commercial Fishing; Appendix C – FLMAP; and Appendix F - Fishing Activity Study
Sectoral Policy 13	Shipping, Ports, Harbours and Ferries	Section 11 – Shipping and Navigation; and Appendix E – Navigation Rik Assessment
Sectoral Policy 14	Submarine Cables	All sections

Source: Marine Scotland (2020)

1.4.4.2 Sea fisheries

The Sea Fisheries chapter of the NMP (Marine Scotland 2020) details five marine planning policies that should be taken into account when developing within the vicinity of areas utilised for fishing purposes. Of these five, three are relevant to this Project. These are: Fisheries 1, Fisheries 2 and Fisheries 3.

1.4.4.3 Shipping Ports, Harbours and Ferries

The Shipping, Ports, Harbours and Ferries chapter of the NMP (Marine Scotland 2020) details five marine planning policies that should be taken into account when considering developments. Of these five, two are relevant to cable installation activities of this Project. These are:

- Safeguarded access to ports and harbours and navigational safety;
- Safeguarded essential maritime transport links to island and remote mainland communities.

1.4.4.4 Submarine Cables

The Submarine Cables chapter of the NMP (Marine Scotland 2020) details five marine planning policies that should be taken into account when considering cable developments. Of these policies, four are relevant to cable installation activities of this Project. The relevant policies are as follows:

- Protect submarine cables whilst achieving successful seabed user co-existence;
- Achieve the highest possible quality and safety standards and reduce risks to all seabed users and the marine environment; and
- Support the development of a Digital Fibre Network, connecting Scotland's rural and island communities and contributing to world-class connectivity across Scotland.
- Safeguard and promote the global communications network.

In addition to these objectives, the NMP details four planning policies to be considered in the development of new submarine cable projects. These are: Cables 1, Cables 2, Cables 3, and Cables 4.

1.4.5 Scottish marine regions

After multiple years of public consultation and specialist studies establishing the support for, and potential areas of marine regions in Scottish waters (Scottish Government, 2015), the Scottish Marine Regions Order 2015 came into force on the 13th May 2015 and details the boundaries of the final eleven Scottish marine regions (Scottish Parliament, 2015. Of these 11 marine regions, two are relevant to this Project; Solway marine region (Scot-NI 3) and Clyde (Scot-NI 4). Within these marine regions, Regional Marine Plans will be developed by Marine Planning Partnerships. These partnerships are comprised of groups of local marine stakeholders, allowing for more focused decision making by the local community to target the issues specific to each marine region.

1.4.6 Dumfries and Galloway Local Development Plan

The Scot-NI 3 cable landfall at Portpatrick falls within the Dumfries and Galloway Local Development Plan (LDP) area. The LDP was adopted in 2019 and for coastal areas the consideration of predicted sea level rise and the effects to the water bodies is important. Dumfries and Galloway Council will seek to ensure coherence with the National Marine Plan (NMP). The plan details five policies (NE9, NE10, NE11, NE12) in relation to the coastal area against which any planning application will be assessed (Dumfries and Galloway Council 2019). The effects to these are considered in Section 4 – Physical Processes.

1.4.7 South Ayrshire Local Development Plan

The Scot-NI 4 cable landfall at Girvan, Scotland falls within the South Ayrshire LDP area. The LDP ensures that coastal developments protect the foreshore and that developments in the coastal area

are in line with the coastal strategy map. Any development must protect or improve the scenic or environmental quality of the area. Within the plan, telecommunication developments are permitted where the developer can show that the visual effect of the installation can be minimised (Ayrshire Council 2014). As the cables will be buried, following installation there will be no visual effects following installation from the proposed telecommunication cables at the landing sites.

1.4.8 Crown Estate Scotland Seabed Lease

The Crown Estate Scotland (CES) own and manage the majority of the seabed out to the 12NM territorial limit. Permission is needed for rights to lay, maintain and operate cables on areas of seabed for which they are the landlord. A Crown Estate Scotland Lease will be required for the right to install and operate the Scot-NI 3 and Scot-NI 4 cables within Scottish territorial waters.

1.5 Northern Irish consent requirements and relevant legislation

1.5.1 UK Marine and Coastal Access Act 2009

In Northern Ireland, the Department of Agriculture Environment and Rural Affairs Marine and Fisheries Division carries out licensing and enforcement functions for activities within territorial waters, under the Marine and Coastal Access Act 2009 (MCAA) Part 4. The MCAA Part 4 licences activities defined in section 66 of the Act and include construction on the seabed, offshore renewable energy installations, dredging and cable installation. The Northern Ireland Environment Agency (NIEA), an Executive Agency within the Department, will act as the appropriate licensing and enforcement authority and determine licence applications.

As part of the consideration of the marine licence application the Regulator may seek advice from their Primary Advisors and Consultees before making a decision on whether to issue the licence. The Regulator may consult any person or body it deems fit, in cases involving any matter in which that person or body has particular interest or expertise.

1.5.2 Marine Act (Northern Ireland) 2013 (The Marine Act)

Marine Act (Northern Ireland) 2013 (The Marine Act) was introduced to provide marine plans for the Northern Ireland inshore region, to provide for marine conservation zones in that region, and to make further provision in relation to marine licensing for certain electricity works in that region. The Act allows for review and alteration of the marine plan. The Act considers the marine plan in determination of authorisation for marine licence application based on the effects to the Northern Irish inshore region.

1.5.3 Northern Ireland Marine Plan

The Marine and Coastal Access Act 2009 (MCAA) and the Marine Act (Northern Ireland) 2013 (The Marine Act), require the Department of Agriculture, Environment and Rural Affairs (DAERA) as the Marine Plan Authority (MPA), to prepare marine plans. The Marine Plan has been developed within the framework of the UK Marine Policy Statement for the sustainable development of the NI marine area.

1.5.4 Ards and Northdown Borough Council Local Development Plan

The Scot-NI 3 cable landfall at Donaghdee, Northern Ireland falls within the Ards LDP area. The Ards LDP is currently being drafted following statutory consultation on the preferred options.

1.5.5 The Larne Area Local Development Plan 2010

The Scot-NI 4 cable landfall at Larne (Drains Bay), Northern Ireland falls within the Mid and East Antrim Borough Council LDP and The Larne Area Plan 2010. The plan details but is not limited to nine relevant

policies (NV1, NV2, NV4, T1, R2, MN1, MN3, COU1, COU3) in relation to the coastal area against which any planning application will be assessed (Department of the Environment 2010).

1.5.6 Crown Estate Seabed Lease

The Crown Estate (TCE) own and manage the majority of the seabed out to the 12 nm territorial limit. Permission is needed for rights to lay, maintain and operate cables on areas of seabed for which they are the landlord. TCE also request that they are informed of cables that transit the UK continental shelf (within the 200 nm limit), as other activities may be impacted. A Crown Estate Lease will be required for the right to install and operate the Scot-NI 3 and Scot-NI 4 cables within Northern Irish waters.

1.6 Objectives and scope of the Marine Environmental Appraisal (MEA) report

The approach to the MEA and proposed content of the report was presented in separate meetings to DAERA on 22nd June 2020, Marine Scotland Licencing Operations Team (MS LOT) on the 24th June 2020 and NatureScot (previously SNH) on 9th July 2020. During the meetings, an overview of the planned cable installation was presented followed by a discussion of the potential pressures to be assessed further in the MEA Report. The authorities provided details of relevant departments to contact for specific information on habitats, species and fishing. The objective of the meetings was to ensure the proposed approach to the assessment was fit for purpose and proportionate.

This MEA Report provides an overview of the baseline environment within the proposed application corridors for each of the Scot-NI 3 and 4 cable routes (a 500m wide corridor within which the cable will be installed). The baseline environment includes physical and biological processes, and the human environment. The MEA identifies and assesses potential effects from the proposed installation activities. A series of supporting documents have been produced for the Project which have been drawn upon or referenced throughout the MEA Report (listed in Table 1-2).

Table 1-2 Supporting documents for the Marine Licence application

Appendix	Document
A	Intertidal Survey Report
B	Pre-Application Consultation (PAC) Report
C	Fisheries Liaison Mitigation Action Plan (FLMAP)
D	Protected Sites Screening Assessment
E	Navigation Risk Assessment (NRA)
F	Fisheries Activity Study (FAS)
G	Marine Archaeology Technical Report
H	Underwater Noise Assessment

1.7 Work undertaken to date

1.7.1 Cable route design

The selection of the Scot-NI 3 and 4 application corridors bring several engineering benefits, as follows:

- Utilising an existing Beach Manhole (BMH) for the landward connection of the cable at three out of the four landing sites;

- Reducing the number of cable crossings along the route and minimising the number of power cable crossings; and
- Avoidance of reef areas or other sensitive habitats wherever practicable.

Cable route design has been informed by the following process and is ongoing.

1.7.2 Desk-top Study

A DTS was produced to inform pre-survey route planning and the marine cable route survey (Global Marine Group 2020a). The DTS provides comprehensive and accurate information for cable engineering, system installation, cable protection and identification of constraints relating to the Scot-NI system.

As part of the DTS, site visits to all possible landing points were undertaken to gather information (Global Marine Group 2020b). Factors considered during route development included archaeology, seabed sediments, gradients, coastal erosion, currents and tides, fishing intensity and other marine users, restrictions and artificial hazards, and environmental designations.

1.7.3 Marine and intertidal surveys

Marine surveys were undertaken between April and July 2020 across the 500m wide survey corridors, centred on the proposed Scot-NI 3 and 4 cable routes. The objective of the surveys was to ascertain the seabed conditions within the cable corridor prior to identifying the final installation route in relation to bathymetry, geology, ecology, marine archaeology and other seabed features detected during survey, e.g. infrastructure crossings, obstacles, wrecks, and man-made objects.

The following surveys were undertaken:

- Geophysical survey
- Geotechnical survey
- UXO survey
- Intertidal survey – (Donaghadee landfall as located in Area of Special Scientific Interest (ASSI))
- Intertidal Archaeological walkover surveys (all landfalls)

The intertidal and archaeological survey reports for Scot-NI 3 and 4 are included in Appendix A.

1.7.4 Consultation and stakeholder engagement

GM introduced the Scot-NI Project to the key regulators (MS-LOT, DAERA, TCE and CES) in February 2020. Intertek followed up by providing information to key stakeholders on the proposed content of the MEA Report and a request for feedback on the approach and availability of data or information to inform the MEA. As outlined in Section 1.6 meetings were also held with DAERA, MS-LOT and NatureScot (SNH) in June/July 2020. The consultation undertaken to date is included in Appendix B.

In addition to key Regulator consultation, the following consultation has been undertaken.

1.7.4.1 Pre-Application Consultation (PAC)

PAC events were held in September 2020 to engage with the public and stakeholders. Due to Covid-19 these were held as online events. In accordance with Section 24 of the Marine (Scotland) Act 2010, a Consultation Report has been prepared and is included as part of Marine Licence Application package (see Appendix B).

1.7.4.2 Fishing Liaison Mitigation Action Plan (FLMAP)

A Fisheries Liaison Officer (FLO) has been appointed for the Project. Consultation with the fisheries commenced in March 2020 prior to survey operations and will continue until the end of cable installation. A FLMAP has been prepared, identifying potential effects of the Project to commercial fisheries and other marine users; the FLMAP also sets out measures to manage and mitigate these effects where required (see Appendix C).

1.7.5 Crossing Agreements

Scot-NI 3 crosses two fibre-optic cables and one power cable; Scot-NI 4 crosses 4 fibre-optic cables and one power cable. Each crossing of existing infrastructure will require a crossing agreement, which sets out the design and agreed terms for installation over an existing asset. Crossing agreement discussions are currently ongoing between asset owners.

1.8 MEA Report Structure

The MEA Report has been produced to inform decision makers of the existing conditions within the Scot-NI 3 and 4 marine cable corridors and to provide information on the potential effects. The MEA Report covers both Scot-NI 3 and Scot-NI 4 for both Scottish and Northern Irish jurisdictions. Each topic Section provides the baseline and assessment for Scot-NI 3 and Scot-NI 4. The structure is outlined in Table 1-3.

Table 1-3 Structure of MEA Report

Section	Topic
1	Introduction
2	Project description
3	MEA Methodology and zones of influence
4	Physical processes
5	Benthic and intertidal ecology
6	Fish and shellfish
7	Marine mammals and reptiles
8	Birds
9	Protected sites and species
10	Marine archaeology
11	Shipping and navigation
12	Commercial fishing
13	Other sea users
14	Cumulative effects
15	Mitigation Schedule
16	Conclusions

2. PROJECT DESCRIPTION

2.1 Section overview

This chapter presents information on the planned installation of the marine components of the Scot-NI 3 and 4 replacement cables.

The key activities to be undertaken during installation are:

- Route preparation: pre-lay grapnel run (PLGR) and route clearance (RC);
- Cable installation (plough burial, surface lay);
- Shore end installation; and
- Post lay inspection and burial (PLIB).

All products, equipment and/or vessel specifications detailed in this section are indicative. In the event that the Project does not/cannot use the specified equipment similar products will be selected.

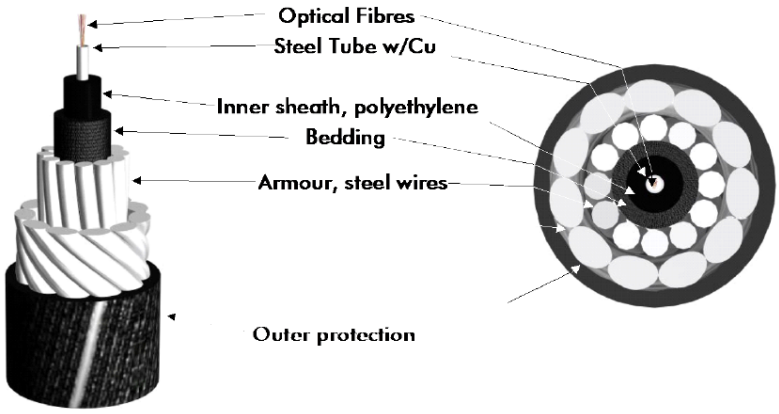
BT recognise the importance of considering the decommissioning process at an early stage. A separate MEA will be undertaken prior to decommissioning of the existing Scot-NI 1 and Scot-NI 2 cables to inform consideration of cable removal. In some circumstances the least environmentally damaging option may be to leave some sections or all of the cable in-situ as this minimises disturbance to the marine historic and natural environment and other sea users. Decommissioning will be agreed in consultation with the regulators on the basis of the state of the cable, ecological criteria, relevant industry guidelines and a technical-financial evaluation of the techniques available. An additional Marine Licence application will be made if required at that time.

2.2 Submarine cable description

Burial of the cable is required to protect the optical fibre transmission path over the entire service life of the system and prevent interaction with the seabed and other sea users.

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 'unrepeatered 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.

Figure 2-1 Cross section of URC-1 fibre optic cable (rock armour variant)



2.3 Landfalls

Three of the existing Beach Manholes (BMH) from Scot-NI 1 and Scot-NI 2 will be used and a new BMH will be constructed at Larne (Drains Bay). Details of the four landfall site locations is provided in Table 2-1.

Table 2-1 Landfall sites

Landfall Site	Location	BMH Latitude	BMH Longitude
Girvan	SCOT-NI 4	55° 13.652' N	4° 51.581' W
Portpatrick	SCOT-NI 3	54° 51.150' N	5° 07. 685' W
Larne (Drains Bay)*	SCOT-NI 4	54° 52.893' N	5° 50.304' W
Donaghadee	SCOT-NI 3	54° 37.395' N	5° 32.076' W

The targeted depth of cable burial from the BMH to Low Water Mark is 2m. Offshore the target burial depth will be to 1m below the seabed.

2.4 Pre-installation works

The objective of route preparation (route clearance and PLGR) is to ensure that the route is, as far as reasonably possible, clear and free from debris in order that the installation is not hindered.

At the conclusion of these activities, the route shall be as far as reasonably possible:

- A pre-lay ROV survey of the planned burial sections for each route will be conducted immediately ahead of the PLGR/RC operations to re-confirm the route is clear of pUXO.
- Clear of any crossed out-of-service (OOS) submarine cable systems.
- Clear of any nearby chains, wires, ropes, warps, abandoned fishing equipment and other items of equipment located on the seabed.

2.4.1 Route clearance

2.4.1.1 Out of Service Cable

The presence of OOS cables have been identified during the DTS of the proposed cable routes, and subsequently verified during survey operations. These will be cleared and made safe in accordance

with International Cable Protection Committee (ICPC) recommendations[1]. Prior to cable installation activities commencing, the vessel will move to the known position of each OOS cable, deploy the grapnel and start clearance activities.

Route clearance operations will include cutting the existing OOS cable, recovering the parted cable ends to deck, 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 minimise the likelihood 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 the cable ends in place and minimise the risk of fastening to fishing gear, in accordance with ICPC recommendations.

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.

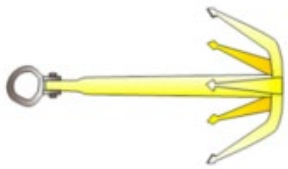
A range of cable recovery tools will be available for use, typically a 'Flatfish' cutting grapnel, de-trenching grapnel, and 'Rennie and Gifford' grapnel (see Figure 2-4), together with the necessary rigging equipment is used. In summary, route clearance operations shall include:

- 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.

2.4.2 Pre-lay grapnel run

Pre-lay grapnel run (PLGR) will be conducted following route clearance works. Typical tools are shown in Figure 2-2 below, which will generally penetrate 0.4m - 1m into the seabed under suitable conditions. The specific grapnel rigging may vary depending on the seabed conditions identified on site.

Figure 2-2 Typical PLGR Equipment

Spearpoint Grapnel	
Rennie Grapnel	
Gifford Grapnel	

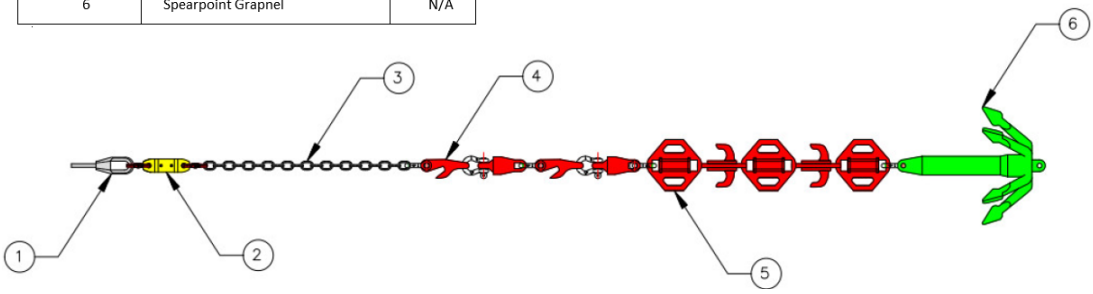
[1] International Cable Protection Committee (ICPC) Recommendation Number 1: Management of Decommissioned and Out of Service Cables. Issue 14A, 12 June 2020. Available by request: http://www.iscpc.org or secretariat@iscpc.org

Flatfish Grapnel (cutting and non-cutting variants used)	
De-trenching Grapnel	

A PLGR 'Grapnel Train' (Figure 2-3) will be deployed from the vessel to the seabed and the vessel will manoeuvre along the planned cable route paying out grappling rope/winch wire. The amount of grappling rope/winch wire to be paid out will be dependent on the depth of water. Once the grapnel train has been deployed the ship will move along the planned cable route.

Figure 2-3 Typical PLGR Chain

Item No.	Description	SWL (Te)
1	48mm Winch Wire	100
2	Swivel	15
3	32mm chain, 20m	31.5
4	Gifford Assembly	13
5	Rennie Assembly	13
6	Spearpoint Grapnel	N/A



2.5 Cable installation

This section details the specific installation activities associated with the installation of the Scot-NI 3 and Scot-NI 4 cables and follows the typical installation sequencing. Target burial depth for cable installation offshore is 1m below seabed surface.

2.5.1 Installation vessels

The cable lay will be performed on a 24-hour basis to ensure minimal duration of navigational impact on other users and to maximise efficient use of suitable weather conditions and vessel and equipment time. The progress speed for plough installation is approximately 600m/hour with speed depending on seabed sediment conditions, achieving target burial depth and weather conditions. Cable may be surface laid in areas of hard ground or at cable crossing locations. Where the cable is surface laid, cable lay vessel speeds may increase up to 2km/hr.

In addition to the installation vessel, additional vessels may be involved with the operation if required by weather conditions, safety and best practice. Although exact details may change, it is likely that the vessels to be used will consist of those outlined below. All vessels will comply with requirements as set out in the Navigation Risk Assessment (Appendix A).

2.5.1.1 Main lay vessel (MLV)

The MLV is a specialist 'cable ship' equipped with dynamic positioning systems, designed specifically to carry and handle long lengths of armoured fibre-optic cable (Figure 2-4). A plough, Trenching ROV and Work Class ROV will also be mobilised to the vessel for cable laying activities. Following mobilisation, the cable will be loaded onto the ship at the cable factory and then transit to the worksite.

Figure 2-4 Typical MLV

2.5.1.2 Ancillary support vessel

In addition to the MLV, a dedicated ancillary vessel may be used for all ancillary operations, including Route Clearance, Pre-Lay Grapnel Run (PLGR), Pre-Lay Inspection and Post-Lay Inspection & Burial (PLIB) operations. The ancillary support vessel will be equipped with a remotely operated vehicle (ROV) for Pre-Lay and Post Lay Inspection and Burial operations.

2.5.1.3 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.

2.5.1.4 Shore end support vessels

For all shore end operations, multiple small inshore vessels will be used to support the cable pull in, the lowering of the cable onto the seabed and any burial of the cable in waters depths less than 15m.

2.5.1.5 Rock-placement vessel

No rock protection has been proposed for the Project. However, a rock placement vessel is included as a potential contingency external cable protection measure (dependant on the outcome of 3rd party crossing agreements). If rock is required at any of the crossings along the cable corridor, a rock-placement vessel will be deployed. This will be equipped to carry sufficient rock material to provide

the necessary protection at crossings and will comprise of a fall pipe, from, which the rock can be accurately deposited from the vessel to the seabed in a controlled manner.

2.5.2 Cable lay and burial

Once the MLV arrives on site, the first shore end will be landed. The MLV will then lay away from the first shore end and bury the cable via the plough, however there will be certain sections (such as at crossing points) where the cable will be laid on the surface on the seabed and will not be ploughed. The MLV will continue plough burial to the second shore end position. After the second shore end has been landed post lay inspection burial (PLB) will be conducted with an ROV to bury sections of the cable which have been surface laid, for planned post lay burial, or in sections of the seabed which were unsuitable for plough burial. This process will then be repeated for the next cable.

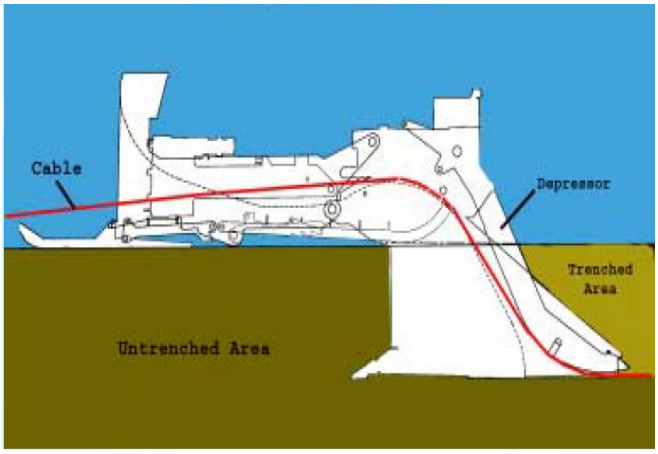
The key steps associated with the cable lay and burial are outlined below.

2.5.2.1 Plough installation

Simultaneous cable installation with plough burial is the planned method of installation for the majority of the offshore route. Once the shore end has been landed, the MLV will then lay away from the shore end position and tow the plough behind the vessel. The cable feeds into a bell-mouth at the front of the plough and is guided down through the shear to emerge in the trench (Figure 2-5).

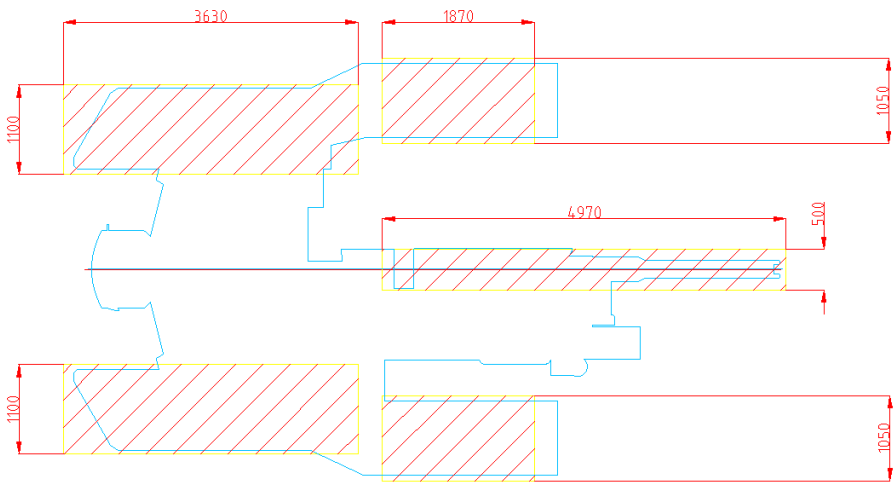
Hydraulically adjustable skids are used to provide steering on the plough and the shear is used to vary the burial depth. On-board sensors ensure the cable passes through the plough in a safe manner before being buried. The sensors also record the burial depth achieved, for this Project the target burial depth is 1m subject to seabed conditions.

Figure 2-5 Plough schematic



The skids have an approximate footprint of 7m^2. The dimensions and footprint of the plough in contact with the seabed is outlined in Figure 2-6 and demonstrated by the hatched areas. The plough dimensions are indicative of the size of equipment to be used. Burial by plough will be carried out at a rate 600m/ hour (depending on the number of crossings and plough recoveries required).

Figure 2-6 Plough footprint

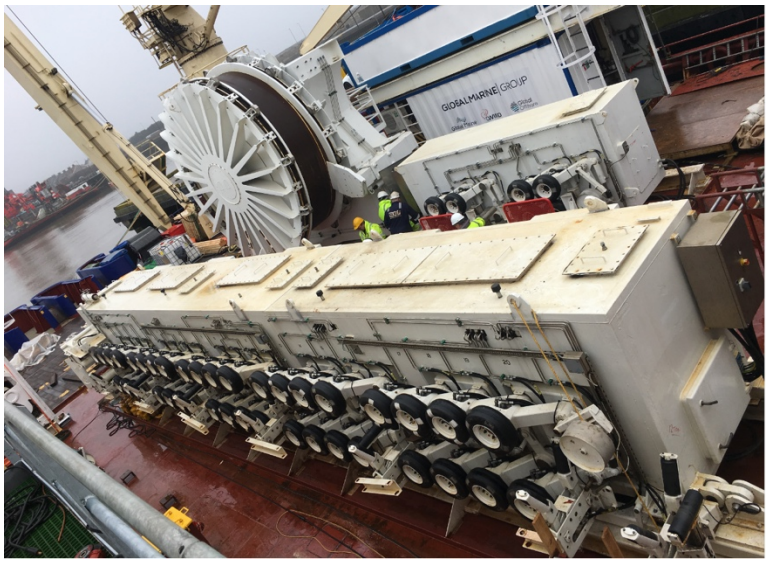


2.5.3 Surface lay

Where conditions are unsuitable for plough burial, the cable will be surface laid. This could be in areas of hard seabed, where burial is not achievable, or at cable crossings.

The MLV installs the cable by passing it through the on-board cable engine (Figure 2-7) which assists in moving the cable to the stern sheaves where the cable is over boarded and deployed to the seabed.

Figure 2-7 Typical Cable Engine



Prior to the start of operations seabed topography will have been reviewed and the amount of slack required in the cable will have been determined. The cable will be installed using cable lay software to ensure that the lay angle, payout speed, slack and tension fall within the design limits of the cable and to also ensure (where possible) that the cable naturally confirms to the seabed topography.

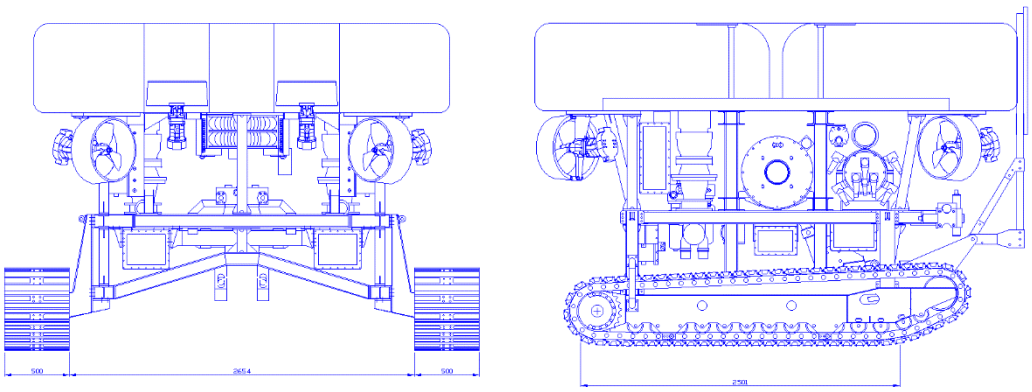
2.5.4 Post lay inspection and burial

On completion of cable laying and plough burial operations there will be areas along the route where it has not been possible to utilise the plough such as In-Service cable crossings where the cable has been surface laid over the third party cable and these areas will be buried by means of a jetting ROV

(Figure 2-8). This operation is referred to as Post Lay Inspection and Burial (PLIB). The jetting ROV is tracked to allow it to sit on the seabed and follow the cable whilst employing water pumps to inject seawater either side of the cable which fluidises the seabed and allows the cable to sink below the surface. The Atlas ROV is designed with two 500mm wide tracks (Figure 2-8) each with a seabed contact length of 2,500mm; the target burial depth is 1m. It should be noted that the seabed will naturally reinstate to its original profile shortly after completion of the works.

Figure 2-8 Atlas ROV jetting trencher

Figure 2-9 Atlas ROV Schematic



2.5.5 Inshore Post Lay Burial (PLB)

Inshore burial from the Low Water Mark (LWM) out to the position where depths are suitable for plough burial to commence often uses a diver assisted jet burial tool fitted with a suitable burial jet legs for the target burial depth (Figure 2-10). The PLB equipment will be mobilised onto a suitable shallow draft vessel which will undertake these operations separately to the MLV. On completion of the shallow draft vessel mobilisation, the MLV will complete trials before commencing PLB operations.

Figure 2-10 Typical Diver Assisted Jet Burial Tool

The PLB vessel will set up close to the landfall and the burial tool will be deployed to the beach where the cable will be loaded into the tool. Having run up the water pump, the jet legs will then be lowered to the required PLB depth as it is slowly commencing burial. This operation will continue until the burial tool approaches the plough down position, when it will be recovered to the PLB vessel, and divers will post-lay bury the final section of cable using surface fed burial lances. PLB of the inshore section could also take place from the plough down position towards the beach.

2.5.6 Diver swim survey

Once burial operations have been completed a final diver swim survey pass will be conducted. This will provide a video survey of the trenched cable.

2.5.7 Cable jointing

The operations are planned for the MLV to install both cables without the requirement for jointing onboard. There are circumstances however where it may be necessary for the vessel to conduct jointing operations. Joints are constructed on board the vessel before the cable laying operation continues.

Where cable joints are required, the MLV may remain stationary for up to one day to create one joint. If joints are required, sensitive areas, e.g. shipping channels, anchoring grounds, will be avoided as far as reasonably practicable.

2.6 Cable crossings

Engineering of all crossings will be designed in accordance with industry best practice (namely ICPC Recommendation No.3.) Crossing designs will also be subject to crossing agreements with the individual cable asset owners. Asset owners will be notified in advance of operations in line with the individual crossing agreement conditions. The cable crossing locations are identified in Figure 2-11 (Drawing reference: P2303-CRSS- 002) A summary of the Scot-NI 3 and Scot-NI 4 crossings are provided in Table 2-2 and Table 2-3 below.

Table 2-2 Crossings Scottish waters

Asset	Owner	Type
Scot-NI 3		
SCOT-NI 1	British Telecommunications plc	Telecoms
Scot-NI4		
LANIS 3	Vodafone	Telecoms
SCOT-NI 2	British Telecommunications plc	Telecoms
Western Link	National Grid and Scottish Power	Power
SIRIUS North	Virgin Media	Telecoms

Table 2-3 Crossings Northern Irish waters

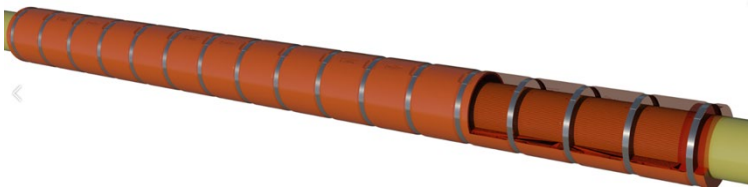
Asset	Owner	Type
Scot NI 3		
Hibernia Atlantic	Hibernia Atlantic	Telecoms
Western Link	National Grid and Scottish Power	Power
Scot-NI 4		
Hibernia Atlantic	Hibernia Atlantic	Telecoms

2.7 Proposed Integral cable protection

2.7.1 High Density Polyethylene (HDPE) Protection (Uraduct ®)

Where the proposed cables cross existing power and telecoms cables, high density polyethylene protection (HPDE) Uraduct® a synthetic material may be fitted to the cable as integral protection (Figure 2-11). 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 (Section 2.5.4) 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.

Figure 2-11 Typical High-Density Polyethylene Protection (HDPE) Cable Protection



2.7.2 Articulated pipe

For this Project, articulated pipe (AP) is planned to be fitted from the end of the BMH duct to the LWM or 10m water depth contour (or other position as appropriate) subject to burial conditions (Figure 2-

12). The maximum external diameter will be approximately 150mm. It may be that the length of AP installed may extend beyond the 10m contour in the event that seabed conditions prevent/ limit burial or where the cable is at risk of exposure and damage from external forces. The AP will also provide additional protection and stability to the cable in areas where it may move during storm conditions.

In some cases, the AP may require clamping and pinning to the seabed to ensure tidal conditions do not cause abrasion damage to the AP and cable. The clamping and pinning operations will be conducted by divers.

Figure 2-12 Articulated Pipe

The lengths of AP to be included in the marine licence applications are provided in Table 2-4.

Table 2-4 Articulated Pipe Lengths required for each landfall

Cable landfall	Length of Articulated Pipe
Portpatrick	275m (HWM) to 10m depth contour)
Donaghadee	900m (BMH duct to 10m depth contour)
Girvan	1500m (BMH duct to 10m depth contour)
Larne	810m (BMH duct to 10m depth contour)

2.8 Contingency external protection measures

The proposed installation measures are detailed in the above project description. However, a number of contingency external protection measures are included to allow a level of flexibility during the installation to allow decisions to be made during operations to ensure stability of the cable, and to ensure that the cable can be protected in unforeseen circumstances.

Conservation bodies have previously noted that any additional or external protection should be included in any initial application to avoid subsequent applications being made post-installation. Therefore, whilst additional external protection such as rock bags are not expected or planned, a number have been included as a 'worst case' contingency.

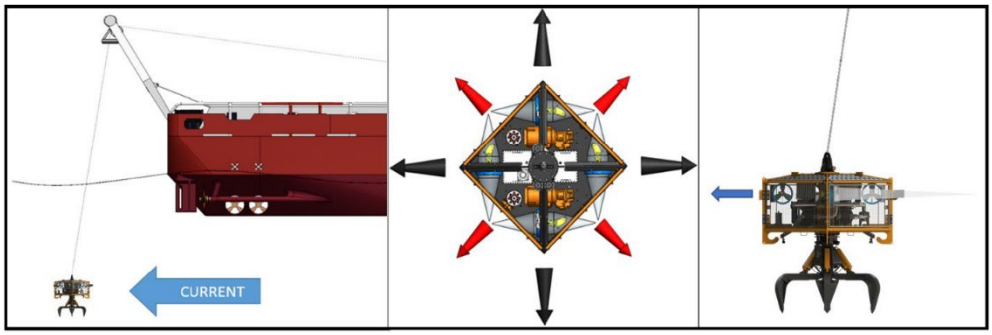
In areas where cable burial is not possible due to seabed conditions, a number of contingency external protection measures could be implemented to ensure safety of the cable and also safety of other sea users. This section details the contingencies included in this application.

2.8.1 Boulder re-positioning

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 (Figure 2-13).

Figure 2-13 Equipment used for boulder picking



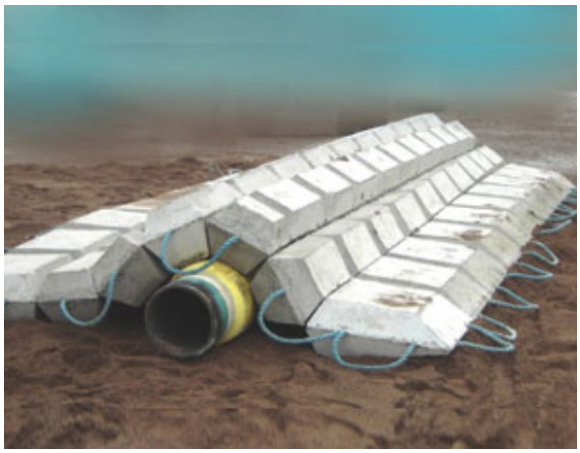
2.8.2 Concrete mattressing

Concrete mattresses (Figure 2-14) are matrices of interlinked concrete blocks which form a close-fitting layer over the cable to provide a strong protective cover to prevent potential impact and snagging by fishing gear or anchors. Typically, concrete mattresses are 6m long by 3m wide by 0.3m high.

The mattresses are usually installed via a crane from the MLV or the ancillary support vessel; which lowers them one at a time or in batches using a purpose designed frame.

Mattresses are typically used in combination with rock protection e.g. at third-party asset crossings, or in areas where the main risk to cables is from fishing activities. The number of mattresses included as a contingency measure within the application are outlined in Section 3-2.

Figure 2-14 Concrete mattress



2.8.3 Rock bags

Rock bags are typically installed on top of the cable and are sized to suit each scenario. The size and weight of the rock bags to be used will ultimately be dependent on the findings of the Cable Burial Risk Assessment (CBRA) and post installation survey results. No rock bags are currently proposed for the Scot-NI 3 and 4 routes. However, a contingency measure of 10 rock bags per licence application have been included. The contingency footprint of 10 rock bags per jurisdiction is provided in Section

3.As the current velocities rarely exceed $1ms^{-1}$ across the planned Scot-NI 3 and 4 cable routes, the expected size of rock bags to be used would likely be 4Te. Similar to mattresses, rock bags are deployed via a crane as shown in Figure 2-15.

Figure 2-15 Rock bag deployment

2.8.4 Rock placement

Rock placement may be a contingency external 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). The dimensions for the likely worst-case rock berms and locations (if required) are provided within Section 3.

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.

2.9 Cable Landing

2.9.1 Shore end landings

Three of the four shore end landings are likely to be carried out as direct shore end (DSE) landings (Figure 2-16). The fourth is likely to be a pre-lay shore end (PLSE). An alternative option is a post lay shore end. The following standard practice will be undertaken for each shore end albeit with a slight variation in the sequence of events.

A beach and dive team, along with the necessary equipment and vessels to carry out the cable landings, will be mobilised to each site prior to the arrival of the MLV or PLSE vessel.

A pre-lay diver swim survey of each route will be carried out prior to the arrival of the MLV/PLSE vessel, from the LWM to the agreed plough down point /proposed position of the MLV/PLSE vessel. Key positions, such as, alter courses (A/C), holding anchors, other in service and out of service cables, will be marked with temporary buoys or similar.

Beach inspections/walk overs will be undertaken prior to any operations taking place and photographic and video records taken.

The beach team will then prepare the landfall and position the equipment for cable pull in operations (position the quadrant and excavator) with due care and consideration for the environment and general public.

Once preparations have been completed and the MLV/PLSE vessel has arrived at the planned support vessel will transfer a messenger line will be transferred to the ancillary support vessel to take ashore. A diver will swim ashore through the surf zone with the messenger line and hand it to the beach team. The beach team will then pass the messenger line around a cable pull-in quadrant (if required), to assist the cable to be pulled in (a quadrant is used when no direct pull in from the vessel to the beach man-hole is possible).

A hauling line will then be attached to the messenger line which will then be transferred back to the MLV/PLSE vessel for the cable to be attached for hauling ashore.

Under the control of the Beach Master, the second excavator will commence the pull in of the cable ashore which will be supported in the water by buoys attached to the cable on the MLV/PLSE as it is paid out. The excavator will slowly move along the beach while monitoring the cable tension under the control of the Beach Master.

Once the cable is ashore and confirmed to be in position over the planned Route Position List (RPL), divers in small support craft will commence the removal of the buoys allowing the cable to lay onto the seabed. During this process, the dive team will check that the cable is lying satisfactorily on the seabed.

The dive team will return the swivel and buoys back to the MLV/PLSE vessel.

Depending if the shore end landing is a first or second end the MLV/PLSE will commence cable installation or move clear of the area.

Figure 2-16 Typical direct shore landing from MLV

2.9.2 Beach Works

The end of the duct which provides access to the BMH will be exposed on the beach using an excavator. The beach team will then remove any duct cover and attach the pre-installed rope to the end of the cable on the beach and pull into the BMH and secure using an armour wire anchor clamp (AWAC) fitted to the wall of the BMH.

A trench to a target depth of 2m deep will then be dug using an excavator down the beach to the low water mark (LWM) and the cable/AP lowered into the bottom of the trench and the burial depth measured and recorded.

After depth verification the trench will be backfilled.

On completion of the cable burial, the beach profile will be restored, and all machinery, equipment and personnel removed from site. Cable pull in is likely to take up to 2 days and completion of the cable burial and restoration of the beach will take up to 5 days per landfall.

2.10 Indicative Programme

Following approval of the Marine Licence applications, cable installation is currently planned to commence in the 3rd quarter 2021 and be complete by the end of the year . Timings may vary due to weather and/or other operational reasons.

The exact timing of the landfall works will be dependent upon the offshore works, marine licensing and onshore permits and conditions and notifications will be issued at agreed schedule prior to operations closer to the project commencement.

3. MEA ASSESSMENT METHODOLOGY

This Section of the MEA outlines the environmental assessment methodology, and then provides information on the project footprint which forms the basis of the assessment sections of this MEA. For each potential pressure, the sensitivity is described, the receptor considered, and the pressure is then either considered further in the MEA or screened out of the assessment.

3.1 Assessment Methodology

3.1.1 Overview

To assess the significance of the effect of the marine licensable activities of the cable installation process on the environment the appraisal followed a stepped process:

- Characterisation of the baseline environment and sensitive receptors
- Establish the potential pressures from the Project and their respective zones of influence
- Evaluate the significance of the effect
- Establish mitigation (where required)

3.1.2 Characterisation of baseline environment

Data was gathered to inform the Scot-NI 3 and Scot-NI 4 application corridors through a review of relevant publicly available literature and where applicable supplemented by survey data. In addition to this, consultation with relevant stakeholders and consultees was undertaken. This information has been used to establish the baseline conditions within the Scot-NI 3 and 4 application corridors. A number of specialist studies/assessments have been undertaken to inform the MEA as detailed in Section 1.

3.1.3 Pressure identification and zone of influence

3.1.3.1 Pressures

Pressures are the mechanism through which an activity has an effect on any part of the ecosystem. The nature of the pressure is determined by the activity type, intensity and distribution. A list of marine physical / chemical and biological pressures and their definitions has been formally agreed by the OSPAR Intercessional Correspondence Group on Cumulative Effects (ICG-C) (OSPAR 2011) and has been used in the assessment. The ICG pressure list does not include human pressures, and therefore, categories have been developed based on industry experience. In order to identify the appropriate pressures on biological features the following guidance has been considered:

- JNCC Marine Activity and Pressures database (PAD) (JNCC 2020); and
- Feature Activity Sensitivity Tool (FEAST) for identifying the sensitivity of marine habitats and features to the effects of cable installation (MS 2020).

Biological receptors which have protected status have been fully considered in Appendix D - Protected Sites Screening Assessment and summarised in the biological Sections of this MEA Report. Further information on the methodology used in the Protected Sites Screening Assessment is included in Appendix D.

The interaction of the Project with other sea users has been considered within Appendix C – Fisheries Liaison Mitigation Action Plan (FLMAP),Appendix E – Navigation Risk Assessment (NRA) and Appendix F – Fishing Activity Study (FAS) and referred to accordingly in the human environment Sections of this MEA Report.

3.1.3.2 Zone of influence

The zone of influence (ZOI) refers to the spatial extent over which the activities of the Project are predicted to have an effect on sensitive receptors. The ZOI which have been identified for each receptor topic, are set out in Section 3.3, Table 3.3 and referred to in the relevant topic chapters. The ZOI identifies the extent of the area to be considered in the assessment. Where receptors are mobile e.g. mobile species or mobile users of the sea, the assessment considers whether there is potential for the receptor to enter the ZOI.

3.1.4 Evaluation of significance

Effects only occur when an impact is present within an environment that is sensitive to it. An impact is the consequence of the pressure i.e. a predicted change in the baseline environment. The effect is the consequence of the impact and is usually measurable.

If appropriate, and typically based on the findings of supporting studies, pressures have been screened out for further assessment in the MEA. The screening decision and justification is provided in Section 3.2.3, Table 3-3.

In assessing the significance of the effect, the magnitude (the spatial extent of the impact, the duration and frequency) and sensitivity, recoverability and importance of the receptor are considered. The following definitions[1] of significance have been used in the assessment:

- Negligible – An effect capable of measurement but without significant consequences.
- Not Significant – An effect which causes noticeable changes in the character of the environment but without significant consequences.
- Minor – An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- Moderate – An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- Significant – An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
- Very Significant – An effect which, by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment.
- Profound – An effect which obliterates sensitive characteristics.

Effects which are Imperceptible, Not Significant and Minor typically do not require mitigation measures other than compliance with environmental statute and best practice. Effects which are classified as Moderate or above would typically be unacceptable without the implementation of project specific mitigation designed to avoid, abate or reduce the significance of the effect.

3.1.5 Establish mitigation

The Project has been developed through an iterative process which involved seeking to avoid or reduce potential environmental effects through routing of the marine cable. This was the first project specific step in mitigating potential effects by seeking to avoid or reduce environmental disturbance.

Embedded mitigation measures which form part of the design are an inherent part of the project. These are constraints built into the design of the Project and described in the MEA to demonstrate that the Applicant will comply with national and international statute and best practice guidance as determined by the cable industry as the basic standard for how to proceed on a project. The

[1] Adapted from EPA (2017)

assessment assumes that these embedded mitigation measures will be implemented when determining the significance of the potential effects.

All embedded mitigation to be implemented has been collated in a Mitigation Schedule presented in Section 15.

3.2 Project Footprint and Zone of Influence

3.2.1 Overview

The marine licence applications for the Scot-NI Project are for the activities associated with installation of the cable.

The installation footprints of the equipment to be used during installation (Section 2 - Project Description) have been provided in Table 3-1. The installation footprint and the potential pressures of cable installation activities have been used to establish the ZOI each pressure has on an environmental receptor.

3.2.2 Installation footprint

The Scot-NI Project consists of four marine licence applications, two to Marine Scotland Licensing Operations Team (MS LOT) (one for each application corridor) and two to Department of Agriculture, Environment and Rural Affairs (DAERA) (one for each application corridor). The approximate footprints for each licensable activity within each jurisdiction are provided in Table 3-1. Table 3-2 provides the approximate footprints for worst case contingency external cable protection measures. The use of contingency external cable protection is not currently proposed but may be required at the time of installation.

Table 3-1 Installation footprint

Activity	Approximate Dimension	Approximate Installation Footprint (km^2)			
		Scot-NI 3		Scot-NI 4	
		Scot	NI	Scot	NI
Pre-lay grapnel run (PLGR) Note 1	2m wide x length of cable corridor Note 2	0.040km^2	0.044km^2	0.115km^2	0.055km^2
Installation Plough (skids + share) Note 3	2.6m wide x length of cable corridor Note 2	0.052km^2	0.057km^2	0.150km^2	0.072km^2
Installation Plough (share) Note 4	0.5m wide x length of corridor Note 2	0.010km^2	0.011km^2	0.029km^2	0.014km^2
Tracked – Remotely Operated Vehicle (T-ROV)	1m x length of Post lay inspection and burial (PLIB) Note 5	N/A	0.0001km^2	0.0004km^2	0.0001km^2

Note 1: PLGR is within the installation footprint of the plough and therefore is not an additional footprint.

Note 2: Scot-NI 3 Scottish corridor 20km; Scot-NI 3 NI corridor – 22km; Scot-NI 4 Scottish corridor – 57.5km; and Scot-NI 4 NI corridor – 27.5km.

Note 3: Based on approximate measurements of an indicative plough to be used for the installation (Figure 2-6). This is subject to change depending on the availability and suitability of equipment at the time of installation. This footprint is worst case as plough installation will not be used for the entire length of the installation route.

Note 4: Based on approximate burial depth of up to 1m. for the length of the cable. This footprint is worst case as plough installation will not be used for the entire length of the installation route.

Activity	Approximate Dimension	Approximate Installation Footprint (km²)			
		Scot-NI 3		Scot-NI 4	
		Scot	NI	Scot	NI

Note 5: As for the plough, dimensions are indicative of typical equipment used by Global Marine during cable installation and for the following PLIB lengths – Scot-NI 3 Scottish waters PLIB 0m; Scot-NI 3 NI waters PLIB 100m; Scot-NI 4 Scottish waters PLIB 400m; Scot-NI 4 NI waters PLIB 100m .

Table 3-2 Worst case contingency external cable protection footprint

Activity	Approximate Dimension	Footprint (km²)			
		Scot-NI 3		Scot-NI 4	
		Scot	NI	Scot	NI
Rock Bags Note 1	2.6m x 2m = 5.2m² per rock bag (4T bag)	52m²	52m²	52m²	52m²
Concrete Mattress Note 2	6m x 3m – 18m² per mattress	N/A	126m²	144m²	N/A
Rock Berm Note 3	90m x 15m = 1,350m² + 50% contingency (675m²) = 2025m² 72 x 15m = 1,080m² + 50% contingency (540m²) = 1620m²	N/A	2025m²	1620m²	N/A

Note 1: A total of 10 rock bags per jurisdiction have been included on each Marine Licence application as a contingency.

Note 2: A total of 7 mattresses for Scot-NI 3 and a total of 8 mattress for Scot-NI 4 have been included in the Marine Licence applications as a contingency.

Note 3: Rock berm dimensions Include 50% additional contingency – the location of the contingency external cable protection measure is likely to be at the Western Link power crossing only (as a contingency if required by crossing agreements). The approximate location of the Western Link power crossing - Scot-NI 3: 3.340484W, 55.185068N; and Scot-NI 4: 5.285494W, 54.660417N.

3.2.3 Pressure identification, zones of influence and screening

As defined in Section 3.1.3 above, the pressures considered in this assessment have been identified from the ICG-C pressure list (OSPAR 2011) in addition to review of the JNCC Pressure Activity Database (JNCC 2020) and the FEAST tool for identifying the sensitivity of marine habitats and features to the effects of cable installation (MS 2020). Several pressures have been identified for each topic area as outlined in Table 3-3. For each pressure identified, Table 3-3 presents any applicable embedded mitigation, the installation footprint and associated zone of influence and a screening decision as to whether assessment within the MEA is required.

Table 3-3 Pressures, zone of influence and screening decision

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Physical change (to another substratum type)						
The immediate vicinity of contingency external cable protection (if used): **Contingency external cable protection**: The worst-case footprint for substratum change has been calculated as follows: ▪ Individual rock bag placement (4 tonne bag) = 5.2m² per 4 tonne bag ▪ Concrete mattresses at crossings 6m x 3m= 18m² (per mattress). ▪ Rock berm footprint assumed to be required for power cable crossing with Western Link: ▪ Scot-NI 3: 90m x 15m² + 50% contingency (675m²) Scot-NI 4: 72m x 15m² + 50% contingency (540m²)	**Scotland jurisdiction** **Scot-NI 3**: Rock bag: 52m² **Scotland jurisdiction** **Scot-NI 4:** Rock bag: 52m² Concrete mattress: 144m² Rock berm: 1620m² **NI jurisdiction** **Scot-NI 3:** Rock bag: 52m² Concrete mattress: 126m² Rock berm: 2025m² **NI jurisdiction** **Scot-NI 4:** Rock bag: 52m²	Physical processes	Low sensitivity as there is no proposed external cable protection. Medium for any contingency external cable protection measures adopted due to the potential for localised alteration to flows in the immediate area. The spatial extent in the context of the wider area of the Irish Sea is localised and minimal. As such, any potential impact to the physical substratum in the immediate area of the cable will be minimal in extent.	No additional cable protection is currently proposed. The footprint of any placed contingency cable protection will be limited to that required by crossing agreements or as required to ensure cable stability on the seabed.	**Yes**	Section 4
		Benthic and intertidal	Medium due to the potential for Annex I habitat to be present along the installation corridor.		**Yes**	Section 5
		Fish and shellfish	Medium due the Project Area being identified as a potential nursery habitat for 8 species of juvenile fish. No external seabed cable protection is proposed. Where contingency external cable protection measures are used on rocky seabed types the sensitivity is medium / low. If contingency external cable protection measures are utilised, the sensitivity of fish and shellfish may increase to medium if installed within sections of burrowed mud or soft sediment habitats where there is a physical change. However, the change will be localised.	The installation period avoids installation during peak sensitivities. Should contingency cable protection be utilised, deposits will be kept to a minimum as required for crossing agreements and cable stability.	**Yes**	Section 6

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
		Protected sites	Low due to the potential for Annex I habitat to be present along the installation corridor.	The installation period avoids installation during peak sensitivities. Should contingency external cable protection be utilised, deposits will be kept to a minimum as required for crossing agreements and cable stability.	**Yes**	Section 9 and Appendix D
Abrasion/disturbance at the surface of the substratum						
The immediate vicinity of the installation plough and any surface laid cable: **Plough approximate dimensions:** (2.6m wide x length of corridor) **Plough share approximate dimensions:** 0.5m wide x length of corridor **T-ROV approximate dimensions:** Cable crossings – 0.5m wide x 100m long per crossing.	**Scotland jurisdiction** **Scot-NI 3**: Plough (skids and share): 0.052km^2 **NI jurisdiction** **Scot-NI 3:** Plough (skids and share): 0.057km^2 T-ROV: 0.0001km^2 **Scotland jurisdiction** **Scot-NI 4**: Plough (skids and share): 0.150km^2 T-ROV: 0.0004km^2 **NI jurisdiction** **Scot-NI 4:** Plough (skids and share): 0.072km^2 T-ROV: 0.0001km^2	Physical processes	**Installation**: The movement of the installation plough across the seabed surface - the sensitivity will be dependent on the seabed. No sensitive physical features have been identified. The footprint of the installation plough is small, and effects will be temporary and negligible. **Surface lay cable:** The cable will be buried for majority of the route. Small sections may be surface laid where burial cannot be achieved.	A plough with the smallest dimensions practicable has been chosen for the proposed works.	**Yes**	Section 4
		Benthic and intertidal ecology	Medium as disturbance of the seabed will occur where PLGR is used, as the cable is laid over the seabed and in areas where trenching and/or cable protection measures are used.	Where possible, the cable will be buried. Discrete sections of the cable may be surface laid due to hard ground. These sections will be stabilised and protected using Articulated Pipe (if required), which will be clamped or pinned to the seabed where required to	**Yes**	(Section 5

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
				minimise movement of the cable and prevent abrasion.		
		Protected Sites	Low / Medium due to the minimal extent of the installation footprint from the installation plough.	None	**Yes**	Section 9 and Appendix D
		Marine Archaeology	Low – Where possible, archaeological anomalies will be avoided by the application of Archaeological Exclusion Zones (AEZ) (Dix 2008 and Plets et al 2013).	Archaeological exclusion zones (AEZs) will be assigned to anomalies where possible to protect archaeological features.	**Yes**	Section 10
Water flow (tidal current) changes – local						
No change to water flow (tidal current) expected.	No change to water flow (tidal current) expected	Physical processes	Medium due to potential for scour to occur at third-party cable crossing sites. Any change will be highly localised and minor within the wider Scot-NI Project Area.	The footprint of any placed cable protection will be limited to that required to ensure cable stability on the seabed and/or protection at crossings.	**No**	N/A
Changes in water suspended solids (water clarity)						
Sediment dispersion footprint: Sediment is expected to settle within 2km of the installation corridor (Gooding et al., 2012). Fine material will be rapidly diluted and dispersed in the water. Far field deposition is predicted to be less than 1 mm for both trenching by jetting and ploughing.	N/A	Physical processes	Low due to the minimal extent of post-lay trenching potentially planned for the route and the high tidal flows of the area rapidly dispersing any released sediment.	None	**No**	N/A

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
		Fish and shellfish	Low as cable will be buried with installation plough for the majority of the route, so sediment suspension events will be minimal. Where post-lay trenching may be utilised, disturbed sediment is expected to be rapidly dispersed by tidal currents.	Post-lay burial is proposed to be used at cable crossing locations.	**No**	N/A
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion						
The immediate vicinity of the installation plough and any surface laid cable: **Plough abrasion:** Plough (skids & share) 2.6m wide x length of corridor **Plough penetration**: Plough share: 0.5m wide x length of corridor **T-ROV approximate dimensions:** Cable crossings – 0.5m wide x 100m long per crossing.	**Scotland jurisdiction** **Scot-NI 3**: Plough (abrasion): 0.052km^2 Plough (penetration): 0.01km^2 PLGR (penetration): 0.04km^2 **NI jurisdiction** **Scot-NI 3:** Plough (abrasion): 0.057km^2 Plough (penetration): 0.011km^2 T-ROV: 0.0001km^2 PLGR (penetration): 0.044km^2 **Scotland jurisdiction** **Scot-NI 4**: Plough (abrasion): 0.150km^2 Plough (penetration): 0.029km^2 T-ROV: 0.0004km^2 PLGR (penetration): 0.115km^2	Physical processes	Low due to the minimal extent of the installation footprint from the installation plough and the predominantly soft sediments the plough will operate within.	None	**Yes**	Section 4
		Benthic and intertidal ecology	Low due to the minimal extent of the installation footprint from the installation plough.	None	**Yes**	Section 5
		Fish and shellfish	Low / Medium due to the minimal extent of the installation footprint from the installation plough.	None	**Yes**	Section 6
		Protected sites	Low / Medium due to the minimal extent of the installation footprint from the installation plough.	None	**Yes**	Section 9 and Appendix D

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
	NI jurisdiction **Scot-NI 4:** Plough (abrasion): 0.072km^2 Plough (penetration): 0.014km^2 T-ROV: 0.0001km^2 PLGR (penetration): 0.055km^2	Marine archaeology	Low / Medium due to the minimal extent of the installation footprint from the installation plough and PLGR.	It is proposed to avoid all known archaeology and anomalies where possible, therefore, the effects of disturbance to the substrate below the seabed will be minimal.	**Yes**	Section 10
Smothering and siltation rate changes						
Sediment dispersion footprint: Sediment is expected to settle within 2km of the installation corridor (Gooding et al., 2012). Fine material will be rapidly diluted and dispersed in the water. Far field deposition is predicted to be less than 1 mm for both trenching by jetting and ploughing	N/A	Benthic and intertidal ecology	Low as cable will be buried with installation plough for the majority of the route, so sediment suspension events will be minimal. Where post-lay trenching may be utilised, disturbed sediment is expected to be rapidly dispersed by tidal currents.	Installation will predominantly use cable plough. Where this is not possible the cable will be surface laid and post lay buried where possible (at crossings)	**No**	N/A
Accidental hydrocarbon or chemical release from installation vessel						
No hydrocarbon or chemical spill is likely if all best practice and compliance measures are implemented. Worst case impact distance for hydrocarbon spill is 10km but the likelihood is negligible.	N/A	Benthic and intertidal ecology	Low due to the unlikely nature of an accidental spill occurring due to the best practice measures that will be implemented in the Project.	Best practice and compliance measures will be in place to minimise the likelihood of any accidental releases and provide an action plan if they do occur to minimise any effects. See Section 15 for full list of measures to be implemented as part of the project design.	**No**	N/A

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Introduction or spread of invasive non-indigenous species (INIS)						
No introduction of INNS is likely if all best practice measures are implemented.	N/A	Benthic and intertidal ecology	Low due to best practice management measures in place to minimise potential for introduction of INNS to the Project Area. All vessels will adhere to best practice measures therefore the risk is considered low. If the contingency external cable protection measures are utilised, rock will be sourced from a quarry and clean.	Best practice and compliance measures will be in place to minimise the likelihood of any INNS from Project vessels or equipment. See Section 15 for full list of measures to be implemented as part of the project design.	**No**	N/A
Underwater noise changes						
No injury or significant disturbance effects are expected from cable installation activities. Refer to Appendix H – Underwater Noise Assessment.	N/A	Fish and shellfish	Low - Data sources available (Popper et al. 2014 and OSPAR Commission 2012) consider that the potential for likely significant effects to fish from cable installation activities is low. Many species of fish lack the specializations for receiving sound, therefore no effects to these groups of fish are anticipated. For fish with hearing specialisations (cod, salmon, herring, sprat, twaite shad and allis shad), to sustain an injury fish would need to be within close proximity of the installation vessel for 24 hours, which is extremely unlikely based on the mobile nature of these specialised species.	The works will be short term and transient. The short duration in line with background shipping noise will ensure any potential noise disturbance effect is temporary and minimal.	**No**	N/A
		Marine mammals	Low to medium due to the potential presence of Annex II harbour porpoise and seals within the installation corridor.	None required	**No**	N/A

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Visual (and above water noise) disturbance – Birds						
4km divers and sea ducks. 2km all other seabird species. Based on the extent and potential consequences of seabird displacement from offshore wind farm developments published by the UK Joint Statutory Nature Conservation Bodies (SNCB) (JNCC, 2017). Disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, only sites within 2-4km of the proposed installation activities have been considered for displacement (dependant on species present).	**Scot-Ni 3 & 4:** 4km divers and sea ducks. 2km all other seabird species.	Birds	Medium sensitivity due to the presence of the installation vessel / plant during installation and disturbance to breeding seabird and colonies in proximity to the application corridor within the Outer Ards SPA, Ramsar and SSSI.	The duration of the works will be limited, ensuring any potential visual and above water noise disturbance effect is temporary in nature. Vessel speeds will be slow moving at approximately 600m/hr for installation plough and 2km/hr for surface lay. Installation is planned for autumn 2021 which avoids the peak breeding season, minimising the risk to breeding bird species and is before migratory and overwintering birds arrive in large numbers.	**Yes**	Section 8 and Appendix D

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Visual (and above water noise) disturbance – Marine mammals						
900m (Brasseur & Reijnders,1994)	900m from vessel While harbour seals have been found to forage up to approximately 100km from their haul-out sites (Cunningham et al., 2009; SMRU, 2017), grey seals have been found to travel further with individuals from the west coast of Ireland being spotted off the west coast of Scotland (DECC, 2016). However, visual disturbance will only take place for seals at haul outs within 900m of vessel.	Marine mammals	Medium – Seal are more sensitive to anthropogenic disturbance when hauled out. Seal flush into the water when vessels pass. Low – Unlike smaller pleasure vessels (e.g whale watching vessels), the installation vessel will not be following any nearby individuals and harassing them.	Cable installation activities will be as limited in duration as is practicable to reduce an impact vessel presence may have. Vessel movements will be temporary, transient and slow (up to 600m/hr) or stationary.	**Yes**	Section 7
Changes in supporting habitat and prey availability – Birds						
Contingency external cable protection measures: The worst-case footprint for substratum change has been calculated as follows: ▪ Individual rock bag placement (4 tonne bag) = 5.2m² per 4 tonne bag ▪ Concrete mattresses at crossings 6m x 3m= 18m² (per mattress). ▪ Rock berm footprint assumed to be required	**Scotland jurisdiction** **Scot-NI 3**: Plough (skids & share): 0.052km² Rock Bags: 52m²	Birds	Low - The footprint of installation is not sufficient to reduce the available prey items within the region.	None available	**Yes**	Section 8 and Appendix D

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
for power cable crossing with Western Link: ▪ Scot-NI 3: 90m x 15m² + 50% contingency (675m²) Scot-NI 4: 72m x 15m² + 50% contingency (540m²)						
Changes in supporting habitat and prey availability – Marine mammals						
Sediment dispersion footprint: Sediment is expected to settle within 2km of the installation corridor (Gooding et al., 2012). Fine material will be rapidly diluted and dispersed in the water. Far field deposition is predicted to be less than 1 mm for both trenching by jetting and ploughing.	N/A	Marine mammals	Low – Cetacean utilise sound and vision to locate prey items. There will be no significant loss of fish and benthic species during cable installation. Cetacean echolocation of prey items will mean that prey availability is not impaired during cable installation. Pinniped also use sight to locate prey items. The duration of sediment suspension will not be significant to pinniped species. The footprint of installation is not sufficient to reduce the available prey items within the region.	None available	**No**	N/A
Death or injury by collision						
Vessel path along the installation corridor.	N/A	Marine mammals	Low due to the low speed of the installation vessel (600m/hr), along with the limited spatial and temporal extent of the installation vessels within the Project Area.	During installation vessels will be travelling at speeds of approximately 4-8 knots. Travel at speeds of 14 knots or less indicate negligible effects of collision to marine mammals (Laist *et al.*, 2001).	**No**	N/A

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Temporary displacement/ restricted access						
Vessels engaged in cable laying will conform to the Submarine Telegraph Act 1885 Article 5 regulations and exhibit signals to prevent collisions at sea. Other vessels which see the signals shall withdraw beyond 1NM (1.85km) from project vessels whilst they are engaged in cable installation activities. The Zone of Influence is therefore approximately 10.8km² surrounding the installation vessel offshore at any time.	N/A	Shipping and navigation	Medium sensitivity due to the potential displacement of shipping vessels fishing and other sea users. The operations of the cable installation vessel shall be completed as quickly as possible.	Limited duration of cable installation activities. Early consultation with relevant contacts to notify of impending activity. All mitigation proposed is set out in Appendix E – Navigation Risk Assessment and Section 15 Mitigation Schedule. All risks have been found to be As Low As Reasonably Practicable (ALARP)	**Yes**	Section 11
		Commercial fisheries	Medium as some limited and localised disruption of static gear and trawler fishermen may occur during the cable installation process. The operations of the cable installation vessel shall be completed as quickly as possible.	Mitigation measures identified in the Fisheries Liaison Mitigation Action Plan (FLMAP) will be implemented.	**Yes**	Section 12
Increased snagging risk						
No external cable protection has been proposed. Any contingency external cable protection measures will be of a profile to minimise the risk of	In the direct vicinity of the cable.	Shipping and navigation	Low – water depths are sufficient to allow for minor alterations from cable protection installation.	Should contingency external cable protection be utilised, no sections of the cable will reduce the water depth by more than 5% chart datum.	**Yes**	Section 11

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
snagging to commercial fishing vessels.		Commercial fisheries	Medium in areas for locations where bottom trawling or scallop dredging takes place.	Should contingency external cable protection be utilised, no sections of the cable will reduce the water depth by more than 5% chart datum.	**Yes**	Section 12
Impact on Stocks						
Sediment dispersion footprint: Sediment is expected to settle within 2km of the installation corridor (Gooding et al., 2012). Fine material will be rapidly diluted and dispersed in the water. Far field deposition is predicted to be less than 1 mm for both trenching by jetting and ploughing.	N/A	Commercial fisheries	Low - Cable installation indirect effects to shellfish stocks associated with burying cables. Sediment suspension and distribution will be minimal and in line with background levels during storm events.	No mitigation measures proposed	**No**	N/A
Presence of installation vessels						
Vessels engaged in cable laying will conform to the Submarine Telegraph Act 1885 Article 5 regulations and exhibit signals to prevent collisions at sea. Other vessels which see the signals shall withdraw beyond 1NM (1.85km) from project vessels whilst they are engaged in cable installation activities. The Zone of Influence is therefore approximately 10.8km² surrounding the installation vessel offshore at any time.	Safety protection zone: 10.8km²	Other Sea Users	Low due to the lack of other infrastructure and other sea users within the vicinity of the project area.	Limited duration of cable installation activities.	**Yes**	Section 13

Dimensions of footprint	Approximate ZOI per cable installation	Receptor	Sensitivity of receiving environment to pressure	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
This will be transient with the vessel as it moves across the installation area.						
Disturbance/restriction to access at landfalls						
A works area will be established for each landing site. The size of the area will be determined by access routes and equipment required for the landing installation.	Within the application corridor/works area	Other Sea Users	Low due to the temporary and short term (up to 5 days) nature of the works.	Limited duration of works The disturbance area will be kept to a minimum as far as practical.	**Yes**	Section 13
Damage to third-party assets						
At six crossing locations pending crossing design and agreements	At third-party cable crossings	Other Sea Users	Medium due to the installation corridor crossing 6 other third-party assets, increasing the potential for damage to occur during installation.	Engineering of all crossings will be designed in accordance with industry best practice (namely International Cable Protection Committee (ICPC) Recommendation No.3.). Crossing designs will also be subject to crossing agreements with the individual cable asset owners. Asset owners will be notified in advance of operations in line with the individual crossing agreement conditions.	**Yes**	Section 13

* Further measures are detailed in the respective topic chapters

4. PHYSICAL ENVIRONMENT

4.1 Introduction

This Section describes the baseline physical environment along the Scot-NI 3 and 4 application corridors, identifies potential impacts associated with the cable installation and presents the findings of the environmental appraisal. To avoid repetition, the baseline for both the Scot-NI application corridors has been discussed as a whole and referred to as the Project Area. Any aspects specific to the individual cable routes (Scot-NI 3 and 4) has been discussed separately.

The physical environment has been described as follows:

- Metocean conditions;
- Climate change implications;
- Coastal processes;
- Bathymetry, geology, seabed sediments and features;
- Water and sediment quality;
- Seabed quality; and
- Suspended sediments.

4.2 Data sources

Baseline conditions have been established by undertaking a desktop review of published information. The data sources used to inform the baseline description and subsequent assessment include but are not limited to the following:

- Scot-NI 3 Cable Route Survey Report (Fugro 2020a);
- Scot-NI 4 Cable Route Survey Report (Fugro 2020b)
- Scotland – Northern Ireland 3 & 4 Cable Route Desk Top Study (Global Marine 2020);
- Offshore Energy Strategic Environmental Assessment (OESEA) 3 – Department of Energy and Climate Change (DECC) (2016);
- Hydrography of the Irish Sea. SEA6 Technical Report – Howarth (2005);
- Sea level rise information from the United Kingdom (UK) Climate Projections (UKCP18) project.

4.3 Consultation

No consultation responses were received in relation to the physical environment topic.

4.4 Existing baseline description

This Section describes the physical conditions within the Project Area, starting in Scotland and heading west to Northern Ireland. Where specific baseline information or survey data exists for Scot-NI 3 and Scot-NI 4, this has been used to inform the baseline and is separated by each proposed cable route.

4.4.1 Overview

The Project Area is situated in the Irish Sea in Regional Sea 6, as described in the UK OESEA Reports (DECC 2016). More specifically, the Project Area runs through the strait between south-western Scotland and north-eastern Northern Ireland called the North Channel. This strait connects the Irish

Sea with the Atlantic Ocean and has a width of 19km at its narrowest point. To the northeast of the North Channel lies the Firth of Clyde.

The Scot-NI 3 application corridor runs from Port Mora near Portpatrick, Scotland to Donaghadee, Northern Ireland across the narrowest point of the North Channel, whereas the Scot-NI 4 application corridor runs from Girvan, Scotland through the Firth of Clyde into the North Channel and lands at Larne (Drains Bay), Northern Ireland.

The purpose of the baseline description is to characterise the physical environment baseline of the Project Area and to enable the identification of areas that may be sensitive to pressures from cable installation.

4.4.2 Metocean conditions

4.4.2.1 Water levels and currents

Scot-NI 3 and Scot-NI 4

Semi-diurnal tides are the dominant physical process in the Irish Sea (Howarth 2005). The tides propagate from the Atlantic Ocean to the Irish Sea through the North Channel, with a general northern flood and southern ebb tidal flow (DECC 2016). Dominated by semi-diurnal tides, the sea height variations within the Irish Sea differ greatly in range from north east to south west. The tidal range in the North Channel is small compared to tidal variation in the rest of the Irish Sea. Tidal heights along both of the proposed cable routes are generally less than 4 m (DECC 2016). The tidal current strength shows even more variation across the Irish Sea within smaller spatial scales than the tidal range. In the North Channel, maximum currents occur around high or low water. Along the proposed cable routes, the mean spring tidal current velocities reach between 0.75 and 1.25 ms^{-1} (DECC 2016). The tide is approximately symmetrical, i.e. speeds are similar on flood and ebb tides (UK Hydrographic Office (UKHO) 2012).

4.4.2.2 Wind

Scot-NI 3 and Scot-NI 4

Wind directly effects the physical marine conditions in the form of sea state, wave development and temperature. In the vicinity of the Project, the prevailing winds are from the west and south-west throughout the year, except in spring when there is an increased occurrence of winds from all directions (DECC 2016). Strong winds that exceed Force 6 (greater than 11 ms^{-1}) are most likely between December and March and least likely between April and August.

4.4.2.3 Waves

Scot-NI 3 and Scot-NI 4

Wave heights are determined by the strength and duration of wind, the distance over which it applies (fetch length), and the depth of water through which they pass. Waves caused by remote winds or storms are termed swell.

The Irish Sea is relatively protected from Atlantic Ocean waves due to the semi-enclosed configuration. Most of the waves in the region are therefore generated locally resulting in a short-wave period. Swell waves only occur at the northern end of the North Channel.

At the most exposed sections of the Scot-NI 3 route are generally towards the centre of the North Channel in Northern Irish waters, significant wave heights of about 2m are exceeded for 10% of the year, and heights of 0.5m for 75% of the year (Barne et al. 1997a; Natural Environment Research Council (NERC) 1998). The mean significant wave height is <1.5m across the year but varies between a winter average of <2 m and a summer average of <1m (BERR 2008). Wave heights in more sheltered locations, such as those close to the Northern Irish coast, will be lower than these indicative values.

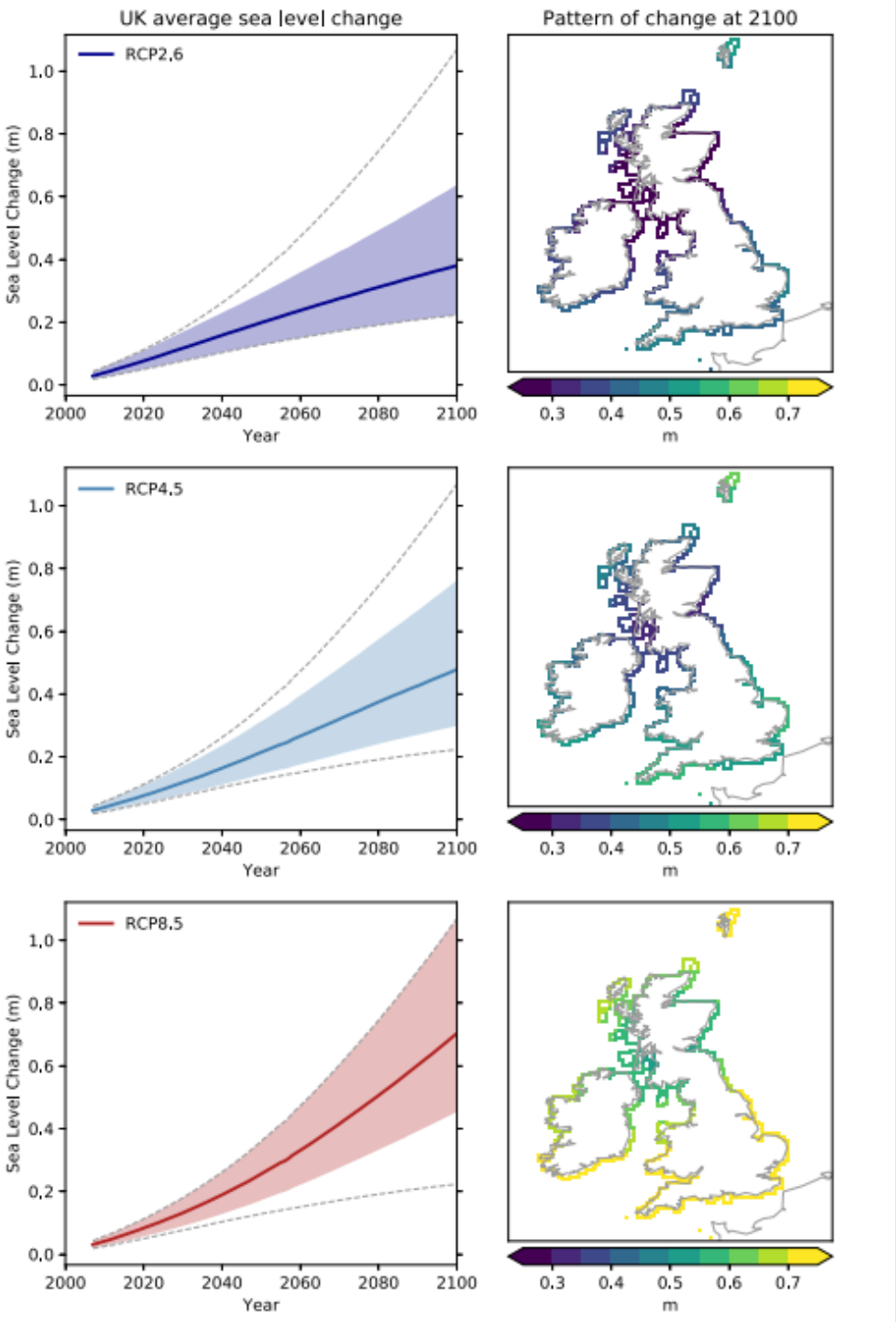
4.4.3 Climate change implications

With the anticipated onset of climate change, sea levels are predicted to change around the UK, which is likely to result in coastal flooding/erosion. The UK Climate Projections (UKCP18) project presents a new set of sea level projections, rooted in the climate models and methods from the Intergovernmental Panel on Climate Change AR5, which includes projections for a range of climate phenomena (temperature, rainfall, sea levels, etc.) under different emission scenarios (Palmer et al, 2018). The study found that sea level rise will occur for all emission scenarios and at all locations around the UK, with possible changes in tidal characteristics and waves.

Due to the uncertainty in future sea levels, a number of different scenarios exist (Palmer et al., 2018). The UKCP18 sea level projections are consistently larger than in the previous set of UK climate projections, UKCP09, for similar emissions scenarios. However, UKCP18 also includes a lower emissions scenario that assumes more mitigation. The amount of sea level rise depends on the location around the UK and increases with higher emissions scenarios. Based on exploratory results to 2300, sea levels continue to increase beyond 2100 even with large reductions in greenhouse gas emissions. Sea level rise over the coming centuries may affect tidal characteristics substantially (including tidal range). However, the atmospheric contribution to storm surges is unlikely to change. Extreme sea levels will increase due to the rise in mean sea level. However, the estimates presented suggest no additional change due to the atmospheric contribution to extreme sea level.

When combined with local information on sea defences and coastline structure, the sea level and storm surge projections enable vulnerability assessments along the UK coastline to be made. The UKCP18 sea level projections of future changes in sea water level around the UK coastline are calculated on a 12km grid around the coastline (Palmer et al, 2018). These are provided in Figure 4-1 below.

Figure 4-1 Three emissions scenarios against the relative sea level rise in the UK and Ireland, with further detailed (Palmer et al, 2018)



The implications of future sea level rise on the Scot-NI landfalls has been projected as follows:

4.4.3.2 Scot-NI 3 – Girvan

For a low emissions scenario (Representative Concentration Pathway (RCP) 2.6), a medium emission scenario (RCP 4.5) and a high emissions scenario (RCP 8.5), sea levels at Girvan are predicted to rise by up to 0.11m, 0.12m and 0.16m, respectively (UKCP, 2018), in 2045 for the central estimate (50th %ile).

The Mean High-Water Spring (MHWS) level in the vicinity of Girvan is 3.1m above Chart Datum (CD) (UKHO, 2020). In this respect, the MHWS level at Girvan could increase to 3.21m CD, 3.22m CD and 3.26m CD under the low, medium, and high scenarios respectively in 2045 for the central estimate (50th %ile). It should be noted that this does not take account of storm surge or waves under different return periods.

4.4.3.3 Scot-NI 3 – Larne

For a low emissions scenario (RCP 2.6), a medium emission scenario (RCP 4.5) and a high emissions scenario (RCP 8.5), sea levels at Larne are predicted to rise by up to 0.12m, 0.13m and 0.17m, respectively (UKCP, 2018), in 2045 for the central estimate (50th %ile). The MHWS level in the vicinity of Larne is 2.8m above CD (UKHO, 2020). In this respect, the MHWS level at Larne could increase to 2.92m CD, 2.93m CD and 2.97m CD under the low, medium, and high scenarios respectively in 2045 for the central estimate (50th %ile). It should be noted that this does not take account of storm surge or waves under different return periods.

4.4.3.4 Scot-NI 4 – Portpatrick

For a low emissions scenario (RCP 2.6), a medium emission scenario (RCP 4.5) and a high emissions scenario (RCP 8.5), sea levels at Portpatrick are predicted to rise by up to 0.12m, 0.13m and 0.17m, respectively (UKCP, 2018), in 2045 for the central estimate (50th %ile). The MHWS level in the vicinity of Portpatrick is 3.9m above CD (UKHO, 2020). In this respect, the MHWS level at Portpatrick could increase to 4.02m CD, 4.03m CD and 4.07m CD under the low, medium, and high scenarios respectively in 2045 for the central estimate (50th %ile). It should be noted that this does not take account of storm surge or waves under different return periods.

4.4.3.5 Scot-NI 4 – Donaghdee

For a low emissions scenario (RCP 2.6), a medium emission scenario (RCP 4.5) and a high emissions scenario (RCP 8.5), sea levels at Donaghdee are predicted to rise by up to 0.13m, 0.14m and 0.17m, respectively (UKCP, 2018), in 2045 for the central estimate (50th %ile). The MHWS level in the vicinity of Donaghdee is 4.0m above CD (UKHO, 2020). In this respect, the MHWS level at Donaghdee could increase to 4.13m CD, 4.14m CD and 4.17m CD under the low, medium, and high scenarios respectively in 2045 for the central estimate (50th %ile). It should be noted that this does not take account of storm surge or waves under different return periods.

4.4.4 Coastal processes

The south west coastline of Scotland comprises both hard rocky shorelines and deposits of softer sediments including gravel, sand, and mud. For most of the South Ayrshire and Dumfries and Galloway coastlines, the wave energy is restricted by the limited fetch lengths across the Irish Sea to the coastlines of the Mull of Kintyre, Ireland, England, and the Isle of Man.

The coastline of Northern Ireland is highly diverse, which is a result of the variation in the underlying geology and wave energy. The coast of Northern Ireland can be divided into five sections, comprising the North Coast, Antrim Coast, Outer Ards Coast, South Down Coast and Sea Loughs. In general, there is a decline in wave energy when moving from the North Coast into the Irish Sea.

4.4.4.1 Scot-NI 3

The proposed Scot-NI 3 Scottish landfall near Portpatrick (Port Mora) is located on the west side of the hammerhead peninsula in Dumfries and Galloway known as the Rhins of Galloway. This coast is exposed to currents from the North Channel and to a lesser extent the North Atlantic. The coastline consists of several pocket beach systems that are self-contained with limited longshore transport of sediment. Tidal currents run parallel to the shoreline on both flood (south going) and ebb (north going) tides. Tidal influences cause a weak net sediment transport south towards the Irish Sea (Rennie et al 2017).

The proposed Scot-NI 3 landfall near Donaghadee falls within the Outer Ards Coast. At this location, beaches are constrained by rocky headlands. The beaches present within the embayment's often consist of a thin layer of sand on top of irregular rocky surface and are therefore at risk of erosion. Although wave energy along this coastline is typically low due to the presence of shallow platforms offshore, erosion does occur during storms.

4.4.4.2 Scot-NI 4

The proposed Scot-NI 4 Scottish landfall is located south of Girvan on the South Ayrshire coast. This location is characterised by extensive sand and gravel beach deposits, with net sediment drift moving northwards along the coast. Localised coastal erosion is recorded at the Girvan Golf Club, which is located approximately 2.5km north of the proposed landfall location (North / South Ayrshire Council 2018).

The proposed Scot-NI 4 landfall near Larne (Drains Bay) is located on the Antrim Coast. The Antrim Coast is characterised as a medium wave energy environment, where offshore, onshore, and longshore movement of sediment occurs. Sediment may be marine derived or terrestrial from the Antrim Glens (Department of Agriculture, Environment and Rural Affairs (DAERA) 2018).

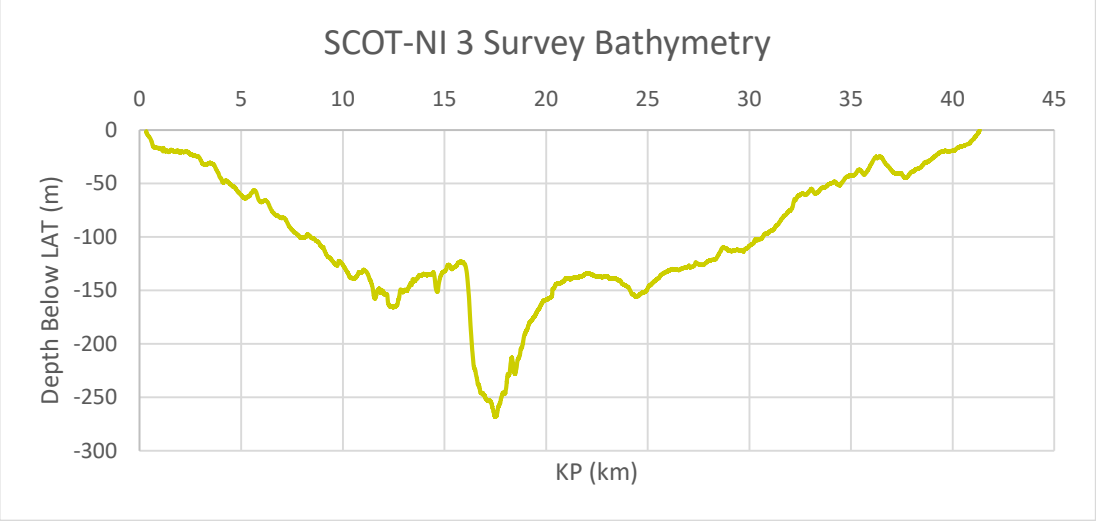
4.4.5 Bathymetry, geology, seabed sediments and features

4.4.5.1 Bathymetry

Scot-NI 3

From the Portpatrick landfall (Figure 4-2 below, Kilometre Point (KP)0), water depth increases steadily for the first 9km of the cable route to approximately 100m. At KP 16, the proposed cable corridor then enters Beaufort's Dyke. Beaufort's Dyke is a steep sided elongate depression trending northwest to southeast located in the middle of the North Channel, which separates Galloway and Northern Ireland. This feature is shown clearly in Figure 4-2 below. The dyke is approximately 50km long, 3.5km wide and is 312m deep at its deepest point. Nearer to the Donaghadee landfall in Northern Ireland, rocky or hard substrate outcrops are common from approximately 10km offshore to the coast and the bathymetry reduces to <50m. Water depths along the final 5km of the cable corridors are shown to steadily decrease on approach to landfall.

Figure 4-2 Bathymetry along the proposed Scot-NI 3 route

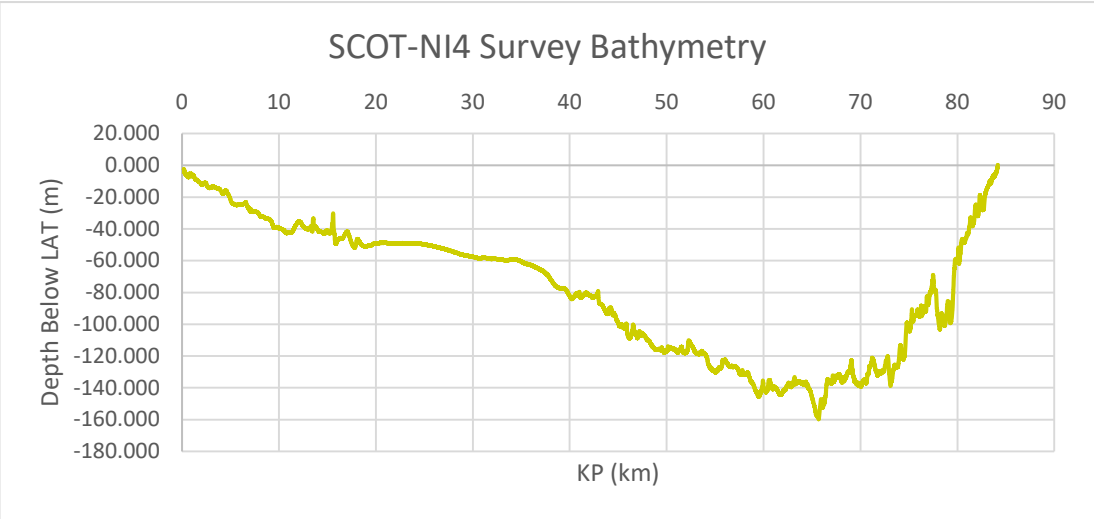


Source: Fugro 2020a

Scot-NI 4

From the landfall in Girvan (Figure 4-3 below - KP 0), the bathymetry along the proposed Scot-NI 4 cable route gradually increases in depth from 2m within the inshore area at Girvan to 40m at KP 10. After some undulation for approximately 8km, the bathymetry continues to increase gradually to 80m at KP 40. From here the bathymetry more rapidly increases to a depth of 100m at KP 45.8. Bathymetry then continues to gradually increase until it reaches a maximum depth of 158m at KP 66. Following the deepest point on the Scot-NI 4 route, the bathymetry begins to undulate until it begins to shallow, reducing to 100m at KP 75.9 and 77m at KP 78.3. There is a short steep increase in bathymetry to 107m at KP 78.9 before it begins to shallow within the nearshore area of Larne to 20m at KP 83.8 and to 0m at KP 85.3 where the proposed Scot-NI 4 route reaches the Larne landfall.

Figure 4-3 Bathymetry along the proposed Scot-NI 4 route



Source: Fugro 2020b

4.4.5.2 Underlying geology

Scot-NI 3 and Scot-NI 4

The bedrocks of the North Channel increase in age from east to west. To the east the bedrock is composed of Triassic sandstones, mudstones and halites. Towards the west this sequence is replaced by Carboniferous limestone, mudstone, and sandstone sequences (Mellet et al. 2015). Approaching the Northern Irish coastline older (Devonian) rocks form the bedrock. Within the North Channel the bedrock is generally overlain by Quaternary sediments composed of a sequence of glacial and/or post glacial deposits.

4.4.5.3 Seabed Sediments and features

Seabed sediments are defined as the unconsolidated sediments at the seabed that have been deposited since the early Holocene (Barne et al. 1997a). Most of the bedrock in the Irish Sea is covered by Quaternary age (<2.6 Million years old) sediments (Mellet et al. 2015). The seabed sediments have been categorised by the British Geological Survey (BGS) (2001). Along the proposed cable route, tidal currents are the main influence on superficial sediments, which consist of sandy gravel, muddy sandy gravel, gravelly muddy sand, gravelly sand, and sand, with occasional bedrock exposure near the Northern Irish coast.

Scot-NI 3

The beach in Port Mora (Scot-NI 3 KP 0) is made up of pebbles, cobbles, and rocks at the foot of the hill. A sandy beach, containing only occasional boulders is exposed at low tide. The north-western and south-eastern sides of the beach are made of rocks becoming cliffs. Within the nearshore and

offshore sections of the proposed Scot-NI 3 cable route, the sediments are primarily composed of gravelly sand and sandy gravel with some areas of boulders and some areas with clayey fine sand.

The beach at the Donaghdee landfall is rocky and pebbly and is backed by a bank of cobbles. The seabed within the nearshore consists of a mixture of sand, gravel, and rocks. An overview of seabed sediments within the Scot-NI 3 and Scot-NI 4 application corridors is presented in Figure 4-4 (Drawing Reference: P2303-SED-001). A summary of the seabed features that have been identified within the Scot-NI 3 application area are presented in Table 4-1.

Table 4-1 Scot-NI 3 Seabed features

Feature	Location
Outcropping glacial till (hard clay)	KP 1.9 – KP 2; KP 14-KP 15; KP 15.8; KP 18.4; KP 18.6; KP 18.8; KP 19.2 and between KP 29.8 – KP 29.9
Outcropping bedrock	KP 32.4 and towards the Donaghdee landfall (KP 40.5 – KP 40.8)
Several boulder fields	KP 0.7, KP 1.6 and between KP 14.5 – KP 15.1, at KP 33.5 and between KP 39.5 – KP 40 and from KP 41.2 to the landfall at Donaghadee
Sand ripples	KP 0.7 and at KP 40.5
Megaripples	KP 0.4 – KP 38.5

Scot-NI 4

The Girvan landfall (Scot-NI 4 KP 0) is composed of a shingle slope at the back of the beach which becomes significantly sandier below the high-water mark with shingle remaining a major component. Within the nearshore and offshore sections, the seabed is primarily composed of gravelly sand, sandy silt, silty sand, silty clayey sand, and boulders. The beach at the Larne landfall is steep and composed of cobbles and boulders averaging around 30cm in diameter. The cobble and boulder substrate of the beach is expected to extend offshore at Larne, with some patches of gravel and sand.

An overview of seabed sediments within the Scot-NI 3 and Scot-NI 4 application corridors is presented in Figure 4-4 (Drawing Reference: P2303-SED-001). Seabed features identified within the Scot-NI 4 application corridor are listed in Table 4-2.

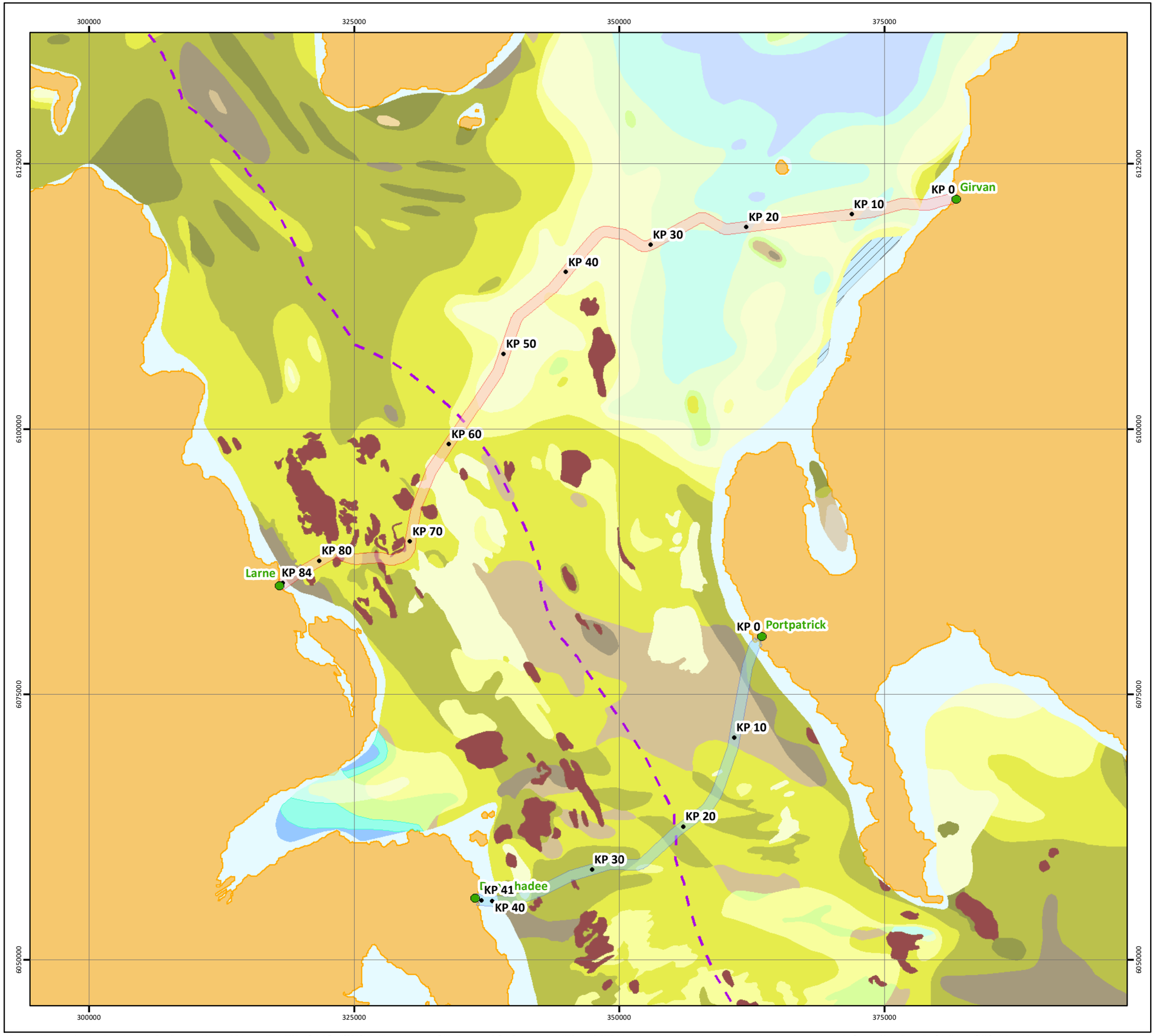
Table 4-2 Scot-NI 4 Seabed features

Feature	Location
Outcropping rock	(KP 77.6 and KP 77.6 and KP 79.5 and KP 82.7)
Boulder fields	Identified at several locations between KP 6.6 and KP 71.2
Megaripples	Identified at numerous locations, offshore and approaching the Larne landfall, between KP 38 – KP 39; KP 47 – KP 48; KP 50 – KP 58; KP 60 – KP 63; KP 79.5 and KP 83.1.

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

SEABED SEDIMENTS
EMODnet Seabed Substrate

Drawing No: P2302-SED-001 | **A**



Legend

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

Seabed Substrate - Folk 16 Level

- 1.1.1 Mud
- 1.1.2 (gravelly) Mud
- 1.2.1 sandy Mud
- 1.2.2 (gravelly) sandy Mud
- 1.3.1 muddy Sand
- 1.3.2 (gravelly) muddy Sand
- 2.1.1 Sand
- 2.1.2 (gravelly) Sand
- 3.1.1 gravelly Sand
- 3.2.1 sandy Gravel
- 3.3.1 Gravel
- 4.1.1 gravelly Mud
- 4.2.1 muddy Gravel
- 4.3.1 gravelly muddy Sand
- 4.4.1 muddy sandy Gravel
- 5. Rock & boulders
- 6. No data at this level

NOTE: Not to be used for Navigation

Date	08 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	ESRI; GEBCO; EMODnet
File Reference	J:\P2302\Mxd\03_SED\ P2302-SED-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

0 5 10 15 20 km

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4.4.6 Water and sediment quality

The European Union (EU) Marine Strategy Framework Directive (MSFD) adopted in 2008 requires that the UK takes "*the necessary measures to achieve or maintain "Good Environmental Status" in the marine environment by the year 2020 at the latest*" (Department for Environment, Food and Rural Affairs (Defra), 2015). The report concludes that good progress has been made towards this with significant contamination restricted to industrial estuaries and coastal areas.

The MSFD and WFD overlap in coastal waters as the WFD extends to three Nautical Miles (NM) seaward from the Scottish territorial baseline. Any proposed development within these waters must have regards to the WFD and ensure that all surface water bodies achieve 'Good Ecological Status (GES)' and that there is no deterioration in the status.

4.4.6.1 Potential sources of contamination

Munitions

The main source munitions for Scot-NI 3 and Scot-NI 4 is likely to be Beauforts Dyke. Due to its depth and proximity to the coast, the Beaufort's Dyke has been used as a disposal ground for surplus ordnance since the early 20th Century. It is estimated that over a million tonnes of munitions were disposed at the site (Callaway 2011a), although the exact location and nature of the munitions are poorly recorded (Fisheries Research Services (FRS) 2004).

In addition to ordnance disposal, Beaufort's Dyke was used for disposal of up to two tonnes of concrete encased metal drums containing radioactive material (laboratory waste and luminous paint, classified as non-hazardous at the time of disposal) during the 1950s (Hansard 1997).

Seabed surveys of the area indicated that munitions have been deposited outside of the Beaufort's Dyke, but no contaminations have been found in the marine environment ((FRS) 2004). This suggests that the deposited munitions are stable, unless disturbed.

Solid objects, such as the ordnance and other material deposited in or around Beaufort's Dyke or originating from the firing range may have migrated as a result of high currents or as a result of physical displacement or following erosion of containers or large objects.

Organic contaminants

The majority of organic compounds present in the environment are either readily biodegradable or of low water solubility and hence of limited significance in terms of water contamination. However, some organic compounds are the subjects of concern. Prominent among the compounds that can reach toxic concentrations in the dissolved phase, and/or bioaccumulate from the dissolved phase to toxic levels are the organo-metallic compounds of lead, tin, and mercury. Use of organo-tin compounds (as marine anti-foulants) and tetraethyl lead (as a petrol additive) has been subject to stringent controls and concentrations in the marine environment are consequently decreasing.

Heavy Metals

In general, dissolved metal concentrations are normally higher in coastal waters than in the open ocean (Chester 2009), with a generally inverse relationship to salinity. However, given the ordnance disposal at Beaufort's Dyke, elevated metal concentrations within the sediments may be expected in the vicinity of the disposal sites.

Artificial Radionuclides

Artificial radionuclides form a very small component of seawater radioactivity. The natural background radioactivity of seawater, largely due to dissolved Potassium-40, is around 12 Bql^{-1}. While artificial radionuclides concentrations in the Irish Sea are elevated relative to those in other UK, with significant inputs from Sellafield, they remain a small fraction of the total (Defra). Studies -(Mitchell 1999) have shown that relatively soluble radionuclides (e.g. Caesium-137, Strontium-90, Tritium) are

advected to the north and west and leave the Irish Sea through the North Channel typically within a year. Non soluble nuclides such as plutonium and americium, are quickly removed from the water column by precipitation or scavenging by suspended particulate matter.

Discharges from Sellafield are currently at very low levels, relative to their peak, and are expected to be close to zero by 2020 (Defra). In the Irish Sea, remobilisation of radionuclides from deeper sediment layers is now the principal source of caesium-137 and plutonium.

Transport mechanisms

Transport mechanisms are important in determining the distribution of contaminants. The majority of contaminants which enter the marine environment in association with water (either river or sewage) tend to either be trapped in the estuarine and near coastal zone (as components of the sediment) or, if soluble in seawater, are rapidly diluted. Contaminants which enter the marine environment as a result of direct local inputs are likely to be elevated in the immediate vicinity of the source but tend to decrease rapidly with distance from the input site.

The North Channel represents an important transport pathway for water in the Project Area and therefore water-borne substances, between the Irish and Malin Seas (Callaway et al. 2011b). Beaufort's Dyke is a submarine tunnel valley located in the North Channel. The dyke has a maximum recorded depth of 312m. Flow through the North Channel has been shown to be predominantly south to north (Howarth 2005) although flow reversal can occur.

Water quality - Scot-NI 3

The Scot-NI 3 application corridor passes through one WFD waterbody: the Mull of Galloway to Corsewall Point coastal waterbody (ID: 200012) at the Portpatrick landfall with an overall waterbody status of Good. There are no designated bathing waters within 2km of the Portpatrick landfall.

Within Northern Irish waters, at the Donaghdee landfall, the proposed Scot-NI 3 installation corridor extends through the Ards Peninsula coastal waterbody (ID:GBNI6NE110), with an overall waterbody status of Good. The closest designated bathing water is Millisle, approximately 1.4km from the Scot-NI 3 application corridor.

Water quality - Scot-NI 4

The Scot-NI 4 application corridor passes through four WFD waterbodies. At the Girvan landfall, the Scot-NI 4 cable extends through the Girvan coastal waterbody (ID: 200015) which has an overall waterbody status of Good. From there, the proposed Scot-NI 4 application corridor extends out to sea through the Firth of Clyde Outer coastal waterbody (ID: 200295) which has an overall waterbody status of Good. The closest designated bathing water within Scottish waters of Scot-NI 4 is the Girvan Bathing Water, which the proposed cable route passes through for approximately 200m on its approach to the landfall.

Within Northern Irish Waters, the proposed Scot-NI 4 route passes through the Maiden Islands coastal waterbody (ID: GBNI6NE040) just off the coast which has an overall water body status of High. On the approach to the Larne landfall, the proposed Scot-NI 4 cable route enters the North Channel coastal waterbody (ID:UKGBNI6NE030) with an overall waterbody status of Good.

The closest designated bathing waters to the Scot-NI 4 installation corridor within Northern Irish waters is the Ballygalley Bathing Water within 3.2km of the Larne landfall.

Shellfish waters – Scot-NI 3

Shellfish waters rely on good water quality to ensure safety for human consumption. Within Scotland, shellfish waters are designated for protection under the Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013. Within Northern Ireland, shellfish waters are designated for protection under Regulation 9 of the Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017.

The closest shellfish waters within Scotland are Loch Ryan (approximately 25km from the Scot-NI 3 application corridor). The majority of Loch Ryan is also designated as a Shellfish Harvesting Area by the Food Standards Agency. Within Northern Irish waters the inner region of Belfast Lough (29km from the Scot-NI 3 application corridor), Larne Lough (38km from the Scot-NI 3 application corridor) and 2 areas within Strangford Lough (46km from the Scot-NI 3 application corridor) are designated Shellfish Waters (DAERA 2017).

Shellfish waters – Scot- NI 4

The closest shellfish waters within Scotland are Loch Ryan (19.4km from the Scot-NI 4 application corridor). Within Northern Irish waters the inner region of Belfast Lough (26km from the Scot-NI 4), Larne Lough (7km from the Scot-NI 4) and two areas within Strangford Lough (83km from the Scot-NI 4) are designated Shellfish Waters (DAERA 2017).

4.4.7 Seabed quality

Sediment in the near-shore sections of the proposed cable route corridors is likely to be affected by recent human activity. However, ordnance disposal in Beaufort's Dyke and activity in the firing range just offshore of the Scottish landfall have had a significant potential impact on contamination of sediments in sections of the proposed cable corridors.

Chemical characteristics

The specific analytical data for metals and organic contaminants is not available for the proposed cable route. However, previous surveys provide analytical data for areas close to the survey route. A study carried out in 1995 found that the nature of the seabed sediments and the total organic carbon and nitrogen levels, are typical of exposed near coastal environments (The Scottish Office Agriculture, Environment and Fisheries Department 1996).

Metals concentrations at a number of sites in Beaufort's Dyke have been reported (Callaway et al. 2011a). The reported concentrations at two locations at the northern end of Beaufort's Dyke are provided in Table 4-3.

Table 4-3 Metal sediment concentration Beaufort's Dyke

Location	Sample	As	Hg	Cd	Cr	Cu	Ni	Pb	Zn
BD-A1	S1	18.7	<0.025	0.3	84.6	15.5	30.6	16.3	78.0
	S2	19.5	<0.025	0.3	46.3	11.1	20.2	14.4	53.5
	S3	26.9	<0.025	0.2	57.9	14.9	15.6	21.4	98.4
	S4	16.2	<0.025	0.5	53.2	9.2	21.4	13.6	61.2
	S5	20.8	<0.025	<0.2	79.2	11.9	33.5	16.8	77.0
	S6	17.9	0.0	<0.2	66.0	16.7	17.6	23.5	95.9
	S7	21.4	<0.025	<0.2	57.4	14.1	14.5	17.3	63.8
	S8	18.7	<0.025	<0.2	57.3	14.8	16.6	19.6	86.6
BD-A5	S1	15.1	<0.025	0.5	63.4	10.0	24.2	13.0	49.7
	S2	15.5	<0.025	0.4	62.4	10.0	25.9	11.0	50.4
	S3	20.0	<0.025	0.5	78.6	11.4	33.0	12.7	62.8
	S4	15.2	<0.025	0.3	53.8	7.9	21.9	10.1	45.4
	S5	16.1	<0.025	0.4	65.5	9.4	29.5	9.4	51.4
	S6	13.5	<0.025	<0.2	53.7	8.0	22.4	8.9	43.9
	S7	15.7	<0.025	0.3	74.0	9.9	32.9	9.3	54.6

Source: Callaway et al. (2011a)

These concentrations have been compared to the Cefas Action Levels in Dredged Materials (Cefas 2014). Cefas have set Action Level 1 and Action Level 2 concentrations to provide standards to assess whether dredged material is suitable for disposal at sea. Concentrations below Action Level 1 are of no concern, concentrations above Action Level 2 are generally unsuitable for sea disposal, while concentrations between Action Levels 1 and 2 require further consideration and testing before a decision can be made. The Action Levels for the surveyed metals are provided in Table 4-4, together with the number of samples which were found to be above each action level.

Table 4-4 Cefas action levels

Parameters	Action Level 1	Number above	Action Level 2	Number above	Total grab samples
Arsenic	20	4	100	0	16
Mercury	0.3	1	3	0	16
Cadmium	0.4	3	5	0	16
Chromium	40	15	400	0	16
Copper	40	0	400	0	16
Nickel	20	12	200	0	16
Lead	50	0	500	0	16
Zinc	130	0	800	0	16

Source: Callaway et al. (2011a), Cefas (2014)

The results indicate that overall, there was evidence of metals contamination. Over 90% of chromium concentrations, 75% of nickel concentrations and around 20% of cadmium and arsenic concentrations were found to be above Action Level 1. All the samples were found to be below Action Level 2 therefore contamination within the seabed is not a concern for the Scot-NI Project Area.

Sediment contamination can result from natural and anthropogenic inputs and can be harmful to biota. The level of both organic and inorganic contaminants in sediments is largely related to the proportion of fine material present, as a result of deposition processes. In areas of fine sediment contaminants can become trapped unless they are disturbed where they can be temporarily re-suspended.

4.4.8 Suspended sediments

Particulate matter in the water column is composed of organic and inorganic fractions. Organic fractions are predominantly the result of biological activity in the water column and are primarily composed of planktonic material, including bacteria. Organic matter will not be influenced by any activities associated with the cable laying and will, therefore, not be discussed further.

Inorganic suspended particulate material (iSPM) is derived from fluvial inputs (derived from both erosion in the river catchments and from chemical reactions in the estuarine zone), fallout from the atmosphere and coastal erosion combined with re-suspension of existing sediments and chemical reactions in the water column. As a result, iSPM loads vary widely and levels within the area are unlikely to be influenced by cable installation activities.

4.4.8.1 Scot-NI 3

Available measurements of iSPM, whether from vessels or by satellite imagery, are largely restricted to near-surface data obtained under non-storm / cloud free conditions and are limited for the Scot-NI Project Area. Long term suspended particulate matter data collected between 1998-2016 shows that average suspended particulate matter within the North Channel is low and typically is around 0-2 mg/l (Cefas 2016). Average concentrations of suspended particulate matter are higher at the landfalls for

Scot-NI 3 (<10 mg/l). Sediment dispersion during cable installation could re-suspend iSPM or particulate matter, however the level of re-suspension will be within background storm events and are likely to re-settle within one tidal cycle.

4.4.8.2 Scot-NI 4

Levels of suspended sediments within Scot-NI 4 are the same as reported for Scot-NI 3, with the general trend of concentrations increasing towards the Girvan and Larne landfalls.

4.5 Potential pressure identification and zone of influence

The following pressures have been considered for the physical environment for cable installation and screened out for further assessment in Section 3, Table 3-3.

- Water flow (tidal current) changes – local; and
- Changes in water suspended solids (water clarity).

To evaluate the most significant effects, the largest ZOI was selected as presented in Table 4-5. The footprints included are indicative worst-case (based on e.g. typical plough equipment of dimensions presented in Table 3-1).

Table 4-5 Potential pressure and zone of influence – physical environment

Activity	Potential Pressure	Receptor	Worst case Zone of Influence*
Boulder re-location and installation plough	Abrasion/disturbance at the surface of the substratum.	Seabed surface	**Scotland jurisdiction** **Scot-NI 3**: Plough (skids and share): 0.052km^2
			NI jurisdiction **Scot-NI 3:** Plough (skids and share): 0.057km^2 T-ROV: 0.0001km^2
			Scotland jurisdiction **Scot-NI 4**: Plough (skids and share): 0.15km^2
			NI jurisdiction **Scot-NI 4:** Plough (skids and share): 0.072km^2 T-ROV: 0.0001km^2
Pre-lay Grapnel Run (PLGR) and installation plough or jetting tool	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Seabed sediments	**Scotland jurisdiction** **Scot-NI 3:** Plough (abrasion): 0.052km^2 Plough (penetration) 0.01km^2
			NI jurisdiction **Scot-NI 3:** Plough (abrasion): 0.057km^2 Plough (penetration) 0.011km^2 T-ROV: 0.0001km^2
			Scotland jurisdiction **Scot-NI 4**: Plough (abrasion): 0.15km^2 Plough (penetration) 0.029km^2 T-ROV: 0.0004km^2
			NI jurisdiction

Activity	Potential Pressure	Receptor	Worst case Zone of Influence*
			Scot-NI 4: Plough (abrasion): 0.072km^2 Plough (penetration) 0.013km^2
Contingency external cable protection measures			
Installation of contingency external cable protection measures	Physical change (to another seabed type)	Seabed sediments	**Scotland jurisdiction** **Scot-NI 3**: Rock Bag: 52m^2
			NI jurisdiction **Scot-NI 3:** Rock Bag: 52m^2 Concrete mattress: 126m^2 Rock Berm: 2025m^2
			Scotland jurisdiction **Scot-NI 4**: Rock Bag: 52m^2 Concrete mattress: 144m^2 Rock Berm: 1620m^2
			NI jurisdiction **Scot-NI 4:** Rock Bag: 52m^2

4.6 Embedded mitigation

The Project Description, (Section 2) provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. There are no embedded mitigation measures specific to the physical environment.

4.7 Impact assessment

4.7.1 Abrasion and/or disturbance of the substrate on the surface of the seabed

4.7.1.1 Scot-NI 3

During installation, a plough will be towed along the proposed Scot-NI 3 cable route which will simultaneously lay and bury the cable. The plough is towed across the seabed on skids and the plough share separates the sediment to bury the cable to the required burial depth. This action is in contact with the surface of the seabed and will cause a localised area of abrasion during the installation process. The footprint of the plough (skid and share) in contact with the seabed is approximately 0.052km^2 within Scottish waters and 0.057km^2 for Northern Irish waters along the length of the proposed Scot-NI 3 cable route.

As the skids pass over the seabed, the sediment below may be compacted, and the topography changed. However, the area affected will be highly localised and as most sediments along the Scot-NI 3 application corridor are mobile bedforms of high energy environments, these changes will be transient with pre-installation conditions quickly returning following natural sediment transport processes. Therefore, effects of abrasion and/or disturbance of the substrate on the surface of the seabed has been assessed as negligible.

In sections of hard seabed where burial cannot be achieved, the cable may be surface laid. Should the cable be surface laid, the seabed will be disturbed within the direct footprint of the cable in contact with the seabed only. The extent of the disturbance will be confined to a small and linear area,

therefore effects of abrasion and/or disturbance to the substrate on the surface of the seabed will be negligible.

Sections of surface laid cable will be assessed to determine the level of on-bottom stability as well as risk from anthropogenic hazards such as fishing activity. If considered unstable, the cable will be pinned or clamped to the seabed to ensure stability and to minimise abrasion to the seabed and the cable.

Contingency external cable protection measures may be used in such areas such as rock bags to provide additional stability (if required). The footprint of any contingency external cable protection will be limited to that required to ensure cable stability on the seabed and/or protection at crossings. This will minimise the movement of the cable on the seabed minimising the potential abrasion due to currents and wave action moving the cable. Therefore, the effects of abrasion and/or disturbance to the substrate on the surface of the seabed from the surface laid cable will be negligible.

If re-location of a small number of targeted boulders is required during pre-installation works, there is the potential for seabed sediments to be subjected to abrasion and/or disturbance of the surface of the seabed. Boulder re-location will induce this pressure in a one-off event when the boulders are picked and re-positioned in a new area of seabed close to the installation route. Despite the potential for abrasion and/or disturbance, should a small number of boulders be repositioned, this will not change the character and nature of the seabed with boulders only being moved a short distance from one location to another.

4.7.1.2 Scot-NI 4

The footprint of the plough (skid and share) in contact with the seabed is approximately 0.015km^2 within Scottish waters and 0.072km^2 for Northern Irish along the entire length of the proposed Scot-NI 4 cable route. This footprint is larger than Scot-NI 3 based on the length of the proposed Scot-NI 4 cable route, however effects are of a similar scale as described for Scot-NI 3. The temporary and localised nature of disturbance, presence of mobile bedforms and characteristic high-energy environment means the seabed will return to baseline conditions swiftly through natural sediment transport processes. Effects of abrasion and/or disturbance to the substrate on the surface of the seabed have been assessed as negligible. As for Scot-NI 3, sections of surface laid cable may require additional protection. In areas where additional cable protection is applied, cable movement will be minimised therefore disturbance to the substratum on the surface of the seabed will be negligible.

4.7.2 Penetration and/or disturbance to the substratum below the surface of the seabed, including abrasion

4.7.2.1 Overview

Prior to installation, a PLGR will be undertaken along the proposed Scot-NI application corridors. A typical PLGR can penetrate and/or disturb up to 40cm depth of the seabed (depending on seabed type). As the PLGR is dragged through the surface sediments of the seabed it will pick up obstructions such as wires and derelict fishing gear and disturb the sediments. While the PLGR can penetrate up to 40cm of the seabed, the sediment along the route are primarily sands and gravels, which will be moved and naturally backfill. Disturbance will be minor and in line with fishing methods and there will be no net loss of sediment. The effects of penetration and/or disturbance to the substratum below the surface of the seabed to the physical environment from the PLGR are negligible.

4.7.2.2 Scot-NI 3

Following the PLGR, ploughing will be undertaken to simultaneously lay and bury the cable. The plough share will affect an estimated area of seabed equivalent to approximately 0.052km^2 along within Scottish waters and 0.057km^2 within Northern Irish waters along the proposed Scot-NI 3 cable route. As the plough passes along the seabed, sediments will be pushed aside and form furrows,

resulting in a temporary and minor change to the morphology of the seabed. However, as the plough installation is simultaneous lay and burial, the sediments will be manually backfilled almost immediately after being disturbed, returning the seabed to near baseline conditions. Considering the localised footprint of penetration and/or disturbance, extent of surrounding seabed sediments and temporary change to the seabed morphology, effects from ploughing are negligible.

In areas unsuitable for plough burial such as rock or in hard seabed where burial is not achievable, the cable will be surface laid. Following this, a post lay inspection survey will determine areas that can be buried using a trenching remote operated vehicle (T-ROV). The high-pressure pumps on the T-ROV will fluidise the seabed which allows the cable to be buried. These high-pressure water jets will disturb the sediment approximately 10.5cm either side of the proposed Scot-NI 3 cable installation. The cable trench created will be naturally backfilled returning the seabed to its former state and the bathymetry to baseline conditions. A shallow depression may be observed directly over the cable if jetting is used, as finer fractions of sediment suspended during the burial process are dispersed by currents, however this is expected to be minimal based on the primarily sand and gravel sediments present along the route. It is estimated that 0.0001km^2 of seabed will be affected by T-ROV within Northern Irish waters only for the installation of Scot-NI 3. Given the high energy location of the proposed Scot-NI 3 cable route and the limited footprint of disturbance, it is anticipated that local sediment transport will fill in any remnant trench swiftly and as a result effects to seabed sediments will be negligible.

4.7.2.3 Scot-NI 4

The effects of the PLGR within the Scot-NI 4 corridor are likely to be of a similar scale to that described for Scot-NI 3 above. However, the depression left by the PLGR may remain longer with increased areas of sandy silt, silty sand and silty clayey sand as small volumes of fine material such as silt and clay will be lost as they are mobilised into the water column. It should be noted however that mechanical backfilling by the plough following the PLGR will return the seabed to near baseline conditions.

Simultaneous cable laying and burial via ploughing is anticipated to affect approximately 0.15km^2 of the seabed within Scottish waters and 0.072km^2 along the proposed Scot-NI 4 cable route. Again, based on the increased length of Scot-NI 4, the footprint is larger than for Scot-NI 3, however effects will be of a similar nature. In sediments that have a silt or clay content, some sediment volume may be lost through the mobilisation of these fine materials, therefore any remnant trench following mechanical backfilling will be greater than in areas of higher sand and gravel content, however effects overall will still be negligible based on natural sediment transport processes.

The T-ROV on the proposed Scot-NI 4 cable will affect approximately 0.0004km^2 of seabed within Scottish waters. In areas of sand and gravel, any remnant depression or trench following jetting will be quickly infilled by natural sediment transport. In sediments with silt and clay content, this remnant trench or depression may remain in the short-term as finer fractions of sediment suspended during the burial process are dispersed by currents. However, it is anticipated that local sediment transport will fill in any remnant trench swiftly and as a result effects to seabed sediments will be negligible.

4.7.3 Physical change (to another seabed type)

4.7.3.1 Scot-NI 3

Proposed Integral Cable Protection

The integral cable protection measures which may be required for installation of the Scot-NI 3 cable (if used) could introduce different types of artificial material onto the seabed, which may differ in consistency to the surrounding sediments. The use integral cable protection may be associated with cable crossings and areas where further cable stability is required. There are three cable crossings for Scot-NI 3 within Scottish waters, of which one is within the intertidal area at Portpatrick, and the others are within Northern Irish offshore waters. These cable crossings will utilise High-Density

Polyethylene (HDPE) Uraduct ® protection approximately 50m either side of the crossing location (except for the crossing in the intertidal area at Portpatrick). There will be a total of 300m of HDPE applied to Scot-NI 3 which will only be applied at cable crossings. The HDPE diameter is small (94mm), therefore the overall footprint of the seabed to be affected is 28.2m^2. This deposit will be a change to the existing primarily gravelly sand seabed conditions and a change of substratum from the baseline. However, the area to be affected by the physical change to substratum type is small in the context of the wider sedimentary seabed surrounding the cable crossings. Effects to the physical environment are generally associated with a larger footprint of change, higher magnitude of change to seabed morphology and local tidal flow changes. Furthermore, as the HDPE at crossings be buried there will be no effects to seabed sediments and morphology.

Articulated Pipe (AP) protection is planned to be fitted from the end of the BMH duct to the LWM or approx. 10m water depth contour subject to burial conditions. The maximum diameter of the articulated pipe is 150 mm and will be applied to the cable and buried at all landfalls. As the articulated pipe will be buried, this will not have any effect on coastal processes at each landfall or change the morphology of the intertidal zone.

The effects of a physical change to another seabed type from the installation of proposed cable protection for Scot-NI 3 on seabed sediments is negligible. Articulated pipe may also be applied to any sections of surface laid cable. This will be in areas of hard ground and is unlikely to constitute a significant change to the seabed in such areas.

Contingency External Cable Protection

There are three cable crossings for Scot-NI 3, one is within the intertidal area at Portpatrick within Scottish waters and two are within Northern Irish Waters (Table 2-2 and Table 2-3). Contingency external cable protection may be required for the cable crossings within Northern Irish waters (the crossing within Scottish waters is protected by AP). Contingency external protection measures include rock berms, concrete mattressing, or rock bags and the measures to be used are dependent on the final installation route within the application corridor and cable crossing agreements. The application of external contingency cable protection has the potential to change the seabed.

For the Scot-NI 3 cable crossing design with the existing Western Link power cable, for assessment purposes, a worst-case contingency rock berm has been included in the assessment to identify the likely effects to the seabed from installation of a power cable crossing in this location within Northern Irish waters. The seabed sediment at the Western Link power cable crossing is coarse sand. The footprint of the rock berm is a worst-case of 2025m^2. This deposit will be a change to the existing gravelly sand seabed conditions and a change of substratum from the baseline. Despite this, the area to be affected by the physical change to substratum type is small in the context of the wider sedimentary seabed surrounding the cable crossings. Effects to the physical environment are generally associated with a larger footprint of change, higher magnitude of change to seabed morphology and local tidal flow changes. Effects from the potential contingency external cable protection is of low magnitude and unlikely to cause changes to tidal flow or sediment transport and therefore are Not Significant.

Approximately seven concrete mattresses may be required within Northern Irish waters totalling a footprint of 126m^2. Similarly, to rock bags, this would result in a physical change to another seabed type, however considering the similarly small footprint of seabed affected, effects to seabed sediments from concrete mattresses from the Scot-NI 3 installation are also negligible.

The locations and requirements for rock bags is not currently known and will only be available following post cable-lay surveys. For the purposes of assessment, this MEA has considered a total of 20 rock bags being deployed for Scot-NI 3, 10 within each jurisdiction with a footprint of 52m^2 within Scottish and 52m^2 within Northern Irish waters. Rock bags are only likely to be used in sections of the route where cable burial is not possible due to hard ground, glacial till or sub cropping rock. The

addition of rock bags to such areas will not cause and significant change to the seabed physical environment. The area affected is small and based on this, the addition of rock bags is negligible.

4.7.3.2 Scot-NI 4

Proposed Integral Cable Protection

There are five cable crossings for Scot-NI 4. Four are within Sottish waters and one is within Northern Irish waters (Table 2-2 and Table 2-3). The proposed integral cable protection will utilise High-Density Polyethylene (HDPE) Uraduct ® protection approximately 50m either side of the crossing location and be post-lay buried where possible. There will be a total of 500m of HDPE applied to Scot-NI 4 which will only be applied at cable crossings. The HDPE diameter is small (94mm), therefore the overall footprint of the seabed to be affected is 47m^2. As Uraduct at crossings will be post-lay buried, the introduction of this material will result in minor change to the substratum type below the seabed. The majority of sediments along the Scot-NI 4 route are sands and gravels which would be replaced by a hard-artificial structure. Despite this, the area to be affected by the physical change to substratum type is small in the context of the wider sedimentary seabed surrounding the cable crossings, therefore effects to seabed sediments will be negligible. Furthermore, as the HDPE at crossings be buried there will be no effects to seabed sediments and morphology.

Articulated Pipe (AP) protection is planned to be fitted from the end of the BMH duct to the LWM or 10m water depth contour subject to burial conditions. It may be that the length of AP installed may extend beyond the 10 m contour for a short distance if seabed conditions require (high exposure). The maximum diameter of the articulated pipe will be 150 mm and will be applied to the cable and buried at all landfalls. As the articulated pipe will be buried in the intertidal area, this will not have any effect on coastal processes at each landfall or change the morphology of the intertidal zone. The effects of a physical change to another seabed type from the installation of proposed cable protection for Scot-NI 3 on seabed sediments is negligible.

Contingency External Cable Protection

Similarly, to Scot-NI 3, the Scot-NI 4 cable crossing design with the existing Western Link power cable will result in a footprint of 1,620m^2 of the seabed experiencing a physical change in seabed type. Effects to seabed sediments from the Western Link cable crossing inducing a physical change to another seabed type are as described for Scot-NI 3 and are therefore Not Significant for Scot-NI 4.

Up to 10 rock bags have been considered as part of this assessment per jurisdiction for Scottish and Northern Irish waters for Scot-NI 4, with a footprint of up to 52m^2. Effects to seabed sediments because of a physical change to another seabed type are as described for Scot-NI 3 and are therefore negligible.

Within Scottish waters, an estimated eight concrete mattresses may be required as contingency external cable protection measures for Scot-NI 4 totalling an area of 144m^2. Effects to seabed sediments from the deposit of concrete mattresses inducing a physical change to another seabed type are as described for Scot-NI 3 and are therefore negligible for Scot-NI 4.

5. BENTHIC AND INTERTIDAL ECOLOGY

5.1 Introduction

This Section describes the baseline environment for benthic and intertidal ecology along the Scot-NI 3 and 4 application corridors, identifies potential effects associated with the cable installation and presents the findings of the environmental assessment. Potential effects on habitats and any potential sensitive species and communities from the proposed installation activities have been assessed, along with the mitigation and management measures that will be utilised to remove or reduce these effects.

5.2 Data sources

Baseline conditions have been established by undertaking a desktop review of published information and through consultation with relevant bodies. The data sources used to inform the baseline description and subsequent assessment include but are not limited to the following:

- Survey Report (Global Marine 2020a);
- Site Visit Report (Scotland-Northern Ireland 3 & 4; Global Marine 2020b);
- Intertidal photographic still images (provided by Global Marine);
- European Marine Observation Data Network (EMODnet) (2020);
- Habitat (Annex I) data from Joint Nature Conservation Committee (JNCC 2019; https://hub.jncc.gov.uk/assets/8f886e47-31d6-477e-9240-65ac42bee709);
- Habitat data provided by Agri-Food & Biosciences Institute (AFBI 2020). This data is credited to JNCC, Department of Agriculture, Environment and Rural Affairs (DAERA) and Centre for Environmental Data and Recording (CEDaR);
- Maidens SCI conservation objectives report by DAERA (2017); and
- DECC (2016).

The seabed (European Nature Information System (EUNIS)) habitat data is available under the European Marine Observation Data Network (EMODnet) Seabed Geology project (www.emodnet-seabedhabitats.eu), funded by the European Commission's Directorate-General for Maritime Affairs and Fisheries (DG MARE). EMODnet Seabed Habitat partners collate polygon habitat maps from survey, ground-truthing point data and results from habitat suitability models. The predictive habitat map of all European seas is updated every 2-3 years. The habitats are classified according to the EUNIS (Version 2007-11) habitat classification.

The EUNIS habitat classification is a comprehensive system covering the terrestrial and marine habitat types of the European land mass and its surrounding seas. It is hierarchical in structure and includes a key with criteria for identification of habitats at the first three levels (substrate type, dominant lifeform, humidity, typical depth zone, human usage, and impact). It is noted that habitats are very difficult to define analytically, the boundaries between them cannot be easily established and differences in opinion may exist.

It is noteworthy that several habitats located in the Northern Irish sector were only assigned AFBI habitat codes (i.e. not assigned any EUNIS classification code) and were thus assigned to the closest EUNIS definition to allow comparison with wider data sets and habitats identified within Scottish waters.

For further information on the EMODnet broad-scale seabed (EUNIS) habitat map for Europe see EMODnet (2020).

5.3 Consultation

Table 5-1 summarises the relevant consultation responses on the marine elements of the proposed Scot-NI application corridors received prior to and during preparation of the Marine Environmental Appraisal (MEA) Report and which were considered in this Section.

Table 5-1 Consultation responses

Stakeholder	Comment	How this has been addressed
Scottish Natural Heritage (SNH) (NatureScot)	SNH (NatureScot) recommends that the benthic and intertidal ecology assessment should consider likely impacts on any priority marine features (PMF) in both subtidal and intertidal areas (see https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/priority-marine-features-scotlands-seas [nature.scot] and guidance: https://www.nature.scot/priority-marine-features-guidance [nature.scot])	The potential impact on priority marine features are included. See Section 5.5.1.3 (Scot-NI 3) and 5.5.2.3 (Scot-NI 4).
	An additional meeting with SNH (NatureScot) was held on 29/07/2020 to discuss whether intertidal surveys would be needed at the landfall locations. The outcome of this meeting was confirmation that no intertidal surveys would be required at the landfall locations of Girvan and Portpatrick	Intertidal Phase 1 habitat survey was undertaken for the proposed cable land point at Donaghadee in Northern Ireland due to protected sites designation status. See Section 5.4.1
Department of Agriculture, Environment and Rural Affairs (DAERA)	DAERA recommended CEDaR as a good data source to inform the benthic section of the MEA report.	This data source has been used. See Section 5.3.

5.4 Existing baseline description

5.4.1 Intertidal area

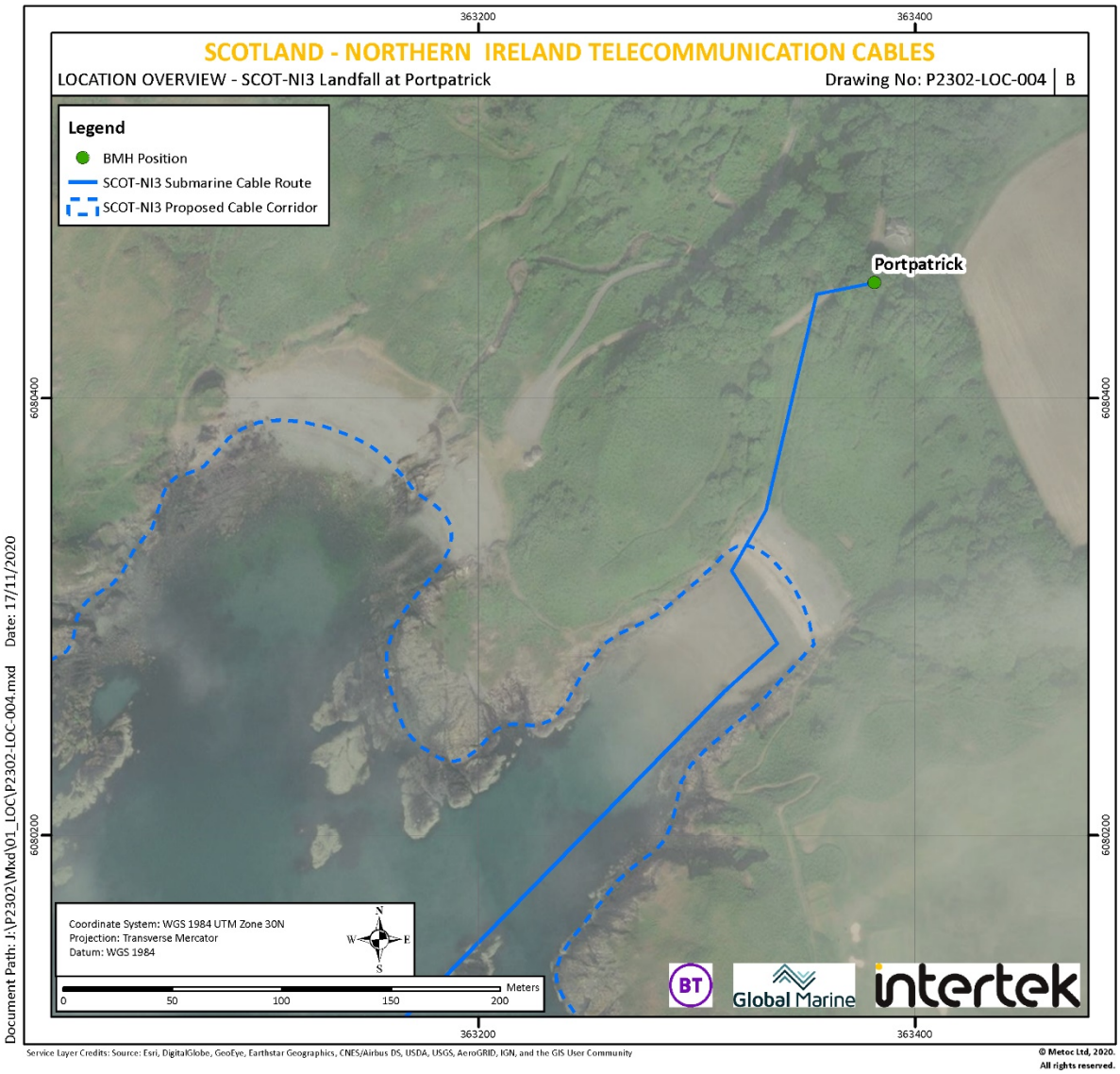
Photographic images were taken at all landfall sites to inform the presence of intertidal habitats. In addition, an Intertidal Phase 1 habitat survey (Thomson Environmental 2020) was undertaken for the landfall area at Donaghadee in Northern Ireland (Scot-NI 3) as this is within several protected sites.

5.4.1.1 Scot-NI 3

Portpatrick landfall

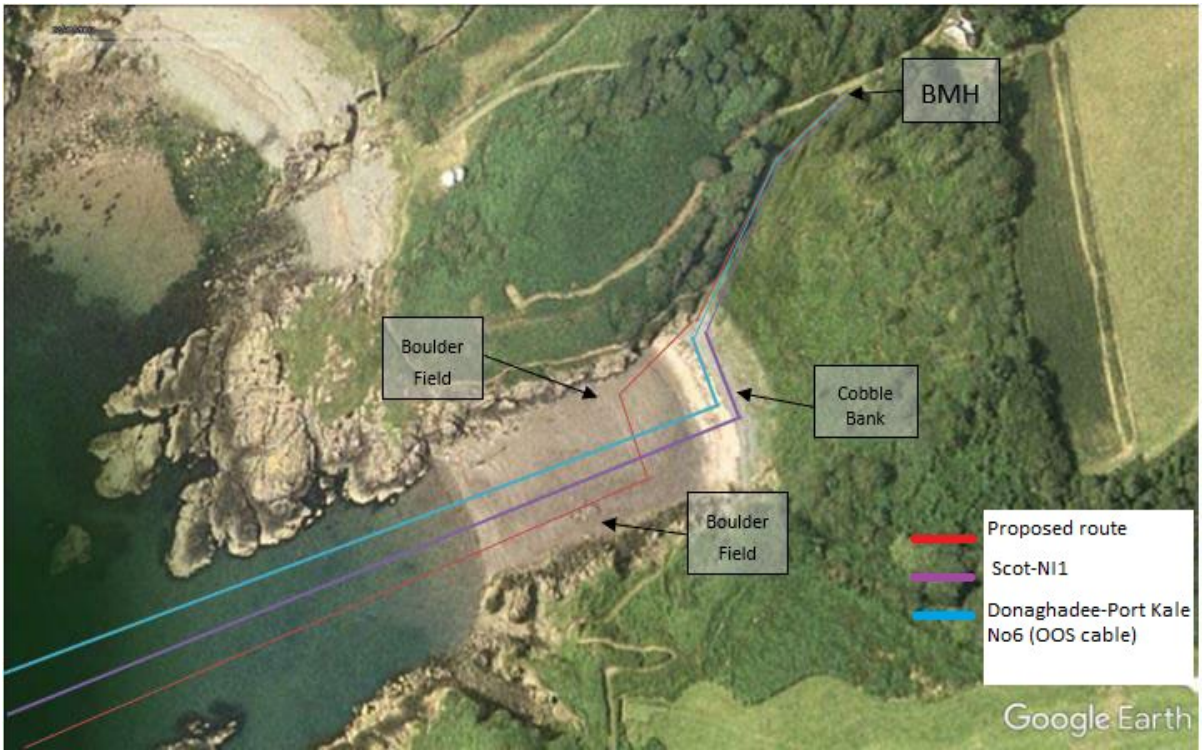
Portpatrick is the existing landfall of the Scot-NI 1 cable. The proposed cable landfall is within Port Mora which is a small cove on the west coast of the Stranraer peninsula (Figure 5-1. Drawing Reference: P2302-LOC-004-A). Immediately to the north is Port Kale, which is a similar cove that has also historically been used as a cable landing point for the existing Scot-NI 1 cable. Port Kale has not been selected as the cable landfall for Scot-NI 3 and will not be considered further in this assessment.

Figure 5-1 Overview of Portpatrick beach (Scot-NI 3) cable alignment and BMH (Drawing reference: P2302-LOC-004-A)



The intertidal area at Port Mora beach extends approximately 90m from the low water mark to the back of the beach. The cove is approximately 55m wide. The beach is encircled by very steep cliffs to the north and south and a hill to the east at the back of the beach (Figure 5-2) with a path on the north-eastern side of the area to the beach manhole (Global Marine 2020a).

Figure 5-2 Satellite overview of Port Mora beach (Scot-NI 3)



Source: Global Marine (2020d)

The intertidal area at Port Mora is made up of pebbles, cobbles, and rocks at the at the foot of the hill, at back of the beach, partly covered with fine to coarse sand. A flat sandy beach, containing only occasional boulders (Figure 5-5 and 5-9) is exposed at low tide (Global Marine 2020a). The north-western and south-eastern sides of the beach are made of rocks becoming cliffs (Figure 5-5).

The nearshore seabed is expected to be a mix of sand, gravel, and rock (Global Marine 2020a). At KP 0.4 (approximately 2 m water depth) the area is covered with >1 m deep sand over hard clay forming a glacial till. Boulders are exposed at KP 0.7, before entering an area of seafloor consisting of <0.5 m deep loose to dense gravelly sand with alternating scattered and then numerous boulder fields (Global Marine 2020a).

A total of nine intertidal habitats were identified at Port Mora (using desk top study, photographic evidence, and professional judgement). A list of the intertidal habitats considered to be present are provided in Table 5-2. The intertidal area is predominantly made up of littoral sediment (A2) and littoral rock and other hard substrata (A1). Photographs used to characterise the intertidal habitat types present at Port Mora (indicating the substrate, floral and faunal communities) are shown in Figures 5-3 to 5-13.

Table 5-2 Intertidal EUNIS habitats at Port Mora (Portpatrick, Scotland

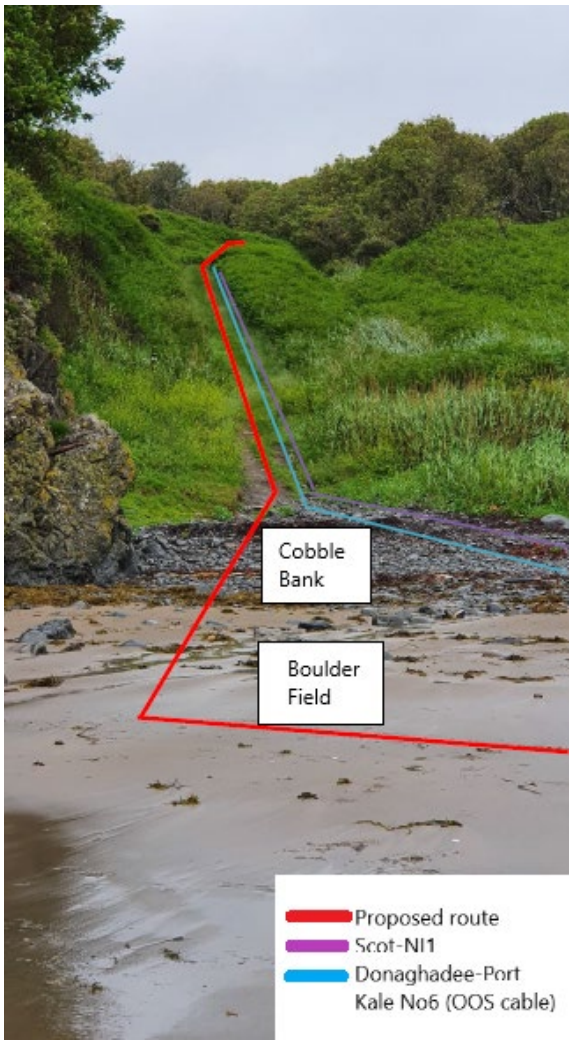
Broad habitat	EUNIS code	Biotope/Habitat description
A1 - Littoral rock and other hard substrata	A1.1133	*Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles
	A1.2	Moderate energy littoral rock
	A1.21	Barnacles and fucoids on moderately exposed shores
	A1.3132	*Fucus vesiculosus* on mid eulittoral mixed substrata

Broad habitat	EUNIS code	Biotope/Habitat description
	A1.45	Ephemeral green or red seaweeds (freshwater or sand-influenced) on non-mobile substrata
	A1.446	Sponges and shade-tolerant red seaweeds on overhanging lower eulittoral bedrock and in cave entrances
A2 – Littoral sediment	A2.1	Littoral coarse sediment
	A2.111	Barren littoral shingle
	A2.22	Barren or amphipod-dominated mobile sand shores

Notes: EUNIS = European Nature Information System

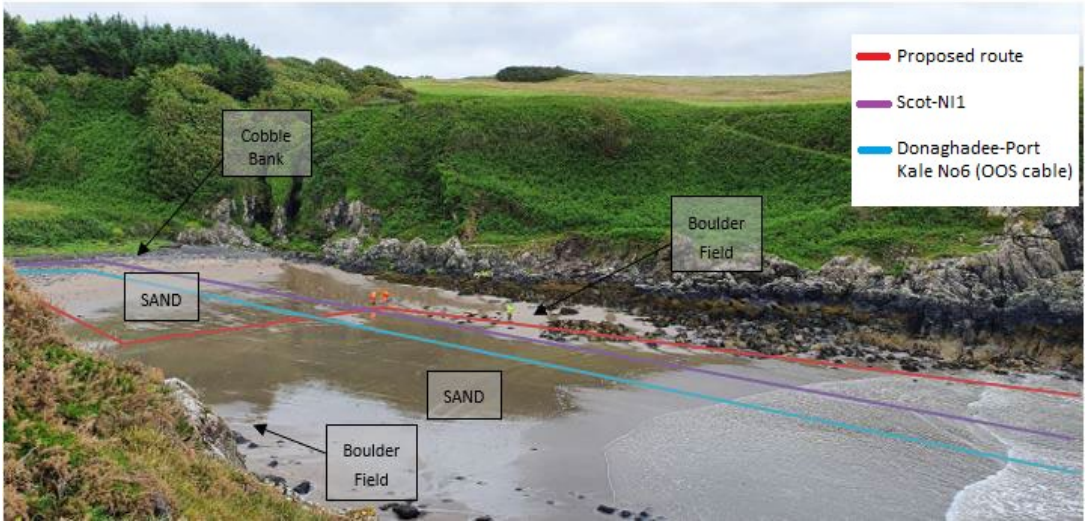
The EUNIS habitat listed in this table are assigned exclusively based on photographic evidence provided by Global Marine (Global Marine, 2020a).

Figure 5-3 Top of Port Mora beach (Scot-NI 3) with boulders, gravel, and sand banks



Source: Global Marine (2020d)

Figure 5-4 Overview of Port Mora beach (Scot-NI 3). The red line indicates the approximate route position



Source: Global Marine (2020d

Figure 5-5 Top of the beach with a stony band in at the back of the beach and sandy areas with occasional boulders

Source: Global Marine (2020d)

Figure 5-6 Overview of the beach at Port Mora – intertidal littoral sediments (A2) with fringing littoral rock and other hard substrata (A2)

Source: Global Marine (2020c)

Figure 5-7 Intertidal littoral sediments (A2) with fringing littoral rock and other hard substrata (A2)

Source: Global Marine (2020c)

Figure 5-8 Barren or amphipod-dominated mobile sand shores (A2.22)

Source: Global Marine (2020c)

Figure 5-9 Moderately energy littoral rock (A1.2)

Source: Global Marine (2020c)

Figure 5-10 *Fucus vesiculosus* on mid eulittoral mixed substrata (A1.3132)

Source: Global Marine (2020c)

Figure 5-11 Ephemeral green or red seaweeds (freshwater or sand-influenced) on non-mobile substrata (A1.45

Source: Global Marine (2020c)

Figure 5-12 Sponges and shade-tolerant red seaweeds on overhanging lower eulittoral bedrock in cave entrances (A1.446)

Source: Global Marine (2020c

Figure 5-13 Rockpool with fucoids and green algae

Source: Global Marine (2020c

Donaghadee landfall

The Donaghadee landfall is the existing landfall of the Scot-NI 1 cable and is located within the Outer Ards SPA, Ramsar, Areas of Special Scientific Interest (ASSI) and North Channel SAC. The site is also within 5 km of the Copeland Islands SPA and ASSI, and the Blaeberry Island Bog ASSI. Records of nine protected species were identified within 2 km of the site, including European otter (*Lutra lutra*) and several birds listed on Schedule 1 of the Wildlife (Northern Ireland) Order 1985 (as amended) (Thomson Environmental 2020).

Due to the designated site status at the Donaghdee landfall an Intertidal Phase 1 habitat survey was undertaken to establish the habitats and species present (Figure 5-14 Drawing reference: P2302-3-HAB-002-A). The intertidal survey was carried out by Thomson Environmental Consultants on 22 August 2020 during a spring low tide. The field survey recorded and mapped 16 biotopes (Table 5-3) and included one priority habitat: Intertidal under-boulder communities (A3.2112).

The intertidal area at Donaghdee beach extends approximately 220m from the low water mark to the back of the beach. The biotopes recorded are listed and described in Table 5-3 and their distribution are shown in Figure 5-14 (Drawing reference: P2302-3-HAB-002-A).

The northern part of the beach contains large artificial boulders at the upper limit of the shore. Below the boulders is a sandy shore, which transitions to two large permanent pools in the mid-shore. Further down, the low shore consisted of a large boulder field covered in fucoid algae. This boulder field also contained small sections of exposed bedrock (Thomson Environmental 2020).

Further south, the bay became gravellier, with patches of mixed sediment including large boulders on sand. The mid-shore was again characterised by boulders covered in fucoid algae with a patch of exposed bedrock. The southern end of the bay had a smaller stretch of sand, which transitioned into a barren shingle beach (Thomson Environmental 2020).

There are extensive kelp beds in the sublittoral fringe, at the edge of the intertidal zone. The southernmost region of the survey area is a small headland of exposed bedrock. The upper limits of the bedrock were colonised by a mixture of yellow and grey lichen, with some small rockpools dominated by ephemeral green algae. Below this, the rock was covered in tar lichen with patches of algae and barnacles. Patches of fucoids, barnacles and limpets were present on the mid-shore rock. The lower shore was dominated by kelp and a mixture of fucoid algae species (Thomson Environmental 2020).

No Annex I habitats were identified within the intertidal survey area. Species sightings were also recorded during the field survey visit which included two birds listed as principal interest/qualifying species for the Outer Ards Ramsar and SPA, European otter (*Lutra lutra*) in the water, common seal (*Phoca vitulina*), and knotted wrack (*Ascophyllum nodosum*) a Northern Irish priority species (Thomson Environmental 2020).

Overall, the intertidal environment at Donaghadee consisted predominantly of ephemeral green or red seaweed communities (freshwater or sand-influenced; A1) and littoral sedimentary (A2) habitats. Habitat photographs from the beach at Donaghadee are shown in Figures 5-15 to 5-19.

Table 5-3 Intertidal EUNIS habitats at Donaghadee (NI)

Broad habitat	EUNIS code	Biotope/Habitat description (EUNIS)
A1 - Ephemeral green or red seaweed communities (freshwater or sand-influenced)	A1.11	Mussel and/or barnacle communities
	A1.21	Barnacles and fucoids on moderately exposed shores
	A1.211	*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock
	A1.213	*Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock
	A1.3132	*Fucus vesiculosus* on mid eulittoral mixed substrata
	A1.412	Fucoids and kelp in deep eulittoral rockpools
	A1.413	Seaweeds in sediment-floored eulittoral rockpools
	A1.45	Ephemeral green or red seaweed communities (freshwater or sand-influenced)
A2 – Littoral sediment	A2.111	Barren littoral shingle
	A2.2	Littoral sand and muddy sand

Broad habitat	EUNIS code	Biotope/Habitat description (EUNIS)
	A2.211	Talitrids on the upper shore and strandline
	A2.221	Barren littoral coarse sand
	A2.245	*Lanice conchilega* in littoral sand
	A2.41	*Hediste diversicolor* dominated gravelly sandy mud shores
A3 – Infralittoral rock and other hard substrata	A3.2112	*Laminaria digitata* and under-boulder fauna on sublittoral fringe boulders
B3 – Rock cliffs, ledges, and shores, including the supralittoral	B3.111	Yellow and grey lichens on supralittoral rock

Notes: EUNIS = European Nature Information System

Source: Thomson Environmental (2020)

Figure 5-14 Distribution of intertidal habitats at Donaghadee (Scot-NI 3) (Drawing reference: P2302-3-HAB-002-A)

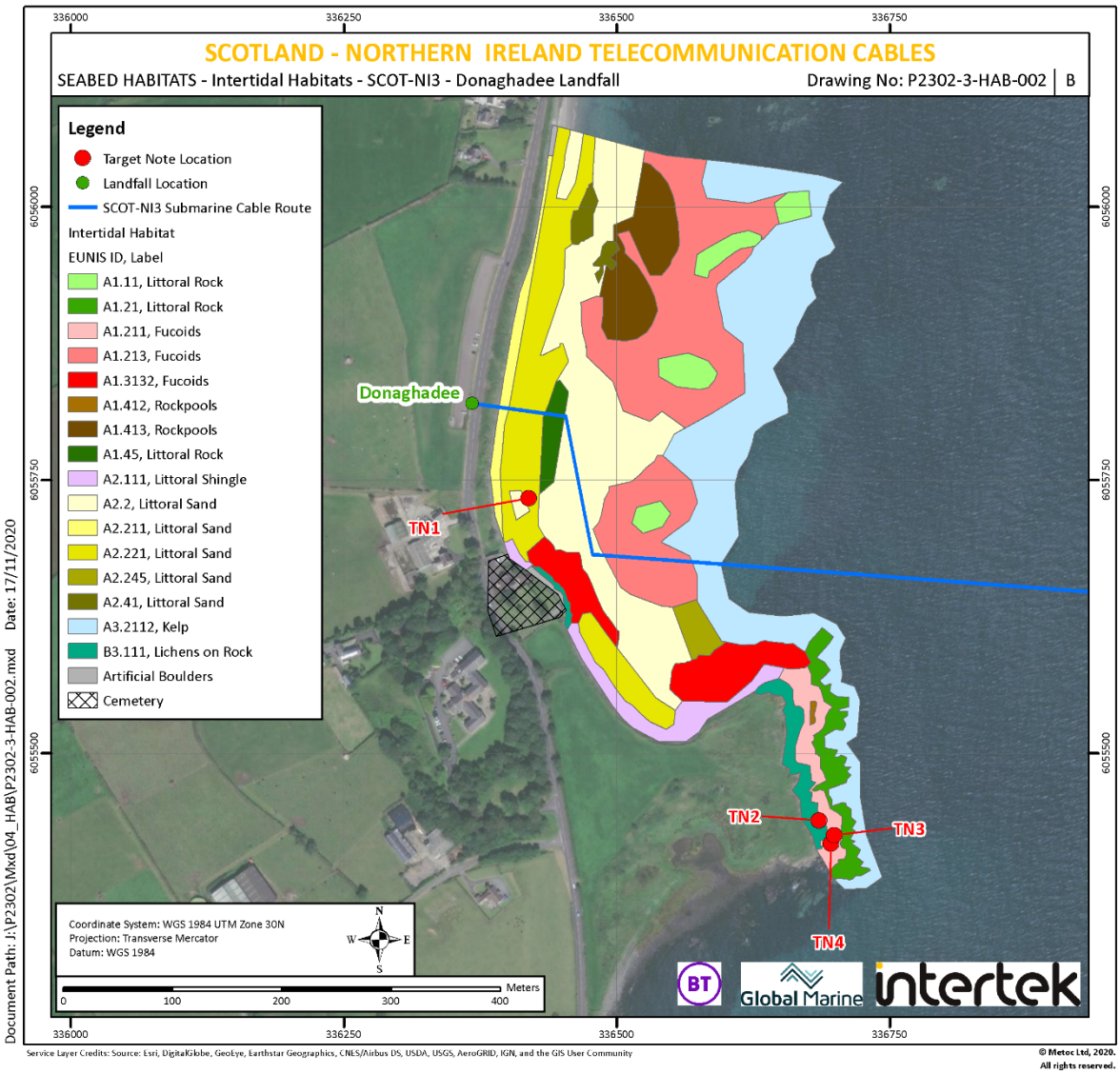


Figure 5-15 Barren littoral coarse sand (A2.221)

Source: Global Marine (2020c)

Figure 5-16 Seaweeds in sediment-floored eulittoral rockpools (A1.413)

Source: Global Marine (2020c)

Figure 5-17 Hediste diversicolor was highly abundant, this area was defined as "Hediste-dominated gravelly sandy mud shores" (A2.41)

Source: Global Marine (2020c)

Figure 5-18 Laminaria digitata and under-boulder fauna on sublittoral fringe boulders (A3.2112)

Source: Global Marine (2020c)

Figure 5-19 Laminaria digitata and under-boulder fauna on sublittoral fringe boulders (A3.2112)

Source: Global Marine (2020c)

5.4.1.2 Scot-NI 4

Girvan

Girvan is the existing landing point of the Scot-NI 2 cable and the Scottish landing of Scot-NI 4. The intertidal area at Girvan extends approximately 85m at low tide (Global Marine 2020b). The intertidal environment at Girvan littoral consists of sedimentary (A2) habitats. Habitat photographs from the beach at Girvan, indicative of the substrate, are shown in Figures 5-21 to 5-23. An overview of the BHM and the cable landfall is provided in Figure 5-20 (Drawing reference: P2302-LOC-006-A).

Like most beaches in this region, the back of Girvan beach is composed of a shingle slope. Below the high water mark the beach becomes significantly sandier (see Figure 5-21), with shingle remaining a major component. A total of three intertidal habitats were identified at Girvan beach. A list of the intertidal habitats observed is presented in Table 5-4.

Figure 5-20 Overview of the beach at Girvan, Scotland (Scot-NI 4) (Drawing reference: P2302-LOC-006-A)

Table 5-4 Intertidal EUNIS habitats at Girvan (Scotland): Scot-NI 4

Broad habitat	EUNIS code	Biotope/Habitat description
A2 – Littoral sediment	A2.1	Littoral coarse sediment
	A2.22	Barren or amphipod-dominated mobile sand shores
	A2.4	Littoral mixed sediments

Source: Thomson Environmental (2020)

Notes: EUNIS = European Nature Information System

The EUNIS habitat listed in this table are assigned exclusively based on photographic evidence provided by Global Marine.

Figure 5-21 The Beach at Girvan taken from the back of the beach, showing barren or amphipod-dominated mobile sand shores (A2.22) with coarse sediments (A2.1) in the foreground

Source: Global Marine (2020c)

Figure 5-22 Lower beach at Girvan, showing barren or amphipod-dominated mobile sand shores (A2.22) with coarse sediments (A2.1) in the foreground

Source: Global Marine (2020c)

Figure 5-23 Mid beach at Girvan, showing Littoral mixed sediments (A2.4)

Source: Global Marine (2020c)

Larne (Drains Bay)

Drains Bay, Larne, is the Northern Ireland landfall for the existing Scot-NI 2 cable and will be the landfall for Scot-NI 4 (Figure 5-24 (Drawing reference: P2302-LOC-007-A)). The beach at Drains Bay is steep and composed of cobbles and boulders averaging around 30 cm in diameter (Figure 5-25 and 5-26). At low water, the beach width is approximately 75m. Overall, the intertidal environment at Larne (Drains Bay) consists predominantly of Littoral rock and other hard substrata (A1) and littoral sediment (A2) habitats. Habitat photographs from the beach at Larne (Drains Bay), indicative of the substrate, floral and faunal communities are shown in Figure 5-25 to Figure 5-30. The survey alignment charts show that the nearshore environment at Drains Bay is dominated by numerous boulder fields and gravelly sand (< 1.0m) over glacial till (KP83.1-84.5). Sandwaves occur further offshore, throughout the shallower parts but disappear in the deeper parts of Beaufort's Dyke (Global Marine 2020a). A total of six intertidal habitats were identified at Drains Bay. A list of the intertidal habitats observed is presented in Table 5-5.

The Larne (Drains Bay) landing is located at an Area of Outstanding Natural Beauty (Antrim Coast and Glens AONB). This means that the area is a designated exceptional landscape whose distinctive

character and natural beauty are precious enough to be safeguarded in the national interest (Landscapes 2020).

Figure 5-24 Overview of the beach at Drains Bay, Larne (Drawing reference: P2302-LOC-007-A)

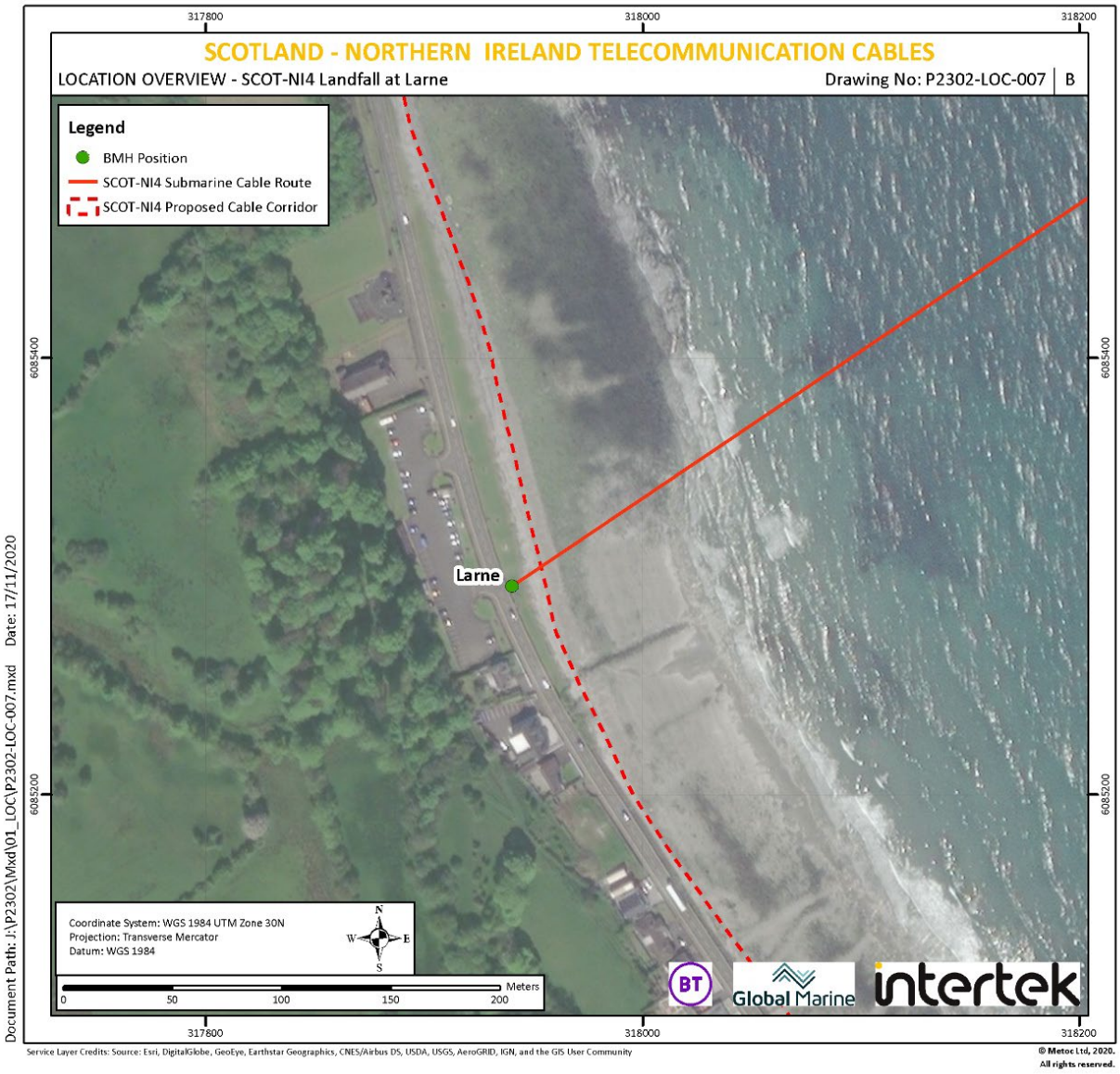


Table 5-5 Intertidal EUNIS habitats at Larne (NI): Scot-NI 4

Broad habitat	EUNIS code	Biotope/Habitat description
A1 - Littoral rock and other hard substrata	A1.1133	*Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles
	A1.3132	*Fucus vesiculosus* on mid eulittoral mixed substrata
	A1.45	Ephemeral green or red seaweeds (freshwater or sand-influenced) on non-mobile substrata
	A2.111	Barren littoral shingle

Broad habitat	EUNIS code	Biotope/Habitat description
A2 – Littoral sediment	A2.22	Barren or amphipod-dominated mobile sand shores
	A2.4	Littoral mixed sediments

Source: Thomson Environmental (2020)

Notes: EUNIS = European Nature Information System

The EUNIS habitat listed in this table are assigned exclusively based on photographic evidence provided by Global Marine.

Figure 5-25 View offshore from Larne (Drains Bay) BMH showing existing cable (Scot-NI 2) and replacement cable (Scot-NI 4) alignment

Source: Global Marine (2020b)

Figure 5-26 The Larne (Drains Bay) beach (taken from the strand line)

Source: Global Marine (2020c)

Figure 5-27 Habitat photograph from Larne (Drains Bay) beach, showing sand flats containing fucoid

Source: Global Marine (2020a)

Figure 5-28 Habitat photograph from Larne (Drains Bay) beach, rocky habitats containing barnacles, limpets and fucoid

Source: Global Marine (2020a)

Figure 5-29 Habitat photograph from Larne (Drains Bay) beach, showing boulders overgrown with green algae and fucoid

Source: Global Marine (2020a)

Figure 5-30 Larne (Drains Bay) beach, boulders overgrown with fucoid.

Source: Global Marine (2020c)

5.4.2 Subtidal area

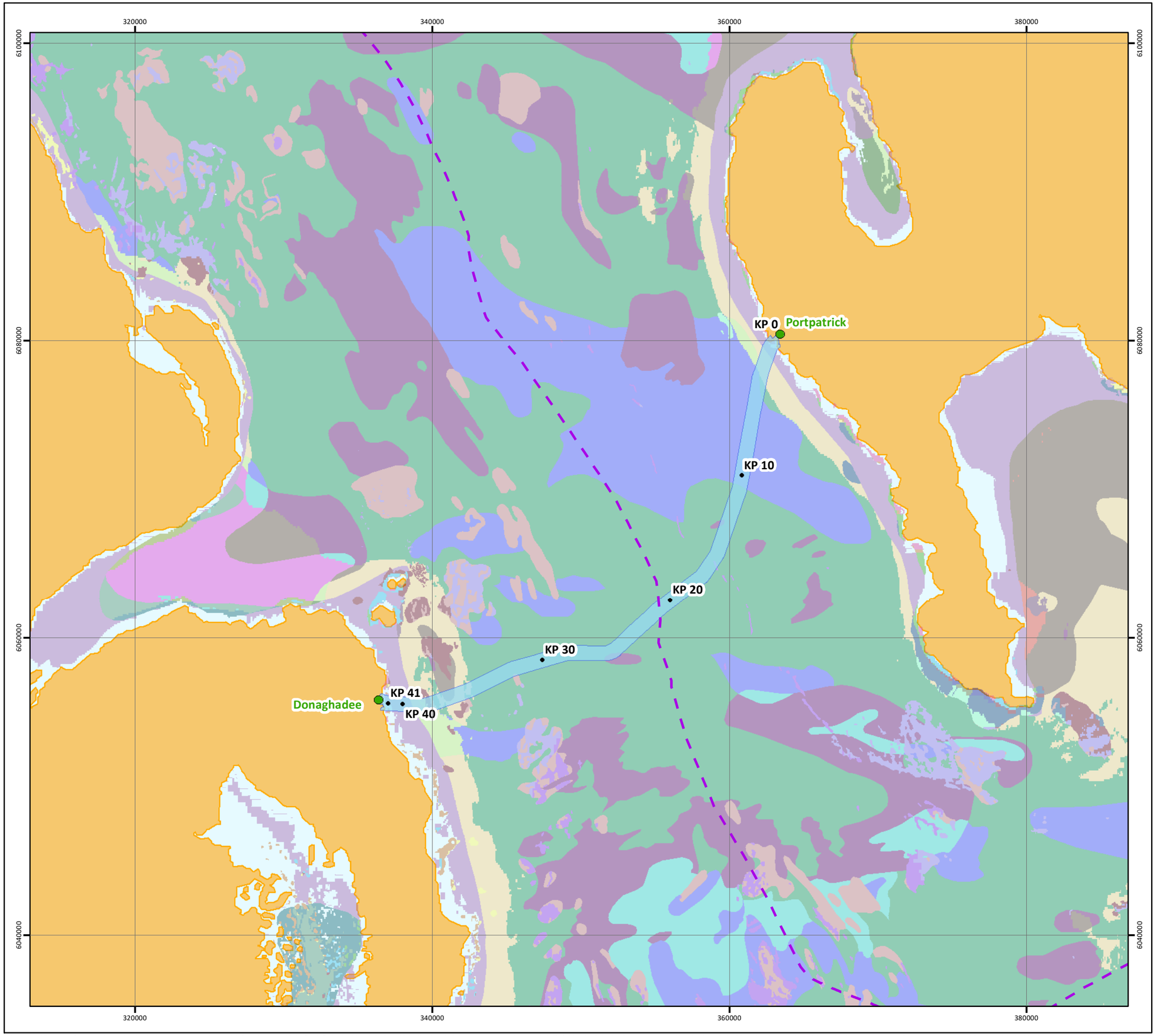
The EUNIS habitat classification system has been used for identifying potential habitats within the Scot-NI application corridors, as it provides a comprehensive pan-European habitat classification system, which is widely used. The habitats present within the subtidal area have been identified by review of benthic sediment information, existing survey information (Global Marine 2020a; EMODnet 2020; habitat data from AFBI (2020) and JNCC (2019)) and professional judgement.

5.4.2.1 Scot-NI 3

Using desktop study and review of geophysical survey data, a total of six EUNIS habitats have been identified in the subtidal environment within the Scot-NI 3 application corridor in Scottish territorial waters, while 11 EUNIS habitats were identified within the application corridor in the Northern Irish sector.

Overall, the subtidal environment within the Scot-NI 3 application corridor predominantly consists of sublittoral sediment (A5) habitats within Scottish territorial waters, although there is also evidence of hard substrate (A4) and infralittoral (A3) habitats. Within the Northern Irish sector, the seabed predominantly consists of both circalittoral rock and other hard substrata (A4) and sublittoral sediment (A5) habitats.

Figure 5-32 (Drawing Reference: P2302-HAB-3-001-A) shows the distribution of subtidal EUNIS habitats within the Scot-NI 3 application corridor. Table 5-6 and Table 5-7 outline the description of each habitat identified, from the EMODnet (2020) and AFBI (2020) data, within the application corridor for the Scottish and the Northern Irish sector, respectively. Potential Annex I habitats are discussed in detail in Section 5.5.



SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

SEABED HABITATS
EMODnet EU SeaMap Seabed Habitats - SCOT-NI3

Drawing No: P2302-3-HAB-001 | **A**

Legend

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

EUNIS classification

- A3
- A3.1
- A3.2
- A3.3
- A4
- A4.1
- A4.12
- A4.12 or A4.27 or A4.33
- A4.2
- A4.27
- A4.3
- A4.33
- A5
- A5.13
- A5.14
- A5.15
- A5.23 or A5.24
- A5.25 or A5.26
- A5.27
- A5.33
- A5.34
- A5.35
- A5.36
- A5.37
- A5.43
- A5.44
- A5.45
- Na

NOTE: Not to be used for Navigation

Date	08 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
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Data Source	UKHO; ESRI; GEBCO; EMODnet
File Reference	J:\P2302\Mxd\04_HAB\ P2302-3-HAB-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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Table 5-6 Likely subtidal EUNIS habitats within the Scot-NI 3 application corridor: Scottish sector

EUNIS code	AFBI habitat code	Biotope/Habitat description (EUNIS or AFBI)	Distribution
A3	-	Infralittoral rock and other hard substrata	KP0.7-KP1.0
A4.33	-	Faunal communities on deep low energy circalittoral rock	KP16.1-KP16.4
A5.14	-	Circalittoral coarse sediment	KP1.6-KP3.1
A5.15	-	Deep circalittoral coarse sediment	KP3.1-KP3.3, KP10.7-KP21.0
A5.27	-	Deep circalittoral sand	KP13.1-KP13.7
A5.45	-	Deep circalittoral mixed sediment	KP3.3-KP10.7

Notes: EUNIS = European Nature Information System

AFBI habitat code represents the habitat code used for the data obtained from AFBINI. For more information on the AFBI habitat codes see Appendix A.

Habitats are based on EMODnet (2020) data.

Table 5-7 Likely subtidal EUNIS habitats within the Scot-NI 3 application corridor: Northern Irish sector

EUNIS code	AFBI habitat code	Biotope/Habitat description	Distribution
A3	-	Infralittoral rock and other hard substrata	KP41.2-KP41.3
A4.2	-	Atlantic and Mediterranean moderate energy circalittoral rock	KP38.1-KP38.4
A4.21	-	Echinoderms and crustose communities on circalittoral rock	KP34.0-KP35.5, KP37.25-KP37.8, KP38.4-KP39.3
A4.3	-	Atlantic and Mediterranean low energy circalittoral rock	KP38.4-KP38.7
A5	-	Deep circalittoral sediment	KP31.9-KP32.4
A5.14	-	Circalittoral coarse sediment	KP35.3-KP36.5, KP37.2-KP37.5, KP37.9-KP38.1, KP37.9- KP39.5
A5.15	-	Deep circalittoral coarse sediment	KP21.0-KP35.3, KP36.5-KP37.2, KP37.5-KP37.9
A5.27	-	Deep circalittoral sand	KP25.0-KP25.8
A4.2	MBf	Atlantic and Mediterranean moderate energy circalittoral rock	KP34.0-KP41.0
A4.2	MRu	Atlantic and Mediterranean moderate energy circalittoral rock	KP34.0-KP41.0
A4	MCS	Atlantic and Mediterranean high energy circalittoral rock	KP34.0-KP41.0
A5.2	S	Sublittoral sand	KP34.0-KP41.0

EUNIS code	AFBI habitat code	Biotope/Habitat description	Distribution
A4.138	MCS.co	*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock	KP34.0-KP41.0

Notes: EUNIS = European Nature Information System

AFBI habitat code represents the habitat code used for the data obtained from AFBI. For more information on the AFBI habitat codes see Appendix A.

The grey colour represents the conversion of AFBI habitat codes to EUNIS habitat codes.

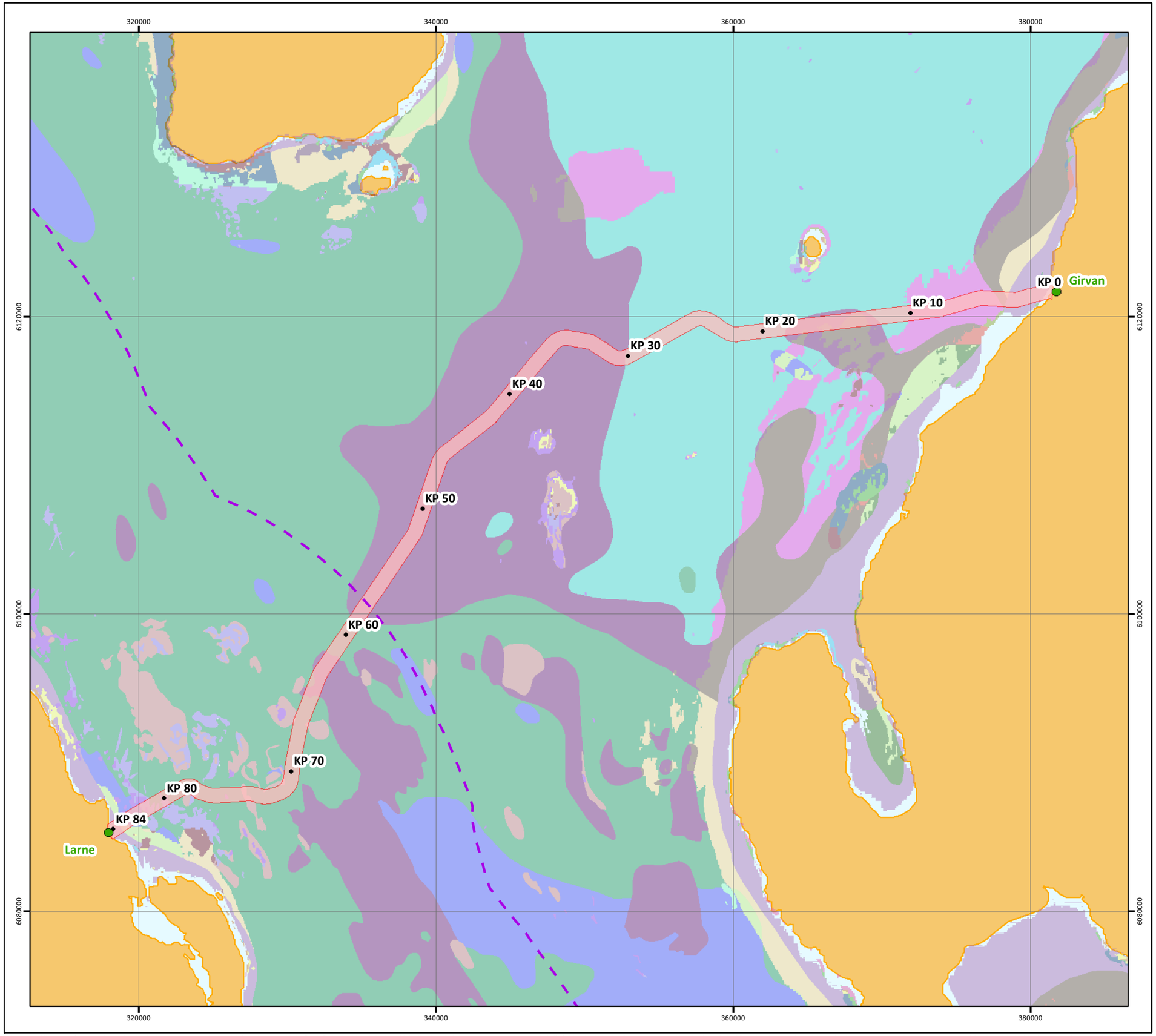
Habitats are based on AFBI (2020) and EMODnet (2020) data.

5.4.2.2 Scot-NI 4

Using desktop study and review of geophysical survey data, a total of five EUNIS habitats were identified in the subtidal environment within the application corridor in Scottish territorial waters, indicating a fairly homogenous seabed , while 23 EUNIS habitats were identified within the Scot-NI 4 application corridor in the Northern Irish sector, representing a greater level of habitat diversity. It is noteworthy that several habitats located in the Northern Irish sector were only assigned AFBI or UK and Irish marine habitat codes (i.e. not assigned any EUNIS classification code) and have thus been converted to EUNIS habitats.

Overall, the subtidal environment along Scot-NI 4 application corridor consisted of various sublittoral sediment (A5) habitats within Scottish territorial waters (EMODnet 2020; JNCC 2019). Within the Clyde Sea Sill MPA the protected habitats comprise circalittoral and offshore sand and coarse sediment communities, which are distributed across the floor of the central part of the sill (NatureScot 2014). Habitats in the Northern Irish sector predominantly constituted of a mixture of circalittoral rock and other hard substrata (A4) and sublittoral sediment (A5) habitats as well as a some infralittoral rock and other hard substrata (A3) habitats (EMODnet 2020; AFBI 2020).

Figure 5-32 (Drawing Reference: P2302-4-HAB-001-A) shows the distribution of subtidal EUNIS habitats along Scot-NI 4 application corridor (EMODnet 2020). Table 5-8 and Table 5-9 outline a description of each habitat identified, from the data sets within the cable corridor for the Scottish and the Northern Irish sector, respectively. Potential Annex I habitats present are discussed in detail in Section 5.5.



SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

SEABED HABITATS
EMODnet EU SeaMap Seabed Habitats - SCOT-NI4

Drawing No: P2302-4-HAB-001 | **A**

Legend

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

EUNIS classification

- A3
- A3.1
- A3.2
- A3.3
- A4
- A4.1
- A4.12
- A4.12 or A4.27 or A4.33
- A4.2
- A4.27
- A4.3
- A4.33
- A5
- A5.13
- A5.14
- A5.15
- A5.23 or A5.24
- A5.25 or A5.26
- A5.27
- A5.33
- A5.35
- A5.37
- A5.43
- A5.44
- A5.45
- Na

NOTE: Not to be used for Navigation

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Data Source	ESRI; GEBCO; EMODnet
File Reference	J:\P2302\Mxd\04_HAB\ P2302-4-HAB-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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Table 5-8 Subtidal EUNIS habitats along the Scot-NI 4 application corridor: Scottish sector

EUNIS code	UK and Irish marine habitat code	Biotope/Habitat description (EUNIS)	Distribution
A5.14	SS.SCS.CCS	Circalittoral coarse sediment	KP3.4-KP3.6
A5.25 / A5.26	SS.SSa.CFiSa / SS.SSa.CMuSa	Circalittoral fine sand or Circalittoral muddy sand	KP3.4-KP4.4, KP13.1-KP18.1
A5.27	SS.SSa.Osa	Deep circalittoral sand	KP12.5-KP18.4, KP30.3-KP57.5
A5.35	SS.SMu.CSaMu	Circalittoral sandy mud	KP4.0-KP10.1
A5.37	SS.SMu.Omu	Deep circalittoral mud	KP18.4-KP30.3

Notes: EUNIS = European Nature Information System

Habitats are based on AFBI (2020) and EMODnet (2020) data.

Table 5-9 Subtidal EUNIS habitats along the Scot-NI 4 application corridor: Northern Irish sector

EUNIS code	UK and Irish marine habitat code	AFBI habitat codes	Biotope/Habitat description (EUNIS)	Distribution
A4.27	-	-	Faunal communities on deep moderate energy circalittoral rock	KP77.3-KP77.8, KP79.7-KP81.7
A4.33	-	-	Faunal communities on deep low energy circalittoral rock	KP75.3-KP75.5, KP77.8-KP78.2, KP81.2-KP81.7, KP82.3-KP83.2
A5	-	-	Deep circalittoral sediment	KP66.5-KP66.9, KP70.1-KP71.2, KP72.5-KP73.2, KP74.1-KP4.4
A5.15	-	-	Deep circalittoral coarse sediment	KP58.9-KP61.7, KP64.9-KP82.2
A5.27	-	-	Deep circalittoral sand	KP57.5-KP58.9, KP61.7-KP64.9
A5.44	-	-	Circalittoral mixed sediments	KP83.1-KP83.6
A5.45	-	-	Deep circalittoral mixed sediments	KP81.7-KP83.3
A5.1	SS.SCS.OCS_Coarse Sand	-	Sublittoral coarse sediment	KP64.7-KP79.5
A5.1	SS.SCS.OCS_Gravel/Sand	-	Sublittoral coarse sediment	KP64.7-KP69.5, KP70.6-KP70.3, KP72.7-KP80.3
A5.2	SS.SCS.OCS_Pebble/Cobble	-	Sublittoral coarse sediment	KP71.4-KP71.5, KP74.2-KP74.3, KP74.8-KP79.8

EUNIS code	UK and Irish marine habitat code	AFBI habitat codes	Biotope/Habitat description (EUNIS)	Distribution
A4.214	CR.MCR.EcCr	-	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock	KP75.8-KP77.8, KP79.8-KP81.4
A4.112	CR.HCR.FaT.CTub	-	*Tubularia indivisa* on tide-swept circalittoral rock	KP76.5-KP77.5 KP80.2-KP81.2
A4.134	CR.HCR.XFa.FluCoAs	-	Flustra foliacea and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock	KP75.0-KP79.4
A4.1122	CR.HCR.FaT.Ctub.Adig	-	*Alcyonium digitatum* with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock	KP75.8-KP77.7, KP80.2-KP81.1
A4.121	CR.HCR.DpSp.PhaAxi	-	*Phakellia ventilabrum* and axinellid sponges on deep, wave-exposed circalittoral rock	KP81.2-KP81.4
A5.1	-	ECS.co	Sublittoral coarse sediment	KP82.3-KP83.0
A3/A3.1	-	ERu	Infralittoral rock and other hard substrata / Atlantic and Mediterranean high energy infralittoral rock	KP82.8-KP83.1
A4	-	Eru.mrip	Atlantic and Mediterranean high energy circalittoral rock	KP83.0-KP83.1
A4.1/A4	-	EBf	Atlantic and Mediterranean high energy circalittoral rock	KP81.9-KP82.4
A5.512	-	MCS.co_M	*Lithothamnion glaciale* maerl beds in tide-swept variable salinity infralittoral gravel	KP82.5-KP83.5
A3.116	-	MBf_K	Foliose red seaweeds on exposed lower infralittoral rock	KP83.7-KP84.0
A5.26	-	MS	Circalittoral muddy sand	KP83.7-KP83.9
A3.221	-	MCS.co_FoR	*Laminaria digitata*, ascidians and bryozoans on tide-swept sublittoral fringe rock	KP83.5-KP83.7
A4.2	-	MRu	Atlantic and Mediterranean moderate energy circalittoral rock	KP81.7-KP82.4
A4.2	-	MBf	Atlantic and Mediterranean moderate energy circalittoral rock	KP83.7-KP83.9
A4.138	-	MCS.co	*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock	KP83.3-KP83.4

Notes: EUNIS = European Nature Information System

AFBI habitat code represents the habitat code used for the data obtained from AFBI

The grey colour represents the conversion of AFBI habitat or UK and Irish marine habitat codes to EUNIS habitat codes.

Habitats are based on AFBI (2020) and EMODnet (2020) data.

5.5 Protected habitats of conservation importance

All habitats within protected sites designated for habitats have been considered in this Section. Sites designated for species (e.g. marine mammals, birds) have been considered within their respective sections of the MEA and Protected Sites Screening Report.

5.5.1 Scot-NI 3

5.5.1.1 Marine protected habitats

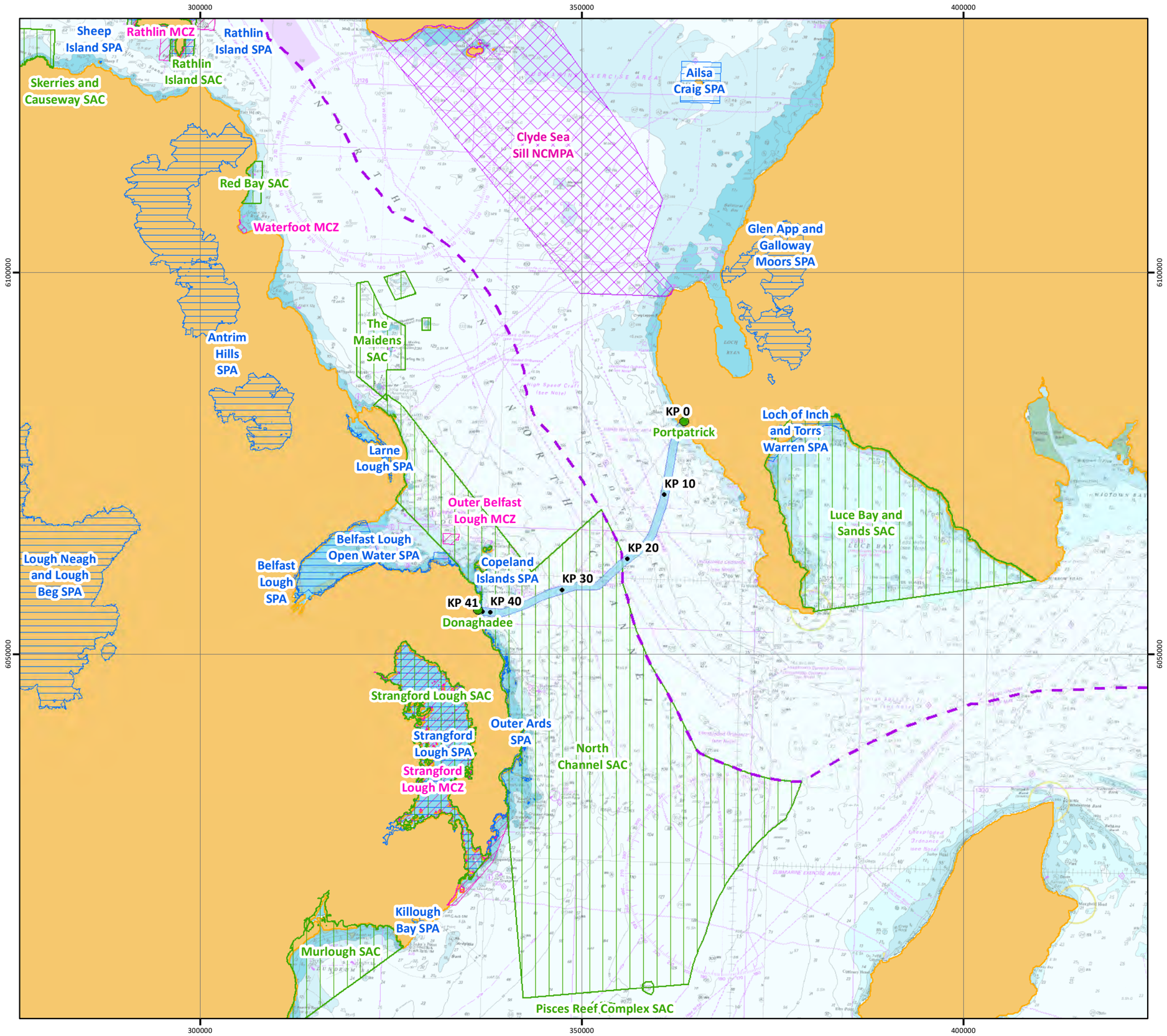
There are several existing and proposed protected sites within or near the application corridor and landfall sites. These protected sites are shown in Figure 5-33 (Drawing Reference: P2302-3-PROT-001-A).

The Scot-NI 3 application corridor intercepts no protected sites in Scottish waters. Within Northern Irish waters the corridor crosses the North Channel SAC in the near-shore environment and passes through the Outer Ards ASSI in the intertidal and the nearshore area.

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

ENVIRONMENTAL DESIGNATIONS
Protected Sites - SCOT-NI3

Drawing No: P2302-3-PROT-001 | **A**



Legend

- Landfall Location
- KP
- SCOT-NI3 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- SAC
- SPA
- MCZ
- NCMPA

NOTE: Not to be used for Navigation

Date	08 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; JNCC; SNH; DAERA; ESRI; GEBCO; MarineFind
File Reference	J:\P2302\Mxd\05_PROT\ P2302-3-PROT-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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5.5.1.2 Protected sites

North Channel SAC

The Scot-NI 3 application corridor has the potential to pass through three different types of Annex I habitats; sandbank (1110), Bedrock and stony reef, of which the latter two represent potential reefs, while the sandbank is of high certainty. Bedrocks and/or stony reefs in the SAC are associated with the EUNIS habitat (A4.21) echinoderms and crustose communities on circalittoral rock, a commonly occurring biotope found around the UK coastline (JNCC 2020).

Furthermore, the application corridor runs through 11 habitats outlined in Table 5-10. However, it is notable that the North Channel SAC is not designated for its benthic habitats (JNCC 2020c).

Table 5-10 Subtidal EUNIS habitats within the North Channel SAC and along the Scot-NI 3 application corridor

EUNIS code	AFBI habitat code	Biotope/Habitat description
A3	-	Infralittoral rock and other hard substrata
A4.2	-	Atlantic and Mediterranean moderate energy circalittoral rock
A4.21	-	Echinoderms and crustose communities on circalittoral rock
A4.3	-	Atlantic and Mediterranean low energy circalittoral rock
A5	-	Deep circalittoral sediment
A5.14	-	Circalittoral coarse sediment
A5.15	-	Deep circalittoral coarse sediment
A5.27	-	Deep circalittoral sand
A4.2	MRu / MBf	Atlantic and Mediterranean moderate energy circalittoral rock
A4	MCS	Atlantic and Mediterranean high energy circalittoral rock
A5.2	S	Sublittoral sand
A4.138	MCS.co	*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock

Notes: EUNIS = European Nature Information System

AFBI habitat code represents the habitat code used for the data obtained from AFBINI. For more information on the AFBI habitat codes see Appendix A.

The grey colour represents the conversion of AFBI habitat codes to EUNIS habitat codes

Habitats are based on AFBI (2020) and EMODnet (2020) data.

Outer Ards ASSI

A total of 16 biotopes have been observed within the intertidal area at Donaghadee, including one priority habitat in Northern Ireland (DAERA 2010): Intertidal under-boulder communities (A3.2112) while no Annex I habitats were identified within the intertidal zone. These biotopes are described and listed in Table 5-11 and their distribution is shown in Figure 5-14 (Drawing reference: P2302-3-HAB-002-A) in section 5.4.1.1 above.

Table 5-11 Intertidal EUNIS habitats at Donaghadee (NI

Broad habitat	EUNIS code	Biotope/Habitat description (EUNIS)
A1 - Ephemeral green or red seaweed communities (freshwater or sand-influenced)	A1.11	Mussel and/or barnacle communities
	A1.21	Barnacles and fucoids on moderately exposed shores
	A1.211	*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock
	A1.213	Fucus vesiculosus and barnacle mosaics on moderately exposed mid eulittoral rock
	A1.3132	Fucus vesiculosus on mid eulittoral mixed substrata
	A1.412	Fucoids and kelp in deep eulittoral rockpools
	A1.413	Seaweeds in sediment-floored eulittoral rockpools
	A1.45	Ephemeral green or red seaweed communities (freshwater or sand-influenced)
A2 – Littoral sediment	A2.111	Barren littoral shingle
	A2.2	Littoral sand and muddy sand
	A2.211	Talitrids on the upper shore and strandline
	A2.221	Barren littoral coarse sand
	A2.245	*Lanice conchilega* in littoral sand
	A2.41	*Hediste diversicolor* dominated gravelly sandy mud shores
A3 – Infralittoral rock and other hard substrata	A3.2112	*Laminaria digitata* and under-boulder fauna on sublittoral fringe boulders
B3 – Rock cliffs, ledges, and shores, including the supralittoral	B3.111	Yellow and grey lichens on supralittoral rock

Source: Thomson Environmental (2020)

Notes: EUNIS = European Nature Information System

Habitats are based on EMODnet (2020) data.

5.5.1.3 Protected Marine Features (PMFs)

The Scottish Priority Marine Feature (PMF) list contains 81 habitats and species considered to be of conservation importance in Scotland's seas. It includes many benthic features which are characteristic of the Scottish marine environment, ranging from flame shell beds in coastal waters to cold-water coral reefs of the deeper seas (SNH 2014). No PMFs (NatureScot 2020) were found within the application corridor in Scottish territorial waters (intertidal and subtidal).

PMFs is also a collective term for those features (habitats, species and geological/geomorphological) which are of conservation importance in the Northern Ireland inshore region (DOE 2014). Along the Scot-NI 3 application corridor in Northern Irish waters one subtidal habitat holds a conservation status as a 'NI Priority'; Intertidal underboulder communities. In addition, of the species recorded within the intertidal zone at Donaghadee (Table 5-12) two have conservation status as NI Priority; Common Seal (*Phoca vitulina*) and Knotted Wrack (*Ascophyllum nodosum*).

5.5.1.4 Intertidal area

At Portpatrick (Port Mora, Scotland) two potential Annex I listed habitats and one priority habitat (UK BAP) were identified in the intertidal zone within the application corridor. Within Northern Irish waters, one priority habitat (UK BAP); Intertidal under-boulder communities (A3.2112) was recorded within the intertidal zone at Donaghadee (NI), and no EC Habitats Directive Annex I listed habitats were observed. The protected habitats which have the potential to be within the Scot-NI 3 application corridor are outlined in Table 5-12 (Northern Ireland) and Table 5-13 (Scotland).

It is noteworthy that an intertidal reef is only classified as an Annex I when the intertidal reef is connected to a subtidal reef (JNCC 2020b). The alignment charts show that the cable intercepts a boulder field between KP0.7 and KP0.8. Although, this boulder field appears to be distinct to the intertidal reefs, some level of connectivity persists. Therefore, the reefs are classified as potential reefs.

5.5.1.5 Subtidal

One potential EC Habitats Directive Annex I listed habitat was identified in the subtidal environment within the application corridor of Scottish territorial waters, while three potential Annex habitats were identified within the application corridor in the Northern Irish sector. The specific Annex habitats are listed in Table 5-14 and Table 5-15 for the Scottish and the Northern Irish sector, respectively.

A description of the protected habitats with the potential to be present within the Scot-NI 3 application corridor is included below.

Table 5-12 Potential protected habitats within intertidal areas of Scot-NI 3: Northern Ireland

Species/Habitat	Site	Legislation	Description	Designation/Status
Intertidal				
Northern Ireland				
Intertidal under-boulder communities	Donaghadee	UK Post-2010 Biodiversity Framework NI Priority	Intertidal under-boulder communities	Priority habitat

Source: The protected habitat is based on JNCC (2019) data.

Table 5-13 Potential protected habitats within intertidal areas of Scot-NI 3: Scotland

Species/Habitat	Site	Legislation	Description	Designation/Status
Scotland: Portpatrick				
Annex I geogenic reef	Port Mora	The Habitats Directive 92/43/EEC PMF	Rocky (bedrock) Reef	Annex I habitat
Intertidal under-boulder communities		UK Post-2010 Biodiversity Framework	Intertidal under-boulder communities	Priority habitat

Table 5-14 Protected subtidal habitats within the application corridor: Scottish sector

Species/Habitat	Legislation	Description	Designation/Status	Certainty	Distribution
Scottish sector					
Annex I geogenic reef	The Habitats Directive 92/43/EEC	Bedrock	Annex I habitat	Potential	KP0.2-KP0.7, KP16.1-KP16.8, KP17.7-KP19.9
Source: The protected habitat is based on JNCC (2019) data.					

Table 5-15 Protected subtidal habitats within the application corridor: NI sector

Species/Habitat	Legislation	Description	Designation/Status	Certainty	Distribution
Northern Irish sector					
Annex I geogenic reef	The Habitats Directive 92/43/EEC	Bedrock reef (1170)	Annex I habitat	Potential	KP31.9 - KP32.4, KP34.4 - KP34.7, KP35.6 - KP35.8, KP37.2-KP37.9, KP38.0-KP 39.2, KP41.2-KP41.7
		Stony reef (1170)		Potential	KP34.0-KP 35.5, KP37.2-KP37.8, KP38.4-KP39.4
Sandbanks which are slightly covered by sea water all the time		Sandbank (1110)		High	KP35.8-KP36.8
Source: The protected habitats are based on JNCC (2019) data.					

5.5.1.6 Annex I geogenic reef: Stony reef

Annex I reef is defined by the Habitats Directive (European Commission, 2013) as *"rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. Intertidal areas are only included within this Annex I type where they are connected to subtidal reefs". Stony reefs are said to comprise "……hard compact substrata (typically boulders and cobbles) which are generally greater than 64mm in size. They arise from the seafloor (are topographically distinct from surrounding seafloor)",* (Irving, 2009).

5.5.1.7 Annex I geogenic reef: Bedrock reef

Bedrock reef occurs where rock underlies surface sediments on the seafloor and may emerge from these sediments. From the near shore geophysical survey at Port Mora it appears that the area between the intertidal and subtidal, approximately from 1 to 7m depth, is covered by sand over glacial till. As intertidal rock needs to be connected to the subtidal to form an Annex I habitat, it is not possible to confirm if there is an Annex I habitat at Port Mora. There appears to be a break in the rock which is not indicative of reef extending in to the subtidal and therefore the bedrock is not considered a potential reef (Global Marine 2000a).

5.5.1.8 Sandbank (1110)

Sandbanks which are slightly covered by seawater at all times occur widely around the UK coast. They are widespread in inshore waters (within 12 nautical miles of the coast) and occur offshore in the southern North Sea and in the Irish Sea between 12 and 200 nautical miles(JNCC 2020d). These are typically non-vegetated sandbanks or sandbanks with vegetation belonging to the *Zosteretum marinae* and *Cymodoceion nodosae* (EEA 2020).

5.5.1.9 Intertidal underboulder communities

'Intertidal underboulder communities' are listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act, 2006 and are a UK Biodiversity Action Plan (BAP) priority habitat. The feature description relates to underboulder communities, which may feature elevated biodiversity because of variable interstitial spaces, micro-niches, shade, and moisture conditions as well as the comparative shelter from wave exposure (JNCC 2008, updated 2011).

Additionally, the UK BAP priority habitat descriptions (JNCC 2008, updated 2011), states that "boulders with a limited underboulder community are not included in this UK BAP habitat, as may occur for example where boulders are embedded in sediment, in low salinity conditions, and where boulders experience high levels of mobility and scour".

5.5.2 Scot-NI 4

5.5.2.1 Marine protected habitats

The Scot-NI 4 application corridor passes through two designated sites for benthic habitats; the Clyde Sea Sill NCMPA (SNH 2019); and The Maidens SAC (JNCC 2020a). These sites are shown in Figure 5-34 (Drawing Reference: P2302-4-PROT-001). The Clyde Sea Sill NCMPA is in the Scottish sector while The Maidens SAC is situated in the Northern Irish Sector.

The presence of protected sites for benthic habitats and review of existing data sets provides an indication of the potential protected habitat distribution within the Scot-NI 4 application corridor. These have been identified further based on available data in Section 5.5.2.3.

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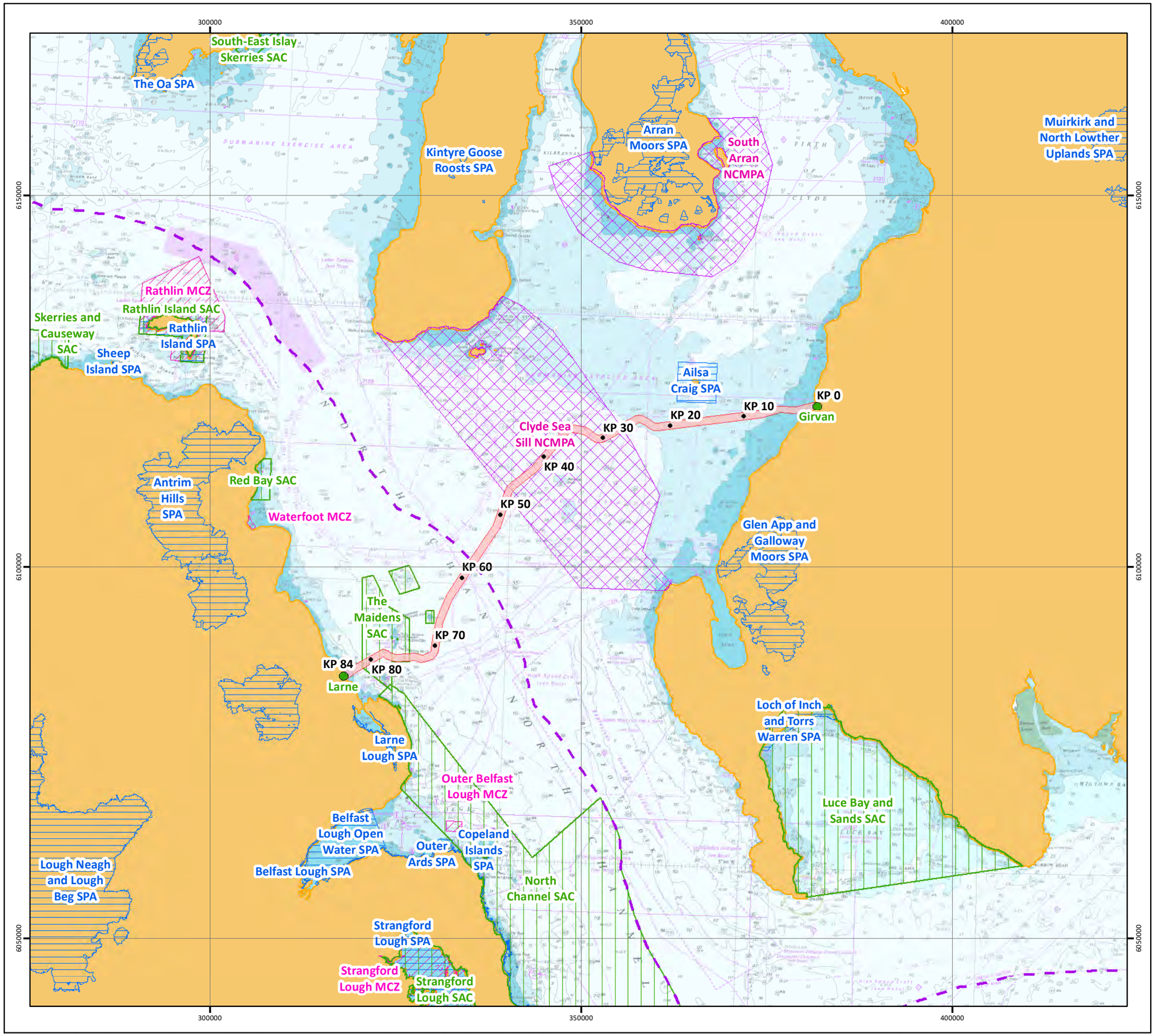
ENVIRONMENTAL DESIGNATIONS
Protected Sites - SCOT-NI4

Drawing No: P2302-4-PROT-001 | **A**



Legend

- Landfall Location
- KP
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- SAC
- SPA
- MCZ
- NCMPA

NOTE: Not to be used for Navigation

Date	08 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; JNCC; SNH; DAERA; ESRI; GEBCO; MarineFind
File Reference	J:\P2302\Mxd\05_PROT\ P2302-4-PROT-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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5.5.2.2 Protected Sites

Clyde Sea Sill NCMPA

The Clyde Sea Sill NCMPA encompasses the core part of a persistent front that extends across the sill at the mouth of the Clyde Sea. Fronts, which are essentially boundaries between water masses of differing temperature or salinity, can concentrate nutrients and plankton and are often associated with pelagic biodiversity hotspots. The protected features also include a breeding black guillemot population on Sanda, Sheep Island and Glunimore Island (encompassed by an existing Site of Special Scientific Interest situated approximately 3 km south from the mainland coast of southern Kintyre; SNH 2014).

The Clyde Sea Sill NCMPA is also protected for its circalittoral and offshore sand and coarse sediment communities. These mobile substrates create sand ribbon fields, sand wave fields and sand banks from twice daily rise and fall of the tide (SNH 2019). Another protected feature associated with these mobile substrate (sand ribbon fields, sand wave fields and sand banks) is that they represent the Marine Geomorphology of the Scottish Shelf Seabed geodiversity feature (SNH 2014).

The protected feature associated with circalittoral and offshore sand and course sediment communities comprises four biotope complexes: circalittoral fine sands (SS.SSa.CFiSa); offshore circalittoral sands (SS.SSa.OSa); offshore circalittoral coarse sediment (SS.SCS.OCS) and circalittoral coarse sediment (SS.SCS.CCS - with a particular focus on the finer resolution SS.SCS.CCS.MedLumVen biotope; SNH (2014).

The dominant species in deep circalittoral sand (A5.27) or offshore circalittoral sand (SS.SSa.OSa) communities in the Clyde Sea Sill NCMPA have been shown to include the bivalves *Tellimya ferruginosa* and *Nucula nitidosa*; *polychaetes Scoloplos armiger* and *Pholoe baltica*, and the *brittlestar Amphiura* filiformis, while offshore circalittoral sand or muddy sand are likely to include high numbers of the tubeworm *Owenia fusiformis* (SNH 2014).

Based on review of JNCC (2019) data, the Scot-NI 4 application corridor does not run through any Annex I habitats inside the Clyde Sea Sill NCMPA, potential bedrock reef Annex I habitat was identified approximately 2.4 km from the application corridor. Two soft bottom EUNIS habitats have been identified within the Scot-NI 4 application corridor in the Clyde Sea Sill NCMPA. The broadscale habitats are listed in Table 5-16.

Table 5-16 EUNIS habitats within the application corridor in the Clyde Sea Sill NCMPA

EUNIS code	EUNIS Biotope/Habitat description
A5.27	Deep circalittoral sand
A5.37	Deep circalittoral mud

Notes: EUNIS = European Nature Information System

Data obtained from EMODnet (European Sea Map)

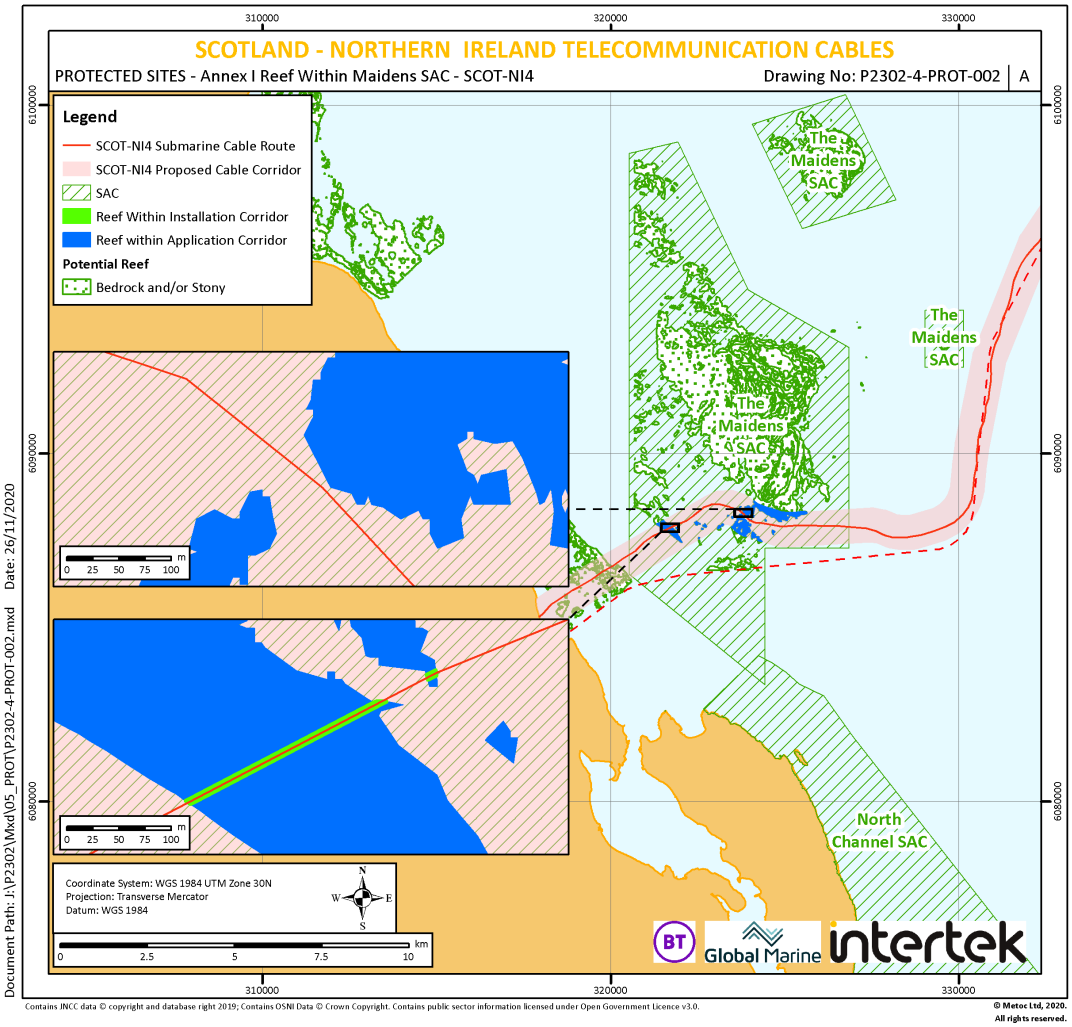
Habitats are based on EMODnet (2020) data.

The Maidens SAC

The Scot-NI 4 application corridor runs through the Maidens SAC, located in the Northern Irish Sector of the application corridor. The Maidens SAC is designated for the two Annex I habitats (JNCC 2020a); Sandbanks which are slightly covered by sea water all the time (Habitat 1110) and Reefs (1170). The Maidens SAC is also an OSPAR marine protected area (mpatlas 2020). The area is considered to have a significant presence of grey seals (*Halichoerus grupys*; NATURA 2000).

The application corridor runs through one potential Annex I habitat, in the form of bedrock reefs within the Maidens SAC. However, the Project has undertaken micro-routing during the Cable Route Desktop Study to avoid sensitive conservation features within the protected site as far as practicable. Hereby, the length of the cable route has been increased to allow avoidance of reef and to minimise surface area through the reef habitat (Figure 5-35 (Drawing Reference: P2302-4-PROT-002-A).

Figure 5-35 Protected sites in the vicinity of the NI-Scot 4 application corridor (Drawing Reference: P2302-4-PROT-001)



Other habitats identified within the Maidens SAC are listed in Table 5-17.

Table 5-17 EUNIS habitats within the application corridor in the Maidens SAC

EUNIS code	UK and Irish marine habitat code	EUNIS Biotope/Habitat description
A4.112	CR.HCR.FaT.CTub	*Tubularia indivisa* on tide-swept circalittoral rock
A4.1122	CR.HCR.FaT.Ctub.Adig	*Alcyonium digitatum* with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock
A4.121	CR.HCR.DpSp.PhaAxi	*Phakellia ventilabrum* and axinellid sponges on deep, wave-exposed circalittoral rock
A4.134	CR.HCR.XFa.FluCoAs	*Flustra foliacea* and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock
A4.214	CR.MCR.EcCr	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock
A5.3	SS.SCS.OCS_Pebble/Cobble	Sublittoral coarse sediment

Notes: EUNIS = European Nature Information System

The grey colour represents the conversion of UK and Irish marine habitats to EUNIS habitats

Habitats are based on AFBI (2020) data.

5.5.2.3 Protected Marine Features (PMFs)

The Scottish Priority Marine Feature (PMF) list contains 81 habitats and species considered to be of conservation importance in Scottish waters. It includes many benthic features which are characteristic of the Scottish marine environment, ranging from flame shell beds in coastal waters to cold-water coral reefs of the deeper seas (SNH 2014). While no PMFs (NatureScot 2020) were identified in intertidal Scottish territorial waters, 'Deep circalittoral sand' (A5.27) which is found inside the Clyde Sea Sill NCMPA may be represent the PMF of 'Offshore subtidal sands and gravels', which span four deep-sea biotopes (Marine Scotland 2020).

PMFs is a collective term for those features (habitats, species and geological/geomorphological) which are of conservation importance in the Northern Irish inshore region (DOE 2014). Along the Scot-NI 4 application corridor in Northern Irish waters two subtidal habitats hold a conservation status as a 'NI Priority'; Intertidal underboulder communities and Maerl beds.

5.5.2.4 Intertidal area

No protected habitats have been identified within the intertidal area at Girvan, Scotland on the data available, while one potential EC Habitats Directive Annex I listed habitat and one priority habitat (UK BAP) was identified in the intertidal zone within the application corridor at Larne beach, Northern Ireland (See Table 5-18 below).

5.5.2.5 Subtidal area

One potential EC Habitats Directive Annex I listed habitat was identified in the subtidal environment within the Scot-NI 4 application corridor in Scottish territorial waters, while two potential Annex habitats were identified within the Scot-NI 4 application corridor in the NI sector (JNCC 2020). The specific Annex habitats are listed in Table 5-19 and Table 5-20 for the Scottish and the Northern Irish sector, respectively.

A description of the protected habitats with the potential to be present within the Scot-NI 4 application corridor is included below.

Table 5-18 Potential protected habitats within Scot-NI 4 intertidal areas: Northern Ireland

Species/Habitat	Site	Legislation	Description	Designation/Status
Intertidal				
Annex I geogenic reef	Larne (Northern Ireland)	The Habitats Directive 92/43/EEC	Stony Reef	Annex I habitat
Intertidal underboulder communities		UK Post-2010 Biodiversity Framework NI Priority	Intertidal underboulder communities	Priority habitat

Table 5-19 Potential protected subtidal habitats within the Scot-NI 4 application corridor: Scotland

Species/Habitat	Legislation	Description	Designation/Status	Certainty	Distribution
Scottish sector					
Annex I geogenic reef	The Habitats Directive 92/43/EEC	Bedrock	Annex I habitat PMF	Potential	KP 0 - KP 0.6
Note: The protected habitat is based on JNCC (2019) data.					

Table 5-20 Protected subtidal habitats within the Scot-NI 4 application corridor: Northern Ireland

Species/Habitat	Legislation	Description	Designation/Status	Certainty	Distribution
Scottish sector					
Annex I geogenic reef	The Habitats Directive 92/43/EEC	Bedrock	Annex I habitat	Potential	KP66-KP66.9, KP70.3-KP71.4, KP72.7-KP74.5, KP75.3-KP75.6, KP77.4-KP78.8, KP79.5-KP81.8, KP82.5-KP83.2
		Stony			KP81.8-KP84.0
Maerl	The Habitats Directive 92/43/EEC	Maerl bed	Annex I habitat	Potential	KP82.5-KP83.5
	OSPAR; List of Threatened and / or Declining Species and Habitats		Threatened and/or Declining species		
	UK Post-2010 Biodiversity Framework NI Priority		Priority habitat		
Note: The protected habitat is based on JNCC (2019) data.					

5.5.2.6 Annex I geogenic reef: Stony reef

See description of this habitat presented in Section 5.5.1.6 above.

5.5.2.7 Annex I geogenic reef: Bedrock reef

See description of this habitat presented in Section 5.5.1.7 above.

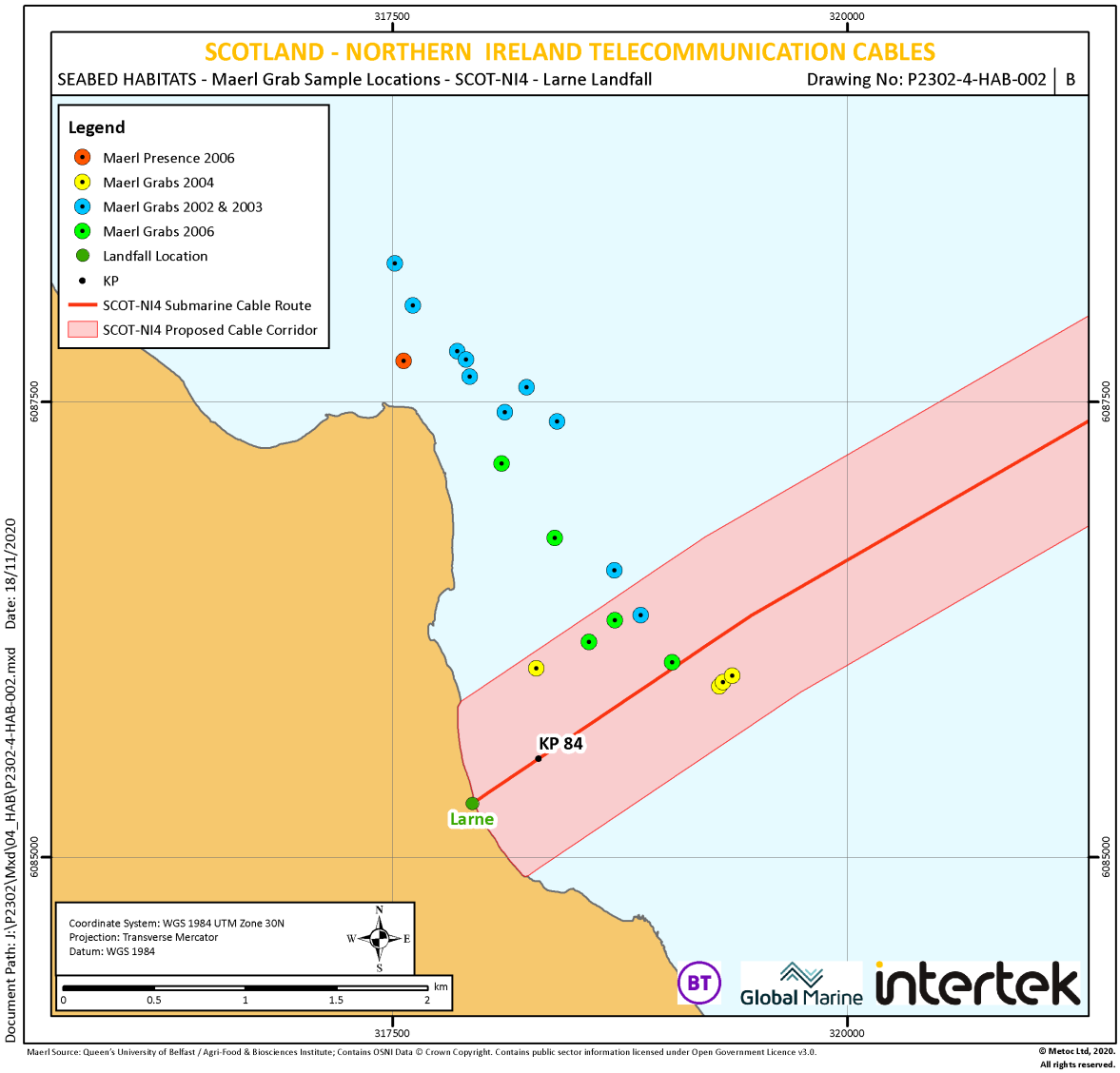
5.5.2.8 Intertidal underboulder communities

See description of this habitat presented in Section 5.5.1.9 above.

5.5.2.9 Maerl

A potential Annex I habitat, UK BAP priority habitat and an OSPAR threatened or declining maerl bed search area is indicated by the AFBI data. A pilot study to map the extent of maerl beds off the East Antrim coastline was carried out by Queen's University of Belfast and AFBI (Mitchell, 2006). Figure 5-36 (Drawing Reference: P2302-4-HAB-002) shows the sample locations undertaken as part of this study at the Ballygally Head. One sample location taken in 2006 has identified the presence of 5% of live Maerl within a grab sample approximately 1.7 km north of the application corridor. No other samples have confirmed the presence of maerl within the Scot-NI 4 application corridor, indicating the extent of live maerl is localised at Ballygally Head.

Figure 5-36 Maerl Grab Sample Location along Scot-NI 4 application corridor (Drawing Reference: P2302-4-HAB-002)



5.6 Potential pressure identification and zone of influence

The following pressures have been considered for benthic and intertidal ecology and screened out for further assessment in the Protected Area and Environmental Sensitivities Overview (Section 3).

- Accidental hydrocarbon or chemical release from installation vessel;
- Introduction or spread of invasive non-indigenous species (INIS); and
- Smothering and siltation rate changes.

The pressures listed in Table 5-21 have been included for further assessment. For each pressure, the assessment considered the different aspects of the Project during installation. To evaluate the most significant effects, the largest zone of influence was selected as presented in Table 5-21.

Table 5-21 Potential pressure and zone of influence - benthic and intertidal ecology

Project Activity	Potential pressure	Receptor	Worst case zone of influence
Installation plough PLGR Installation jetting tool Boulder re-location (if required)	Abrasion/disturbance at the surface of the substratum. Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Intertidal and subtidal habitat	**Scotland jurisdiction** **Scot-NI 3**: Plough (abrasion): 0.052 km^2 Plough (penetration): 0.01km^2 PLGR (penetration): 0.04km^2
			NI jurisdiction **Scot-NI 3:** Plough (abrasion): 0.057km^2 Plough (penetration): 0.011km^2 T-ROV: 0.0001km^2 PLGR (penetration): 0.044km^2
			Scotland jurisdiction **Scot-NI 4:** Plough (abrasion): 0.150km^2 Plough (penetration): 0.029km^2 T-ROV: 0.0004km^2 PLGR (penetration): 0.115km^2
			NI jurisdiction **Scot-NI 4:** Plough (abrasion): 0.072km^2 Plough (penetration): 0.014km^2 T-ROV: 0.0001km^2 PLGR (penetration): 0.055km^2
Installation of cable protection measures	Physical change (to another substratum type)	Intertidal and subtidal habitat	**Scotland jurisdiction** **Scot-NI 3**: Rock bags: 52m^2
			NI jurisdiction **Scot-NI 3:** Rock bags: 52 m Concrete Mattress: 126 m^2 Rock berm: 2025 m^2
			Scotland jurisdiction **Scot-NI 4**: Rock bags: 52m^2 Concrete Mattress: 14 m^2 Rock berm: 1620 m^2
			NI jurisdiction **Scot-NI 4:** Rock bags: 52 m^2

5.7 Embedded Mitigation

The project description, described in Section 2, provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to benthic

and intertidal ecology is provided in Table 5-22 below. These measures will be complied with as a matter of best practice.

Table 5-22 Embedded mitigation measures: Project design

ID	Embedded mitigation
COMP 1	Ballast water discharges from Project vessels will be managed under the International Convention for the Control and Management of Ships' Ballast Water and Sediments standard.
COMP 2	The latest guidance from the GB non-native species secretariat (2015) will be followed and a Biosecurity Plan produced pre-installation. All vessels and equipment will be clean and free from debris and fouling.
COMP 3	Project vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ships standards.
COMP 4	Control measures and shipboard oil pollution emergency plans (SOPEPs) will be in place and adhered to under MARPOL Annex I requirements for all project vessels.
BP 12	Micro-routing has been used where possible to avoid or minimise the surface area the application corridor routes through higher-grade annex I reef and sandbank habitat.
BP 13	Construction vehicle movement will avoid sensitive areas as far as practical; Beach profile will be restored following cable installation.

Note: COMP = Compliance measures included in the project design to meet environmental and health and safety legislation.

BP = Best Practice measures included as part of the project design

5.8 Impact assessment

5.8.1 Abrasion/disturbance at the surface of the substratum and Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.

This section assesses the pressures 'Abrasion/disturbance at the surface of the substratum' and 'Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion' associated with installation activities. The pressures result in a similar effect on habitats. Activities considered by the assessment that cause these pressures include cable route preparation such as the pre lay grapnel run, and cable burial. These activities lead to limited or no loss of substrate from the system. The magnitude of the effect has been assessed as low for the following reasons:

- Disturbance will be short-term
- The zone of influence is small in comparison to the wider extent of habitat present within the application corridors and surrounding area.
- Sediment will not be removed or altered leaving the underlying character of the habitat similar to that pre-cable installation.

5.8.1.1 Scot-NI 3

The sensitivity of intertidal and subtidal habitats to the two pressures are presented in Table 5-23 and Table 5-24, respectively.

The habitat sensitivity information from MarLIN (presented in Table 5-23) indicates that intertidal habitat sensitivity to penetration ranges from 'Not sensitive' to Medium' and from 'Low' to 'High' sensitivity for Donaghadee and Portpatrick, respectively. Subtidal habitats (Table 5-24) in Scottish and Northern Irish territorial waters ranges in sensitivity from 'Low' to 'Medium' and from 'Not sensitive' to 'Medium', respectively. For some habitats it was concluded that the assessed pressures were 'Not

Relevant' (NR). Grey cells within the tables indicate that the assessment is based on sublevel habitat assessment.

Habitats that are likely to be affected in the Scottish sector include:

- Littoral sediment: (A2.1, A2.211, A2.22) - intertidal;
- Potential Annex: (bedrock reef, stony reef) - intertidal;
- Priority habitat: Intertidal under-boulder communities - intertidal;
- Outer Ards SPA - intertidal;

Habitats that are likely to be affected in the Northern Irish sector include:

- Priority habitat: Intertidal under-boulder communities - intertidal;

During operation of the plough, as the skids pass over the seabed the sediment below may be compacted, and the topography changed. The cable installation equipment and pre lay grapnel run will also penetrate the seabed disturbing sediment to 40cm below the surface. The area effected by the PLGR is within the installation footprint of the plough and therefore is not an additional footprint. The area affected will be highly localised, narrow and as most sediments along the Scot-NI 3 application corridor are mobile bedforms of high energy environments, these changes will be transient with pre-installation conditions quickly returning following natural sediment transport processes. Therefore, effects of Abrasion/disturbance at the surface of the substratum and penetration and/or disturbance of the substrate below the surface of the seabed has been assessed as negligible and is not significant.

Table 5-23 Sensitivity of intertidal habitats to the pressures abrasion of the seabed and penetration below the surface of the seabed at Donaghadee and Portpatrick

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
Donaghadee							
A1.11	Mussel and/or barnacle communities	NR	NR	NR	NR	NR	NR
A1.21	Barnacles and fucoids on moderately exposed shores	NR	NR	NR	NR	NR	NR
A1.211	*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock	NR	NR	NR	NR	NR	NR
A1.213	*Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock	NR	NR	NR	NR	NR	NR
A1.3132	*Fucus vesiculosus* on mid eulittoral mixed substrata	Low	Medium	Medium	Low	Medium	Medium
A1.412	Fucoids and kelp in deep eulittoral rockpools	NR	NR	NR	NR	NR	NR
A1.413	*Bifurcaria bifurcata* in shallow eulittoral rockpools	Medium	High	Low	NR	NR	NR
A1.45	Ephemeral green or red seaweeds (freshwater or sand-influenced) on non-mobile substrata	NR	NR	NR	NR	NR	NR
A2.111	Barren littoral shingle	High	High	Not sensitive	High	High	Not sensitive

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
A2.2	Littoral sand and muddy sand	High	High	Not sensitive	High	High	Not sensitive
A2.211	Talitrids on the upper shore and strandline	Low	High	Low	Low	High	Low
A2.221	Barren littoral coarse sand	High	High	Not sensitive	High	High	Not sensitive
A2.245	*Lanice conchilega* in littoral sand	High	High	Not sensitive	High	High	Not sensitive
A2.41	Ragworm dominated gravelly sandy mud shores	Low	High	Low	Low	High	Low
A3.2112	*Laminaria digitata* and under-boulder fauna on sublittoral fringe boulders	Low	Medium	Medium	Low	Medium	Medium
B3.111	Yellow and grey lichens on supralittoral rock	NR	NR	NR	NR	NR	NR
Portpatrick: Port Mora							
A1.1133	*Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles	NR	NR	NR	NR	NR	NR
A1.2	Moderate energy littoral rock	NR	NR	NR	NR	NR	NR
A1.21	Barnacles and fucoids on moderately exposed shores	NR	NR	NR	NR	NR	NR
A1.3132	*Fucus vesiculosus* on mid eulittoral mixed substrata	Medium	Medium	Low	Low	Medium	Medium
A1.45	Ephemeral green or red seaweeds (freshwater or sand-influenced) on non-mobile substrata	NR	NR	NR	NR	NR	NR
A1.446	Sponges and shade-tolerant red seaweeds on overhanging lower eulittoral bedrock and in cave entrances	NR	NR	NR	NR	NR	NR
A2.1	Littoral coarse sediment	High	Not sensitive	High	High	High	Not sensitive
A2.111	Barren littoral shingle	High	Not sensitive	High	High	High	Not sensitive
A2.22	Barren or amphipod-dominated mobile sand shores	High	Not sensitive	High	High	High	Not sensitive

Grey colour = Assessment has been based on sublevel habitat assessments.

NR = Not Relevant

Source: (MarLIN, 2020)

Table 5-24 Sensitivity of subtidal habitats to the pressures abrasion of the seabed and penetration below the surface of the seabed for the Scottish and the Northern Irish sector

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
Scottish sector							
A3	Infralittoral rock and other hard substrata	NR	NR	NR	NR	NR	NR
A4.33	Faunal communities on deep low energy circalittoral rock	NR	NR	NR	NR	NR	NR
A5.14	Circalittoral coarse sediment	Low	High	Low	Low	High	Low
A5.15	Deep circalittoral coarse sediment	Medium	High	Low	Medium	High	Low
A5.27	Deep circalittoral sand	Low	Medium	Medium	Low	Medium	Medium
A5.45	Deep circalittoral mixed sediments	None	Medium	Medium	Medium	High	Low
Northern Irish sector							
A3	Infralittoral rock and other hard substrata	NR	NR	NR	NR	NR	NR
A4	Circalittoral rock and other hard substrata	NR	NR	NR	NR	NR	NR
A4.138	*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock	NR	NR	NR	NR	NR	NR
A4.2	Atlantic and Mediterranean moderate energy circalittoral rock	None	Medium	Medium	NR	NR	NR
A4.21	Echinoderms and crustose communities on circalittoral rock	NR	NR	NR	NR	NR	NR
A4.3	Atlantic and Mediterranean low energy circalittoral rock	NR	NR	NR	NR	NR	NR
A5	Sublittoral sediment	High	High	Not Sensitive	Medium	Medium	Medium
A5.14	Circalittoral coarse sediment	Low	High	Low	Low	High	Low
A5.15	Deep circalittoral coarse sediment	Medium	High	Low	Medium	High	Low
A5.2	Sublittoral sand	Low	Medium	Medium	Low	Medium	Medium
A5.27	Deep circalittoral sand	Low	Medium	Medium	Low	Medium	Medium

Grey colour = Assessment has been based on sublevel habitat assessments.

NR = Not Relevant

Source: (MarLIN, 2020)

5.8.1.2 Scot-NI 4

The sensitivity of intertidal and subtidal habitats to the two pressures is presented in Table 5-25 and Table 5-26, respectively.

The habitat sensitivity information from MarLIN (Table 5-25) indicates that intertidal habitat sensitivity to abrasion/disturbance ranges from 'Not sensitive' to Medium' and from 'Not sensitive' to 'Low' sensitivity for Larne and Girvan, respectively. Subtidal habitats (Table 5-26) in Scottish and NI territorial waters range in sensitivity from 'Low' to 'Medium' and from 'Not sensitive' to 'Medium', respectively. For some habitats it was concluded that the assessed pressure was 'Not Relevant' (NR). Grey cells within the tables indicate that the assessment is based on sublevel habitat assessment.

Habitats that are likely to be affected in Scottish sector include:

- Potential Annex I habitat: bedrock reef – subtidal – subtidal.

Habitats that are likely to be affected in Northern Irish sector include:

- Potential Annex I habitat: stony reef - intertidal;
- UK BAP/NI Priority habitat: Intertidal underboulder communities - intertidal;
- Potential Annex I habitat: bedrock reef – subtidal – subtidal;
- Potential Annex I habitat: stony reef - subtidal; and
- Potential Annex I habitat: Mearl bed.

However, as the disturbance is short-term and highly localised in space (i.e. small footprint), the overall significance of the installation effects on intertidal and subtidal habitats has been assessed as negligible and is not significant.

Table 5-25 Sensitivity of intertidal habitats to the pressures abrasion of the seabed and penetration below the surface of the seabed at Larne and Girvan

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
Larne: NI							
A1.1133	*Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles	NR	NR	NR	NR	NR	NR
A1.3132	*Fucus vesiculosus* on mid eulittoral mixed substrata	Low	Medium	Medium	Low	Medium	Medium
A1.45	Ephemeral green or red seaweeds (freshwater or sand-influenced) on non-mobile substrata	NR	NR	NR	NR	NR	NR
A2.111	Barren littoral shingle	High	High	Not sensitive	High	High	Not sensitive
A2.22	Barren or amphipod-dominated mobile sand shores	High	High	Not sensitive	High	High	Not sensitive
A2.4	Littoral mixed sediments	Low	High	Low	Low	High	Low
Girvan: Scotland							
A2.1	Littoral coarse sediment	High	High	Not sensitive	High	High	Not sensitive
A2.22	Barren or amphipod-dominated mobile sand shores	High	High	Not sensitive	High	High	Not sensitive

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
A2.4	Littoral mixed sediments	Low	High	Low	Low	High	Low
Grey colour = Assessment has been based on sublevel habitat assessments. NR = Not Relevant **Source:** (MarLIN, 2020)							

Table 5-26 Sensitivity of subtidal habitats to pressures abrasion of the seabed and penetration below the surface of the seabed for the Scottish and the Northern Irish sector

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
Scottish sector							
A5.14	Circalittoral coarse sediment	Low	High	Low	Low	High	Low
A5.25 or A5.26	Circalittoral fine sand and Circalittoral muddy sand	Medium	High	Low	Medium	High	Low
A5.27	Deep circalittoral sand	Low	Medium	Medium	Low	Medium	Medium
A5.35	Circalittoral sandy mud	None	Medium	Medium	None	Medium	Medium
A5.37	Deep circalittoral mud	None	Medium	Medium	None	Medium	Medium
Northern Irish sector							
A3/A3.1	Infralittoral rock and other hard substrata/Atlantic and Mediterranean high energy infralittoral rock	NR	NR	NR	NR	NR	NR
A3.116	Foliose red seaweeds on exposed lower infralittoral rock	NR	NR	NR	NR	NR	NR
A3.221	*Laminaria digitata*, ascidians and bryozoans on tide-swept sublittoral fringe rock	NR	NR	NR	NR	NR	NR
A4	Circalittoral rock and other hard substrata	NR	NR	NR	NR	NR	NR
A4.1	Atlantic and Mediterranean high energy circalittoral rock	NR	NR	NR	NR	NR	NR
A4.112	*Tubularia indivisa* on tide-swept circalittoral rock	NR	NR	NR	NR	NR	NR
A4.1122	*Alcyonium digitatum* with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock	NR	NR	NR	NR	NR	NR
A4.121	*Phakellia ventilabrum* and axinellid sponges on	NR	NR	NR	NR	NR	NR

EUNIS code	Habitat type name	Abrasion			Penetration		
		Resistance	Resilience	Sensitivity	Resistance	Resilience	Sensitivity
	deep, wave-exposed circalittoral rock						
A4.134	*Flustra foliacea* and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock	NR	NR	NR	NR	NR	NR
A4.138	*Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock	NR	NR	NR	NR	NR	NR
A4.2	Atlantic and Mediterranean moderate energy circalittoral rock	None	Medium	Medium	NR	NR	NR
A4.214	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock	NR	NR	NR	NR	NR	NR
A4.27	Faunal communities on deep moderate energy circalittoral rock	None	Medium	Medium	NR	NR	NR
A4.33	Faunal communities on deep low energy circalittoral rock	NR	NR	NR	NR	NR	NR
A5	Sublittoral sediment	High	High	Not Sensitive	Medium	Medium	Medium
A5.1	Sublittoral coarse sediment	Low	High	Low	Low	High	Low
A5.15	Deep circalittoral coarse sediment	Medium	High	Low	Medium	High	Low
A5.2	Sublittoral sand	Low	Medium	Medium	Low	Medium	Medium
A5.26	Circalittoral muddy sand	Medium	High	Low	Medium	High	Low
A5.27	Deep circalittoral sand	Low	Medium	Medium	Low	Medium	Medium
A5.44	Circalittoral mixed sediments	Low	Medium	Medium	None	Medium	Medium
A5.45	Deep circalittoral mixed sediments	Medium	High	Low	Medium	High	Low
A5.512	*Lithothamnion glaciale* maerl beds in tide-swept variable salinity infralittoral gravel	None	Very low	High	None	Very low	High

Grey colour = Assessment has been based on sublevel habitat assessments.

NR = Not Relevant

Source: (MarLIN, 2020)

5.8.2 Physical change (to another seabed type)

This section assesses the pressure of physical change (to another seabed type), in which the impact of permanent change in substrate type would lead to the habitat or biotope being re-classified (MarLIN 2020).

Activities considered by the assessment that cause physical change include any form of external cable protection that alter the seabed, such as the proposed integral protection measures contingency external cable protection measures included in this application (rock bags, rock berm or concrete mattress) used along the application corridor (as outlined in Table 3-2).

It should be noted that the use of contingency external cable protection considered in the assessment represents a conservative, worst-case quantity of deposit to the seabed and it is likely that no or very little contingency external protection measures will be required. Although cable protection will only be used where necessary, it is possible that seabed habitat within the footprint of the protection may be lost and replaced with a harder substrate than the existing seabed, and thus change the seabed type in localised areas.

Rock bags will provide hard substrate for epifauna to colonise. In areas where there is existing stony seabed or bedrock reef the surrounding dominant epifaunal species will rapidly colonise, as they are capable of early reproduction and rapid growth. Therefore, it is expected that due to the small footprint and that epifauna will be able to colonise introduced substrate in such areas and the magnitude of the change is low.

The external protection in softer sediment habitats will inevitably support the settlement of non-local hard bottom fauna that may not be representative of the surrounding benthos, although this process is likely to take longer given the limited presence of adjacent colonising species. Evidence suggests that effects on the change in substrate will affect the local fauna in soft sediment areas, however the footprint will be very localised, and the magnitude is low but will in most cases be long-term.

5.8.2.1 Scot-NI 3

The Scot-NI 3 cable will require the following proposed cable protection:

- Uraduct ® cable protection for 50m on either side of the two fibre-optic cable crossings (see Section 3, Tables 3-1).
- The cable is proposed to be buried to 1m. however, for discrete sections it may be necessary to surface lay the cable. In these areas articulated pipe may be required as to prevent abrasion to the cable. If required in specific circumstances, sections of the cable surface laid will be pinned or clamped to the seabed to avoid any movement of the cable while minimising the footprint.

The Uraduct ® will be fixed to the cable as installed and subsequently be post lay buried, therefore no changes are expected to the seabed from introduction of Uraduct ® .

In addition, as the proposed Scot-NI 3 cable crosses the Western Link power cable within Northern Irish Waters (approximate KP26.5) it is possible that the third party asset owners will require the installation of external cable protection as part of the crossing agreements. As this is not currently proposed it has been included as a contingency measure.

Contingency external cable protection that may be required for cable crossings or stability and protection could include:

- Rock berm
- Rock bags.
- Concrete mattressing.

Concrete mattressing will only be used at cable crossings where crossing agreements require. This is likely to be for the Western Link crossing only. As the footprint of the rock berm is greater, the change caused by the rock berm at the Western Link crossing location is worst case and has been assessed for this location. The potential effects of the possible contingency external protection measures to benthic habitats within the Scot-NI 3 application corridor are discussed below.

Contingency external cable protection - rock berm

The greatest footprint from the contingency external cable protection is a rock berm. For Scot-NI 3, this contingency measure may be used for the crossing with the Western Link power cable within Northern Irish Waters (approximate KP26.5). While rock berms are currently not planned to be utilised at this crossing, as a worst-case scenario Table 5-27 outlines the location of the crossing.

Table 5-27 Potential rock berms at the crossing locations: Scot-NI 3

Territorial water	Crossing	Water Depth (m)	Latitude (DDM)	Longitude (DDM)	Total rock berm height (m)
NI	Western HVDC Link	147	54° 39.719' N	5° 17.070' W	2.0

The worst-case rock berm is assumed to have a design height of 1.5m with a slope of 1:3.

The dimensions of the contingency rock berm included in the assessment is provided in Table 3-2 of the MEA. The rock berm for Scot-NI 3 may be up to 15m wide, approximately 90m long, with a maximum height of 1.5m. The worst-case footprint of external cable protection at this location will be 2025m^2. This is highly conservative and if required is likely to be smaller.

At the crossing location the benthic habitat is likely to consist of deep sandy sediments (A5.2 and A5.27). The sensitivity of this habitat type to physical change is considered to be medium (MarLIN 2020).

Case studies for offshore renewable energy schemes have identified that installation of artificial structures (rock berms) within soft sandy sediment environments have the potential to introduce new species to the area such as sea anemones and the soft coral *Alcyonium digitatum* (Langhamer 2012), and a general increase in epifauna can be observed across the introduced hard substrate (Lindeboom et al. 2011; Nord Stream 2014). Despite the increase in faunal diversity over the rock berm, Davis et al. (1982) identified no measurable decrease in adjacent infauna densities at a distance of 4m from artificial structures over the two-year period since their introduction.

As the footprint within the wider region is small, the introduction of the rock berm would represent a small change to the substratum type and no significant changes to the benthic population structure is expected form the scale of the changes and the sensitivity is medium with the overall impact expected to be minor.

Rock bags

The addition of discretely placed rock bags as a contingency may be required at approximately 50m intervals (worst case) for certain sections of surface laid cable to provide stability. In areas of softer sediments, it is likely that the cable will achieve adequate burial depth. The only potential for introduction of rock bags or mattressing in soft sediment areas will be for a requirement of a crossing agreement or in areas of hard ground.

This deposit in areas of hard ground is unlikely to cause a significant change to the receiving environment of the seabed, as it will be used in areas where the cable is surface laid. As the nature of the seabed in such areas is likely to consist of firm and coarse sediments, the change of the addition of small and localised deposits of rock bags will cause a low magnitude of change in substrate type, therefore, this effect is likely to be not significant. If used in areas of soft sediment the change would

be similar for a rock berm. Therefore, the worst-case effect of the introduction of rock bags within soft sediment areas is minor.

Mattressing

Up to 7 mattress have been included as contingency for Scot-NI 3 with a total footprint of 126m^2. These have been included in case they are requested to be included as part of the cable crossing designs following third party crossing agreement discussions. There are two crossings within soft sediments on the Scot-NI 3 application corridor. It is unlikely that external cable protection will be required for fibre-optic cable crossings. However, installation of rock bags or mattressing over softer sediments has been considered as a contingency measure. The sensitivity of softer sediments to a change in substratum is medium.

While mattresses are a hard, protective surface, they have the ability to become smothered by surrounding soft sediments over time and therefore the sensitivity of the receiving environment over time will be reduced. The immediate effects of mattress installation within softer sediment will be similar to a rock berm with a smaller footprint and is minor.

Habitats assessment

To determine the sensitivity of intertidal and subtidal habitats within the installation corridor an assessment has been carried out using information provided on the Marine Life Information Network (MarLIN 2020).

The sensitivity of intertidal and subtidal habitats to physical change are presented in Table 5-28 and Table 5-29, respectively.

The habitat sensitivity information from MarLIN presented in Table 5-28 indicates that intertidal habitat sensitivity to physical change is 'High' for both Portpatrick and Donaghdee. Subtidal habitats (Table 5-29) in both Scottish and Northern Irish territorial waters are 'High' in sensitivity. It is noteworthy that except for one subtidal habitat, no sensitivity information was available for the habitats of 'High' sensitivity, thus these sensitivities represent similar habitats. However, as the disturbance is short-term and highly localised in space, the overall significance of the installation effects on the intertidal habitats has been assessed as not significant.

Table 5-28 Sensitivity of intertidal habitats at Donaghadee and Portpatrick to physical change (to another seabed type)

EUNIS Habitat	Resistance	Resilience	Sensitivity
Donaghadee			
A1.11	None	Very low	High
A1.21	None	Very low	High
A1.211	None	Very low	High
A1.213	None	Very low	High
A1.3132	Low	Very low	High
A1.412	None	Very low	High
A1.413	None	Very low	High
A1.45	Low	Very low	High
A2.111	None	Very low	High
A2.2	None	Very low	High
A2.211	None	Very low	High
A2.221	None	Very low	High

EUNIS Habitat	Resistance	Resilience	Sensitivity
A2.245	None	Very low	High
A2.41	None	Very low	High
A3.2112	None	Very low	High
B3.111	None	Very low	High
Portpatrick: Port Mora			
A1.1133	None	Very low	High
A1.2	None	Very low	High
A1.21	None	Very low	High
A1.3132	Low	Very low	High
A1.45	None	Very low	High
A1.446	None	Very low	High
A2.1	None	Very low	High
A2.111	None	Very low	High
A2.22	None	Very low	High

Grey colour = Assessment has been based on sublevel habitat assessments.

Table 5-29 Sensitivity of subtidal habitats to physical change (to another seabed type) for the Scottish and the Northern Irish sector

EUNIS Habitat	Resistance	Resilience	Sensitivity
Scottish sector			
A3	None	Very Low	High
A4.33	None	Very Low	High
A5.14	None	Very Low	High
A5.15	None	Very Low	High
A5.27	None	Very Low	High
A5.45	None	Very Low	High
Northern Irish sector			
A3	None	Very Low	High
A4	None	Very Low	High
A4.138	None	Very Low	High
A4.2	None	Very Low	High
A4.21	None	Very Low	High
A4.3	None	Very Low	High
A5	None	Very Low	High
A5.14	None	Very Low	High
A5.15	None	Very Low	High
A5.2	None	Very Low	High
A5.27	None	Very Low	High

Grey colour = Assessment has been based on sublevel habitat assessments.

5.8.2.2 Scot-NI 4

The Scot-NI 4 cable will require the following proposed cable protection:

- Uraduct ® will be applied 50 m on either side (i.e. 100 m per cable crossing) of each of the five cable crossings (see Table 5-30 for details on crossing locations). The cable with Uraduct ® will subsequently be post-lay buried into the seabed using a water jet.
- The cable is proposed to be buried to 1m. however, for discrete sections it may be necessary to surface lay the cable. In these areas, articulated pipe may be required to prevent abrasion to the cable. If required in specific circumstances, sections of the cable which are surface laid will be pinned or clamped to the seabed to avoid any movement of the cable while minimising the footprint of external cable protection required.

As for Scot-NI 3 the Uraduct ® will be fixed to the cable as installed and subsequently be post lay buried, therefore no changes are expected to the seabed from introduction of Uraduct ®.

Similarly, as the proposed Scot-NI 4 cable crosses the Western Link power cable within Scottish Waters (approximate KP32) it is possible that third party asset owners will require the installation of external cable protection as part of negotiated crossing agreements, which as explained for Scot-NI 3 has been included as a worst-case contingency measure. Other contingency external cable protection measures such as rock bags and concrete mattressing have also been included in the licence application but not currently proposed to be used unless required by crossing agreements or localised cable protection. As for Scot-NI 3, concrete mattressing would only be used at cable crossings, therefore the footprint of mattressing at the Western Link crossing would fall within the rock berm footprint which is worst case and has not been considered further at this location. The potential effects of the possible contingency external cable protection measures to benthic habitats within the Scot-NI 4 application corridor are discussed below.

Contingency external cable protection - rock berm

The greatest footprint from the contingency external cable protection is a rock berm. For Scot-NI 4, this contingency measure may be used for the crossing with the Western Link power cable within Scottish Waters (approximate KP23). While rock berms are currently not planned to be utilised at this crossing, as a worst-case scenario. Table 5-30 outlines the locations of the potential crossing location which may utilise a berm on Scot-NI 4.

Table 5-30 Potential rock berms at the crossing locations: Scot-NI 4 application corridor

Territorial water	Crossing	Water Depth (m)	Latitude (DDM)	Longitude (DDM)	Total rock berm height (m)
Scotland	Western HVDC Link	59	55° 11.095' N	5° 20.301' W	2.0

The worst-case rock berm is assumed to have a design height of 1.5m with a slope of 1:3.

The dimensions of the contingency rock berm included in the assessment is provided in Table 3-2 of the MEA. The rock berm for Scot-NI 4 may be up to 15m wide, approximately 72m long, with a maximum height of 1.5m. The worst-case footprint of external cable protection at this location will be 1620m^2. This is highly conservative and if required is likely to be smaller.

At the crossing location the benthic habitat is likely to consist of deep circalittoral coarse sediments (A5.15) (EMODnet 2020). This habitat may cover large areas of the offshore continental shelf but can be diverse, characterised by robust infaunal polychaete and bivalve species. The sensitivity of this habitat type to physical change is considered to high (MarLIN 2020).

Case studies for offshore renewable energy schemes have identified that installation of artificial structures (rock berms) within soft sandy sediment environments have the potential to introduce new

species to the area such as sea anemones and the soft coral *Alcyonium digitatum* (Langhamer 2012), and a general increase in epifauna can be observed across the introduced hard substrate (Lindeboom et al. 2011; Nord Stream 2014). Despite the increase in faunal diversity over the rock berm, Davis et al. (1982) identified no measurable decrease in adjacent infauna densities at a distance of 4m from artificial structures over the two-year period since their introduction.

As the footprint within the wider region is small, the introduction of the rock berm would represent a small change to the substratum type and no significant changes to the benthic population structure is expected form the scale of the changes and the sensitivity is medium with the overall impact expected to be minor.

Rock bags

The effects of introduction of rock bags will be similar to Scot-NI 3. The addition of discretely placed rock bags as a contingency may be required at approximately 50m intervals (worst case) for certain sections of the cable to provide stability. In areas of softer sediments, it is likely that the cable will achieve adequate burial depth. The only potential for introduction of rock bags or mattressing in soft sediment areas will be for a requirement of a crossing agreement or in areas of hard ground.

This deposit in areas of hard ground is unlikely to cause a significant change to the receiving environment of the seabed, as it will be used in areas where the cable is surface laid. As the nature of the seabed in such areas is likely to consist of firm and coarse sediments, the change of the addition of small and localised deposits of rock bags will cause a low magnitude of change in substrate type, therefore, this effect is likely to be not significant. If used in areas of soft sediment the change would be similar for a rock berm. Therefore, the worst-case effect of the introduction of rock bags within soft sediment areas is minor.

Mattressing

Up to 8 mattresses have been included as contingency for Scot-NI 3 with a total footprint of 144m^2. These have been included in case they are requested to be included as part of the cable crossing designs following third party crossing agreement discussions. There are five crossings within soft sediments on the Scot-NI 4 application corridor. It is unlikely that external cable protection will be required for fibre-optic cable crossings, however, installation of rock bags or mattressing over softer sediments has been considered as a contingency measure. The sensitivity of softer sediments to a change in substratum is medium. While mattresses are a hard-protective surface, they can become smothered by surrounding soft sediments over time and therefore the sensitivity of the receiving environment will be reduced. Mattress installation is likely to have a similar minor effect as that of a rock berm but a smaller footprint.

Habitats assessment

To determine the sensitivity of intertidal and subtidal habitats within the installation corridor an assessment has been carried out using information provided on the Marine Life Information Network (MarLIN 2020).

The habitat sensitivity information from MarLIN presented in Table 5-31 and Table 5-32, respectively, indicates that intertidal habitat sensitivity to physical change is 'High' for both Larne and Girvan. Subtidal habitats in both Scottish and Northern Irish territorial waters are 'High' in sensitivity. It is noteworthy that except for one subtidal habitat, no sensitivity information was available for the habitats of 'High' sensitivity, thus these sensitivities represent similar habitats. However, as the disturbance is short-term and highly localised in space, the overall significance of the installation effects on the intertidal habitats has been assessed as negligible and is not significant.

Table 5-31 Sensitivity of intertidal habitats at Larne and Girvan to Physical change (to another seabed type)

EUNIS Habitat	Resistance	Resilience	Sensitivity
Larne: NI			
A1.1133	None	Very low	High
A1.3132	Low	Very low	High
A1.45	None	Very low	High
A2.111	None	Very low	High
A2.22	None	Very low	High
A2.4	*None*	*Very low*	*High*
Girvan: Scotland			
A2.1	None	Very low	High
A2.22	None	Very low	High
A2.4	None	Very low	High

Grey colour = Assessment has been based on sublevel habitat assessments.

Table 5-32 Sensitivity of subtidal habitats to the physical change to another seabed type for the Scottish and the Northern Irish sector

EUNIS Habitat	Resistance	Resilience	Sensitivity
Scottish sector			
A5.14	None	Very Low	High
A5.25 or A5.26	None	Very Low	High
A5.27	None	Very Low	High
A5.35	None	Very Low	High
A5.37	None	Very Low	High
Northern Irish sector			
A3/A3.1	None	Very Low	High
A3.116	Not relevant	Not relevant	Not relevant
A3.221	None	Very low	High
A4	None	Very low	High
A4.1	None	Very low	High
A4.112	None	Very low	High
A4.1122	None	Very low	High
A4.121	None	Very low	High
A4.134	None	Very low	High
A4.138	None	Very low	High
A4.2	None	Very Low	High
A4.214	None	Very low	High
A4.27	None	Very Low	High

EUNIS Habitat	Resistance	Resilience	Sensitivity
A4.33	None	Very Low	High
A5	None	Very Low	High
A5.1	None	Very Low	High
A5.15	None	Very Low	High
A5.2	None	Very Low	High
A5.26	None	Very Low	High
A5.27	None	Very Low	High
A5.44	None	Very Low	High
A5.45	None	Very Low	High
A5.512	None	Very Low	High

Grey colour = Assessment has been based on sublevel habitat assessments.

Habitats that are likely to be affected in the Scottish sector include:

- Littoral sediment: (A2.1, A2.22, A2.4) – intertidal;
- Sublittoral sediment: A5.14, A5.25, A5.26, A5.27, A5.35, A5.37 – Subtidal;
- Potential Annex habitat: bedrock reef– Subtidal;
- Clyde Sea Sill NCMPA– Subtidal;
- PMF: A5.27– Subtidal

Habitats that are likely to be affected in Northern Irish sector include:

- Ephemeral green or red seaweed communities: (A1.1133, A1.3132 A1.45) - intertidal;
- Littoral sediment: (A2.111, A2.22, A2.4) - intertidal;
- Potential Annex I habitat: stony reef - intertidal;
- UK BAP/NI Priority habitat: Intertidal underboulder communities - intertidal;
- Infralittoral rock and other hard substrata: A3, A3.1, A3.221 – Subtidal;
- Circalittoral rock and other hard substrata: A4, A4.1, A4.112, A4.1122, A4.121, A4.134 A4.138, A4.2, A4.214, A4.27, A4.33 – subtidal;
- Sublittoral sediment: A5, A5.1, A5.15, A5.2, A5.26, A5.27, A5.44, A5.45, A5.512 – subtidal;
- Potential Annex habitat (1170): bedrock reef, stony reef – subtidal;
- Potential Annex habitat (1170): bedrock reef, stony reef – subtidal;
- Potential Annex I habitat: 'Maerl beds' – subtidal;
- The Maidens SAC – subtidal

Due to habitat sensitivity being assessed as high and the introduction of external cable protection constitute a permanent change to the habitat, the significance of the effect has been assessed as moderate. However, because the effects of change are short-term and the area affected is small relative to the wider extent of the surrounding habitats, the effects are considered to be tolerable. In addition, the external cable protection will over time lead to an increase in the local species diversity.

5.9 Conclusions

5.9.1 Scot-NI 3 and Scot-NI 4

In conclusion, the installation of the Scot-NI 3 and Scot-NI 4 cables will not cause any significant effects to intertidal or subtidal benthic habitats within Scottish and Northern Irish waters.

5.9.1.1 Abrasion/disturbance at the surface of the substratum

Abrasion/disturbance will occur along the entire cable installation footprint within the application corridors, during the installation. During operation of the plough, as the skids pass over the seabed the sediment below may be compacted, and the topography slightly changed. However, the area affected will be small and highly localised and as most sediments along the Scot-NI 3 application corridor are mobile bedforms of high energy environments, these changes will be transient with pre-installation conditions quickly returning following natural sediment transport processes. The installation is a one off, short term effect and the impact is very small relative to the wider habitat and habitats are expected to recover quickly. Therefore, effects of abrasion and/or disturbance of the substrate on the surface of the seabed has been assessed as negligible.

The addition of proposed cable protection (Uraduct ® and post lay buried articulated pipe) is unlikely to cause a physical change to the seabed.

5.9.1.2 Physical change (to another substratum type)

Physical change to the seabed may occur because of potential contingency external protection measures at specific locations within the application corridor (such as at cable crossings). through the rock berms, rock bags or concrete mattressing. Despite this, the footprint of the contingency external cable protection is small in comparison to the wider habitat and may in fact lead to an increase in local species diversity. Due to the small footprint of cable installation, short timeframe of the installation activities, limited smothering outside of the cable trench, and limited use of potential contingency external cable protection where the cable cannot be buried, habitats and species will not be significantly affected. Any effects to the benthic and intertidal environments are further reduced by the embedded mitigation measures.

5.9.1.3 Scot-NI 3

Scot-NI 3 passes through no designated sites for benthic and intertidal habitats in Scottish or Northern Irish waters. Early route development has aimed to minimise the disturbance of marine protected habitats and seabed features where possible to minimise effects to potential areas of priority marine features and habitats. Where possible, the cable installation follows existing cable installation areas and utilises existing BMH infrastructure and no significant effects to benthic or intertidal habitats will occur.

5.9.1.4 Scot-NI 4

The installation of Scot-NI 4 on abrasion and disturbance of habitats at the seabed and below the surface, have been considered and the effects found to be short-term and highly localised in space. the overall significance of the installation effects on intertidal and subtidal habitats has been assessed as negligible and is not significant.

The Scot-NI 4 application corridor passes through the Maidens SAC for approximately 6.8 km. The protected site is designated for sandbanks that are slightly covered by sea water at all times and geogenic reefs. Following desk top study, the Project made every effort to minimise the effect to reef and sandbanks through the protected site by micro-routing around sections of identified bedrock reef within the SAC (Figure 5-35) as far as practicable. The extent of reef within the site is approximately 21.6 km² (JNCC 2019). The extent of potential reef within the application corridor is approximately 0.64 km², of which 0.0011 km² (1136 m²) is within the footprint of the installation route (buffer of

installation route of 2.6m wide corridor (1.3 m either side of the central line) x 6.912 km through the SAC)). Therefore, the effects to reef habitat within this area is less than 0.005% of the entire reef habitat within the protected site and not significant.

6. FISH AND SHELLFISH

6.1 Introduction

This Section describes the baseline environment for fish and shellfish species present in the vicinity of the Scot-NI 3 and 4 application corridors, identifies potential effects associated with the installation and presents the findings of the environmental assessment.

Fish species are wide ranging mobile species. In addition, the Scot-NI 3 and 4 application corridors are located closely together and in many cases within the same fish species nursing and spawning ground. Therefore, to avoid repetition the baseline for both the Scot-NI application corridors has been discussed as a whole and referred to as the Project Area. Anything specific to the individual cable routes (Scot-NI 3 and 4) has been discussed individually.

6.2 Data sources

Baseline conditions have been established by undertaking a desktop review of publicly available information. The data sources used to inform the baseline description and subsequent assessment include, but are not limited to, the following:

- Appendix A: Environmental Survey Report (Fugro Ltd. 2020)
- Appendix F: Fishing Activity Study (Intertek 2020).
- Appendix H: Underwater Noise Assessment
- Fisheries Sensitivity Maps in British Waters (Coull et al. 1998);
- Spawning and nursery grounds of selected fish species in UK waters (Ellis et al. 2012);
- Updating Fisheries Sensitivity Maps in British Waters (Aires et al. 2014);

6.3 Consultation

No consultation comments have been received regarding fish and shellfish.

6.4 Fish and shellfish baseline

6.4.1 Spawning and nursery grounds

The fish and shellfish species most likely to be affected by the installation activities are those with demersal (bottom dwelling) life stages. These include demersal spawning species which lay their eggs on the seabed in specific substrate types; and species that live in contact with the seabed (either resting on the seabed or floating just above the seafloor).

Figures 6-1 and 6-2 (Drawings P2302-FISH-002 and P2302-FISH-003) and Tables 6-1 and 6-2 detail the fish species that are known to utilise the Project Area as either a spawning ground (the location where eggs are laid) or nursery area (the location where juveniles are common).

Of the demersal spawning species, Atlantic herring are known to be particularly sensitive to seabed disturbance because they spawn in very specific substrates. These species are of particular importance because they play a key ecological role as principal prey items for several larger fish species, marine birds and marine mammals and are protected under the United Kingdom (UK) Biodiversity Action Plan (BAP), Priority Marine Features (PMF) Scotland, and Northern Ireland's Priority Species (see Section 6.4.5 for more information). Further detail on Atlantic herring (which potentially occur only within the Scot-NI 4 application corridor) has been provided in Section 6.4.1.3.

The overall likelihood of the presence of juveniles within the first year of their life in the vicinity of the Scot-NI 3 application corridor has been determined to be low. For the Scot-NI 4 application corridor, the overall likelihood of the presence of juveniles within the first year of their life for all species is low, except whiting, Atlantic herring, and European sprat which have been determined to be moderate (Figures 6-3 and 6-4 Drawings P2302-FISH-012 and P2302-FISH-013). The likelihood of presence of juveniles has been defined with reference to the 'Random Forest probability of presence scale'. Low probability is defined as 0 ranging to high probability at around 0.99 (maximum score is dependent on species type and ranges from 0.525 for Atlantic herring to 0.99 for haddock) (Aires et al. 2014).

A summary of fish spawning and nursery area activity for each cable route is provided below.

6.4.1.1 Scot-NI 3

The Scot-NI 3 application corridor is a spawning ground and nursing area for eight fish and shellfish species, of which three are demersal spawners; Atlantic cod (*Gadus morhua*), Common skate (*Dipturus batis*) and Norway lobster (*Nephrops norvegicus*). Atlantic cod is reported as spawning and nursing at a high intensity and spurdog (*Squalus acanthias*) and whiting (*Merlangius merlangus*) nursery areas are of a high intensity (Table 6-1).

The following demersal spawning species (as identified in Table 6-1) are known to spawn within the Project area:

- Atlantic cod;
- Norway Lobster;
- Spurdog; and
- Whiting.

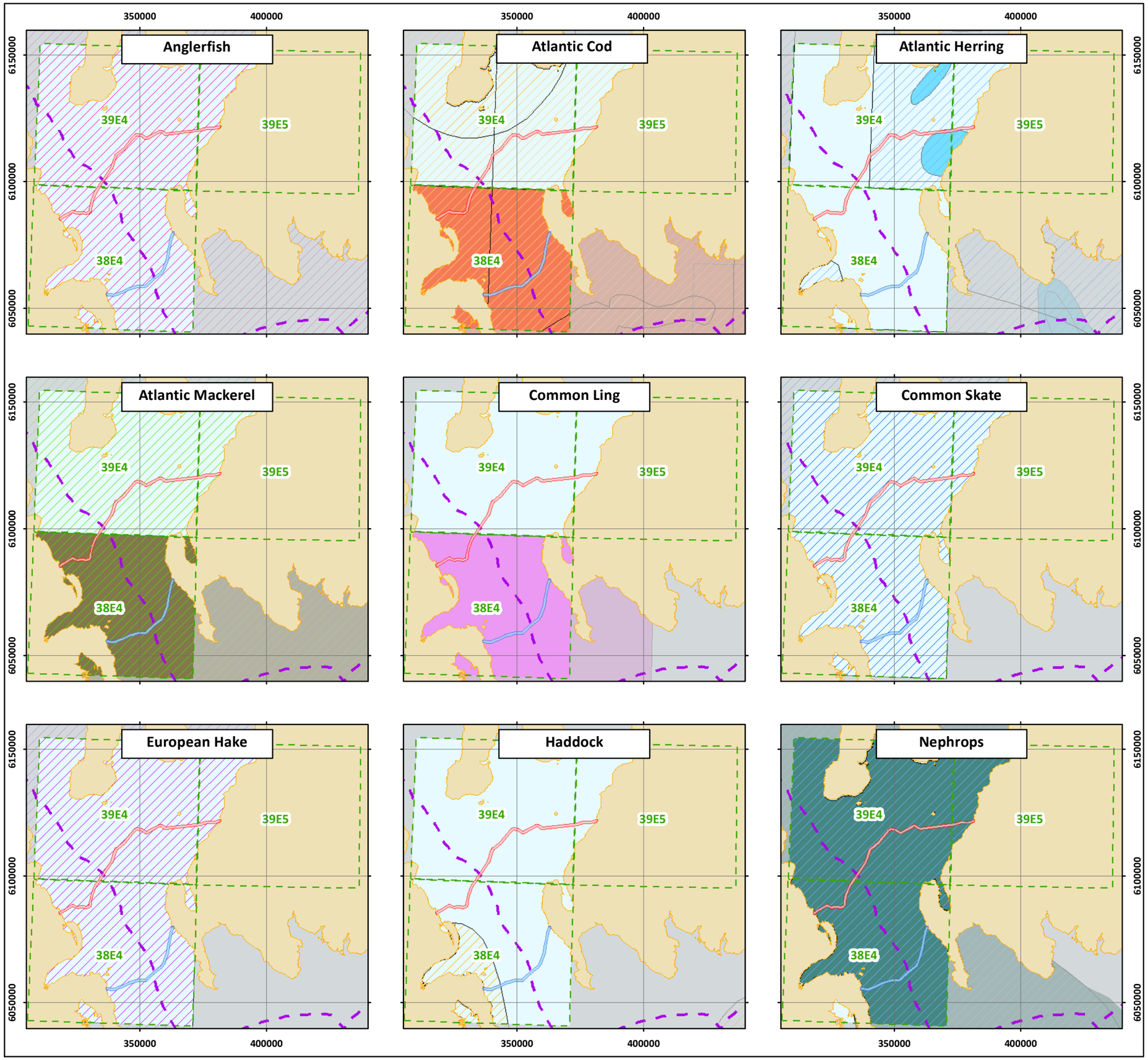
6.4.1.2 Scot-NI 4

The Scot-NI 4 application corridor is within a spawning ground for seven fish and shellfish species of which, four species are demersal spawners; Atlantic herring (*Clupea harengus*), Atlantic cod, Common skate, and Norway lobster. Atlantic cod are recorded as spawning at a high intensity (Table 6-2). The Scot-NI 4 application corridor is also within a nursery area for nine fish and shellfish species, of which Atlantic cod, Atlantic herring, spurdog and whiting are reported as nursing at a high intensity. Norway lobster is the only species listed as using the area as a nursery ground which has demersal juveniles.

The following demersal spawning species (as identified in Table 6-2) are known to spawn within the Project area:

- Atlantic cod;
- Atlantic herring;
- Norway lobster;
- Spurdog; and
- Whiting.

Of these, Atlantic herring are known to be particularly sensitive to seabed disturbance because they spawn in very specific substrates. These species are of particular importance because they play a key ecological role as principal prey items for several larger fish species, marine birds and marine mammals and are protected under the UK Biodiversity Action Plan (BAP), Priority Marine Features Scotland, and Northern Ireland's Priority Species (see Section 6.4.6 for more information). Therefore, further detail on Atlantic herring has been provided in Section 6.4.2.2.



SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

FISH ACTIVITY
Spatial Patterns of Fish Spawning and Nursing
Sheet 1 of 2

Drawing No: P2302-FISH-002	A

Legend

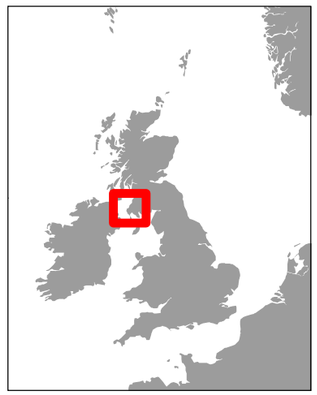
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- ICES Block

Nursery Grounds

- Anglerfish
- Atlantic Cod
- Atlantic Herring
- Atlantic Mackerel
- Common Skate
- European Hake
- Haddock
- Nephrops

Spawning Grounds

- Atlantic Cod
- Atlantic Herring
- Atlantic Mackerel
- Common Ling
- Nephrops



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NOTE: Not to be used for Navigation

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Projection	Transverse Mercator
Datum	WGS 1984
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Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

BT Global Marine intertek

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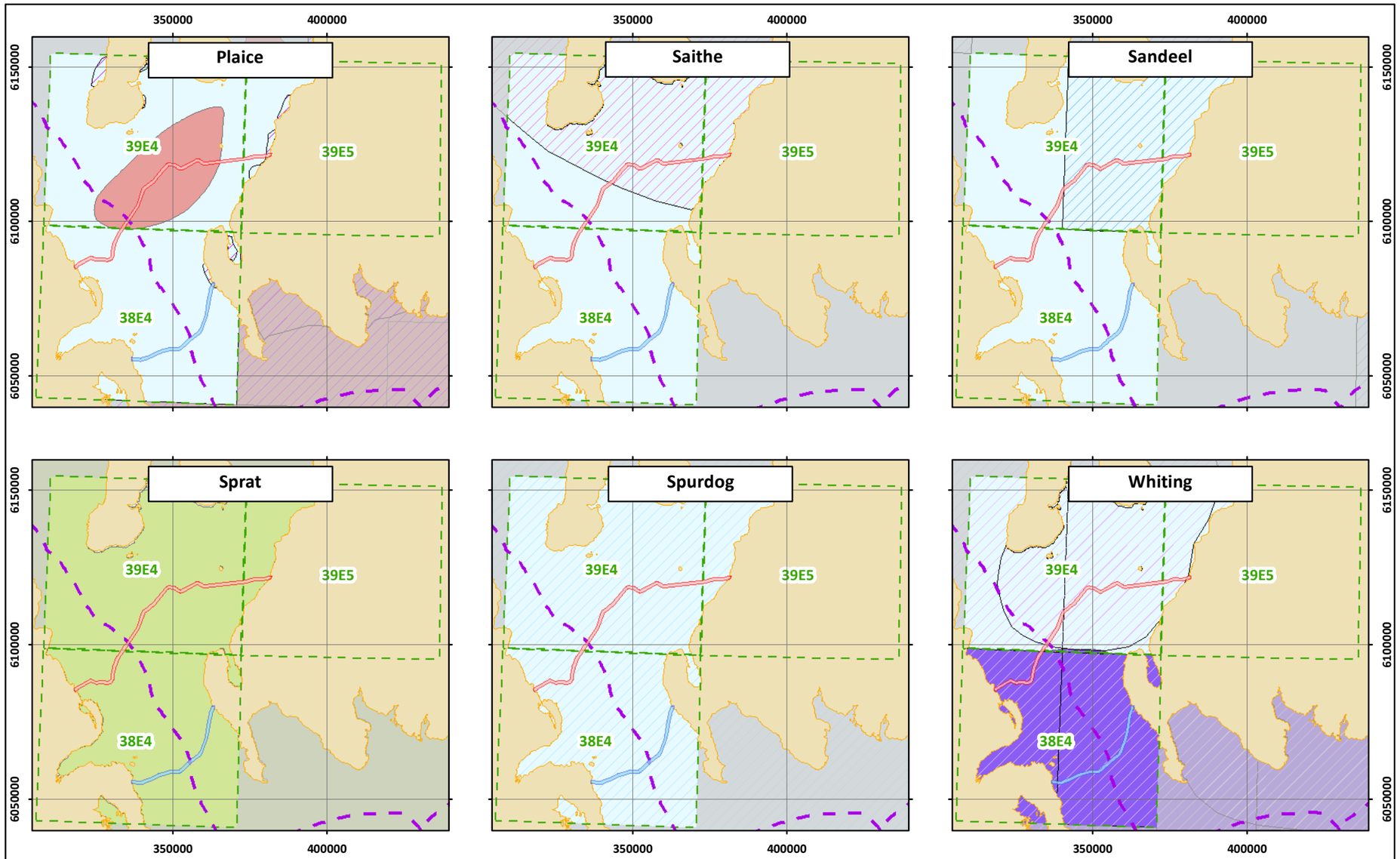


SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

FISH ACTIVITY
Spatial Patterns of Fish Spawning and Nursing
Sheet 2 of 2

Drawing No: P2302-FISH-003 | **A**

Legend

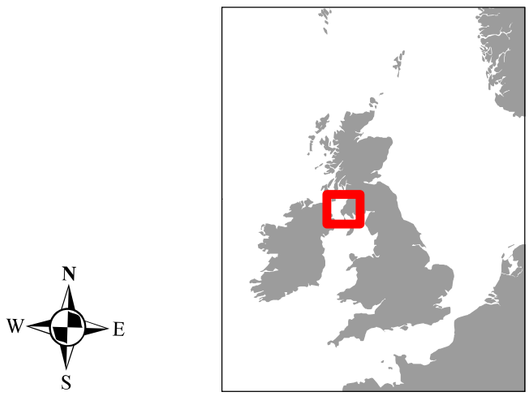
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- ICES Block

Nursery Grounds

- Plaice
- Saithe
- Sandeel
- Spurdog
- Whiting

Spawning Grounds

- Plaice
- Sprat
- Whiting



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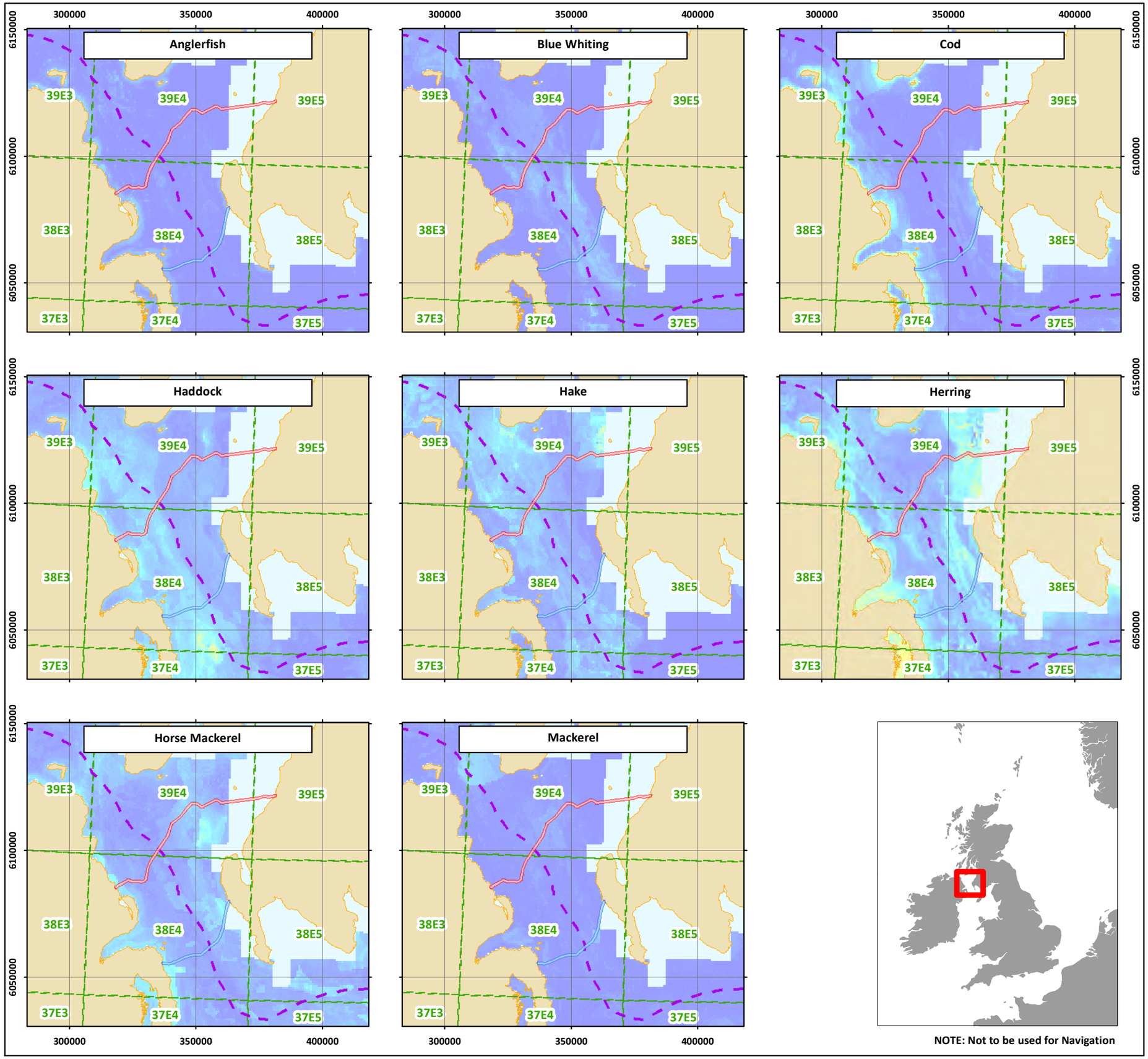

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SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

FISH ACTIVITY

Probability of 0 Group Presence

Sheet 1 of 2

Drawing No: P2302-FISH-012 | **A**

Legend

- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- ICES Block

Probability of 0 Group Presence

Anglerfish	High : 0.906438 / Low : 0
Hake	High : 0.80898 / Low : 0
Blue Whiting	High : 0.873672 / Low : 0
Herring	High : 0.525266 / Low : 0
Cod	High : 0.9827 / Low : 0
Horse Mackerel	High : 0.886139 / Low : 0
Haddock	High : 0.990367 / Low : 0
Mackerel	High : 0.861965 / Low : 0

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Datum	WGS 1984
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File Reference	J:\P2302\Mxd\06_FISH\ P2302-FISH-012.mxd
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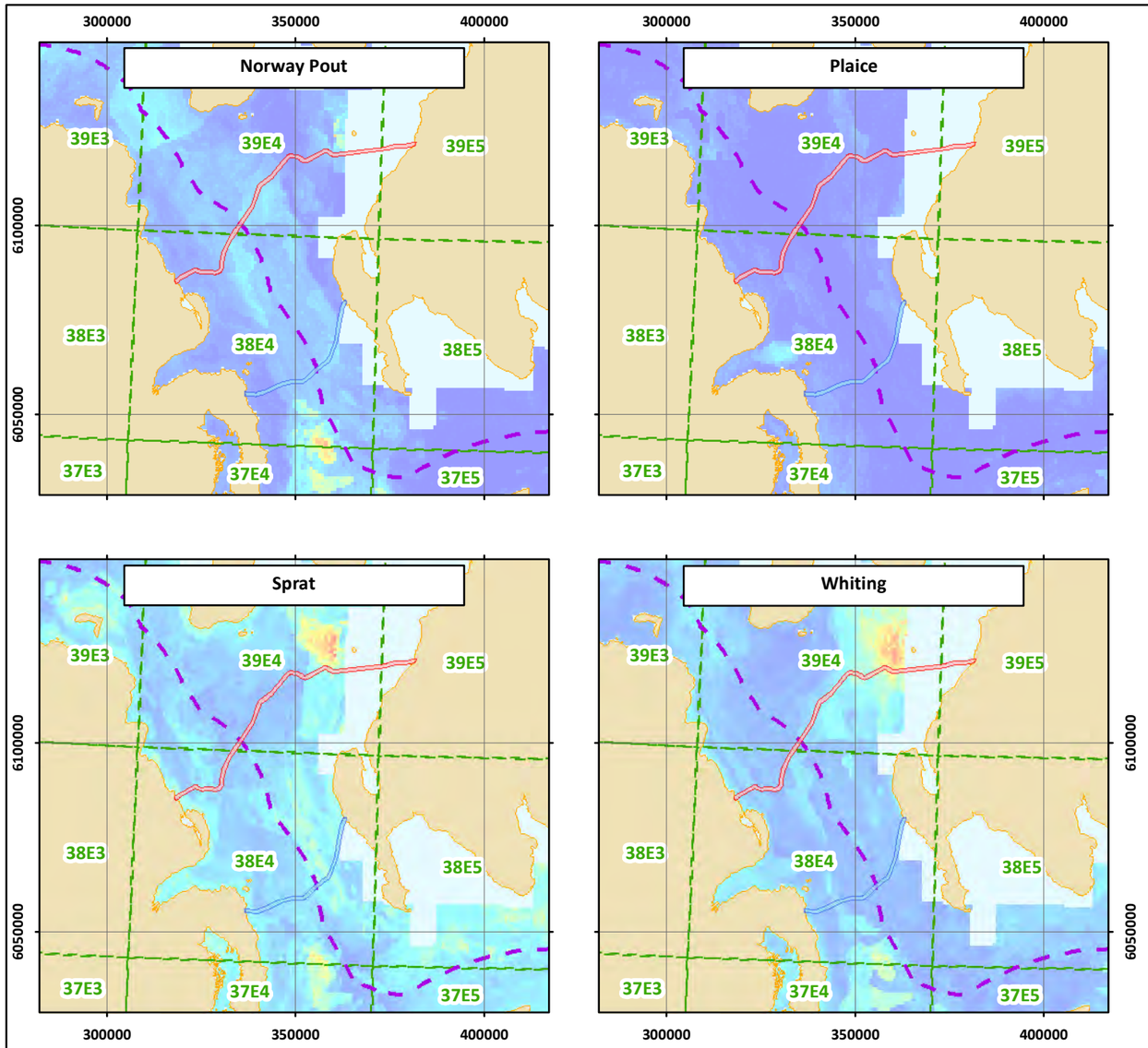

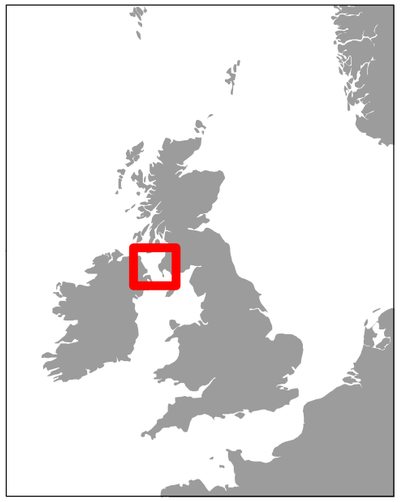

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SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

FISH ACTIVITY

Probability of 0 Group Presence

Sheet 2 of 2

Drawing No: P2302-FISH-013	A

Legend

- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- ICES Block

Probability of 0 Group Presence

Norway Pout
High : 0.986533
Low : 0

Plaice
High : 0.807249
Low : 0

Sole
High : 0.8188
Low : 0

Sprat
High : 0.867262
Low : 0

Whiting
High : 0.914184
Low : 0

Date	06 October 2020
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Datum	WGS 1984
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Table 6-1 Fish species with spawning and/or nursery grounds within the Project Area – SCOT-NI 3

Species	Spawning aquatic zone	Spawning grounds	Nursery grounds	Spawning & Nursery Periods											
				J	F	M	A	M	J	J	A	S	O	N	D
Anglerfish (*Lophius piscatorius*)	Pelagic*	Not present	Low intensity												
Atlantic Cod (*Gadus morhua*)	Demersal	High intensity	High intensity												
Atlantic mackerel (*Scomber scombrus*)	Pelagic	Low intensity	Present												
Common Ling (*Molva molva*)	Pelagic*	Present	Not present												
Common skate (*Dipturus batis*)	Demersal	Not present	Present	No information available											
European Hake (*Merluccius merluccius*)	Pelagic*	Not present	Low intensity												
European sprat (*Sprattus sprattus*)	Pelagic	Present	Not present												
Haddock (*Melanogrammus aeglefinus*)	Pelagic	Not present	Present												
Norway lobster (*Nephrops norvegicus*)	Demersal	Present	Present												
Spurdog (*Squalus acanthias*)	Live young	Present	High intensity												
Whiting (*Merlangius merlangus*)	Pelagic*	Low intensity													

Key
- Spawning and nursery period
- Nursery period
- Spawning period

Sources: Coull et al. 1998, Ellis et al. (2012)

* The adults of these species are demersal (bottom dwellers) however they are pelagic spawners – the eggs and larvae are pelagic.

Notes:

1.The terms: present, low intensity, high intensity and insufficient data are used to describe results in terms of occurrence and relative abundance of eggs or juveniles in a given area.

2. Ellis et al. (2012) states that there are insufficient data on occurrence of eggs or egg bearing females to delineate spawning grounds, but these should broadly overlap with nursery grounds.

3.Spurdog are a viviparous species - Gravid females can be found all year. Therefore, this species will use the area as both a spawning and nursery area

4. Nursing – if a species is recognised as nursing it is assumed that the species nursing period will be the same as the spawning period plus two months after cessation of spawning.

Table 6-2 Fish species with spawning and/or nursery grounds within the Project Area – SCOT-NI 4

Species	Spawning aquatic zone	Spawning grounds	Nursery grounds	Spawning & Nursery Periods											
				J	F	M	A	M	J	J	A	S	O	N	D
Anglerfish (*Lophius piscatorius*)	Pelagic*	Not present	Low intensity												
Atlantic Cod (*Gadus morhua*)	Demersal	High intensity	High intensity												
Atlantic herring (*Clupea harengus*)	Demersal	Present	High intensity												
Atlantic mackerel (*Scomber scombrus*)	Pelagic	Low intensity	Present												
Common Ling (*Molva molva*))	Pelagic*	Present	Not present												
Common skate (*Dipturus batis*)	Demersal	Not present	Present	No information available											
European Hake (*Merluccius merluccius*)	Pelagic*	Not present	Low intensity												
European plaice (*Pleuronectes platessa*)	Pelagic*	Present	Not present												
European sprat (*Sprattus sprattus*)	Pelagic	Present	Not present												
Norway lobster (*Nephrops norvegicus*)	Demersal	Present	Present												
Sandeel (*Ammodytes* sp)	Demersal	Not present	Low intensity												
Saithe (*Pollachius virens*)	Pelagic	Not present	Present												
Spurdog (*Squalus acanthias*)	Live young	Present	High intensity												
Whiting (*Merlangius merlangus*)	Pelagic*	Low intensity	High intensity												

Key
- Spawning and nursery period
- Nursery period
- Spawning period

Sources: Coull et al. 1998, Ellis et al. (2012)

* The adults of these species are demersal (bottom dwellers) however they are pelagic spawners – the eggs and larvae are pelagic.

Notes:

1.The terms: present, low intensity, high intensity and insufficient data are used to describe results in terms of occurrence and relative abundance of eggs or juveniles in a given area.

2. Ellis et al. (2012) states that there are insufficient data on occurrence of eggs or egg bearing females to delineate spawning grounds, but these should broadly overlap with nursery grounds.

3.Spurdog are a viviparous species - Gravid females can be found all year. Therefore, this species will use the area as both a spawning and nursery area

4. Nursing – if a species is recognised as nursing it is assumed that the species nursing period will be the same as the spawning period plus two months after cessation of spawning.

6.4.2 Herring

6.4.2.1 Scot-NI 3

Atlantic herring are not recorded as present within the Scot-NI 3 application corridor.

6.4.2.2 Scot-NI 4

Atlantic herring is a pelagic species which spawns on specific gravelly seabed. The Scot NI-4 application corridor intersects the very northern edge of the Ballantrae Bank Atlantic herring spawning ground for 13.7km; within the Firth of Clyde. Spawning on the Ballantrae Bank occurs during the spring (March-April) (Ellis et al. 2012).

Atlantic herring have a specific habitat preference which limits the spatial extent of their spawning grounds. Eggs adhere to the seabed and can form extensive egg beds, meaning they are particularly sensitive to seabed disturbance during this period. The suitability of the seabed substrate as a spawning habitat for Atlantic herring is a function of:

- Particle size – spawning typically occurs on coarse gravel (0.5-5cm) to stone (8-15cm) substrates (ICES 2012);
- Seabed features – preference for crest of ridges and ripples rather than hollows (ICES 2012);
- High oxygenation of sediments e.g. well mixed waters (Behrens 2007);
- Current speed – prefer reasonably strong tidal currents (1.5 – 3 knots) (Reid et al. 1999); and
- Water depth – prefer relatively shallow water (approximately 15-40m deep) (Reid et al. 1999).

Atlantic herring numbers fluctuate annually, and Atlantic herring often abandon and then return to suitable areas, therefore all suitable areas of Atlantic herring spawning habitat are important to maintain a resilient population.

The water depth at which the cable intersects the spawning area is estimated to be 29.3m and therefore within the range of preferred water depth for herring (15-40m). The sediment type where the Scot-NI 4 application area intersects the Ballantrae Bank spawning ground are composed of sand. Therefore, it is unlikely that the sediment within the application corridor will provide suitable herring spawning habitat.

6.4.3 Diadromous fish

6.4.3.1 Scot-NI 3 and Scot-NI 4

The term diadromous is used to describe fish species that migrate between fresh and salt water; the North Channel is an important migration route. Diadromous fish either spawn in fresh water and feed at sea (anadromous) or spawn at sea and feed in fresh water (catadromous). It is possible that the following species listed on Annex II of the Habitats Directive are likely to be within or moving through the Project Area on their migration at certain times of the year:

- Anadromous - Sea or brown trout (*Salmo trutta*)
- Anadromous - Atlantic salmon (*Salmo salar*)
- Anadromous - Sea lamprey (*Petromyzon marinus*)
- Anadromous -River lamprey (*Lampetra fluviatilis*)

Atlantic salmon spawning occurs in rivers during late autumn to winter. Atlantic salmon utilise the rivers for reproductive and nursery phases of their lifecycle and migrate out into the Atlantic Ocean to feed and grow, the outward migration occurs during late spring with most of the fish gone by June. These salmon will remain in the sea for 1-4 years, returning to the river from January to June (NatureScot (SNH), 2020a).

Unlike Atlantic salmon, sea trout do not undertake consistent long-distance migrations, typically remaining relatively close to their natal river system. Like Atlantic salmon, migration to the sea occurs from late April- June. Some smaller trout will return to the river as little as few weeks or months after their migration to sea, while larger adult fish return after one year (NatureScot (SNH), 2020b).

River lamprey and sea lamprey migrate from their coastal feeding grounds into freshwater, to spawn, during the autumn and spring and spring / early summer, respectively (NatureScot (SNH), 2020c).

There are no protected areas within 40km of the Project Area which are designated for diadromous fish.

6.4.4 Shellfish

6.4.4.1 Shellfish typically live on or in the seabed. For the purpose of this assessment, commercial shellfish (crustacean and molluscs) are described below; refer to Section 5 – Benthic and Intertidal for an overview of the benthic community structure.

6.4.4.2 Scot NI-3

As detailed in Appendix F – Fisheries Activity Study, the following commercially targeted species are likely to be found within the vicinity of the Project Area:

- Brown crab (*Cancer pagurus*) – found on bedrock including under boulders, mixed coarse grounds, and offshore in muddy sand. Lower shore, shallow sublittoral and offshore to about 100m deep.
- Velvet crab (*Necora puber*) - typically found on intertidal stony and rock substrata and in shallow water, they are most abundant on moderately sheltered shores.
- European lobster (*Homarus Gammarus*) – found on rocky substrata, where they live in holes and excavated tunnels from the lower shore to about 60m depth.
- King scallop or great scallop (*Pecten maximus*) - depth at which they occur ranges from 10 to 110m. They prefer areas of clean firm sand, fine or sandy gravel and may occasionally be found on muddy sand.
- Nephrops or Norway lobster (*Nephrops norvegicus*) - The water depths at which Nephrops are typically found ranges from 200m to 800m, Nephrops have also been recorded as spawning and nursing within the Project Area (Tables 6-1 and 6-2). There are even records of Nephrops in Scottish sea lochs at depths shallower than 20m. Nephrops are found in shallow burrows and are common on grounds with fine cohesive mud which is stable enough to support their unlined burrows.

In addition to the commercially targeted species noted above, blue mussel (*Mytilus edulis*), common cockle (*Cerastoderma edule*), whelks and native oysters (*Ostrea edulis*) may also be observed in the region. However, according to Appendix F – Fisheries Activity Study, these species are not commercially targeted in the Project Area.

6.4.4.3 Scot NI-4

The baseline for Scot-NI 4 is similar to the above for Scot-NI 3, with a greater emphasis on Norway lobster which are common within the Clyde Sea, within Scottish waters which is shallower than 200m.

6.4.5 Elasmobranchs

6.4.5.1 Scot NI-3 and Scot-NI 4

Elasmobranchs are cartilaginous fish which encompasses sharks, rays, and skates. Around 48 species of sharks, rays and skates have been recorded within UK waters, this includes, resident, vagrant, rare, and seasonal species. Table 6-3 lists elasmobranchs identified as likely to be present within or adjacent to the Scot-NI application corridors.

Table 6-3 Elasmobranchs likely to be within the Scot-NI application corridors

Common name	Scientific name	Habitat
Angel shark	*Squatina squatina*	Demersal
Basking shark	*Cetorhinus maximus*	Pelagic
Common skate (blue skate)	*Dipturus batis*	Demersal
Common smoothhound	*Mustelus mustelus*	Demersal
Cuckoo ray	*Leucoraja naevus*	Demersal
Lesser spotted dogfish	*Scyliorhinus canicula*	Demersal
Nursehound	*Scyliorhinus stellaris*	Demersal
Porbeagle shark	*Lamna nasus*	Epipelagic
Short fin mako	*Isurus oxyrinchus*	Pelagic
Spotted ray	*Raja montagui*	Demersal
Spurdog	*Squalus acanthias*	Benthopelagic
Thornback ray	*Raja clavata*	Demersal
Tope shark	*Galeorhinus galeus*	Benthopelagic and demersal
White skate	*Rostroraja alba*	Demersal

Source: AFBI (2009), Baxter et al. (2011)

6.4.5.2 Rays and skates

Scot-NI 3 and Scot-NI 4

Rays and skates are amongst the most common bottom dwelling fish (AFBI 2009). The common skate is known to be found in Scottish waters; only occasional individuals are reported in Northern Irish waters (Baxter et al. 2011; AFBI 2009). The cuckoo ray is common in the Irish Sea; greatest densities are reported to the north and the south of the North Channel (AFBI 2009). Thornback ray, spotted ray, and white skate are also common to the region (Baxter et al. 2011).

6.4.5.3 Sharks

Scot-NI 3 and Scot-NI 4

The nursehound is common throughout coastal and shelf waters in Scotland and also reported in Northern Irish waters (AFBI 2009; Baxter et al. 2011).

Offshore there are a number of shark species typical in Scottish and Northern Irish waters. The tope shark is reportedly highly migratory; present at the surface in shallow waters and demersal off the continental shelf. The blue shark is known to migrate off the west coast of Scotland during the summer months. Spurdog, the most abundant shark species in the world, is also widely distributed in the area. Common smoothhound, lesser spotted dogfish (also known as the smaller spotted catshark) and shortfin mako are widespread throughout Scottish and Northern Irish waters.

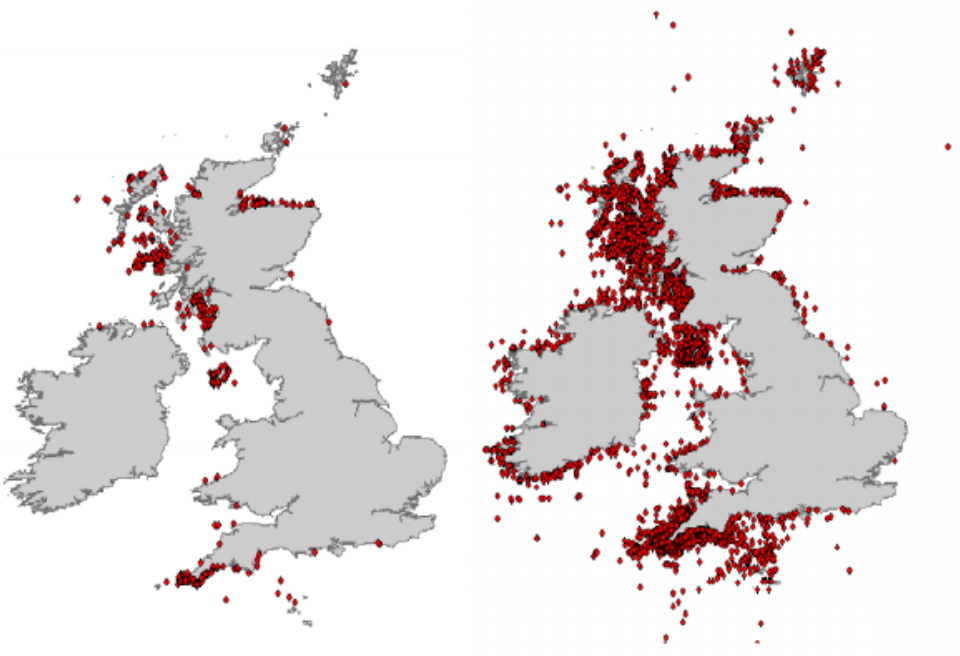
The angel shark is resident to Northern Irish waters, however, is reported to be severely depleted (AFBI 2009; IUCN Red List website); sightings in Scottish waters are very rare (Baxter et al. 2011). Porbeagle may also be observed in the Project Area, especially in deeper waters during June and October (Wildlife Trust 2020)

Basking shark are the second largest species of fish in the world, growing up to 12m in length, they are filter feeders that feed on plankton and zooplankton. Due to the low population numbers, the Northeast Atlantic population of basking sharks are listed as 'endangered' under the IUCN Red List of Threatened Species. Basking sharks are protected in Scotland under the Nature Conservation

(Scotland) Act 2004 and in Northern Ireland under the Wildlife (Northern Ireland) Order 1985, with it being an offence to intentionally or recklessly disturb or capture individuals.

Basking sharks are commonly seen at the surface in the summer months, particularly around the western coasts of the UK, but it is less clear where they spend the winter. It is thought that they make extensive migrations to locate plankton, principally migrating north to south during winter months along the continental shelf of Europe (DECC 2016). As can be shown in Figure 6-5, Basking sharks are most likely to be sighted in Scottish waters but are still present within Northern Irish waters.

Figure 6-5 UK basking shark sightings reported by the general public in 2013 (left) and total sightings between 1987-2013 (right)



Source – DECC (2016)

6.4.6 Species of conservation importance

Fish are afforded protection under several different conventions discussed in the sections below.

6.4.6.1 EC Habitats Directive Annex II Species

Eight fish species, listed on Annex II of the European Commission (EC) Habitats Directive, are known to occur in UK waters. Of these the following are likely to be observed in the Project Area:

- Atlantic Salmon;
- River lamprey; and
- Sea lamprey.

6.4.6.2 UK Biodiversity Action Plan (BAP) Priority Species, Priority Marine Features Scotland, Northern Ireland's Priority Species

The species listed in Table 6-4 may be observed within the Project Area and are listed as UK BAP Priority Species, Priority Marine Features (PMF) Scotland and Northern Ireland Priority Species. The species on these lists are a priority for conservation in Northern Ireland and Scotland's seas.

Table 6-4 Priority species within the Project Area.

UKBAP species	PMF Scotland	Northern Ireland Priority Species
Angel shark	Anglerfish	Angel shark
Atlantic herring	Atlantic herring	Atlantic herring
Atlantic mackerel	Atlantic mackerel	Atlantic mackerel
Atlantic cod	Atlantic cod	Atlantic cod
Basking shark	Basking shark	Basking shark
Common ling	Common ling	Common ling
Atlantic salmon	Atlantic salmon	Atlantic salmon
Common skate	Common skate	Common skate
Common sole	European eel	Common sole
European hake	River lamprey	European hake
European eel	Porbeagle shark	European eel
European plaice	Sandeel	European plaice
River lamprey	Saithe	River lamprey
Porbeagle shark	Sea lamprey	Porbeagle shark
Sandeel	Tope shark	Sandeel
Sea lamprey	Whiting	Tope shark
Short fin mako		Whiting
Tope shark		
Whiting		

6.4.6.3 International Union for Conservation of Nature (IUCN)

On the IUCN Red List of Threatened Species; Atlantic cod and tope shark are listed as vulnerable, while sandeel (species *Ammodytes tobianus*) and common sole are listed as deficient and Basking shark are listed as endangered.

6.4.6.4 OSPAR Listed species

The following species are on the OSPAR List of Threatened and/or declining species and habitats. This list has been developed to fulfil the commitment of the OSPAR Biological Diversity and Ecosystems Strategy to assess the species and habitats that need to be protected (OSPAR Commission 2015).

- Atlantic cod
- Sea lamprey
- Angel shark
- Basking shark
- Common skate
- Porbeagle shark
- Spurdog

6.5 Potential pressure identification and zone of influence

The following pressures have been considered for fish and shellfish and screened out for further assessment in Section 3, Table 3-3.

- Water clarity changes; and
- Underwater noise changes

Two potential pressures on fish and shellfish have been included for further assessment. In order to evaluate the most significant effects, the largest zone of influence was selected as presented in Table 6-5.

Table 6-5 Potential effects and zone of influence

Project Activity	Potential pressure	Receptor	Worst case zone of influence
Contingency external cable protection installation	Physical change (to another seabed type)	Other fish species with demersal life stages Shellfish	**Scotland jurisdiction** **Scot-NI 3**: Rock bags: 52m²
			NI jurisdiction **Scot-NI 3:** Rock bags: 52m² Concrete Mattress: 126m² Rock berm: 2025m²
		Atlantic herring Other fish species with demersal life stages Shellfish	**Scotland jurisdiction** **Scot-NI 4**: Rock bags: 52m² Concrete Mattress: 144 m² Rock berm: 1620m²
			NI jurisdiction **Scot-NI 4:** Rock bags: 52m²
Installation plough TROV PLGR	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Other fish species with demersal life stages Sessile shellfish species Mobile shellfish species	**Scotland jurisdiction** **Scot-NI 3**: Plough (abrasion): 0.052km² Plough (penetration): 0.01km²
			NI jurisdiction **Scot-NI 4:** Plough (abrasion): 0.057km² Plough (penetration): 0.011km² T-ROV: 0.0001km²
		Atlantic herring Other fish species with demersal life stages Sessile shellfish species Mobile shellfish species	**Scotland jurisdiction** **Scot-NI 4**: Plough (abrasion): 0.150km² Plough (penetration): 0.029km² T-ROV: 0.0004km²
			NI jurisdiction **Scot-NI 4:** Plough (abrasion): 0.072km²

Project Activity	Potential pressure	Receptor	Worst case zone of influence
			Plough (penetration): 0.014km^2 T-ROV: 0.0001km^2

6.6 Embedded mitigation

The project description, described in Section 2, provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to fish and shellfish is provided in Table 6-6 below. These measures will be complied with as a matter of best practice.

Table 6-6 Embedded mitigation

ID	Embedded mitigation
COMP 6	Project vessels will comply with the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs) – as amended
BP 9	The survey and installation vessels will be moving at a maximum speed 6 knots during installation activities. This will allow any rafting seabirds, marine mammals, or basking sharks time to disperse before the vessel arrives. When not conducting installation activities, vessels will avoid bird rafts where operationally possible and safe to do so.

6.7 Impact assessment

6.7.1 Physical change (to another substratum type)

6.7.1.1 Scot NI-3

There are three cable crossings for Scot-NI 3 including Scot-NI 1, Western Link and Hibernia Atlantic. The two telecommunication cable crossings will have Uraduct® applied to the cable and the cable will then be buried post-lay. Therefore, there will be no physical change to another seabed type at these crossing locations.

The contingency external cable protection measures which may be required for installation of the Scot-NI 3 cable if used could introduce different types of material onto the seabed, which may differ in consistency to the surrounding sediments. These measures are likely to be required for the cable crossings within Scottish and Northern Irish waters and areas where further cable stability or protection are required. The contingency external protection measures may be in the form of concrete mattressing, rock bags or rock berms. The final measures deployed are dependent on the cable burial assessment and cable crossing agreements with existing asset owners.

For assessment purposes, it is assumed that the worst-case contingency external cable protection measures will be used as set out in Table 3-2. These will consist of a rock berm at the Western Link power cable crossing, mattresses at cable crossings (7 within Northern Irish waters), and up to 10 rock bags within Northern Irish waters; and up to 10 rock bags within Scottish waters for Scot-NI 3. Rock bags may be used in areas of hard ground where plough or jetting burial will not be possible and/ or sufficient burial may not be achieved.

The seabed sediments at the Western Link power cable crossing are composed of deep circalittoral coarse sediment. This deposit will be a change of approximately 2025m^2 area of sand to a coarse rock substrate. Fish and shellfish receptors most vulnerable to this pressure are species which rely on soft sediment, including substrate spawning fish, flatfish such as European plaice and shellfish that live on

or within soft sediment. However, the area to be affected by the physical change, is minor in the context of the wider sedimentary seabed surrounding the cable crossing. The Western Link cable crossing is within a Norway lobster and Atlantic cod spawning ground. Norway lobster spawn throughout the year across the Irish Sea and is not listed as a species requiring conservation. The footprint of the cable protection would displace Norway lobster from utilising it for their burrows. However, the footprint is small within the context of the wider habitat available. The footprint of the potential contingency rock berm is within a high intensity Atlantic cod spawning habitat. However, Atlantic cod prefer spawning across more coarse-grained sediments, and the crossing location is unlikely to be of prime spawning habitat. The installation of a rock berm is relatively small within the wider environment and it is unlikely that any significant effects to Atlantic cod populations will occur from installation of the rock berm. Therefore, any effects to fish species will be negligible.

Installation of up to 7 mattresses within Northern Irish waters will be similar in effect to installation of the rock berm with a much smaller footprint. The effects to fish and shellfish will be negligible.

For sections of the cable where burial may be marginal or the cable is surface laid over rock, contingency external cable protection such as rock bags or mattressing may be required. An estimation of the length of contingency external cable protection required for the Scot-NI 3 cable is included in Table 6-5. This assumes protection is required for all the potentially marginal areas and therefore represents the worst-case.

Contingency external cable protection in areas of outcropping bedrock will be over existing hard ground or rock. In such areas, there will be no significant physical change to another seabed type. The deployment of the worst-case footprint of 10 rock bags with a footprint of 52m² pre jurisdiction (Scotland and Northern Ireland). In relation to fish and shellfish, installation of a worst-case cable protection across outcropping rock of 126m² is relatively small in relation to the surrounding available habitat. The application of rock over rock does not constitute a significant change from the baseline therefore it is unlikely to affect the spawning and nursery areas along the Scot-NI 3 application corridor.

Contingency external cable protection in areas of glacial till may not be required. This is dependent on the number of boulders and the progress of the plough through these areas. Should the plough have trouble it may be required to surface lay discrete sections of the cable and protect them with mattressing or rock bags. As glacial till is made up of a mixture of coarse-grained sediments and boulders is also unlikely that the application of rock bags will significantly change the substratum and no significant effects are anticipated.

6.7.1.2 Scot NI-4

There are five cable crossings for Scot-NI 4 including the LANIS 3, Scot-NI 2, Western Link, SIRIUS North, and Hibernia Atlantic cables. Of these, four are telecommunication cable crossings which will be protected using Uraduct® with the cable then buried post-lay. Therefore, there will be no change of substrate at these cable crossings.

As with Scot-NI 3, for assessment purposes, it is assumed that the worst-case contingency external cable protection measures for Scot-NI 4 will be used as set out in Table 3-2 and Table 6-5 above. These will consist of a contingency rock berm at the Western Link power cable crossing, concrete mattress within Scottish waters and up to 10 rock bags within Scottish waters; and up to 10 rock bags within Northern Irish waters for Scot-NI 3. Rock bags may be used in areas of hard ground where plough or jetting burial will not be possible and/ or sufficient burial may not be achieved.

The seabed sediments at the Western Link power cable crossing are composed deep circalittoral sand. Contingency external rock protection over this substrate will be a change of approximately 1620m² area of sand to a coarse rock substrate.

The Western Link cable crossing is within a Norway lobster and sprat spawning area. Sprat are pelagic spawners and therefore will not be affected by Project activities taking place on the seabed. Norway lobster are demersal spawners, they spawn widely across the Irish Sea. The footprint of the cable protection is small within the context of the wider habitat available for Norway lobster therefore, any species displaced from spawning at the area of rock protection will be able to find suitable habitat in the adjacent and surrounding area and any effects to spawning activity will be negligible. In addition, sprat and Norway lobster are not listed as fish or shellfish species requiring conservation. Therefore, the effects of physical change to fish and shellfish populations will be negligible.

Installation of up to 8 mattresses within Scottish waters will be similar in effect to installation of the rock berm, with a much smaller footprint. The effects to fish and shellfish will be negligible.

For sections of the Scot-NI 4 cable where burial may be marginal or the cable is surface laid over rock, contingency external cable protection such as rock bags or mattressing may be required. An estimation of the length of cable protection required for the Scot-NI 4 cable is included in Table 6-5 as worst-case assuming protection is required for all the potentially marginal areas.

Contingency external cable protection in areas of outcropping bedrock will be over existing hard ground or rock. In such areas, there will be no significant physical change to another seabed type. The deployment of the worst-case footprint of 10 rock bags with a much smaller footprint of 52m² per jurisdiction (Scotland and Northern Ireland). In relation to fish and shellfish, installation of the worst case cable protection across rocky outcrops is unlikely to constitute a significant change to the benthic environment and effects to the spawning and nursery areas along the Scot-N 4 application corridor are expected to be negligible.

There is no cable protection proposed for the Ballantrae Bank Atlantic herring spawning ground close to Girvan therefore, the effects of this pressure on Atlantic herring have not been considered further. Overall, the addition of contingency external cable protection will be not significant.

6.7.2 Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.

Aspects of the Project that physically disturb the seabed, e.g. PLGR, plough and jet trenching, have the potential to disturb species with demersal life stages, larval or juvenile ages, or fish and shellfish species that live in contact with the seabed. Typically, the extent of this disturbance will be up to 50cm wide along both the Scot-NI 3 and 4 cable routes where the plough is used (The footprints per jurisdiction are given in Table 3-1 and Table 6-5).

The assessment recognised that Atlantic herring is the most vulnerable species to the pressure given that the Scot-NI 4 application corridor intersects the northern part of the Ballantrae Bank spawning ground. Shellfish and other fish species with demersal life stages have been grouped together in the discussion below as a similar conclusion can be reached.

6.7.2.1 Atlantic herring

6.7.2.2 Scot-NI 3

Atlantic herring are not known to spawn along the Scot-NI 3 application corridor and therefore there will be no effect on the species from the proposed installation.

6.7.2.3 Scot-NI 4

Atlantic herring are sensitive to the pressure ‘Penetration and disturbance’ due to the fragility and importance of successful egg hatching and Atlantic herring recruitment. If spawning is interrupted or Atlantic herring eggs are damaged this could lead to a decrease in recruitment for the year, leading to decreased fish stocks and lack of prey availability for the species preying upon Atlantic herring.

Disturbance to the herring spawning ground will be limited as disturbance will be restricted to the extent of the direct installation footprint. The Ballantrae Bank spawning ground covers approximately 207km². The length of Scot-NI 4 application corridor which intersects the Atlantic herring spawning area is approximately 13.7km. It has been calculated that a total area of 0.003km² of seabed within the spawning area will be affected by installation; equivalent to 0.001% of the spawning ground. In addition, the sediments where the cable intersects the spawning ground are composed of sand and therefore unlikely to be suitable for herring spawning. Disturbance of the seabed will be a semi-isolated activity. Although several aspects will disturb the seabed, they will generally be in quite short succession of each other and affecting the same area. For example, PLGR will proceed cable trenching but will affect the same section of seabed. Sediments will not be removed from the seabed and therefore once installation is complete the previous habitat will remain a viable spawning habitat.

As detailed in Section 6.4.2.2, spawning on the Ballantrae Bank occurs during the spring (March-April). As detailed in Section 2, cable installation activities are likely to commence in quarter 3 of 2021 and be complete by the end of 2021. Therefore, it is unlikely that installation activities will be undertaken in the spawning period.

In context of the arguments above the effects from the pressure penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion are considered negligible.

6.7.2.4 Shellfish and Other fish species with demersal life stages

Scot-NI 3 and Scot-NI 4

Table 6-1 and 6-2 identify that there are demersal spawning species present in the Project Area all year round. In addition, there are a range of shellfish present (see Section 6.4.4), many of which are commercially important fishery resources.

Mobile shellfish and fish with demersal life stages are not considered sensitive to the pressure as these species have the capacity to move away from the disturbance, with a large area of habitat being available for them to temporarily relocate too. King scallops are also not considered sensitive to the pressure, the MarLIN (2008) sensitivity assessment for king scallop records a low sensitivity and high recoverability rating to physical disturbance. King scallop are less mobile and may not be able to move from the installation footprint.

The effects from the pressure are considered negligible for the following reasons:

- The installation is a one-off event.
- The limited footprint of the installation activities will ensure that any effects are localised to the cable trench; a very narrow strip of seabed.
- Habitat disturbance will be a one-off event with the seabed able to recover to pre-installation conditions quickly following installation. Once the cables are installed the seabed will not be routinely disturbed.
- The Project Area is minimal in terms of the extended spawning areas available for fish species within the region.
- Due the limited footprint of the installation activities species will not be affected at a population level. Stock recruitment will not be affected.

7. MARINE MAMMALS AND REPTILES

This section describes the baseline environment for marine mammals and reptiles present along the Scot-NI 3 and 4 application corridors and identifies the potential effects associated with the cable installation.

Marine mammals and reptiles are wide ranging mobile species. In addition, the proposed cable routes are located close together within adjacent marine mammal management units. Therefore, to avoid repetition the baseline for both the Scot-NI cable routes has been discussed as a whole and referred to as the Project Area. Any aspects specific to the individual cable routes (Scot-NI 3 and 4) have been discussed individually.

7.1 Data sources

Baseline conditions have been established by undertaking a desktop review of published information. The data sources used to inform the baseline description and subsequent assessment include but are not limited to the following:

- Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III (Hammond et al. 2017);
- Atlas of Cetacean distribution in north-west European waters (Reid et al 2003);
- Sea Watch Foundation sightings data (Sea Watch Foundation 2020);
- Marine Scotland NMPi tool (Marine Scotland 2020);
- Offshore Energy Strategic Environmental Assessment 3 A1a7 Marine and other mammals (DECC 2016);
- Updated seal usage maps: The Estimated at-sea Distribution of Grey and Harbour Seals (Russel et al 2017)
- Seal haul out sites (Marine Scotland 2020 and DAERA 2020); and
- North Channel Special Conservation Area Site Selection Document (JNCC 2017).

7.2 Consultation

Table 7-1 summarises the relevant consultation responses on the marine elements of the proposed Scot-NI application corridors received during preparation of the MEA Report and which have been considered in this section.

Table 7-1 Consultation and scoping responses

Stakeholder	Comment	How this has been addressed
JNCC	Having reviewed the scoping material, we note the SCOT-NI 3 cable route also passes through a historic munitions dumping ground. We appreciate the cable route has been planned to avoid all known potential unexploded devices but highlight that should any unexpected devices be found and require removal, marine mammal mitigation will need to be agreed with the appropriate regulator and SNCB prior to clearance taking place. We also highlight an EPS licence for injury may be needed, depending on the specific circumstances and conclusions of the environmental impact assessment.	Understanding the complexities involved with routing through a charted munitions dumping ground, the project has developed a bespoke UXO strategy in close consultation with its Independent UXO Specialists and Insurers. This strategy is to 'Avoid any and all pUXO by a safe distance'. The post survey routes have successfully achieved this and as such no UXO clearance operations are planned. Additional mitigations are in place should unexpected pUXO be encountered during the later phases of the Project following similar principles. UXO clearance will only being considered if other mitigations are insufficient

Stakeholder	Comment	How this has been addressed
NatureScot	Following an Ecology desk top study, the Project discussed the findings with SNH with regards to the potential effects to otter from cable installation. No otter records within 200m of the Portpatrick landing site have been identified. The installation works at Portpatrick will be short term and will take approximately three to five days to complete outside any key sensitive periods for otter (should they be present). Prior to installation activities taking place at the site, the Project team will be fully briefed on the 'Measures to minimise effects on otters' contained within the available guidance, including such measures as mammal ladders in open excavations, controlled artificial lighting and capped pipes to prevent entrapment. Due to the limited effects to otter from the short-term nature of the activities, no further survey and/or investigation works are currently proposed. The activities will be taking appropriate measures into account in the unlikely event that otters are present on the beach during cable installation activities. NatureScot requested to confirm agreement with the above approach and that an EPS licence is not required based on the unlikely significant effects to otter from cable installation.	NatureScot Response received from Sian Williams [29/09/2020] confirming that based on the information provided NatureScot are happy for work to proceed as described.

7.3 Existing baseline description

7.3.1 General overview

Marine mammals that may be present within and adjacent to the Project Area include cetaceans (whales, dolphins, and porpoises), pinnipeds (seals) and potentially *Lutra lutra* (otters). Chelonians (marine turtles) are the only type of reptile that may potentially be encountered within the region. Otters may be present in the surrounding areas however the Project Area is not within 70km of a SAC designated for otter). The closest is Owenkillew River SAC, located approximately 72km and 90km from the Larne and Donaghadee landing sites respectively and not fluvially linked to the Project Area. There are no records of otters within 200m of the cable landing sites therefore otter have not been considered further in the MEA Report.

Most cetaceans are wide-ranging, and individuals encountered within UK waters form part of a much larger biological population whose range extends into the North Atlantic and North West European waters. As a result, management units (MUs) have been outlined for seven of the common regularly occurring species, following advice from the Sea Mammals Research Unit and the International Council for the Exploration of the Sea (ICES) (DECC 2016). These provide an indication of the spatial scales at which effects of anthropogenic activities should be taken into consideration. The relevant MUs for species known to overlap the Project Area are shown in Table 7-2. All cetaceans are protected from deliberate injury and disturbance, no matter their location, in Scotland (out to 12nm) by the Conservation (Natural Habitats, &c.) Regulations 1994 (CHSR) (amended 2012), in Northern Ireland (out to 12nm) by the Conservation (Natural Habitats, etc) Regulations (CNHR) (Northern Ireland) 1995 (as amended) and offshore (beyond 12nm) in Scotland and Northern Ireland by the Conservation of Offshore Marine Habitats and Species Regulations 2017.

7.3.2 Cetaceans

There are 28 species of cetacean reported in UK waters with ten species known to be present all year round (NPWS 2015). Some species can occur close to shore, and may be found within enclosed bays, harbours, and estuaries e.g. harbour porpoise; others are highly migratory and show a preference for deeper water offshore habitat.

Harbour porpoise (*Phocoena phocoena*) are the most commonly observed cetacean species in the waters surrounding the Project Area. The more occasional sightings of cetacean species include: bottlenose dolphin (*Tursiops truncatus*), short beaked common dolphin (*Delphinus delphis*), minke whale (*Balaenoptera acutorostrata*), Risso's dolphin (*Grampus griseus*), white-beaked dolphin (*Lagenorhynchus albirostris*), killer whale (*Orcinus orca*), humpback whales (*Megaptera novaengliae*) (Marine Institute; 2020 and Reid et al 2003).

Table 7-2 lists species which may be present in the Scot-NI application corridors and provides an appraisal of the frequency of sightings. Generally, the greatest numbers of cetacean species are present in coastal waters within the summer months.

The Sea Watch sightings database has recorded a number of species in the Project Area and surrounding waters. The sightings data supplied in Table 7-2 covers a large sea area, encompassing the whole of Northern Ireland, South West Scotland, and the Inner Hebrides therefore, the frequency of sightings will be lower.

Harbour porpoise is the most abundant and widely distributed cetacean species in UK waters, and the most frequently observed species in the Scot-NI Project Area, with the highest densities observed in the Scottish and Irish nearshore areas. Harbour porpoise are most observed during July, August, and September (Reid et al 2003 and Hammond *et al* 2017).

Other toothed whales (e.g. bottlenose dolphin, common dolphin, and killer whale) are sighted occasionally and in low numbers, most frequently in summer months. Baleen whales (e.g. minke, humpback and fin whale) may also be sighted. The most frequently sighted baleen whale is the minke, with peak sightings taking place from June to September.

The baseline description below focuses on harbour porpoise as this species is a designated feature of the North Channel SAC within Northern Irish waters and is the most abundant species in the area.

Table 7-2 Cetacean species observed in and around the Scot-Ni 3 and 4 Project Area

Species	Frequency of sightings	Marine Scotland NMPI annual distribution and relative abundance*** Scottish waters only.	Sea Watch sightings for Northern Ireland (2015–2020)****	Sea Watch Sightings for South West Scotland and Inner Hebrides (2020)****	Estimation of density Celtic and Irish Sea (animals/km²)*****	Applicable MU******	Abundance of animals in MU*****
Toothed whales (odontocetes)							
Harbour porpoise (*Phocoena phocoena*)	Common throughout the year. Highest densities observed during July, August, and September**	0.00-0.03 within Project Area	132 individuals from 47 sightings, recorded throughout the year. Pods of up to 10 individuals observed	231 individuals observed from 32 sightings. All sightings recorded in September. Pods of up to 25 observed,	0.239	Celtic and Irish Sea	104,695
Bottlenose dolphin (*Tursiops truncatus*)	Occasionally sighted *	0.00	266 individuals from 18 sightings– observed from February – August. Most frequently sighted in summer months Pods of up to 50 individuals observed	39 individuals from 7 sightings, sightings recorded in September and August. Pods of up to 12 individuals observed	0.008	Irish Sea	397
Short-beaked common dolphin (*Delphinus delphis*)	Occasionally sighted in March, August, and July**	0.00 – 0.381 Scot-NI 4 only	101 individuals from 18 sightings, observed in January, April, July, September, and October. Most frequently sighted in July	910 individuals from 23 sightings. All sightings in September. Pods of up to 95 observed.	No data available	Celtic and Greater North Seas	56,556
Risso's Dolphin (*Grampus griseus*)	Occasionally sighted in August**	0.00	1 sighting of 4 individuals in August	No individuals recorded	0.031	Celtic and Greater North Seas	No data available.
White-beaked dolphin (*Lagenorhynchus albirostris*)	Occasionally sighted in July**	0.00 – 0.158 Scot-NI 3 only	No data available	No individuals recorded	No data available	Celtic and Greater North Seas	15,895

Species	Frequency of sightings	Marine Scotland NMPI annual distribution and relative abundance*** Scottish waters only.	Sea Watch sightings for Northern Ireland (2015–2020)****	Sea Watch Sightings for South West Scotland and Inner Hebrides (2020)****	Estimation of density Celtic and Irish Sea (animals/km^2)*****	Applicable MU******	Abundance of animals in MU*****
Killer whale (*Orcinus orca*)	Rarely sighted**	0.00	4 individuals sighted in June and May	2 individuals sighted in September	No data available	N/A	
Baleen whales (mysticetes)							
Humpback whale (*Megaptera novaeangliae*)	Rarely sighted - only sighting in July**	No data available	4 individual sightings observed in June and one in October.	No individuals recorded	No data available	N/A	No data available.
Minke whale (*Balaenoptera acutorostrata*)	Occasionally sighted**	0.00-0.005 along mid-section of Scot-NI 4 only	8 individuals sighted in June and July, pod of 3 observed.	25 individuals observed from 18 sightings. All sightings recorded in September. Pods of up to 4 observed	0.017	Celtic and Greater North Seas	23,528

Sources: * Marine Institute - this data covers Northern Irish waters (2020) and **Reid *et al*. (2003), ***Marine Scotland 2020 ****Sea Watch (2020); *****Hammond *et al* (2017) ****** IAMMWG 2015

7.3.2.2 Harbour porpoise

ScotNI3 and ScotNI4

Harbour porpoise are present in the Project Area all year round. Densities of harbour porpoise during the summer season (April to September inclusive) range between 0.3-1.5 individuals per km^2 (Reid *et al*., 2003 Heinänen and Skov 2015;NMPi, 2020) in the Straits of Moyle area. During the winter season (October to March inclusive) harbour porpoise density ranges from 0.3 – 3 individuals per km^2 (Heinänen and Skov 2015). A summary of harbour porpoise summer and winter densities within the Project Area can be viewed in Figures 7-1 and 7-2 below. According to Hammond *et al*. (2017), harbour porpoise abundance was higher in the vicinity of Scot-NI 4 compared to Scot-NI 3.

The Project Area crosses the Celtic and Irish Sea MU. The Celtic and Irish Sea MU host a network of protected sites that contribute towards maintaining the favourable conservation status of the harbour porpoise (JNCC 2017). Scot-NI 3 transects the North Channel SAC, and Scot- NI 4 is located 2km to the North of the North Channel SAC (see Figure 9-1).

The North Channel SAC is designated solely for its important population of harbour porpoise. The SAC includes locations where some of the largest groups of harbour porpoise have been counted over the period from 1996 to 2014, ranging from 20 to 100 individuals in any one count. It is estimated that the North Channel SAC supports over 537 individuals for at least part of the year; representing approximately 1.2% of the population within the UK part of the Celtic and Irish Seas MU[1] (JNCC 2017).

The site's selection assessment document (JNCC 2017) notes that harbour porpoise within the MU prefer water depths shallower than 40m and within areas with stronger currents; and that lower densities are observed in areas with high levels of shipping activity (based on a threshold of approximately 50 ships per day in summer).

To summarise, harbour porpoise is likely to be present throughout the Project Area throughout the year, but densities will be highest during the summer and autumn months. Evidence suggests that the highest density of harbour porpoise in the Project Area will be in areas of less than 40m water depth and where shipping activity is low.

[1] JNCC (2017) notes that this estimate was based on July 2005 SCANS-II survey data and it is unlikely to be reflective of abundances in other months, especially winter. Therefore, the estimate is merely indicative and cannot be considered as a specific population number for the site.

Figure 7-1 Predicted densities of harbour porpoise (individuals per km^2) during summer across three different years (Heinänen and Skov 2015)

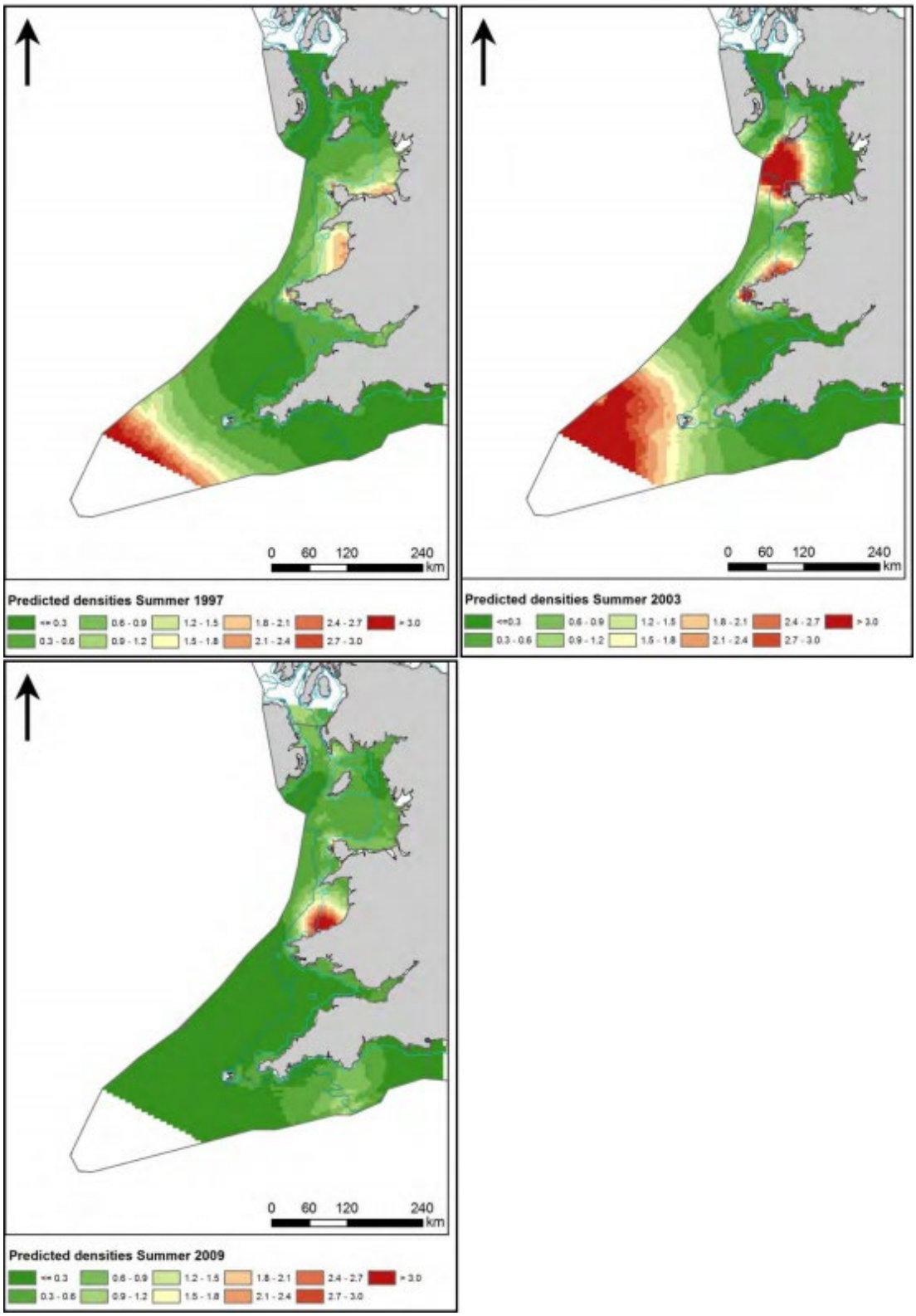
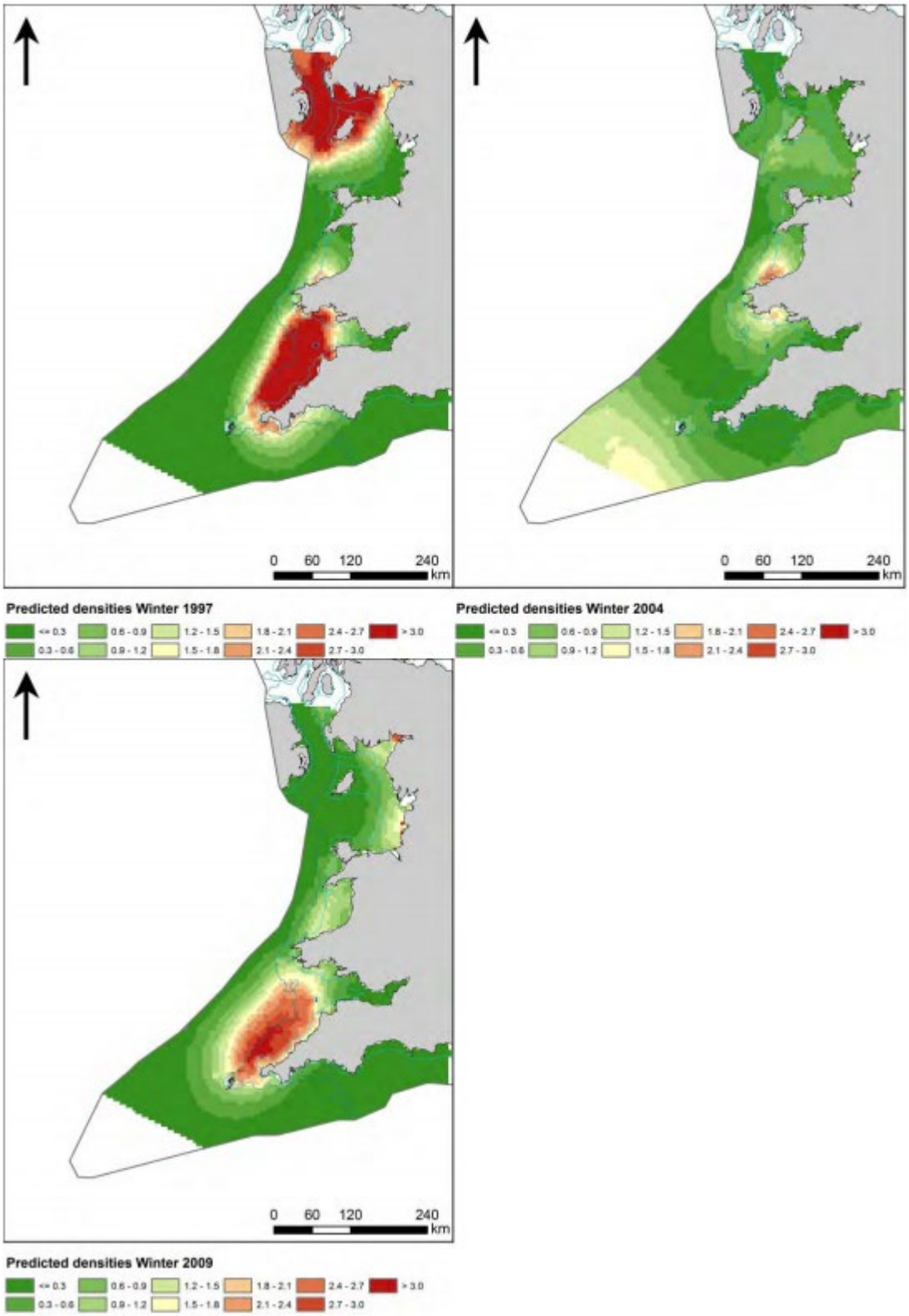


Figure 7-2 Predicted densities of harbour porpoise (individuals per km^2) during winter across three different years (Heinänen and Skov 2015)



7.3.3 Pinnipeds

Two species of seal are resident within UK waters and may be observed in the Project Area; grey seal (*Halichoerus grypus*) and harbour (or common) seal (*Phoca vitulina*). The density of grey and harbour seal usage in the Project Area is at its highest in coastal areas in close proximity to resting and haul out locations.

There are three periods in the seal's life cycle which are of particular importance: breeding, moulting, and pupping. At these times seals tend to be restricted to haul out sites e.g. males defending territory, females feeding pups which cannot swim, undergoing the moult and therefore are unlikely to be found offshore. These seasons vary between species and sometimes regions but are typically shown in Table 7-3 and 7-4.

Table 7-3 Grey seal life cycle

Grey Seal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Breeding												
Moulting												
Pupping												

Grey seal pups are born between September to November on remote and generally undisturbed areas, in particular offshore islands. Grey seal moult occurs between December to March where animals remain ashore for the majority of this time and are likely to forage close to their haul out sites. Grey seal range widely to seek out their preferred prey consisting of a wide variety of species including sandeel, gadoids (cod, whiting, haddock, common ling), and flatfish (common plaice, sole, flounder, dab) in depths up to 100m or more (SMRU 2014).

Table 7-4 Harbour seal life cycle

Harbour seal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Breeding												
Moulting												
Pupping												

Harbour seal pups are typically born between June and July each year on sheltered shores that have ready access to the sea. Harbour seal moult occurs between July and August and the breeding season spans from March to September each year. Harbour seals normally feed within 40-50km around their haul out sites. They take a wide variety of prey including sandeel, gadoids, herring and sprat, flatfish, octopus, and squid. Moulting occurs in August.

7.3.3.2 Scot-NI 3

The mean grey seal usage at the Portpatrick landfall in Scotland is low (0 -5 individuals per 25km^2) and remains low through the nearshore and offshore area in both Scotland and Northern Ireland (Figure 7-3 Drawing reference: P2302-MAMA-001). The mean usage increases to low-moderate around the Donaghdee landfall in Northern Ireland, ranging from 1-10 individuals per 25km^2 (Figure 7-3 Drawing reference: P2302-MAMA-001). Grey seal foraging distances indicate they are likely to be present within the Scot-NI application corridors.

The mean usage of harbour seal in Scottish waters is low 0-5 individuals per 25km^2 in offshore waters and at the Portpatrick landfall (Figure 7-4 Drawing reference: P2302- MAMA-002). In Northern Irish

offshore waters grey seal usage is also low (0 -5 individuals per 25km^2. Similarly, to grey seal, harbour seal usage is also highest around the Strangford Lough and the Outer Ards, with mean usage ranging from 1-5 individuals per 25km^2 (Figure 7-4 Drawing reference: P2302-MAMA-002). The Scot-NI 3 application corridor transects the Outer Ards Area of Special Scientific Interest (ASSI) for 240m and is 9.7km from the Strangford Lough SAC, both designated for their population of harbour seals. Harbour seal can forage 50km from their haul out sites, therefore harbour seal from the Strangford Lough SAC may be present within the Scot-NI 3 application corridor. Harbour seal foraging along Scot-NI 3 will be restricted to 50km from the coastline. The harbour seal population at Strangford Lough at the time of designation was estimated to be 210 individuals (DAERA 2017).

A seal haul out site is located within the 50m of the proposed Scot-NI 3 cable route at Kinnegar Rocks, Donaghdee landfall (Marine Scotland 2020 and DAERA 2020) (Figure 7-3 and 7-4 Drawing reference: P2302-MAMA-001 and 002).

7.3.3.3 Scot-NI 4

Compared to Scot-NI 3 grey seals are less frequently observed within the Scot-NI 4 application corridor. At the Girvan and Larne landfalls, grey seal usage is low and is estimated at 0-3 individuals per 25km^2 (Figure 7-3 Drawing reference: P2302-MAMA-001). Although seal usage maps report grey seal as having a low density in the area, Scot-NI 4 is located within the Maidens SAC and 900m from the Maidens ASSI, designated for their populations of grey seal (Figure 7-2 Drawing reference: P2302-MAMA-001). The small remote islands which make up the Maidens SAC and the waters surrounding them in the North Channel SAC are important for providing haul-out sites, resting sites and foraging areas for grey seals, with a maximum count of 70 adults recorded in a July 2000 survey (Figure 7-3 Drawing reference: P2302-MAMA-001). Recent surveys in 2009 confirmed use of the site for both pupping and breeding (NIEA not dated).

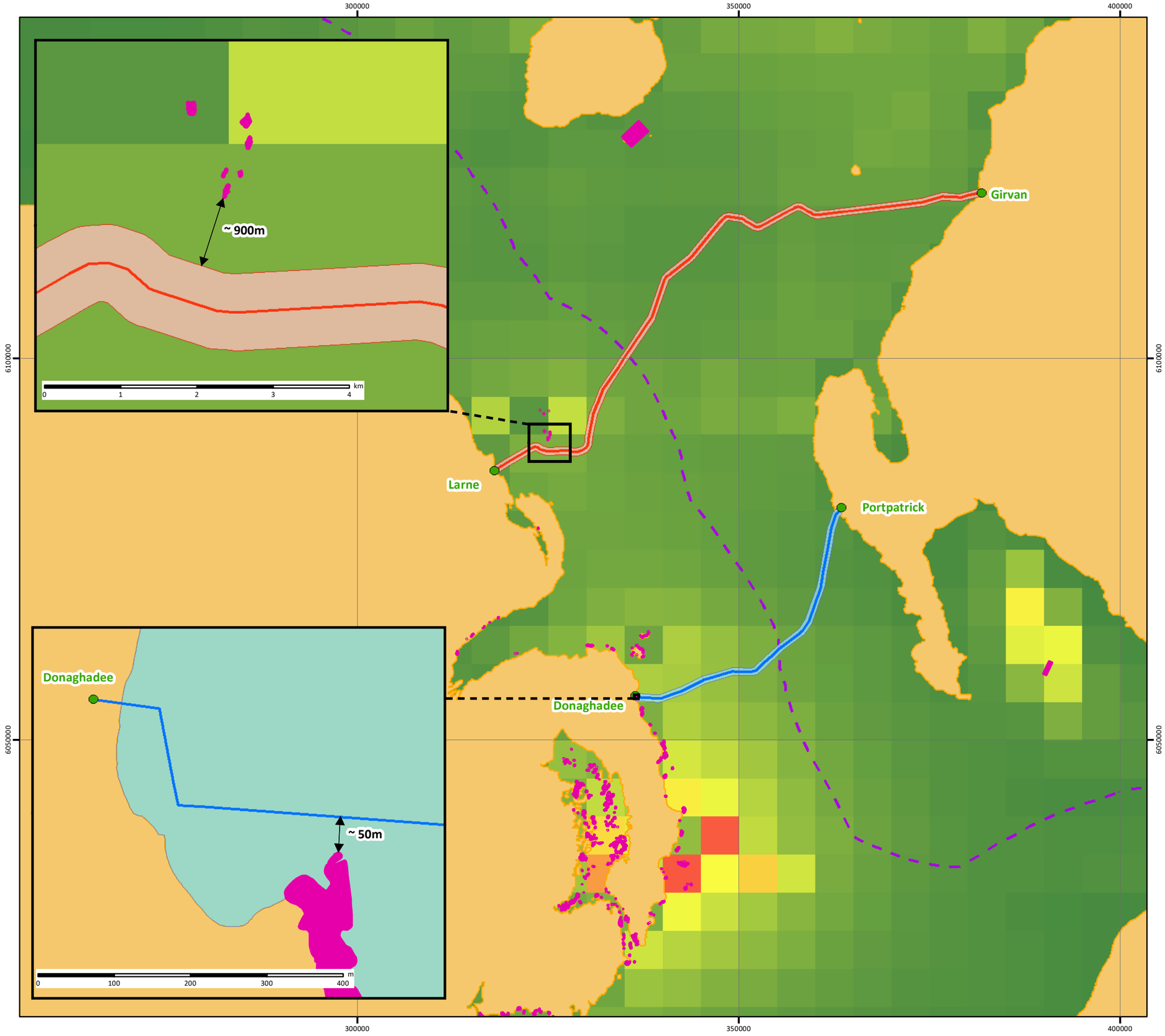
Harbour seal usage is low at both the Girvan and Larne landfalls and within Northern Irish waters and Scottish offshore waters, with estimated usage of at 0-1 individuals per 25km^2 (Figure 7-4 Drawing reference: P2302-MAMA-001). The density increases offshore from the Girvan landfall to 5-10 individuals per 25km^2 to the south of the Isle of Arran and the lower Firth of Clyde, before dropping down again towards Northern Irish waters (Figure 7-4 Drawing reference: P2302-MAMA-001). This increase in usage is likely to be associated with designated haul out sites located on Sanda Island and to the south of the Isle of Arran. Scot-NI 4 passes within 900m of the Maidens ASSI, selected for its harbour seal population.

The Scot-NI 4 application area within Northern Irish waters passes approximately 1km from a known seal haul out (Marine Scotland 2020 and DAERA 2020) (Figure 7-3 and 7-4 Drawing reference: P2302-MAMA-001 and 0024).

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

MARINE MAMMALS
Estimated Grey Seal-at-Sea Density

Drawing No: P2302-MAMA-001 | **A**



Legend

- Landfall Location
- SCOT-NI3 Submarine Cable Route
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Submarine Cable Route
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- Designated Seal Haul-out Site

Estimated Grey Seal-at-sea Density

Mean Usage (number/25km²)

High : 25+

Low : 0

NOTE: Not to be used for Navigation

Date	06 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	MS; DAERA; UKHO; ESRI; GEBCO;
File Reference	J:\P2302\Mxd\16_MAMA\ P2302-MAMA-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

0 5 10 15 20 km

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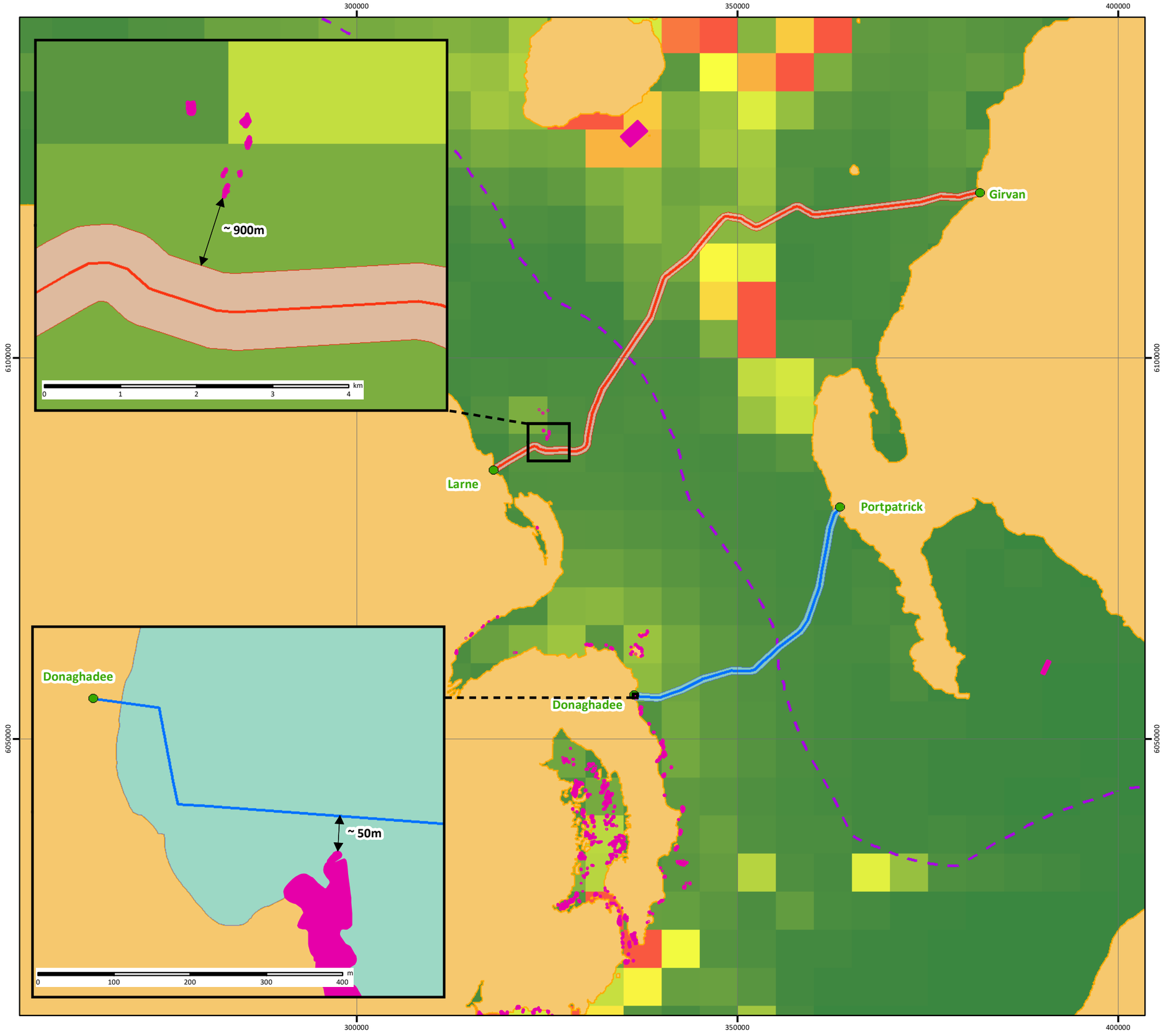
SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

MARINE MAMMALS
Estimated Harbour Seal-at-Sea Density

Drawing No: P2302-MAMA-002 | **A**



Legend

- Landfall Location
- SCOT-NI3 Submarine Cable Route
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Submarine Cable Route
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- Designated Seal Haul-out Site

Estimated Harbour Seal-at-sea Density

Mean Usage (number/25km²)

High : 25+

Low : 0

NOTE: Not to be used for Navigation

Date	06 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	MS; DAERA; UKHO; ESRI; GEBCO;
File Reference	J:\P2302\Mxd\16_MAMA\ P2302-MAMA-002.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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7.3.4 Chelonians

7.3.4.1 Scot-NI 3 and Scot-NI 4

There are five species of marine turtle that have been recorded in UK waters. The leatherback turtle (*Dermochelys coriacea*) is the largest of all the marine turtles and the most commonly recorded turtle in UK waters. There are approximately 33 animals sighted per year in all UK waters (approximately 88% of all turtle sightings) (DECC 2016).

Although the vast majority of turtles recorded in UK waters are leatherback turtles, loggerhead turtles (*Caretta caretta*) and Kemp's ridley turtles (*Lepidochelys kempii*) have also occasionally been recorded. Loggerhead turtles have been recorded in low numbers throughout the year and are lethargic due to the low water temperature of UK waters (DECC 2016).

Most turtle sightings are on the west and south coasts of Ireland, southwest England, south and northwest Wales, the west coast of Scotland, Orkney, and Shetland (Marine Conservation Society 2020). The closest sightings are in Strangford Lough and two locations off the west coast of the Isle of Man (Marine Conservation Society 2020). The Irish Sea is considered a through route for leatherbacks passing from south Ireland and south west England through to Northern Ireland and the west coast of Scotland. Leatherback turtles are most commonly observed around the UK and Ireland between June and October, with peak abundances in August (DECC 2016).

Protected species and species of conservation importance

7.3.4.2 Legislative protection

Table 7-5 summarises key legislation in place which protects marine mammals in UK waters and how it applies to the species identified as present in the Project Area.

Table 7-5 Legislation protecting marine mammals

Legislation/Convention		Cetaceans	Pinnipeds
European Union			
Habitats Directive – Annex II species	Annex II listed species are protected under the Habitats Directive by designating core areas of their habitat as Special Areas of Conservation as part of the Natura 2000 network.	Harbour porpoise & bottlenose dolphin	✓
OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic) list of threatened and/or declining species		Harbour porpoise	
UK			
Wildlife and Countryside Act 1981 – Schedule 5	Section 1 protects all seals from 0 to 12 nautical miles	✓	*
Conservation of Seals Act 1970			✓
Scotland			
The Conservation (Natural Habitats, &c.) Regulations 1994 (amended 2012)	Protected under Schedule II: European Protected Species of Animals and Schedule III: Animals which may not be taken or killed in certain ways	✓	*
The Conservation of Offshore Marine Habitats and Species Regulations 2017	Includes the necessary legal measures to fulfil the requirements of: The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention); and EC Habitats Directive (particularly in relation to European Protected Species)	✓	✓

Legislation/Convention		Cetaceans	Pinnipeds
Marine Scotland Act 2010	The Act provides additional protection for seals at designated haul-outs		✓
Conservation of Seals (Scotland) Order 2007	Prohibition of killing, injuring, or taking seals		✓
Northern Ireland			
Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended)	Protected under Schedule II: European Protected Species of Animals and Schedule III: Animals which may not be taken or killed in certain ways	✓	*
The Conservation of Offshore Marine Habitats and Species Regulations 2017	Includes the necessary legal measures to fulfil the requirements of: The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention); and EC Habitats Directive (particularly in relation to European Protected Species)	✓	✓
Wildlife and Natural Environment Act (Northern Ireland) 2011	Places a statutory duty on public bodies in Northern Ireland to conserve biodiversity		*

* Listed as animals which may not be taken or killed in certain ways

All cetaceans are listed on Annex IV of the EC Habitats Directive as European Protected Species. It is an offence to deliberately kill, injure or disturb animals classed as EPS.

The following SACs within the vicinity of the Project Area list a marine mammal species as a designating feature:

- North Channel SAC – harbour porpoise;
- Maidens SAC – grey seal;
- Maidens ASSI – grey seal and harbour seal;
- Outer Ards ASSI – harbour seal; and
- Strangford Lough SAC – harbour seal.

7.3.4.3 UK Biodiversity Action Plan (BAP) Priority Species, Priority Marine Features Scotland, Northern Ireland's Priority Species

The species listed in Table 7-6 are species which maybe observed within the Project Area (Table 7-24) and are listed as UK BAP Priority Species, Priority Marine Features (PMF) Scotland and Northern Ireland Priority Species. The species on these lists are a priority for conservation in Northern Ireland and Scotland's seas.

Table 7-6 Priority Species

UKBAP species	PMF Scotland	Northern Ireland Priority Species
Harbour porpoise	Harbour porpoise	Harbour porpoise
Bottlenose dolphin	Bottlenose dolphin	Bottlenose dolphin
Risso's Dolphin	Short-beaked common dolphin	Risso's Dolphin
White-beaked dolphin	Risso's Dolphin	Killer whale
Killer whale	White-beaked dolphin	Humpback whale
Minke whale	Killer whale	Minke whale
	Minke whale	

7.4 Potential pressure identification and zone of influence

The following pressures have been screened within Appendix D: Protected Sites and Screening Report and screened out for further assessment (See Table 3-3):

- Death or injury by collision;
- Underwater noise changes (see Appendix H – Underwater noise);
- Changes in supporting habitat and prey availability

The pressure 'visual disturbance (and above water noise disturbance)' for pinnipeds has been included for further assessment within Appendix D. Cetaceans and chelonians are not known to be sensitive to visual disturbance, therefore have not been considered further. To evaluate the most significant effects, the largest ZOI was selected as presented in Table 7-7.

Table 7-7 Potential pressure and zone of influence – marine mammals and reptiles

Project Activity	Potential pressure	Receptor	Worst case zone of influence
Presence of project vessels	Visual (and above water noise) disturbance	Pinniped	900m*

* Source: Brasseur & Reijnders (1994)

7.5 Embedded mitigation

Section 2 - Project Description provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to marine mammals and reptiles is provided in Table 7-8 below. This measure will be complied as a matter of best practice for vessel speed during cable installation.

Table 7-8 Embedded mitigation measures: Project design

ID	Embedded mitigation
BP 9	The survey and installation vessels will be moving at a maximum speed 6 knots during installation activities. This will allow any rafting seabirds, marine mammals or basking sharks time to disperse before the vessel arrives. When not conducting installation activities, vessels will avoid bird rafts where operationally possible and safe to do so.

There are no mitigation measures available to reduce the effects of visual disturbance caused by the installation vessels.

7.6 Impact Assessment

7.6.1 Visual (and above water noise) disturbance

Seals hauled out on land could react to the presence of vessels (Brasseur & Reijnders 1994). Visual disturbance to seals is dependent on the background levels animals are habituated to. Seals found hauled-out are more susceptible from anthropogenic disturbance than when in the water, flushing out into the water when a vessel passes within 300m-500m of the site (Wilson, 2005). This behaviour is typically observed from vessels in motion and this impact would be most significant for breeding and moulting seals, hauled out on the coast and on intertidal banks.

Conclusions for Scot-NI 3 and Scot-NI 4 from Appendix D are summarised in Sections 7.6.1.1 and 7.6.1.2 below.

7.6.1.1 Scot-NI 3

Within Scottish waters, the nearest designated haul out site is located 900m from the boundary of the application corridor therefore, there will be no effects of visual disturbance to seals resting, moulting, or breeding.

Within Northern Irish waters the Scot-NI 3 application corridor passes through the Outer Ards ASSI for approximately 240m which is designated for harbour seal. Within this area there is one seal haul out which is located 50m from the proposed Scot-NI 3 cable route, named Kinnegar Rock (DAERA 2020).

The presence of the vessels may cause a flight reaction to seals hauled out at Kinnegar Rock on first arrival of the MLV. However, the MLV would slowly approach the shore end position to the 13m depth contour (approximately 450m from Kinnegar Rock) and thereafter remain stationary throughout cable landing installation.

In addition to the MLV, an ancillary vessel will be used to bring the cable ashore from MLV. This would involve approximately two to three small vessel movements in the nearshore. The vessel will move slowly and is within background vessel movements for the area.

The proposed installation operation is short term and will not restrict access to water or foraging, therefore, there are no anticipated effects to the local seal population. No significant effects to seal have also been identified within the Protected sites Screening Report (Section 9).

Subsequently, visual, and above water noise disturbance will be minimised based on a low number of vessel movements and speeds therefore, effects will be negligible to seal. Furthermore, intertidal surveys conducted at the Donaghadee landfall to date have not observed any seals hauled out at Kinnegar Rock (September - November).

7.6.1.2 Scot-NI 4

Within Scottish waters, the nearest designated haul out site is 900m from the boundary of the application corridor therefore, there will be no effects of visual disturbance to seals resting, moulting, or breeding.

Within Northern Irish waters the application corridor passes through the Maidens SAC for approximately 6.9km which is designated for grey seal and is located 900m from the Maidens ASSI which is designated for grey and harbour seals. Within this area there is one seal haul out which is located 1km from the application corridor. Given the distance of Scot NI-4 from the haul out sites, it is unlikely that the MLV or ancillary vessel will evoke any reaction. In addition, vessel density around the haul out site and SAC indicates that 1-10,000 vessels pass through the area each year (NIMM 2020). Therefore, seals are likely to be somewhat habituated to vessel activity in the area. No significant effects to seal were identified within the Protected sites Screening Report (Section 9).

8. MARINE AND COASTAL BIRDS

8.1 Introduction

This Section provides details of the protected bird species that may be present or have the potential to be present within the vicinity of the Scot-NI application corridors. Important national and international marine bird populations are protected within designated sites including, Special Protection Areas (SPAs), Ramsar sites, Nature Conservation Marine Protected Areas (NCMPA), Sites of Special Scientific Interest (SSSI), Marine Conservation Zones (MCZs) and Areas of Special Scientific Interest (ASSI).

A full assessment of the potential effects of the proposed installation activities on protected sites designated for birds is provided within the Protected Sites Screening Report (Appendix D), this section summarises the findings of Appendix D.

8.2 Data sources

The baseline environment for birds has been established by undertaking a desktop review of published information and through consultation with relevant bodies. The key data sources used to inform the baseline description and assessment for birds include but are not limited to the following:

- Appendix D: Scot-NI Protected Sites Screening Report;
- Wetland Bird Survey (WeBS) Core Count Data for Outer Ards Sectors 10-18 (BTO 2020a);
- British Trust for Ornithology (BTO), Northern Ireland Seabird Report 2019 (BTO 2020b);
- BTO report 724: Desk-based revision of seabird foraging ranges used for HRA screening (Woodward *et al.* 2019);
- JNCC Report No. 461: The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1 – 1.4 of the SPA selection guidelines (Revised 2018) (Kober *et al*. 2012);
- JNCC Report No. 431: An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs (Kober *et al*. 2010);
- Population Trends of Breeding Seabird Colonies in Scottish SPAs (The Scottish Government 2012); and
- Scotland's Indicator – Birds (SNH 2017).

8.3 Consultation

Table 8-1 summarises the relevant consultation responses on the marine elements of the Scot-NI application corridors received prior to and during preparation of the MEA Report and which were considered in this Section.

Table 8-1 Consultation responses

Stakeholder	Comment	How this has been addressed
DAERA – Northern Ireland Environment Agency (NIEA) Ornithology	Recommended Woodward *et al*. 2019 as most up to date data source of information on seabird foraging ranges, in preference to Thaxter *et al.* 2012.	This data source has been used. See Section 8.2.
	Recommended the use of annual Northern Ireland Seabird Reports 2013-2019.	This data source has been used. See Section 8.2.

Stakeholder	Comment	How this has been addressed
	Recommended contacting BTO and Royal Society for the Protection of Birds (RSPB) Northern Ireland.	BTO and RSPB have both been contacted. BTO provided the WeBS) Core Count Data for Outer Ards Sectors and interpretation advice. RSPB NI has not been able to provide consultation response.
	In addition to the designated sites (Outer Ards Special Protection Area (SPA), Outer Ards Areas of Special Scientific Interest (ASSI) and Clyde Sea Sill Nature Conservation Marine Protected Area (NCMPA)), the assessment should consider potential effects on seabirds breeding within the Larne Lough SPA, Belfast Lough SPA, Copeland Islands SPA, Rathlin Island SPA, The Gobbins ASSI, Portmuck ASSI and The Maidens ASSI. It should also be noted that both cable routes will pass through the proposed East Coast (NI) Marine SPA.	These designated sites are considered in Appendix D and summarised in Section 8.4 below.
NatureScot (previously SNH)	The marine advisory unit have provided sites and features to be considered within the environmental assessment including: Clyde Sea Sill NCMPA - the black guillemot feature is located far to the north of the cable route and is not likely to be affected. Girvan to Ballantrae SSSI (designated for geology) and the Ailsa Craig SSSI & SPA designated for breeding seabirds.	These designated sites are considered in Appendix D and summarised in Section 8.4 below.

For the Protected Sites Screening Report, a list of European sites to be assessed in the screening was agreed with NatureScot (previously SNH) and DAERA (Northern Ireland Environment Agency (NIEA) Ornithology Department).

8.4 Existing baseline description

South west Scotland and Northern Ireland are known to support large numbers of nationally and internationally important seabird populations. In particular, Firth of Clyde and the Antrim coast are important for breeding seabird colonies, as reflected in the designation of several cliff and island colonies as protected sites (e.g. Ailsa Craig SPA and Rathlin Island SPA). It has also been recognised that the marine areas used by seabirds are as important as the colonies themselves (Barne *et al.* 1997). A significant proportion of breeding seabirds use the UK inshore area (waters to 12 NM) and offshore area (12 NM to 200 NM) for foraging, resting, travelling and maintenance behaviours during the breeding season and at other times of the year (Kober *et al.* 2010).

Seabirds and seaduck are those species of bird that depend wholly or mainly on the marine environment for their survival. They spend the majority of their lives at sea, exploiting its surface and the water column to varying depths for food. Most of these species come ashore only to breed in large colonies on rocky shore and cliff areas. There are 25 species of offshore seabird and seaduck nesting regularly within UK waters and all of them breed in the Irish Sea. Other breeding birds within the Scot-NI Project Area may include tern, gull auks, shags, and shearwater species. While breeding, the waters adjacent to the nest site are of primary importance for providing a food source.

Wading birds are generally shoreline birds, which feed within shallow water or on rocky shores, estuaries, and mudflats. This group of bird includes curlews, godwit, turnstone, sandpiper, woodcock, snipe, and phalaropes. Wading birds often undertake migrations from upland areas or from northern summer breeding grounds.

A search area of 15 km for bird species from each Scot-NI application corridor has been applied in the Protected Sites Screening Report (Appendix D) in addition to the inclusion of additional sites[1].

These sites were screened for a potential pressure-receptor pathway. A total of 12 protected sites with bird interest features were screened for Scot-NI 3 and a total of nine sites for Scot-NI 4 (Appendix D).

The sections below provide information on the protected sites with bird features, with the potential for a pressure-receptor pathway with the Scot-NI application corridors. These sites have been considered further in the Protected Sites Screening Report (Appendix D). The location of these sites in relation to the Scot-NI application corridors are presented in Figure 8-1 (Drawing Reference: P2302-PROT-005B).

8.4.1 Scot-NI 3

Table 8-2 Protected sites with bird features in the vicinity of Scot-NI 3

Site Name	Distance from Scot-NI 3 (km)	Jurisdiction
Outer Ards SPA and Ramsar	Within	Northern Ireland
Outer Ards ASSI	Within	Northern Ireland
East Coast Marine pSPA	Within	Northern Ireland
Copeland Islands SPA	5.5	Northern Ireland
Copeland Islands ASSI	5.5	Northern Ireland
The Gobbins ASSI	8.6	Northern Ireland
Strangford Lough SPA and Ramsar	9.9	Northern Ireland
Strangford Lough ASSI Part 1, 2 and 3	9.9	Northern Ireland
Belfast Lough Outer ASSI	14.3	Northern Ireland
Belfast Lough SPA	14.5	Northern Ireland

All the species listed as Qualifying features of the protected sites screened for further consideration are listed within the Protected Sites Screening Report (Appendix D). The foraging distances of protected bird species from their designated sites are based on Woodward *et al.* (2019). These are also set out in the Protected Sites Screening Report (Appendix D).

Protected bird species with foraging ranges that could overlap the Scot-NI 3 application corridor includes 20 species of wintering birds of which two are Annex I protected species (Red-throated Diver (*Gavia stellata*) and Golden plover (*Pluvialis apricaria*). Eight of the 20 species of wintering birds are unlikely to be present within the cable corridor and one species is present year-round (Common eider (*Somateria mollissima*)). There are 16 species of protected breeding birds within foraging distance of

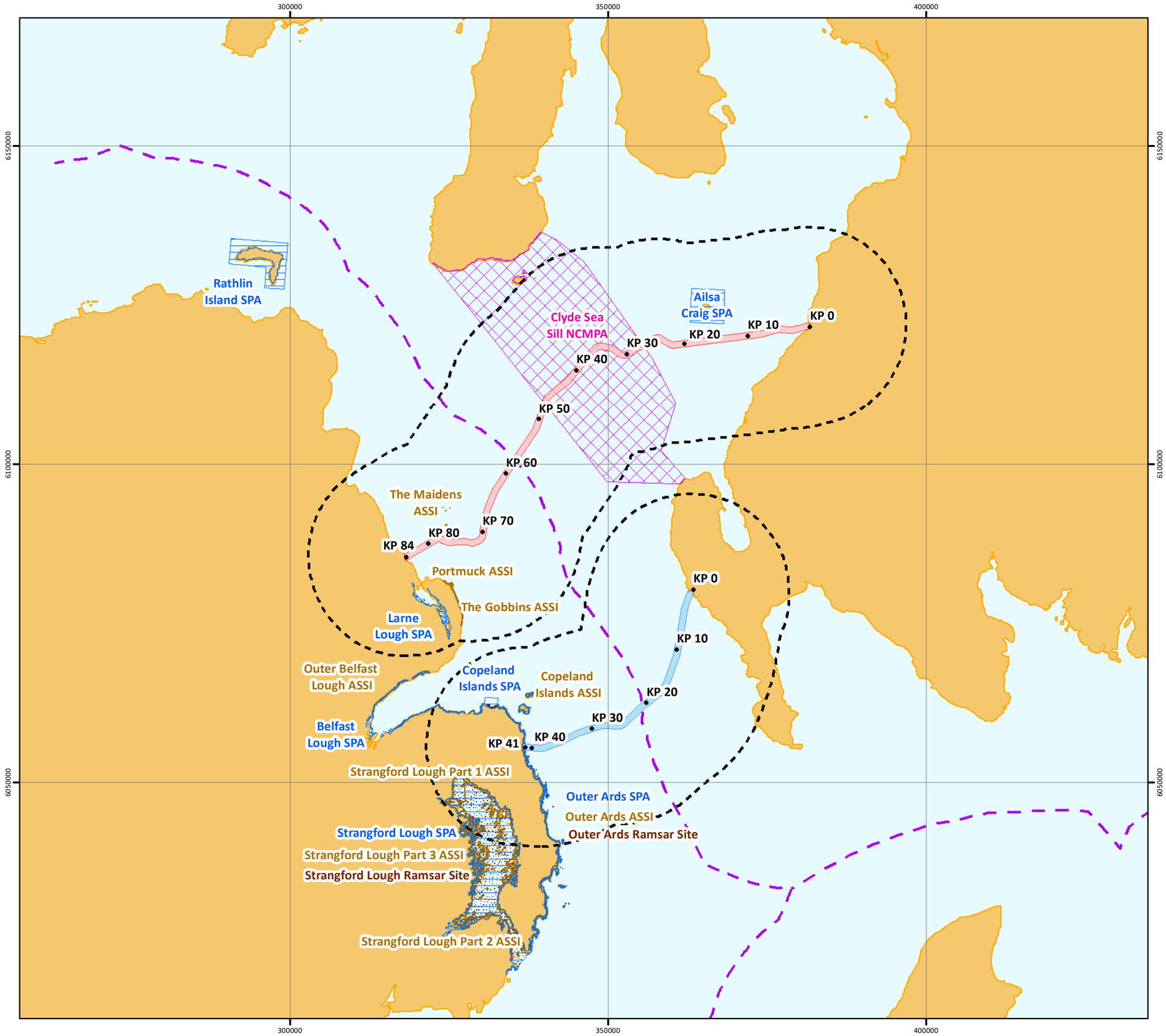
[1] Consultation responses from NatureScot confirmed that Clyde Sea Sill NCMPA and Ailsa Crag SPA within Scottish waters should be included in the screening report. As these are within 15 km they have automatically been considered.

Northern Ireland Environment Agency requested that a number of sites within Northern Irish waters were included in the screening for a pathway for an effect. Only one of these sites with bird features, Rathlin Island SPA, is located beyond the 15 km search area set for birds. Rathlin Island SPA lies 46.7 km north of the Scot-NI 4 application corridor. Initial screening for pathway for birds was undertaken using bird foraging distances (Woodward *et al.* 2019).

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

ENVIRONMENTAL DESIGNATIONS
Designations for Marine and Coastal Birds

Drawing No: P2302-PROT-005 | **B**



Legend

- KP
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- 15km Application Corridor Buffer
- Scotland/Northern Ireland Adjacent Waters Limit
- SPA
- Ramsar
- NCMPA
- ASSI

N W E S

NOTE: Not to be used for Navigation

Date	10 November 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; JNCC; SNH; DAERA; ESRI; GEBCO;
File Reference	J:\P2302\Mxd\05_PROT\ P2302-PROT-005.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

BT Global Marine intertek

0 5 10 15 20 km

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the Scot-NI 3 application corridor, of which 6 are Annex I breeding birds (Arctic tern (*Sterna paradisaea*), Common tern (Sterna hirundo), Roseate tern (*Sterna dougallii*), Sandwich tern (*Thalasseus sandvicensis*), Common guillemot (*Uria aalge*) and Manx Shearwater (*Puffinus puffinus*). Eight species of non-breeding birds have foraging ranges that overlap with Scot-NI 3 however, none are likely to be present within the cable corridor. The national and international conservation status of birds with foraging ranges congruent with Scot-NI 3 are included in Table 8-3 below.

Table 8-3 Bird species likely to be present in the vicinity of Scot-NI 3

Species	BOCC UK	BOCC Ireland	UK BAP	Scottish Biodiversity list	Northern Ireland Priority species	Annex I Species of the Birds Directive
Auks						
Atlantic puffin (*Fratercula arctica*)	Red	Amber				
Black guillemot (*Cepphus grylle*)	Amber	Amber				
Common guillemot (*Uria aalge*)	Amber	Amber				✓
Razorbill *(Alca torda)*	Amber	Amber				
Cormorants and shags						
European shag (*Phalacrocorax aristotelis*)	Red	-				
Great cormorant (*Phalacrocorax carbo*)	-	Amber				
Divers						
Red throated diver (*Gavia stellata*)	-	Amber		✓		✓
Grebes						
Great crested grebe *(Podiceps cristatus)*	-	Amber				
Gulls						
Black-headed gull (*Larus ridibundus*)	Amber	Amber		✓	✓	
Black-legged kittiwake (*Rissa tridactyla*)	Red	-				
Common gull (*Larus canus*)	Amber	Amber				
Mediterranean gull *(Ichthyaetus melanocephalus*)	Amber	Amber				
Oystercatchers						
Oystercatcher (*Haematopus ostralegus*)	Amber	-				
Petrels and shearwaters						
Northern fulmar (*Fulmarus glacialis*)	Amber	-				
Manx shearwater (*Puffinus puffinus*)	Amber	Amber		✓		✓
Plover						
Golden plover (*Pluvialis apricaria*)	-	Amber		✓	✓	✓

Species	BOCC UK	BOCC Ireland	UK BAP	Scottish Biodiversity list	Northern Ireland Priority species	Annex I Species of the Birds Directive
Northern lapwing (*Vallenus vallenus*)	Red	-	✓	✓	✓	
Ringed plover (*Charadrius hiaticula*)	Red	Amber				
Sandpipers, snipes, and phalaropes						
Purple sandpiper (*Calidris maritima*)	Amber	-		✓		
Redshank (*Tringa totanus*)	Amber	Amber			✓	
Turnstone (*Arenaria interpres*)	Amber	-				
Swans, ducks, and geese						
Common eider (*Somateria mollissima*)	Amber	Amber				
Light-bellied Brent goose *(Branta bernicla hrota)*	Amber	Amber			✓	
Tern						
Arctic tern (*Sterna paradisaea*)	Amber	Amber		✓		✓
Common tern (*Sterna hirundo*)	Amber	Amber		✓		✓
Roseate tern (*Sterna dougallii*)	Red	Red	✓	✓	✓	✓
Sandwich tern (*Thalasseus sandvicensis*)	Amber	Amber		✓		✓

Note: The Birds of Conservation Concern (BOCC) value reflects the species' global and European status, as well as that within the UK. It has been provided to aid in highlighting the importance of the UK population in international terms (BTO 2015).

Annex I of the Birds Directive lists 193 threatened species. For these species EU Member States must conserve their most suitable territories in number and size as Special Protection Areas.

Sources: The Scottish Government (2012), BTO (2020b), Kober *et al.* (2010 & 2012), BOCC UK (BTO 2015), BOCC Ireland (BTO 2020c and 2020d), UK BAP (JNCC 2007), Scottish biodiversity list (NatureScot 2020), Northern Ireland priority species list (DAERA 2020), Annex I Species (EC 2020).

8.4.2 Scot-NI 4

Table 8-4 Protected sites with bird features in the vicinity of Scot-NI 4

Site Name	Distance from Scot-NI 4 (km)	Jurisdiction
Clyde Sea Sill NCMPA	Within	Scotland
East Coast Marine pSPA	Within	Northern Ireland
Ailsa Craig SPA	0.76	Scotland
The Maidens ASSI	2.15	Northern Ireland
Larne Lough SPA, Ramsar and ASSI	4.1	Northern Ireland
Portmuck ASSI	6.5	Northern Ireland
Rathlin Island SPA	46.7	Northern Ireland

All the species listed as Qualifying features of the protected sites screened for further consideration are listed within the Protected Sites Screening Report (Appendix D). The foraging distances of protected bird species from their designated sites are based on Woodward *et al.* (2019). These are also set out in the Protected Sites Screening Report (Appendix D).

Protected bird species with foraging ranges that could overlap the Scot-NI 4 application corridor includes 9 species of wintering birds of which two are Annex I protected species (Red throated diver (*Gavia stellata*) and Golden plover (*Pluvialis apricaria*)). There are 16 species of protected breeding birds of which 6 are Annex I breeding birds (Arctic tern (*Sterna paradisaea*), Common tern (Sterna hirundo), Roseate tern (*Sterna dougallii*), Sandwich tern (*Thalasseus sandvicensis*), Common guillemot (*Uria aalge*) and Manx Shearwater (*Puffinus puffinus*).

Nine species of protected breeding birds are present year-round. There is one species of non-breeding bird within foraging distance of the Scot-NI4 cable corridor, Peregrine falcon (*Falco peregrinus*), however due to the preferred prey items and habitat requirements of this bird it is unlikely to come withing the application corridor. The national and international conservation status of birds with foraging ranges congruent with Scot-NI 4 are included in Table 8-5 below.

Table 8-5 Bird species likely to be present in the vicinity of Scot-NI 4

Species	BOCC UK	BOCC Ireland	UK BAP	Scottish Biodiversity list	Northern Ireland Priority species	Annex I Species of the Birds Directive
Auks						
Common guillemot (*Uria aalge*)	Amber	Amber				✓
Razorbill (*Alca torda*)	Amber	Amber				
Black guillemot (*Cepphus grylle*)	Amber	Amber				
Atlantic puffin (*Fratercula arctica*)	Red	Amber				
Cormorants and shags						
European shag (*Phalacrocorax aristotelis*)	Red	-				
Divers						
Red throated diver (*Gavia stellata*)	-	Amber		✓		✓
Gannets						
Northern gannet (*Morus bassanus*)	Amber	Amber				
Grebes						
Great crested grebe (*Podiceps cristatus*)	-	Amber				
Gulls						
Lesser black-backed gull (*Larus fuscus*)	Amber	-				
Mediterranean gull (*Ichthyaetus melanocephalus*)	Amber	Amber				
European herring gull (*Larus argentatus*)	Red	-	✓	✓	✓	

Species	BOCC UK	BOCC Ireland	UK BAP	Scottish Biodiversity list	Northern Ireland Priority species	Annex I Species of the Birds Directive
Black-legged kittiwake (*Rissa tridactyla*)	Red	-				
Petrels and shearwaters						
Northern fulmar (*Fulmarus glacialis*)	Amber	-				
Manx shearwater (*Puffinus puffinus*)	Amber	Amber		✓		✓
Sandpipers, snipes, and phalaropes						
Greenshank (*Tringa nebularia*)	Amber	-				
Redshank (*Tringa totanus*)	Amber	Amber			✓	
Swans, ducks, and geese						
Common eider (*Somateria mollissima*)	Amber	Amber				
Goldeneye (*Bucephala clangula)*	Amber	Amber			✓	
Light-bellied Brent goose *(Branta bernicla hrota*)	Amber	Amber			✓	
Red breasted merganser (*Mergus serrator*)	-	Amber				
Shelduck (*Tadorna tadorna*)	Amber	Amber				
Tern						
Arctic tern (*Sterna paradisaea*)	Amber	Amber		✓		✓
Common tern (*Sterna hirundo*)	Amber	Amber		✓		✓
Roseate tern (*Sterna dougallii*)	Red	Red	✓	✓	✓	✓
Sandwich tern (*Thalasseus sandvicensis*)	Amber	Amber		✓		✓

Note: The Birds of Conservation Concern (BOCC) value reflects the species' global and European status, as well as that within the UK. It has been provided to aid in highlighting the importance of the UK population in international terms (BTO 2015).

Annex I of the Birds Directive lists 193 threatened species. For these species EU Member States must conserve their most suitable territories in number and size as Special Protection Areas.

Sources: The Scottish Government (2012), BTO (2020b), Kober et al. (2010 & 2012), BOCC UK (BTO 2015), BOCC Ireland (BTO 2020c and 2020d), UK BAP (JNCC 2007), Scottish biodiversity list (NatureScot 2020), Northern Ireland priority species list (DAERA 2020), Annex I Species (EC 2020).

8.5 Potential pressure identification and zone of influence

The following pressures were scoped out of the protected sites assessment (justification for this exclusion is provided in the Protected Sites Screening Report (Appendix D) and in Section 3, Table 3-2):

- Accidental Hydrocarbon and PAH contamination; and
- Introduction or spread of invasive non-indigenous species (INIS).

Two potential pressures on marine birds have been included for further assessment. In order to evaluate the most significant effects, the largest zone of influence was selected as presented in Table 8-6.

Table 8-6 Potential pressure and zone of influence - birds

Project Activity	Potential Pressure	Receptor	Worst Case Zone of Influence*
Presence of Project vessels and equipment	Visual (and above water noise) disturbance	Divers and seaduck	4 km (JNCC 2017)
		All other seabirds	2 km (JNCC 2017)
Cable burial by ploughing and jetting	Changes in supporting habitat and prey availability	Marine birds	**Scotland jurisdiction** **Scot-NI 3**: Plough (skids & share): 0.052 km^2 Rock Bags: 52 m^2
			NI jurisdiction **Scot-NI 3:** Plough (skids and share): 0.057 km^2 TROV: 0.001 km^2 Rock Bags: 52 m^2 Concrete mattress: 126 m^2 Rock Berm: 1957 m^2
			Scotland jurisdiction **Scot-NI 4**: Plough (skids and share): 0.149 km^2 TROV: 0.004 km^2 Rock Bags: 52 m^2 Concrete mattress: 144 m^2 Rock Berm: 1687.5 m^2
			NI jurisdiction **Scot-NI 4:** Plough (skids and share): 0.071 km^2 Rock Bags: 52 m^2

Note: Based on (JNCC 2017) a zone of influence of 4 km for divers and duck and 2 km for all other species was adopted.

8.6 Embedded mitigation

Section 2 - Project Description provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to birds is provided in Table 8-7 below. This measure will be complied as a matter of best practice for vessel speed during cable installation.

Table 8-7 Embedded mitigation measures: Project design

ID	Embedded mitigation
BP 9	The survey and installation vessels will be moving at a maximum speed 6 knots during installation activities. This will allow any rafting seabirds, marine mammals, or basking sharks time to disperse before the vessel arrives. When not conducting installation activities, vessels will avoid bird rafts where operationally possible and safe to do so.

There are no Project specific mitigation measures relevant to birds proposed for the Project.

8.7 Impact Assessment

Protected sites for birds have been screened (Appendix D) to determine if there could be a potential pressure-receptor pathway between the Scot-NI application corridors and the Qualifying bird Feature(s). For all Qualifying bird features where it was determined that there was a possible interaction between the proposed installation activities and the Qualifying bird features of a protected site, the likely significance of the effect on the conservation objectives, alone and in combination with other projects in the area was assessed (Appendix D).

8.7.1 Scot-NI 3

Of the 12 European sites and five ASSI's initially screened within the relevant search areas for the Scot-NI 3 application corridor (Appendix D), initial screening concluded that there exists a pressure-receptor pathway between the Project and the Qualifying bird features of eight European sites (Outer Ards SPA, Outer Ards Ramsar, East Coast Marine pSPA, Copeland Islands SPA, Strangford Lough SPA, Strangford Lough Ramsar, Belfast Lough SPA and Belfast Lough Ramsar), all within NI waters.

Of these sites, all eight were considered for visual and above water noise disturbance and three were considered for changes in supporting habitat and prey availability (Appendix D). All sites are within Northern Irish waters.

Further analysis of the likely significant effect (LSE) taking into consideration the sites conservation objectives, concluded that there is no potential for an LSE on any of the five European sites with a potential pressure-receptor pathway assessed. As such, Appropriate Assessment (AA) is not required.

No NCMPAs, MCZs and ASSI/SSSIs have the potential for a pressure-receptor pathway with the Scot-NI 3 application corridor.

Within Northern Irish waters four ASSIs were assessed that have a potential pressure-receptor pathway for bird interest features and no significant effects have been identified and no notifications are required to NIEA Ornithology Department.

The screening findings for Scot-NI 3 are summarised in Table 8-8.

Table 8-8 Summary of site screening conclusions for Scot-NI 3 (all sites within NI waters)

Site Name	Distance to Site	Designating Feature to be assessed for LSE	Potential Pressure to be assessed for LSE	Screening Conclusion
Outer Ards SPA, Ramsar and ASSI	Within	Breeding and wintering birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
Outer Ards SPA and ASSI			Changes in supporting habitat and prey availability	No potential for LSE/AA not required.

Site Name	Distance to Site	Designating Feature to be assessed for LSE	Potential Pressure to be assessed for LSE	Screening Conclusion
East Coast Marine pSPA	Within	Breeding and wintering birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
			Changes in supporting habitat and prey availability	No potential for LSE/AA not required.
Copeland Islands SPA and ASSI	5.5 km	Breeding birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
Strangford Lough SPA, Ramsar and ASSI Part 1, 2 and 3	9.9 km	Breeding birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
Belfast Lough SPA and Ramsar	14.5 km	Wintering birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
The Gobbins ASSI	8.6 km	Bird populations	Visual (and above water noise) disturbance	The proposed activities will not negatively impact the integrity of The Gobbins ASSI.

8.7.2 Scot-NI 4

Of the six European sites, one NCMPA within Scottish waters; and one MCZ and three ASSI's within NI waters were initially screened within the relevant search areas for the Scot-NI 4 application corridor (Appendix D) for effects to birds.

The screening (Appendix D) concluded that there exists a pressure-receptor pathway between the Project and the Qualifying bird features of four European sites (East Coast Marine pSPA, Ailsa Craig SPA, Larne Lough SPA, Larne Lough Ramsar). Of these four sites, all were considered for visual and above water noise disturbance and one was considered for changes in supporting habitat and prey availability (Appendix D). One site (Ailsa Craig SPA) is within Scottish waters, all other sites are within Northern Irish waters.

Within Scottish waters, Scot-NI 4 application corridor passes through the Clyde Sea Sill NCMPA which is designated for black guillemot. The installation will not hinder the conservation objectives of the bird interest feature of the Clyde Sea Sill NCMPA within Scottish waters. This conclusion was confirmed in a consultation response form NatureScot (Table 8-1). No MCZs or SSSI were identified with a pathway for effect.

Within Northern Irish waters, further analysis of the LSEs taking into consideration the sites conservation objectives concluded that there is no potential for an LSE on any of the three European sites assessed for the Scot-NI 4 application corridor. As such, AA is not required.

Within Northern Irish waters the conservation features of three ASSIs with potential pressure-receptor pathways for bird interest features were assessed and no significant effects have been identified from the proposed Scot-NI 4 cable installation and no notification is required to NIEA Ornithology Department.

The screening findings for Scot-NI 4 are summarised in Table 8-9.

Table 8-9 Summary of site screening conclusions for Scot-NI 4

Site Name	Distance to Site	Designating Feature to be assessed for LSE	Potential Pressure to be assessed for LSE	Screening Conclusion
East Coast Marine pSPA	Within	Breeding and wintering birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
			Changes in supporting habitat and prey availability	No potential for LSE/AA not required.
Ailsa Craig SPA	0.76km	Breeding birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
Larne Lough SPA, Ramsar and ASSI	4.1km	Breeding birds and wintering birds	Visual (and above water noise) disturbance	No potential for LSE/AA not required.
Clyde Sea Sill NCMPA	Within	Black guillemot	Visual (and above water noise) disturbance	The proposed activities will not negatively impact the integrity of Clyde Sea Sill NCMPA.
			Changes in supporting habitat and prey availability	The proposed activities will not negatively impact the integrity of Clyde Sea Sill NCMPA.
The Maidens ASSI	2.15 km	European shag	Visual (and above water noise) disturbance	The proposed activities will not negatively impact the integrity of Portmuck ASSI.
Portmuck ASSI	6.5 km	Bird populations	Visual (and above water noise) disturbance	The proposed activities will not negatively impact the integrity of Portmuck ASSI.

9. PROTECTED SITES

This Section provides details of the protected sites and species that may be present or have the potential to be present within the vicinity of the Scot-NI application corridors. A full assessment of the potential effects of the proposed installation activities on protected sites has been undertaken and is provided within the Protected Sites Screening Report (Appendix D).

9.1 Data sources

The baseline environment has been established within the Protected Sites Screening Report (Appendix D) through desktop review of published information and through consultation with relevant bodies. The data sources used to inform the baseline description and subsequent assessment include but are not limited to the following:

- Appendix D: Scot-NI Protected Sites Screening Report;
- Appendix H: Underwater Noise Assessment
- Joint Nature Conservation Committee (JNCC) website (https://jncc.gov.uk);
- Scottish Natural Heritage (SNH) website (https://www.nature.scot);
- The Royal Society for the Protection of Birds (RSPB) website (https://www.rspb.org.uk); and
- Marine Scotland MAPS National Marine Plan interactive (NMPi) tool (https://marinescotland.atkinsgeospatial.com/nmpi).

9.2 Consultation

Table 9-1 summarises the relevant consultation undertaken to date for the Scot-NI application corridors, received prior to and during preparation of the Screening Assessment which are considered in this report.

Table 9-1 Consultation responses

Stakeholder	Comments	How this has been addressed
Department of Agriculture, Environment & Rural Affairs (DAERA)	Consultation with DAERA confirmed the selection of protected sites that should be assessed within Northern Irish waters.	The sites listed by the regulator have been included in the Protected Sites Screening Report (Appendix D) and in this section.
DAERA	Meetings held with DAERA and MS - LOT confirmed acceptance that a combined Protected Sites Screening Assessment should be submitted with the application to include the HRA Screening process, Marine Protected Area (MPA) / Marine Conservation Zone (MCZ) Screening process and Area of Special Scientific Interest (ASSI) assessment. There are no Sites of Special Scientific Interest (SSSI) with sensitive features within the Project area.	European Designated Sites, MPA, MCZ and ASSI have been considered in the Protected Sites Screening Report (Appendix D) and summarised in this section.
Marine Scotland – Licensing Operations Team, (MS - LOT)		
SNH	Consultation with SNH confirmed the selection of protected sites that should be assessed in Scottish waters.	The sites listed by the regulator have been included in the Protected Sites Screening Report (Appendix D) and in this section.

9.3 Existing baseline description

9.3.1 Protected sites

The protected sites and species have been screened for effects from cable installation (Appendix D) Table 9-2 describes the different protected sites found within the Scot-NI Project Area and considered within the Protected Sites Screening Report (Appendix D). Figure 9-1 (Drawing Reference: P2302-PROT-004) shows the protected sites within the Scot-NI Project Area described below.

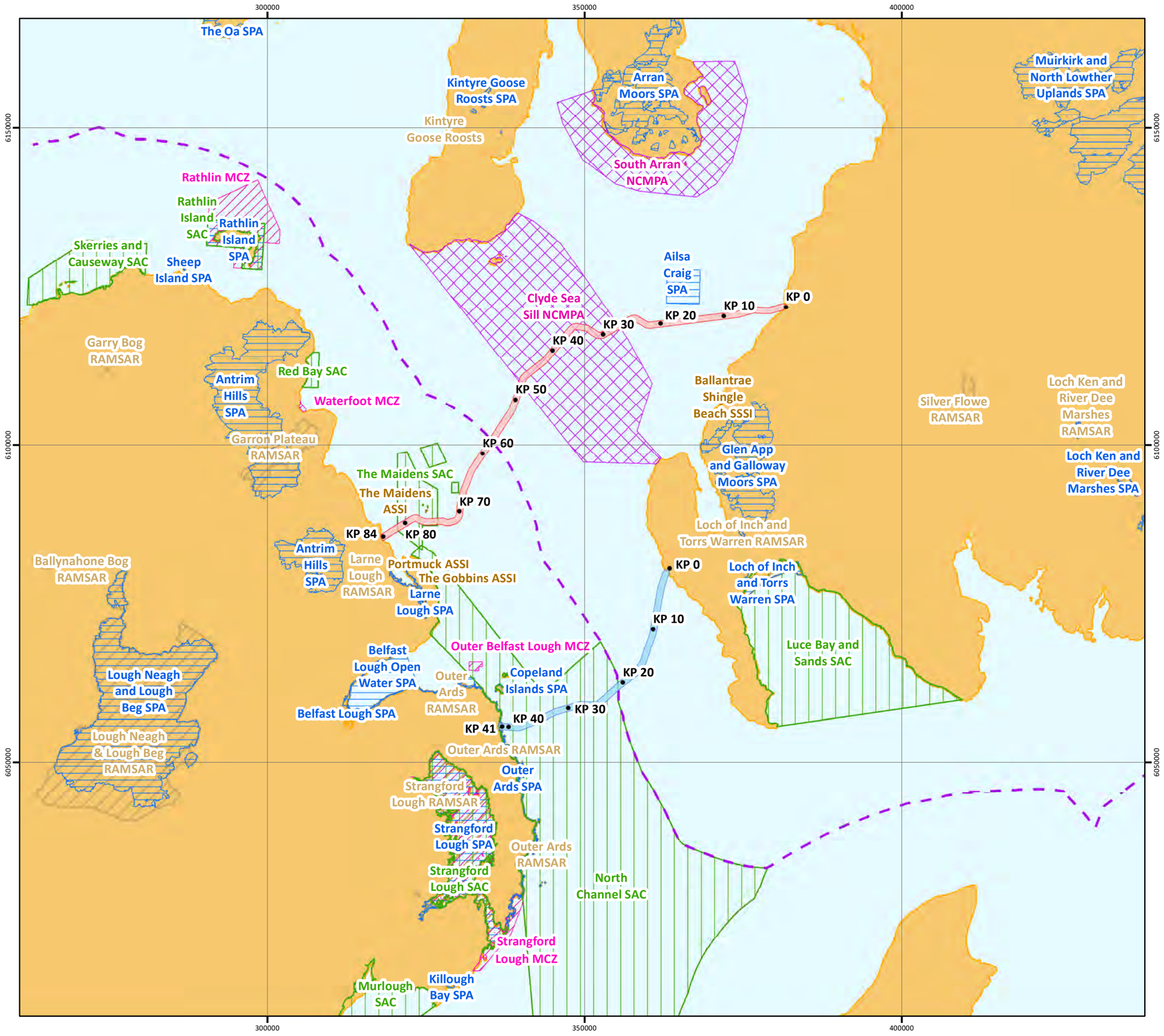
Table 9-2 Protected sites

Designation	Description
Special Area of Conservation (SAC)	Special Areas of Conservation (SACs) are sites designated in Northern Ireland inshore waters under the Conservation (Natural Habitats, & c.) Regulations (Northern Ireland) 1995 ; in Scottish inshore waters under a combination of the Conservation of Habitats and Species Regulations 2010 (in relation to reserved matters) and the Conservation (Natural Habitats, & c.) Regulations 1994; and in UK offshore waters under the Conservation of Offshore Marine Habitats and Species Regulations 2017. The objective is to protect and conserve habitats and species listed on Annex I and II of the EC Habitats Directive. Habitats and species listed under these Annexes are considered to be in need of conservation at a European level.
Special Protection Area (SPA)	Special Protection Areas (SPAs) are sites designated in Northern Ireland inshore waters under the Conservation (Natural Habitats, & c.) Regulations (Northern Ireland) 1995 ; in Scottish inshore waters under a combination of the Conservation of Habitats and Species Regulations 2010 (in relation to reserved matters) and the Conservation (Natural Habitats, & c.) Regulations 1994; and in UK offshore waters under the Conservation of Offshore Marine Habitats and Species Regulations 2017. The objective is to protect and conserve Annex I or migratory breeding and non-breeding birds as listed on the EC Birds Directive. The Birds Directive aims to protect EU bird species, and their eggs, nests and habitats, through the preservation, maintenance and restoration of new and existing habitats important to bird species. This is primarily achieved through the designation of SPAs. There are more than 500 wild bird species naturally occurring in the EU which are protected under various annexes.
Ramsar site	A Ramsar site is a wetland site designated to be of international importance under the Ramsar convention. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental treaty established in 1971 by United Nations Educational, Scientific and Cultural Organization (UNESCO) which came into force in 1975. The aim of the convention is the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.
Marine Conservation Zone (MCZ) - Northern Ireland and National Conservation Marine Protected Area (NCMPA) - Scotland	The Marine and Coastal Access Act (MCAA) 2010 sets marine conservation zone (MCZ). The objectives of MCZs are to protect nationally important habitats, species, and geological/geomorphological features, while fully taking into account any economic, cultural or social consequences of doing so. In Scotland MCZs are known as Marine Protected Areas (MPAs). Within the Northern Irish inshore region and Scottish inshore region, the power to designate MCZs has been devolved through the Marine Act (Northern Ireland) 2013 and the Marine (Scotland) Act 2010, respectively. These MCZs/MPAs safeguard vulnerable or unique marine species and habitats of national importance in the inshore region based on an ecosystem approach. The designations contribute to an ecologically coherent UK network of MPAs as well as wider biodiversity commitments at European and global level.
Areas of Special Scientific Interest (ASSI)	ASSI provide statutory protection for the best examples of Northern Ireland's flora, fauna, geological or physiographical features. An ASSI designation may extend into intertidal areas, to the jurisdictional limit of local authorities - i.e. the mean low water mark in Northern Ireland. There is no provision for marine ASSIs beyond the mean low water mark. ASSIs were first designated under the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985. New ASSIs are designated under the Environment (Northern Ireland) Order 2002. The Order makes it an offence for anyone to intentionally or recklessly damage any natural feature of an ASSI.

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

ENVIRONMENTAL DESIGNATIONS
Protected Sites

Drawing No: P2302-PROT-004 | **A**



Legend

- KP
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scotland/Northern Ireland Adjacent Waters Limit
- SAC
- SPA
- MCZ
- RAMSAR
- NCMPA
- SSSI/ASSI

NOTE: Not to be used for Navigation

Date	09 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; JNCC; SNH; DAERA; ESRI; GEBCO; NIEA;
File Reference	J:\P2302\Mxd\05_PROT\ P2302-PROT-004.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

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9.3.2 Protected sites search areas

Search areas have been used to identify protected sites with primary or qualifying features corresponding to receptors depending on the potential pressures and Project activities. The receptors and the search areas used are outlined below:

- Habitats – Application corridor for Scot-NI 3 and Scot-NI 4;
- Birds – 46.7 km buffer of the Scot-NI 3 and Scot-NI 4 application corridors, incorporating Rathlin Island for Scot-NI 3;
- Cetaceans – Application corridor for Scot-NI 3 and Scot-NI 4;
- Pinnipeds – 100 km buffer of the Scot-NI 3 and Scot-NI 4 application corridors

A summary of all the protected sites identified within the Protected Sites Screening Report (Appendix D) is provided below for Scot-NI 3 and Scot-NI 4. A total of 27 protected sites have been identified and screened within the relevant search areas for the Scot-NI application corridors.

9.3.3 Scot-NI 3

A total of 17 protected sites were identified within the search areas for the Scot-NI 3 application corridor. The Scot-NI 3 application corridor crosses three protected sites:

- The Outer Ards Special Protected Area (SPA), Ramsar and ASSI;
- The North Channel Special Area of Conservation (SAC); and
- The East Coast Marine pSPA.

All protected sites within the search area for Scot-NI 3 application corridor fall within Northern Irish waters. The sites alongside with their distances to the Scot-NI 3 application corridor boundary have been outlined in Tables 9-3 and Table 9-4 below.

Table 9-3 Relevant European sites identified within the Search Areas for Scot-NI 3

Site Name & Code	Distance (km)
North Channel SAC (Site code UK0030399)	Within
Strangford Lough SAC (Site code UK0016618)	9.7
Murlough SAC (Site code UK0016612)	41
East Coast Marine pSPA	Within
Outer Ards SPA and Ramsar site (Site code UK9020271)	Within
Copeland Islands SPA (Site code UK9020291)	5.5
Strangford Lough SPA & Ramsar site (Site code UK9020111)	9.9
Belfast Lough SPA and Ramsar site (Site code UK9020101)	14.5
Belfast Lough Open Water SPA (Site code UK9020290)	14.5

Table 9-4 Relevant ASSI's identified within the Search Areas for Scot-NI 3

Site Name & Code	Distance (km)
Outer Ards ASSI (ASSI 105)	Within
Copeland Islands ASSI (ASSI 232)	5.5
The Gobbins ASSI (ASSI 283)	8.6

Site Name & Code	Distance (km)
Strangford Lough ASSI Part 1 (ASSI 6), 2 (ASSI 32) and 3 (ASSI 34)	9.9
Belfast Lough Outer ASSI (ASSI 104)	14.3

9.3.4 Scot-NI 4

A total of 11 protected sites were identified within the search areas for the Scot-NI 4 application corridor. Of these one is located within Scottish waters (The Clyde Sea Sill NCMPA), all others are within Northern Irish waters. The Scot-NI 4 application corridor crosses three protected sites:

- The Maidens SAC;
- The Clyde Sea Sill Nature Conservation Marine Protected Area (NCMPA); and
- The East Coast Marine pSPA.

The sites alongside their distances to the Scot-NI 4 application corridor have been outlined in Tables 9-5, Table 9-6 and Table 9-7 below.

Table 9-5 Relevant European sites identified within the Search Areas for Scot-NI 4

Site Name & Code	Distance (km)
The Maidens SAC (Site code UK0030384)	Within
East Coast Marine pSPA	Within
Ailsa Craig SPA (Site code UK9003091)	0.76
Larne Lough SPA and Ramsar site (Site code UK9020042)	4.1
Rathlin Island SPA (Site code UK9020011)	46.7

Table 9-6 Relevant NCMPAs/MCZs identified within the Search Areas for Scot-NI 4

Site Name & Code	Distance (km)
Clyde Sea Sill NCMPA	Within
Rathlin Island MCZ	46.7

Table 9-7 Relevant ASSI's identified within the Search Areas for Scot-NI 4

Site Name	Distance (km)
The Maidens ASSI	2.15
Larne Lough ASSI	4.1
Portmuck ASSI	6.5

9.3.5 Other protected sites considered

9.3.5.1 Designated Seal Haul-Out Sites

The Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014 designated 194 seal haul-out sites around the coast of Scotland, providing seals increased legal protection at the time when

they are most vulnerable out of the water. There are no designated haul-out sites located in the direct vicinity of the Scot-NI application corridors within Scottish waters.

Within Northern Ireland seal haul outs are protected under schedule 5 of the Wildlife (Northern Ireland) Order 1985 (as amended) and, in particular, Article 10 details offences in relation to obstructing access to or damaging a place of shelter. It is also an offence to disturb animals while they are using such places. There is a seal haul out located within 50m of the Scot-NI 3 application corridor at Kinnegar Rocks at the Donaghdee landfall.

9.3.5.2 Area of Outstanding Natural Beauty (AONB)

The Antrim Coast & Glens AONB was designated in 1988 under the Nature Conservation and Amenity Lands (NI) Order. It includes Rathlin Island, the Glens of Antrim and the coastal area between Larne and Ballycastle (Causeway Coast & Glens Heritage Trust 2020). The landfall at Larne (Scot-NI 4) is located adjacent to the Antrim Coast and Glens AONB.

9.4 Potential pressure identification and zone of influence

The following pressures have been considered for protected sites and species and were screened out for further assessment. Justification for this exclusion is provided in the Protected Sites Screening Report (Appendix D):

- Accidental Hydrocarbon and Polycyclic Aromatic Hydrocarbons (PAH) contamination
- Water flow (tidal current) changes – local.
- Introduction or spread of invasive non-indigenous species (INIS)
- Visual disturbance (fish)
- Siltation rate changes including smothering (depth of vertical sediment overburden)
- Death or injury by collision (marine mammals)
- Underwater noise changes (fish and marine mammals)

Five potential pressures to protected sites have been included for further assessment (Table 9-8). The zone of influence (the spatial extent over which effects may extend) has also been defined. The zone of influence has been used to establish a search area within which protected sites were screened for the relevant qualifying interest feature. Since mobile species from protected sites further field may travel into the zone of influence, the zone of influence cannot be used alone as a distance to screen in relevant protected sites. Therefore, search areas (distances from the Project) for each receptor group were applied taking into consideration other information such as marine mammal management units and expert judgement to use for the initial screening of sites.

Table 9-8 Potential pressures and zones of influence - protected sites

Project Activity	Potential Pressure	Receptor	Worst Case Zone of Influence
Seabed preparation, cable burial	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Habitats	**Scotland jurisdiction** **Scot-NI 3**: Plough (abrasion): 0.052 km^2 Plough (penetration): 0.01 km^2 PLGR (penetration): 0.04 km^2
			NI jurisdiction **Scot-NI 3:** Plough (abrasion): 0.057 km^2 Plough (penetration): 0.011 km^2

Project Activity	Potential Pressure	Receptor	Worst Case Zone of Influence
			T-ROV: 0.0001 km^2 PLGR (penetration): 0.044 km^2
			Scotland jurisdiction **Scot-NI 4**: Plough (abrasion): 0.150 km^2 Plough (penetration): 0.029 km^2 T-ROV: 0.0004 km^2 PLGR (penetration): 0.115 km^2
			NI jurisdiction **Scot-NI 4:** Plough (abrasion): 0.072 km^2 Plough (penetration): 0.014 km^2 T-ROV: 0.0001 km^2 PLGR (penetration): 0.055 km^2
External cable protection at cable crossings.	Physical change (to another seabed type).	Habitats	Plough (skids and share): 0.150 km^2 T-ROV: 0.0004 km^2 Rock Berm: 1620 m^2

9.5 Embedded mitigation

The Project description, described in Section 2, provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to protected sites and species is provided in Table 9-9 below. These measures will be complied with as a matter of best practice.

Table 9-9 Embedded mitigation measures: Project design

ID	Embedded mitigation
BP 9	The survey and installation vessels will be moving at a maximum speed 6 knots during installation activities. This will allow any rafting seabirds, marine mammals or basking sharks time to disperse before the vessel arrives. When not conducting installation activities, vessels will avoid bird rafts where operationally possible and safe to do so.

9.6 Protected Sites Assessment

Protected sites were assessed to determine if there was a potential pressure-receptor pathway between the Scot-NI application corridors and the Qualifying Feature(s). Of the 27 protected sites identified within the relevant search areas for the Scot-NI application corridors, initial screening concluded that there exists a pressure-receptor pathway between the Project and the Qualifying Features of 21 sites.

For all Qualifying Features where it was determined that there was a possible interaction between the proposed installation and maintenance activities and the qualifying features of a protected site, the likely significance of the effect on the conservation objectives, alone and in combination with other projects in the area was assessed. This screening was undertaken prior to the implementation of mitigation.

Table 9-9 and Table 9-10 below summarise the conclusions of the assessment for the Scot-NI 3 and Scot-NI 4 application corridors respectively.

Table 9-10 Protected Sites Screening Conclusions - Scot-NI 3

Site Type	Site Name	Designating Feature Screened In for LSE	Potential pressure	Potential in-combination effects	Conclusion
SAC	North Channel SAC	Harbour porpoise	Changes in supporting habitat and prey availability	No potential cumulative effect (PCE)	**No potential for LSE / Appropriate Assessment not required.**
SPA and Ramsar	Outer Ards SPA and Ramsar	Breeding and wintering birds	Visual (and above water noise) disturbance Changes in supporting habitat and prey availability	No PCE	**No potential for LSE / Appropriate Assessment not required.**
	East Coast Marine pSPA	Breeding and wintering birds	Visual (and above water noise) disturbance Changes in supporting habitat and prey availability	No PCE	**No potential for LSE / Appropriate Assessment not required.**
	Copeland Islands SPA	Breeding birds	Visual (and above water noise) disturbance	No PCE	**No potential for LSE / Appropriate Assessment not required.**
	Strangford Lough SPA and Ramsar	Breeding birds	Visual (and above water noise) disturbance	No PCE	**No potential for LSE / Appropriate Assessment not required.**
	Belfast Lough SPA and Ramsar	Wintering birds	Visual (and above water noise) disturbance	No PCE	**No potential for LSE / Appropriate Assessment not required.**
ASSI	Outer Ards ASSI	Wintering waterbirds Harbour seal	Visual (and above water noise) disturbance Changes in supporting habitat and prey availability	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**
	Copeland Islands ASSI	Breeding birds	Visual (and above water noise) disturbance	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**
	The Gobbins ASSI	Bird populations	Visual (and above water noise) disturbance	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**
	Strangford Lough ASSI Part 1, 2 and 3	Breeding birds	Visual (and above water noise) disturbance	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**

Table 9-11 Protected Sites Screening Conclusions - Scot-NI 4

Site Type	Site Name	Designating Feature Screened In for LSE	Potential pressure	Potential in-combination effects	Conclusion
SAC	The Maidens SAC	Reefs	Siltation rate changes (including smothering) Physical change (to another seabed type)	No PCE	**No potential for LSE / Appropriate Assessment not required.**
		Grey seal	Changes in supporting habitat and prey availability	No PCE	**No potential for LSE / Appropriate Assessment not required.**
SPA	East Coast Marine pSPA	Breeding and wintering birds	Visual (and above water noise) disturbance Changes in supporting habitat and prey availability	No PCE	**No potential for LSE / Appropriate Assessment not required.**
	Ailsa Craig SPA	Breeding birds	Visual (and above water noise) disturbance	No PCE	**No potential for LSE / Appropriate Assessment not required.**
	Larne Lough SPA and Ramsar	Breeding birds and wintering birds.	Visual (and above water noise) disturbance	No PCE	**No potential for LSE / Appropriate Assessment not required.**
MPA	Clyde Sea Sill NCMPA	Black guillemot	Visual (and above water noise) disturbance Changes in supporting habitat and prey availability	No PCE	**Achievement of conservation objectives will not be hindered**
		Circalittoral and offshore sand and coarse sediment communities. Marine geomorphology of the Scottish shelf seabed – sand banks, sand ribbon fields and sand wave fields.	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion Physical change to another seabed type	No PCE	**Achievement of conservation objectives will not be hindered**
ASSI	The Maidens ASSI	European shag	Visual (and above water noise) disturbance	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**
	Larne Lough ASSI	Breeding birds	Visual (and above water noise) disturbance	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**
	Portmuck ASSI	Bird populations	Visual (and above water noise) disturbance	No PCE	**The proposed activities will not negatively impact the integrity of the ASSI**

9.6.2 Screening Statement and Conclusion

9.6.2.1 Scot-NI 3

The Protected Sites Screening Report (Appendix D) concluded that it was considered possible that there exists a pressure-receptor pathway between the Scot-NI 3 cables and the qualifying features of 13 protected sites. Further analysis of the LSEs taking into consideration the sites conservation objectives concluded that there is no potential for an LSE on any European site from installation of Scot-NI 3. As such, Appropriate Assessment is not required.

In addition, the Scot-NI 3 cable will not hinder the conservation objectives of the NCMPAs, MCZs or ASSIs assessed and Stage 1 Assessment or Notification is not required.

9.6.2.2 Scot-NI 4

The Protected Sites Screening Report (Appendix D) concluded that it was considered possible that there exists a pressure-receptor pathway between the Scot-NI 4 cables and the qualifying features of nine protected sites. Further analysis of LSE taking into consideration the sites conservation objectives concluded that there is no potential for an LSE on any European site assessed from installation of Scot-NI 4. Appropriate Assessment is therefore not required.

In addition, the Scot-Ni 4 cable will not hinder the conservation objectives of the NCMPAs, MCZs or ASSIs assessed and Stage 1 Assessment or Notification is not required.

10. MARINE ARCHAEOLOGY

This section provides details of the marine archaeology assets that may be present within the vicinity of the Scot-NI application corridors and identifies potential effects associated with the cable installation. A summary of the archaeological assessments, which included an archaeological Desk-Based Assessment, an assessment of geophysical and walkover surveys at the landfall locations, is provided in the Marine Archaeology Technical Reports in Appendix G.

10.1 Data Sources

The baseline conditions have been established within the Marine Archaeology Technical Reports (Appendix G). The data sources used to inform the baseline description and subsequent assessment include but are not limited to the following:

- Appendix G1: Scot-NI Archaeological Desk Based Assessment (DBA) (Coracle 2020a);
- Appendix G2: Scot-NI 3 Archaeological review of marine geophysical survey data and the results of archaeological surveys at the two landfall locations. (Coracle 2020b); and
- Appendix G4: SCOT-NI 3 Marine archaeology and cultural heritage Technical report. (Coracle 2020c)
- Appendix G3: Scot-NI 4 Archaeological review of marine geophysical survey data and the results of archaeological surveys at the two landfall locations (Coracle 2020d).
- Appendix G5: SCOT-NI 4 Marine archaeology and cultural heritage Technical report (Coracle2020e)

10.2 Consultation

Table 10-1 summarises the relevant consultation responses undertaken to date for the Scot-NI application corridors, received prior to and during preparation of the Marine Environmental Appraisal (MEA) which are considered in this report.

Table 10-1 Consultation and scoping responses

Stakeholder	Summary of consultation response	How response has been addressed
Department of Agriculture, Environment & Rural Affairs (DAERA)	Consultation with DAERA confirmed they were content with the overall approach to the MEA. DAERA requested that the archaeological assessment consider DAERA historic environment records, historic environment record of Northern Ireland (HERoNI), the Historic Environment Map Viewer and Marine Map Viewer. Furthermore, the construction impact of cable installation at the landfall to potential heritage assets should be considered as part of the MEA.	These data sources have been utilised as part of the archaeological Desk Based Assessment (DBA) provided as part of the Marine Archaeology Technical Reports in Appendix G
Historic Environment Scotland	My colleague Chloé Porter and myself will be representing HES at the Pre-Application Consultation (PAC) event for the marine licence application for the SCOT-NI 3 and SCOT-NI 4 cables on Tuesday 15/09. We checked the information on the web page: scotnipac.com. Regarding the Marine Archaeology Assessment, I understand that the project has sub-contracted Coracle Archaeology to provide specialist marine	The Project responded confirming the methodology used in the DBA During the geotechnical survey, CPTs were undertaken instead of cores due to the chemical weapons and health and safety risk associated with working in close proximity to the Beaufort's Dyke. Therefore, no archaeological review of geotechnical information has been undertaken.

Stakeholder	Summary of consultation response	How response has been addressed
	archaeology support. They will carry out a desk-based assessment, marine geophysical- and geotechnical data review and will prepare a Written Scheme of Investigation, including Protocol for Archaeological Discoveries and a technical report to support the MEA. Do you have any other information regarding the desk-based assessment and the proposed methodology for the potential impact on marine archaeology? What is going to happen to the existing cables that are being replaced. Will these just be left in situ or will they be removed? If the latter, will the Marine Environmental Assessment also cover this aspect of the project?	The Marine Environmental Assessment will provide an overview of the archaeological baseline based on DBA, geophysical survey review and archaeological walkover survey. The assessment process follows the standard approach to environmental assessment and application of professional judgement. The key stages of the assessment process are listed as follows ▪ Characterisation of the baseline environment ▪ Establish potential effects from the Project and zone of influence ▪ Characterisation of the change in effect ▪ Evaluation of significant of effects ▪ Establish mitigation

10.3 Survey

The marine geophysical survey collected multibeam echosounder (MBES), sidescan sonar (SSS), magnetometer and sub-bottom profiler (SBP) data. The width of the geophysical survey swathe was 500m (250m either side of the proposed cable line) however to identify locations of potential Unexploded Ordnance (pUXO) within the application corridors, a high resolution SSS and magnetometer array survey was conducted 13m either side of the planned route in addition to standard geophysical survey operations. A limited geotechnical survey was undertaken to obtain CPT's instead of cores due to the chemical weapons and health and safety risk associated with working in close proximity to the Beaufort's Dyke.

The resolution of the UXO survey undertaken was very high containing five magnetometers and an attached high resolution side scan sonar (SSS). This high-resolution survey was conducted to allow route planning to minimise the significant risk of UXO in this area and due to this, numerous and combined SSS and magnetometer anomalies have been identified which would have not been identified during standard cable route survey operations.

Due to the high likelihood of UXO being present within the Cable Survey Corridor (CSC) and due to the Beauforts Dyke dumping ground, the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification. These unique routeing constraints are considered further in Table 10-2 and Table 10-3.

10.4 Route Design

10.4.1 Route Engineering

The route engineering process considers many factors and constraints including archaeological considerations. Initial routing was undertaken using information on known wrecks and artefacts which were avoided. Subsequently, the survey corridor was agreed based on available knowledge, and the cable route survey was undertaken. A separate high resolution UXO survey (as described in Section 10.3) was undertaken which identified further anomalies which were assessed in the archaeological technical reports and incorporated into further work on the route design.

Where avoidable, the relevant anomalies were routed around to reduce interaction considering the allocated AEZs (see Sections 10.5.2.4 and 10.5.3.4). Some of the AEZs could not be avoided due to other hard constraints on routing such as UXO risk, and the technical capabilities of the burial equipment that will be deployed (see Section 10.4.2).

The specific route design considerations relating to each anomaly are described in further detail in Section…….

10.4.2 Cable Installation

The primary burial tool for both the Scot-NI 3 and 4 cables will be a cable plough which is towed behind the installation vessel. Steering along the cable route with a cable plough is achieved by applying lateral forces on the tow bridal and tow line to adjust the cable plough's heading. There is no active steering. This lateral force is imposed by steering the cable ship to the side of the cable route ahead of the plough in the same direction as the turn. Submarine cable ploughs are therefore subject to limited steering parameters and route turns need to reflect the steering capabilities of the plough and cable ship system.

The route is defined by the route position list (RPL). The RPLs for Scot-NI 3 and 4 have been carefully engineered to comply with these maximum turning parameters which typically allow for a maximum alter course angle of 15° every 250m. This means that small turns are not possible in plough buried sections of the route.

10.5 Existing Baseline Description

The marine archaeological Desk Based Assessment (DBA) gathered and collated data for all known sites and features of cultural heritage significance within and in proximity to the 500m CSC. The DBA also assessed a Wider Study Area (WSA) 1 km either side of the proposed cable route, facilitating a broader understanding of the archaeological potential of the region.

The datasets were also used to assess the archaeological and palaeo-environmental potential of sub-surface sediments. No features with archaeological potential e.g., palaeo-channels containing organic deposits were visible along the Scot-NI 3 or Scot-NI 4 route, therefore the potential for paleo-landscapes along the CSC is deemed to be low. The technical reports provided in Appendix G collate records solely from within the CSC.

Non-intrusive landfall surveys were undertaken at all landfalls and utilised walkover, geophysical (electro-magnetic conductivity) and metal-detector surveys to identify sites and features of archaeological potential. These were compared with the results of the DBA to provide a fuller understanding of the archaeological potential at the proposed landfalls, and to assess the potential effect of the proposed development. The marine geophysical survey collected multibeam echosounder (MBES), sidescan sonar (SSS), magnetometer and sub-bottom profiler (SBP) data. To allow identification of potential Unexploded Ordnance (pUXO) within the application corridors, a high resolution SSS and magnetometer array survey was conducted 13m either side of the planned RPL route in addition to standard geophysical survey operations.

Geophysical datasets were assessed for anomalies with archaeological potential, with categories based on the presence of multiple lines of evidence. Anomalies were defined based on their potential to be of archaeological interest and have been classified using the following criteria:

- **High potential** – typically identified by multiple geophysical datasets and can be positively identified as being an archaeological site (e.g., wreck) or of archaeological interest
- **Medium potential** – typically identified by multiple geophysical datasets, and strongly suggestive of the presence of anthropogenic feature(s) which may be of archaeological interest, but cannot be classified or identified visually (e.g., cannot be positively identified as a wreck);
- **Low potential** – usually identified by a single geophysical dataset (typically magnetics and/or SSS) that suggest a possible anthropogenic feature that may have archaeological significance and that differs in character from those identified as having no potential; or

No potential – geological features such as boulders or known (and often mapped) anthropogenic features such as cables, anchorages etc.

10.5.1 Archaeological Exclusion Zones

It is proposed by Coracle Archaeology that any known and located historic assets and geophysical anomalies identified as being of high or medium archaeological potential are protected through the imposition of an archaeological exclusion zone (AEZ) around each asset, that may be impacted by the proposed development.

The suggested extent of each AEZ is the radius of a circle centred on the given location and based on the available geophysical data for each anomaly, including the lateral distribution of visible features, extent and direction of scour, and likelihood for debris spread away from the site. The AEZ's have been designed to encompass all debris / structure visible on the seabed, with an added dimension to adequately protect both potentially buried remains and the potential for mobile debris associated with the direction (and extent) of the scour.

The AEZs defined by Coracle Archaeology have been defined following professional recommendations (Dix 2008) and converted into circular AEZs with a defined centre point to encapsulate the required exclusion zone. The extent of the suggested circular AEZ is therefore sufficiently large to encompass the area that would be defined by a polygon, following the procedures outlined in Dix (2008).

The use of a centre point and set radius has been deemed the most robust method when attempting to incorporate AEZs into different vessel navigation systems. This reduces the risk of accidental incursions into AEZs, and possible impacts on the potential asset within, during site works. In accordance with clauses 4.1.1 and 4.2.1 of the Model Clauses (which advocates preservation in situ with the aid of AEZs; The Crown Estate & Wessex Archaeology 2010), the extent of the AEZ is based not only on the perceived archaeological potential of the asset, but also on its extent, if known.

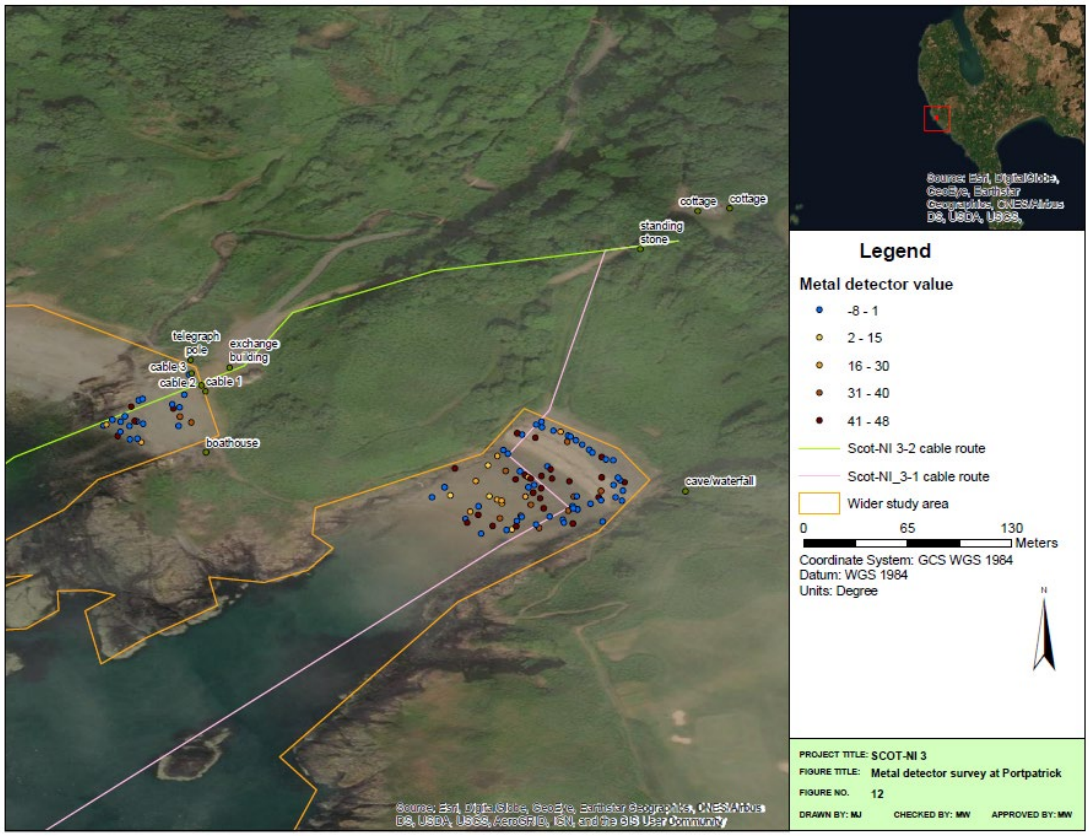
The AEZ's proposed by Coracle Archaeology are based on the precautionary principle and are wider than necessary following detailed engineering and assessment of the project specific activities. The potential impact on the anomalies is primarily from the PLGR and the subsea plough/jetting tool used to excavate and then backfill the cable trench. As such, disturbance of the seabed will be confined to a narrow corridor. There is no planned use of anchor spreads for the installation vessels. The specific details of the anomalies, the project specific activities and the mitigation regarding route adjustments are discussed below.

10.5.2 Scot-NI 3

10.5.2.1 Portpatrick Landfall

Several sites recorded above Mean High Water Springs (MHWS) were visited and recorded, including the Glen Cottage standing stone, Ouchtriemakain cave and the Port Kale cable house. There is no obvious pattern or distribution of metal detections at Port Mora, through the line of detections along the high-water mark may be indicative of casual losses from vessels driven ashore by the tide (Figure 10-1). A perpendicular line of high value detections along the centre of the Port Mora beach may be indicative of a buried cable with protruding severed remains of redundant cables observed.

Figure 10-1 Metal detector survey at Portpatrick



10.5.2.2 Donaghadee Landfall

No known historic assets were recorded within the Historic Environment Record of Northern Ireland (HERoNI) for the study area and no features of archaeological potential were observed. A large monolith, approximately 3.6m high, is located on the headland to the south of the beach which appears to be a modern memorial stone. Further afield is a World War II pill box on a hill behind the beach. There is no pattern of distribution of metal-detections on Donaghdee beach. Detections were numerous and of significant quantity and may be indicative of scrap metal observed on the surface of the beach (Figure 10-2).

Figure 10-2 Metal detector survey at Donaghadee

10.5.2.3 Marine Archaeological Potential - Scot NI 3

The DBA reviewed all known and potential maritime cultural heritage assets identified within the Scot-NI 3 application corridor. A total of 16 wrecks and one monument are located within the Scot-NI 3 application corridor (Coracle 2020a). All the wrecks were known from the outset and have been avoided during cable routeing.

The archaeological review of the survey data has identified 11 geophysical anomalies of high and medium archaeological potential within the Scot-NI 3 application corridor as summarised in Table 10-2 below. The locations of these anomalies can be viewed in Appendix G.

Of the anomalies, two are classified as being of 'high' and nine of 'medium' archaeological potential. No anomalies corresponding to the known archaeological heritage assets within the Scot-NI 3 application corridor were visible in the marine geophysics survey data or in proximity to the reported locations.

Table 10-2 Summary of geophysical anomalies with archaeological potential Scot-NI 3

CA No.	Description	Archaeological Potential
CA_3001	SSS anomaly SN3-P-SC0783 (3.2 x 1m) associated with bathymetry depression 5.6 x 2.7x 0.15m	Medium
CA_3002	Collection of SSS anomalies on the seabed (SN3-P-SC1049-54 and SN3-P-USC0272), each 4-11m in length. Suggest a wide debris spread, with the northernmost SSS anomaly (SN3-P-USC0272) associated with a series of magnetic anomalies up to 227nT (SN3-P-UMC064). Bathymetry shows two depressions, the southwestern most (centred on SN3-P-SC1051) measures 22 x 33 x 0.2 m, while the north western	High

CA No.	Description	Archaeological Potential
	most (centred on SN3-P-USC0272) measures 11 x 13 x 0.4m. Some of these anomalies could relate to previously installed telecommunications cable	
CA_3003	Visible shipwreck outline (SSS Anomaly SN3-P-USC0274) measuring 18 x 2.8 x 0.3m, orientated NE-SW, with bow at the NE end. Associated with magnetic anomalies SN3-P-UMC058 (251nT) and SN3-P-MC024 (734nT)	High
CA_3006	Collection of three magnetic anomalies: SN3-D-UMC0356 (125nT), SN3-D-UMC0358 (127nT) and SN3-D-MC0036 (72nT)	Medium
CA_3009	SSS Anomaly SN3-D-SC0403 (3x2m) associated with Magnetic Anomaly SN3-D-MC0011 (27nT)	Medium
CA_3010	Magnetic anomalies SN3-D-UMC0144-49 (31-55nT). Single clearly defined SSS anomaly 3 x 2m. No associated bathymetry anomaly	Medium
CA_3015	Magnetic anomaly SN3-D-UMC0091 (96nT) associated with a series of linear SSS anomalies, possibly fishing gear, covering an area c. 7x10m.	Medium
CA_3018	Magnetic anomaly SN3-D-MC0023 (14nT) associated with SSS anomaly SN3-D-SC0885 (3.4 x 3.3 x 2.9m)	Medium
CA_3021	Cluster of magnetic anomalies SN3-D-UMC0030-39 (6-60nT)	Medium
CA_3022	Magnetic anomaly SN3-D-MC0009 (738nT) associated with bathymetry anomaly measuring 22 x 14 x 2m. Also visible in SSS.	Medium
CA_3023	Magnetic anomaly SN3-T-UMC074 (166nT) associated with area of rough seabed, possibly associated with debris.	Medium

High Archaeological Potential Anomalies

CA_3002 and CA_3003 were the only anomalies of high archaeological potential identified and are described as follows:

(CA_3002) - A series of linear anomalies are visible on the seabed surface in the Multi-Beam Echosounder (MBES) data. The origin of these features is unclear but is likely to represent a scatter of debris. It is possible that this is an exposed section of the Donaghadee-Port Kale telecommunications cable. It is suggested that it is not a singular cable and may represent the exposure of earlier Donaghdee-Port Kale Anglo-Irish cables laid in 1870, 1893, 1922, 1937 and 1950. The possibility that these features could represent an unmapped wreck site cannot be entirely discounted.

(CA_3003) - A vessel hull also visible in the geophysical datasets and lies perpendicular to the coast with the bow pointing towards Port Mora. No known wreck sites were identified in the DBA at this location. The Historic Environment Record (HER) tentatively recorded an unknown wreck of the Devonshire 210m from this anomaly and another unknown wreck site. No further wreck sites were identified within the cable survey corridor (CSC).

Paleo-landscapes

The palaeo-channel is filled with marine sands and holds no palaeo-environmental potential. No features with archaeological potential are visible along the Scot-NI 3 route, therefore the potential for palaeo-landscapes along the CSC is deemed to be low.

10.5.2.4 Archaeological Exclusion Zones (AEZs) (Scot-NI 3)

The AEZs have been avoided where possible by rerouting and where not possible, the cable route has been engineered to minimise routeing through these AEZs. This section details the five proposed AEZs crossed by the proposed Scot-NI 3 cable and the spatial constraints associated with the routeing. As outlined above and in the archaeological reports (Appendix G) these are two high risk AEZs and three medium risk AEZs.

The routeing considerations and constraints for these AEZ's are summarised in Table 10-3 below. It is important that the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification

Table 10-3 Summary of AEZs crossed by Scot-NI 3 route

CA No.	AEZ Radius (proposed by Coracle)	Encroachment into AEZ	Archaeological Potential	Routeing considerations and proposed mitigations
3002	25m	9m	High	The first of the two-high risk AEZs on the Scot-NI 3 cable route. The Scot-NI 3 route has been routed as far north as possible, within the constraints of the UXO survey corridor, to minimise surface area through this AEZ. The route cannot be routed any further north due to the presence of the existing Scot NI 1 cable system (4m to the north). With most of the anomalies being situated further to the south it is not possible to reroute to the south and stay within the UXO survey corridor. The second of the two-high risk AEZs on the Scot-NI 3 route. The Scot-NI 3 route has been routed as far north as possible, within the constraints of the UXO survey corridor, to minimise surface area through this AEZ. During the Portpatrick shore end installation, divers will be deployed and will buoy off the wreck to ensure that the extent of the wreck is visible on the surface. The cable will then be accurately buried along the installation route with a diver operated jet sled. See Figure 10.3
3003	18m	7m	High	
3006	20m	6m	Medium	The cable route just crosses through the northern section of this AEZ. The presence of two pUXOs prevents the cable from avoiding the AEZ entirely however the surface area has been significantly reduced. The cable route cannot be routed further to the south due the AEZ anomalies being centred further south and due to the constraints of the UXO survey corridor. See Figure 10.4
3010	20m	7m	Medium	The cable has been re-routed further to the south to position further away from the centre of the anomalies. An alter course in the cable is strategically placed prior to the AEZ to prevent the route from drifting any closer to the boundaries of the UXO survey corridor. See Figure 10.5
3021	35m	26m	Medium	The cable has been re-routed further to the south and positioned further away from the centre of the anomalies. The ability to move any further south is restricted by UXO coverage. See Figure 10.6

Figure 10-3 Archaeological Exclusion Zones for geophysical anomalies CA_3002 and CA_3003

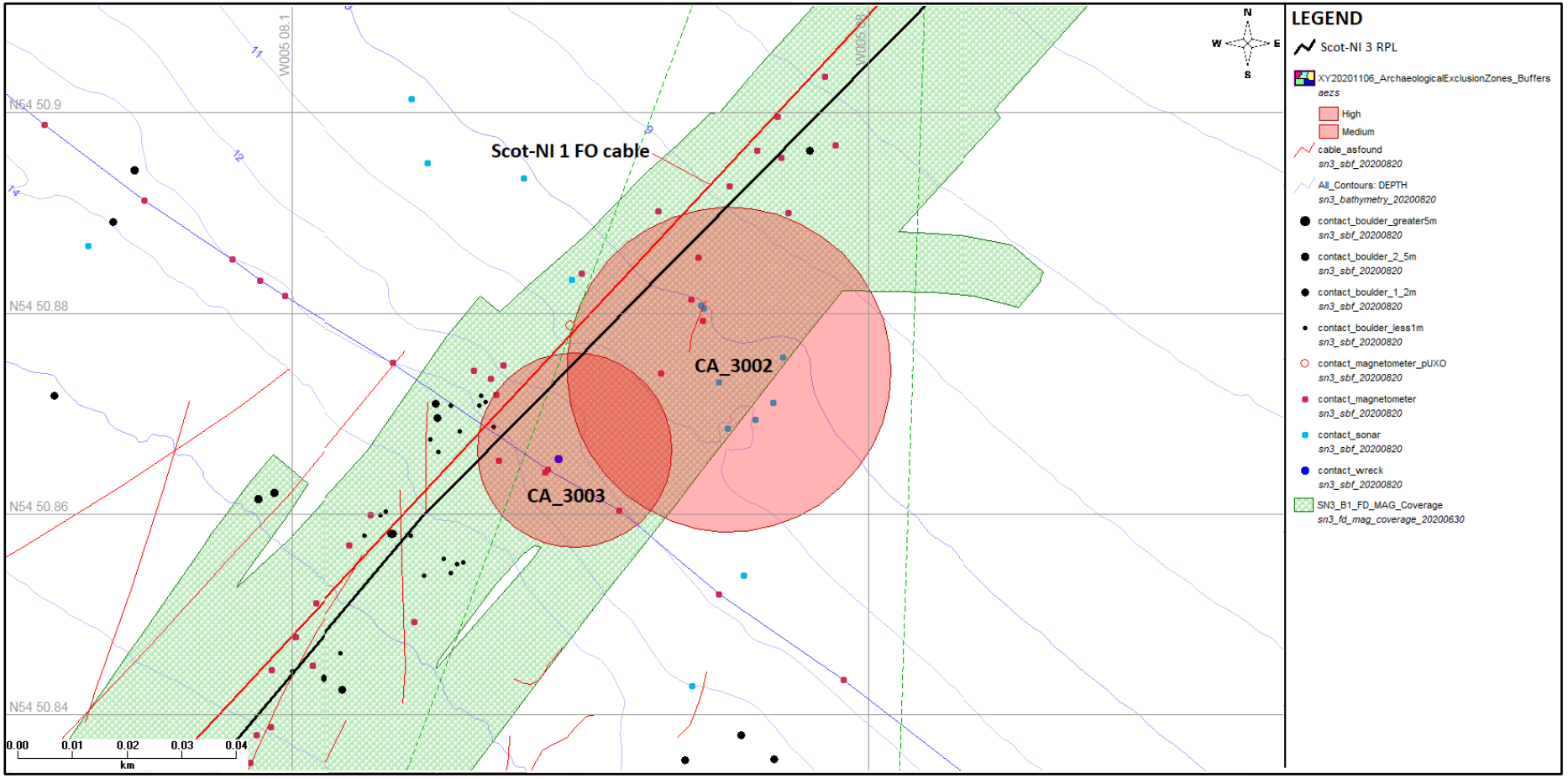


Figure 10-4 Archaeological Exclusion Zone for geophysical anomalies CA_3006

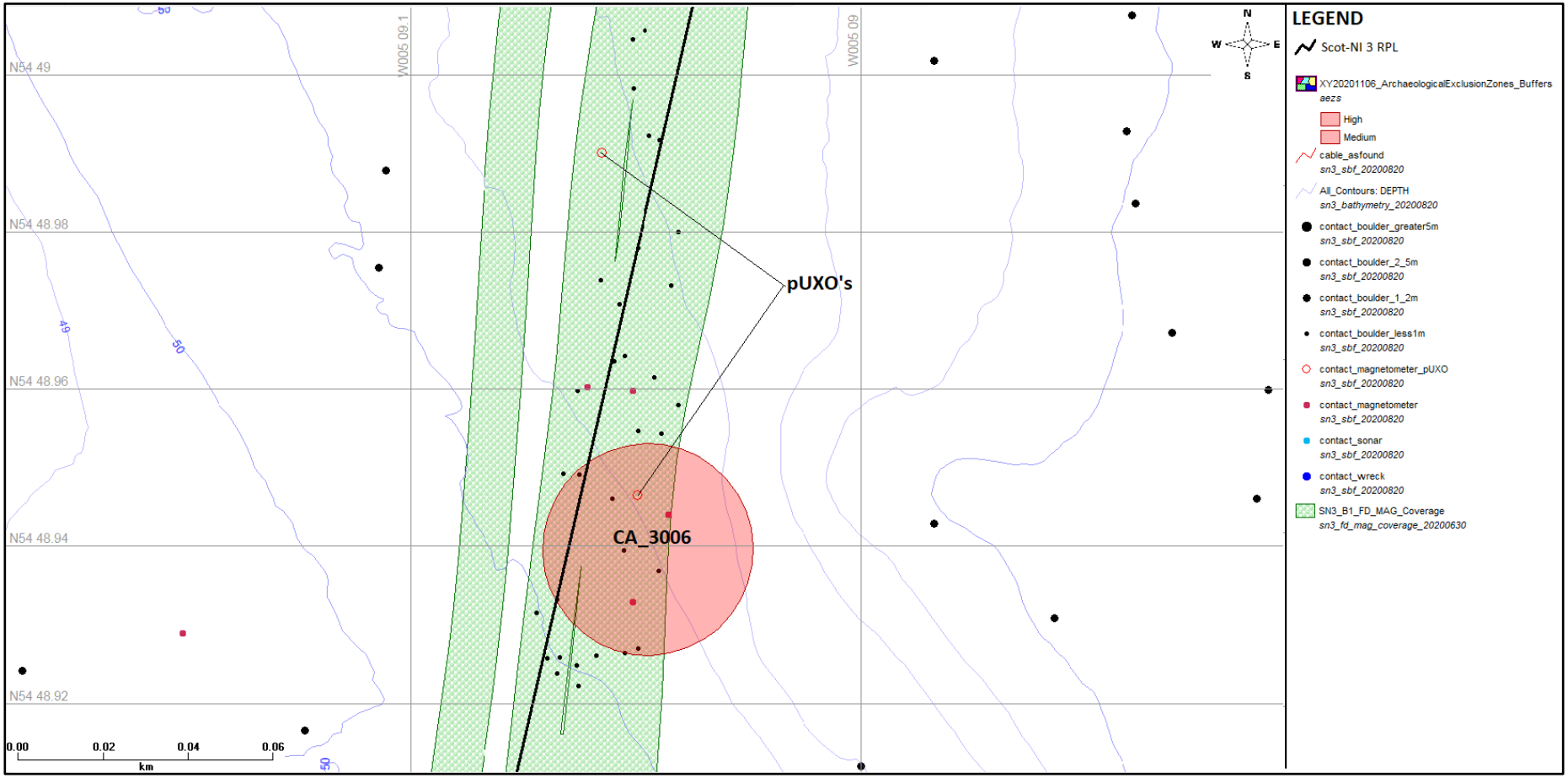


Figure 10-5 Archaeological Exclusion Zone for geophysical anomalies CA_3010

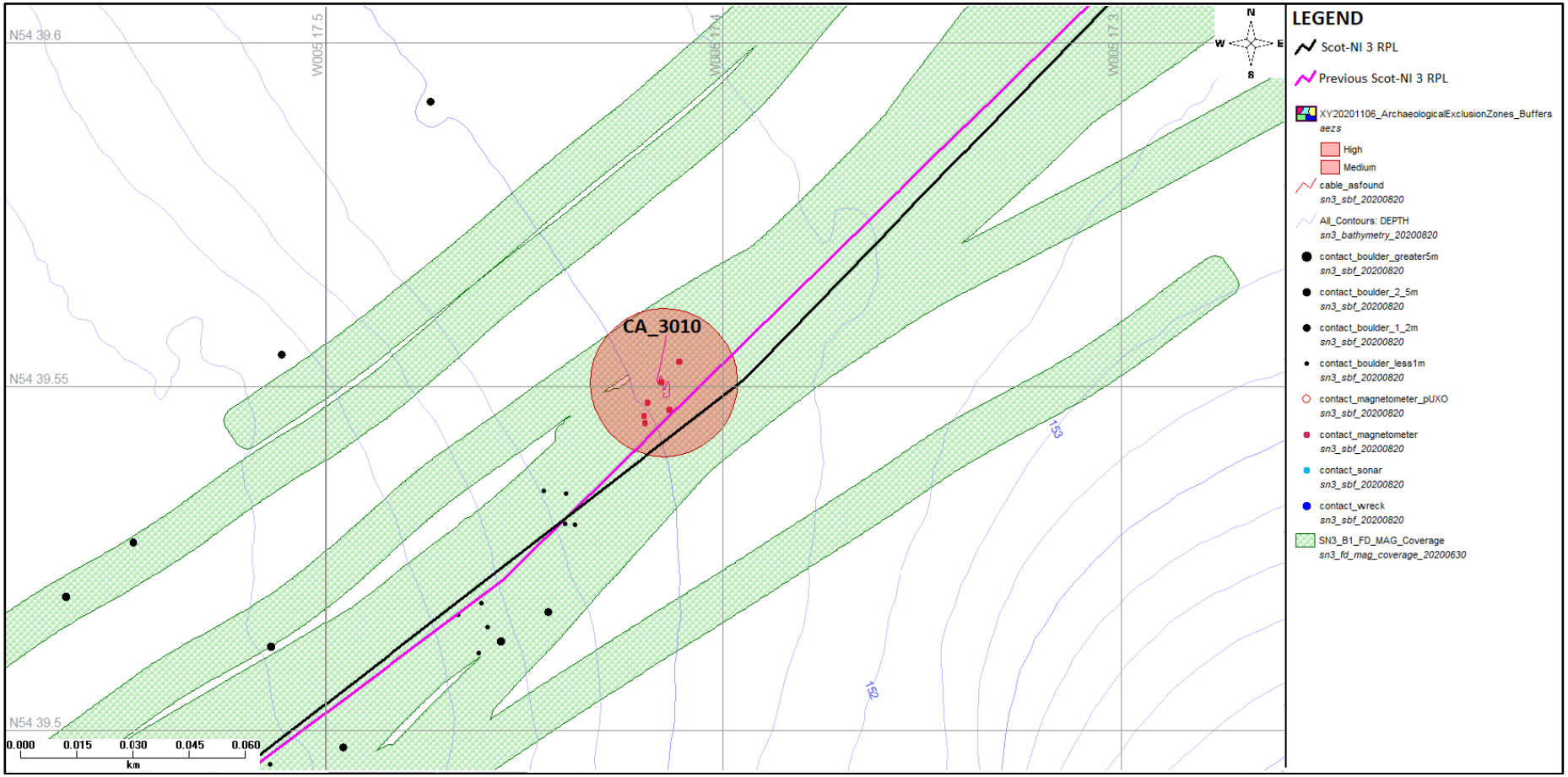
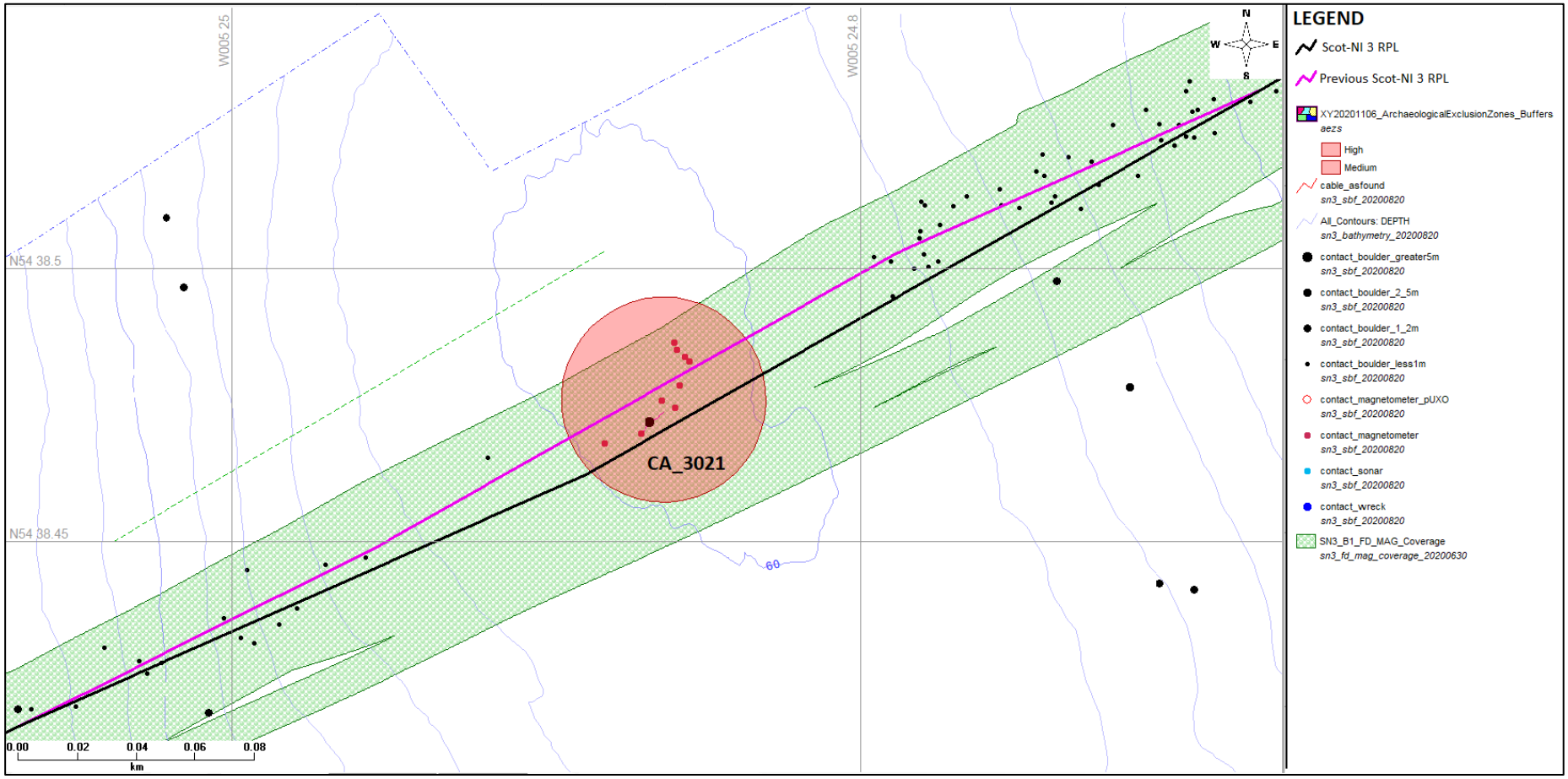


Figure 10-6 Archaeological Exclusion Zone for geophysical anomalies CA_3021

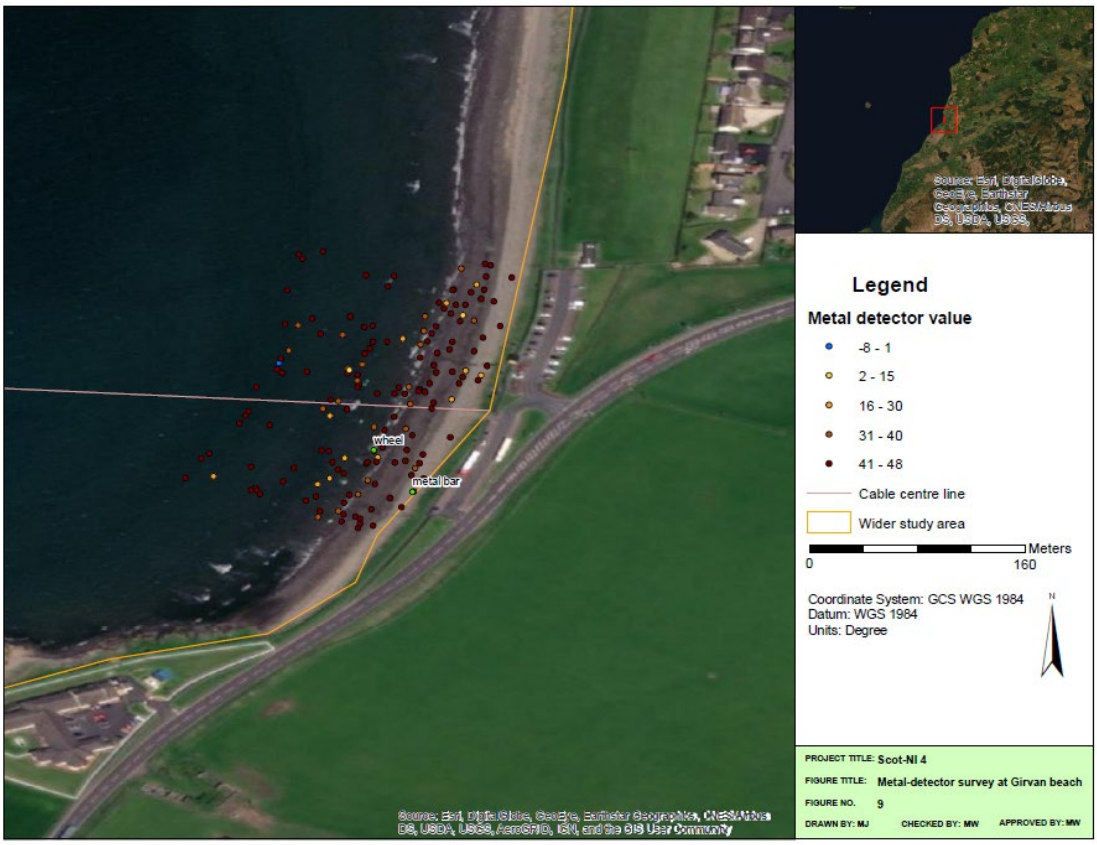


10.5.3 Scot-NI 4

10.5.3.1 Girvan Landfall

There were no recorded historic assets on the beach at Girvan, though two assets were identified in the DBA, above MHWS and just beyond the beach. Shalloch Castle (also known as 'smithy') was demolished in 1895 with several derelict single-storey buildings on the opposite side of the road which appear more synonymous with smithy. There are a series of linear cropmarks at Horse Rock that are visible in aerial photography. Considerable quantities of scrap metal were found on the beach, including a semi-submerged potential industrial wheel and a metal bar. A large amount of ceramic building material was also present, and a telegraph pole marks the location of the existing Scot NI cable currently in operation.

Figure 10-7 Metal detector survey at Girvan Beach



10.5.3.2 Larne Landfall

There were no recorded historic assets within the study area and nothing of archaeological potential was observed during the walkover survey. A historic coastguard station is reported in the HERoNI on the periphery of the study area but was not apparent during the survey. CBM was again prevalent alongside scrap-metal and sizeable brick work at the edge of the beach. The presence of scrap-metal as well as beach losses may explain the distribution of metal detections on the beach.

Figure 10-8 Metal detector survey at Girvan Beach

10.5.3.3 Marine Archaeological Potential - Scot NI 4

The DBA reviewed all known and potential maritime cultural heritage assets identified within the Scot-NI 4 application corridor. A total of five wrecks, one aircraft and one monument (Shalloch Castle) are located within the Scot-NI 4 application corridor (Coracle 2020a). All the wrecks were known from the outset and have been avoided during cable routeing.

The archaeological review of the survey data has identified seven geophysical anomalies of 'high' and 'medium' archaeological potential within the Scot-NI 4 CSC as summarised in Table 10-4 below. The locations of these anomalies can be viewed in Appendix G.

Of the anomalies, four are classified as being of 'high' and three of 'medium' archaeological potential. One of the anomalies may correspond with a known historic asset.

Table 10-4 Summary of geophysical anomalies with archaeological potential Scot-NI 4

CA No.	Description	Archaeological Potential
CA_4002	Magnetic anomalies SN4-D-UMC0350-55 (55-172nT) associated with area of increased seabed roughness in SSS	Medium
CA_4007	SSS anomaly SN4-D-SC4955, 20 x 4 x 1m, showing a linear feature within a bathymetric depression measuring 55 x 24 x 2m. Possible wreck site	High
CA_4009	SSS anomaly SN4-D-SC4154 (24 x 5 x 0.7m) linear anomaly visible in both SSS and bathymetry, attributed to a wreck site. Possible debris c. 20m to the south associated with SSS anomalies SN4-D-SC4155 and SN4-D-SC4162	High
CA_4010	SSS anomalies SN4-D-SC4158 and SN4-D-SC4159, possibly debris associated with CA_4009	High

CA No.	Description	Archaeological Potential
CA_4011	SSS anomalies SN4-D-SC4152, SN4-D-SC4156, SN4-D-SC4157, SN4-D-SC4160 and SN4-D-SC4161, possibly debris associated with CA_4009	High
CA_4013	Magnetic anomalies SN4-D-MC093 (17nt), SN4-D-UMC1207 (35nT), SN4-D-UMC1208 (36nT) and SN4-D-UMC1209 (53nT) associated with an angular dark SSS reflector, 7 x 3 m	Medium
CA_4014	SSS anomaly SN4-D-SC0489 (3.7 x 6.3m) associated with bathymetric anomaly	Medium

Most of the cultural heritage interest within the CSC refer to reports of losses rather than known wreck sites with several assets recorded at the same location. No corresponding geophysical anomalies were visible in the marine geophysics survey data. An anomaly indicative of a previously unmapped wreck site is located within a depression visible in the bathymetric data, with the nearest historic asset identified in the DBA an unknown wreck 7 km west of the anomaly.

A defined hull is visible in the geophysical datasets (Table 10-3: CA4009) measuring 20m in length and a visible beam of 5m. A series of anomalies are visible to the south of the wreck site which may be indicative of scattered debris. No known wreck site was identified within the DBA at this location. An unknown wreck site was identified lying 900m southwest of the wreck site. It is possible that these are the same vessel. No further work sites were identified within the CSC during the review of marine geophysical data.

No features with archaeological potential are visible, therefore the potential for submerged palaeo-landscape features along the CSC are deemed to be low.

10.5.3.4 Archaeological Exclusion Zones (AEZs) (Scot-NI 4)

The proposed AEZs have been avoided where possible and where not possible, the cable route has been engineered to minimise the surface area crossed through these AEZs. This section details the two proposed AEZs crossed by the proposed Scot-NI 4 cable and the spatial constraints associated with the routeing. As shown in the archaeological reports (Appendix G) these are both medium potential AEZs.

The routeing considerations and constraints for these two AEZ's are summarised in Table 10-5 below. It is important that the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification.

Table 10-5 Summary of AEZs crossed by Scot-NI 4 route

CA No.	AEZ Radius (proposed by Coracle)	Encroachment into AEZ	Archaeological Potential	Routeing considerations
4002	30m	29m	Medium	The magnetometer targets are well dispersed and do not offer a clear path through. The route has been amended to go just to the north of the AEZ centre point which avoids all the individual magnetometer targets. The extent of the AEZ significantly overlaps the UXO survey corridor and as such it cannot be avoided by the cable route. See Figure 10-9
4013	20m	19m	Medium	The magnetometer targets are well dispersed therefore the route passes just to the east of the AEZ centre point. This avoids all individual magnetometer hits. The extent of the AEZ is unavoidable as the cable route needs to be ≥13m from the edge of the UXO corridor to obtain UXO ALARP certification. See Figure 10.10

Figure 10-9 Archaeological Exclusion Zone for geophysical anomaly CA_4002

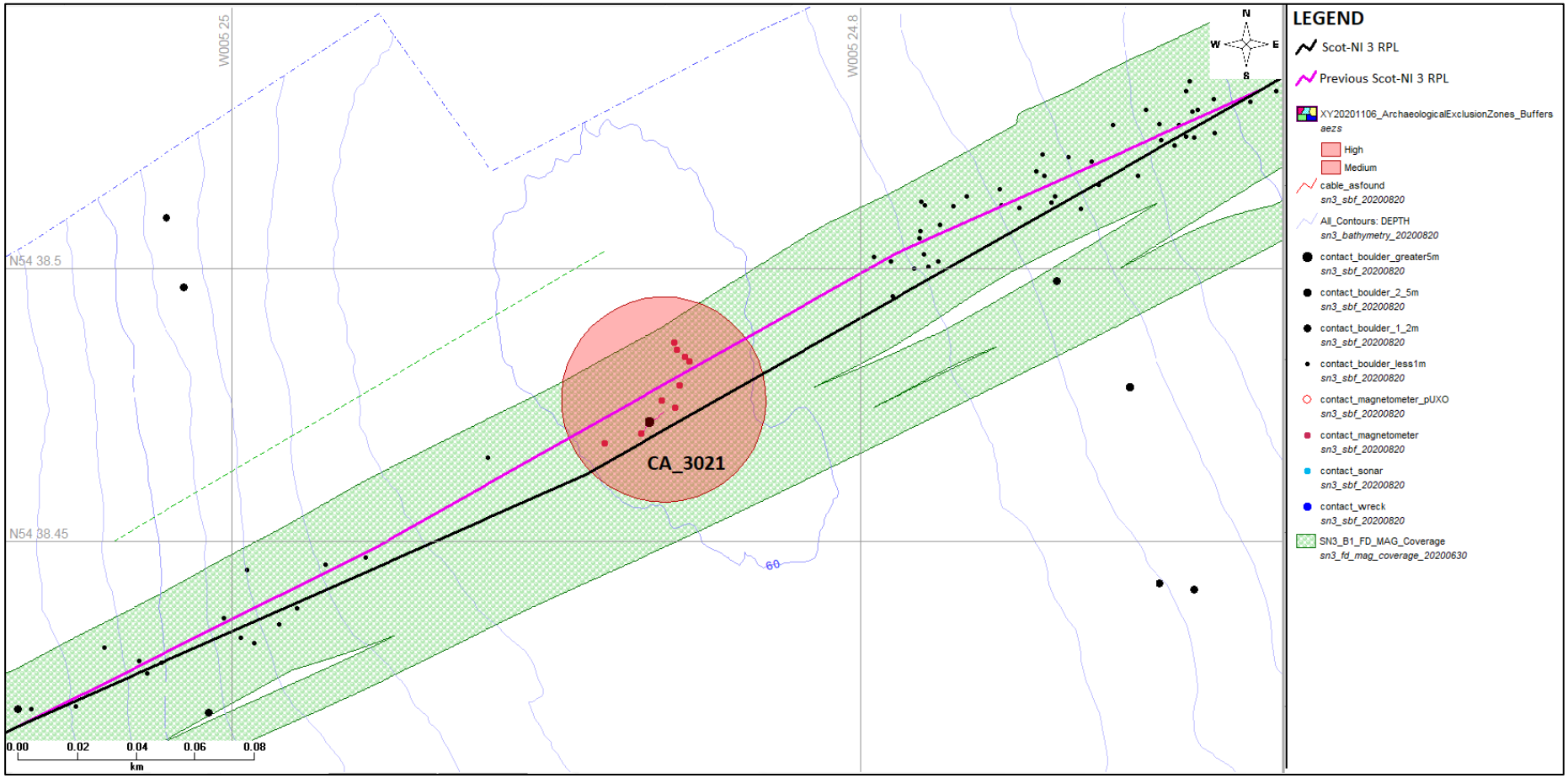
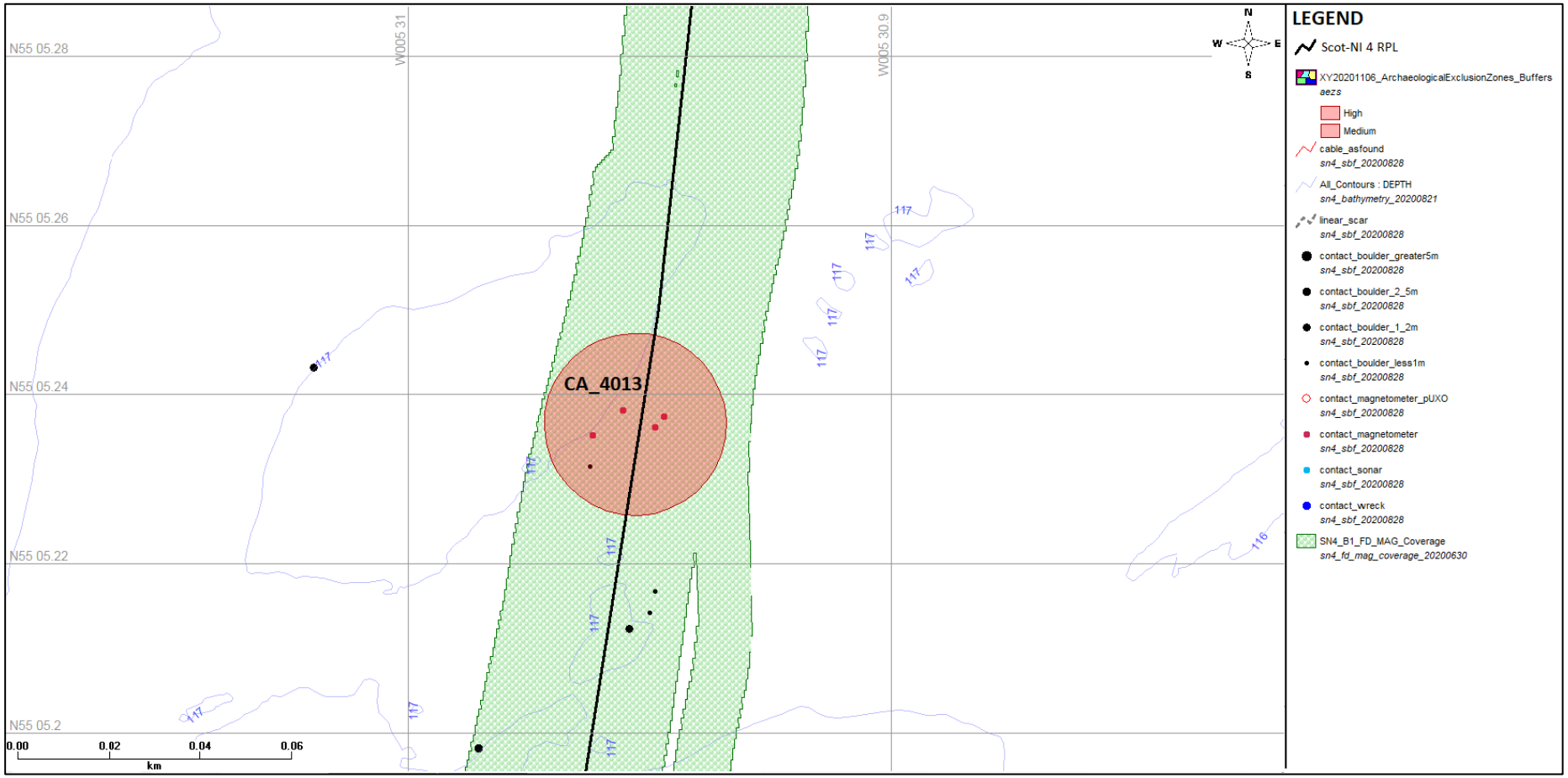


Figure 10-10Archaeological Exclusion Zone for geophysical anomaly CA_4013



10.6 Potential pressure identification and zone of influence

One potential pressure to marine archaeology has been included for further assessment. The zone of influence (the spatial extent over which effects may extend) has also been defined. The zone of influence has been used to establish a search area within marine archaeology could be affected and is outlined in Table 10-6.

Table 10-6 Potential pressures and zones of influence – marine archaeology

Project Activity	Potential Pressure	Receptor	Worst case zone of influence
Seabed preparation, cable installation.	Abrasion/disturbance at the surface of the substratum	Potential archaeology	Footprint of the installation in relation to archaeological targets identified through desk top study, and archaeological review of geophysical survey data.
Seabed preparation, cable installation.	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Potential archaeology	**Scotland jurisdiction** **Scot-NI 3**: Plough (abrasion): 0.052 km^2 Plough (penetration): 0.01 km^2 PLGR (penetration): 0.04 km^2
			NI jurisdiction **Scot-NI 3:** Plough (abrasion): 0.057 km^2 Plough (penetration): 0.011 km^2 T-ROV: 0.0001 km^2 PLGR (penetration): 0.044 km^2
			Scotland jurisdiction **Scot-NI 4:** Plough (abrasion): 0.150 km^2 Plough (penetration): 0.029 km^2 T-ROV: 0.0004 km^2 PLGR (penetration): 0.115 km^2
			NI jurisdiction **Scot-NI 4:** Plough (abrasion): 0.072 km^2 Plough (penetration): 0.014 km^2 T-ROV: 0.0001 km^2 PLGR (penetration): 0.055 km^2

10.7 Embedded mitigation

The project description, described in Section 2, provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to marine archaeology is provided in Table 10-7. These measures will be complied with as a matter of best practice.

Table 10-7 Embedded mitigation

ID	Embedded mitigation
BP 8	Archaeological exclusion zones (AEZs) have been assigned to anomalies. These have been avoided where possible and where not possible the surface area crossed by the cable has been minimised to protect potential archaeological features. Additionally, for the Portpatrick shore end for high archaeological AEZs anomalies (CA_3002 & CA_3003) divers will buoy off visible extent.

10.8 Impact Assessment

10.8.1 Abrasion/disturbance at the surface of the substratum

10.8.1.1 Scot-NI 3

Detailed investigations have assessed archaeology, the submerged palaeo-archaeology, and the archaeological potential of the proposed Scot-NI 3 route. An assessment of geophysical survey data did not reveal the presence of any palaeo-environmental features that may have archaeological potential.

The DBA identified 17 cultural heritage assets within the CSC for Scot-NI 3 including 16 wrecks and one monument. None of these are protected wrecks or designated monuments and none were positively identified during the marine geophysical or landfall survey data.

No anomalies of archaeological potential were identified within geophysical and metal-detector surveys at both Port Mora and Donaghadee landfalls.

A total of 11 geophysical anomalies with 'high' and 'medium' archaeological potential were identified within the application corridor, none of which correspond to any known assets identified within the DBA.

AEZs have been proposed to avoid disturbance to the seabed surrounding these unknown anomalies. These zones have been avoided where possible by rerouting the cable. There are two high risk AEZs and three medium risk AEZs that are unavoidably crossed by the Scot-NI 3 route. Rerouting to completely avoid these AEZs is not possible because of routing constraints. Of particular importance is that the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification. The unique routeing constraints are considered further in Table 10-3.

In these five AEZ's the surface area of the AEZ crossed by the cable has been minimised to protect potential archaeological features. However, the AEZ's proposed by Coracle Archaeology are based on the precautionary principle and are wider than necessary following detailed engineering and assessment of the project specific activities. The potential disturbance to the seabed will be confined to a narrow corridor. Additionally, for the Portpatrick shore end for the two-high archaeological AEZs anomalies (CA_3002 & CA_3003) divers will buoy off the visible extent of the anomaly. Therefore, effects to archaeology are not significant.

10.8.1.2 Scot-NI 4

Detailed investigations have assessed archaeology, the submerged palaeo-archaeology, and the archaeological potential of the proposed Scot-NI 4 route. An assessment of geophysical survey data did not reveal the presence of any palaeo-environmental features that may have archaeological potential.

The DBA identified seven cultural heritage assets within the CSC for Scot-NI 4 including five wrecks and one aircraft. None of these are protected wrecks or designated monuments and only one asset was tentatively identified during the marine geophysical or landfall survey data.

No anomalies of archaeological potential were identified within geophysical and metal-detector surveys at both Girvan and Larne landfalls.

A total of seven geophysical anomalies with archaeological 'high' or 'medium' potential were identified within the Scot-NI 4 CSC. Four of the anomalies are classified as 'high' and three of 'medium' archaeological potential.

AEZs have been proposed to avoid disturbance to the seabed surrounding these unknown anomalies. and these zones have been avoided where possible by rerouting the cable. There are two medium risk AEZs that are unavoidably crossed by the Scot-NI 4 route. Rerouting to completely avoid these two AEZs is not possible because of routing constraints. Of particular importance is that the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification. The unique routeing constraints are considered further in Table 10-4.

Within these two AEZ's, the surface area of the AEZ crossed by the cable has been minimised to protect potential archaeological features. The AEZ's proposed by Coracle Archaeology are based on the precautionary principle and are wider than necessary following detailed engineering and assessment of the project specific activities. The potential disturbance to the seabed will be confined to a narrow corridor. Therefore, effects to archaeology are not significant.

10.8.2 Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion

10.8.2.1 Scot-NI 3

As with abrasion/disturbance at the surface of the substratum, detailed investigations have assessed archaeology, the submerged palaeo-archaeology, and the archaeological potential of the proposed Scot-NI 3 route. Geophysical survey data did not reveal the presence of any palaeo-environmental features that may have archaeological potential.

A total of 11 geophysical anomalies with archaeological 'high' or 'medium' potential were identified within the Scot-NI 3 CSC, none of which correspond to any known assets identified within the DBA. Two of the anomalies are classified as of 'high' and nine of 'medium' archaeological potential.

AEZs have been proposed to avoid disturbance to the seabed surrounding these unknown anomalies and these zones have been avoided where possible by rerouting the cable. There are two high risk AEZs and three medium risk AEZs that are unavoidably crossed by the Scot-NI 3 route. Rerouting to completely avoid these AEZs is not possible because of routing constraints. Of particular importance is that the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification. The unique routeing constraints are considered further in Table 10-3.

In these five AEZ's the surface area of the AEZ crossed by the cable has been minimised to protect potential archaeological features. However, the AEZ's proposed by Coracle Archaeology are based on the precautionary principle and are wider than necessary following detailed engineering and assessment of the project specific activities. The potential disturbance to the seabed will be confined to a narrow corridor. Additionally, for the Portpatrick shore end for the two-high archaeological AEZs anomalies (CA_3002 & CA_3003) divers will buoy off the visible extent of the anomaly. Therefore, effects to archaeology are not significant.

10.8.2.2 Scot-NI 4

A total of seven geophysical anomalies with archaeological 'high' or 'medium' potential were identified within the Scot-NI 4 CSC. Four of the anomalies are classified as 'high' and three of 'medium' archaeological potential.

AEZs have been proposed to avoid disturbance to the seabed surrounding these unknown anomalies and these zones have been avoided where possible by rerouting the cable. There are two medium risk AEZs that are unavoidably crossed by the Scot-NI 4 route. Rerouting to completely avoid these two AEZs is not possible because of routing constraints. Of particular importance is that the route must stay within the agreed UXO survey coverage corridor and be at least 13m from the boundary of this corridor to maintain UXO ALARP Certification. The unique routeing constraints are considered further in Table 10-4.

Within these two AEZ's, the surface area of the AEZ crossed by the cable has been minimised to protect potential archaeological features. The AEZ's proposed by Coracle Archaeology are based on the precautionary principle and are wider than necessary following detailed engineering and assessment of the project specific activities. The potential disturbance to the seabed will be confined to a narrow corridor. Therefore, effects to archaeology are not significant.

11. SHIPPING AND NAVIGATION

11.1 Introduction

This Section summarises the findings of the Navigation Risk Assessment (NRA) (Appendix E) undertaken for the Project and outlines the likely significant effects from cable installation on shipping and navigation.

11.2 Data sources

The NRA data sources included the following:

- EMODnet vessel density maps of European waters, 2019.
- Admiralty charts (FindMaps 2018).
- Royal Yachting Association (RYA), 2019.
- MMO Fishing Data, 2016.
- Marine Traffic.
- RNLI Incident Data (2020).
- Marine Accident Investigation Branch (MAIB) (2020).

11.3 Consultation

The NRA (Appendix E, Table 1-4) summarises the consultation undertaken with regards to shipping and navigation. A total of 15 stakeholders were consulted including statutory stakeholders in Scotland and Northern Ireland and the RYA (Scotland and Northern Ireland).

11.4 Existing Baseline Description

11.4.1 Shipping

Shipping activity within the Scot-NI Project area has been thoroughly considered in the NRA. A summary of the shipping present within each application corridor is provided below. Monthly shipping densities in the vicinity of the Scot-NI 3 and 4 application corridors are displayed in Figure 11-1 (Drawing Reference: P2302-SHIP-013) below.

11.4.1.1 Scot-NI 3

A total vessel density of 31,670 hours per month were recorded across the Scot-NI-3 application corridor over 2019. Fishing vessels make up 11% of the data while Cargo vessels make up 31%. The percentage of fishing vessels are a lot lower across the Scot-NI-3 application corridor than the Scot-NI-4 application corridor. The busiest months are observed to be from May to September. Shipping density increases within Northern Irish waters associated with vessel traffic from Belfast Harbour and associated shipping lanes.

11.4.1.2 Scot-NI 4

A total vessel density of 42,239 hours per month were recorded across the Scot-NI 4 application corridor in 2019. Cargo, fishing, and passenger vessels make up most of the dataset (22%, 29% & 19% respectively). The busiest period is between May and September with the busiest month being May with fishing unusually high during this month.

11.4.2 Ferry Operators

11.4.2.1 Scot-NI 3

While the Belfast Harbour and Bangor Marina are over 25km and 10km away from the Scot-NI-3 application corridor, most high-density vessel traffic is associated with vessels entering and exiting the port and marina. Belfast Harbour and the Port of Larne 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 application corridor:

- Belfast to Liverpool (two crossings daily).
- Belfast to Douglas.
- Larne to Fleetwood.

11.4.2.2 Scot-NI 4

There is one ferry route which intersects the proposed Scot-NI-4 application corridor and two which run just to the south of the application corridor near KP 72 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).

11.4.3 Fishing Activity

Fishing activity has been considered within Section 12 and separately within the NRA (Appendix E) and Fishing Activity Study (FAS) in Appendix F of this MEA. Fishing is consistently present across both Scot-NI application corridor. By analysing the seasonality, fishing is generally more intensive from May to September and with a significant increase in the month of May. The key elements for Scot-NI 3 and Scot-NI 4 are summarised below.

11.4.3.1 Scot-NI 3

Fishing effort follows a seasonal pattern with overall activity lower between December and June followed by a rapid increase and peak in effort between August and November. From consultation with the fisheries stakeholders, August and September are identified as particularly profitable months for potting, whereas the scallop fishing season runs from November to March. The Scottish section of the Scot-NI 3 application corridor shows increased activity across the North Channel, towards the Firth of Clyde. However, applying a speed filter to filter out vessels that are not moving at typical fishing speeds (0 – 4 knots) reveals that most vessels are crossing rather than fishing the area in the middle of the North Channel. The Northern Irish section of the proposed Scot-NI 3 application corridor shows a greater number of fishing vessel movements to the south of the corridor (See FAS Appendix F Section 6).

11.4.3.2 Scot-NI 4

The most distinct area where fishing activity is more intensive is in the Firth of Clyde, between KP 10 to KP 30 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 cable application corridors largely avoid this area; however, Scot-NI 4 unavoidably enters the area due to the location of the 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.

11.4.4 Other Sea Users

Other sea users have been considered within Section 13 and the NRA (Appendix E). The key elements for Scot-NI 3 and Scot-NI 4 are summarised below.

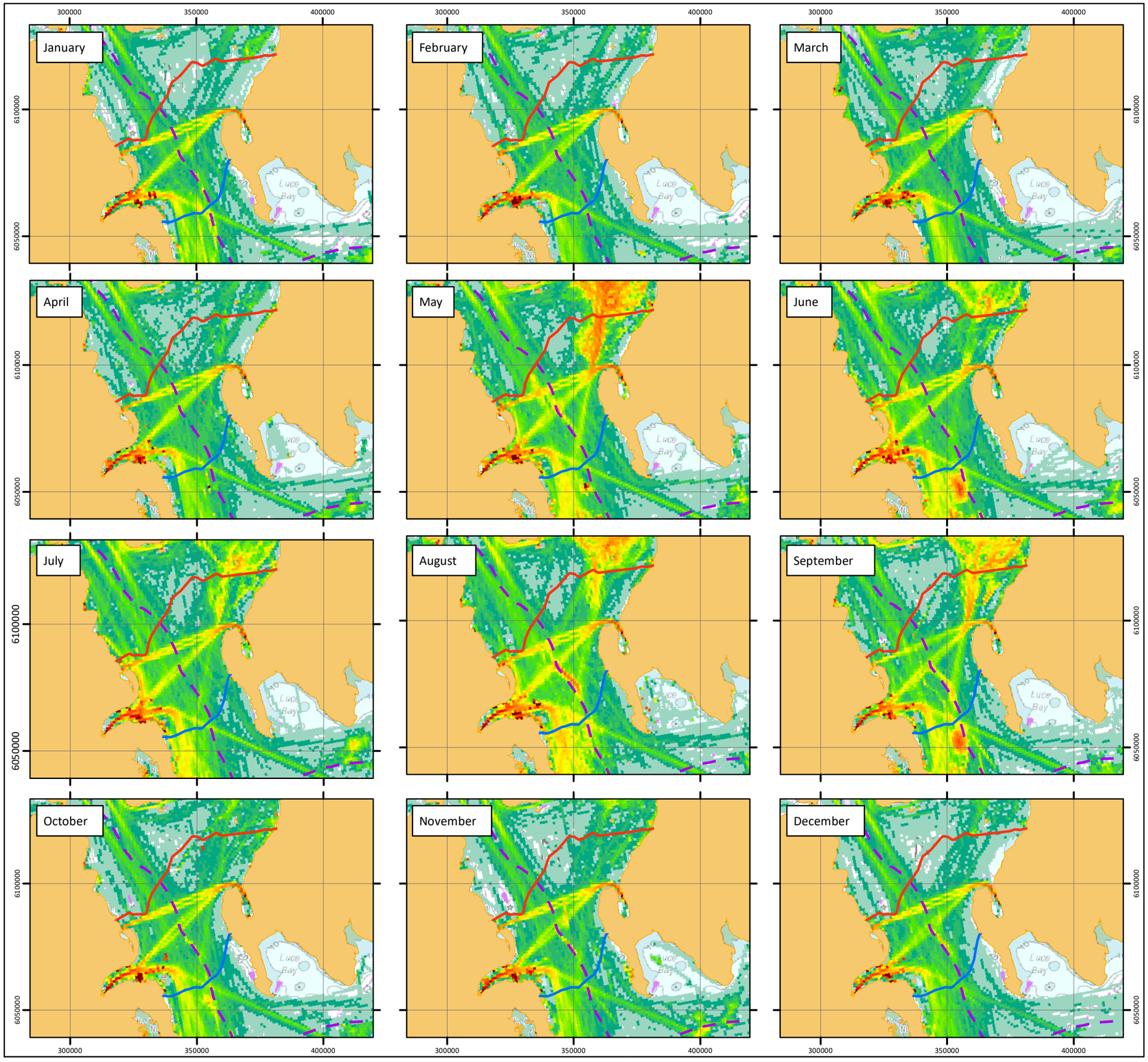
11.4.4.1 Scot-NI 3

The RYA Automatic Identification System (AIS)[1] intensity is moderate on the Scotland side of the proposed application corridor in some areas associated with Portpatrick and along the coastline. AIS intensity is Low to Moderate across the Scot-NI 3 application corridor with the high-density areas confined to the Irish coastline, from KP 36 to KP 40, with the highest intensity extending down from Bangor Marina.

11.4.4.2 Scot-NI 4

There is one RYA club and one marina approximately 2km to the north of the SCOT-NI 4 application corridor associated with Girvan port, which is unlikely to be affected. The AIS intensity associated with this part of the application corridor is also Low to Negligible. 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 corridor which is unlikely to be affected during the cable installation process. However, there is an area of moderate AIS intensity leading from Belfast Harbour, which transect the Scot-NI 4 application corridor at KP 79 and KP 81. Larne Lough general boating area (3.6km south east) includes the East Antrim Boat Club, Island Magee Boat Club and Blue Circle Sailing Club, whose activities are mainly confined to the lough itself (RYA 2020).

[1] 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.



SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

AIS VESSEL DENSITY
Monthly Vessel Densities
All Vessels

Drawing No: P2302-SHIP-013 | **A**

Legend

- SCOT-NI3 Submarine Cable Route
- SCOT-NI4 Submarine Cable Route
- Scotland/Northern Ireland Adjacent Waters Limit

2019 Vessel Density

Vessel Hours (per km²)

100
10
0

NOTE: Not to be used for Navigation

N
W E
S

Date	16 October 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-SHIP-013.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

BT Global Marine intertek

0 20 40 60 80 km

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11.5 Potential pressure identification and zone of influence

Based on the risk assessment undertaken within the NRA (Appendix E), the following pressures were scoped out. Justification for this exclusion is provided in the NRA and in Section 3, Table 3-3:

- Presence of the installation vessel; and
- Changes in water depths.

All effects to shipping and navigation that have been considered in the NRA are listed in Table 11-1 below.

Table 11-1 Potential effects and zones of influence

Activity	Potential pressure	Receptor	Worst case zone of influence
Pre-Lay Grapnel Run	▪ Displacement of vessels due to avoidance of Project vessels ▪ Vessel Collision ▪ Project vessels blocking navigational features ▪ Fishing interaction with surface laid cable ▪ Accidental anchoring on surface laid cable ▪ Extreme weather conditions	Project vessels, Commercial shipping, recreational boating, and fishing vessels	Immediate installation corridor - vessels requested to remain at least 1NM away from cable vessels during installation operations.
Shore End Operations (cable pull in)			As above
Cable lay and burial			As above
Offshore installation, post-lay inspection, and burial (PLIB)			As above
Surface Lay where plough burial is not feasible			As above

11.6 Embedded mitigation

The NRA (Appendix E) and Fishing Activity Mitigation Action Plan (Appendix C) have provided the Project with mitigation measures to minimise the effects to shipping, commercial fisheries, and other sea users. Through the application of these mitigation measures, all risks to these receptors has been reduced to As Low as Reasonably Possible (ALARP), therefore no further assessment is required.

The NRA assumes that these measures will be complied with; either as a matter of best practice (BP) or to ensure compliance (COMP) with statute.

Table 11-2 Embedded mitigation measures: Project design

ID	Embedded mitigation
COMP 5	The dropped object procedure will be followed, and any unrecovered dropped objects must be reported to the relevant authority (MS LOT or DAERA) using their dropped object procedure, within 24 hours of the project becoming aware of an incident.
COMP 6	Project vessels will comply with the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs) – as amended
COMP 7	'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.
COMP 8	Should the project create potential hazards to shipping (such as large rock berms) along the cable routes, stakeholders will be informed immediately via a NtM to ensure safety is upheld.

ID	Embedded mitigation
BP 1	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 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 distance will be requested.

11.7 Risk assessment

The descriptions and definitions in the NRA risk analysis (Appendix E - Section 6) takes into consideration the applied mitigation needed to reduce the hazards to ALARP.

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 which therefore lowers the overall risk rating. 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 is required. 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). Effects of cable installation to shipping and navigation are therefore considered to be low.

12. COMMERCIAL FISHING

12.1 Introduction

This Section provides details of commercial fishing activity that may be present in the vicinity of the Scot-NI 3 and 4 application corridors and identifies potential impacts associated with the installation. It should be read in conjunction with the separate Fishing Mitigation and Action Plan (FLMAP) (Appendix C) and the Fishing Activity Study (Appendix F) which provides a summary assessment of all the potential marine interactions, including commercial fisheries, which could influence or affect the proposed cable works.

12.2 Data sources

The key data sources used to inform the commercial fishing baseline description and assessment includes but is not limited to the following:

- Fishing effort and quantity and value of landings by International Council for the Exploration of the Sea (ICES) Rectangle (Scottish Government, 2019).
- The FLMAP (Appendix C) provides a summary of the potential impacts of the Scot-NI 3 and Scot-NI 4 replacement cables. It also details the mitigation measures to be implemented by the Project. This information has been used to inform the baseline overview of this Section, and a summary of the assessment findings.
- Navigation Risk Assessment (Appendix E) provides information to inform the baseline for shipping and navigation activity in the area and includes assessment of any hazards identified and mitigation measures to manage these. This information has been used to inform the specific navigational risks associated with commercial fishing activity in the area.
- The FAS (Appendix F) details the fishing methods and activity that takes place in the vicinity of the proposed Scot-NI 3 and Scot-NI 4 replacement cables.

12.3 Consultation

The Project has appointed an independent Fishing Liaison Officer (FLO) for the survey and installation phases of the Scot-NI replacement cables. Fisheries liaison and consultation commenced on the 18th March 2020; the Phase 1 – Initial Consultations involved visits and calls with local fishing organisations and stakeholders to discuss the survey and installation, planned for the following year. Phase 2 – Follow-up conversations began in October 2020 where fishing organisations and stakeholders had the opportunity to comment on the draft FLMAP with any remaining questions or concerns that would be incorporated into the final FLMAP. The full list of consulted fisheries stakeholders is available in Appendix I of the FLMAP (Appendix C). Table 12-1 summarises the consultation comments received that are relevant to commercial fisheries and received prior to and during preparation of the MEA Report.

Table 12-1 Consultation responses

Stakeholder	Comments	How this has been addressed
Marine Scotland (MS)	MS recommended to document the conversations with fishermen, NatureScot and other key stakeholders and append them to the MEA Report.	The consultation with fisheries stakeholders is documented in the FLMAP (Appendix C).

Stakeholder	Comments	How this has been addressed
Department of Agriculture, Environment and Rural Affairs (DAERA) Fisheries Division	Consultation should involve Northern Ireland Fish Producers Organisation Ltd (NIFPO) and Anglo North Irish Fish Producers Organisation Ltd (ANIFPO) as you indicate, and there are also other organisations such as the Northern Ireland Scallop Fishermen's Association, The North Coast Lobster Fishermen's Association which would have interests at Larne, and the North East Lobster Fishermen's Co-operative which has interests at Donaghadee.	All the suggested fish producer organisations have been included in the consultation. The consultation with fisheries stakeholders is documented in the FLMAP (Appendix C).

12.4 Existing baseline description

12.4.1 Commercial fishing

Scot-NI 3 is located within ICES rectangle 38E4 and Scot-NI 4 is located within ICES rectangles 38E4, 39E4 and 39E5 (Figure 12-1 (Drawing Reference No: P2302-FISH-001-A)). According to the Marine Scotland statistics, ICES rectangle 38E4, 39E4 and 39E5 are primarily targeted for shellfish and pelagic species, although some demersal species are also targeted (Scottish Government 2019). The commercial fishing identified for each Scot-NI application corridor have been defined below.

12.4.1.1 Scot-NI 3

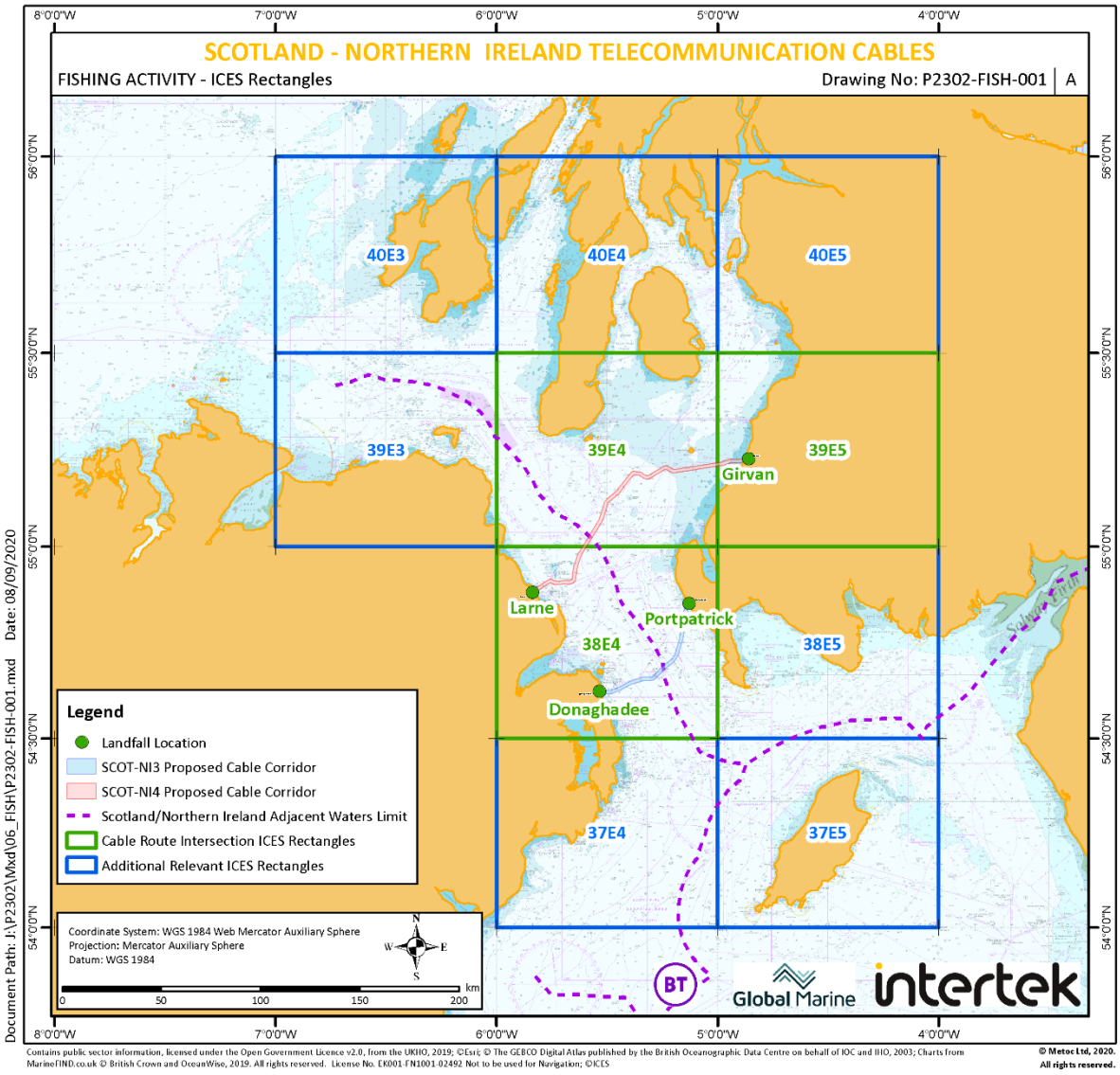
Scot-NI 3 passes through ICES rectangle 38E4. Within this ICES rectangle, pots, traps, and dredging account for most fishing effort, with scallops, herring and hake being the top species targeted. Fishing effort follows a seasonal pattern with overall activity lower between December and June followed by a rapid increase and peak in effort between August and November. From consultation with the fisheries stakeholders, August and September are identified as particularly profitable months for potting, whereas the scallop fishing season runs from November to March.

In 2018, a total catch value of £2 million was landed from ICES rectangle 38E4. The Scottish section of the Scot-NI 3 route shows increased activity across the North Channel, towards the Firth of Clyde. However, applying a speed filter to filter out vessels that are not moving at typical fishing speeds (0 – 4 knots) reveals that most vessels are crossing rather than fishing area in the middle of the North Channel. This is consistent with the information from the fisheries consultation that most fishing activities, especially potting, are taking place closer to shore. The Northern Irish section of the Scot-NI 3 application corridor shows a greater number of fishing vessel movements south of the proposed Scot-NI 3 application corridor (See Fisheries Activity Study (FAS) Appendix F and Section 6 of the MEA Report).

12.4.1.2 Scot-NI 4

For ICES rectangle 39E5 close to the Girvan landfall, the highest catch takes place between June, July and August and the lowest catch between December and February. For ICES rectangle 39E4, there is a period of lower catch from December to April, a peak in June followed by steady catch levels from July to November. For both ICES rectangles 39E4 and 39E5, pots, dredging and demersal trawls account for most fishing effort with Nephrops, scallops and razor clam the top species being targeted. In 2018, there was a total catch value of £5.4 million from ICES rectangle 39E4 and £1.6 million from ICES rectangle 39E5. Most of the fishing activity in the vicinity of Scot-NI 4 across 39E4 and 39E5 is concentrated in the Firth of Clyde (Scotland) and includes pots, dredging and demersal trawls. In the Northern Irish section of the Scot-NI 4 application corridor the fishing activity is focused on potting and dredging, taking place closer to shore.

Figure 12-1 Location Overview map with ICES Rectangles (Drawing No: P2302-FISH-001-A)



12.5 Potential impacts and zones of influence

Key potential impacts on commercial fisheries have been identified following consultation with fishers and fish producer organisations with members operating in the region. All potential impacts identified by the fishing industry are identified in Table 12-2 below.

The potential for collision risk was assessed in Section 11 – Shipping and Navigation, with the risk expected to be minimal due to the temporary nature of vessel displacement and mitigation measures to be implemented (See Section 15 – Mitigation Schedule). The potential for impact on stocks has been assessed in Section 6 – Fish and Shellfish, with the effects being assessed as negligible due to the footprint of the installation and the absence of suitable habitat within the application corridors for demersal spawners.

Table 12-2 Potential impacts and zone of influence – commercial fishing

Project Activity	Potential Pressure	Receptor	Worst Case Zone of influence
Presence of Project vessels	Temporary displacement/ restricted access	Commercial fishing vessels and static gear	10.8 km² (Based on 1NM requested clearance from the cable ship)
Installation of cable and potential cable/crossing contingency external protection measures	Increased snagging risk	Commercial fishing vessels	In the direct vicinity of the cable

12.6 Embedded Mitigation

The Project description, described in Section 2, provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The FLMAP and the Navigation Risk Assessment (NRA) have identified key measures to minimise the potential effects on commercial fishing. Some mitigation measures are common between commercial fishing, shipping and navigation.

The embedded mitigation relevant to commercial fisheries is provided in Table 12-3 below. These measures will be complied with as a matter of best practice (BP) and compliance (COMP).

Table 12-3 Embedded mitigation measures: Project design

ID	Embedded mitigation
COMP 5	The dropped object procedure will be followed, and any unrecovered dropped objects must be reported to the relevant authority (MS LOT or DAERA) using their dropped object procedure, within 24 hours of the project becoming aware of an incident.
COMP 6	Project vessels will comply with the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs) – as amended
COMP 7	'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.
COMP 8	Should the project create potential hazards to shipping (such as large rock berms) along the cable routes, stakeholders will be informed immediately via a NtM to ensure safety is upheld.
BP 1	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 2020). Vessels are advised in the Mariners Handbook not to anchor or fish (trawl) within 0.25NM of cables.

ID	Embedded mitigation
BP 10	Disruption claims will be handled in accordance with ESCA standard operating practices.
BP 11	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 distance will be requested.

12.7 Impact assessment

12.7.1 Temporary displacement/restricted access

Vessels engaged in cable laying will conform to the Submarine Telegraph Act 1885 Article 5 regulations and exhibit signals to prevent collisions at sea. Other vessels which see the signals shall be requested to withdraw beyond 1NM (1.852km) from project vessels whilst they are engaged in cable installation activities. This request will be in the NtM, and broadcast via Navtex/VHF if deemed appropriate by the UKHO.

Based on installation speeds of 600m/hr, if gear removal is necessary, it will be temporary as the installation spread passes through the area. The duration of the vessel to transit an area is dependent on a number of factors including seabed type and weather considerations and is unlikely to be for more than 1-2 days, and forward notice will be given so vessels can plan their activities in advance to minimise disruption.

The FLO will liaise with static gear fishermen to identify a suitable temporary and transient gear displacement zone prior to installation. The entire installation process is expected to take less than three weeks, so individual areas within the application corridors are unlikely to be impacted for more than a few days at a time.

12.7.1.1 Scot-NI 3

During the proposed installation period (September - October), fishing activity for Scot-NI 3 is focussed on crab and lobster potting close to shore in Northern Irish waters, whilst some pots are in deeper waters. However, most of the potting activity takes place south of Scot-NI 3 application corridor and is not expected to interact with the Project. Should the installation timescales vary, the disturbance will be very localised and short term. During installation, the FLO will liaise with static gear fishermen in the area to discuss installation timescales through their area of interest. Static gear fishers operating within the installation corridors may be requested to temporarily move their pots from a short section of the corridor as the installation passes through. As the disturbance is highly localised, and short term, the effects of temporary displacement/restricted access to commercial fishers within then Scot-NI 3 application corridor is not significant.

12.7.1.2 Scot-NI 4

During the proposed installation period (September - October), fishing activity for Scot-NI 4 is focussed on demersal trawling for nephrops and potting for crab and lobster predominantly in the Firth of Clyde within Scottish waters. However, should the installation timescales vary, the disturbance will be very localised and short term. As the disturbance is highly localised, and short term, the effects of temporary displacement/restricted access to commercial fishers within then Scot-NI 4 application corridor is not significant.

12.7.2 Increased snagging risk

The risk of snagging and damage to the cables is increased in areas where bottom trawling and/or scallop dredging takes place. Where possible the installation route has followed the route of existing cables to reduce the area of seabed which is unavailable for trawling.

Cable burial to 1m is targeted for the entire Scot-NI 3 and Scot-NI 4 cable installation. However, in areas where cable burial is not possible due to seabed conditions or crossing points, remedial

protection may be required to help protect both the cable and other seabed users. The locations and types of potential external cable protection are not confirmed at this stage however the potential options are described in Section 2 and include:

- Concrete mattresses;
- Rock bags; and
- Rock berms.

12.7.2.1 Scot-NI 3

For Scot-NI 3, contingency external cable protection measures may be required at the cable crossing with Western Link power cable within Northern Irish waters and other discrete areas where burial of the cable is marginal as a result of seabed conditions. Any cable protection installed at a cable crossing is likely to be of a profile design to minimise the risk of snagging to commercial fishing vessels.

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 2020). Vessels are also advised in the Mariners Handbook not to anchor or fish (trawl) within 0.25NM of cables.

Should external cable protection be required for Scot-NI 3, and vessels operate over the installed cable, the main fisheries to be affected would be demersal trawls within the centre of the North Channel and scallop dredging within inshore waters off the coast of Ireland and Scotland. The locations and types of potential external cable protection are outlined in Section 2. However, considered the embedded mitigation measures proposed, effects of increased snagging risk to commercial fishing resulting from the installation of Scot-NI 3 are not significant.

12.7.2.2 Scot-NI 4

For Scot-NI 4, contingency external cable protection may be required at the cable crossing with Western Link power cable within Scottish waters and other discrete areas where burial of the cable is marginal as a result of seabed conditions.

Cable protection installed at a cable crossing is likely to be of a profile design to minimise the risk of snagging to commercial fishing vessels.

As noted for Scot-NI 3 above, fishing vessels should avoid trawling over installed seabed infrastructure (UKHO 2020, SOLAS 1974 as amended). Should vessels trawl over the installed cable, there is potential for snagging of fishing gear which could affect the demersal trawling fishery within the central North Channel and demersal trawling for Nephrops and scallop dredging within the Firth of Clyde. Snagging on an obstruction has the potential to cause damage to gear with financial consequences, therefore trawling over cables is not recommended (SOLAS 1974 as amended).

The locations and types of potential external cable protection will be determined following a post-cable lay inspection, however all details of contingency external cable protection measures deployed will be provided to the UKHO for dissemination to commercial fishermen. The effects of increased snagging risk to commercial fishing resulting from the installation of Scot-NI 4 are not significant.

13. OTHER SEA USERS

13.1 Introduction

This Section provides details of other sea users that may be present within the vicinity of the Scot-NI application corridors. Potential effects to other sea users from the proposed installation activities have been assessed, along with the mitigation and management measures that will be utilised to remove or reduce these impacts.

Other sea users include those relating to shipping and commercial fisheries and these have covered separately in Sections 11 and 12, respectively. This section focuses on sea users which have not been discussed elsewhere in the MEA Report. The following receptors have been grouped together in this section for consideration:

- Military Practice Areas;
- Disposal Sites;
- Renewable Energy;
- Pipelines Infrastructure;
- Existing Cables; and
- Recreational Activity.

13.2 Data sources

Baseline conditions have been established by undertaking a desktop review of published information. The data sources used to inform the baseline description and subsequent assessment include but are not limited to the following:

- Marine Scotland NMPi tool (Marine Scotland 2020)
- Northern Ireland Marine Map Viewer (DAERA 2020)
- Fisheries Liaison Mitigation and Action Plan (FLMAP) (Appendix C)
- Navigational Risk Assessment (Appendix E)
- Fishing Activity Study (Appendix F)

13.3 Consultation

Table 13-1 summarises the relevant consultation responses on the marine elements of the proposed Scot-NI application corridors received prior to and during preparation of the MEA Report.

Table 13-1 Consultation responses

Stakeholder	Comments	How this has been addressed
The Crown Estate	Received conflict check of existing operators in the area. These have confirmed the existing baseline description.	The conflict check has been reviewed and any existing seabed asset included in the report has been considered in this section.
Crown Estate Scotland	Received conflict check of existing operators in the area. These have confirmed the existing baseline description.	The conflict check has been reviewed and any existing seabed asset included in the report has been considered in this section.

Stakeholder	Comments	How this has been addressed
UK Hydrographic Office (UKHO) – SDR Team	No comments on the report. UKHO requests receipt of the appropriate information regarding the cable laying operation as outlined in your License Consent. This will include any bathymetric survey data you will undertake. This helps UKHO chart the cables correctly and inform mariners that work is being undertaken.	The Project note the UKHO response and will submit relevant documentation to the UKHO according to the licence conditions.
The Royal Yachting Association Northern Ireland (RYANI)	Cable installation projects rarely pose a risk to recreational craft and the local Notices to Mariners will 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.	The RYANI response is noted, mitigation measures are in place to ensure all mariners are aware of the installation prior to commencement of works.
The Royal Yachting Association Scotland (RYAS)	RYAS stated that the Project is unlikely to pose a risk to recreational craft and that any inconvenience is temporary. Approximately 20% of recreational craft transmit an AIS signal and that most movements are from May to September. A further suggested source of information is the 'Sailing Directions and Anchorages, Firth of Clyde including Solway Firth and North Channel'. This source indicates no anchorages near Girvan, Portpatrick and Larne but does not cover Donaghadee. Furthermore, RYAS mentioned the importance of publicising the work and commented that Notices to Mariners are NOT effective. Instead, notices posted at marinas and harbours within 50NM and a navigation warning during the 07:10 and 19:10 Coastguard transmissions are suggested as good ways of communication.	The RYA response is noted, mitigation measures are in place to ensure all mariners are aware of the installation prior to commencement of works.

13.4 Existing baseline description

13.4.1 Military practice areas

The Scot-NI application corridors are within an important military training exercise, test and evaluation area and cross a Navy Department Exercise area used for submarine exercise. This area has been segmented into several smaller areas with reference numbers. Figure 13-1 (Drawing Reference: P2302-INFR-001) shows the military exercise areas on the West coast of Scotland as well as the Navy Department channels.

13.4.1.1 Scot-NI 3

The landfall at Portpatrick is adjacent to the Luce Bay bombing and UXO demolition site, located approximately 3km inland from the cable land fall. Within Scottish waters, the Scot-NI 3 cable passes

through two sections of the Irish Sea Navy Department Exercise area, Beaufort (Ref X5408) for 20.8km and Magee (X5407) for 0.1km.

Within Northern Irish waters, Scot-NI 3 also passes through two sections of the Irish Sea Navy Department Exercise area Magee (Ref X5407) for 8.8km and Ardglass (Ref X5402) for 11.8km.

13.4.1.2 Scot-NI 4

The Scot-NI 4 application corridor passes through three sections of the Irish Sea Navy Department Exercise area.

Within Scottish waters the Scot-NI 4 cable passes through five sections of the Irish Sea Navy Department Exercise areas, Turnberry (X5521) for 16.3 km, Ballantrae (X5525) for 7.2 km, Ailsa (X5524) for 14.8 km, Mermaid (X5529) for 5.8km and Coresewall (X5526) for 13.3 km.

Within Northern Irish waters the Scot-NI 4 application corridor passes through two sections of the Irish Sea Navy Department Exercise area: Coresewall (X5526) for 1.4 km and Maiden (X5527) for 25.6 km.

In addition to the exercise areas, there is a smaller Firing Danger Area in the outer Clyde Firth. These firing areas are no risk to cable installation activity as they operate using a clear range policy, however, they do slightly increase the potential for the occurrence of blank shells in the Project Area which may be mistaken for live UXO.

13.4.2 Disposal sites

The spoil disposal sites within the Scot-NI Project Area are shown in Figure 13-1 (Drawing Reference: P2302-INFR-001).

13.4.2.1 Scot-NI 3

Scot-NI 3 passes through the disused Beaufort's Dyke disposal site for approximately 32km (KP 1 to KP 32). This area was used for the disposal of munitions and military waste from approximately 1920 until 1976. Beauforts Dyke disposal site is the largest munitions dump in British waters, and over 1 million tons of munitions have been disposed of within this area. Spoil includes munitions (ranging from bullets, grenades, mortar bombs, up to 12,000 lb High Capacity high explosive bombs and large sea mines) and chemical weapons.

13.4.2.2 Scot-NI 4

Scot-NI 4 passes within 1.4km of an open spoil disposal site at Girvan and 1km of a closed spoil site at Larne.

13.4.3 Renewable energy

There are currently no offshore wind farms planned or operational in the Project Area. The closest is Robin Rigg OWF, situated approximately 98km south-east of the Scot-NI 4 application corridor in the Solway Firth and therefore will not be affected by the Scot-NI Project. Similarly, there are no active or planned leases for wave power generation within the Scot-NI Project Area. Renewable energy will not be considered further in this assessment.

13.4.4 Pipeline infrastructure

There is one pipeline within the Project Area relevant to the Scot-NI Project as shown in Figure 13-1 (Drawing Reference: P2302-INFR-001).

13.4.4.1 Scot-NI 3

There are no pipelines within 10km of the Scot-NI 3 application corridor.

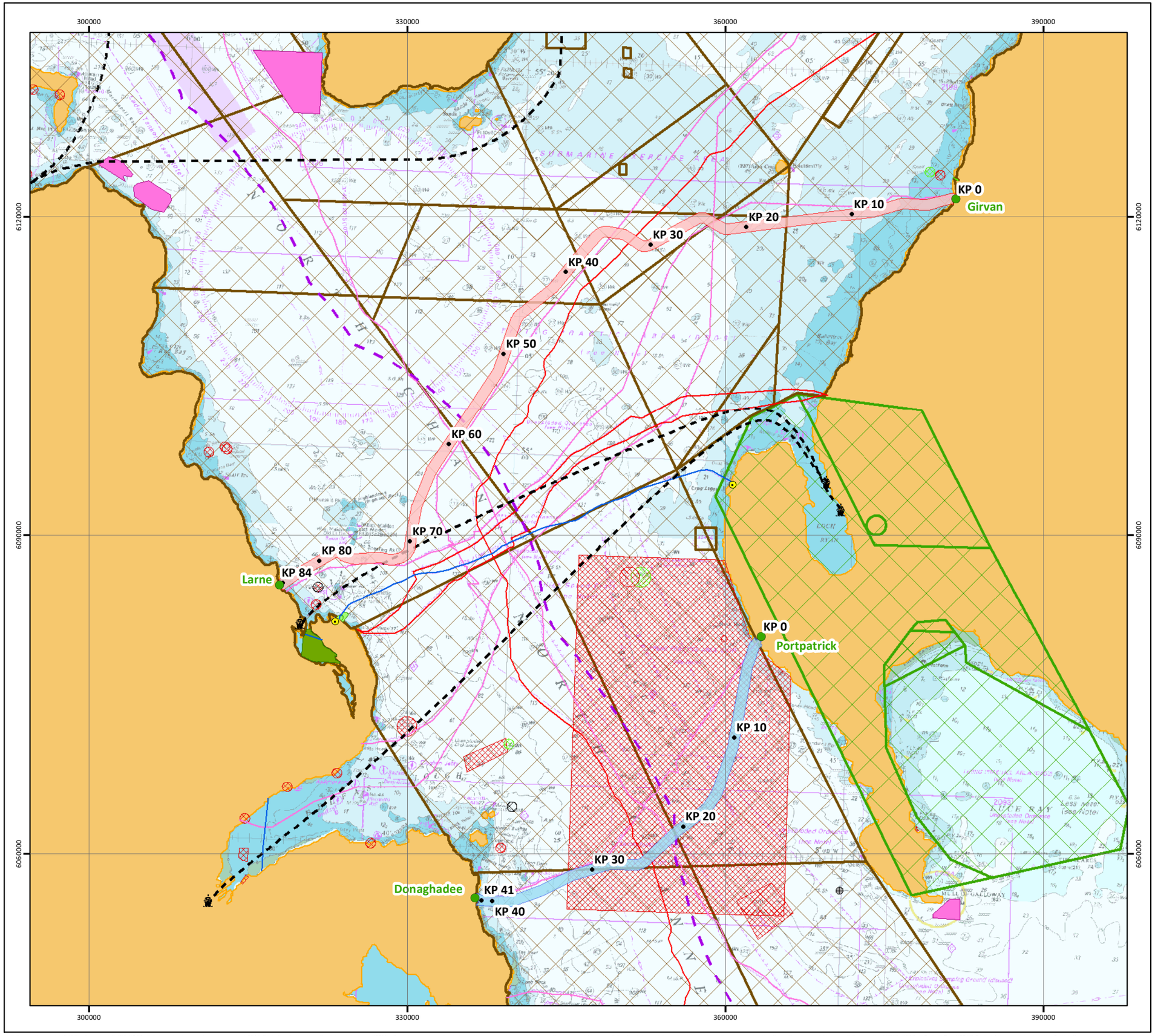
13.4.4.2 Scot-NI 4

The Scotland to Northern Ireland Pipeline (SNIP) is located approximately 1.5km from Scot-NI 4 within Northern Irish waters. This is a 24" gas pipeline for transfer of gas across the North Channel, landing at Stranraer and Islandmagee peninsulas. The pipeline does not cross or impact the proposed application corridor.

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

INFRASTRUCTURE
Other Marine Users

Drawing No: P2302-INFR-001 | **A**



Legend

- Landfall Location
- KP
- SCOT-NI3 Proposed Cable Corridor
- SCOT-NI4 Proposed Cable Corridor
- Scot/NI Adjacent Waters Limit

Transport

- Ferry Port
- Ferry Route

Oil and Gas Infrastructure

- Well
- Terminal

Pipelines

- Active

Cables

- Power
- Telecom

Military Exercise Area (PEXA)

- Defence Estates and Support (DE & S)
- Navy Department

Energy Infrastructure

- Tidal Lease
- Natural Gas Storage
- Natural Gas Pipeline

Disposal Sites

- Open
- Closed
- Disused

NOTE: Not to be used for Navigation

Date	08 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	TCE; CES; KISCA; OGA; CEFAS; ScotGov; UKHO; ESRI; GEBCO; MarineFind;
File Reference	J:\P2302\Mxd\15_INFR\ P2302-INFR-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

BT Global Marine intertek

0 5 10 15 20 km

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13.4.5 Existing sea bed cables

There are several existing in-service cables within the Scot-NI Project area as shown in Figure 13-1 (Drawing Reference: P2302-INFR-001).

13.4.5.1 Scot-NI 3

There are three cable crossings on the Scot-NI 3 route (Table 13-2). All cable crossing locations are shown in Figure 13-2 (Drawing Reference: P2302-CRSS-002).

Table 13-2 Scot-NI 3 Cable Crossings

Asset	Owner	Type	Jurisdiction
SCOT-NI 1	British Telecommunications plc	Telecoms	Scotland
Western HVDC	National Grid and Scottish Power	Power	Northern Ireland
Hibernia Atlantic	Hibernia Atlantic	Telecoms	Northern Ireland

13.4.5.2 Scot-NI 4

There are five cable crossings on the Scot-NI 4 route (Table 13-3). All cable crossing locations are shown in Figure 13-2 (Drawing Reference: P2302-CRSS-002).

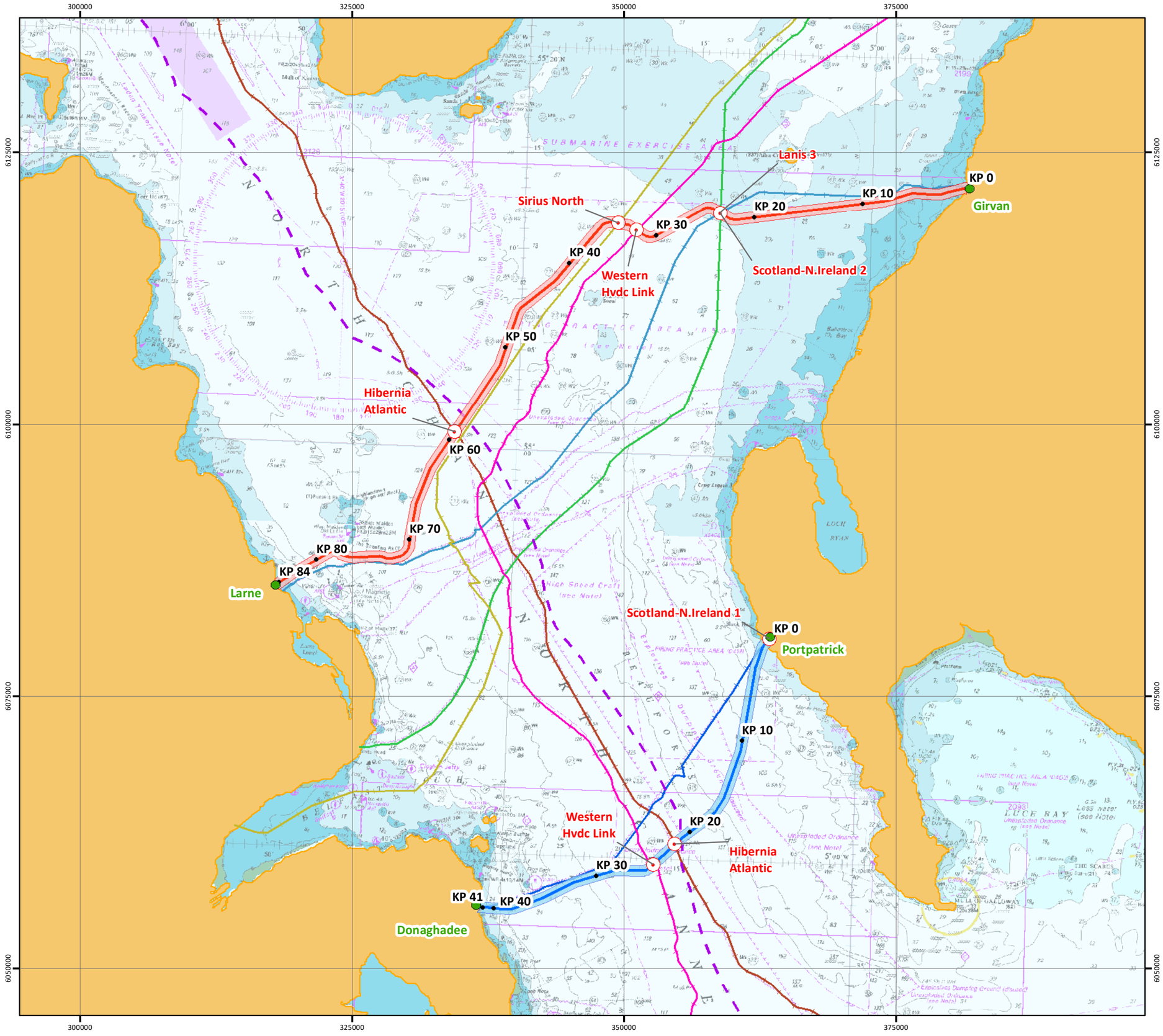
Table 13-3 Scot-NI 4 Cable Crossings

Asset	Owner	Type	Jurisdiction
LANIS 3	Vodafone	Telecoms	Scotland
SCOT-NI 2	British Telecommunications plc	Telecoms	Scotland
Western HVDC	National Grid and Scottish Power	Power	Scotland
SIRIUS North	Virgin Media	Telecoms	Scotland
Hibernia Atlantic	Hibernia Atlantic	Telecoms	Northern Ireland

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

CROSSINGS
Existing Cable Crossings

Drawing No: P2302-CRSS-002 | **A**



Legend

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

Existing Asset

- Scotland-Northern Ireland 1
- Scotland-Northern Ireland 2
- Lanis 3
- Western HVDC Link
- Sirius North
- Hibernia Atlantic

NOTE: Not to be used for Navigation

Date	19 October 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	KISCA; UKHO; ESRI; GEBCO; MarineFind;
File Reference	J:\P2302\Mxd\11_CRSS\ P2302-CRSS-002.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

0 2.5 5 7.5 10 km

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13.4.6 Recreational activity

Recreational usage of the waters surrounding the Scot-NI application corridors is shown in Figure 13-3 (Drawing Reference: P2302-REC-001-B).

13.4.6.1 Scot-NI 3

There are no marinas, RYA sailing clubs or training centres within close proximity to the Port Mora landfall site. Portpatrick harbour is located 1.4km south of the Port Mora landing site. There is a medium intensity of pleasure vessels visiting and sailing from Portpatrick harbour and coastal area (RYA 2019).

The offshore section of the application corridor has low intensity usage by pleasure craft. The nearshore area within Northern Irish waters has a medium intensity usage for pleasure craft.

The Donaghdee landfall is within proximity of Copelands marine (1.9km to the north east), Donaghdee sailing club (2.21km to the north) and Millisle Bathing Water (1.6km to the south). This designated bathing water (UKNO3_53300) has a status of good (DAERA 2019) and is approximately 1.8km in length adjacent to a sandy beach.

The usage of these facilities is seasonal with greater usage during the summer months.

13.4.6.2 Scot-NI 4

The Girvan landfall is within close proximity of Girvan bathing water (UKS7616025) (0.94km north), the Carrick Sailing Club (1.6km north) and Girvan Harbour pontoons (1.8km north).

Girvan bathing water is a 2 km long, flat bay. It is situated on the South Ayrshire coast adjacent to Girvan town. Most of the beach is sandy with some shingle. The beach is prized for its views of the Ailsa Craig and the Kintyre peninsula. The beach at Girvan has a water classification of ‘sufficient’ and is a popular local and tourist destination in the summer months (SEPA 2019).

The overall usage of Scottish coastal and offshore waters by pleasure craft is low to medium.

Within Northern Irish waters the usage increases with proximity to the coast to medium. The Larne Landfall is within close proximity of Ballygalley bathing water (UKNO5_51000) (1.8km north), which has a status of good (DAERA 2019). Further afield, approximately 5.2km south east of the Larne Landfall, is the Browns Bay bathing water (UKNO5_51100) which has a status of good (DAERA 2019).

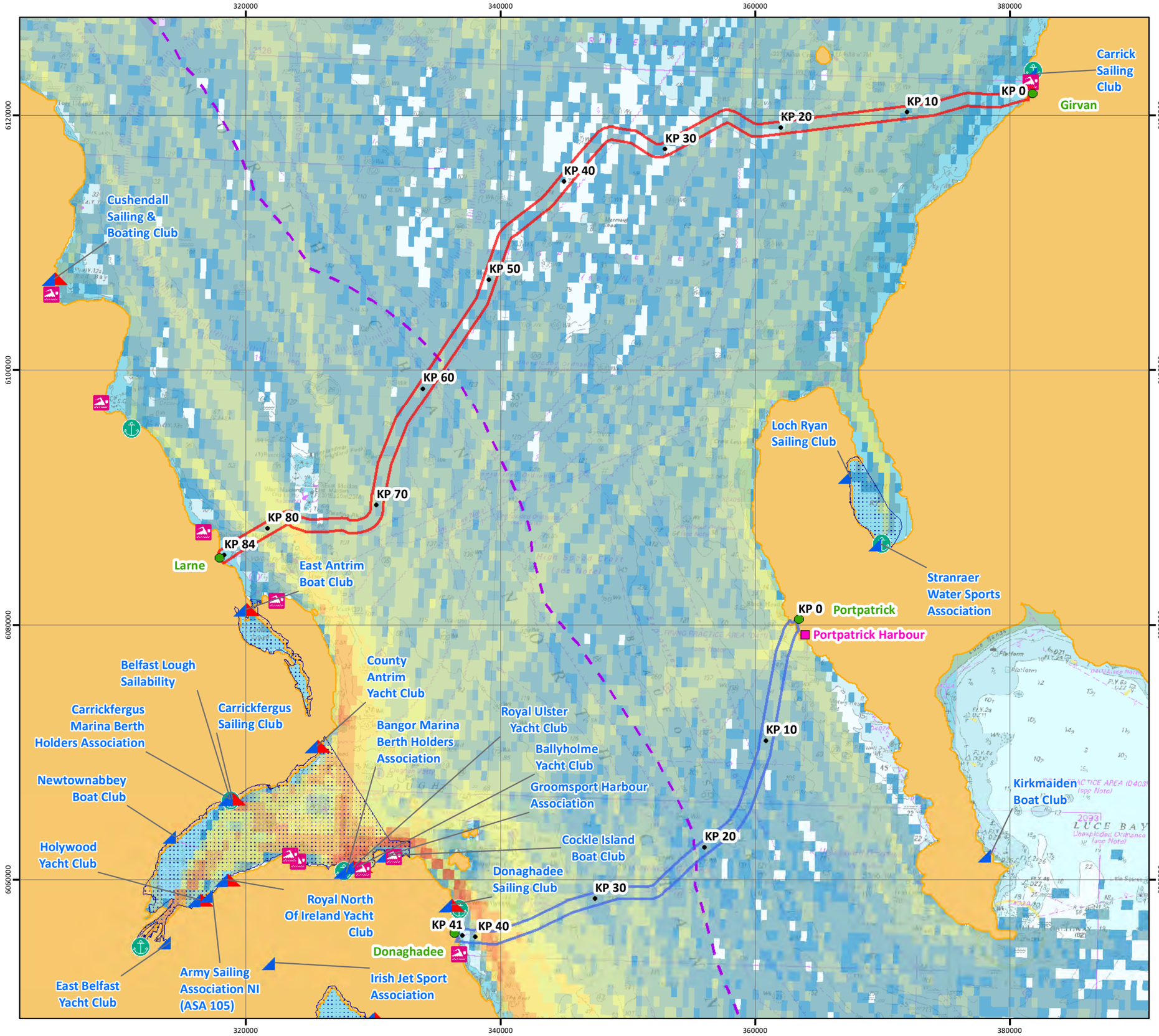
Larne Lough general boating area (3.6km south east) includes the East Antrim Boat Club, Island Magee Boat Club and Blue Circle Sailing Club, whose activities are mainly confined to the lough itself (RYANI 2020).

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

RECREATION

Designated Bathing Waters and Royal Yachting Association Recreational Boating

Drawing No: P2302-REC-001 | **B**



Legend

- Landfall Location
- KP
- SCOT-NI3 Proposed Cable Corridor
- 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

NOTE: Not to be used for Navigation

Date	17 November 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-REC-001.mxd
Created By	Chris Dawe
Reviewed By	Chris Carroll
Approved By	Paula Daglish

0 2.5 5 7.5 10 km

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13.5 Potential effects and zones of influence

The following pressures (Table 13-4) have been considered for other sea users and none have been screened out.

Three potential pressures to other sea users have been included for further assessment. The zone of influence (the spatial extent over which effects may extend) has also been defined.

Key potential effects on commercial fishing are considered in Section 12. The potential for collision risk is assessed in Section 11 - Shipping and Navigation, with the risk expected to be minimal due to the temporary nature of vessel displacement and mitigation measures to be implemented.

Table 13-4 Potential effects and zone of influence

Activity	Impact	Receiving environment	Zone of influence
Presence of installation vessels	Temporary displacement/ restricted access	All other sea users	10.8km² based on 1NM requested clearance from cable ship
Disturbance/restriction to access at landfalls	Temporary displacement/ restricted access	Recreational beach users	Within the application corridor / works area
Damage to third-party assets	Damage to the functioning of the seabed asset	Existing asset owners	Footprint of relevant cable crossing point during installation.

13.6 Embedded mitigation

The Project description, described in Section 2, provides the current installation 'base case'. This includes mitigation measures which form part of the design and are therefore an inherent part of the Project and comprise embedded or primary mitigation. The embedded mitigation relevant to Other sea users is provided in Table 13-5 below. These measures will be complied as a matter of best practice.

Table 13-5 Embedded mitigation

ID	Embedded mitigation
COMP 5	The dropped object procedure will be followed, and any unrecovered dropped objects must be reported to the relevant authority (MS LOT or DAERA) using their dropped object procedure, within 24 hours of the project becoming aware of an incident.
COMP 6	Project vessels will comply with the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs) – as amended.
COMP 7	'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.
COMP 8	Should the project create potential hazards to shipping (such as large rock berms) along the cable routes, stakeholders will be informed immediately via a NtM to ensure safety is upheld.
BP 1	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.

ID	Embedded mitigation
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 2020). Vessels are advised in the Mariners Handbook not to anchor or fish (trawl) within 0.25NM of cables.
BP 11	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.

13.7 Impact assessment

The installation activities are unlikely to pose a risk to other sea users and any potential effects are of a temporary nature. Following implementation of the mitigation measures outlined in Sections 13.6 above, the residual effects from the cable installation have been assessed as negligible.

13.7.1 Temporary displacement/ restricted access - all other sea users.

Due to limited ability to manoeuvre, offshore installation vessels will request 1NM clearance from other vessels. The following other sea users have been identified as possible receptors of temporary displacement:

- **Military practice and exercise vessels**: The presence of the marine cable installation vessels within the military exercise areas has the potential to interact with Ministry of Defence (MoD) vessel movements and training exercises. The MoD may require installation vessels to avoid exercise areas when exercises are taking place within them. Scotland's National Marine Plan states that "Development and use that either individually or cumulatively obstructs or otherwise prevents the defence activities supported by an exercise area may not be permitted" (Scottish Government, 2014).
- **Recreational vessels**: The Royal Yachting Association of both Scotland and Northern Ireland have provided the consultation feedback that the cable installation is unlikely to interfere with the recreational craft. The effects to other recreational users of the nearshore and landfall areas such as canoeists, divers and sea anglers will be temporary and localised and is not expected to result in significant disruption.

  Additionally, disturbance and/or restrictions to access at the Landfalls may affect:

- **Recreational beach users**: Installation of the proposed cables in the intertidal zone at the landfall sites will be undertaken by trenching across the beach. Mechanical diggers will be used to construct a trench from low to high water. This has the potential to impact local users of the beach areas at both landfalls through displacement and restricted access to beaches.

13.7.1.1 Scot-NI 3

Although Scot-NI 3 crosses two Navy department exercise areas in Scottish waters and two in Northern Irish waters, the short-term installation of the cable and its long-term presence on the seabed will not hinder MoD operations.

No significant effects on recreational vessels are expected due to the relatively short installation period and the fact that recreational vessels can easily manoeuvre around Project vessels.

As the Scottish landfall, Port Mora is in a secluded bay therefore the risk of any effects is unlikely to be significant. For the Northern Irish landfall at Donaghadee, there may be temporary displacement of recreational access to the beach and visual effects to walkers. Experiential effects through noise or light pollution and associated landscape effects due to the nearshore and intertidal works will be temporary and localised and not expected to result in significant disruption or distraction to recreational activity.

Overall, the installation of the Scot-NI 3 cable will result in negligible effects to other sea users in relation to temporary displacement and/or restricted access.

13.7.1.2 Scot-NI 4

Scot-NI 4 passes through five Navy department exercise areas in Scottish waters and two in Northern Irish waters. However, due to the temporary and localised nature, the cable installation is not expected to hinder the MoD operations.

No significant effects on recreational vessels are expected due to the relatively short installation period and the fact that recreational vessels can easily manoeuvre around Project vessels.

Due to the close proximity of popular beaches near the Scottish and Northern Irish landfall location, there may be temporary displacement of recreational access to these beaches and visual effects to walkers. However, due to the temporary and localised nature of the installation activities, no significant disruption or distraction to recreational activity is expected.

When considering the proposed mitigation, the effects of the Scot-NI 4 cable installation on other sea users is negligible regarding temporary displacement and/or restricted access.

13.7.2 Damage to 3rd party asset

13.7.2.1 Scot-NI 3 and Scot-NI 4

Damage to existing 3rd party assets is unlikely. The engineering of all crossings will be designed in accordance with industry best practice, namely International Cable Protection Committee (ICPC) Recommendation No.3. Furthermore, crossing designs will also be subject to crossing agreements with the individual cable owners. Asset owners will be notified in advance of operations in line with the individual crossing agreement conditions. In summary, damage to third party assets will be negligible.

14. CUMULATIVE EFFECTS

14.1 Introduction

Scotland's National Marine Plan (Scottish Government 2015) policy GEN 21 Cumulative Impacts and Northern Irelands Draft Marine Plan (Department of Agriculture, Environment and Rural Affairs (DAERA) 2018) general policy: Cumulative Impacts, require planning/public authorities and decision makers to consider whether the proposed Project is likely to have significance adverse cumulative impacts.

Based on the requirements of the above marine plans, this Section identifies other plans or projects within or in proximity to the proposed Scot-NI 3 and Scot-NI 4 application corridors. Cumulative effects are defined as '*impacts that result from incremental changes caused by other past, present, or reasonably foreseeable actions together with the projects*' (European Commission 1999). Cumulative effects can be characterised by two different types of relationships:

- **Intra-project effects:** The combined effects arising as a result of two or more effects from a project interacting, for example upon a single receptor or resource; and
- **Inter-project effects:** The interaction and combination of environmental effects of the Scot-NI Project with other plans and projects affecting the same receptor.

No significant intra-project effects have been identified. Despite any spatial or temporal overlap of potential effects on the physical, biological and socio-economic environment the MEA concluded that the effects from cable installation are temporary and short-term. No potential effects have been identified that could combine to have a significant cumulative intra-project effect on an environmental receptor. This Section therefore focuses on the potential for inter-project effects.

Based on the linear nature of Scot-NI 3 and Scot-NI 4 and the limited spatial extent of effects from cable installation activities of both, an assessment of transboundary effects[1] has also been excluded from the cumulative effects assessment. This is on the basis that effects within respective territories of Scotland and Northern Ireland will not be of a large enough magnitude to cause significant transboundary effects over and above the effects reported within each of the respective territories.

14.2 Data Sources

To identify the relevant plans and projects for consideration within the cumulative effects assessment the following data sources were used:

- Marine Scotland Marine Licence Application Public Register (Marine Scotland 2020a);
- Marine Scotland (2020b) National Marine Plan interactive (NMPi) (Marine Scotland 2020b);
- Department of Agriculture, Environment and Rural Affairs Marine Licensing Public Register (DAERA 2020a);
- DAERA Northern Ireland Marine Mapviewer (DAERA 2020b); and
- Sea Fish Industry Authority (SEAFISH) Kingfisher Information Service.

[1] Transboundary effects are those that may affect countries other than the country, or countries in which a project will be constructed and operated.

14.3 Consultation

Consultation has been ongoing throughout the development of the Scot-NI Project and no concerns of comments have been raised during this time pertaining to the cumulative effects assessment of the Scot-NI Project.

14.4 Assessment Methodology

The proposed method for the assessment of potential cumulative effects is based on 'A Strategic Framework for Scoping Cumulative Effects' (Marine Management Organisation 2014). The guidance sets out a two-stage approach to identifying cumulative effects as summarised below:

- Task 1: Identification of activities, receptors, and pressures
- Task 2: Defining interactions within a specific scale

14.4.1 Task 1 - Identification of activities, receptors, and pressures

To first identify which projects and plans are likely to interact with the proposed Scot-NI 3 and Scot-NI 4 application corridors, it was established whether a common pressure-receptor pathway exists with the Scot-NI 3 or Scot-NI 4 installation and other types of projects and plans. For there to be potential cumulative effects, Scot-NI 3 and Scot-NI 4 and another project or plan must share a common pressure-receptor pathway which overlaps spatially and temporally. Based on professional judgement, projects and plans were grouped into categories and then each category was assessed to determine whether it would have a pathway likely to induce similar pressures to Scot-NI 3 and Scot-NI 4. Where project categories had a pressure-receptor pathway, these were considered in further detail.

14.4.2 Task 2 - Defining interactions within a specific scale

The nature of a linear telecoms cable project means that many potential pressures result in temporary or short-term and localised effects restricted to the footprint of the Scot-NI 3 and Scot-NI 4 application corridors. The search area for other projects has been defined as the extent of the application corridors, herein referred to as the assessment search area. Although it is recognised that certain pressures may exceed this spatial extent these have been scoped out of the MEA as they will have a negligible effect.

A review of all the data sources in Section 14.2 was undertaken to identify any projects and plans that fall within or intersect the application corridors.

14.4.3 Assumptions

It should be noted that the extent to which effects of other projects can be assessed is dependent on the level of information available. The assessment is based on information available in the public domain or provided to the applicant at the time of writing this MEA Report (October 2020), as such the assessment relies on the accuracy of records in the public domain or provided. The cumulative effects assessment considers activities associated with installation of the Scot-NI 3 and Sot-NI 4 cables only.

14.5 Identification of Projects and Plans

14.5.1 Marine Licence Public Registers

A review of the Marine Scotland Marine Licence Applications Public Register and DAERA Marine Licensing Public Register was undertaken in October 2020 to identify projects to be included in the assessment. Table 14-1 below outlines the types of projects listed and establishes whether any are within the assessment search area or induce similar pressures to Scot-NI 3 and 4 and therefore may have an inter-project effect.

Table 14-1 Summary of other projects identified on the Marine Licence Public Registers

Project Category	No. of Applications	Does project category induce similar pressures to Scot-NI?	Are there any other to be taken forward to assessment?
Marine Scotland Licence Applications Register			
Cable	15	Yes	No, all applications are outside of the assessment search area
Chemotherapeutant	206	No	No, project category does not induce similar pressures to Scot-NI, therefore there is no potential for inter-project effects
Construction of new works and construction, alteration, or improvement of any works	154	Yes	No, all applications are outside of the assessment search area
Decommissioning of works	2	Yes	No, all applications are outside of the assessment search area
Deposit of any substance or object (including other deposits)	19	Yes	No, all applications are outside of the assessment search area
Dredging (including dredged spoil, navigational dredging, and other dredging)	55	Yes	No, all applications are outside of the assessment search area
Fish (including shellfish) farm	183	No	No, project category does not induce similar pressures to Scot-NI, therefore there is no potential for inter-project effects
Macroalgae (including macroalgal farm)	9	No	No, project category does not induce similar pressures to Scot-NI, therefore there is no potential for inter-project effects
Maintenance of existing works	31	Yes	No, all applications are outside of the assessment search area
Mooring	51	Yes	No, all applications are outside of the assessment search area
Other	4		No, all applications are outside of the assessment search area
Pontoon	29	No	No, project category does not induce similar pressures to Scot-NI, therefore there is no potential for inter-project effects

Project Category	No. of Applications	Does project category induce similar pressures to Scot-NI?	Are there any other to be taken forward to assessment?
Removal of any substance or object	12	Yes	No, all applications are outside of the assessment search area
Renewables (including tidal, wave and wind) - tidal	142	Yes	No, all applications are outside of the assessment search area
Use of explosive substance or article	1	No	No, project category does not induce similar pressures to Scot-NI, therefore there is no potential for inter-project effects
DAERA Marine Licensing Public Register			
Construction	50	Yes	No, all applications are outside of the assessment search area
Dredging (including capital dredge and maintenance dredging)	9	Yes	No, all applications are outside of the assessment search area
Disposal (including sea disposal)	9	No	No, project category does not induce similar pressures to Scot-NI, therefore there is no potential for inter-project effects

14.5.2 Marine Scotland NMPi

A review of NMPi did not identify any proposed projects or plans that would induce similar pressures and/or that were located within the assessment search area of the Scot-NI 3 and Scot-NI 4 application corridors.

14.5.3 DAERA (2020b) Northern Ireland Marine Mapviewer

A review of the Northern Ireland Marine Mapviewer, which includes information such as renewable energy zones contained within the Offshore Renewable Energy Strategic Action Plan 2012-2020 identified two marine renewable resource zones in proximity to Scot-NI 3 and Scot-NI 4 application corridors:

- Offshore Renewable Energy Strategic Action Plan Tidal Resource Zone 4 – located 1km north of Scot-NI 3.
- Offshore Renewable Energy Strategic Action Plan Tidal Resource Zone 3 – located 1.8km north of Scot-NI 4.

Both renewable resources zones are located outside the assessment search area and the pressures resulting from Scot-NI 3 and Scot-NI 4 do not overlap with those pressures induced by tidal power. Therefore, there is limited potential for inter-project effects with Scot-NI 3 and Scot-NI 4 and these renewable energy zones are not considered further.

No other plans were identified that would induce similar pressures and/or that were located within the assessment search area of the Scot-NI 3 and Scot-NI 4 application corridors.

14.5.4 GIS Search

In addition to the Marine Scotland and DAERA public registers, GIS analysis of known infrastructure in the area was undertaken. A summary of the projects identified during this analysis is presented in Figure 14-1 (Drawing No. P2302-CUMU-001-A) below. Table 14-2 and 14-3 outline the projects

identified within the assessment search area of the Scot-NI 3 and Scot-NI 4 cables respectively, which will be taken forward for further consideration.

Table 14-2 Projects identified within assessment search area of the Scot-NI 3 application corridor

Project Category	Name	Distance (km)
Power cable	Western High Voltage Direct Current (HVDC) Link	Intersects Scot-NI 3 route
Telecoms cable	Hibernia Atlantic	Intersects Scot-NI 3 route

Table 14-3 Projects identified within assessment search area of the Scot-NI 4 application corridor

Project Category	Name	Distance (km)
Power Cable	Western HVDC Link	Parallel and Intersects Scot-NI 4 route
Telecom Cable	Sirius North	Parallel and Intersects Scot-NI 4 route
Telecom Cable	Hibernia Atlantic	Intersects Scot-NI 4 route
Telecom Cable	LANIS 3	Intersects Scot-NI 4 route

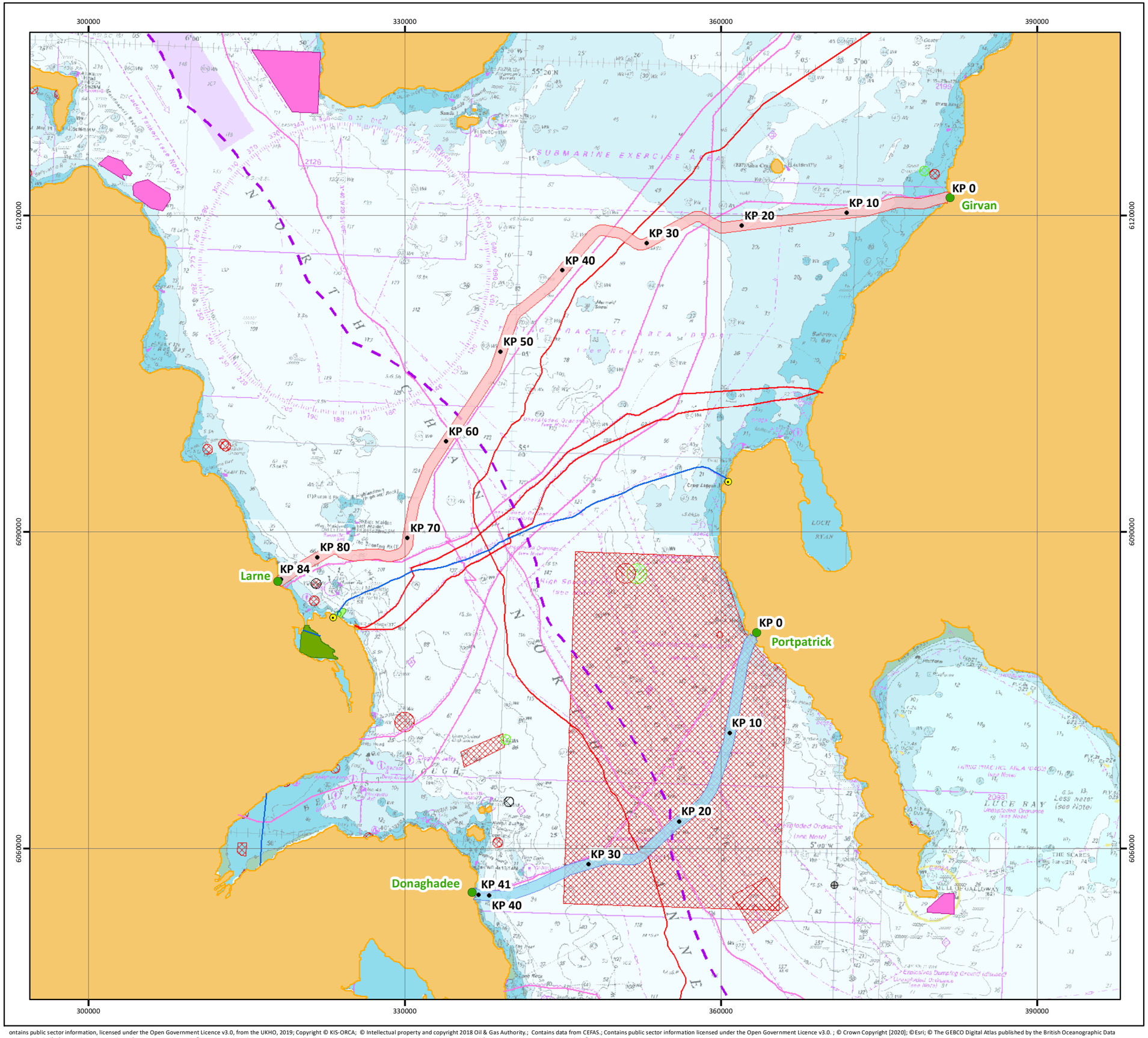
14.5.5 Fishing Activity

It is recognised that dredging and demersal trawling are two of the main fishing methods employed within the Scot-NI Project Area. Otter trawling is the primary method which involves a ground rope or chain which drags along the bottom of the seabed to help disturb fish. Dredging, particularly for scallops involved teeth being raked through the seabed to disturb and collect scallops within the seabed sediments. Both scallop dredging and otter trawling induce the pressures penetration and/or disturbance to the substratum on the surface of the seabed including abrasion, and abrasion/disturbance of the substratum below the surface of the seabed. As a result, there is the potential for the Scot-NI 3 and Scot-NI 4 installation to have inter-project effects with demersal fishing activity. Despite this, the Scot-NI 3 and Scot-NI 4 installation will be a temporary and one-off disturbance. Furthermore, the installation of Scot-NI 3 and Scot-NI 4 would only induce these pressures on a narrow footprint on the seabed, therefore potential inter-project effects with demersal fishing activities will be highly limited and are therefore not considered further.

SCOTLAND - NORTHERN IRELAND TELECOMMUNICATION CABLES

CUMULATIVE EFFECTS
Other Marine Users & 5km ZOI

Drawing No: P2302-CUMU-001 | **B**



Legend

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

Oil and Gas Infrastructure

- Well
- Terminal

Pipelines

- Active

Cables

- Power
- Telecom

Energy Infrastructure

- Tidal Lease
- Natural Gas Storage
- Natural Gas Pipeline

Disposal Sites

- Open
- Closed
- Disused

NOTE: Not to be used for Navigation

Date	17 November 2020
Coordinate System	WGS 1984 UTM Zone 30N
Projection	Transverse Mercator
Datum	WGS 1984
Data Source	UKHO; KISCA; OGA; CEFAS; TCE; CES; GEBCO; ESRI
File Reference	J:\P2302\Mxd\10_CUMU\P2302-CUMU-001.mxd
Created By	Chris Dawe
Reviewed By	Emma Storey
Approved By	Paula Daglish

0 5 10 15 20 km

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14.6 Assessment

Based on Table 14-1 to Table 14-3, a total of six projects were identified that have the potential to interact with the Scot-NI project. Two projects were identified for Scot-NI 3 and four projects for Scot-NI 4.

14.6.1 Scot-NI 3

14.6.1.1 Western HVDC Link

The Western HVDC Link is an undersea electrical link between west Scotland and North Wales which has been operational since 2018. The Western HVDC Link extends within and is crossed by the Scot-NI 3 application corridor. As a result, there is the potential for maintenance and repair activities to Western HVDC Link to coincide with the installation of Scot-NI 3. Currently the applicant is not aware that the Western HVDC Link will require any maintenance or repair works. The effects of contingency external cable protection at the crossing locations has already been discussed within the relevant MEA sections.

There is limited information available in regard to the Western HVDC Link, however based on experience with other HVDC interconnectors, repair and maintenance activities are likely restricted to reburial of the cable and the deposit of external cable protection. As a result of these activities, there is the potential for inter-project effects arising from penetration and/or disturbance to the substratum on the surface of the seabed including abrasion, abrasion/disturbance of the substratum below the surface of the seabed and physical change (to substratum type). Despite this, re-burial of the Western HVDC Link will likely be limited to the immediate footprint of the as-laid cable. Should installation of Scot-NI 3 coincide, effects of both projects will be highly localised. Therefore, effects to the physical environment, benthic ecology, fish and shellfish and marine archaeology as a result of both will not result in significant inter-project effects.

In regards the external cable protection, there is no information in relation to the footprints installed as part of Western HVDC Link. However, the Scot-NI 3 contingency external cable protection will be limited to the Western HVDC Link crossings and areas of hard seabed. It is currently estimated that a worst-case footprint of 2,025m^2 of seabed will be affected by contingency external cable protection in the form of a rock berm for Scot-NI 3. While there is the likelihood that the Western HVDC Link required external cable protection, considering the limited nature of the physical change (to substratum type), effects resulting to physical processes, benthic ecology, fish and shellfish and commercial fisheries receptors will be highly localised. Furthermore, considering the wider extent of sedimentary habitat in the Project Area, inter-project effects resulting from a physical change (to substratum type) will not be significant.

14.6.1.2 Hibernia Atlantic Telecoms Cable

The Hibernia Atlantic telecommunication cable extends from Lynn, Massachusetts in the United States across the Atlantic to Southport in Wales. The cable has been operational since 2003, therefore inter-project effects would be limited to if maintenance and/or repair activities were to coincide with installation of Scot-NI 3. Maintenance activities on telecoms cables are even more limited when compared to power cables, therefore even in the event that the Scot-NI 3 installation coincides with maintenance activities on the Hibernia Atlantic cable, effects will be highly localised. Effects will be limited to penetration and/or disturbance to the substratum on the surface of the seabed including abrasion, and abrasion/disturbance of the substratum below the surface of the seabed based on the excavation and re-burial of the cable during repair. Based on the temporary and localised nature of repair activities and the Scot-NI 3 installation, there will be no significant inter-project effects.

14.6.2 Scot-NI 4

14.6.2.1 Western HVDC Link

Inter-project effects will be of a similar magnitude to that reported for Scot-NI 3 in relation to penetration and/or disturbance to the substratum on the surface of the seabed, and abrasion/disturbance of the substratum below the surface of the seabed including abrasion. Regarding physical change (to another substratum type), the estimated footprint for external cable protection for Scot-NI 4 is less (1620m^2) when compared to Scot-NI 3. However, effects to physical processes, benthic ecology, fish and shellfish and commercial fisheries receptors will be of a similar magnitude and not significant.

14.6.2.2 Sirius North, Hibernia Atlantic and LANIS 3

Sirius North, Hibernia Atlantic and Lanis 3 are operational telecommunication cables. Hibernia Atlantic is described in Section 14.6.1.2 above. Sirius North extends 147km for Carrickfergus in Northern Ireland to Saltcoats in Scotland and has been operational since 1999. Lanis 3 extends 122km from Whitehead in Northern Ireland to Troon in Scotland and has been operational since 1992.

The applicant is not aware of any maintenance or repair activities required, however as operational telecoms cables, maintenance and repair activities could be required. The potential for significant inter-project effects with the installation of Scot-NI 4 is limited based on the small extent of maintenance and repair activities. Maintenance and repair activities will be restricted to the immediate footprint of the as laid cables. While the installation of the Scot-NI 4 cable may impact the same seabed sediments as the telecoms cable and therefore may affect the biological communities that rely on these habitats, the spatial extent of these effects are highly localised. Furthermore, maintenance activities on any or all of these cables will not affect marine archaeology and the Scot-NI 4 cable has been designed to avoid any archaeological assets, therefore no inter-project effects with these assets will arise. Overall inter-project effects are considered not significant.

14.7 Mitigation

No mitigation is proposed as no significant cumulative effects have been identified.

15. SCHEDULE OF MITIGATION

The Scot-NI 3 and Scot-NI 4 replacement cable Project includes a range of primary mitigation measures that have been 'designed' into (or 'embedded' in) the development proposals to reduce or prevent significant adverse effects arising. Additional measures such as legislative compliance and best practice are also included in the embedded mitigation measures. The assessment of effects has therefore considered all measures that form part of the Project. These mitigation measures are detailed within each Section (where relevant to the topic) and gathered in Table 15-1 and 15-2 below. As mitigation measures have been proposed from within the MEA Report and several supporting appendices each mitigation measure has been given an identification number and document reference for the source of the mitigation. The different types of mitigation are outlined below:

- COMP – Compliance measures included in the project design to meet environmental and health and safety legislation;
- BP – Best Practice measures included as part of the project design; and
- M – Mitigation introduced in this MEA Report

Table 15-1 Embedded mitigation measures - project design

ID	Aspect	Embedded mitigation	Source
COMP 1	Benthic and Intertidal Ecology	Ballast water discharges from Project vessels will be managed under the International Convention for the Control and Management of Ships' Ballast Water and Sediments standard.	MEA Report
COMP 2	Benthic and Intertidal Ecology	The latest guidance from the GB non-native species secretariat (2015) will be followed and a Biosecurity Plan produced pre-installation. All vessels and equipment will be clean and free from debris and fouling.	MEA Report
COMP 3	Benthic and Intertidal Ecology	Project vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ships standards.	MEA Report
COMP 4	Benthic and Intertidal Ecology	Control measures and shipboard oil pollution emergency plans (SOPEPs) will be in place and adhered to under MARPOL Annex I requirements for all project vessels.	MEA Report
COMP 5	Commercial Fishing; Shipping and Navigation; Other sea users	The dropped object procedure will be followed, and any unrecovered dropped objects must be reported to the relevant authority (MS LOT or DAERA) using their dropped object procedure, within 24 hours of the project becoming aware of an incident.	Appendix E: NRA
COMP 6	Fish and Shellfish (Basking Shark), Commercial Fishing; Shipping and Navigation; Other sea users	Project vessels will comply with the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs) – as amended	Appendix E: NRA
COMP 7	Commercial Fishing; Shipping and Navigation; Other sea users	'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.	Appendix C: FLMAP; Appendix E: NRA

ID	Aspect	Embedded mitigation	Source
COMP 8	Commercial Fishing; Shipping and Navigation; Other sea users	Should the project create potential hazards to shipping (such as large rock berms) along the cable routes, stakeholders will be informed immediately via a NtM to ensure safety is upheld.	Appendix C: FLMAP
BP 1	Commercial Fishing; Shipping and Navigation; Other sea users	Early consultation with relevant contacts to notify of impending activity.	Appendix E: NRA
BP2	Commercial Fishing; Shipping and Navigation; Other sea users	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.	Appendix E: NRA
BP3	Commercial Fishing; Shipping and Navigation; Other sea users	Guard Vessels may be deployed as required to ensure that cable installation proceeds as safely and efficiently as possible.	Appendix E: NRA
BP4	Commercial Fishing; Shipping and Navigation; Other sea users	Appropriate cable protection to be installed as applicable along the cable route including over crossed assets if required.	Appendix E: NRA
BP5	Commercial Fishing; Shipping and Navigation; Other sea users	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.	Appendix E: NRA
BP6	Commercial Fishing; Shipping and Navigation; Other sea users	The UKHO will be informed of installation activities in order to issue Maritime Safety Information (MSI) broadcasts as appropriate.	Appendix E: NRA
BP7	Commercial Fishing; Shipping and Navigation; Other sea users	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 2020). Vessels are advised in the Mariners Handbook not to anchor or fish (trawl) within 0.25NM of cables.	Appendix E: NRA
BP 8	Archaeology	Archaeological exclusion zones (AEZs) have been assigned to anomalies. These have been avoided where possible and where not possible the surface area crossed by the cable has been minimised to protect potential archaeological features. Additionally, for the Portpatrick shore end for high archaeological AEZs anomalies (CA_3002 & CA_3003) divers will buoy off visible extent.	Appendix G: Marine Archaeology Technical Report
BP 9	Marine Birds; Marine mammals; Fish and shellfish; Protected sites	The survey and installation vessels will be moving at a maximum speed 6 knots during installation activities. This will allow any rafting seabirds, marine mammals or basking sharks time to disperse before the vessel arrives. When not conducting installation activities, vessels will avoid bird rafts where operationally possible and safe to do so.	Appendix H: EPS and Protected Species Risk Assessment
BP 10	Commercial Fishing	Disruption claims will be handled in accordance with ESCA standard operating practices.	Appendix C: FLMAP
BP 11	Commercial Fishing; Shipping and Navigation; Other sea users	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.	Appendix E: NRA
BP12	Benthic and Intertidal Ecology	Micro-routing has been used where possible to avoid or minimise the surface area the application corridor	Project design

ID	Aspect	Embedded mitigation	Source
		routes through higher-grade annex I reef and sandbank habitat.	
BP13	Benthic and Intertidal Ecology	Construction vehicle movement will avoid sensitive areas as far as practical; Beach profile will be restored following cable installation.	Project design

16. CONCLUSIONS

The conclusions to the environmental assessment for telecommunication cable installation within Scot-NI 3 and Scot-NI 4 application corridors are presented in Table 16-1 for Scot-NI 3 marine licence applications and Table 16-2 for Scot-NI 4 marine licence applications. The assessment has been undertaken for each cable corridor within the MEA and has considered differences in jurisdictions where they apply.

The receptors assessed, the potential pressures the project could exert, the likely effects of these pressures, and the significance levels, are summarised in Table 16-1. During assessment, the worst case has been considered. Therefore, effects are likely to be as summarised below in Table 16-1, or less.

Based on the assessment methodology set out in Section 3, effects which are Negligible, Not Significant and Minor typically do not require mitigation measures other than compliance with environmental statute and best practice. The effects of cable installation within the Scot-NI application corridors are generally considered to be not significant and adequately controlled by project design, best practice and compliance measures (outlined in Section 15).

Table 16-1 Scot-NI 3 conclusion of the environmental assessment

Section	Potential Pressure	Potential Effect	Significance of Effect – Scot-NI 3	
			Scotland	Northern Ireland
Physical Processes	Abrasion/disturbance at the surface of the substratum.	Disturbance to the seabed	Negligible	Negligible
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		Negligible	Negligible
	Physical change (to another seabed type)	Reduction in extent of seabed sediments	Not Significant	Not Significant
Benthic and Intertidal Ecology	Abrasion/disturbance at the surface of the substratum.	Mortality, injury or disturbance to benthic habitats and species	Negligible	Negligible
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Mortality, injury or disturbance to benthic habitats and species	Negligible	Negligible
	Physical change (to another substratum type)	Reduction in extent of sedimentary habitats – Contingency external cable protection: Rock berm	Minor	Minor
		Reduction in extent of sedimentary habitats – Contingency external cable protection: Rock bags or mattressing	Minor	Minor
Fish and Shellfish	Physical change (to another substratum type	Reduction in sedimentary habitats	Negligible	Negligible

Section	Potential Pressure	Potential Effect	Significance of Effect – Scot-NI 3	
			Scotland	Northern Ireland
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Disturbance of species with demersal life stages	Negligible	Negligible
Marine Mammals and Reptiles	Visual and above water noise disturbance	Disturbance to seals at haul out sites	Not Significant	Not Significant
Birds	Visual and above water noise disturbance	Disturbance to breeding and wintering bird species	No potential for LSE/AA not required	No potential for LSE/AA not required
	Changes in supporting habitat and prey availability	Reduction in supporting habitat and prey for breeding and wintering bird species	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
Protected Sites and Species	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Reduction in protected habitat and mortality, injury, or displacement of associated species	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
	Siltation rate changes (including smothering).		No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
	Physical change (to another seabed type).		No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
Marine Archaeology	Abrasion/disturbance at the surface of the substratum	Damage to archaeological assets	Not Significant	Not Significant
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Damage to archaeological assets	Not Significant	Not Significant
Shipping and Navigation	Displacement of vessels due to avoidance of Project vessels	Temporary displacement or restricted access	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Vessel Collision	Damage to vessels and injury to personnel	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Project vessels blocking navigational features	Temporary displacement or restricted access	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Fishing interaction with surface laid cable	Snagging or dragging of surface laid cable	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Accidental anchoring on surface laid cable	Damage to surface laid cable	As Low As Reasonably Practicable	As Low As Reasonably Practicable

Section	Potential Pressure	Potential Effect	Significance of Effect – Scot-NI 3	
			Scotland	Northern Ireland
	Extreme weather conditions	Cable installation risk	As Low As Reasonably Practicable	As Low As Reasonably Practicable
Commercial Fishing	Temporary displacement/ restricted access	Reduction in fishing activity and increase in fishing effort	Not Significant	Not Significant
	Increased snagging risk	Damage to fishing gear	Not Significant	Not Significant
Other Sea Users	Temporary displacement / restricted access	Disruption to activities	Negligible	Negligible
	Damage to third-party assets	Physical damage to third-party assets	Negligible	Negligible
Cumulative Effects	Abrasion/disturbance at the surface of the substratum.	Disturbance to the seabed, support habitats and species	Not Significant	Not Significant
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		Not Significant	Not Significant
	Physical change (to another seabed type)		Not Significant	Not Significant

Table 16-2 Scot-NI 4 conclusion of the environmental assessment

Section	Potential Pressure	Potential Effect	Significance of Effect – Scot-NI 4	
			Scotland	Northern Ireland
Physical Processes	Abrasion/disturbance at the surface of the substratum.	Disturbance to the seabed	Negligible	Negligible
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		Negligible	Negligible
	Physical change (to another seabed type)	Reduction in extent of seabed sediments	Not Significant	Not Significant
Benthic and Intertidal Ecology	Abrasion/disturbance at the surface of the substratum.	Reduction in extent of sedimentary habitats – Contingency external cable protection: Rock berm	Minor	Minor
		Reduction in extent of sedimentary habitats – Contingency external cable protection: Rock bags and mattress	Minor	Minor
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Mortality, injury or disturbance to benthic habitats and species	Negligible	Negligible
	Physical change (to another substratum type)	Reduction in extent of sedimentary habitats	Not significant	Negligible
Fish and Shellfish	Physical change (to another substratum type	Reduction in sedimentary habitats	Negligible	Negligible
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Disturbance of species with demersal life stages	Negligible	Negligible
Marine Mammals and Reptiles	Visual and above water noise disturbance	Disturbance to seals at haul out sites	Not Significant	Not Significant
Birds	Visual and above water noise disturbance	Disturbance to breeding and wintering bird species	No potential for LSE/AA not required	No potential for LSE/AA not required
	Changes in supporting habitat and prey availability	Reduction in supporting habitat and prey for breeding and wintering bird species	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
Protected Sites and Species	Penetration and/or disturbance of the substrate below the	Reduction in protected habitat and mortality, injury, or	No potential for LSE/AA not required and will not negatively	No potential for LSE/AA not required and will not negatively

Section	Potential Pressure	Potential Effect	Significance of Effect – Scot-NI 4	
			Scotland	Northern Ireland
	surface of the seabed, including abrasion.	displacement of associated species	impact the integrity of any protected site	impact the integrity of any protected site
	Siltation rate changes (including smothering).		No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
	Physical change (to another seabed type).		No potential for LSE/AA not required and will not negatively impact the integrity of any protected site	No potential for LSE/AA not required and will not negatively impact the integrity of any protected site
Marine Archaeology	Abrasion/disturbance at the surface of the substratum	Damage to archaeological assets	Not Significant	Not Significant
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Damage to archaeological assets	Not Significant	Not Significant
Shipping and Navigation	Displacement of vessels due to avoidance of Project vessels	Temporary displacement or restricted access	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Vessel Collision	Damage to vessels and injury to personnel	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Project vessels blocking navigational features	Temporary displacement or restricted access	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Fishing interaction with surface laid cable	Snagging or dragging of surface laid cable	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Accidental anchoring on surface laid cable	Damage to surface laid cable	As Low As Reasonably Practicable	As Low As Reasonably Practicable
	Extreme weather conditions	Cable installation risk	As Low As Reasonably Practicable	As Low As Reasonably Practicable
Commercial Fishing	Temporary displacement/ restricted access	Reduction in fishing activity and increase in fishing effort	Not Significant	Not Significant
	Increased snagging risk	Damage to fishing gear	Not Significant	Not Significant
Other Sea Users	Temporary displacement / restricted access	Disruption to activities	Negligible	Negligible
	Damage to third-party assets	Physical damage to third-party assets	Negligible	Negligible
Cumulative Effects	Abrasion/disturbance at the surface of the substratum.	Disturbance to the seabed, support habitats and species	Not Significant	Not Significant
	Penetration and/or disturbance of the substrate below the		Not Significant	Not Significant

Section	Potential Pressure	Potential Effect	Significance of Effect – Scot-NI 4	
			Scotland	Northern Ireland
	surface of the seabed, including abrasion			
	Physical change (to another seabed type)		Not Significant	Not Significant

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