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SCOTTISH HYDRO ELECTRIC POWER DISTRIBUTION PLC

Skye - Harris Subsea Cable Replacement

Marine Environmental Appraisal

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Marine Environmental Appraisal

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GLOSSARY

AA
Appropriate Assessment

AIS
Automatic Identification System

ALARP
As Low As Reasonably Practicable

APS
Arnish Power Station

BPPS
Battery Point Power Station

CBA
Cost Benefit Analysis

CCI
Cable Consulting International Ltd

CEMP
Construction Environmental Management Plan

CFD
Contracts for Difference

CFU
Colony Forming Units

CLV
Cable Lay Vessel

CPT
Cone penetration testing

DD
Decimal Degrees

DDM
Degrees, Decimal Minutes

DMS
Degrees, Minutes, Seconds

EIA
Environmental Impact Assessment

EPS
European Protected Species

EPS RA
European Sites and Protected Species Risk Assessment

EQS
Environmental Quality Standards

ESCA
European Subsea Cables Association

EUNIS
European Nature Information System

FEAST
Feature Activity Sensitivity Tool

FLMAP
Fisheries Liaison Mitigation Action Plan

FLO
Fisheries Liaison Officer

GB
Great Britain

GES
Good Ecological Status

GtGP
Guide to Good Practice

HRA
Habitats Regulation Appraisal

HPC
High-performance corer

Hz
Hertz

HWDT
Hebridean Whale and Dolphin Trust

ICG
Intercessional Correspondence Group

ICPC
International Cable Protection Committee

IMO
International Maritime Organisation

iSPM
Inorganic suspended particulate material

JNCC
Joint Nature Conservation Committee

kHz
Kilo Hertz

Km
Kilometre

Kp
Kilometre Points

kV
Kilo Volt

LAT
Latitude

LSE
Likely Significant Effect

M
Metre

MAIB
Marine Accident Investigation Branch

MarLIN
Marine Life Information Network

MBES
Multi-beam Echosounder

MCA
Maritime and Coastguard Agency

MCAA
Marine and Coastal Access Act

MEA
Marine Environmental Appraisal

mm2
Millimetre Squared

MHWS
Mean High Water Springs

MLWS
Mean Low Water Springs

MMO
Marine Mammal Observation

MPA
Marine Protected Area

MPP
Marine Planning Partners

MPS
Marine Policy Statement

MS-LOT
Marine Scotland Licensing Operations Team

MSFD
Marine Strategy Framework Directive

MU
Management Unit

NCMPA
Nature Conservation Marine Protected Areas

Nm
Nautical Mile

NMP
Scottish National Marine Plan

NMPi
National Marine Plan Interactive

NRA
Navigation Risk Assessment

NRHE
National Record of the Historic Environment

NSA
National Scenic Area

OIMD
Operation, Inspection, Maintenance, and Decommissioning

OREIs
Offshore Renewable Energy Installations

OSPAR
Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic

PAC
Pre-Application Consultation

PAIH
Potential Annex I Habitat

PAM
Passive Acoustic Monitoring

PEXA's
Maritime Practice and Exercise Areas

PILC
Paper Insulated Lead covered

PLGR
Pre-Lay Grapnel Run

PMF
Priority Marine Features

PMSC
Port Marine Safety Code

pSPAs
Proposed Special Protection Areas

RBMP
River Basin Management Plans

RNLI
Royal National Lifeboat Institution

ROV
Remotely Operated Vehicle

RYA
Royal Yachting Association

SAC
Special Areas of Conservation

SEPA
Scottish Environment Protection Agency

SEPD
Southern Electric Power Distribution

SEL
Sound Exposure Levels

SHEPD
Scottish Hydro Electric Power Distribution plc

SPAs
Special Protection Areas

SS
Suspended Sediment

SSE
Scottish and Southern Energy plc

SSEN
Scottish and Southern Electricity Networks

VC
Vibrocore

Vhpm
Vessel Hours Per Month

UK
United Kingdom

UKBAP
United Kingdom Biodiversity Action Plan

UKHO
UK Hydrographic Office

USBL
Ultra-Short Baseline

UXO
Unexploded Ordnance

WFD
Water Framework Directive

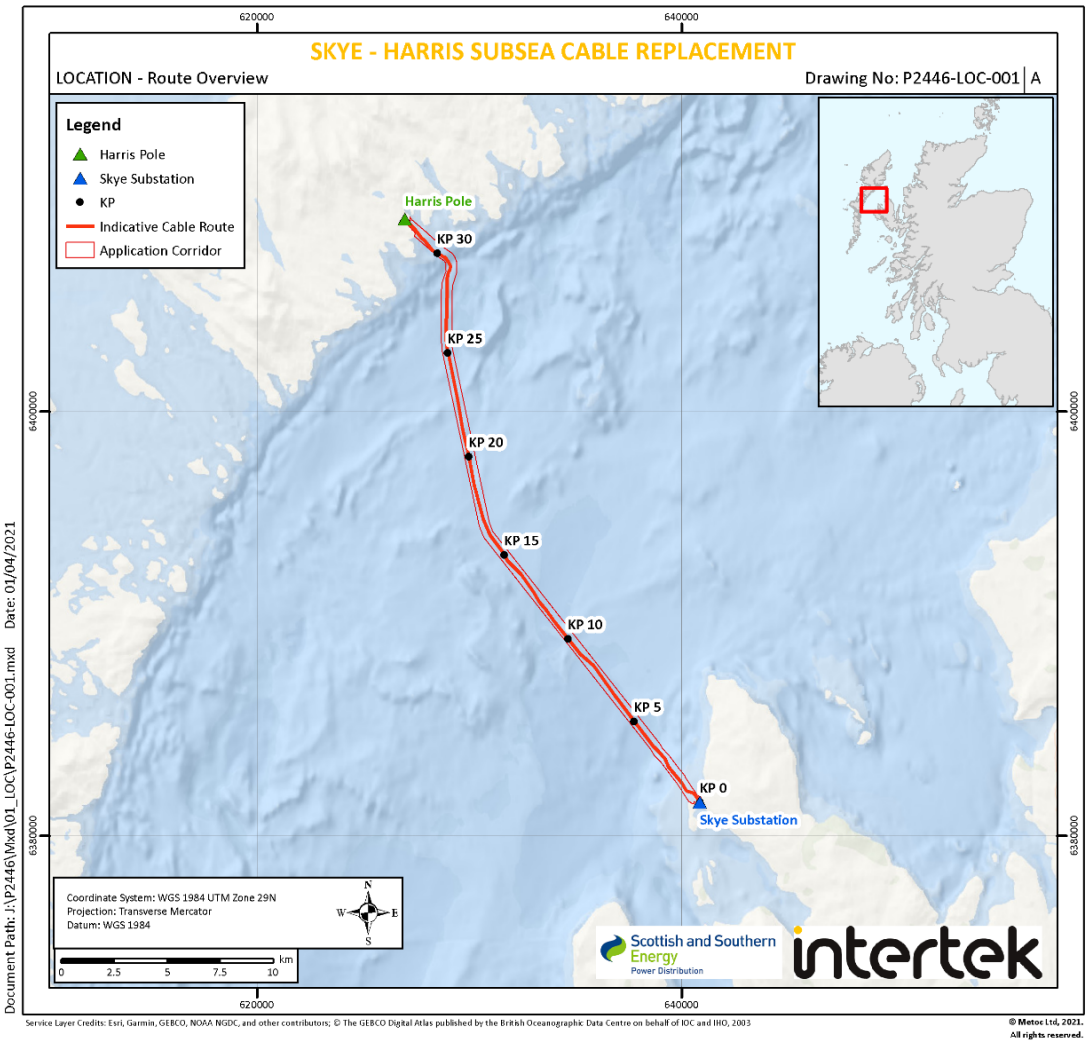
XLPE
Cable to cross Linked Polyethylene

1. INTRODUCTION

1.1 Overview

Scottish Hydro Electric Power Distribution plc (SHEPD), part of the Scottish and Southern Energy plc (SSE) group of companies, are the current licence holders (under the Electricity Act 1989) for electricity distribution in the north of Scotland. This region covers a quarter of the total United Kingdom (UK) landmass, with electricity being delivered to 740,000 customers. In the marine environment SHEPD maintains connections to the majority of the Scottish islands with over 100 subsea cable links totalling approximately 454km. On 16 October 2020, a fault was identified on the existing submarine power cable between the islands of Skye and Harris. This cable was installed in 1990 and was operational over a 30-year period. Following a review of the options appraisal and survey information, SHEPD have identified that this cable needs to be replaced. An overview of the proposed Skye-Harris cable replacement route is shown in Figure 1-1.

Figure 1-1 Overview of the proposed replacement cable Application Corridor



The installation of a replacement cable requires a marine licence under Part 4 of The Marine (Scotland) Act 2010. As per Section 23 of the Marine (Scotland) Act 2010, SHEPD have followed the formal Pre-Application Consultation (PAC) process (Marine Scotland, 2015). SHEPD have consulted stakeholders

and produced a PAC report summarising how their views have influenced the marine licence application (see Appendix E).

This Marine Environmental Appraisal (MEA) supports SHEPD's marine licence application, by providing baseline information and an assessment of potential impacts on sensitive environmental receptors. Where potentially significant adverse effects have been identified, appropriate mitigation has been detailed in order to reduce the magnitude of effect to an acceptable level. The mitigation requirements identified by this MEA are also included in the supporting marine Construction Environmental Management Plan (CEMP), Document Reference: P2446_R5282_Rev0, in order to ensure they are effectively disseminated to, and implemented by SHEPD and the cable installation contractor during the proposed works.

This MEA should be read in conjunction with the following documents:

- Marine Licence Application Form
- Skye-Harris Cable Replacement Project Description (Appendix A)
- Fisheries Liaison Mitigation Action Plan (FLMAP) (Appendix B)
- European Sites and Protected Species Risk Assessment (EPS RA) (Appendix C)
- Marine Construction Environmental Management Plan (CEMP) (Appendix D)
- Pre-Application Consultation (PAC) Report (Appendix E)
- Operation, Inspection, Maintenance, and Decommissioning (OIMD) Strategy (Appendix F)
- European Protected Species Licence Application Form
- Basking Shark Licence Application Form

1.2 Project need

The Islands of Harris and Lewis are normally fed from Ardmore Grid Substation by a combination of a 33kV circuit from Ardmore to Harris and a 132kV circuit from Harris to Stornoway. The 33kV circuit is comprised of overhead line, underground cable and submarine cable. Electricity is now considered to be an essential service for communities. This cable distributes electricity to domestic and business customers and well as providing an export route for community and commercial generator customers. Therefore, the circuit provides a long term economic and social benefit to the communities.

On Friday 16th of October, the 33kV subsea cable between Harris and Ardmore faulted on the red phase at around 10:30am resulting in the loss of supplies to the 13,600 customers in Lewis & Harris. Backup generation from Battery Point Power Station (BPPS) in Stornoway and Arnish Power station (APS) is currently in place as mitigation against the loss of supplies. Standby generation has been moved to the islands as an additional contingency. This now means that there is an increased reliance upon fossil fuels to maintain electricity supplies to the islands through the use of the embedded power stations and mobile Diesel generators. This places electricity supplies at significant risk if any further faults occur on the SHEPD electricity network infrastructure.

1.3 Consideration of alternatives

Considering the socio-economic importance of the Skye - Harris power cable, together with SHEPD's duty to ensure reliability of supply to its customer, the do-nothing option was considered but immediately rejected. Network testing has confirmed that there is a submarine cable fault on the red phase of the cable. Attempting a repair instead of replacement would be possible however there is significant concern with the water depth, age of the existing cable and possible success of any repair. At this cable location, the water depth reaches a maximum of 164m at its deepest point. The following options were considered by SHEPD:

1.3.1 Do Nothing

Given the risk associated with continuing to meet demand on a prolonged basis from BPPS and APS and the impact on connected distributed generation not being able to export, a Do-Nothing option was quickly rejected. Given the cost of running BPPS and APS would be an ongoing cost under a Do-Nothing option, and alternative standby arrangements would still be needed to protect security of supply, alongside the additional impact on connected distributed generation, a Do-Nothing option is clearly not a viable solution.

1.3.2 Carry out submarine cable repair

Analysis around a traditional piece in repair highlighted the significant stresses and tension placed on a cable using this method, particularly given the age of the cable and increased depth from which this cable would have to be raised to enable an on-vessel repair to be attempted. Concerns were also raised around joint kits and the ability to carry out a paper insulated, lead covered (PILC) cable to cross-linked polyethylene (XLPE) cable joint, whilst achieving a water seal at this repair depth. As a result, SHEPD approached contractors NKT, Briggs and Global Marine as well as Cable Consulting International Ltd (CCI), an independent cable consultant, to seek additional evidence on the viability of a repair.

CCI was approached to provide an independent engineering assessment of a repair option. There were several concerns raised within the independent report. As above they were mainly around unknowns of cable condition, suitability of joints and further stress placed on the cable when lifting to deck to carry out repairs. CCI gave a Low Confidence rating on a successful repair, with the possibility of increasing to Low / Medium if several potential mitigations could be put in place. Even then, it was their opinion that should a repair be successful, they would not anticipate it lasting any more than 3 years.

Following further investigation by SHEPD it was deemed several key mitigations were not practicable. Therefore, the likelihood of a successful repair was Low. As a result, this option was rejected.

1.3.3 Carry out full end to end like for like replacement with single 240mm^2 33kV cable

Although included in initial assessment, SHEPD no longer procures 240mm^2 cable; our standard procurement is now 95mm^2, 185mm^2 and 300mm^2 cable, except where electrical requirements determine a larger size is required. Also, a 240mm^2 cable and 300mm^2 cable would not meet short term demand requirements, therefore this option was rejected.

1.3.4 Carry out full end to end replacement with a single 33kV 500mm^2 Cu DWA uprated cable

This option will have the quickest return to service for any of the subsea cable replacement solutions. It will restore security of supply, remove the need for diesel generation running on full duty and allow export for connected island generators. This solution is also the most economical of all replacement solutions whilst providing sufficient optionality to take forward an efficient whole system solution when future requirements are clearer should demand and generation requirements dictate.

1.3.5 Carry out full end to end replacement with 2 x 33kV 500mm^2 Cu DWA uprated cables

This option would see the installation of a second 33kV circuit following on from the replacement of the existing faulted cable. This option has the potential to increase generation export capacity. However, there is currently no available capacity on the GB mainland to accommodate additional export.

Under present network conditions, no capacity is likely to be released to Western Isles generators, regardless of the size of the subsea cable link.

This option assumes a second cable would have to be installed separately, as while a single 33kV option can be pursued through an emergency tender, if a dual option was tendered this would have to go through a full regulated tender and would take far longer (circa 6 months from initiation to contract award, assuming no delays or issues arise in the process). The cable manufacturing would then start after the contract was signed.

This option has not been rejected but has been shelved for now until future network requirements are understood, specifically future transmission reinforcement schemes. Given a single 33kV option is the preferred solution at this stage, there is optionality to proceed with this option in the future under a separate project if required. Currently this option is not being progressed for immediate security of supply.

1.3.6 Carry out full end to end replacement with a single 66kV submarine cable

A 66kV option was considered, but rejected for the following reasons:

- Existing assets at the Ardmore and Harris ends are 132/33kV; there is no existing 66kV within the vicinity. Additional equipment and land would be needed at either end to connect it in:
  - 2 x 132/66kV transformers, protection and automatic voltage control. This is a non-standard transformer size for SHEPD which would present additional policy/design and procurement considerations.
  - 2 x 132kV circuit breaker, 132kV switchgear/busbars and protection would be required.
  - 2 x 66kV circuit breakers, 66kV switchgear/busbars and protection would be required.
- It is more likely that 132kV cable/joints and cable sealing ends would be installed, but operated at 66kV, as 132kV is a more standardised voltage for SSEN.

It is also noted that while Southern Electric Power Distribution (SEPD) currently owns and operates 66kV network, SHEPD does not. Introduction of this voltage in SHEPD would require changes to our operational safety rules, internal processes and procedures, training and authorisation of staff. That aside, overall, the cost of a 66kV solution would result in a higher cost for less capacity and increased losses when compared to the 132kV solution.

1.3.7 Carry out full end to end replacement with a single 132kV submarine cable

Given the significant additional cost relative to Option 4, additional risk to security of supply and limited, if any, potential benefit in terms of additional generation capacity in the short to medium term, this was not recommended at this stage. However, SHEPD will continue to work with SHE Transmission and review the case for investment in April 2022 when the results of the next Contracts for Difference (CfD) round are known. Cost Benefit Analysis (CBA) has shown that installing a 33kV cable now followed by a 132kV option in the future is more economical, due to generation costs and constraints, than proceeding solely with a 132kV option immediately, given the timelines for planning, procurement and construction.

1.3.8 Carry out full end to end replacement with a single 220kV submarine cable

This option is similar to Option 7 above (132kV option) but at a higher voltage and with a higher capacity cable. The benefits associated with additional capacity would be dependent on removing Transmission constraints on Skye and the mainland. This option is also more expensive compared to the 132kV option owing to the higher voltage rating of the cable. There would also be a need for 220/132kV voltage transformation and reactive compensation on either end of the cable which would require an increase in substation footprint on either side. This option would also take longer to deliver

compared to the 33kV options but would potentially have comparable delivery time as the 132kV cable option.

It should be noted, the full capacity of the 220kV cable could not be utilised given that the network rating of the 132kV network either side of the cable will be less than the cable rating.

1.3.9 Carry out full end to end replacement with a single 33kV cable followed by the installation of a 132kV cable at a future date.

This option is being considered as part of a future whole system solution. This option is not currently being progressed but again, installing the single 33kV cable now will alleviate ongoing generation costs and constraints whilst restoring security of supply. The optionality is still available to install the 132kv cable at a later date. This will be investigated between SHEPD and SHE Transmission and any future installed cable would be progressed under a separate project and licence application.

1.3.10 Outcome

Therefore, considering that the repair option has been ruled out due to technical constraints, a single 33kV 500mm^2 cable replacement has been deemed to be the most economic and efficient solution at this present time to restore security of supply for customers and restore export capacity for generation customers. Furthermore, this solution will remove the ongoing requirement to run diesel generation.

The replacement cable would be on a like-for-like basis, initially surface laid within the installation corridor at an offset from the faulted cable with post lay burial likely to be conducted. A cable on bottom stability analysis will be completed to identify whether cable mobility may be an issue. The installation of rock filter bags or rock placement may be required to stabilise the cable. Subject to final engineering design, cable burial is anticipated to be achievable along large sections of the route, and this should reduce the need for rock filter bags or rock placement.

At this stage it is expected that the cable will be buried between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS) where possible. It is initially proposed that the cable be protected with split pipe protection fitted directly around the cable for 255m at Skye and 217m at Harris.

1.4 Marine and intertidal surveys

Marine surveys were undertaken between February and March 2021. The objective of the surveys was to ascertain the seabed conditions within the 500m cable corridor prior to cable installation in relation to bathymetry, geology, ecology, marine archaeology and other seabed features detected during survey, e.g., obstacles, wrecks, and man-made objects.

The following surveys were undertaken:

- Geophysical survey
- Geotechnical survey
- Benthic survey
- Intertidal survey

1.5 Scope of assessment

This MEA covers the marine cable installation activities related to the replacement of the cable below MHWS. SHEPD also recognise the need to consider options regarding the future of the existing faulted cable, specifically whether it shall be removed or left *in situ*. As such, this MEA also considers the potential effects of decommissioning the existing cable through removal of the cable from the high-water mark to a distance offshore of 440m at the Skye landfall and 600m offshore at the Harris landfall.

Section 4.4 details the pressure-receptor pathways that have been scoped in for further assessment in the MEA.

2. LEGISLATIVE CONTEXT

2.1 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, with all regional and national plans required to conform to the MPS.

The MPS also states that in relation to energy infrastructure several factors must be considered when any decision makers are examining and determining applications. Of these factors, one is relevant to this Project:

- The national level of need for energy infrastructure, as set out in the National Planning Framework which applies in Scotland.

2.2 Marine (Scotland) Act 2010

The Marine (Scotland) Act 2010 gained Royal Assent in 2010 and provides the legal mechanism to help protect Scotland's coastal and territorial waters through new and improved management systems (Scottish Parliament, 2010). The act comprises 5 key elements, which are:

1. A Strategic Marine Planning System
2. A Streamlined Marine Licensing System
3. Improved Marine Nature Conservation Measures
4. Improved Measures for the Protection of Seals
5. Improved Enforcement Measures

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

2.3 Conservation (Natural Habitats, &c) Regulations 1994 (also known as the 'Habitats Regulations')

The Conservation (Natural Habitats, &c) Regulations 1994 (also known as the 'Habitats Regulations') transposed the European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) into Scottish law. The Habitats Regulations enshrine the Habitats Regulations Appraisal (HRA) process in law, requiting that any proposal which has the potential to result in a negative Likely Significant Effect (LSE) to a European site or its designated features be subject to HRA, and if necessary Appropriate Assessment (AA). The regulations also make it an offence to deliberately or recklessly capture, kill, injure harass or disturb a European Protected Species (EPS). When European protected species are present, licences to permit works that will affect them can only be granted when:

- There is no satisfactory alternative; and
- The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

The regulations were amended further in 2019 following the UK leaving the EU, by the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 (Scottish Government, 2019). The 2019 amendment ensures that the requirements of the Habitats and Birds Directives to

how European sites are designated and protected will continue to be enforced in Scotland (NatureScot, 2021).

2.4 Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004

Basking sharks in the UK are protected under Schedule 5 the Wildlife and Countryside Act 1981 (as amended), which prohibits the killing, injuring or taking of any wild animal listed in Schedule 5 of the Act. The Nature Conservation (Scotland) Act 2004, in Part 3 Schedule 6, strengthens the legal protection for basking shark in Scottish waters and other Schedule 5 species to include 'reckless' acts and makes it a specific offence to intentionally or recklessly disturb or harass basking sharks.

2.5 Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014

The Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014 (made in exercise of the power conferred by section 117 of the Marine (Scotland) Act 2010) made it an offence to harass a seal (intentionally or recklessly) at a designated haul-out site, with the Order designating 194 such sites around the Scottish coastline. A haul-out site is defined as a location on land where seals come ashore at times to rest, breed, have pups or moult. Section 117 of the Marine (Scotland) Act 2010, in conjunction with this Order, is designed to offer protection to seals on land, when they are at their most vulnerable.

2.6 Marine Licence and supporting information requirements

Submarine 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 (EIA) (Amendment) Regulations 2017 (HM Government, 2017).

Marine Scotland advise that a Marine Licence applicant should consider the scale and nature of the submarine cable project and consider the need for a proportionate environmental assessment. This should also include the extent to which an activity is in accordance with any marine plan for the area. Where there exists the potential for the environment, human health, legitimate uses of the sea or designated sites (i.e. Natura or Marine Protected Area (MPA)) to be impacted by the project, Marine Scotland recommends that these impacts should be assessed (Marine Scotland, 2015a). The results of the assessment, along with other supporting information such as a cable-route study and cable-burial plan (if required), should be provided to Marine Scotland to support the Marine Licence Application.

This Marine Environmental Appraisal (MEA) Report presents an overview of the baseline environment and provides the necessary environmental assessment to support the Marine Licence Application through consideration of the potential impacts of the project to the marine environment.

2.7 Scottish National Marine Plan

Adopted by the Scottish Government in March 2015 (Marine Scotland, 2015b) 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 12 nautical miles (NM)) 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: GEN 1, GEN 2, GEN 4, GEN 13, GEN 15, GEN 18 and GEN 12.

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 two most relevant sectoral

policy sections are sea fisheries (due to the potential impacts to local fishermen) and submarine cables.

2.7.1 Sea fisheries

The Sea Fisheries chapter of the NMP 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.

2.7.2 Submarine Cables

Relevant objectives to this Project listed in the NMP regarding submarine cables include:

- 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 generation, distribution and optimisation of electricity from traditional and renewable sources to Scotland, UK and beyond.

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.

2.8 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 11 Scottish marine regions (Scottish Parliament, 2015). Of these 11 marine regions, two are relevant to this Project; the West Highlands marine region and Outer Hebrides marine region (Section 1.3.6 and 1.3.7). Within these marine regions, Regional Marine Plans will be developed by Marine Planning Partnerships (MPP). These partnerships will be 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. At the time of writing, no MPP's have been developed for the West Highlands or Outer Hebrides marine regions.

3. PROJECT DESCRIPTION

This section provides an overview of the activities associated with installation of the replacement cable and decommissioning of the nearshore sections of the existing cable. A detailed project description is provided in Appendix A to this MEA.

The Skye-Harris cable is located on the west coast of Scotland, between the islands of Skye and Harris in the Little Minch. The existing cable is approximately 32km in length and routes from Ardmore, Skye across the Little Minch to Beacravik, Harris. The proposed replacement cable will route in close proximity to the existing cable but where possible will be micro-routed around any potential environmental and technical constraints as informed by pre-installation surveys. In addition to the installation of the replacement cable, nearshore sections of the existing cable at each landfall will be removed. This will consist of up to 440m of cable removal at the Skye landfall, and up to 600m at the Harris landfall.

The Application Corridor to be consented will be 500m wide to allow for flexibility in route engineering. The Application Corridor is shown in Figure 1-1, with simplified co-ordinates of the corridor provided in Table 3-1 below in the WGS-84 co-ordinates system. Full co-ordinates of the Application Corridor are provided in the accompanying Marine Licence Application.

Table 3-1 Application Corridor simplified co-ordinates

Degrees Minutes Seconds (DMS)		**Decimal Degrees (DD)**		**Degrees Decimal Minutes (DDM)**	
Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
57° 33' 18.667" N	6° 38' 46.485" W	57.555185	-6.646246	57° 33.311' N	6° 38.775' W
57° 40' 25.303" N	6° 48' 22.171" W	57.673695	-6.806159	57° 40.422' N	6° 48.370' W
57° 45' 0.276" N	6° 49' 59.454" W	57.750077	-6.833182	57° 45.005' N	6° 49.991' W
57° 46' 36.751" N	6° 49' 54.130" W	57.776875	-6.831703	57° 46.613' N	6° 49.902' W
57° 47' 2.930" N	6° 49' 44.351" W	57.784147	-6.828986	57° 47.049' N	6° 49.739' W
57° 47' 19.950" N	6° 49' 59.850" W	57.788875	-6.833292	57° 47.333' N	6° 49.998' W
57° 48' 18.003" N	6° 51' 45.913" W	57.805001	-6.862754	57° 48.300' N	6° 51.765' W

It should be noted that cable burial and protection measures are still to be finalised, with the values presented representing the maximum potential values to allow for the worst-case scenario to be assessed. A summary of the replacement cable installation and existing cable decommissioning activities that have been considered in the MEA is detailed below:

- Surface laying of approximately 13.1km of subsea cable using a cable lay vessel (CLV);
  - Includes the use of a remotely operated vehicle (ROV) to conduct touch down monitoring and associated Ultra-Short Baseline (USBL) positioning systems;
- Burial of cable for 18.9km using a trenching ROV;
- Potential rock placement for 7.69km and rock bags for cable protection and stabilisation;
- Use of articulated pipe in the intertidal zone and part of nearshore sections for 472m for cable protection and stabilisation; and
- Associated vessel presence.

4. ASSESSMENT METHODOLOGY

4.1 Assessment criteria

4.1.1 Assessment criteria

The environmental assessment presented in this document reports on the impacts associated with the licensable activities of the cable installation process and presents its findings and conclusions. The assessment process follows the standard approach to EIA and application of professional judgement. While EIA guidance has been used as the basis for this assessment, it should be noted that the Project itself is not subject to EIA regulations itself, being a submarine cable development (see Section 2.6 above). The key stages of the assessment process are listed as follows and align with the Institute of Environmental Management & Assessment (2004) guidelines which state, "The assessment stage of the EIA should follow a clear progression; from the characterisation of 'impact' to the assessment of the significance of the effects including the evaluation of the sensitivity and value of the receptors." (p11/2) (IEMA, 2004):

- Characterisation of the baseline environment;
- Establish potential impacts from the Project and zone of influence;
- Characterisation of the change in impact;
- Evaluation of significant of effects; and
- Establish mitigation.

Zones of influence have been identified with regard to the spatial extent over which the activities of the Project are predicted to have an impact on the receiving environment. These are referred to in topic chapters and identify the extent of assessment and include mobile species or mobile users of the sea with the potential to enter the zone of influence.

4.1.2 Pressure identification

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 Chapter 5- Designated Sites Assessment and summarised in the biological Sections of this MEA Report.

The interaction of the Project with other sea users has been considered within Appendix C – Fisheries Liaison Mitigation Action Plan (FLMAP) and referred to accordingly in the human environment Sections of this MEA Report.

4.1.3 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 4.4, Table 4-2.

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:

- Imperceptible – 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.
- Slight – 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.

4.2 Mitigation requirements

Certain measures are incorporated into the Project design as adherence to standard industry best practices or embedded mitigation which is fundamental to how the project will be executed. Details of the embedded mitigation which SHEPD are committed to implementing, and hence has been considered by this MEA are presented in Table 4-1. All embedded mitigation will be included within the CEMP. Additional mitigation has been suggested on a receptor specific basis informed by the impact assessments. During the assessment of impacts in the receptor specific assessment chapters, all proposed mitigation is considered when assessing the significance of an impact.

Table 4-1 Embedded mitigation and best practice measures relevant to the project

Measure	Details
Production of a Construction Environmental Management Plan (CEMP)	Measures will be adopted to ensure environmental impacts are minimised, and to reduce the potential for release of pollutants from installation works. This will be informed by the results of this MEA.

[1] Adapted from EPA (2017)

Measure	Details
All project personnel will be trained and informed of their responsibility to implement the environmental and ecological mitigation outlined in the CEMP	Toolbox talks, inductions, and awareness notices will be used to disseminate this information among all relevant project personnel.
Preconstruction surveys will be conducted to inform detailed route engineering.	Appropriate preconstruction geophysical surveys and visual inspection will be conducted to confirm the locations of potentially sensitive features.
Environmental planning.	The final cable route, and positioning of rock placement will be optimised as part of the final engineering design to avoid impacts on sensitive environmental features, including Annex I habitats and wrecks insofar as possible.
Scottish Marine Wildlife Watching Code (SMWWC)	All vessels will adhere to the provisions of the SMWWC during installation works. NatureScot developed the Code as part of its duties under the Nature Conservation (Scotland) Act 2004. The Code was first published in 2006 and was revised in 2017. The code aims to minimise disturbance to marine wildlife.
Lighting on board will be kept to a minimum	Lighting on-board the cable installation vessel will be kept to the minimum level required to ensure safe operations. This will minimise disturbance to seabird species.
Deployment of anchor chains will be kept to a minimum.	Reduces the potential for disturbance to benthic habitats and species including those which utilise the seabed.
Vessels will be travelling at a slow speed during installation works.	The slow speed of installation vessels will minimise the risk of disturbance and injury impacts to seabird and marine mammal receptors.
Production of an Emergency Spill Response Plan	An Emergency Spill Response Plan will help to ensure that the potential for release of pollutants from cable installation works is minimised.
Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels. In the event of an accidental fuel release occurring appropriate standard practice management procedures will be implemented accordingly.	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environmental Protection Committee) act. Production of this plan will help to ensure that the potential for release of pollutants from construction, operation and decommissioning is minimised.
Vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ship standards.	Measures will be adopted to ensure that the potential for release of pollutants from installation vessels is minimised.
Ballast water discharges from vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention).	The BWM Convention, adopted in 2004, aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Measures will be adopted to ensure that the risk of Invasive Non-Native Species (INNS) introduction during cable installation works is minimised.

Measure	Details
A Fisheries Liaison Officer (FLO) will be employed to manage interactions between cable installation vessels, personnel, equipment and fishing activity. This will be managed through the Fisheries Liaison Mitigation Action Plan.	Employment of a FLO will ensure all commercial fisheries operators in the vicinity of the Project will be proactively and appropriately communicated with in terms of proposed Project operations including exclusions, dates and durations.
Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures.	Ensure navigational safety and minimise the risk and equipment snagging.
Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).	IRPCS are the international standards designed to ensure safe navigation of vessels at sea. All installation vessels will adhere to these rules, including displaying appropriate lights and shapes. SOLAS is an international maritime treaty which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards. In relation to the Project its compliance will ensure navigational safety.
As built survey data will be provided to the UKHO and Kingfisher for inclusion on Admiralty Charts and KIS-ORCA Awareness Charts.	Ensure navigational safety and minimise the risk and equipment snagging.

4.3 Cumulative impact assessment

Information sources used to inform the potential cumulative effects that may be occurring in the region included the following:

- SEAFISH Kingfisher Bulletin
- UKDEAL: Oil and gas industry information;
- Oil and Gas Authority: Oil and gas industry information;
- KIS-ORCA: Marine cables information; and
- The Crown Estate Website: Offshore wind farm and marine aggregate digital data.
- Marine Scotland: Marine licensing website

Review of these information sources did not identify any projects/activities within/in the vicinity of the Project that could lead to the occurrence of cumulative effects. As such, no further assessment of cumulative effects will be undertaken in this report.

4.4 Pressure identification, zones of influence and screening

As detailed in Section 4.1.2 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 2021) and the FEAST tool for identifying the sensitivity of marine habitats and features to the

effects of cable installation (Marine Scotland, 2021c). Several pressures have been identified for each topic area as outlined in Table 4-2. For each pressure identified, Table 4-2 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 4-2 Pressures, zone of influence and screening decision

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Physical change (to another substratum type)					
Physical environment (including seabed conditions)	Low - No sensitive physical features have been identified.	Articulated pipe: 567m x 26.3cm = 149.1m² Rock placement: 7.69km x 13m = 0.1km² Rock bags: 4.5m² * 24 bags = 108m² Grout bags = 0.81m² * 24 bags = 19.44m² Concrete mattress: 18m² * 10 = 180m²	The final cable route, and positioning of rock placement will be optimised as part of the final engineering design to avoid impacts on sensitive environmental features, including Annex I habitats and wrecks insofar as possible.	**Yes**	Section 6
Benthic and intertidal ecology	High due to potential presence of habitats and species sensitive to physical change within the Application Corridor.			**Yes**	Section 8
Fish and shellfish	Medium due the Project Area being identified as a potential nursery habitat for 13 species of juvenile fish.			**Yes**	Section 11
Abrasion/disturbance at the surface of the substratum					
Physical environment (including seabed conditions)	Low - No sensitive physical features have been identified.	Articulated pipe: 567m x 26.3cm = 149.1m² Rock placement: 7.69km x 13m = 0.1km² Rock bags: 4.5m² * 24 bags = 108m² Grout bags = 0.81m² * 24 bags = 19.44m² Concrete mattress: 18m² * 10 = 180m²	Deployment of anchor chains will be kept to a minimum.	**Yes**	Section 6
Benthic and intertidal ecology	High due to potential presence of habitats and species sensitive to abrasion within the Application Corridor.			**Yes**	Section 8
Marine archaeology	High due to potential presence of archaeological features within the Application Corridor.			**Yes**	Section 10

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Water flow (tidal current) changes – local					
Physical environment (including seabed conditions)	Low due to no cable crossings occurring along the cable route.	No change to water flow (tidal current) expected	N/A	**No**	N/A
Changes in water suspended solids (water clarity)					
Physical environment (including seabed conditions)	Medium due to trenching activities potentially leading to increase in suspended sediments in the water column.	Sediment is expected to settle within 100m of the Application 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	**Yes**	Section 6
Fish and shellfish	Medium due to trenching activities potentially leading to increase in suspended sediments in the water column.			**Yes**	Section 11
Commercial fisheries	High due to presence of aquaculture sites in the vicinity of the Application Corridor.			**Yes**	Section 12
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion					
Physical environment (including seabed conditions)	Low - No sensitive physical features have been identified.	Within trenching corridor (18.908km x 7m width)	The final cable route, and positioning of rock placement will be optimised as part of the final engineering design to avoid impacts on sensitive environmental features, including	**Yes**	Section 6

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Benthic and intertidal ecology	High due to potential presence of habitats and species sensitive to smothering events within the application corridor		Annex I habitats and wrecks insofar as possible.	**Yes**	Section 8
Marine archaeology	High due to potential presence of archaeological features within the Application Corridor.			**Yes**	Section 10
Smothering and siltation rate changes					
Benthic and intertidal ecology	High due to presence of habitats sensitive to smothering events within the application corridor	100m (Gooding et al., 2012)	N/A	**Yes**	Section 8
Accidental hydrocarbon or chemical release from installation vessel					
Benthic and intertidal ecology	Medium due to presence of potential Annex I bedrock reef habitat along the cable route.	Within the Application Corridor	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.	**No**	N/A
Introduction or spread of invasive / non-native species (INNS)					
Benthic and intertidal ecology	Medium due to presence of potential Annex I bedrock reef habitat along the cable route.	Immediate vicinity of the Application Corridor.	Best practice and compliance measures will be in place to minimise the likelihood of any INNS from Project vessels or equipment.	**No**	N/A
Underwater noise changes					
Designated sites	High due to the Application Corridor passing within/in the vicinity of sites designated for the protection of harbour porpoise, harbour seal, minke whale and basking shark.		N/A	**Yes**	Section 5

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Marine megafauna	High due to known presence of basking shark, pinniped and cetacean species within/in the vicinity of the Application Corridor.			**Yes**	Section 7
Fish and shellfish	Medium due to the potential presence of migratory salmon within the Application Corridor.	Immediate vicinity of the Application Corridor.	N/A	**Yes**	Section 11
Visual (and above water noise) disturbance					
Designated sites	Medium due to the presence of Special Protection Areas (designated for breeding bird) being found in the vicinity of the Application Corridor.	Within the Application Corridor	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 a maximum of 8 knots.	**Yes**	Section 5
Vessel presence					
Designated sites	Medium due to the Application Corridor being situated within the Inner Hebrides and the Minches SAC (designated for harbour porpoise) and in the vicinity of the Ascrib, Isay and Dunvegan SAC (Designated for harbour seal).	Within the Application Corridor	N/A	**Yes**	Section 5
Marine megafauna	Medium due to the potential presence of the species described above, in addition to basking shark, grey seals and other frequently sighted cetacean species.			**Yes**	Section 5

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Changes in supporting habitat and prey availability					
Ornithology	Low – the Application Corridor is not located within any areas designated as important feeding grounds for seabirds. The footprint of installation is not sufficient to reduce the available prey items within the region.	N/A	N/A	**No**	N/A
Marine megafauna	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.	N/A	N/A	**No**	N/A
Death or injury by collision					
Marine megafauna	Low due to the low speed of the vessels (8 knots), along with the limited spatial and temporal extent of the installation vessels within the Application Corridor.	Vessel path within the Application Corridor.	Vessels will be travelling at a slow speed during installation works. Travel at speeds of 14 knots or less indicate negligible effects of collision to marine mammals (Laist et al., 2001).	**No**	N/A

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Temporary displacement/restricted access					
Shipping and navigation	Medium due to presence of vessel traffic within/in the vicinity of the Application Corridor.	Within the Application Corridor.	Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures. Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).	**Yes**	Section 13
Commercial fisheries	Medium due to the known presence of fishing vessels within/in the vicinity of the Application Corridor.	Within the Application Corridor.	Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures. Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS). As built survey data will be provided to the UKHO and Kingfisher for inclusion on Admiralty Charts and KIS-ORCA Awareness Charts.	**Yes**	

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Vessel collisions					
Shipping and navigation	Medium due to the known presence of ferry routes within/in the vicinity of the Application Corridor.	Within the Application Corridor.	Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures. Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).	**Yes**	Section 13
Increased snagging risk					
Shipping and navigation	Medium due to the known presence of ferry routes within/in the vicinity of the Application Corridor.	Within the Application Corridor.	Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices include the time and location of any work being carried out, and emergency event procedures. Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS). As built survey data will be provided to the UKHO and Kingfisher for inclusion on Admiralty Charts and KIS-ORCA Awareness Charts.	**Yes**	Section 13
Commercial fisheries	High due to the elevated levels of demersal trawling within/in the vicinity of the Application Corridor.	Within the Application Corridor.		**Yes**	Section 12

Receptor	Sensitivity of receptor to pressure	Dimensions of pressure footprint	Applicable embedded mitigation and best practice measures*	Further assessment required?	Reference
Damage to third party assets					
UXO and existing utilities	Medium due to the Application Corridor passing in the vicinity of the Skye-Uist power cable.	Within the Application Corridor.	N/A	Yes	Section 14

5. DESIGNATED SITES ASSESSMENT

5.1 Introduction

This section provides details of the marine designated sites and species that may be present or have the potential to be present within the vicinity of the Application Corridor. Potential impacts on sites determined to be at risk of impact 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. This section should be read in conjunction with the separate West Highlands EPS Risk and Protected Sites and Species Assessment (Xodus Group, 2019a) which assessed the impacts of survey activities to protected sites and species over the West Highlands marine region.

5.2 Data sources

Prior to commencement of any survey activities on the Project, an EPS Risk and Protected Sites and Species Assessment (Xodus Group, 2019a) was conducted. This assessment detailed the baseline for protected sites located in the vicinity of the existing cable and assessed the impacts of the survey activities on these sites. Relevant information has been used to inform the baseline overview of this section, and where applicable assessment findings corroborated with this MEA to ensure consistency.

In order to establish baseline conditions a desktop review of published information has been undertaken supported by consultation with relevant bodies. Data sources used to inform the baseline description and assessment include the following:

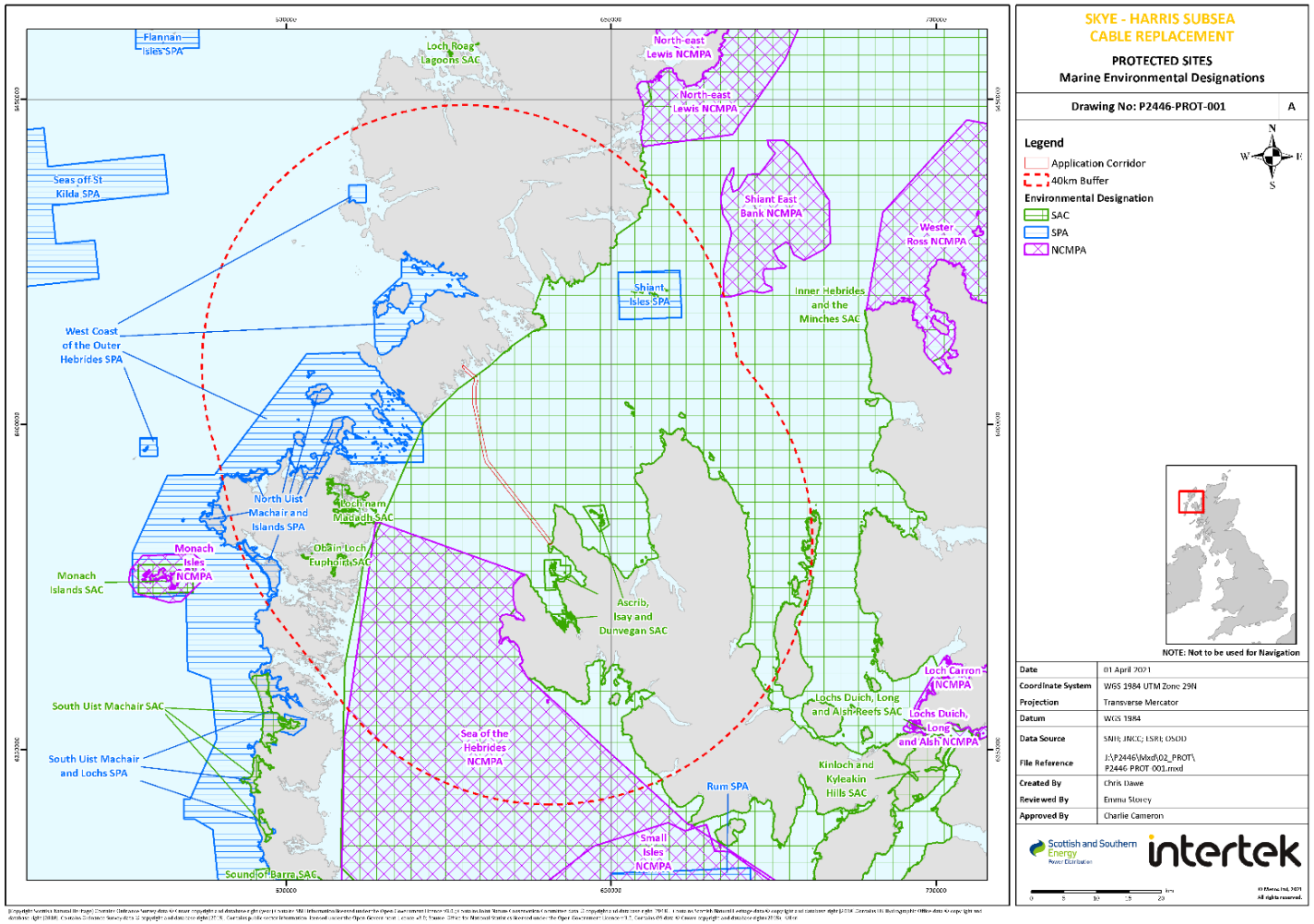
Table 5-1 Data source examples

Source	Data/information used
Joint Nature Conservation Committee (JNCC)	Joint SNCB Interim Displacement Advice Note (2017) Annex I Reefs in UK offshore waters
NatureScot	Site summary and citation reports on designated sites Background to NCMPA selection
Marine Scotland	National Marine Plan Interactive (NMPi)

5.3 Designated sites and species

There are two marine designated sites located within the Application Corridor: the Inner Hebrides and the Minches SAC and the South Lewis, Harris and North Uist National Scenic Area (NSA). Additionally, the Application Corridor passes within areas of potential Annex I reef habitat at both the Harris and Skye landfalls. A further eight protected sites occur in the vicinity of the Application Corridor, these are as shown in Figure 5-1 (Ref: P2446-PROT-001-A).

Figure 5-1 Designated sites located within/in the vicinity of the Application Corridor (P2446-PROT-001-A)



5.3.2 Special Areas of Conservation (SAC)

SAC's are sites classified under the Conservation (Natural Habitats, & c.) Regulations 2010 (as amended), the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended by the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019) and for the protection of Annex I and II habitats and species respectively (JNCC, 2019b).

5.3.2.1 Inner Hebrides and the Minches SAC (Within)

The Inner Hebrides and the Minches SAC covers a large area of 1381391.4 ha, stretching from the northern coast of Harris down to the waters south of Jura. The site is designated for the protection of the resident harbour porpoise (Phocena phocena) population, the only such site designated for the species in Scotland. The site provides protection for approximately 32% of the harbour porpoise population found on the west coast of Scotland, and contains the highest density of harbour porpoise in the country (NatureScot, 2020b). The status of the species in the site is currently favourable (NatureScot, 2020b).

5.3.2.2 Ascrib, Isay and Dunvegan SAC (1.91km south)

Spread across a complex of skerries, islets, undisturbed mainland shores and offshore islands in north-west Skye, Ascrib, Isay and Dunvegan SAC supports a breeding colony of harbour seal (Phoca vitulina). The population across the site is one of the larger discrete colonies in the UK, accounting for approximately 2% of the overall UK population (JNCC, 2021a).

5.3.3 Special Protection Areas (SPAs)

SPAs are sites classified under the Conservation (Natural Habitats, & c.) Regulations 2010 (as amended), the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended by the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019), for the protection of Annex I or migratory breeding and non-breeding birds (JNCC, 2019c). Proposed Special Protection Areas (pSPAs) are sites that have been identified by the Scottish Government that would provide for the protection of vulnerable bird species and further expand Scotland's network of SPAs (Marine Scotland, 2019).

5.3.3.1 West Coast of the Outer Hebrides proposed SPA (pSPA) (8.2km west)

The West Coast of the Outer Hebrides pSPA covers an area of 132170 ha across the Outer Hebrides stretching from the north west coast of Harris, along the west coasts of North Uist, Benbecula and South Uist, to the south of Sandray (south of Barra) (NatureScot, 2017). The site supports a variety of marine habitats, allowing for a wide diversity of plants and animal communities with high densities of fish and invertebrates (such as marine worms, crabs and mussels) to thrive within the site's boundaries. Such diversity provides food for the proposed designating features of the site, which are as follows:

Breeding

- Red-throated diver (Gavia stellata)

Non-breeding

- Black-throated diver (Gavia arctica)
- Common eider (Somateria mollissima)
- Great northern diver (Gavia immer)
- Long-tailed duck (Clangula hyemalis)
- Red-breasted merganser (Mergus serrator)
- Slavonian grebe (Podiceps auratus)

5.3.3.2 North Uist Machair and Islands SPA (19.7km west)

North Uist Machair and Islands SPA covers an area of 4873.53 ha across a range of coastal sites encompassing areas of rocky shore, sandy beaches and dunes, cultivated machair, saltmarsh, calcareous coastal plains and acid grassland. There are also important freshwater wetlands including eutrophic machair lochs, marshes and fens, and wet machair (NatureScot, 2018). The site is designated for the following populations:

Breeding

- Corncrake (Crex crex) (Annex I);
- Dunlin (Calidris alpina schinzii) (Annex I);
- Oystercatcher (Haematopus ostralegus);
- Redshank (Tringa tetanus); and
- Ringed plover (Charadrius hiaticula)

Non-Breeding

- Greenland barnacle goose (Branta leucopsis) (Annex I);
- Ringed plover; and
- Turnstone (Arenaria interpres)

5.3.3.3 Shiant Isles SPA (23.3km east)

Covering an area of 6935.65 ha, the Shiant Isles SPA is comprised of four islands located in the Minch. The SPA's boundary extends approximately 2km from the islands into the marine environment to protect their surrounding waters. The site is designated for the following populations:

Breeding

- Fulmar (Fulmarus glacialis)
- Guillemot (Uria aalge)
- Kittiwake (Rissa tridactyla)
- Puffin (Fratercula arctica)
- Razorbill (Alca torda)
- Shag (Phalacrocorax aristotelis)
- Breeding seabird assemblage

Non-breeding

- Greenland barnacle goose (Annex I)

5.3.4 Sites of Special Scientific Interest (SSSI)

SSSI's are statutory designations made by NatureScot under the Nature Conservation (Scotland) Act 2004 (NatureScot, 2019d). Under Section 3 of the Act, NatureScot have the responsibility to designate areas of land as SSSI's that are of special interest for their flora, fauna, geology or morphology.

5.3.4.1 Loch an Duin SSSI (13.5km west)

Covering an area of 2621.19 ha, Loch an Duin SSSI, north of Lochmaddy, North Uist, is a large, complex coastal area (NatureScot, 2020c). The site is designated for the following geological and biological features:

- Coastal geomorphology of Scotland;

- Saline lagoon;
- Tidal rapids;
- Otter (Lutra lutra);
- Breeding bird assemblage; and
- Brackish water cockle (Cerastoderma glaucum).

5.3.5 Nature Conservation Marine Protected Areas

Nature Conservation Marine Protected Areas (NCMPAs) are designated by Scottish Ministers under the Marine (Scotland) Act for the protection of biodiversity and geodiversity features within territorial waters (12 nautical miles (NM)) (NatureScot, 2020a).

5.3.5.1 Sea of the Hebrides NCMPA (5.6km south-west)

The Sea of the Hebrides NCMPA covers a large area off the west coast of Scotland, covering an area of 1,003,900 ha (NatureScot, 2019c). The cool, nutrient-rich waters of the site mix with shallow warmer water to generate an area of high productivity, known as a front. This results in a concentration of nutrients and plankton, which in turn attracts a range of predators, including basking shark and minke whales. These species are found in peak numbers between May and October when plankton numbers are at their highest. The protected features and conservation objectives of the site are as follows:

- Biodiversity
- Basking shark (Cetorhinus maximus);
- Minke whale (Balaenoptera acutorostrata); and
- Fronts
- Geodiversity
- Marine geomorphology of the Scottish seabed
- Conservation objectives
- To conserve these features in order to make a long-lasting contribution to the MPA network.

5.3.6 Other protected sites

5.3.6.1 South Lewis, Harris and North Uist National Scenic Area (NSA) (Within)

The South Lewis, Harris and North Uist NSA was designated in 1978. The site covers 202,388 hectares (ha) in total, of which 112,301 ha is on land with the remaining 90,087 ha being marine. North Harris contains the peak of Clisham (799m), the highest peak in the Outer Hebrides. Steep-sided glens, with precipitous crags, have a mountainous character. Exposure and grazing prevent tree growth, in turn increasing the intervisibility with surrounding landscapes, helping to enhance the significance of the surrounding mountains. Deep sea lochs in the east penetrate far into the hills, with the east coast of Harris containing many bays and islets. The west coast is comprised of wide sandy machair-backed beaches. Rocky headlands, separating the bays, have been sculptured into geos and stacks. Scattered islands lie in the Sound of Harris between South Harris and North Uist (NatureScot, 2020d). As the cable landfall sites will be reverted back to the pre-cable installation state following the completion of all installation activities, the South Lewis, Harris and North Uist NSA will not be adversely affected by the Project.

5.3.6.2 Potential Annex I habitat – Reef

The intertidal sections of the cable landfall sites on Skye and Harris pass within an area identified as potential Annex I habitat (PAIH) - bedrock reef by the JNCC (JNCC, 2019a). Bedrock reef occurs in areas

where the underlying bedrock rises above the seabed and creates a hard surface for species such as corals, sponges and sea squirts, as well as providing shelter for other crustacean and fish species (JNCC, 2014). PAIH habitat has been assessed further in Section 8: Benthic and Intertidal Ecology.

5.3.6.3 Designated seal haul-out sites

Under the Marine (Scotland) Act 2010, all grey and harbour seals are protected within Scottish territorial waters, with it being an offence to kill, injure or take seals, intentionally or recklessly, without a license. The subsequent Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014 made it an offence to harass a seal (intentionally or recklessly) at a haul-out site, with the Order also designating 194 protected haul-out sites around the Scottish coastline.

There are no designated haul-out sites located in the direct vicinity of the cable replacement Application Corridor. The closest haul-out sites to the Application Corridor are the Sound of Harris Islands for breeding grey seals (9.47km west), An Acarsaid a Deas haul out for harbour seals (10.5km north-east) and Loch a' Bhaigh haul-out for grey and harbour seals (17.3km west) (Marine Scotland, 2021b). The distance at which seals are disturbed at haul-out sites by human presence has been estimated to be 900m (Brassuer and Reijnders, 1994). As the closest site is 10.6km from the Application Corridor, installation and decommissioning activities will not disturb any seal haul-out sites, with these sites not being considered further in this assessment.

5.3.7 Potential for likely significant effects

Table 5-2 below summarises the designated sites in the vicinity of the replacement cable Application Corridor and details which sites have been assessed further to determine whether there is a potential likely significant effect (LSE). Those sites or impacts for which no LSE is expected have not been considered further in this assessment.

Table 5-2 Designated sites in the vicinity of the Application Corridor

Designated site	Designating features	Distance from replacement cable Application Corridor	Potential pressures	Potential pressure-receptor pathway	Require further assessment?
Inner Hebrides and the Minches SAC (UK0030393)	▪ Harbour porpoise (*Phocena phocena*)	Within	Underwater noise changes Vessel presence	The presence of vessels and the sound produced during installation activities could potentially disturb harbour porpoise from this site.	**Yes**
Ascrib, Isay and Dunvegan SAC (UK0030230)	▪ Harbour seal (*Phoca vitulina*)	1.9km	Underwater noise changes Vessel presence	The presence of vessels and the sound produced during installation activities could disturb harbour seal foraging outside of this site.	**Yes**
West Coast of the Outer Hebrides pSPA	**Breeding** ▪ Red-throated diver (*Gavia stellata*) **Non-breeding** ▪ Black-throated diver (*Gavia arctica*) ▪ Common eider (Somateria mollissima) ▪ Great northern diver (*Gavia immer*) ▪ Long-tailed duck (*Clangula hyemalis*) ▪ Red-breasted merganser (*Mergus serrator*) ▪ Slavonian grebe (*Podiceps auratus*)	8.2km	N/A	The designating bird features of this site are not expected to be found foraging within the Application Corridor, with birds such as red-throated diver having a mean-max foraging range of only 4.5km (Woodward et al., 2019). As such there is no potential pressure-receptor pathway between these features and cable installation activities.	**No**

Designated site	Designating features	Distance from replacement cable Application Corridor	Potential pressures	Potential pressure-receptor pathway	Require further assessment?
North Uist Machair and Islands SPA (UK0019804)	**Breeding** ▪ Corncrake (*Crex crex*) (Annex I); ▪ Dunlin (*Calidris alpina schinzii*) (Annex I); ▪ Oystercatcher (*Haematopus ostralegus*); ▪ Redshank (*Tringa tetanus*); and ▪ Ringed plover (*Charadrius hiaticula*) **Non-Breeding** ▪ Greenland barnacle goose (*Branta leucopsis*) (Annex I); ▪ Ringed plover; and ▪ Turnstone (*Arenaria interpres*)	19.7km	N/A	The designating bird features of this site are wading birds that are not found feeding offshore. As such there is no potential pressure-receptor pathway between these features and cable installation activities.	**No**
Shiant Isles SPA (UK9001041)	**Breeding** ▪ Fulmar (*Fulmarus glacialis*) ▪ Guillemot (*Uria aalge*) ▪ Kittiwake (*Rissa tridactyla*) ▪ Puffin (*Fratercula arctica*) ▪ Razorbill (*Alca torda*) ▪ Shag (*Phalacrocorax aristotelis*)	23.3km	Visual disturbance	The breeding bird features of Shiant Isles SPA are all species that typically feed offshore. As such there exists the potential for these species to be found feeding within the vicinity of the Application Corridor.	**Yes**

Designated site	Designating features	Distance from replacement cable Application Corridor	Potential pressures	Potential pressure-receptor pathway	Require further assessment?
	▪ Breeding seabird assemblage				
	Non-breeding ▪ Greenland barnacle goose (Annex I)		N/A	No potential pressure-receptor pathway.	**No**
Loch an Duin SSSI (135990)	▪ Coastal geomorphology of Scotland; ▪ Saline lagoon; ▪ Tidal rapids; ▪ Otter (*Lutra lutra)*; ▪ Breeding bird assemblage; and ▪ Brackish water cockle (*Cerastoderma glaucum*).	13.5km	N/A	No potential pressure-receptor pathway. The breeding bird assemblage present within the site is composed of terrestrial species such as raven (*Corvus corax*) and wading species such as dunlin (*Calidris alpine*).	**No**
Sea of the Hebrides NCMPA	▪ Basking shark (*Cethorinus maximus*) ▪ Minke whale (*Balaenoptera acutorostrata*)	5.6km	Underwater noise changes Vessel presence	Minke whale and basking shark from this site could potentially be found feeding within the Application Corridor. As such, they could potentially be disturbed by the installation activities.	**Yes**
	▪ Fronts ▪ Marine geomorphology of the Scottish seabed		N/A	No potential pressure-receptor pathway.	**No**

5.4 Assessment of likely significant effects

5.4.1 Underwater noise changes

Underwater noise changes generated by Project vessels and installation equipment may pose a risk to cetaceans, pinnipeds and basking shark. Such noise has the ability to impact these species in two ways as follows:

- Injury - physiological damage to an individuals' auditory or other internal organs; and
- Disturbance – either temporary or continuous. While this factor does not result in injury, disruptions to behavioural patterns such as migration, nursing, breeding, foraging, socialising and/or sheltering may occur.

To determine the potential impact of noise generated by the Project on cetaceans, pinnipeds and basking shark, the sound levels that will be produced have been compared to the available estimated thresholds for injury and disturbance in cetaceans, pinnipeds and basking shark. JNCC guidance (JNCC, 2020) recommends using the injury criteria proposed by Southall *et al.* (2019) based on a combination of linear (un-weighted) peak pressure levels and mammal hearing weighted (M-weighted) sound exposure levels (SEL).

If frequencies of the sound produced fall outside the predicted auditory bandwidth for a species, then disturbance is unlikely. Sufficiently high noise sources, however, can still cause damage to an individuals' auditory or other internal organs. For details on the typical auditory bandwidths of cetaceans, see Table 5-3 below. The hearing range of basking sharks is not currently known. However, five other elasmobranchs have been found to have a hearing range between 20 Hz to 1 kHz. This range may or may not be transferable to basking sharks (Macleod et al., 2011). Pinnipeds possess a typical hearing range of 50 Hz to 86 Hz (NMFS, 2018).

Table 5-3 Auditory bandwidths estimated for hearing groups of cetaceans (NMFS, 2018; Southall et al., 2019)

Hearing Group	Estimated Auditory Bandwidth
Low-frequency cetaceans (deep diving species e.g. minke whale, pilot whale, etc.)	7 Hz to 35 kHz, with peak sensitivity around 100- 200 Hz
Mid-frequency cetaceans (small dolphins e.g. bottlenose dolphin, common dolphin, white-beaked dolphin, etc.)	150 Hz to 160 kHz, with peak sensitivity above 10 kHz (Except for killer whales: 50 Hz to 100 kHz)
High-frequency cetaceans (harbour porpoise)	180 Hz to 200 kHz, with peak sensitivity above 4 kHz
Phocid pinnipeds (true seals, e.g. grey and harbour seal)	50 Hz to 86 kHz

The main sources of underwater noise that will be generated by the cable installation activities are:

- Noise from installation vessels utilised during the works;
- Noise from cable laying activities;
- Noise from Multi-beam Echosounder (MBES) used to obtain detailed maps of the seafloor which show water depths; and
- Noise from the Ultra-Short Baseline (USBL) device used to position the ROV to conduct touch down monitoring.

The presence of installation vessels within the Minches will not result in a significant change in the number of vessels typically present in the area and as such will not result in a significant change to the soundscape of the area. Previous modelling studies conducted to support EPS applications for cable

replacement projects in Scotland have found that injury to other species would only occur if the animal was within the boat engine itself (Xodus Group, 2019c). As such, this source of noise will not result in an adverse effect on any protected species and has not been considered further.

As cable installation activities will be a continuous but temporary occurrence, nearby animals will not be subject to lasting or prolonged periods of noise. As such, noise and associated temporary disturbance from the cable laying activities themselves will not result in a significant adverse effect on nearby individuals.

MBES devices typically operate at frequency ranges of 200kHz or above, outside the range of hearing range of mid and high frequency species such as dolphins and harbour porpoise. As such, there is no potential for disturbance to occur as a result of the use of this equipment.

Continuous sound generated by USBL devices are used to determine the position of subsea equipment during cable installation. The system operates by emitting a low frequency acoustic pulse between the transponder on the vessel and the transducer on the subsea unit. USBL devices typically operate at a frequency of 24 - 33.5 kHz (Xodus Group, 2019a). Such frequencies produced can be audible to nearby cetaceans, and thus could potentially result in adverse effects to such receptors.

The impact of USBL devices in relation to designated species is discussed in the following sections.

5.4.1.2 Inner Hebrides and the Minches SAC

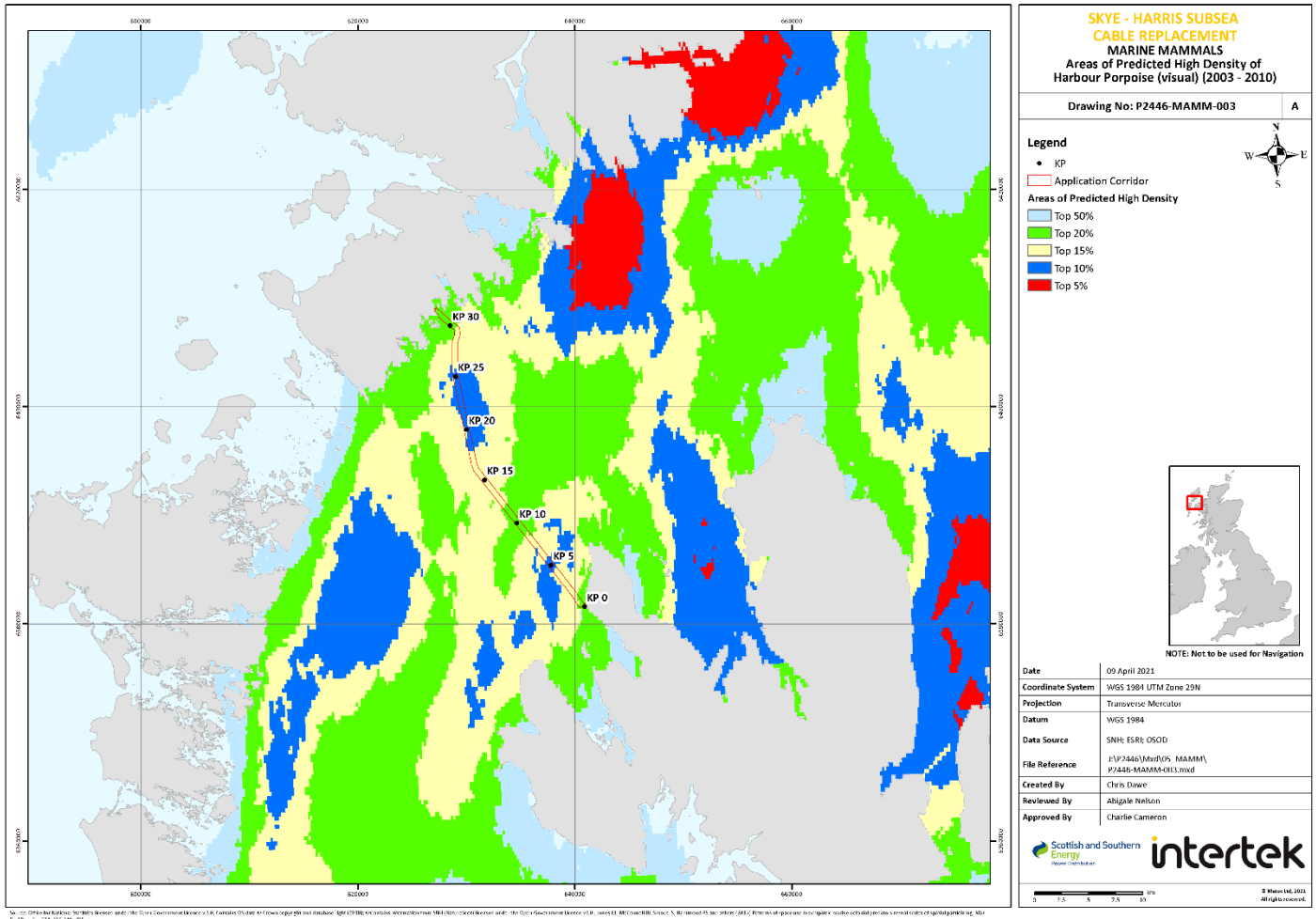
Primary Feature: Harbour porpoise

Conservation Objectives
To ensure that the Inner Hebrides and the Minches SAC continues to make an appropriate contribution to harbour porpoise remaining at favourable conservation status. To ensure for harbour porpoise within the context of environmental changes, that the integrity of the Inner Hebrides and the Minches SAC is maintained through:

- Harbour porpoise within the Inner Hebrides and the Minches are not at significant risk from injury or killing.
- The distribution of harbour porpoise throughout the site is maintained by avoiding significant disturbance.
- The condition of supporting habitats and the availability of prey for harbour porpoise are maintained.

Assessment against conservation objectives
Harbour porpoise are present within the Inner Hebrides and the Minches SAC year-round, so will be present in the Minches during cable installation works. Figure 5-2 (Ref: P2446-MAMM-003-A) below details the density of harbour porpoise present within the Application Corridor.

Figure 5-2 Areas of predicted high density of harbour porpoise (P2446-MAMM-003-A)



While harbour porpoise are typically more sensitive to noise disturbance in the higher frequency sound ranges (Dyndo et al., 2015), they can still be susceptible to impacts from USBL devices. Previous assessments on the effects of USBL devices on harbour porpoise found that in a worst-case scenario, harbour porpoise could be injured by the device within a range of 104m (Xodus Group, 2019b). However, individuals would have to be present within this range for a period of several hours. Given that the sound will be produced from a moving vessel and that cetaceans typically move away from sources of noise disturbance, the likelihood of injury occurring is extremely low.

Disturbance ranges for USBL activities have previously been calculated to be approximately 207m. (Xodus Group, 2019b). While disturbance effects would be instantaneous to any individuals within this range, as shown above, the Application Corridor does not pass through the areas of highest harbour porpoise density. As such, installation works will not significantly affect the distribution of harbour porpoise within the SAC. Given the short-term, localised and transient nature of the installation activities, any disturbance caused will not be significant, ensuring the species distribution within the site is maintained. Underwater noise changes and associated cable installation activities will not affect the supporting habitat of harbour porpoise or the availability of prey species within the Minch, ensuring they are maintained for use by harbour porpoise into the future.

5.4.1.3 Ascrib, Isay and Dunvegan SAC

Primary Feature: Harbour seal

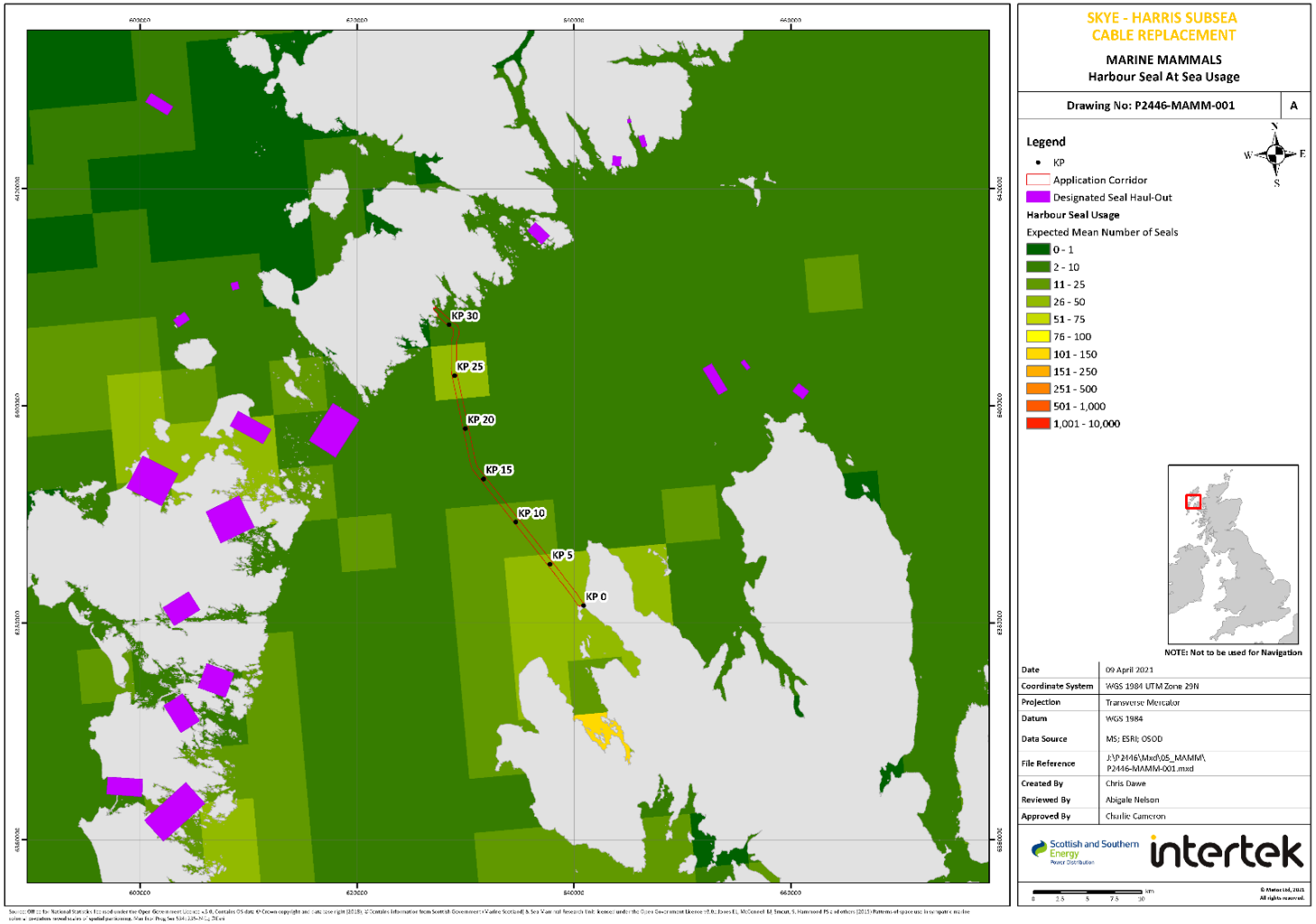
Conservation Objectives
To avoid deterioration of the habitats for harbour seal or significant disturbance to the harbour seal, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Assessment against conservation objectives
Due to the distance of the installation activities from the harbour seal haul-out sites within the Ascrib, Isay and Dunvegan SAC (approximately 1.9km) and the short-term, localised and transient nature of such activities, there will be no disturbance of hauled-out seals within the site from noise generated by the installation activities.

Seals in the water could be susceptible to disturbance from USBL devices given the overlap in their hearing ranges and frequencies generated by USBL devices (NMFS, 2018). Recent studies have shown however that individuals will quickly return to an area that was subjected to even high-intensity noise emissions within a short period of time (Russell et al., 2016). Given the low density of seals at sea within the Application Corridor (see Figure 5-3 below Ref: P2446-MAMM-001-A) and transient nature of the installation activities, the distribution of harbour seal within the Ascrib, Isay and Dunvegan SAC will be maintained, with no significant disturbance of the species occurring. As such, the population of harbour seal within the Ascrib, Isay and Dunvegan SAC will remain a viable component of the site. Underwater noise changes and associated cable installation activities will not affect the distribution, extent, structure, function and supporting processes of the supporting habitat for harbour seal, ensuring they are maintained for use by harbour seal into the future.

Figure 5-3 Harbour seal at-sea usage (P2446-MAMM-001-A)



5.4.1.4 Sea of the Hebrides NCMPA

Protected Features: Minke whale, Basking shark

Conservation Objective

1. The conservation objectives of the Sea of the Hebrides MPA are that the protected features—
    a. so far as already in favourable condition, remain in such condition; and
    b. so far as not already in favourable condition, be brought into such condition, and remain in such condition.
2. In paragraph (1) "favourable condition", with respect to a mobile species of marine fauna, means that—
    a. the species is conserved or, where relevant, recovered to include the continued access by the species to resources provided by the Sea of the Hebrides MPA for, but not restricted to, feeding, courtship, spawning or use as nursery grounds;
    b. the extent and distribution of any supporting feature upon which the species is dependent is conserved or, where relevant, recovered; and
    c. the structure and function of any supporting feature, including any associated processes supporting the species within the Sea of the Hebrides MPA, is such as to ensure that the protected feature is in a condition which is healthy and not deteriorating.
3. In paragraph (1) "favourable condition", with respect to a large-scale feature, means that—
    a. the extent, distribution and structure of that feature is maintained;
    b. the function of that feature is maintained so as to ensure that it continues to support its characteristic biological communities and their use of the site including for, but not restricted to, feeding, courtship, spawning or use as nursery grounds; and
    c. the processes supporting that feature are maintained.
4. In paragraph (3)(b) the reference to the characteristic biological communities of a large-scale feature includes a reference to the diversity of any species associated with the large scale feature.
5. In paragraph (1) "favourable condition", with respect to a feature of geomorphological interest, means that—
    a. its extent, component elements and integrity are maintained;
    b. its structure and functioning are unimpaired; and
    c. its surface remains sufficiently unobscured for the purposes of determining whether the criteria in paragraphs (a) and (b) are satisfied.
6. For the purpose of determining whether a feature of geomorphological interest is sufficiently unobscured under paragraph (4)(c), any obscuring of that feature entirely by natural processes is to be disregarded.
7. For the purpose of determining whether a protected feature is in favourable condition within the meaning of paragraphs (2), (3) or (5) any alteration to that feature brought about entirely by natural processes is to be disregarded.

Assessment against conservation objectives

The Sea of the Hebrides NCMPA is designated for the populations of minke whale and basking shark which utilise the site for feeding in the summer months. As installation activities for the Project are located outside of the NCMPA, no individuals within the site itself will be affected. Distribution data

for both species within and outside of the NCMPA collected as part of the Data Confidence Assessment for the site (NatureScot, 2014) indicates that both minke whale and basking shark are found in lower numbers in the northern section of the site compared to that further south, at 0 – 0.1 animals per km² for both species along the Application Corridor (see Figures 5-4 and 5-5 below respectively Ref: P2446-MAMM-004-A and P2466-MAMM-005-A). This is potentially due to the fronts that create the rich feeding grounds primarily being located in the southern reaches of the site. However, modelled persistence data above mean density for minke whale and basking shark indicates that both species may be found at higher densities in the vicinity of the Skye and Harris landfalls (NatureScot, 2014). This indicates that individuals of both species do range outside of the NCMPA and could still be found in the vicinity of the installation works.

As detailed in Section 5.4.1 above, minke whale hearing lies within the low-frequency range of 7 Hz to 35 kHz (with peak sensitivity around 100 - 200 Hz) and basking shark are predicted (based the hearing ranges of other elasmobranch species) to have a range of 20 Hz to 1 kHz. As such, only the minke whales hearing range places the species in the range of sound associated with USBL devices. Continuous sound emissions from the USBL system throughout the survey and cable installation activities would present a worst-case scenario which would increase the potential risk of injury to the animals from noise emissions. However, the USBL system is likely to be employed intermittently, with gaps between noise emissions offering animals the opportunity to move away from the source and avoid exposure. Installation activities are currently planned to take place over a (worst-case) 2-month period between the end of June and Mid-August. While disturbance within close proximity to the USBL device would be instantaneous, for a continuous disturbance impact to occur, the animals would have to stay in close proximity to, and potentially follow the USBL, for the duration of the surveys. Even if the short-term operations result in a response by an animal on its own, this would not be likely to impair the ability of an animal to survive or reproduce or result in any significant impacts to the local populations or distribution. As such, there will not be significant disturbance of either species within or outside of the Sea of the Hebrides NCMPA given the transient and short-term nature of such activities.

Underwater noise changes and associated cable installation activities will not affect the distribution, extent, structure, function and supporting processes of the supporting habitat for minke whale or basking shark, ensuring they are maintained for use by these species into the future.

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Figure 5-4 Observed adjusted densities of minke whale (2000-2012) (P2446-MAMM-004-A)

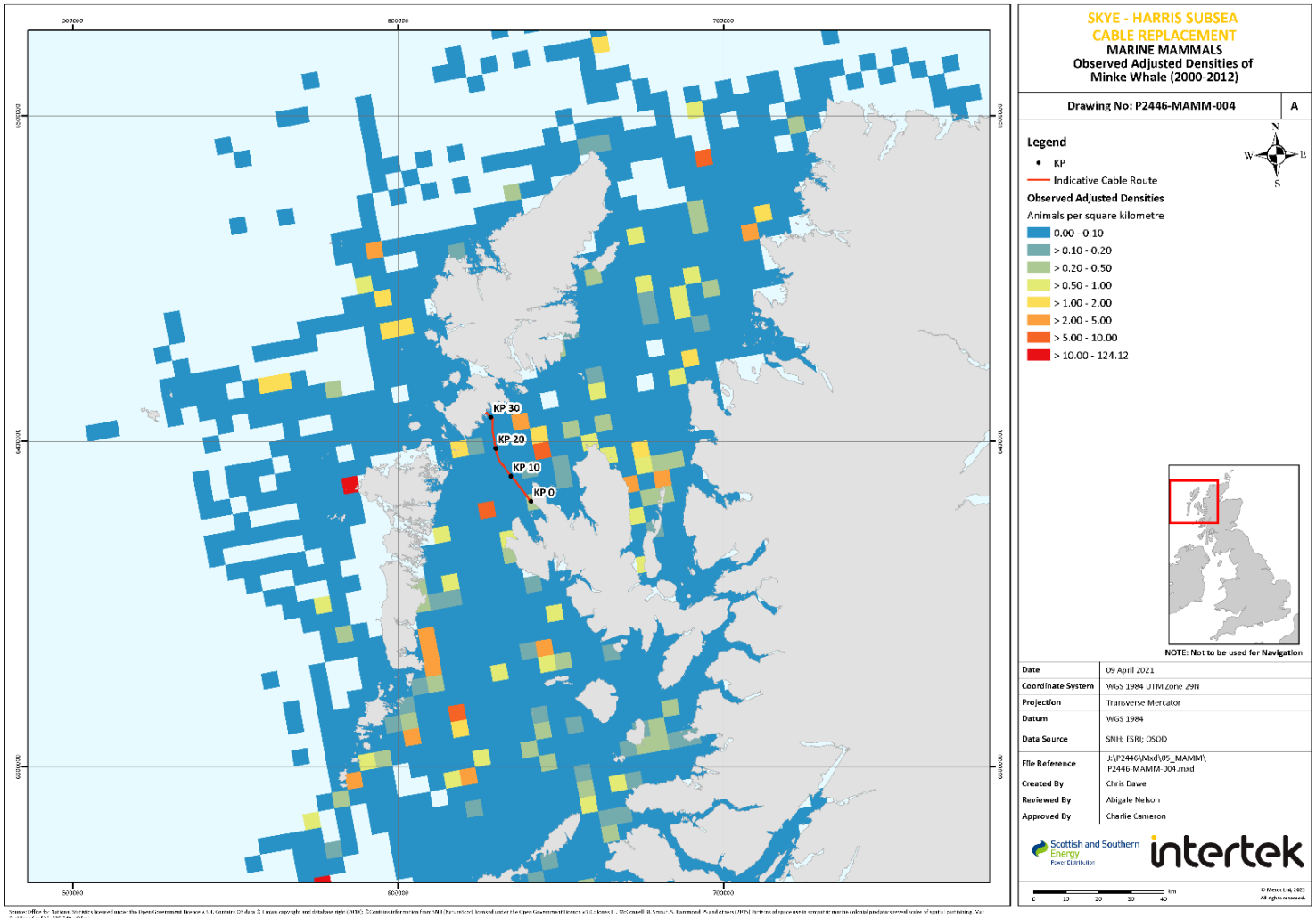
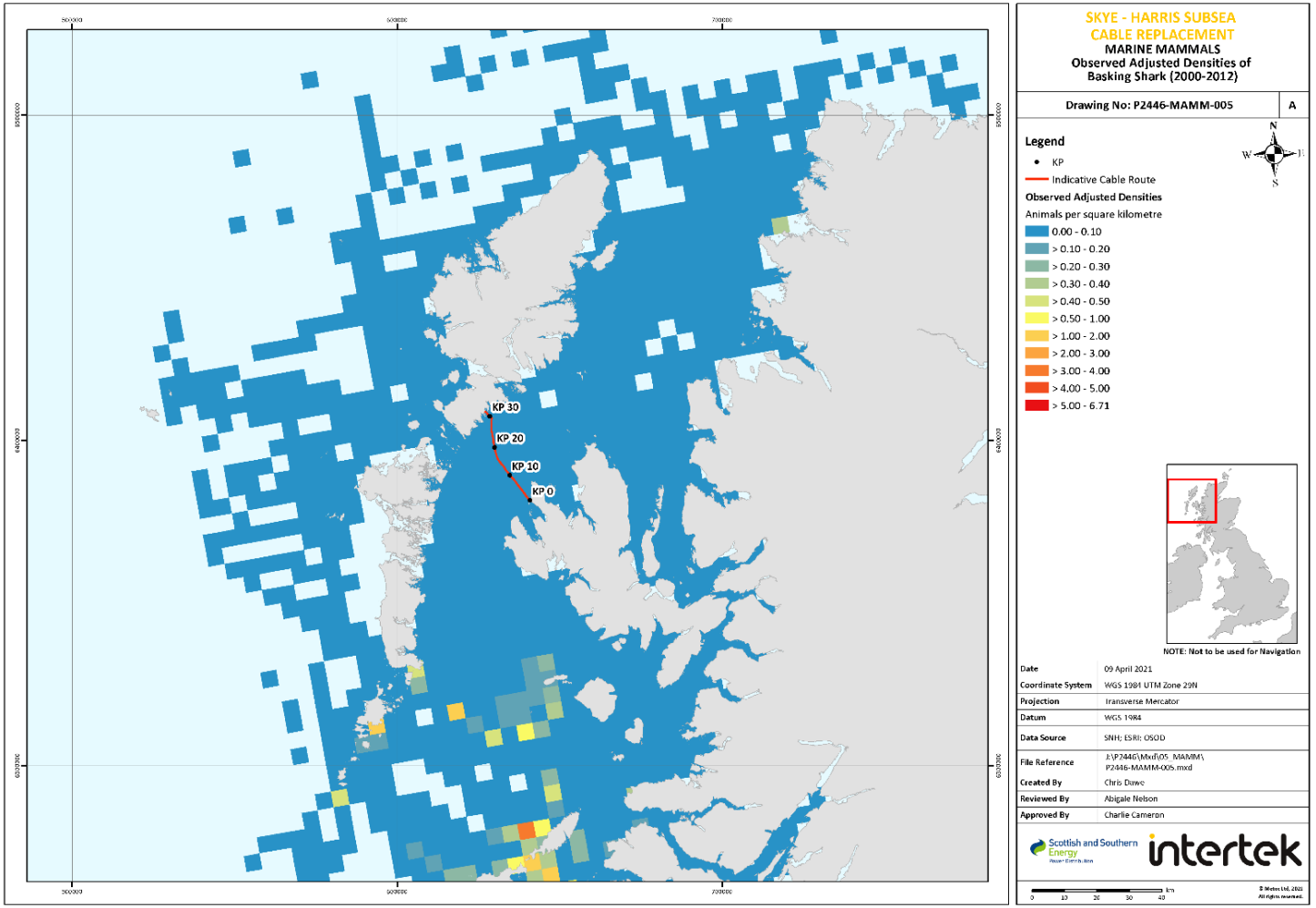


Figure 5-5 Observed adjusted densities of basking shark (2000-2012) (P2446-MAMM-005-A)



5.4.2 Vessel presence

5.4.2.1 Inner Hebrides and the Minches SAC

Conservation Objectives
To ensure that the Inner Hebrides and the Minches SAC continues to make an appropriate contribution to harbour porpoise remaining at favourable conservation status. To ensure for harbour porpoise within the context of environmental changes, that the integrity of the Inner Hebrides and the Minches SAC is maintained through:

- Harbour porpoise within the Inner Hebrides and the Minches are not at significant risk from injury or killing;
- The distribution of harbour porpoise throughout the site is maintained by avoiding significant disturbance; and
- The condition of supporting habitats and the availability of prey for harbour porpoise are maintained.

Assessment against conservation objectives
Due to the mobile nature of harbour porpoise and limited time that the installation activities will encompass, the risk will be minimal and will not have an adverse effect on the local population. As such, harbour porpoise will not be at a significant risk from being injured or killed and their distribution within the site will remain unaffected.

5.4.2.2 Ascrib, Isay and Dunvegan SAC

Conservation Objectives
To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site;
- Distribution of the species within site;
- Distribution and extent of habitats supporting the species;
- Structure, function and supporting processes of habitats supporting the species; and
- No significant disturbance of the species.

Assessment against conservation objectives
Seals located at haul-out sites have a typical disturbance range of 900m, where vessels or human presence at a distance lower than this may cause the seals to ‘flush’ from the site into the sea (Brassuer and Reijnders, 1994). As the Application Corridor is located 1.9km from the Ascrib, Isay and Dunvegan SAC however, harbour seals hauled out will not be disturbed by the installation activities.

5.4.2.3 Sea of the Hebrides NCMPA

Due to the mobile nature of minke whale and limited time that the installation activities will encompass, the risk will be minimal and will not have an adverse effect on the local population. As such, minke whale will not be at a significant risk from being injured or killed and their distribution within the site will remain unaffected.

As a slow-moving species, basking shark are more susceptible to the threat of vessel strikes, with the threat increasing as vessel speed increases. As the installation vessel will be moving at a slow speed, collision risk will be low.

5.4.3 Visual disturbance

5.4.3.1 Shiant Isles SPA

Conservation objectives
To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site;
- Distribution of the species within site;
- Distribution and extent of habitats supporting the species;
- Structure, function and supporting processes of habitats supporting the species; and
- No significant disturbance of the species

Assessment against conservation objectives
The Shiant Isles SPA is composed of four islands in the Minch, located approximately 23.3km east of the cable corridor (NatureScot, 2009). The site is designated for the breeding seabirds of fulmar, guillemot, kittiwake, puffin, razorbill and shag, all species which forage offshore. Of these species, shag has a mean max foraging range of 13.2km (Woodward et al., 2019), and as such is unlikely to be found foraging within the cable corridor. The mean max foraging ranges of the remaining species however all fall within range the cable corridor however, and so could be found foraging in the vicinity of the cable installation works.

Fulmar and kittiwake are considered to have a low sensitivity to visual disturbance from vessel movement (JNCC, 2017). Guillemot, puffin and razorbill are, however, considered to have a moderate sensitivity to vessel movements (JNCC, 2017) with these species seeing moderate to high proportions of observed disturbance behaviours in response to vessel traffic in a 2019 study (Fliessbach et al., 2019). Installation activities will be a temporary activity occurring over a 24-hour basis, and so will transit through any feeding areas utilised by these species in a short period of time. As such, while individual birds may be temporarily disturbed by the installation activities, they will be able to quickly return to any utilised feeding areas. As such, no significant disturbance of the sites designating species will occur, and their populations will remain a viable component of the site. Due to the distance of the cable installation works from Shiant Isles SPA, the works will have no effect on the species distribution within the site or on the site's physical characteristics.

5.5 Conclusion

The above assessment has demonstrated that installation and decommissioning activities associated with the cable replacement will not adversely affect the conservation objectives of any designated sites within or in the vicinity of the Application Corridor, and that an Appropriate Assessment (AA) will not be required. Any disturbance caused by the installation of the replacement cable and decommissioning of the nearshore section of the existing cable will be minor and temporary due to their short-term, localised and transient nature. No LSE will occur as a result of installation/decommissioning activities.

6. PHYSICAL ENVIRONMENT

6.1 Introduction

This section provides a description of the physical environment (metocean conditions, underlying geology and superficial sediments) influencing the baseline environment, identifies impacts associated with replacement cable installation and existing cable decommissioning on physical processes and presents findings of the environmental assessment.

6.2 Data Sources

Fugro has undertaken geophysical, geotechnical and environmental surveys to provide an overview of the seabed conditions along the Application Corridor. The following report was used to inform the physical processes baseline description:

- Cable Route Survey – SSEN Skye to Harris Replacement Cable, Volume 1: Integrated Geophysical Results Report (Fugro, 2021).

Hydrofix Surveys Ltd were commissioned to undertake a preliminary desk-based UXO risk assessment. The following report was used to inform the physical processes baseline description:

- Background Information & Preliminary UXO Risk Assessment (Hydrofix, 2021).

6.2.1 Marine Survey

Surveys of the 500m wide marine survey corridor were carried out between 25 February to 23 March 2021 by Fugro. The objective of the surveys was to establish seabed conditions along the replacement cable route, including bathymetry and other seabed features (such as crossing of infrastructure and other obstacles), etc. The scope of the survey works included:

- Geophysical route survey (nearshore, 15-60 m; offshore). The geophysical survey comprised of MBES, SSS, sub-bottom profiler SBP) and magnetometer.
- Geotechnical survey. Geotechnical survey included testing and sampling using a high-performance corer (HPC) Vibrocore (VC) and cone penetration testing (CPT).
- Landfall topographic survey.
- Reporting and charting.
- Environmental survey, including sampling, was also undertaken and reported separately as part of the marine survey campaign.

6.3 Physical Environment Description

6.3.1 Metocean Conditions

6.3.1.1 Water Levels and Currents

The tides around Scotland are strongly semi-diurnal and can be described by the principal semi-diurnal lunar (M2) and semi-diurnal solar (S2) constituents (Neill *et al*., 2017) with the diurnal species, namely the K1 and O1, generally an order of magnitude smaller (Inall and Sherwin, 2006). An M2 amphidrome exists to the south of Islay, which results in a propagation of the M2 tide as a Kelvin-type wave of surface elevation from south to north, with an amplitude of approximately 1.6m and a phase of approximately 180° within The Little Minch.

The tidal range within The Minch is generally semi-diurnal with a spring and neap tidal range of 4.0m and 1.7m at Leverburgh, the closest point to the landfall on Harris, and 4.5m and 1.7m at Loch Dunvegan, the closest point to the landfall on Skye (TotalTide, 2021). Table 6-1 provides a summary of the tidal levels and ranges in the vicinity of the proposed cable landfall locations.

Table 6-1 Tidal levels and ranges (TotalTide, 2021)

Location	MHWS (m CD)	MLWS (m CD)	Spring range (m)	MHWN (m CD)	MLWN (m CD)	Neap range (m)
Leverburgh	4.6	0.6	4.0	3.5	1.8	1.7
Loch Dunvegan	5.2	0.7	4.5	3.8	2.1	1.7

The flood tide within The Minch flows in a general northerly direction and the opposite direction during the ebb. Peak current speeds are generally low within The Minch, with speeds of up to 0.8 and 0.3m/s during peak spring and neap tides, respectively (ABPmer, 2017), however, speeds are higher between the many islands and channels, peaking at approximately 2.5m/s (Ramsay and Brampton, 2000a).

6.3.1.2 Waves

Waves are directly driven by winds, modified by currents and shallow sea-floor topography. In UK waters, wave climate is strongly seasonal; mean wave heights peak around January, with a high risk of high monthly-mean wave heights and extreme wave heights from October to March (UKMMAS, 2010).

The wave resource in Scotland is generally influenced by conditions in the North Atlantic due to the predominantly south-westerly prevailing winds, with a fetch sufficient to generate swell (Neill and Hashemi, 2013). The dominant wave direction for both swell and total sea is from the westerly sector. Although the influence of waves from this sector will reduce significantly to the north, swell conditions generated in the North Atlantic will diffract into the Sea of the Hebrides (Ramsay and Brampton, 2000a).

Within the Little Minch, local wind-generated waves dominate the local wave climate, with fetch-limited waves to the east. However, a strong southerly or northerly wind that has been blowing for a long time could generate swell waves from the Atlantic Ocean meaning that the proposed cable corridor is relatively exposed (Hydrofix, 2021) with an annual mean significant wave height of approximately 1.9 m (ABPmer, 2017).

6.3.1.3 Wind

Northern Scotland is subject to strong winds, with prevailing winds from the south-west and annual average wind speeds in the vicinity of the proposed cable route of approximately 10 m/s (ABPmer, 2017). For 75% of the time, wind speeds exceed 4 m/s, while for 0.1% of the time, wind speeds exceed 20 m/s (Barne et al., 1997). Average wind speeds during the winter are higher, increasing up to 30 m/s (Hydrofix, 2021).

6.3.1.4 Temperature and Salinity

The North Atlantic Drift current carries oceanic water along the north coast of Scotland through the Faroe – Shetland Channel to the Norwegian coast. This has a cooling effect on temperatures in the summer and a warming affect in the winter. The waters within the Little Minch are derived from three principle sources: a) oceanic or Atlantic water, b) Clyde/Irish Sea water, and c) coastal water derived from land, which mixes as the water travels northwards at a rate of a few kilometres a day through the Minch, however, some of this water travelling through the Sea of the Hebrides reverses at the Little Minch to flow southwards along the east coast of Barra (Barne et al., 1997).

The average annual temperature in the vicinity of the proposed cable is approximately 10°C with warmest temperatures in August/September and coldest temperatures in February, March and April (Hydrofix, 2021), while the mean annual salinity is approximately 34.6 ppt (1971 – 2016 average) (Marine Scotland, 2016). The variability in salinity within the Little Minch is small as the strong currents result in a well-mixed water column with no stratification (Hydrofix, 2021).

6.3.2 Coastal Processes

As noted in Section 6.3.1.2, the Little Minch is sheltered from westerly/south-westerly waves, however, strong southerly/northerly winds can give rise to more significant wave conditions and higher wave energy.

Along the majority of Harris and Skye, the coastline comprises cliffs with a number of shingle/cobble/boulder fringe beaches along the inner areas of the sea lochs – littoral processes do occur on these fringe beaches, however, there is little information on any significant beach sediment movements (Ramsay and Brampton, 2000a). Due to the hard nature of this coastline, there is little erosion or accretion, and any erosion is as a result of intermittent storm events (Ramsay and Brampton, 2000a). Furthermore, Barne et al. (1997) note that between Stornoway Harbour and Barra Head on Harris, the majority of the coastline comprises cliffs and sea lochs with no significant beaches or detectable littoral drift with little sign of erosion or accretion. On Skye between Ardnamurchan Point to Rubha Reidh, the sheltered nature of this stretch of coastline from Atlantic swell and beaches are small and independent of each other (Barne et al., 1997).

In the vicinity of the landfall site at Trumpan, Skye, the surficial sediments comprise Devensian diamictous till to the north east and marine deposits of gravel, sand and silt to the south west (Hydrofix, 2021). The beach sediments at the Skye landfall generally comprise cobbles and boulders over bedrock with a grassy field or peat layer at the back of the beach. Global Marine (2020a) also observed a boggy wet area behind the existing landfall site. At the Skye landfall site, there are very few beaches other than dynamically stable shingle and cobble fringe beaches, which are common in many of the sea lochs on the west coast of Scotland (Ramsay and Brampton, 2000b). During the Fugro survey, it was noted that the landfall area is generally flat to the south consisting of wet grass and swamp around the pond with a 2m high embankment separating the accessible part of the grassy field from the beach rocky area. The beach itself consists of two distinct bays separated by cliffs on the east and west side, both of which comprise cobbles and boulders with rock outcrops on each side. The topography of the landfall area consists of land at approximately 2.5m LAT at KP 0.110 rising to a maximum of around 13.0m LAT at KP 0.050 before falling to approximately 10.0m LAT at KP 0.000 (Fugro, 2021a).

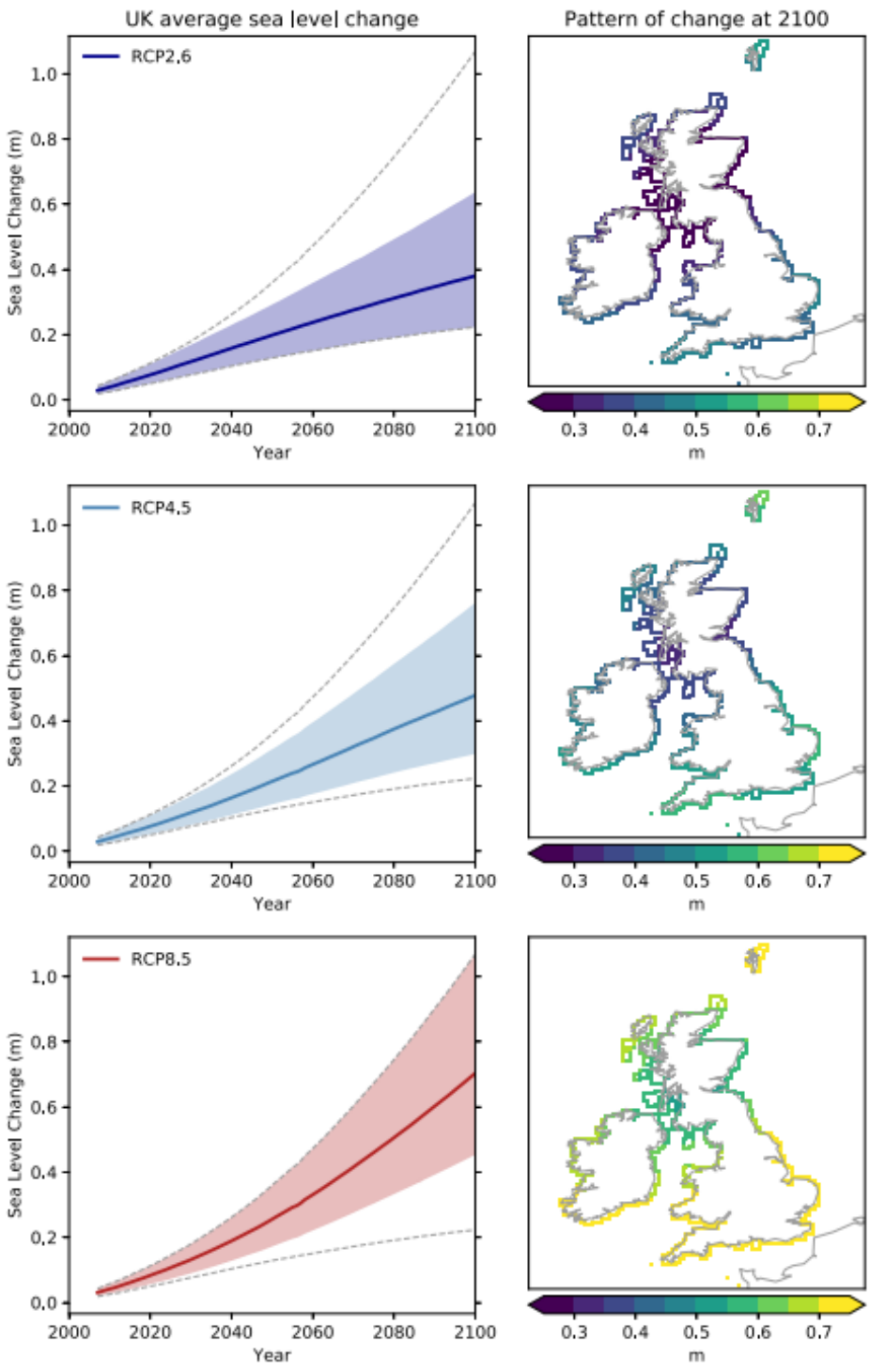
At the Harris landfall site, the surficial sediments are limited with aerial imagery suggesting exposed bedrock (Hydrofix, 2021). The existing landfall comprises sand over bedrock with boulders and cobbles with a rock outcrop in the middle of the landfall slope (Hydrofix, 2021). The back of the beach comprises a grassy or possible peat layer (Global Marine, 2020b). During the Fugro survey, it was noted that the general perimeter is very rocky and steep with the beach area having a constant slope and comprising small pebbles, with the exception of low tide where rocks can be observed. The topography of the landfall area consists of land at approximately 2.0m LAT at KP 0.147 rising to a maximum of around 13.0m LAT at KP 0.000 (Fugro, 2021a).

With the anticipated onset of climate change, sea levels are predicted to change around 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 IPCC AR5, which includes projections for a range of climate phenomena (temperature, rainfall, sea levels, etc.) under different emission scenarios. 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. These are provided in Figure 6-1 below.

Figure 6-1 Three emissions scenarios against the relative sea level rise in the UK and Ireland, with further detailed (Palmer et al, 2018)



6.3.3 Bathymetry, Geology, Seabed Sediments and Features

6.3.3.1 Bathymetry

The bathymetric survey along the proposed replacement cable route was reported in four sections: Skye Nearshore (KP 0.228 to KP 1.440); Skye Offshore (KP 1.440 to KP 14.930), Harris Offshore (KP 14.930 to KP 29.170) and Harris Nearshore (KP 29.170 to KP 31.895).

The water depths within the Skye Nearshore region range between 10.9m LAT at KP 0.228 to 34.5m LAT at KP 1.440. The maximum seabed gradient along this section is 8° and occurs at KP 1.217. The water depths within the Skye Offshore region range between 34.5 m LAT at KP 1.440 to 164.8m LAT at KP 4.010. The maximum seabed gradient along this section is 20° and occurs at KP 2.923. The water depths within the Harris Offshore region range between 113.8m LAT at KP 28.640 to 152.6m LAT at KP 25.980. The maximum seabed gradient along this section is 15° and occurs at KP 29.056. The water depths within the Harris Nearshore region range between 17.5 m LAT at KP 31.840, KP 31.850 and KP 31.895 to 129.0m LAT at KP 28.170. The maximum seabed gradient along this section is 23° and occurs at KP 29.261.

6.3.3.2 Underlying Geology

The primary geology under the Little Minch comprises Jurassic siliciclastic, argillaceaous and undifferentiated sandstone and limestone rocks interspersed with microgabbroic igneous intrusions. The bedrock at the Skye landfall comprises basaltic and micrograbbroic lavas and pyroclastic rocks of the Skye Lava Group, while the bedrock at the existing landfall site on Harris comprises a range of granites and porphyritic granites of the Uig Hills – Harris Igneous Complex (Hydrofix, 2021).

6.3.3.3 Seabed Sediments and Features

Within the Skye Nearshore region, the seabed sediment comprises medium to coarse sand with gravel, cobbles and occasional boulders. A boulder field exists between KP 0.228 and 0.236. A rock outcrop is observed 5.3 m west of the proposed cable route at KP 0.264, while megaripples, orientated west-north-west to east-south-east, are observed from KP 0.765 to KP 1.440 with an average wavelength of 25m and a height of 0.4m.

Within the Skype Offshore region, the seabed sediments along the proposed cable route comprise the following:

- Medium to coarse sand with gravel, cobbles and occasional boulders from KP 1.440 to KP 3.400
- Sandy clay with gravel, cobbles and occasional boulders from KP 3.400 to KP 7.000 and KP 12.700 to KP 13.823
- Clayey sand with gravel, cobbles and occasional boulders from KP 7.000 to KP 12.700
- Clayey sand from KP 13.823 to KP 14.093
- Sandy clay from KP 14.093 to KP 14.930

A number of boulder fields exist within the Skye Offshore region with megaripples, orientated west-north-west to east-south-east, observed from KP 3.412 to KP 3.557 with an average wavelength of 10m and a height of 0.2m. Sand waves are also observed within the cable route between KP 7.500 and KP 9.650 with wavelengths ranging between approximately 60m and 400m with heights of 1.5m.

Within the Harris Offshore region, the seabed sediments along the proposed cable route comprise the following:

- Sandy clay between KP 14.930 to KP 23.000
- Clay with shell fragments between KP 23.000 and KP 25.500
- Sandy clay with shell fragments between KP 25.500 and 28.200 and KP 29.000 and KP 29.170

- Clay between KP 28.200 and KP 29.000.

Numerous boulder fields also exist within this region.

Within the Harris Nearshore region, the seabed sediments along the proposed cable route comprise the following:

- Sandy clay with shell fragments from KP 29/170 to KP 29.800 and KP 30.100 to KP 30.900
- Clay from KP 29.800 to KP 30.100 and KP 30.900 to KP 31.800
- Sand from KP 31.800 to KP 31.895

Numerous boulder fields also exist within this region.

6.3.4 Water and Sediment Quality

Water and sediment quality at any particular location on the UK continental shelf is the result of a combination of source, transport and removal mechanisms for the individual chemical species under consideration. There are many routes by which substances with the potential to affect water quality enter the Little Minch, both through natural processes and as a result of anthropogenic inputs over the past few decades.

6.3.4.1 Water Quality

The 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" (UKMMAS, 2010). The report concludes that good progress has been made towards this with significant contamination restricted to industrial estuaries and coastal areas.

The requirement for monitoring UK rivers and near-shore waters has increased as a result of the implementation of the EU Water Framework Directive (WFD), with more stringent criteria for water quality in rivers applied. River Basin Management Plans (RBMP) are being developed as a requirement of the WFD and report on the 'ecological status' of surface and ground water in coastal waters (out to 1 nm from the baseline) and 'chemical status' of surface and ground waters in territorial waters (out to 12 nm from the baseline). The Scottish Environment Protection Agency (SEPA) is responsible for producing RBMPs for the Scotland and the Solway Tweed River Basin Districts. The MSFD assessments are carried out at subregion level, i.e. the Greater North Sea and the Celtic Seas. The MSFD and WFD overlap in coastal waters as the WFD extends to three 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.

The Application Corridor passes through three WFD waterbodies: North West Skye waterbody at the Skye landfall (ID: 200145) with an overall waterbody status of High in 2016; the Little Minch waterbody (ID: 200160) with an overall waterbody status of High in 2016; and the Eilean Glas to Rubha Reinis waterbody at the Harris landfall (ID: 200482) with an overall waterbody status of Good in 2016 (Atkins Geospatial, 2021).

There are no designated bathing waters in close proximity to the landfall sites on either Harris or Skye. The closest designated bathing waters are Sand Beach and Gairloch Beach to the north-east, both of which have had Excellent bathing water quality in 2017/18 and 2018/19. In August 2020, one water quality sample was collected at both beaches. Both samples had < 10 colony forming units (CFU)/100ml for both *Escherichia coli* and Intestinal enterococci.

6.3.4.2 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 is primarily

composed of planktonic material, including bacteria. This 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, generally increasing with proximity to the coastline (UKMAAS, 2010). These are also highly dependent on energy inputs (i.e. storms).

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 Little Minch. Average measured iSPM for the period 1998-2015 within the Little Minch is low (approximately 0-1mg/l) (CEFAS Report, 2016). However, iSPM concentrations vary widely with season, wave action, tidal conditions and freshwater discharges. As a result, water clarity and seabed and water column light intensity are also highly variable.

6.3.4.3 Sediment Quality

Unlike water quality, there are no formal quantitative Environmental Quality Standards (EQS) for sediments and as such, common practice for characterising baseline sediment quality conditions is to compare against the Cefas Guideline Action Levels for the disposal of dredged material (AECOM, 2017). 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 a predominantly coarse sediment area, such as the Little Minch in the vicinity of the landfall sites, contamination levels are expected to be low.

6.4 Impact Assessment

Table 6-2 provides details of the potential impacts and zone of influence from the cable installation regarding the physical environment.

Table 6-2 Potential impacts and zone of influence

Activity	Impact	Receiving environment	Zone of influence	Source of Information
Trenching	Physical change (to another substratum type)	Superficial sediments, cover depth >10mm	20m	Estimate, based on sediment properties settling velocity of particles and currents
Trenching/cable in place/removal of existing cable	Abrasion/ disturbance at the surface of the substratum	Superficial sediments,	<5m	Based on cables already in place and scientific judgement
Cable in place	Water flow (tidal current) changes locally	Oceanography	Not sensitive	Scientific judgement
Cable in place	Seabed movement	Flow induced features (e.g. sandwaves)	<5m	Scientific judgement
Trenching/removal of existing cable	Changes in suspended solids	Water quality	300m	Estimate, based on sediment properties, settling velocity of particles and currents – likely to be a considerable over-estimate given conditions in the area. More likely to be undetectable
Trenching	Penetration and/or disturbance of the substrate below the surface of the seabed including abrasion	Quaternary deposits	Not sensitive	Scientific judgement

As described in Section 6.3.3.3, the sediments of the Little Minch are predominantly silty sandy clay. It is likely that fine material is derived from relatively localised erosion.

Following disturbance, e.g. by jetting to bury exposed cable, only fine material is expected to remain in the water column for more than a few minutes (see Table 1-4).

Table 6-3 shows that:

- Only gravel and (to a lesser extent) sand are likely to form an appreciable depth of deposits, but this is generally likely to be limited to within 20m of the trench, even in extreme current conditions.
- Silts and clays could be transported a considerable distance before deposition; however, elevated concentrations of suspended material are limited to approximately 300m from the jetting site as a result of dilution in the water column.
- Silts and clays could remain in the water column in excess of 8 hours and 22 days, respectively; however, during these periods, currents would be expected to range between <0.1 m/s (at slack water) and approximately 0.8 5m/s during maximum spring tidal flow, with additional mixing due to wave action.

Table 6-3 Sediment settling and zone of influence following disturbance

Fraction (maximum % in sediment)#	Mean settling velocity	Mean Settling time	Mean distance (m) before settling, based on peak spring current speed	Mean deposit depth (mm) based on peak spring current speed	Zone of influence
	m/s	s	0.8 m/s	0.8 m/s	m
Clay (27.7%)	0.000002	1948052	779221	1.0681E-07	Several km†
Silt (36.8%)	0.00010	30383	12153	9.09466E-06	300* (water column)
Sand (33.8%)	0.028	106	42.5	0.002	20 (deposition)
Gravel (1.6%)	0.25	11.9	4.77	0.001	

% of each component based on average dry mass % at each sample locations along cable route from particle size distribution undertaken by Fugro (2021)

* Zone of influence for silt based on BERR 2008

† Clay will disperse a wide distance, but will form a correspondingly thin layer and thus result in a negligible impact

Assumptions:

Trench volume is 1.5m³ per metre, based on a worst-case trench zone 1.5m wide by 1m deep

100% of silt enters water column, assuming fine material is mobilised by jetting

20% of sand and gravel enters water column, representing a reasonable worst case

6.5 Conclusion

The above assessment has demonstrated that installation and decommissioning activities associated with the cable replacement will not adversely affect the physical environment within or in the vicinity of the Application Corridor. Any sediment dispersed as a result of cable installation/decommissioning activities will predominantly settle within the immediate vicinity of such activities, with finer particles being dispersed to imperceptible levels in the water column through associated tidal and wave action.

7. MARINE MEGAFAUNA

7.1 Introduction

This section provides details of the marine megafauna (marine mammals, basking shark and otters) that may be present within the vicinity of the Application Corridor. Potential impacts to marine megafauna determined to be at risk of impacts from the proposed installation/decommissioning activities have been assessed, along with the mitigation and management measures that will be utilised to remove or reduce these impacts. The potential impacts to birds have been assessed separately in Section 5: Designated Sites of this MEA. This section should be read in conjunction with the separate West Highlands European Protected Species (EPS) Risk and Protected Sites and Species Assessment (Xodus Group, 2019a) which assesses the risk to marine megafauna based upon worse case scenarios for the Projects survey activities, including activity extent, time of year and duration.

7.2 Data sources

Prior to commencement of any survey activities on the Project, an EPS Risk and Protected Sites and Species Assessment was conducted (Xodus Group, 2019a) which detailed the baseline for protected species located in the vicinity of the existing cable and assessed the impacts of the survey activities on these sites. Relevant information has been used to inform the baseline overview of this section, and where applicable assessment findings corroborated with this MEA to ensure consistency.

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 assessment include the following:

Table 7-1 Data source examples

Source	Data/information used
Hebridean Whale and Dolphin Trust (HWDT)	Species sighting data
Marine Scotland	National Marine Plan Interactive (NMPi)

7.3 Baseline and receptor identification

7.3.1 Cetaceans

All cetacean species found in the UK are listed under Annex IV of the Habitats Directive as EPS and are protected in Scottish Territorial waters under Section 39 of the Conservation (Natural Habitats, &c.) Regulations 1994, with it being an offence to capture, kill or disturb any EPS (HM Government, 1994). Additionally, as harbour porpoise and bottlenose dolphins are listed under Annex II of the Habitats Directive, conservation of these species requires designation of SAC's under Schedule 2 of the Habitats Regulations.

There are five commonly observed cetacean species within the waters between Skye and Harris, with several other species classed as infrequent visitors. These species are detailed in Table 7-2:

Table 7-2 Cetacean species recorded within the Application Corridor ((Hammond et al., 2017; HWDT, 2018)

Species	Description of Occurrence	Density estimates within the Application Corridor (individuals/km²)	Management Unit (MU) population estimate
Commonly Observed Species			
Harbour porpoise	The most frequently sighted cetacean found on the west coast and within the Application Corridor. Sighted year round, with densities peaking between April and October. Application Corridor falls within the Inner Hebrides and the Minches SAC, designated for harbour porpoise.	0.397	21,642
Minke whale	Most commonly sighted in the summer months between June and August. Designating species for the Sea of the Hebrides NCMPA, located 5.6km from the Application Corridor. Densities for the species are low within the Application Corridor, with their preferred feeding grounds being located further south.	0.1	23,528
Short-beaked common dolphin (*Delphinus delphis*)	An increasingly common sight in Scottish waters, common dolphin are present within the Minch between April and October. Sightings within the application corridor itself are lower compare to both the north and south, where 0.036-0.095 sightings per km have been recorded, as opposed to 0.011 – 0.021 within the Application Corridor.	0.015	56,556
Risso's dolphin (*Grampus griseus*)	Risso's dolphin are present all year round throughout the Hebrides in low densities. The species typically inhabits deeper waters where their preferred prey of squid and cuttlefish are found.	Insufficient data	Insufficient data
Bottlenose dolphin (*Tursiops truncatus*)	Found year round in the Hebrides, bottlenose dolphin typically display a preference for inshore habitats. Sightings data within the Application Corridor indicates a low density in the Little Minch between Skye and Harris.	Insufficient data	45
Infrequent visitors			
White-beaked dolphin (*Lagenorhynchus albirostris*)	White-beaked dolphin can be seen year-round in the Hebrides but are typically sighted in the north Minch and Outer Hebrides. Sightings data within the Application Corridor is very low.	Insufficient data	15,895

Species	Description of Occurrence	Density estimates within the Application Corridor (individuals/km²)	Management Unit (MU) population estimate
Humpback whale (*Megaptera novaeangliae*)	Humpback whales are rarely sighted in the Hebrides, with only six being recorded between 2006 – 2017. Such sightings have occurred year-round.	Insufficient data	Insufficient data
Killer whale (*Orcinus orca*)	Sightings of killer whales in the Little Minch are very infrequent, with most sightings being recorded off the coast of Mull. These sightings have typically been of the 'West Coast Community', the only resident group of killer whales in the UK.	Insufficient data	Insufficient data

7.3.2 [redacted]

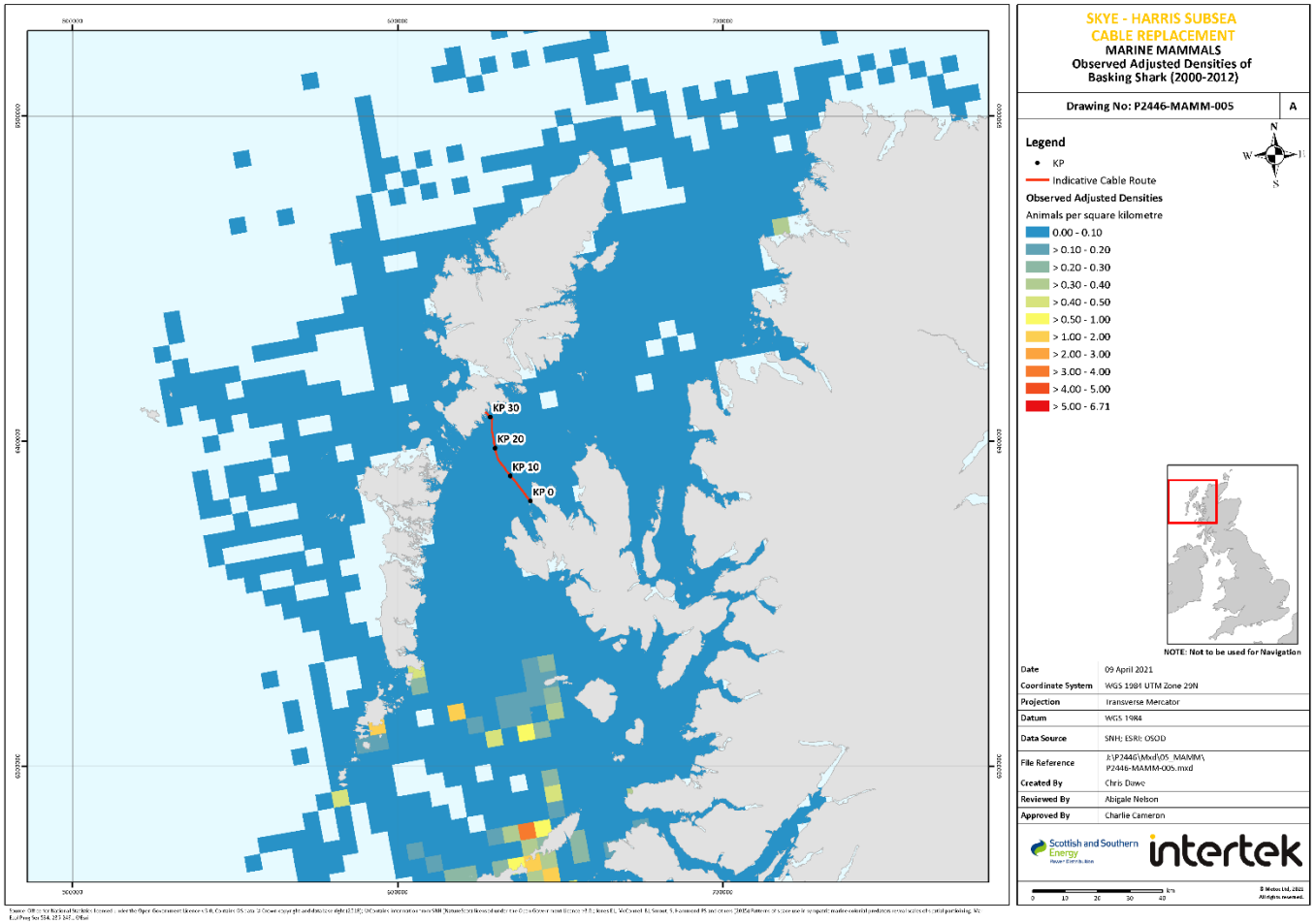
[redacted]

7.3.3 Basking shark

The second largest species of fish in the world, growing up to 12m in length, basking sharks are filter feeders that feed on plankton and zooplankton (The Wildlife Trusts, 2019). 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 (Fowler, 2009). Basking sharks are protected in Scotland under the Nature Conservation (Scotland) Act 2004, with it being an offence to intentionally or recklessly disturb or capture individuals (Scottish Parliament, 2004). They are found throughout the UK, with sightings typically peaking in the summer months. Densities of basking shark within the Application Corridor are low, peaking at only 0 – 0.1 animals per km² (see Figure 7-3 (Ref: P2446-MAMM-005)).

[redacted]

Figure 7-3 Observed adjusted densities of basking shark (2000-2012) (P2446-MAMM-005-A)



7.3.4 Pinnipeds

Under the Marine (Scotland) Act 2010, all grey and harbour seals are protected within Scottish territorial waters, with it being an offence to kill, injure or take seals, intentionally or recklessly, without a license. The subsequent Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014 made it an offence to harass a seal (intentionally or recklessly) at a haul-out site, with the Order also designating 194 protected haul-out sites around the Scottish coastline. Two species of seal are typically found in Scottish waters: harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*). The at-sea usage of harbour and grey seal in the vicinity of the Application Corridor is displayed in Figures 7-4 (Ref:P2446-MAMM-001) and 7-5 (Ref:P2446-MAMM-002) respectively. As shown in the figures, harbour seal at-sea usage is typically low across the Application Corridor, with peaks of 51 – 75 individuals around KP25 near the Harris landfall and at the Skye landfall due to the nearby haul-out sites within the Ascrib, Isay and Dunvegan SAC. This is in contrast to the grey seal at-sea usage which is very low across the entire Application Corridor, with a mean of 2-10 individuals being predicted to be present.

The closest designated seal haul-out site to the Application Corridor is the Sound of Harris Islands grey seal breeding site, located approximately 9.45km from the Application Corridor. The closest haul-out site for harbour seal site is located in the island of Isay, 3.22km south of the Application Corridor within the Ascrib, Isay and Dunvegan SAC.

Figure 7-4 Harbour seal at-sea usage (P2446-MAMM-001)

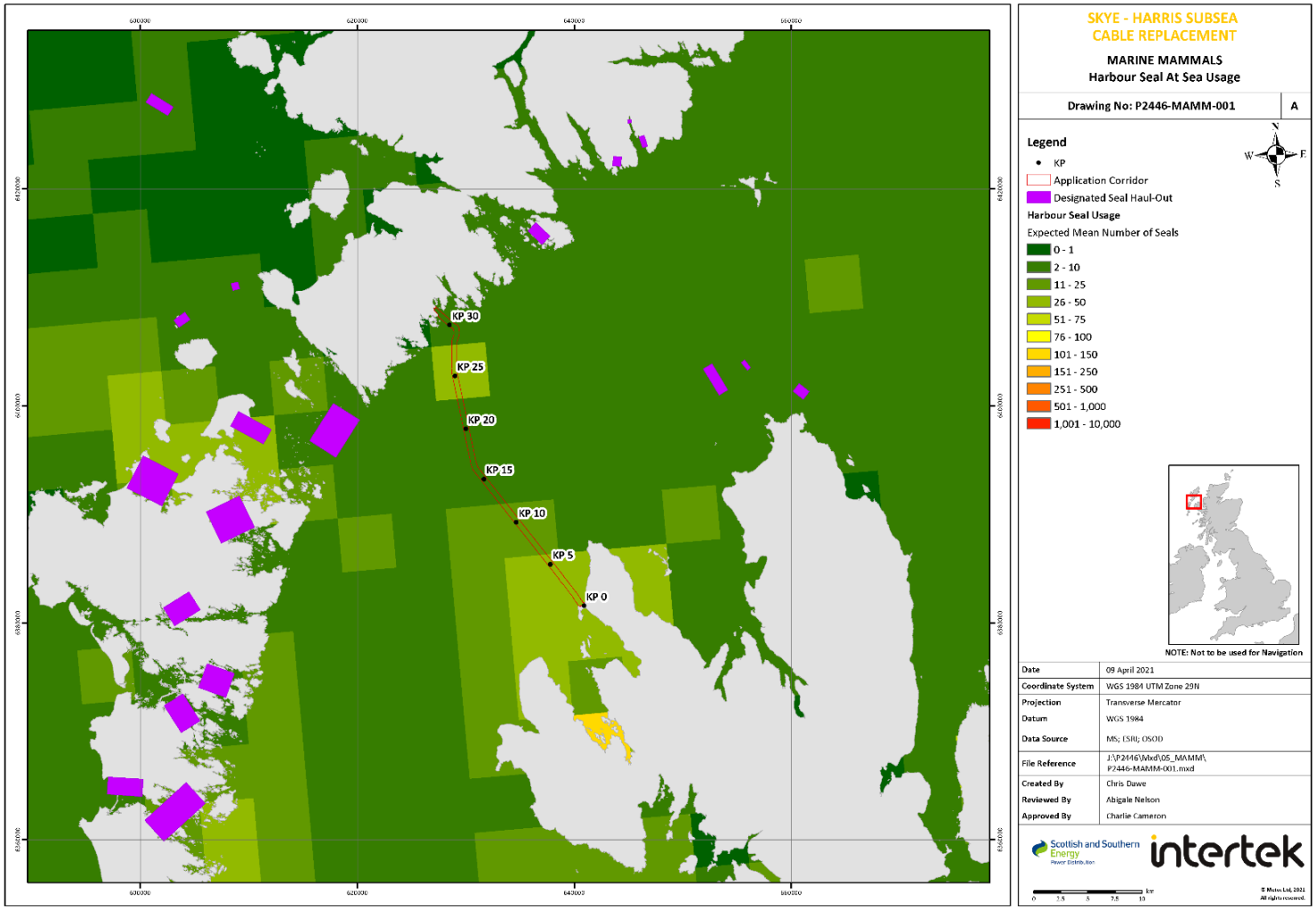
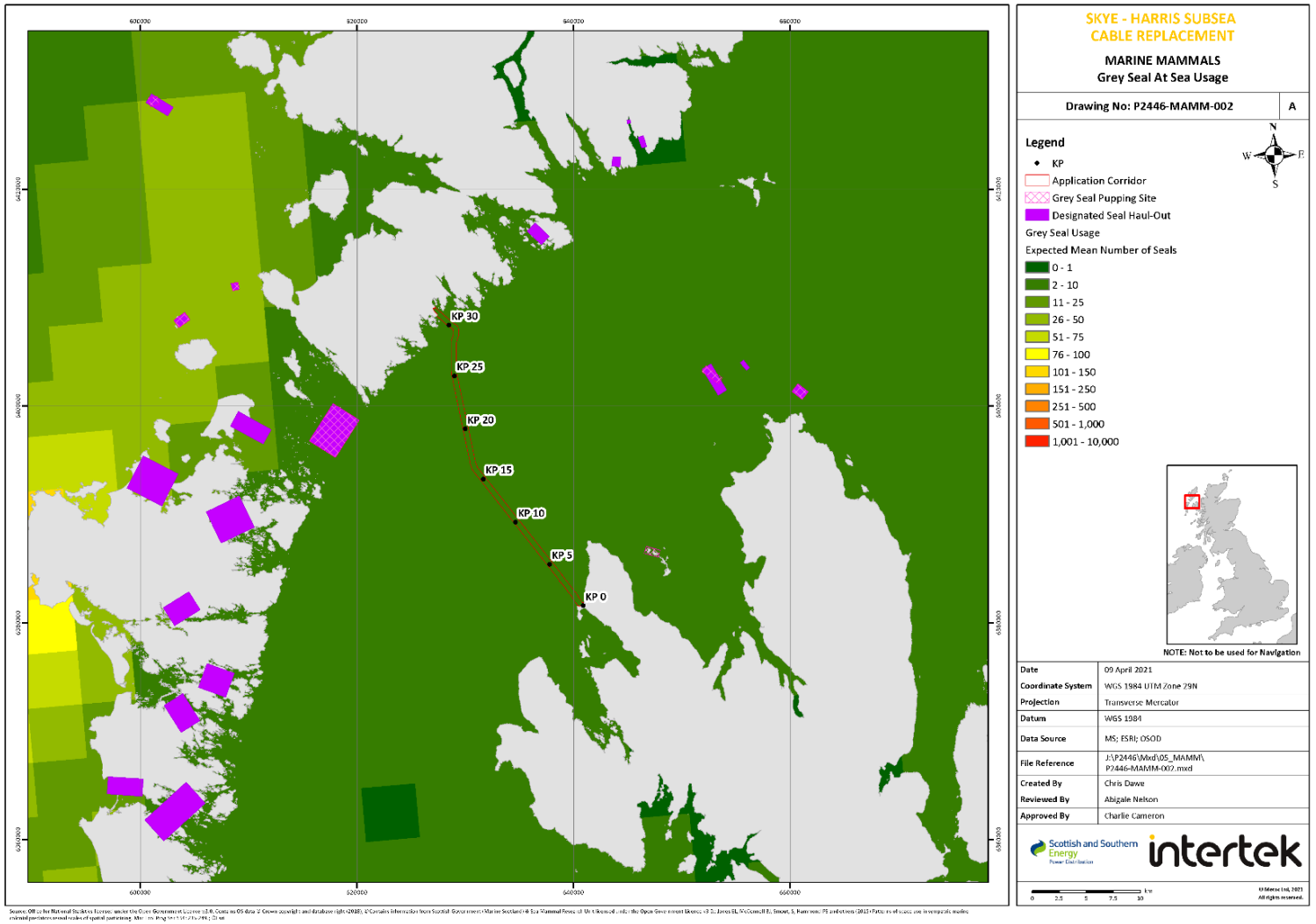


Figure 7-5 Grey seal at-sea usage (P2446-MAMM-002)



7.4 Impact Assessment

7.4.1 Underwater noise changes

As described in Section 5: Designated Sites, the only source of noise from the installation/decommissioning activities with potential to result in adverse effects to marine mammals is sound produced by USBL devices. The effects of underwater noise changes on harbour porpoise, minke whale, harbour seal and basking shark have been assessed in Section 5: Designated Sites, with the assessment concluding that no significant effects to these species would occur. The assessment below therefore focuses on other cetacean and pinniped species, along with otters, and the effects USBL devices may have on these species.

7.4.1.1 Cetaceans

The other commonly sighted species in the Little Minch, short-beaked common dolphin, Risso's dolphin and bottlenose dolphin, are mid-frequency cetaceans that have an estimated auditory bandwidth of 150 Hz to 160 kHz, with a peak sensitivity above 10 kHz (Southall et al., 2019). As detailed in the accompanying EPS Risk Assessment (Appendix C), USBL in a worst-case scenario would disturb less than 0.1 individuals of any cetacean species per 0.13km^2. As such, potential disturbance impacts from USBL on short-beaked common dolphin, Risso's dolphin and bottlenose dolphin would be negligible. The potential for any disturbance is further reduced by the low population density of these species within the Application Corridor, reducing the likelihood of these species being present during installation/decommissioning activities. Therefore, there will not be any significant disturbance to cetacean species as a result of installation/decommissioning activities.

7.4.1.2 Pinnipeds

Due to the distance of the Application Corridor from the closest grey seal haul-out site (approximately 9.45km), and short-term, localised and transient nature of the installation/decommissioning activities, there will be no disturbance to hauled-out seals from noise generated by the installation activities. Seals in the water could be susceptible to disturbance form USBL devices however, given the overlap in their hearing ranges and sound generated by USBL devices (NMFS, 2018). Recent studies have shown however that individuals will quickly return to an area that was subjected to even high-intensity noise emissions within a short period of time (Russell et al., 2016). Given the very low usage of grey seals at sea within the Application Corridor and transient nature of the installation activities, no significant disturbance of grey seals will occur as a result of installation/decommissioning activities.

7.4.2 Vessel presence

The effects of vessel presence on harbour porpoise, minke whale, harbour seal and basking shark have been assessed in Section 5: Designated Sites, with the assessment concluding that no significant effects to these species would occur, due to the mobile nature of these species and the temporary, transient and localised nature of the installation/decommissioning activities. This finding also applies to any short-beaked common dolphin, Risso's dolphin, bottlenose dolphin and grey seal encountered during installation/decommissioning activities, with the slow-moving nature of the activities ensuring individuals would have sufficient time to move out of the path of any vessels. No grey seals will be disturbed by installation/decommissioning activities when hauled out due to the distance between the Application Corridor and the closest haul-out site being 9.45km away, with seals typically being disturbed by vessel presence at a distance of 900m (Brassuer and Reijnders, 1994). As such, no significant disturbance of cetacean or pinniped species will occur as a result of installation/decommissioning activities.

[redacted]

7.5 Mitigation

The following mitigation measure will ensure that otters at the Skye and Harris landfalls are not significantly disturbed by installation/decommissioning activities:

- If an otter shelter is discovered at the landfall nearshore areas, a protection zone with a minimum of 30m radius will be set up and will be clearly demarcated/fenced off.

7.6 Conclusion

The above assessment has demonstrated that installation and decommissioning activities associated with the cable replacement will not adversely affect any cetacean, pinniped or otter within or in the vicinity of the Application Corridor. Any disturbance caused by the installation of the replacement cable and decommissioning of the nearshore section of the existing cable will be minor and temporary due to their short-term, localised and transient nature.

8. BENTHIC AND INTERTIDAL ECOLOGY

8.1 Introduction

This section describes the baseline environment for the intertidal and subtidal benthic ecology within the Application Corridor and identifies potential impacts associated with the installation of the replacement cable and decommissioning of the nearshore sections of the existing cable on the subtidal benthic and intertidal environment. Potential impacts on habitats and species have been assessed, along with the mitigation and management measures that will be utilised to remove or reduce these impacts.

8.2 Data sources

Baseline conditions have been partly established by undertaking a desktop review of published information and through interpretation of the subtidal and intertidal survey reports produced by Fugro, for the marine surveys undertaken between 13 – 16 March 2021. The Marine Scotland FEAST tool and MarLIN sensitivity descriptions have been utilised to inform the impact assessment.

The data sources used to inform the baseline description and assessment included:

- Offshore Environmental Results Report (Fugro, 2021b).
- Intertidal Environmental Results Report (Fugro, 2021c).
- Marine Scotland FEAST tool (Marine Scotland, 2021c).
- MarLIN - The Marine Life Information Network (MarLIN, 2021).

8.3 Baseline identification and overview

8.3.1 Intertidal ecology

8.3.1.1 Ardmore, Skye

The Skye foreshore consisted of two coarse sediment (e.g. pebbles, cobbles, boulders) bays that were interrupted by areas of raised bedrock. These raised areas of bedrock were largely to the west, centre and east of the survey area, where they extended from the terrestrial zone into the subtidal zone. The western and central bedrock were associated with headlands and the eastern bedrock with the base of cliffs. An additional area of raised bedrock was present in the mid to low shore in the centre of the eastern embayment that largely extended into the subtidal. Other isolated areas of emergent bedrock, that did not extend into the subtidal, were observed within both bays (Fugro, 2021c).

Within the area surveyed, one European Nature Information System (EUNIS) environment, two habitat complexes, five biotope complex, thirteen biotopes and six sub-biotopes were identified. These habitats and complexes displayed a common zonation for moderately exposed to exposed UK shores, with lichens characterising the top shore. Below this point, barnacles generally dominated Chthalamus sp. with *Semibalanus balanoides* below). Zonation was also observed in brown seaweeds (from *Pelvetia canaliculata* through *Fucus spiralis*, *Fucus vesiculosus* and *Fucus serratus* to *Laminaria digitata*). Figure 8-1 below displays these habitats and complexes mapped over the intertidal area.

Potentially Sensitive Habitats

Of the identified habitats, four potentially sensitive habitats were observed;

- **Annex I geogenic reef (bedrock) habitats** - Rocky marine habitats that rise from the seabed. Generally subtidal, but may transition into the intertidal zone where they are exposed at low tide (JNCC, 2021c). Within the survey area, the bedrock associated with the western and central

headland extended into the subtidal zone, as did the bedrock in the centre of the eastern bay (some of which was overlaid with coarse sediments), and bedrock to the east of the survey areas under the cliffs. Therefore, these bedrock outcrops have the potential to be Annex I geogenic (bedrock) reef (Fugro, 2021).

- **Intertidal under-boulder communities** – A United Kingdom Biodiversity Action Plan (UKBAP) priority habitat, 'intertidal under-boulder communities' habitat may occur from the mid eulittoral to the sublittoral fringe, encompassing areas of boulders (> 256 mm diameter) that support a diverse under-boulder community. The under-boulder habitat (including fissures, crevices and any interstitial spaces between adjacent boulders) is a series of microhabitats that naturally increase biodiversity (BRIG, 2008). It was determined that there existed the potential for the habitat to occur in the lower shore and into the infralittoral across the majority of the Skye intertidal survey area (Fugro, 2021).
- **Vegetated sea cliffs of the Atlantic and Baltic coasts** - The Annex I habitat 'Vegetated Sea Cliffs of the Atlantic and Baltic Coasts' is described as vegetated cliffs that vary based on exposure, geology and geomorphology, location and management. Community makeup within such habitats is dependent on how exposed the location is, with more sheltered locations grading into a more complex assemblage of maritime and para-maritime communities as compared to exposed locations (EC, 2013). The UKBAP 'Maritime Cliff and Slope' priority habitat comprises sloping to vertical coastal faces a break in the slope is formed by slippage and/or coastal erosion, with the typical morphology and vegetation being variable. The cliffs demonstrated considerable elevation and featured salt-tolerant vegetation including grasses. Therefore, the cliffs have the potential to be both Annex I 'Vegetated Sea Cliffs of the Atlantic and Baltic Coasts' and UKBAP 'Maritime Cliff and Slope' priority habitat due to elevation, angle and the presence of vegetation.

The locations of these habitats are detailed in Figure 8-2 below. No other Annex I habitats or Annex II species, OSPAR threatened and/or declining species and habitats or UKBAP priority habitats and species were observed within the Skye intertidal survey area.

Figure 8-1 Map of habitats recorded at the Skye landfall (Fugro, 2021c)

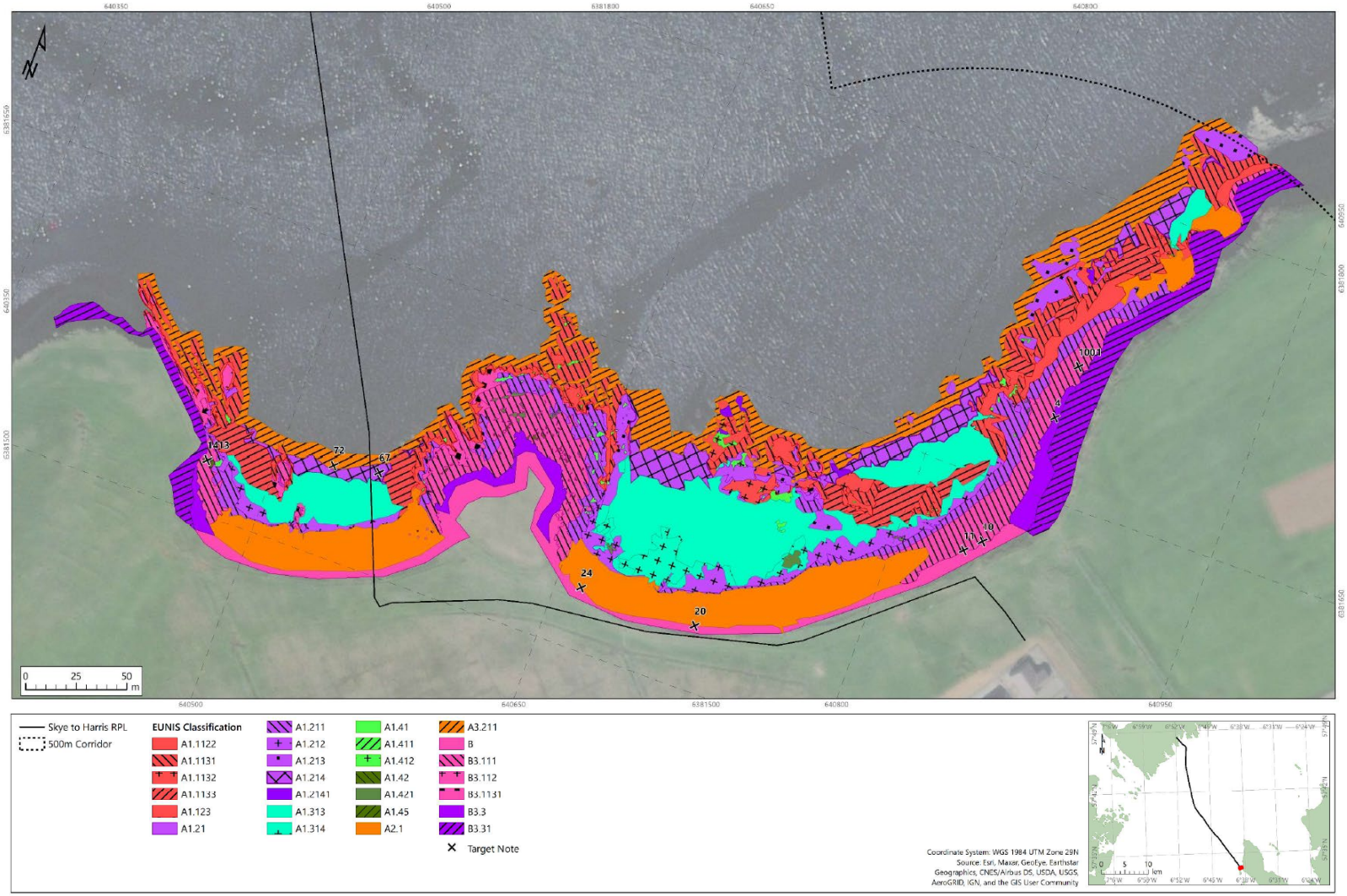
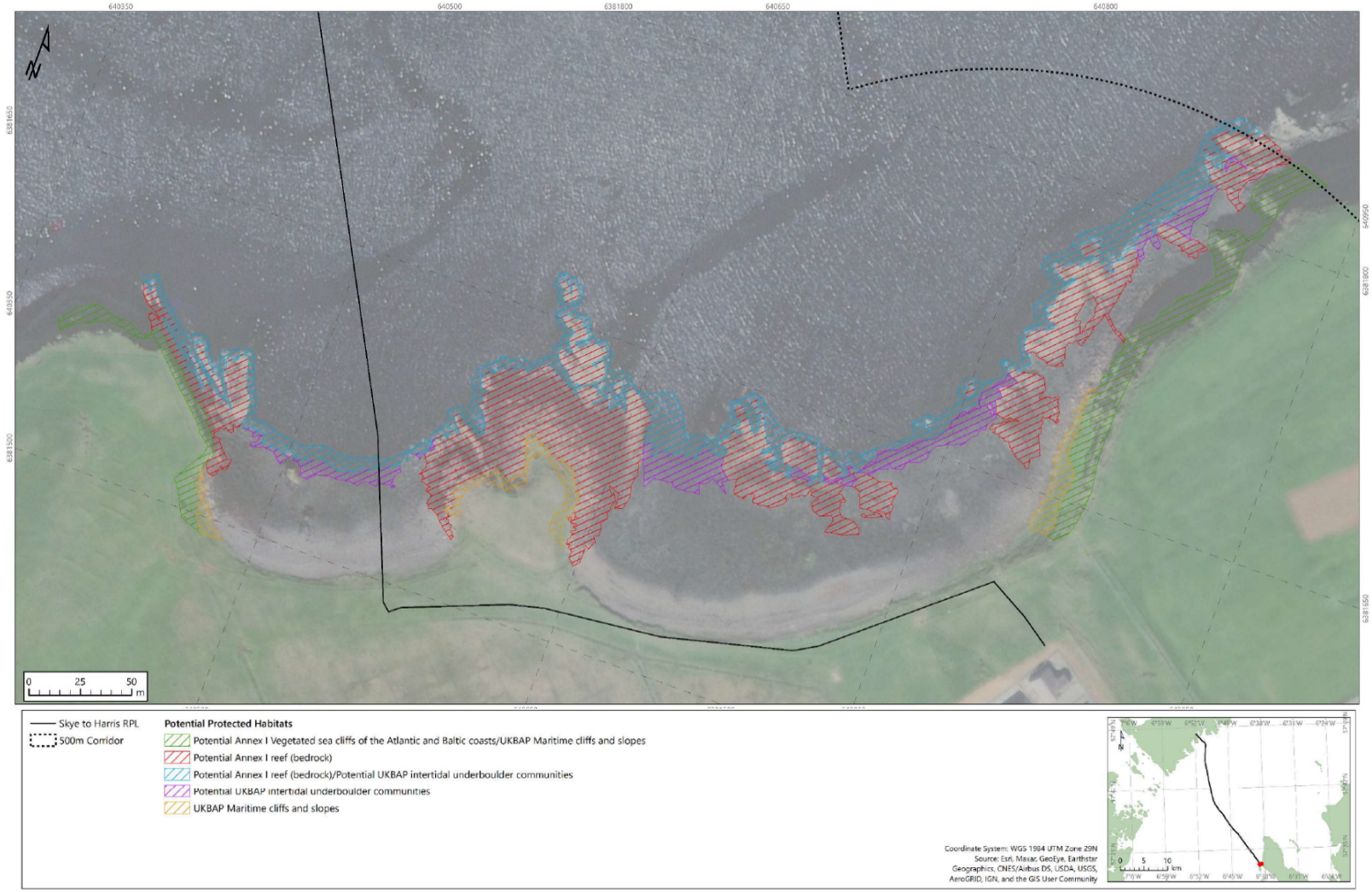


Figure 8-2 Potentially protected intertidal habitats (Skye landfall) (Fugro, 2021c)



8.3.1.2 Beacravik, Harris

The Harris foreshore predominantly comprised bedrock slabs that extended into the subtidal, in places overlaid by coarse sediments (e.g. sand to boulders) that were disturbed by wave action (Fugro, 2021c). Within the area surveyed, one broad habitat, two habitat complexes, three biotope complexes, ten biotopes and two sub-biotopes were identified. These displayed a common zonation for sheltered UK shores, with lichens characterising the top shore, below which brown seaweeds (*Pelvetia canaliculata*, *Fucus spiralis*, *Fucus vesiculosus*, *Fucus serratus* to *Laminaria digitata*) dominated from the mid to the lower shore. Figure 8-3 below displays these habitats and complexes mapped over the intertidal area.

Potentially Sensitive Habitats

Of the identified habitats, three potentially sensitive habitats were observed:

- **Annex I geogenic reef (bedrock) habitats** - Within the Harris intertidal survey area, bedrock outcroppings were present across the majority of the intertidal area, with coarse sediment overlying the bedrock in places. These bedrock outcrops extended into the sublittoral zone when the geophysical data and video data was considered. Therefore, the entirety of the Harris intertidal zone (extending in a band into the subtidal) has the potential to be Annex I geogenic (bedrock) reef (Fugro, 2021c).
- **Vegetated sea cliffs of the Atlantic and Baltic coasts** - Within the Harris intertidal survey area, a section of cliff area was considered to possibly comprise this UKBAP priority habitat. Grassy slopes within the northern section of the cable corridor developed to bedrock cliffs to the west and east of the survey area. The cliffs to the west and east have the potential to be both Annex I 'Vegetated Sea Cliffs of the Atlantic and Baltic Coasts' and UKBAP 'Maritime Cliff and Slope' priority habitat due to elevation, angle and the presence of vegetation (Fugro, 2021c).

The locations of these habitats are detailed in Figure 8-4 below. No other Annex I habitats or Annex II species, OSPAR threatened and/or declining species and habitats or UKBAP priority habitats and species were observed within the Skye intertidal survey area.

Figure 8-3 Map of habitats recorded at the Harris landfall (Fugro, 2021c)

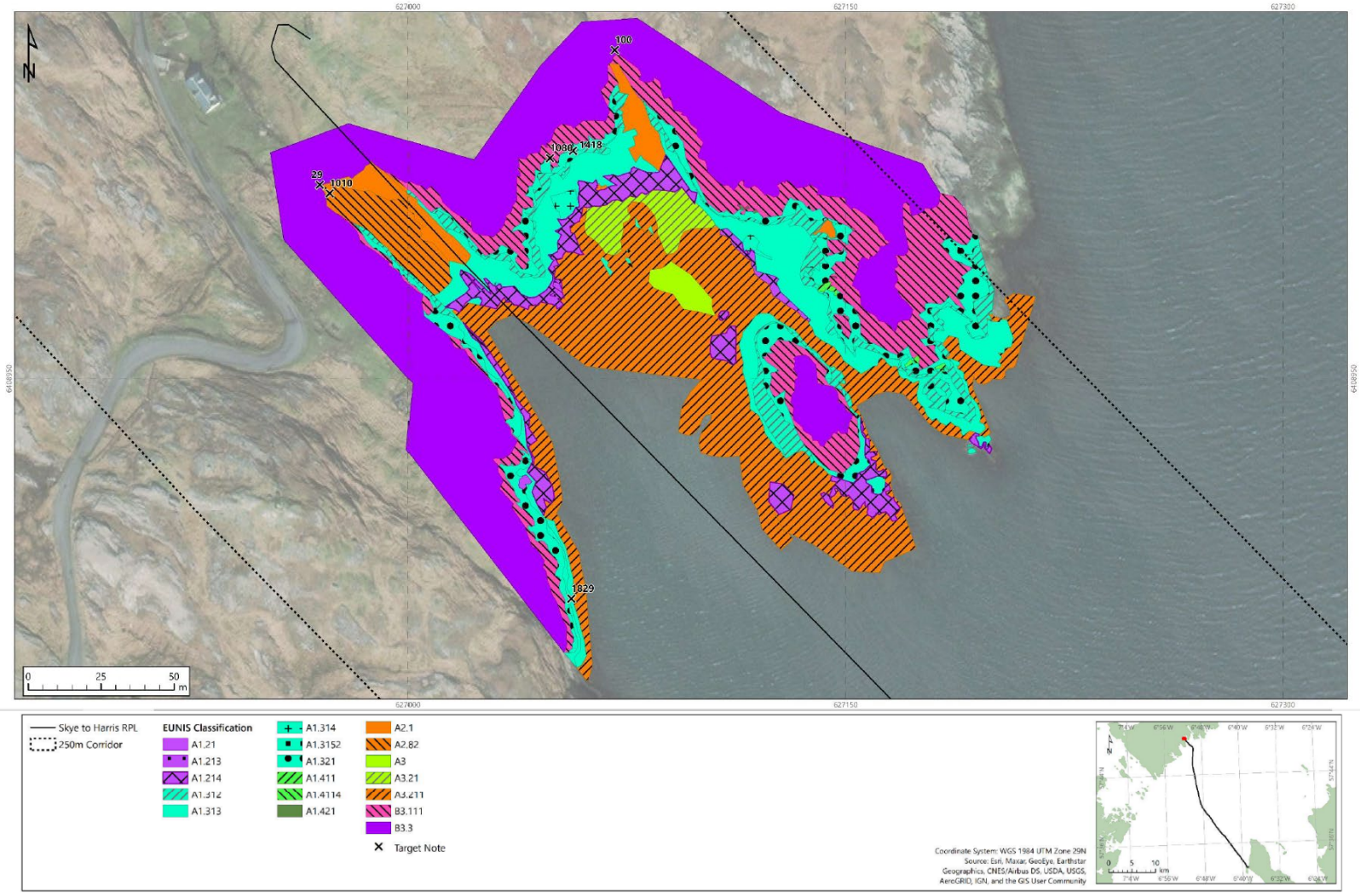
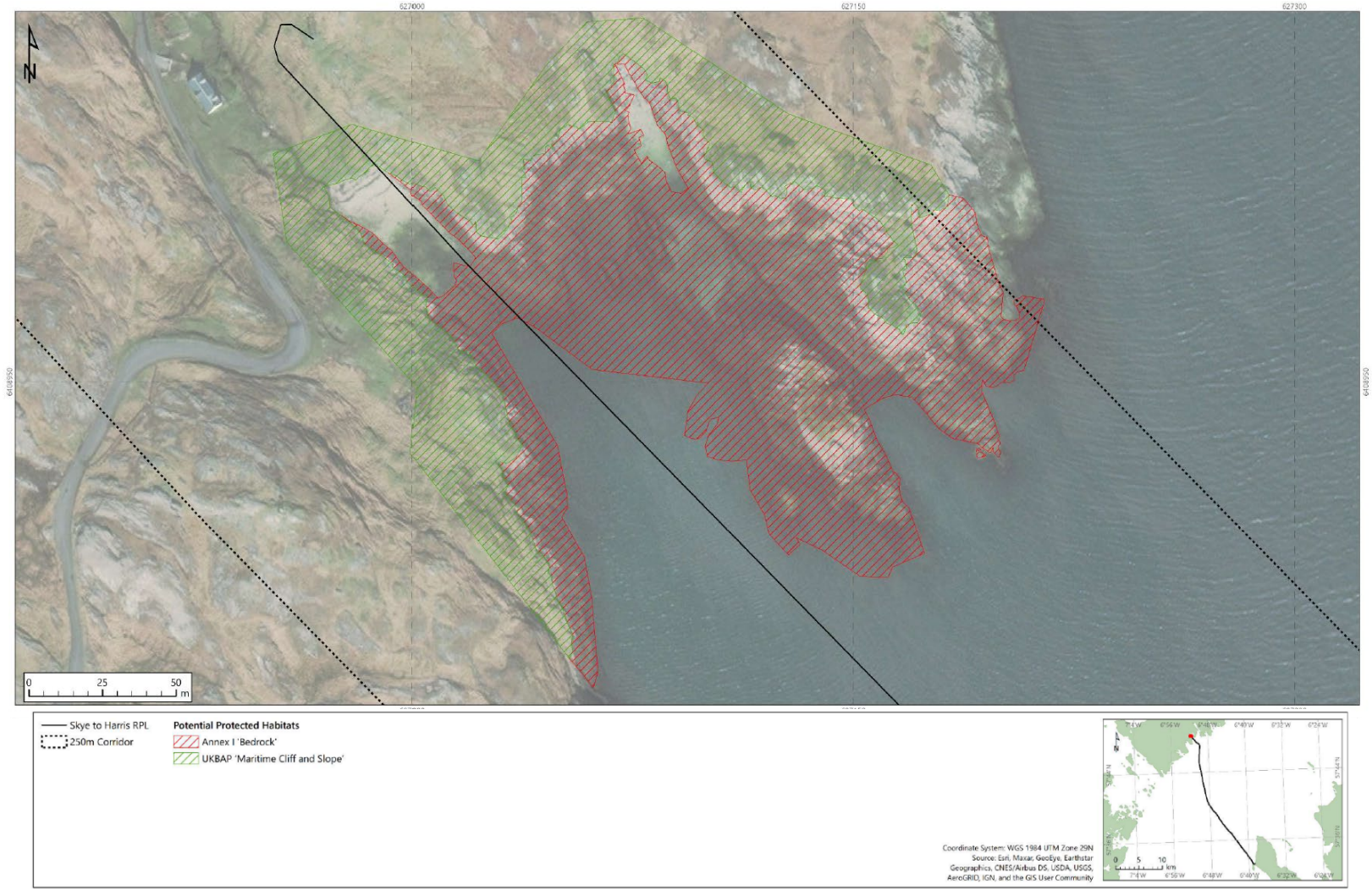


Figure 8-4 Potentially protected intertidal habitats (Harris landfall) (Fugro, 2021c)



8.3.2 Subtidal ecology

Along the 32 transects undertaken during the environmental surveys, the main sediment type observed across the Application Corridor was mud with shell fragments. This sediment type has been classified mostly as the EUNIS biotope complex 'Deep circalittoral mud' (A5.37) found from the northern to the middle part of the corridor.

Areas of sand with shell fragments at the northern and middle parts of corridor were classified as 'Deep circalittoral sand' (A5.27).

Sediments comprising bedrock with a thin veneer of muddy sand/sandy mud with shell fragments, located in the middle of the corridor, have been classified as the EUNIS habitat complex 'Atlantic and Mediterranean moderate energy circalittoral rock' (A4.2).

Sediments comprising muddy sand/sandy mud with patchy mixed sediment of gravel, pebbles, cobbles and boulders have been classified as the EUNIS biotope complex 'Caryophyllia smithii and Swiftia pallida on circalittoral rock' (A4.211) located near the northern nearshore part of the route.

Sediments comprising mixed sediment with shell fragments sand, gravel, pebbles and cobbles have been classified as the EUNIS biotope complex 'Circalittoral coarse sediment' (A5.14) at the south-eastern nearshore part of the route.

Areas of sandy mud with shell fragments at the northern nearshore part, in depths between 30 m and 50 m, were classified as 'Circalittoral sandy mud' (A5.35).

Areas of muddy sand/sandy mud with cobbles and boulders found in the middle and to the south-eastern nearshore part of the route were classified as 'Deep circalittoral mixed sediments' (A5.45).

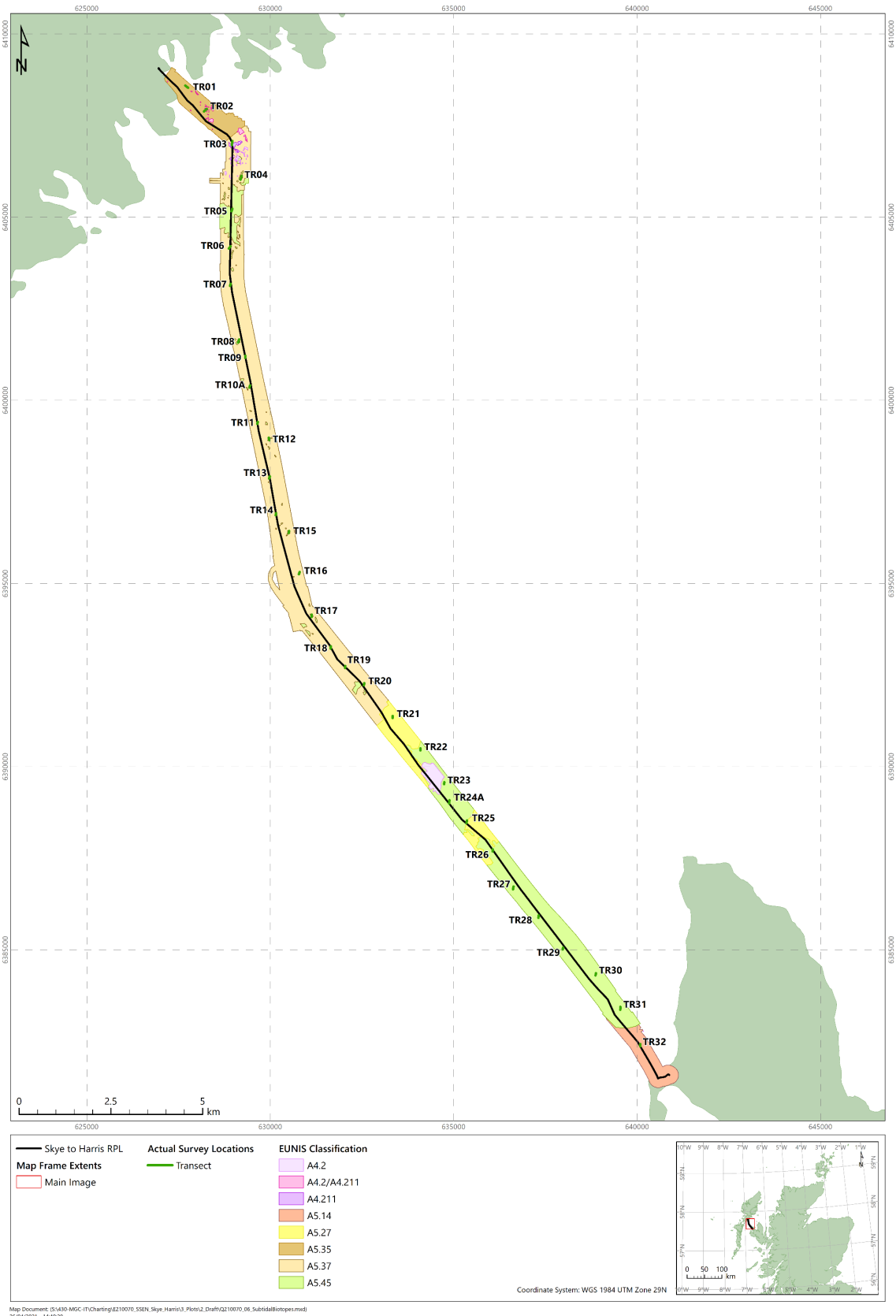
Subtidal epifauna mostly included cup corals (Scleractinia including *Caryophyllia* (*Caryophyllia*) *smithii*), sea fans (*Swiftia pallida*), ascidians (Ascidiacea including *Diazona violacea*), starfish (Asteroidea including *Luidia ciliaris* and *Asterias rubens*), feather stars (Crinoidea including ?*Leptometra celtica*), urchins (*Echinus esculentus*), squat lobsters (*Galatheoidea*), brittlestars (*Ophiuroidea*), tube worm clusters *(Filograna implexa/Salmacina dysteri*), faunal turf (Hydrozoa/Bryozoa), sponges (Porifera), burrows and tracks.

Figure 8-5 below displays the locations of these habitats across the Application Corridor.

Potentially Sensitive Habitats and Species
Several potentially sensitive habitats or species were identified within the Application Corridor. These habitats and species are detailed below:

- **Geogenic reef** – Outcrops of bedrock corresponding to bedrock reef were observed at points along transects TR01 – 04 (near the Harris landfall) and potentially at transect TR23. In addition, potential stony reef habitat was identified at several transects. Following a stony reef assessment, sections of transects TR15, TR17, TR20, TR24A, TR25, TR28 and TR30 were classified as 'Low Reef'. Sections of transects TR05, TR22, TR29 and TR31 were classified as 'Medium Reef' (Fugro, 2021b).
- **Sea pen and burrowing megafauna communities** - Burrows typically associated with the habitat 'sea pen and burrowing megafauna communities' were observed along transects TR01 to TR22 and transect TR25. Burrows of the size class 3cm to 15cm were present along all of these transects. Using the SACFOR scale, these burrows were assessed to be present at densities between 'Frequent' and 'Superabundant'. 'Superabundant' densities were found within transects TR03, TR11, TR14 and TR16. Burrows of the size class > 15cm, potentially inhabited by *Nephrops norvegicus*, were not present along all of these transects, but where observed they were classified at densities from 'frequent' to 'Superabundant'. 'Superabundant' densities of Nephrops burrows were found within transects TR01, TR03 - TR05, TR07 - TR14, TR16 and TR17.

Figure 8-5 Map of EUNIS habitats within the Application Corridor (Fugro, 2021b)

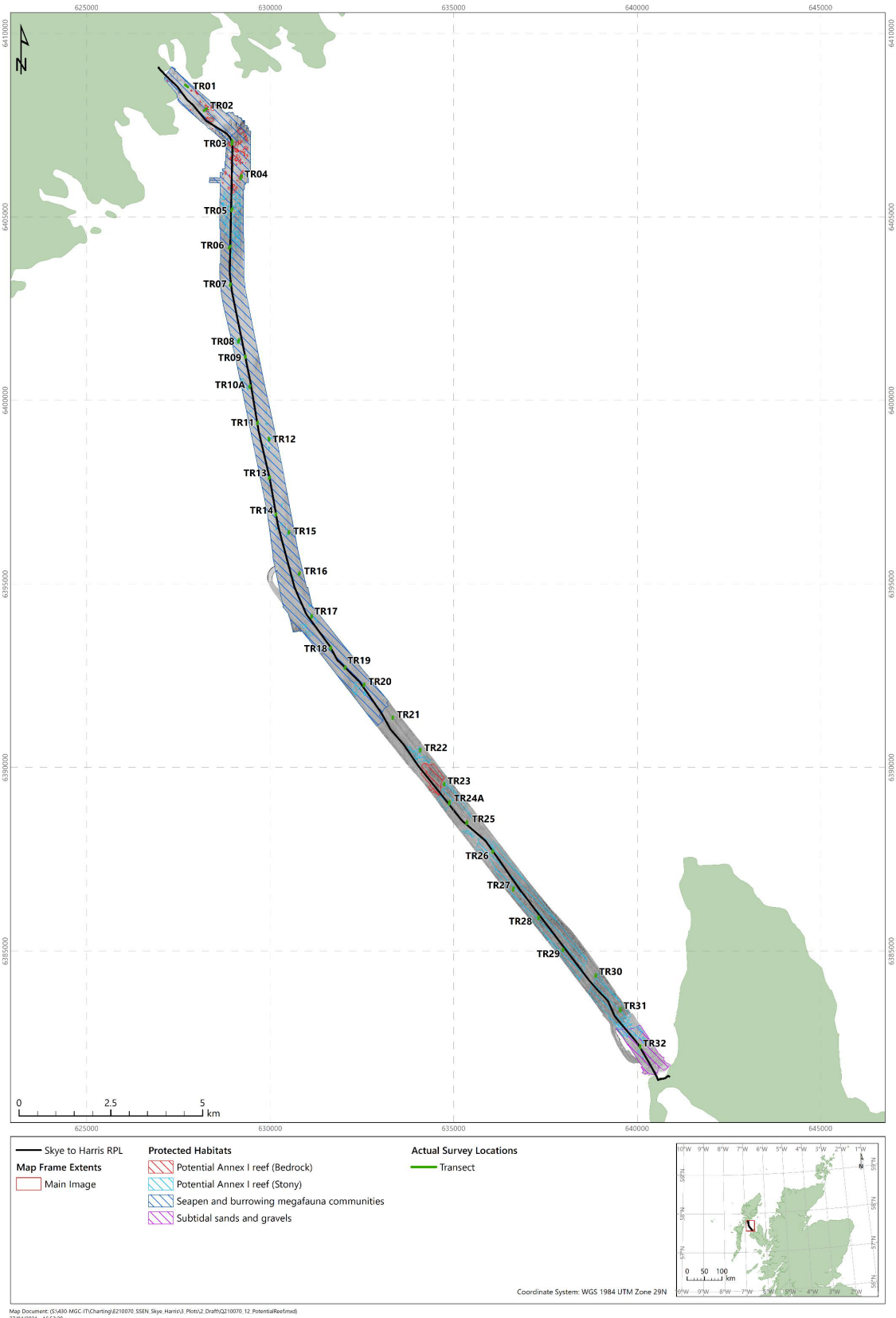


Where burrows were observed, sea pens were not always present. The sea pen observed along the most sections of transects was the sea pen *Funiculina quadrangularis*, which was observed at densities from 'Frequent' to 'Abundant', primarily between transects TR05 – TR20. The sea pen *Virgularia* spp. was observed at densities between 'Occasional' and 'Common', primarily between TR08 and TR19. The sea pen *Pennatula phosphorea* was observed along the fewest number of transects and in the lowest abundance, typically at 'Frequent' density (primarily between transects TR18 – TR20), and along transect TR05 as 'Occasional' density.

- **Subtidal sands and gravel** - An area at the south-east part of the proposed replacement cable route was classified as 'Circalittoral coarse sediment' (A5.14; Figure 4.21). This habitat is categorised within the broad habitat of 'Subtidal sands and gravels', which is a UKBAP habitat.
- **Circalittoral sands and mixed sediment communities** - Circalittoral sands and mixed sediment communities is a protected feature within the nearby Shiant East Bank NCMPA as a representative feature and comprises the habitats 'Offshore circalittoral sand' (A5.27/SS.SSa.OSa), 'Circalittoral mixed sediment' (A5.44/SS.SMx.CMx) and 'Offshore circalittoral mixed sediment' (A5.45/SS.SMx.OMx). Based on the assigned EUNIS main habitat types the 'Deep circalittoral sand' (A5.27) is equivalent to 'Offshore circalittoral sand' (SS.SSa.OSa) and the 'Deep circalittoral mixed sediment' (A5.45) is equivalent to the 'Offshore circalittoral mixed sediment' (SS.SMx.OMx) were present in the area.
- **Northern sea fan and sponge communities** - The habitat 'Northern sea fan and sponge communities' was likely present within the survey area and is a PMF in Scotland's seas. These communities are considered to be at the southernmost extent of their range and have global significance as Annex I 'reefs' on the EU Habitats Directive (NatureScot, 2019a).
- **Maerl beds** - Maerl beds (*Phymatolithon calcareum*) are a PMF habitat, a UKBAP habitat and an OSPAR (2008) threatened and/or declining habitat. Fragments of live maerl (Corallinales) were identified on the seabed along transect TR32 and estimated to cover less than 10% of the seabed, and as such did not form a notable feature of the sediment.
- **Other potentially sensitive habitats and species -** Feather star individuals likely to be the species *Leptometra celtica* were recorded in transects TR03, TR05, TR22, TR23, TR25 and TR31. *L. celtica* individuals have been found in the wider area (Rowley, 2007) and is a PMF species. The cluster anemone *Parazoanthus anguicomus* was recorded in transect TR04. This species has been found in the wider area (Wilson, 2008) and is a PMF species. The Norway pout (*Trisopterus esmarkii*) was observed along transect TR04. This species is included in the PMF species list.

No other Annex I habitats, OSPAR threatened and/or declining species and habitats or UKBAP priority habitats and species were observed within the survey area. The potential extent of the sensitive habitat features described above is displayed in Figure 8-6 below.

Figure 8-6 Potential extent of protected habitats within the Skye-Harris Application Corridor



8.4 Impact Assessment

Within the intertidal zone, the only habitats that may be affected by the marine installation/decommissioning activities are the 'Annex I geogenic reef (bedrock) habitat' and 'intertidal under-boulder communities'. The 'vegetated sea cliffs of the Atlantic and Baltic coasts' habitat identified by the intertidal surveys are located above MHWS and as such have not been considered within this assessment. All habitats and species identified in the benthic environmental survey will be considered in the following assessment.

8.4.1 Physical change (to another substratum type)

8.4.1.1 Intertidal

At both landfall sites, the cable will be encased in articulated pipe and buried with an excavator to protect the cable. At the Skye landfall, trenching of the cable will consist of a (worst-case) distance of 85m between MWHS and MLWS, and at the Harris landfall a (worst-case) distance of 65m between MWHS and MLWS. At the Skye landfall, a separate trench will also be excavated between MHWS and MLWS within which an earthing conductor and rods will be installed and at the Harris landfall two separate trenches may be required between MHWS and MLWS within which separate earthing conductors and rods will be installed (see Section 5.4.4 of Appendix A: Project Description for further information). The trenched area will be re-instated after burial is complete to the mean ground level, ensuring the habitat is restored. 'Intertidal under-boulder communities' (found at the Skye landfall) are considered to be highly sensitive to physical change, as a change to the habitat would result in the removal of this biotope (Tillin and Perry, 2016). However, as the physical change will not result in the removal of the existing habitat and will be localised in its effect, the magnitude of the change will be minor and tolerable for the 'intertidal under-boulder community' habitat.

Trenching activities will lead to a temporary loss of habitat within the direct trenching footprint. In areas of Annex I geogenic (bedrock reef) the surrounding substrate is stable cobbles, boulders and bedrock where the dominant epifaunal species are rapid colonisers, capable of early reproduction and rapid growth. Therefore, it is expected that epifauna will be able to colonise the substrate following its re-instatement. This conclusion is supported by evidence from post-construction monitoring of offshore windfarms. The examples provided below are from the introduction of a hard substrate into a predominantly sandy environment. This however can be used to infer that colonisation of external protection in areas, where there is already rock habitat, will likely be quicker i.e. as colonisation of external protection on sand habitats is dependent on the passive transport of adult organisms or the availability of larvae from the surrounding region.

Case Studies on the Offshore Windfarm Egmond aan Zee (OWEZ), Prinses Amalia Wind Farm and Horns Rev Wind Farm found that the density of species on scour protection material were high and the number of species observed increased with time. In addition, in many cases the number of rare species had also increased (Lengkeek et al., 2017). Studies (Lindeboom et al., 2011) at OWEZ identified 11-17 hard substratum benthos species on the rock material, noting the surrounding habitat was sandy. At the Horns Rev windfarm, the scour protection has been colonised by sea anemones and the soft coral *Alcyonium digitatum* (Langhamer, 2012). Monitoring of the Nord Stream pipeline in Swedish waters showed that over a period of four years a general increase in epifauna was seen on the introduced hard substrate (pipeline and rock berms; (Ramboll, 2016).

Given the small footprint of the sections of burial proposed at each landfall and the ability for the epifauna to re-colonise the re-instated substrate, no significant loss of 'Annex I geogenic (bedrock reef)' habitat will occur.

The removal of portions of the existing cable from each landfall (440m from Skye and 600m from Harris) will result in a change to the existing conditions, with a loss of available habitat occurring when the cable sections are removed. This habitat loss will be localised however, due to the small footprint

of the existing cable, and will allow for the seabed beneath the existing cable to be re-colonised. As such, while decommissioning of the existing cable may lead to localised loss in habitat associated with the cable itself, such loss will not be significant in extent.

8.4.1.2 Subtidal

Subject to final engineering design rock placement may be required along sections of the Application Corridor, to protect the replacement cable in areas where burial is not achievable due to ground conditions and where seasonal scallop fishing is known to occur. Rock placement, in a worst-case scenario, would be utilised between KP 1.610 – 5 (3.39km), KP 12.7 – 15 (2.3km) and for 2km around KP 27. As such, given the design width of rock berms being 13m, the worst-case area of rock placement within the Application Corridor will be 0.1km². Of the sensitive habitats and species identified along the Application Corridor, potential bedrock/stony reef habitat, sea pens and burrowing megafauna communities and northern sea fan and sponge communities could be present where rock placement may be required. Rock bags are also planned to be utilised between KP 8.235-12.700, with two bags placed every 100m. Concrete mattresses and grout bags may potentially be utilised to stabilise the points where the existing cable is cut to allow removal as part of decommissioning, or in instances of free spans respectively. In the instances of rock bag placement, concrete mattress installation and grout bag installation, such activities may occur within potential bedrock/stony reef habitat.

As with the bedrock reef found in the intertidal area of the Application Corridor, due to the surrounding substrate being stable cobbles, boulders and bedrock where the dominant epifaunal species are rapid colonisers, capable of early reproduction and rapid growth, it is expected that epifauna will be able to colonise the new substrate. As such, with the ability of the surrounding epifauna to colonise the new rock substrate and minimal area covered by the rock placement, rock bags and concrete mattress installation, there will not be any significant loss of bedrock/stony reef habitat.

Sea pens and burrowing megafauna communities were found to be prevalent within the Application Corridor primarily between transects TR01 to TR22 and at transect TR25. Such communities are typically highly sensitive to physical change, with replacement of the sedimentary habitat with rock leading to the loss of the habitat (Hill and Tyler-Walters, 2018). Within the areas that sea pens were found, rock placement (if utilised) would cover an area of approximately 0.06km², between KP 12.7 – 15 (2.3km) and for 2km around KP 27. While this area would result in a loss of available habitat, due to the existing widespread nature of the community within the Application Corridor and beyond, the total area of habitat lost in relation to the community's overall occurrence would be minimal. To minimise this habitat loss, the use of rock protection, as defined by final engineering design, will only be utilised where burial cannot be achieved, and the footprint of the rock placement will be the minimum required to ensure cable safety and stability.

While the PMF 'Northern Sea Fan and Sponge Communities' were not explicitly identified during the environmental survey, due to their presence elsewhere on the west coast of Scotland it is possible that they may be found within the Application Corridor in depths between 20-50m in areas of bedrock, boulders and cobbles. Due to their fragile and long-lived nature, any species found in the direct footprint of any rock placement would be lost (Marine Scotland, 2021). However, in time the rock placement may provide additional substrate on which species could re-colonise. As such, while rock placement would lead to a loss of habitat, this would not be a permanent change. Therefore, the effect of physical change on the habitat would be minor and tolerable. To minimise this potential habitat loss, the use of rock protection will only be utilised where burial cannot be achieved, and the footprint of the rock placement will be the minimum required to ensure cable safety and stability.

8.4.2 Abrasion/disturbance at the surface of the substratum

8.4.2.1 Intertidal

The sensitivity of bedrock reef biotopes to abrasion is considered to be low due to the habitats high resilience enabling recovery within two years (Jasper and Hill, 2015). 'Intertidal under-boulder communities' have a medium sensitivity to abrasion, with abrasion events potentially leading to the loss of fucoid cover and a reduction in species abundance and diversity (Tillin and Perry, 2016). As the cable will be buried within the intertidal zone with installation activities taking place over a short time-period, any abrasion events will be temporary and will not occur once installation is complete. As such, the potential impact of abrasion from installation activities within the intertidal zone will be minor.

Decommissioning of sections of the existing cable at each landfall could result in abrasion of the underlying substrate. Due to the localised and temporary nature of the potential abrasion however, and low – medium resilience of the bedrock reef and under-boulder communities however, any impacts will be minor.

8.4.2.2 Subtidal

As with physical change, the pressure 'abrasion/disturbance at the surface of the substratum' will only occur in areas where the cable is surface laid (with or without rock placement). As such, of the sensitive habitats and species identified along the Application Corridor, potential stony reef habitat, sea pens and burrowing megafauna communities and northern sea fan and sponge communities could be affected.

As described in Section 8.4.2.1, bedrock reef is considered to have a low sensitivity to abrasion due to the habitats high resilience enabling recovery within two years (Jasper and Hill, 2015). As such, the pressure will not have a significant effect on subtidal bedrock/stony reef within the Application Corridor.

Sea pen and burrowing megafauna have been found to have a medium sensitivity to abrasion events (Hill and Tyler-Walters, 2018). *Virgularia mirabilis* and *Pennatula phosphorea* can avoid abrasion by withdrawing into the sediment, and so are resilient to infrequent abrasion events, such as cable installation. *Funiculina quadrangularis* (the most commonly observed sea pen species within the Application Corridor (Fugro, 2021a)) cannot withdraw into the sediment however, placing it at greater risk of abrasion events. *F. quadrangularis* was observed primarily between transects TR08 – TR20. As such, with rock placement only occurring within potential areas of *F. quadrangularis* at transect TR18 – TR20, there is minimal overlap between areas of rock placement and the species. In areas where overlap may occur, abrasion events will be temporary and localised in nature, ensuring that a minimal number of individuals would be affected. While Nephrops burrows may be damaged by abrasion, it has been reported that burrows were re-established within two days providing that the occupant had remained unharmed (Marrs et al., 1998). Such findings have been found to be typical of other burrowing megafauna associated with this community (Hill and Tyler-Walters, 2018). As such, due to the temporary and localised nature of any abrasion events resulting from cable laying activities, the potential impact on sea pen and burrowing megafauna communities will be minor.

Northern sea fan and sponge communities have been found to have a medium sensitivity to abrasion events (Marine Scotland, 2021). Studies have found that some sea fan colonies returned to an upright position immediately after impact, while others were permanently bent, which would reduce feeing efficiency. However, Tinsley (2006) observed flattened sea fans which had continued growing, with new growth being aligned perpendicular to the current, so clearly even colonies of *Eunicella verrucosa* which are damaged can continue to survive (Tinsley, 2006). As such, due to the temporary and localised nature of any abrasion events resulting from cable laying and trenching activity, the potential impact on northern sea fan and sponge communities will be minor.

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

8.4.3.1 Intertidal

As penetration of bedrock reef is not feasible due to the hard underlying substrate, no trenching activities will take place within this habitat type. 'Intertidal under-boulder communities' have a medium sensitivity to penetration (Tillin and Perry, 2016). While a single over-turning event is likely to lead to loss of algae, with damage and mortality of attached epifauna potentially occurring, after the trenched material is re-instated it may be re-colonised. Characteristic species such as amphipods and polychaetes may be able to relocate back to the underside of the boulder material after the area has been re-instated. As such, any effects of trenching on 'intertidal under-boulder communities' will be temporary and not result in the permanent loss of habitat, ensuring any impact is not significant.

No novel penetration of the seabed will occur as a result of the decommissioning activities. As such penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion will not have a significant effect on the intertidal habitats at the Skye or Harris landfalls.

8.4.3.2 Subtidal

Trenching activities for cable installation are planned to occur between KP 0.280 – 1.610 (1.33km), KP 5 – 8.235 (3.235km), KP 15 – 26.700 (11.7km) and KP 29.325 – 31.968 (2.643km). In total, this is a trenching length of 18.908km, covering an area of 0.01km². Sensitive habitats and species potentially found within areas of trenching activities include sea pen and burrowing megafauna communities and potential maerl beds.

Sea pen and burrowing megafauna communities have been found to have a medium sensitivity to sub-surface abrasion/penetration events (Marine Scotland, 2021). While such areas are targeted for trawling due to the presence of *Nephrops* (including the Little Minch), the species exhibits a certain resilience to fishing pressure due to the fact that juveniles and egg-carrying females remain within their burrows, therefore escaping capture and injury (Marine Scotland, 2021). While repeated penetration events do lead to reduced average size of *Nephrops*, as trenching activities will be a temporary and localised occurrence the number of individuals affected will be reduced. The sea pen *V. mirabilis* and *P. multiplicatus* do not appear to be negatively affected by low-level penetration events, such as cable trenching activities, potentially due to their ability to withdraw into the sediment (Marine Scotland, 2021). As *F. quadrangularis* cannot withdraw however, they are typically more susceptible to penetration events with distribution typically being reduced as a result of fishing activities (Hughes, 1998). The abundance of *F. quadrangularis* within the Application Corridor, despite the high levels of fishing activity for *Nephrops,* indicates the species may be more resilient than previously indicated. This is supported by experimental studies conducted by Eno et al. (1996) which found that even if damaged, *F. quadrangularis* (and other sea pen species) appeared to remain functional and able to re-anchor themselves in the sediment if dislodged by fishing gear (Eno, 1996). Despite this, any individuals located in the direct footprint of the trenching corridor would potentially be killed. As the seabed would be returned to its previous state after installation activities have concluded however, the community will be able to re-colonise the area, with the community considered to have a medium recovery rate (Marine Scotland, 2021). As such, in addition to the trenching activities being minimal in area in relation to the wide area of habitat available for the community, the effects of trenching on sea pen and burrowing megafauna communities will be minor and tolerable. To further protect the community, micro-routing will be undertaken when trenching to avoid visible concentrations of burrows or sea pens.

Low levels of live maerl (*P. calcareum*) were found at transect TR32, close to the Skye landfall and potentially within an area of trenching activity. Maerl beds have a high sensitivity to sub-surface abrasion/penetration and low recoverability (Marine Scotland, 2021c), with recovery from demersal towed gears for example being estimated to take 10-40 years (Hall-Spencer and Moore, 2000). While

the prevalence of maerl within this area of the Application Corridor is low (covering only 10% of the surveyed transect), as a PMF in Scottish waters loss of the habitat should be avoided where possible. As such, the final route design will be optimised to avoid areas of identified maerl and micro-routing will be undertaken when trenching to avoid damage to the habitat, ensuring cable installation activities will have a negligible effect on the habitat.

8.4.4 Smothering and siltation rate changes

8.4.4.1 Intertidal

Any sediment disturbance from installation/decommissioning activities will be negligible in extent due to the low level of sediment disturbed by trenching activities. Previous research on sediment deposition from trenching activities has found that disturbed sediment is expected to settle rapidly within 100m of a trench (Gooding et al., 2012). In addition, the decommissioning of the existing cable will not result in significant sediment dispersion due to the underlying rocky nature of the substrate. This pressure will therefore not result in a significant effect to the benthic features of the intertidal zone.

8.4.4.2 Subtidal

Smothering events would have the potential to occur only with the immediate vicinity of the installation corridor. As described in Section 8.4.4.1 above, disturbed sediment is expected to settle rapidly within 100m of a trench, with only seabed within the direct vicinity of the trench receiving significantly elevated levels of sediment deposition. Sea pen and burrowing megafauna communities are not sensitive to smothering due to the burrowing nature of the associated megafauna and are tolerant of higher levels of suspended sediments due to the ability of sea pen species self-clean and remove excess silt, in both low and high siltation rate events (Hill and Tyler-Walters, 2018). Maerl beds, however, are intolerant of any levels of smothering due to their inability to escape from the elevated sediments (Marine Scotland, 2021). The loose and complex consistency of this biotope provides considerable structural diversity utilized by a wide range of species. Smothering of maerl will likely result in a major decline in species richness for the area. While trenching would only cause significant sediment deposition in its direct vicinity of the cable route (10 m either side of the trench), micro-routing will be undertaken prior to trenching to ensure activities do not occur in close proximity to the existing maerl habitat, preventing adverse smothering impacts from occurring.

8.5 Conclusion

The above assessment has demonstrated that installation and decommissioning activities associated with the cable replacement will not significantly affect the benthic and intertidal ecology in the vicinity of the Application Corridor. Any impacts on the habitats and species within the Application Corridor will be temporary and localised. Micro-routing of the installation corridor will be undertaken to (where possible) avoid sensitive habitats and species to ensure they are not significantly affected by the installation activities.

9. ORNITHOLOGY

9.1 Overview

The proposed replacement cable installation and decommissioning of the nearshore sections of the existing cable will not result in any adverse effects on sensitive ornithological receptors. The reasoning for this conclusion is detailed below:

- As detailed in Section 5 - Designated Sites, the closest designated site for ornithological features is the West Coast of the Outer Hebrides pSPA, located 8.2km west of the Application Corridor. The site is designated for a number of breeding and non-breeding sea duck species. However, the mean-max foraging ranges of these species do not overlap with the Application Corridor, and so they will not be present during installation and decommissioning activities.
- North Uist Machair and Islands SPA, is located approximately 19.7km west of the Application Corridor. The designating features of this site are either terrestrial species or intertidal waders and so will not be found within the Application Corridor.
- Shiant Isles SPA, located approximately 23.3km east, contains breeding seabird features that could potentially be found foraging within the Application Corridor. However, as detailed in Section 5.4.3.1, no significant disturbance to these species will occur due to the temporary and localised nature of the installation and decommissioning activities.

As such, no further assessment of potential impacts on ornithological receptors is required.

10. MARINE ARCHAEOLOGY

10.1 Introduction

This section describes the key characteristics of the marine historic environment along the Application Corridor between Ardmore, Skye and Beacravik, Harris and provides an assessment of potential impacts of the installation and decommissioning activities on marine archaeology.

10.2 Data sources

A geophysical and geotechnical survey was undertaken by Fugro in March 2021. The results of this survey were then reviewed to determine the presence of any anomalies or features of archaeological significance. Two potential features of potential archaeological significance were identified from this review of the survey data along the Application Corridor.

A review of publicly available information available on marine archaeological sites within/in the vicinity of the Application Corridor was conducted in order to inform this assessment. Key data sources used included:

- The National Record of the Historic Environment (NRHE) of Scotland, using the Canmore and Pastmap database websites; and
- UK Hydrographic Office (UKHO) wreck register and relevant nautical charts.

Information detailed in a preliminary UXO risk assessment conducted by Hyrdofix (2021) describing background information on the general site conditions of the Skye-Harris replacement cable route, including locations of wrecks, has also been utilised to inform this section.

10.3 Baseline and receptor identification

Data from the NRHE (Marine Scotland, 2021b)) indicates that there are no known charted wrecks located within the Application Corridor. The closest known charted wreck to the Application Corridor is that of the fishing trawler MFV Enterprise which sank in 2010, located approximately 7.6km east (see Figure 10-1, Ref P2446-Arch-001). Data from the geophysical and geotechnical survey conducted for the Project did however indicate the presence of two magnetic anomalies that could potentially constitute shipwrecks. Data from the Canmore search database also indicates the potential presence of a wreck within the Application Corridor (Canmore, 2021). These wrecks are:

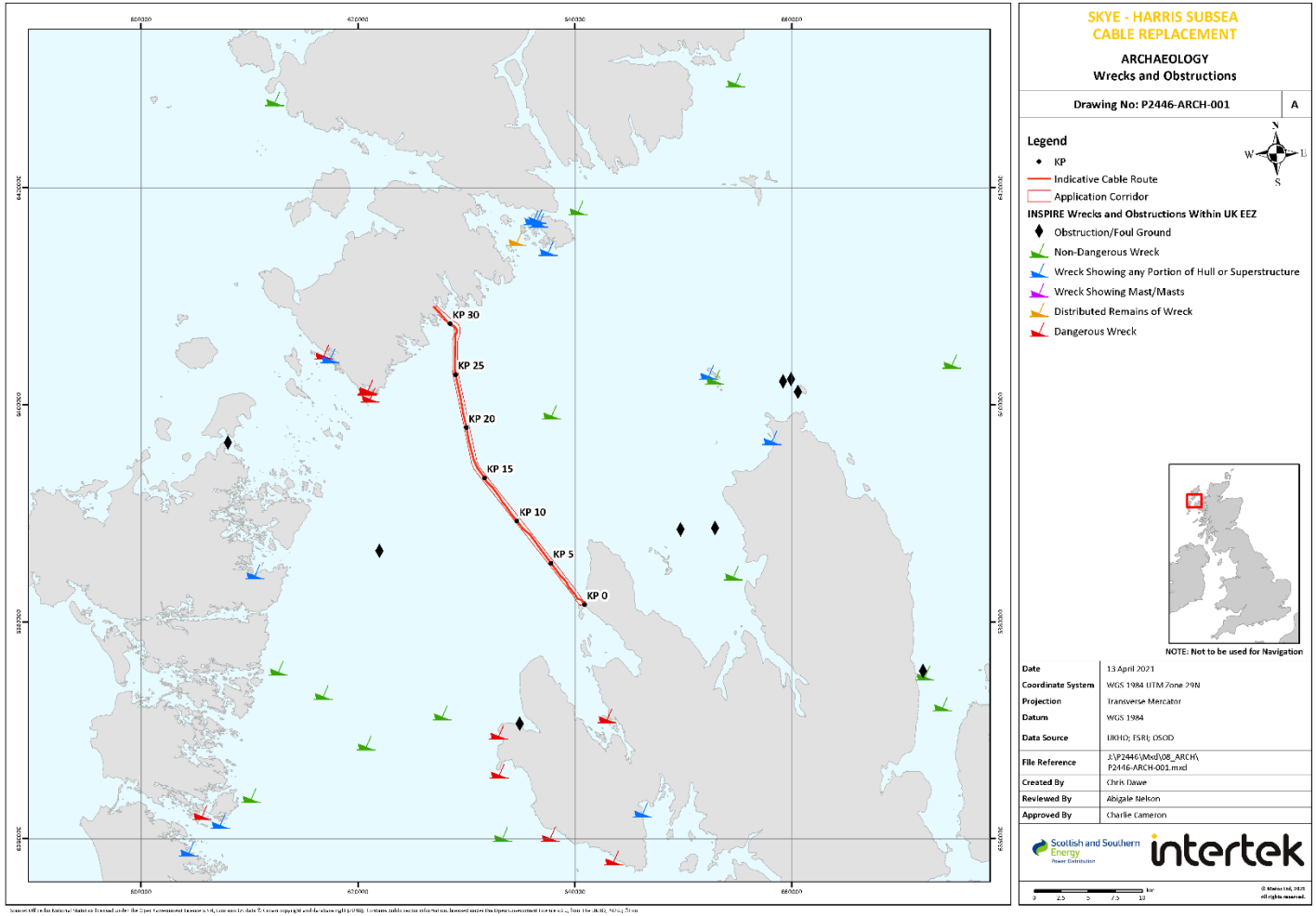
- Solan – A steamship that sunk in 1892 (close to the Skye landfall site); and

A further five wrecks are listed on the Canmore database as being located approximately 900m east of the Application Corridor, near the Harris landfall site. Three are listed as unknown/other, with the other to being listed as follows:

- Bellmore – A steamship that sank in 1889; and
- Erendrungen – A vessel that sank in 1832.

It should be noted, however, that the latitude/longitude of the wrecks are all listed as the same and the position does not contain decimal seconds, preventing an accurate plotting of vessel location (Hydrofix, 2021).

Figure 10-1 Wrecks and obstructions



10.4 Impact Assessment

As described in Section 10.3, there is the potential for features of archaeological significance to be present within the Application Corridor. As such, cable installation and decommissioning activities have the potential to damage these wrecks and lead to a loss of historic record. Any damages would be likely to occur during either the initial cable laying activities or during placement of any cable protection measures. If such activities lead to the damage of an existing wreck, the effect would be permanent and constitute a significant impact on marine archaeology due to the receptors inability to recover.

As such, the following measures will be implemented during the route design process to further ensure the protection of marine archaeological receptors:

- All wrecks or features of archaeological significance will be avoided by a buffer of ≥50 m during detailed route design;
- The locations of wrecks and features of archaeological significance will be identified on electronic charts onboard the installation vessel and will be utilised to guide installation operations; and
- The locations of any wrecks or features of archaeological significance will be provided to Historic Environment Scotland and the UK Hydrographic Office (UKHO).
- The Crown Estate's 'Protocol for Archaeological Discoveries' (The Crown Estate, 2014) will be implemented during installation works.

10.5 Conclusion

The pre-lay geophysical survey works identified the potential presence of features of archaeological significance within the Application Corridor. This is in addition to a review of publicly available data indicating the potential presence of an 18th century wreck within the Application Corridor, close to the Skye landfall site. As such, it cannot be ruled out that cable installation and decommissioning works will not have a significant adverse effect on features of archaeological significance. Through the implementation of the mitigation measures detailed above and in Section 4.2: Mitigation Requirements however, damage or loss of any archaeological features will be avoided. Therefore, this assessment concludes that cable installation and decommissioning activities will not result in any adverse effects to features of archaeological significance.

11. FISH AND SHELLFISH

11.1 Introduction

This section provides details on fish spawning and nursery grounds, noise sensitive fish species, shellfish and basking sharks that may be present within the vicinity of the Application Corridor. Potential impacts from the proposed installation and decommissioning activities have been assessed, along with the mitigation and management measures that will be utilised to remove or reduce these impacts.

11.2 Data sources

Prior to commencement of any survey activities on the Project, an EPS Risk and Protected Sites and Species Assessment (Xodus Group, 2019a) was conducted. This assessment detailed the baseline for protected sites located in the vicinity of the existing cable and assessed the impacts of the survey activities on these sites. Relevant information has been used to inform the baseline overview of this section, and where applicable assessment findings corroborated with this MEA to ensure consistency.

Fugro were commissioned to undertake an environmental survey and provide an overview of benthic environment along the marine Application Corridor. Relevant information acquired from this survey has been used to inform the baseline for fish and shellfish in this section to allow an assessment of the potential impacts the installation activities may have on the identified species. The Project documents used to inform this baseline description include the following:

- Offshore Environmental Results Report, (Fugro, 2021b)
- EPS Risk and Protected Sites and Species Assessment – West Highlands, (Xodus Group, 2019a) (Appendix C)

The Project documents have been supplemented where necessary to establish baseline conditions by undertaking a desktop review of published information and through consultation with relevant bodies. These data sources used to inform the baseline description and assessment include but are not limited to the following:

- Fisheries Sensitivity Maps in British Waters, Coull, Johnstone and Rogers, 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

11.3 Baseline and receptor identification

11.3.1 Spawning and nursery grounds

The probability of 0-group occurrence within/in the vicinity of the Application Corridor, i.e. fish in the first year of their life is detailed in Figures 5-1 and 5-2 (Ref: P2446-FISH-001-2 and 001-2) (Coull, Johnstone and Rogers, 1998; Ellis et al., 2012; Aires, González-Irusta and Watret, 2014).

Figure 11-1 Probability of 0 Group presence (Map 1 of 2) (P2446-FISH-001-1)

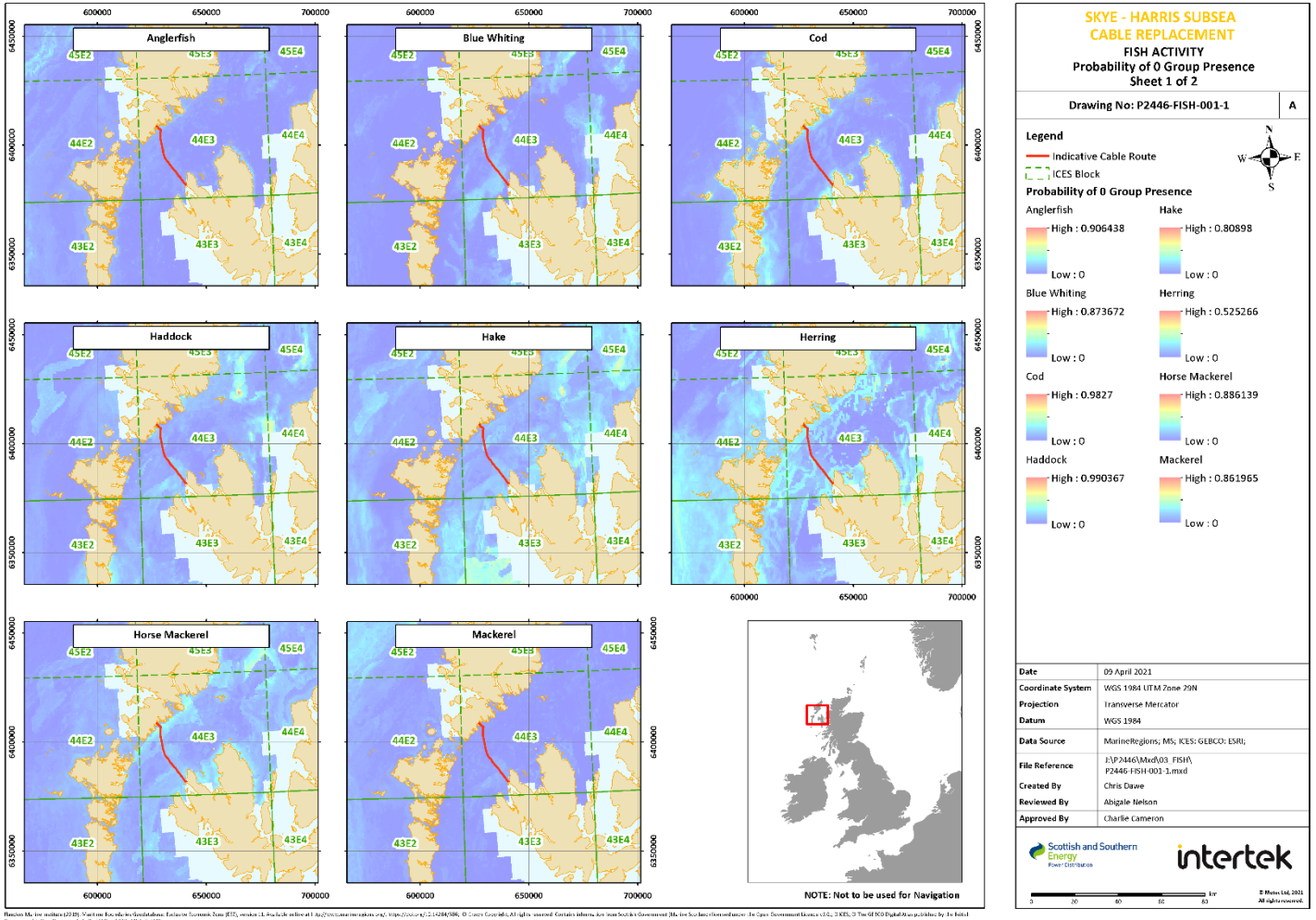
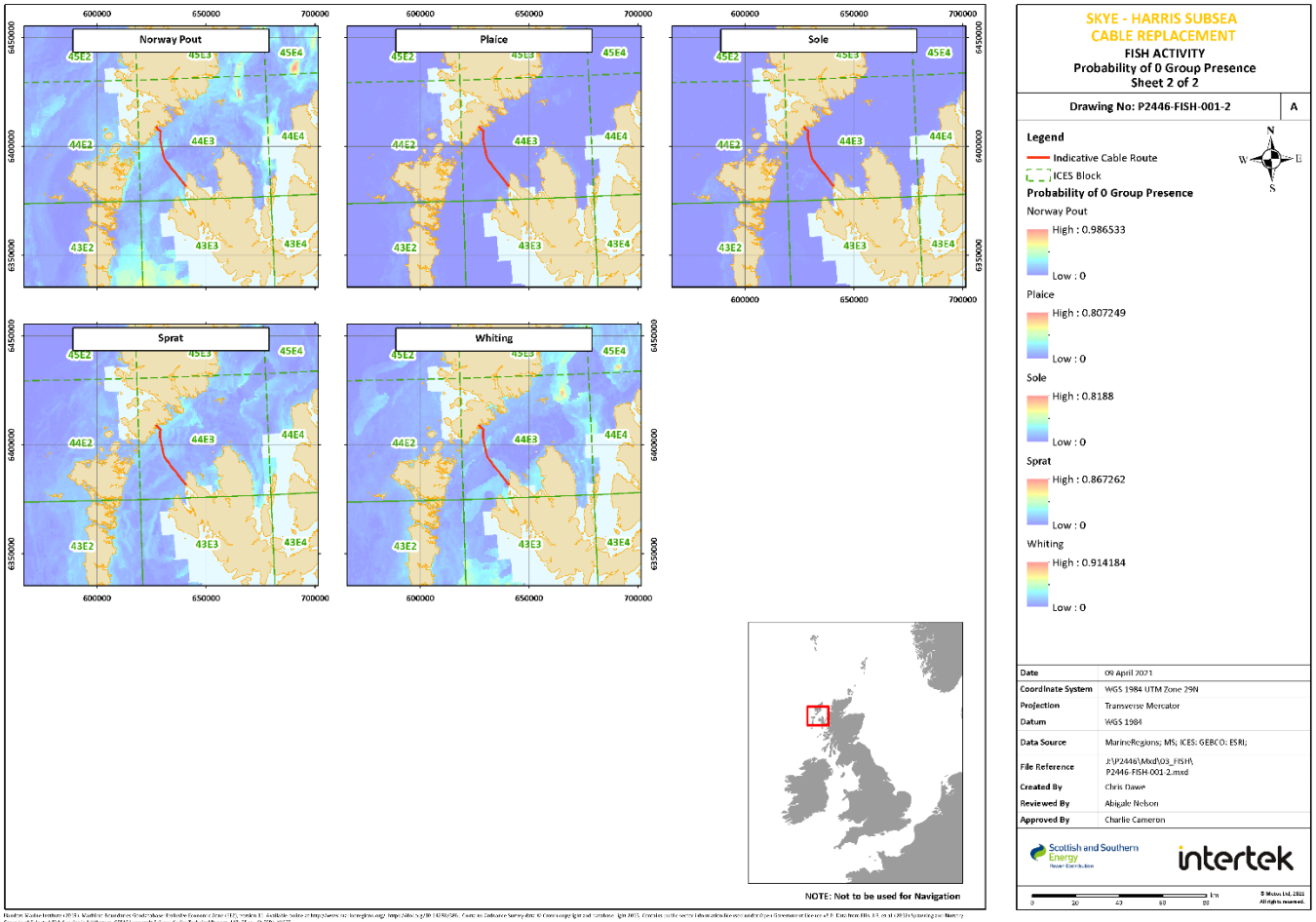


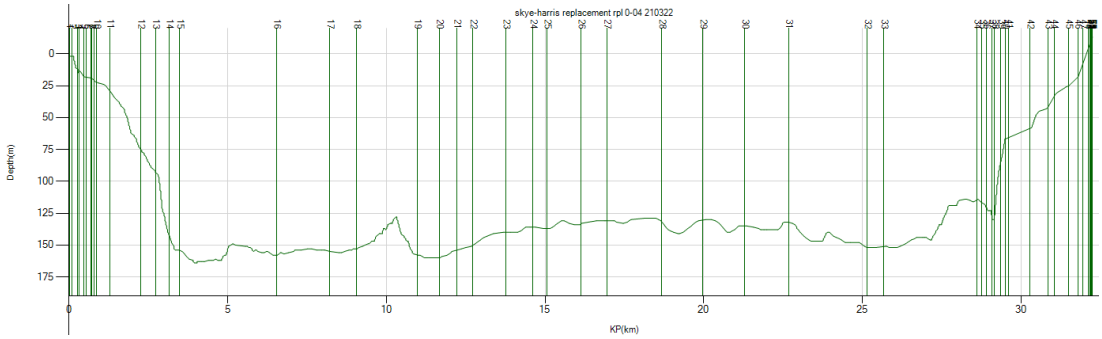
Figure 11-2 Probability of 0 Group presence (Map 2 of 2) (P2446-FISH-001-2)



Data from Ellis *et al.* 2012 indicates that the area within the Application Corridor is located in an area of low intensity usage for both spawning and as a nursery ground for sandeel (*Ammodytes sp*.). This is in contrast to herring (*Clupea harnegus*), with data indicating the site is not used for spawning purposes but is a high intensity nursery ground for the species (Ellis et al., 2012). The lack of spawning in this region is likely due to depth limitations, with herring typically spawning at depths of between 15-40m (DECC, 2016), while the majority of the seabed in the Application Corridor is found in depths exceeding this (see Figure 11-3).

The area is also known nursery ground for numerous other species including anglerfish (*Lophius piscatorius*), Atlantic mackerel (*Scomber scombrus*), blue whiting (*Micromesistius poutassou*), European hake (Merluccius merluccius), haddock (Melanogrammus aeglefinus), horse mackerel (*Trachurus trachurus*), Norway pout (*Trisopterus esmarkii),* sprat (*Sprattus sp*.) saithe *(Pollachius virens*), spurdog (*Squalus sp.)* and whiting (*Merlangius merlangus*) (Coull, Johnstone and Rogers, 1998; Ellis et al., 2012; Aires, González-Irusta and Watret, 2014).

Figure 11-3 Topographic and Seabed Profile Along the Skye to Harris Cable



11.3.2 Shellfish

Data from a previous NatureScot report on Priority Marine Features (PMFs) in Scottish waters does not indicate the presence of shellfish species (such as blue mussel (*Mytilus ediulis*) or horse mussel (*Modiolus modiolus*)) within the area through which the Application Corridor passes (Tyler-Walters et al., 2016).

11.3.3 Basking shark

Baseline information on basking shark in the vicinity of the Application Corridor is detailed in Section 7.3.3 in this report.

11.3.4 Noise Sensitive Species

Some species of fish are more sensitive to disturbance/injury from noise than others, depending on whether the species possesses a swim bladder and the distance of this bladder from their ear. Based on these dependencies, three separate functional groups of fish can be developed (Hawkins and Popper, 2014). These groups include:

- Fish without a swim bladder. Low sensitivity to noise as they can only detect kinetic energy. Species include sharks, common skate complex, mackerel, flounder).
- Fish that possess a swim bladder but is located far from the ear. Medium sensitivity to noise, as despite the presence of the bladder it will likely not contribute to pressure reception with species being primarily kinetic detectors. Such species include salmon and sea trout. Also included in this group are fish eggs and larvae that due to limited mobility lack the ability to move away from a noise source.

- Fish that possess a swim bladder or other air bubble close to the ear. High sensitivity to noise, as the proximity of the bladder/air bubble to the ear allows for sound pressure to be detected. This broadens the fishes' hearing range but makes it susceptible to anthropogenic noise disturbance as the noise levels are more likely to breach their hearing threshold compared to less sensitive species (Popper et al., 2014). Such species include herring, sprat and cod.

Publicly available datasets indicate that there is low potential for species sensitive to noise such as herring, sprat, and salmon to be present within the Application Corridor (Coull, Johnstone and Rogers, 1998; Ellis et al., 2012; Aires, González-Irusta and Watret, 2014). Wild salmon are present in some rivers in Skye and lochs in Harris, however (Trout and Salmon Fishing in Scotland, 2021a, 2021b). While such locations are not found in the vicinity of the cable landfall sites, individual salmon could be found migrating within the Little Minch and thus be present within the Application Corridor during installation/decommissioning activities.

11.4 Impact Assessment

11.4.1 Physical change (to another substratum type)

Sandeel (*Ammodytes sp*.)
Subject to final engineering design the use of cable protection measures will be minimised as much as possible and may require rock placement in areas of known scallop dredging between KP 1.610 to KP 15 and around KP 27. In addition, articulated pipe will be utilised at the intertidal zones of both landfalls. Such measures will be minimal in spatial extent in the context of the wider area available for use as spawning and nursery grounds. As such, due to the low intensity of the area's usage as a spawning and nursery ground it is expected that the effects from physical change to seabed habitat from cable protection on sandeel species distribution and potential spawning habitat will not be significant.

Atlantic herring and other species
Approximately 88% of the Application Corridor is located at depths that are typically outside of the depth range for Atlantic herring spawning reducing the likelihood of the seabed in the vicinity of the replacement cable route being an important location for the species. Subject to final engineering design the use of cable protection measures will be minimised as much as possible and may require rock placement in areas of known scallop dredging between KP 1.610 to KP 15 and around KP 27. In addition, articulated pipe will be utilised at the intertidal zones of both landfalls. This will reduce the likelihood of long-term adverse effects on the habitat and species found along the cable route. As such, it is expected that the potential for these species and their distribution within the Application Corridor and the wider area to be adversely affected is negligible.

11.4.2 Changes in water suspended solids (water clarity)

There are no fish and shellfish species found within the Application Corridor that are sensitive to changes in suspended solids or smothering. As described in Section 8.4.4.1 above, disturbed sediment is expected to settle rapidly within 100m of a trench, with only seabed within the direct vicinity of the trench receiving significantly elevated levels of sediment deposition. Silts and clays could be transported a considerable distance before deposition; however, elevated concentrations of suspended material are limited to approximately 300m from the jetting site as a result of dilution in the water column. As such, the impact of changes in water suspended solids (water clarity) on fish shellfish within/in the vicinity of the Application Corridor will be negligible.

11.4.3 Underwater noise changes

The potential impact of underwater noise changes on basking shark is assessed in Section 5.4.1.4 where it is concluded that due to the short term and transient nature of the installation activities and

intermittent usage of USBL devices, there will not be significant disturbance of basking shark within or in the vicinity of the Application Corridor. Section 11.3.4 above identified the potential for salmon, a species with medium sensitivity to underwater noise due to the species possessing a swim bladder located far from their hearing (Hawkins and Popper, 2014), to be present within the Application Corridor. As such there exists the potential individuals could be adversely affected by underwater noise produced by the installation/decommissioning activities.

A previous study conducted in 2016 by Harding *et al.* on the effects of noise produced by pile driving activities (typically one of the most impactful sources of underwater in the marine environment) on salmon found that the individuals did not illicit a significant physiological or behavioural response to the disturbance, however (Harding et al., 2016). This is likely due to salmon being typically insensitive to sound, with the species featuring a lack of specialist hearing mechanisms reducing their ability to detect noise stimuli (Hawkins and Johnstone, 1978). As such, any individuals present within/in the vicinity of the Application Corridor will not be significantly disturbed by installation or decommissioning activities.

11.4.4 Death or injury by collision

The potential impact of vessel collisions on basking sharks is assessed in Section 5.4.2.3 where it is concluded that the risk of collision is low due to the slow-moving nature of the vessels and low likelihood of the vessels overlapping with the presence of basking sharks within the replacement cable installation corridor. This is in addition to the temporal and spatial constraints of the installation activities limiting the time at which collisions could potentially occur and low population distribution of the species within the Project area. As such, impacts to basking shark from installation vessels are considered to be not significant.

11.5 Conclusion

Spawning and nursery ground habitat for fish species will not be significantly reduced due to the minimal extent of cable protection measures that will be utilised across the Application Corridor and minimal baseline usage of the area as a spawning and nursery ground by fish species. Basking shark or other noise-sensitive species will not be significantly disturbed by the presence of installation vessels or sound generated by installation activities due to their short-term and transient nature. As such, there will be no significant impact to fish and shellfish.

12. COMMERCIAL FISHERIES

12.1 Introduction

This section provides details of commercial fishing activity and aquaculture within the vicinity of the Application Corridor. Potential impacts to commercial fishing from the proposed installation/decommissioning activities have then been assessed, along with the mitigation and management measures that will be utilised to remove or reduce these impacts. This section should be read in conjunction with the separate regional Fisheries Liaison Mitigation Action Plan – West Highlands (FLMAP, Appendix B)) which provides a summary assessment of all the potential marine interactions, including commercial fisheries, which could influence or be affected by the proposed replacement cable works.

12.2 Data sources

Prior to commencement of any works on the Project, a regional FLMAP covering the west highlands was prepared to set out how SHEPD will interact with all legitimate sea users, prior to and during any works relating to replacement of the cables in the west highlands region. The FLMAP specifically outlines the associated risks to the commercial fisheries industry (and other legitimate sea users) and assesses the potential effects and should be read in conjunction with this section. The information provided in the FLMAP has been used to inform the baseline overview of this Section.

The Project documents have been supplemented where necessary. The data sources used to inform the baseline description and assessment includes but is not limited to the following:

- 2019 Scottish Sea Fisheries Statistics - Fishing effort and quantity and value of landings by ICES Rectangle (Marine Scotland, 2020)

12.3 Baseline and receptor identification

12.3.1 Commercial fishing

The Application Corridor is located entirely within ICES rectangle 44E3. According to the Marine Scotland statistics, this area is primarily targeted for crustacean and shellfish species, although some pelagic species are also targeted within the region (Marine Scotland, 2020). In ICES rectangle 44E3, traps (potting) account for 41% of fishing effort, followed by dredges at 32% and trawls at 27%. Within the Application Corridor specifically, mobile-gear trawling activity is the most prevalent at over 100 hours per year across approximately KP 15-20 of the Skye-Harris cable route, followed by up to 50 hours of dredging effort and 1-50 hours of trapping/potting activity at the Harris landfall area (SHEPD, 2020). The top species targeted are (in descending order of tonnage) scallops, Norway lobster (*Nephrops norvegicus*), brown crab (*Cancer pagarus*), velvet crab (*Necora puber*) and European lobster (*Homarus gammarus*) (Marine Scotland, 2020).

In 2019, a total catch value of £4.3M was landed in ICES rectangle 44E3. This is lower than ICES rectangle 43E3 to the south of Application Corridor which had a total catch value of £5.3M in 2019, but higher than ICES rectangle 45E4 to the north-west of the area of interest which had a total catch value of £2.9M in 2019 (Marine Scotland, 2020). The Skye-Harris subsea cable replacement is sited within the 6nm limit, in which the UK has exclusive fishing rights. There is a roughly even split in landings from vessels <10m, 10m-15m and >15m (SHEPD, 2020).

Figures 12-1 and 12-2 (Ref: P2446-FISH-002 and 003) below display fishing activity by vessels over 15m and fishing effort by vessels over 15m within/in the vicinity of the Application Corridor respectively.

Figure 12-1 Fishing activity for >15m UK vessels 2017 by ICES sub rectangle (P2446-FISH-002)

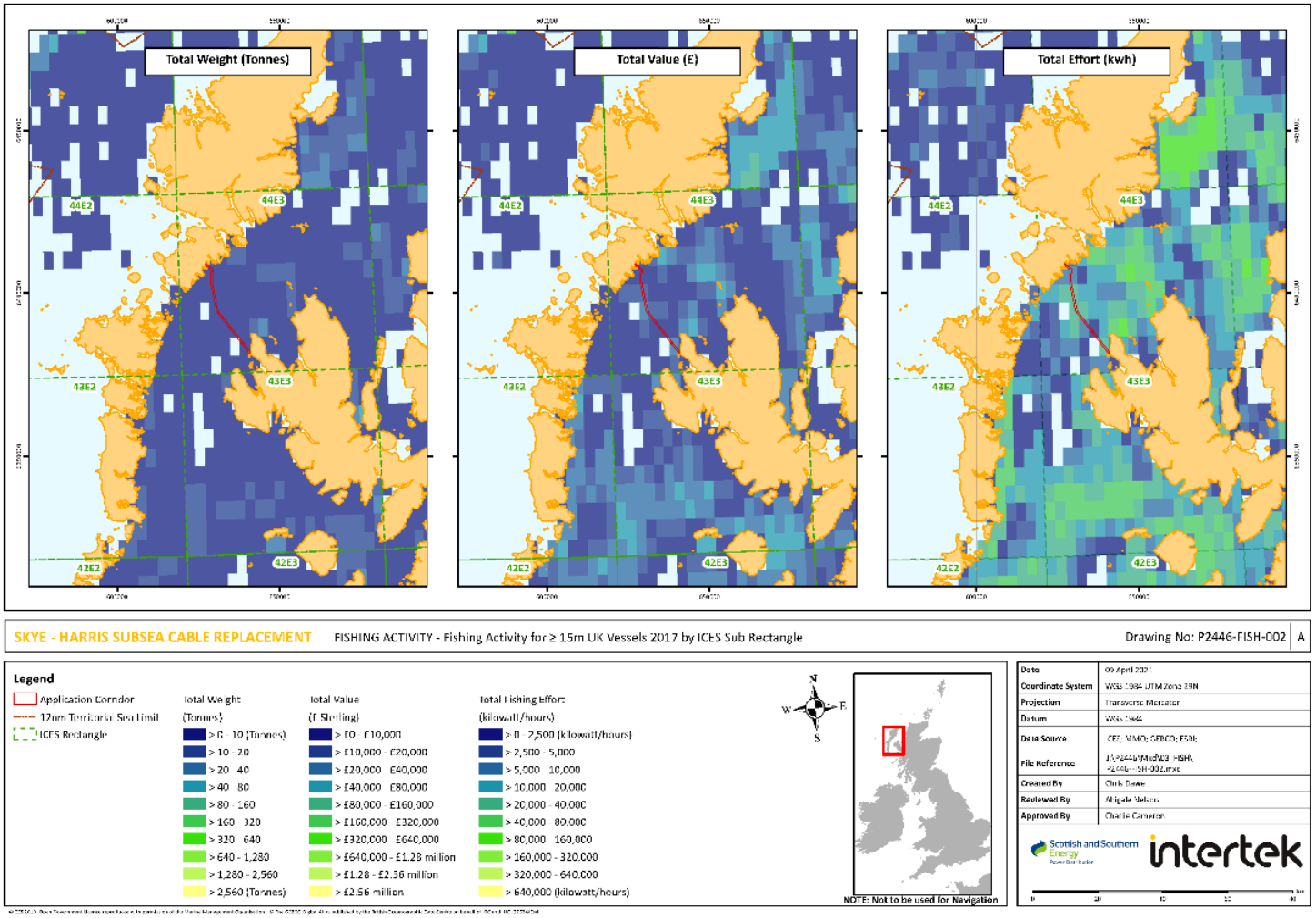
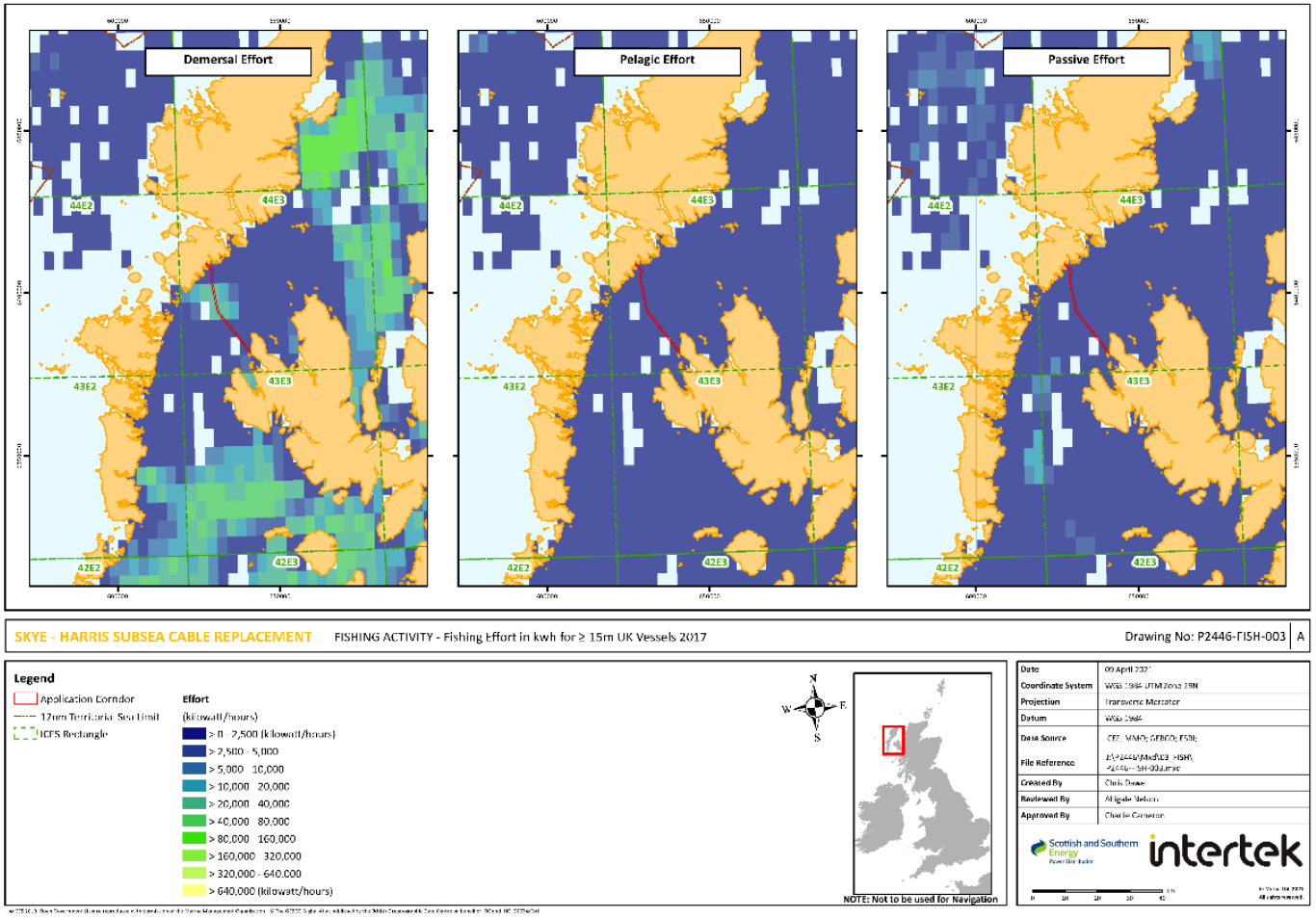


Figure 12-2 Fishing effort in kilowatt hours for ? 15m UK vessels 2017 (P2446-FISH-003)



12.3.2 Aquaculture

Several aquaculture sites are located near both landfall locations on Skye and Harris (see Figure 12-3 and 12-4 respectively (Ref: P2449-FISH-006 and 007). At the Skye landfall, the closest sites are de-registered shellfish sites located around approximately 2.8km around the headland at which the cable landfall is sited, and so will not be affected by marine installation or decommissioning activities. At the Harris landfall, while there are no aquaculture sites within the Application Corridor the route does pass within close proximity to a number of other sites. These sites are as follows:

- Three de-registered shellfish sites, closest of which is approximately 170m from the Application Corridor;
- Three inactive fish sites closest of which is approximately 350m from the Application Corridor; and
- One active fish site, located approximately 430m from the Application Corridor.

As such, there is the potential that installation activities at the Harris landfall could affect the nearby active and inactive aquaculture sites.

Figure 12-3 Aquaculture sites: Skye landfall (P2446-FISH-006)

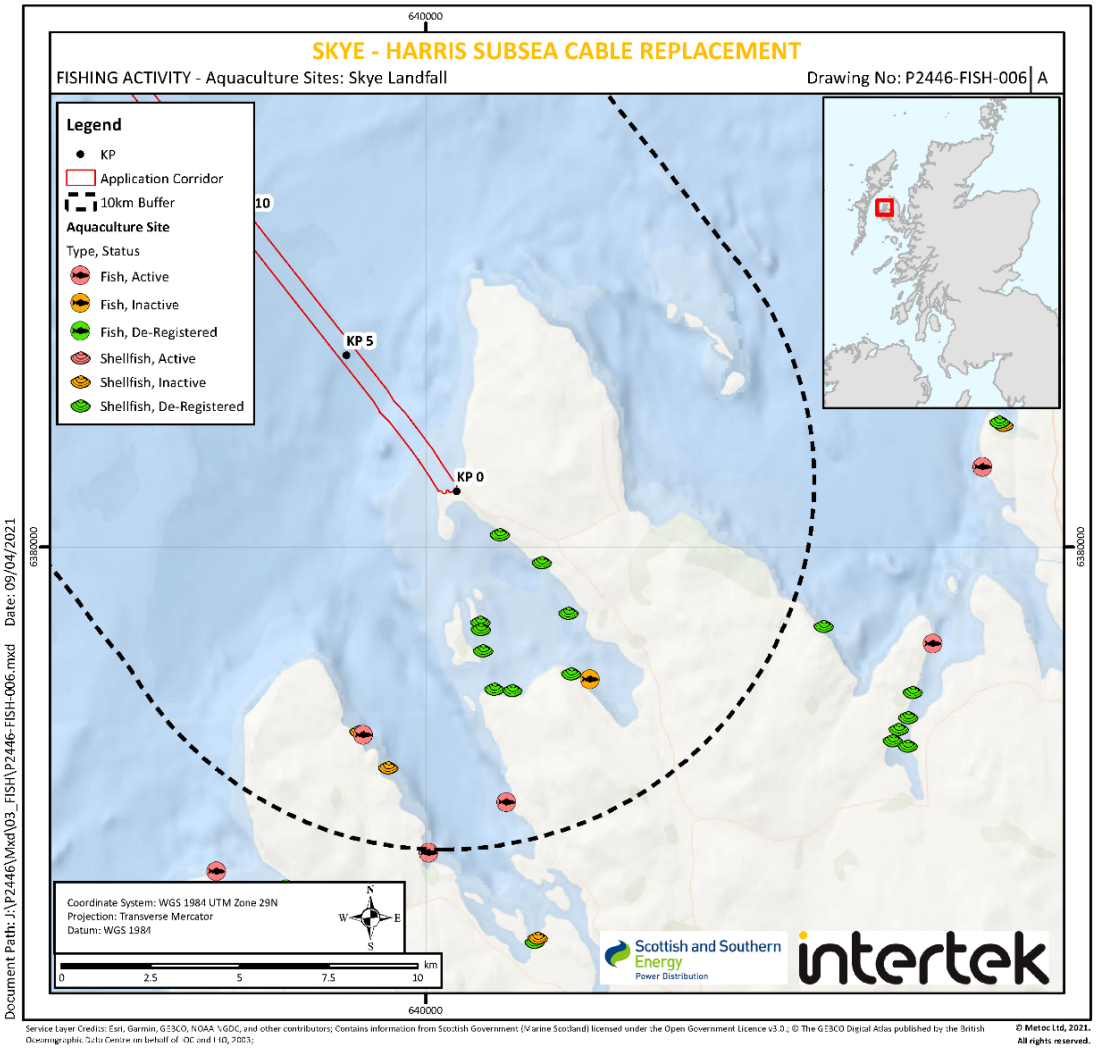
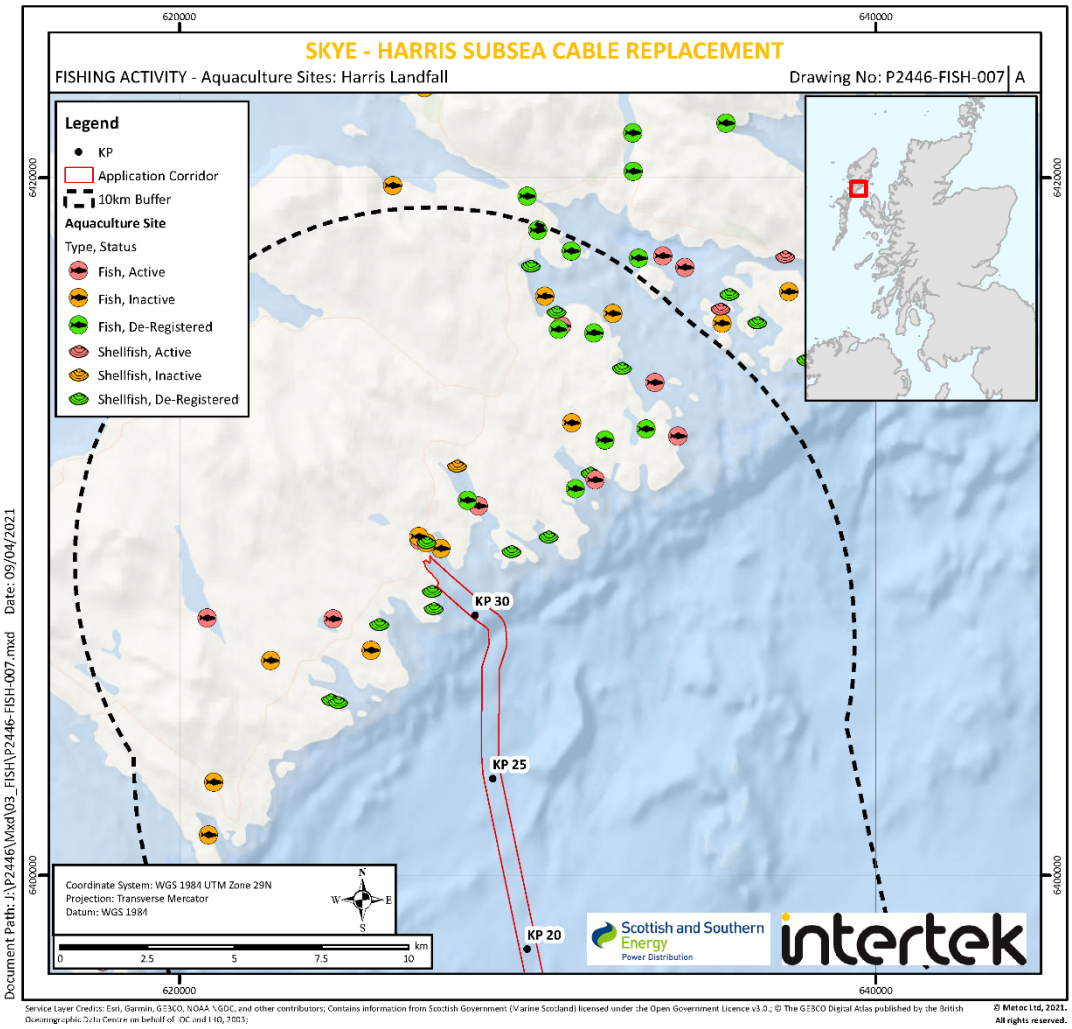


Figure 12-4 Aquaculture sites: Harris landfall (P2446-FISH-007)



12.4 Impact Assessment

12.4.1 Loss of access

There is potential for the presence of installation vessels to restrict access to fishing grounds or to cause fishing vessels to deviate from their typical navigation route, resulting in a loss of earnings, additional fuel costs or disruption of normal fishing activities. Longer term impacts relate specifically to reduced fishing effort within traditional fishing grounds, particularly for trawl fisheries where there is an increased risk of gear being snagged on the replacement cable and associated protection measures (e.g. rock placement).

Regarding the immediate loss of access to fishing grounds and navigation routes due to the presence of installation vessels, the impacts relate to the 500m safety zone that will be enforced around the installation vessel when in operation. When the installation schedule for the cable is finalised, this will be circulated amongst local fishermen ahead of the activities to provide as much notice as possible, allowing for temporary changes in routing to be made due to the linear nature of the cable installation route and transient nature of this safety zone however, the duration of time where fishing vessels will be displaced will be minimal.

12.4.2 Loss of fishing ground and increased snagging risk

Due to the high levels of demersal stern trawler activity over the cable route, there is a risk that snagging could occur in areas where cable protection is required. Within the areas where trawling occurs along the Application Corridor, subject to final engineering design rock placement may be required where the cable is required to be surface laid, e.g through boulder fields. The remaining sections of the route will be buried by a trenching ROV in areas of soft sediment, where indicated by the final engineering design. As cable protection measures will only generally be utilised in areas of harder seabed where trawling would be less likely to occur due to the snagging risk, installation of the replacement cable will not lead to an increase in snagging risk or loss of trawling or dredging grounds. Potting vessels near the Harris landfall will be able to return to their usual fishing grounds after installation/decommissioning works have been completed on the new/existing cables respectively. As such there will be no adverse effect of the Project to the traditional fishing grounds in the area. While occasional maintenance of the cable may occur in the future, such activities will be clearly communicated ahead of time with typical safety procedures (such as those used in this Project) being followed, thus ensuring impacts to local fishermen are kept to a minimum.

12.4.3 Changes in water suspended solids (water clarity)

The aquaculture sites within the vicinity of the Application Corridor could potentially be adversely affected by the disturbance of sediment during installation/decommissioning activities at the Harris landfall. Previous studies have indicated that excessive suspended sediment (SS) can adversely affect the fitness of affected fish through gill damage, lowered feeding efficiency, and physiological stress, which can result in impaired growth and reproductive success (Awata et al., 2011). In the case of the Harris landfall area however, due to the seabed being characterised by potential Annex I reef making burial unsuitable the new cable will be primarily surface laid with protection by articulated pipe. The existing cable due to be decommissioned at this location is also surface laid. As such, trenching activities at this location will be minimal. In the event of trenching activities occurring, any sediment disturbance from installation/decommissioning activities will be negligible in extent due to the low level of sediment disturbed by trenching activities. Previous research on sediment deposition from trenching activities has found that disturbed sediment is expected to settle rapidly within 100m of a trench (Gooding et al., 2012). As the closest aquaculture site is approximately 170m from the Application Corridor, no aquaculture sites will be affected by installation/decommissioning activities.

12.5 Conclusion

The above assessment has demonstrated that installation and decommissioning activities associated with the cable replacement will not significantly affect commercial fishing interests within or in the vicinity of the Application Corridor. Any loss of access to fishing grounds caused by the installation of the replacement cable and decommissioning of the nearshore section of the existing cable will be minor and temporary due to their short-term, localised and transient nature. Aquaculture sites will not be affected by the installation and decommissioning activities due to low levels of sediment disturbance from installation and the distance of the nearest aquaculture sites from the Application Corridor.

13. SHIPPING AND NAVIGATION

13.1 Introduction

13.1.1 Aim of this Section

This section identifies the potential risk to shipping and navigation arising from activities associated with installation of the replacement cable, decommissioning of the nearshore sections of the existing cable and the presence of the replacement cable during its operational lifespan.

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

13.1.2 Data sources

Automatic Identification System (AIS) data from EMODnet covering 2017, 2018 and 2019 have been used in this section. As per Regulation 19 of Chapter V, Safety of Navigation, of the Annex to the International Convention for the Safety of Life at Sea (SOLAS V), 1 July 2002, an AIS must be installed and operated on: all ships of 300 gross tonnage and upwards engaged on international voyages; cargo ships of greater than 500 gross tonnage not engaged on international voyages; all passenger vessels irrespective of size and fishing vessels greater than 15m. In recent years, AIS has increasingly been installed by other maritime users on smaller craft, including yachts, fishing vessels, and pleasure craft, making it a robust and reliable indicator of marine traffic.

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

- AIS data. EMODNET (2017, 2018 & 2019)
- Admiralty charts, http://wmsgateway.findmaps.co.uk/wms/IntertecMetocCharts?
- Royal Yachting Association (RYA) Data for 2019
- Marine Mammal Observation (MMO) fishing data, 2017
- Marine Traffic, www.marinetraffic.com
- Royal National Lifeboat Institution incidents 2010 to 2019. https://data-rnli.opendata.arcgis.com/datasets/rnli-returns-of-service?geometry=-46.917%2C50.370%2C36.711%2C59.196
- Marine Accident Investigation Branch (MAIB) annual reports 2011 to 2019. https://www.gov.uk/government/collections/maib-annual-reports

13.1.3 Study Area

This section covers the marine components of the cable installation works in the Little Minch between Ardmore, Skye and Beacravik on Harris. The study area has been defined as 10km either side of the proposed Application Corridor.

Kilometre points (KPs) have been assigned to the route using the Scottish landfall as KP0 and are shown in Figure 1-1 (Ref: P2446-LOC-001).

All AIS data and navigational features dataset presented in this report are limited to the area of the assessment, hereby known as the Study Area.

13.2 Guidance Methodology

The Navigation Risk Assessment (NRA) methodology used in this section differs slightly from a significance assessment and has been prepared in accordance with the guidance below:

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

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

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

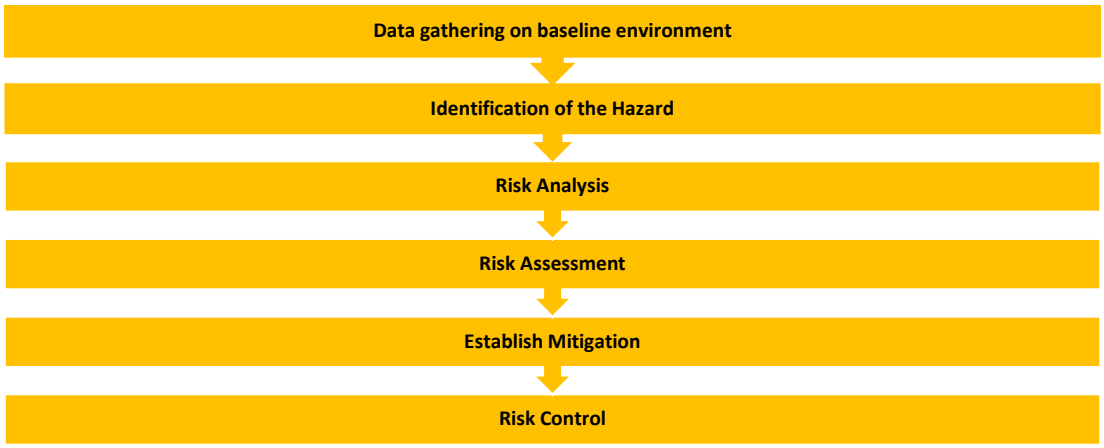
Where applicable, further consideration has been given to:

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

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

The assessment process involves the following main steps presented in Figure 13-1.

Figure 13-1 Assessment Steps



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

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

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

The steps presented in **Figure 13-1** are described in more detail below.

13.2.2 Data gathering on baseline environment

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

The analysis has included:

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

13.2.3 Identification of the hazard

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

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

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

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

13.2.4 Risk analysis

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

Risk is the combination of frequency and consequence which are defined in Table 13-1 and 13-2 below. The definitions below have been developed using the IMO guidelines which includes effects on human safety and ships, however this assessment also focuses on displacement of existing vessels and this is the most likely consequence of the proposed development.

Table 13-1 Frequency of a hazard

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

Table 13-2 Consequence of a hazard

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

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

13.2.5 Risk assessment

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

Having established the frequency and consequence of the hazard, a risk assessment has been carried out using a risk matrix, adapted from the guidance above, presented in Table 13-3.

Table 13-3 Risk Matrix

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

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

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

Definitions of the risk levels are provided in Table 13-4 below.

Table 13-4 Definitions of risk levels with respect to vessel displacement

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

13.2.6 Establish mitigation

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

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

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

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

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

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

13.2.7 Risk control

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

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

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

13.3 Marine Campaign Works

The project description is provided in Appendix A and provides details of the proposed route and operational aspects of the marine campaign works such as cable installation, site preparation and cable protection methods. A schedule is also included estimating the timeframe for the various marine activities.

Existing vessels will be requested to remain at least 500m from project vessels whilst they are engaged in cable installation activities. This is due to the cable lay vessel's limited ability to manoeuvre whilst undertaking operations.

Pertinent Information from the project description that is directly relevant to the marine activities for the NRA is outlined below.

Pre-Lay Survey
A detailed geophysical pre-lay survey will be undertaken across the entire cable route. Typically, vessels survey at approximately **800m/hr** therefore it will take **1.7 days**.

Therefore, as a worst case the maximum area for disruption would be 1km wide by 19km long per 24-hour period.

Pre-Lay Grapnel Run (PLGR) including boulder clearance and cable removal
PLGR progress rates are approximately **1.85km/hr** and will therefore take **0.7** days for a PLGR to be undertaken. This usually clears the route of any debris such as OOS cables and fishing gear etc.

Large boulders that cannot be avoided during the route engineering process will need to be cleared on a case-by-case basis. Operational progress rates for these operations are currently unknown.

Therefore, as a worst case the maximum area for disruption during a PLGR would be 1km wide by 44.45km long per 24-hour period.

Cable Shore End Pull-In Operations
The first cable pull in operations will take **2 days** to complete and the cable lay vessel (CLV) will be stationed around the 13m water depth contour.

Once the cable is laid across the seabed, the cable lay vessel will remain on station at the 13m water depth contour at the other shore end. The cable will then float off the vessel to shore to complete the second cable pull in operation taking another **2 days**.

Cable Lay Operations
Once the cable is successfully pulled (first cable pull-in) to its required position onshore, the buoyancy units will be removed and the CLV will commence laying operations until the second cable pull in. The CLV is a DP2 class vessel and expected laying speed will be between **250 m/hr** and **350 m/hr**.

Therefore, as a worst case the maximum area for disruption would be 1km wide by 6km long per 24-hour period.

Post-Lay Trenching
Once the cable has been laid on the seabed the cable is then buried using a trenching tool. Typical burial speeds are around **200m/h** and will therefore take **6.5 days**

Therefore, as a worst case the maximum area for disruption would be 1km wide by 4.8 km long per 24-hour period.

Articulated Pipe Installation
The cable protection strategy may include the installation of Articulated Pipe. Generally, this is installed following the cable pull-in operations by divers or from the CLV, or by a combination of both methods therefore where areas that require articulating piping. Typical speeds for installing articulated piping around **0.6 m/hr** therefore there will be an additional **12 days** for diving operations.

Rock protection where cable burial is not achieved.
Subject to final engineering design rock placement may be utilised to protect the cable from potential damage from activities such as over-trawling. The method of cable protection would require to installation of graded rock to be deposited on top of the cable using a DP. Where required subject to final engineering design rock placement may occur over (approximately) nine days.

Decommissioning
Based on current regulations and available technology, the preliminary decommissioning plan assumes recovery and removal of the subsea cables, with external cable protection to remain in-situ. However, the decommissioning plan will be flexible to adopt the least environmentally damaging option.

Similar vessels as used in installation will be involved but the expected rate for decommissioning the will be similar to that of the cable laying operations.

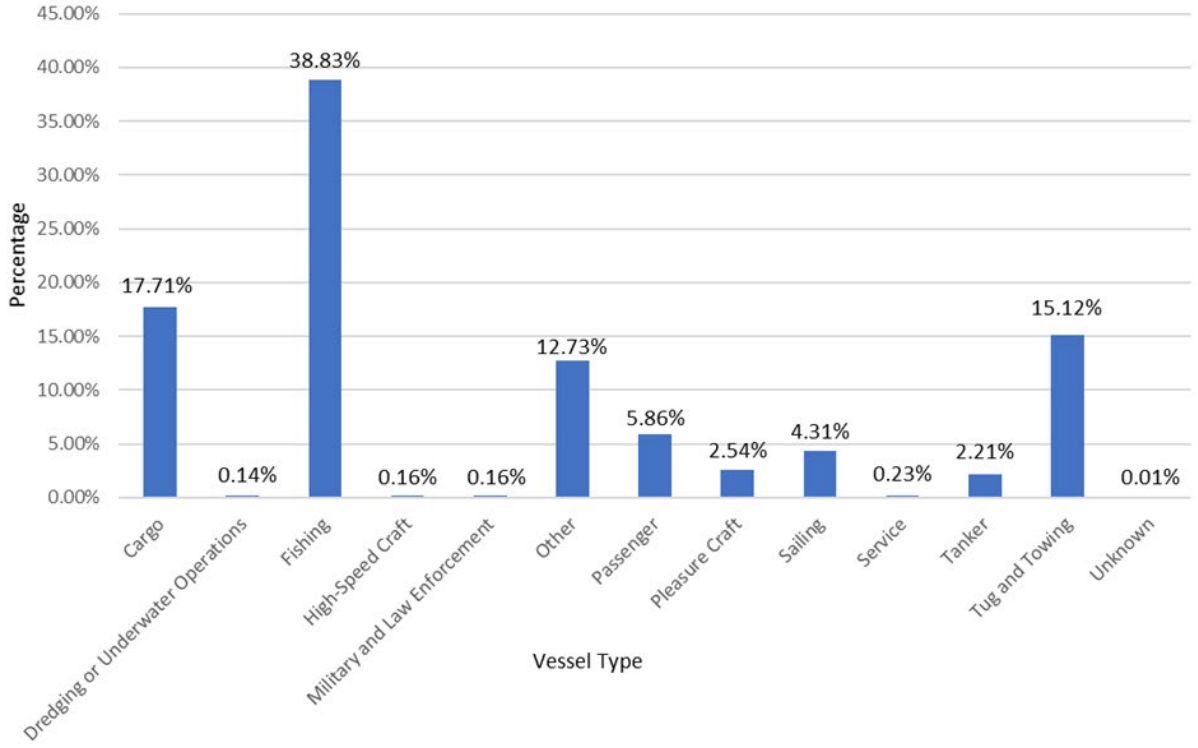
13.4 Existing Baseline Assessment

13.4.1 Shipping Overview

12 months of AIS data from Jan to December 2019 (EMODnet, 2021) were analysed across a 20km corridor to examine the types of shipping occurring near the Application Corridor and the typical patterns of vessel activity. The total average monthly vessel density can be observed in Figure 13-4 (P2442-AIS-001).

A total vessel density of over 33,000 hours per month were recorded across the Application Corridor in 2019. The distribution of the vessel categories are presented in Figure 13-2. It can be seen that a large number of fishing vessels make up the dataset (38%) while Cargo vessels make 17% and Tug and towing make up 15%.

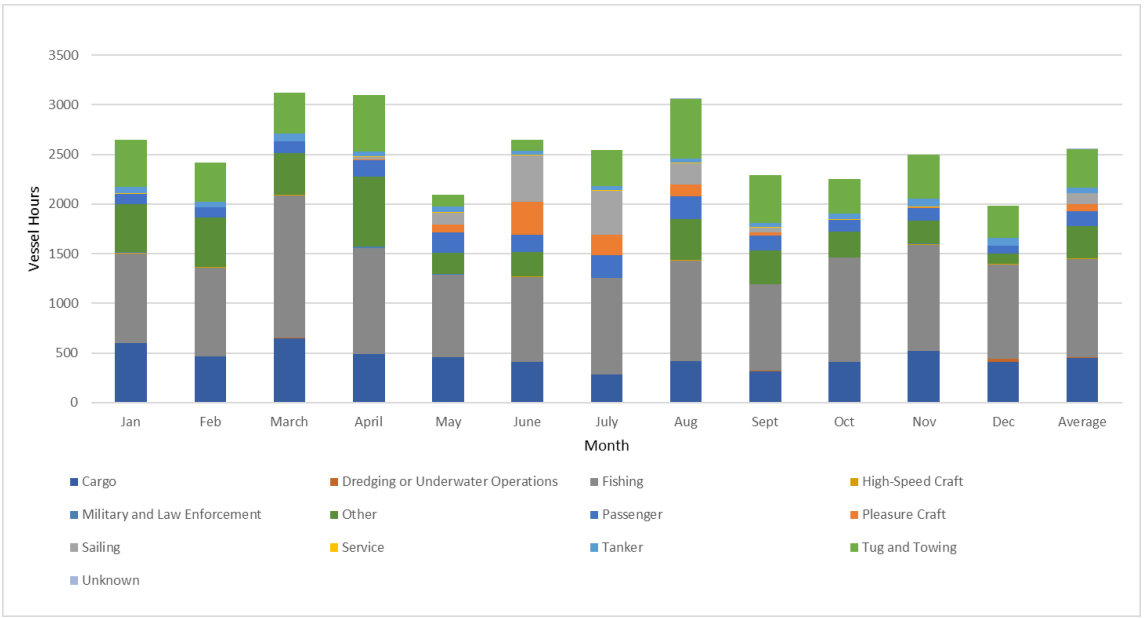
Figure 13-2 Vessel Distribution Across the Skye – Harris Route



Seasonal distribution of the vessel traffic has been analysed in full and the busiest months are observed to be March, April and August – although vessel activity is consistently above 2,000 hours per month throughout the year.

It should be noted that within the AIS dataset, July's 'other vessel' category has been included in August's dataset. This may indicate an anomaly in the AIS data sourced publicly from EMODnet. No other anomalies have been observed in this data. Figure 13-3 highlights the seasonal changes.

Figure 13-3 Seasonality Changes in Vessel Traffic Across the Skye – Harris Route



The vessel density across the Application Corridor is generally very low and between 0.5 – 2 vessel hours per month (vhpm). Low (2 – 5 vhpm) AIS intensities are observed (from KP20 to KP40) where patterns in vessel traffic can be correlated with unofficial port and shipping channels leading between Skye and Harris and also through the Minch Sea.

The highest vessel traffic can be observed between From KP25 to ~KP30 which is associated with fishing activity just offshore Harris.

Figure 13-5 (P2446-AIS-001) highlights the seasonal variation in shipping patterns across the Application Corridor.

Figure 13-4 EMODnet Shipping Density Across the Proposed Development (Ref: P2446-AIS-001)

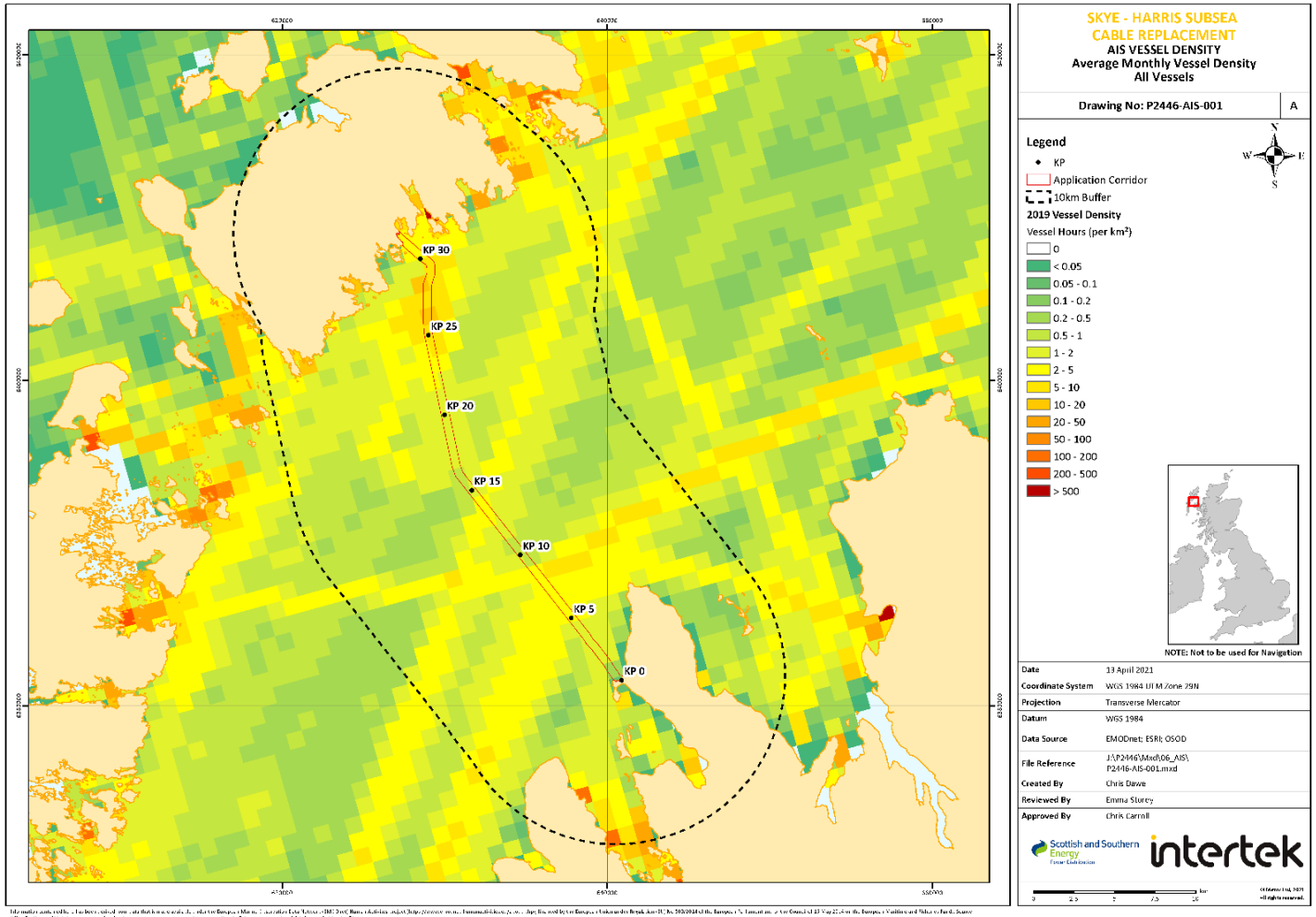
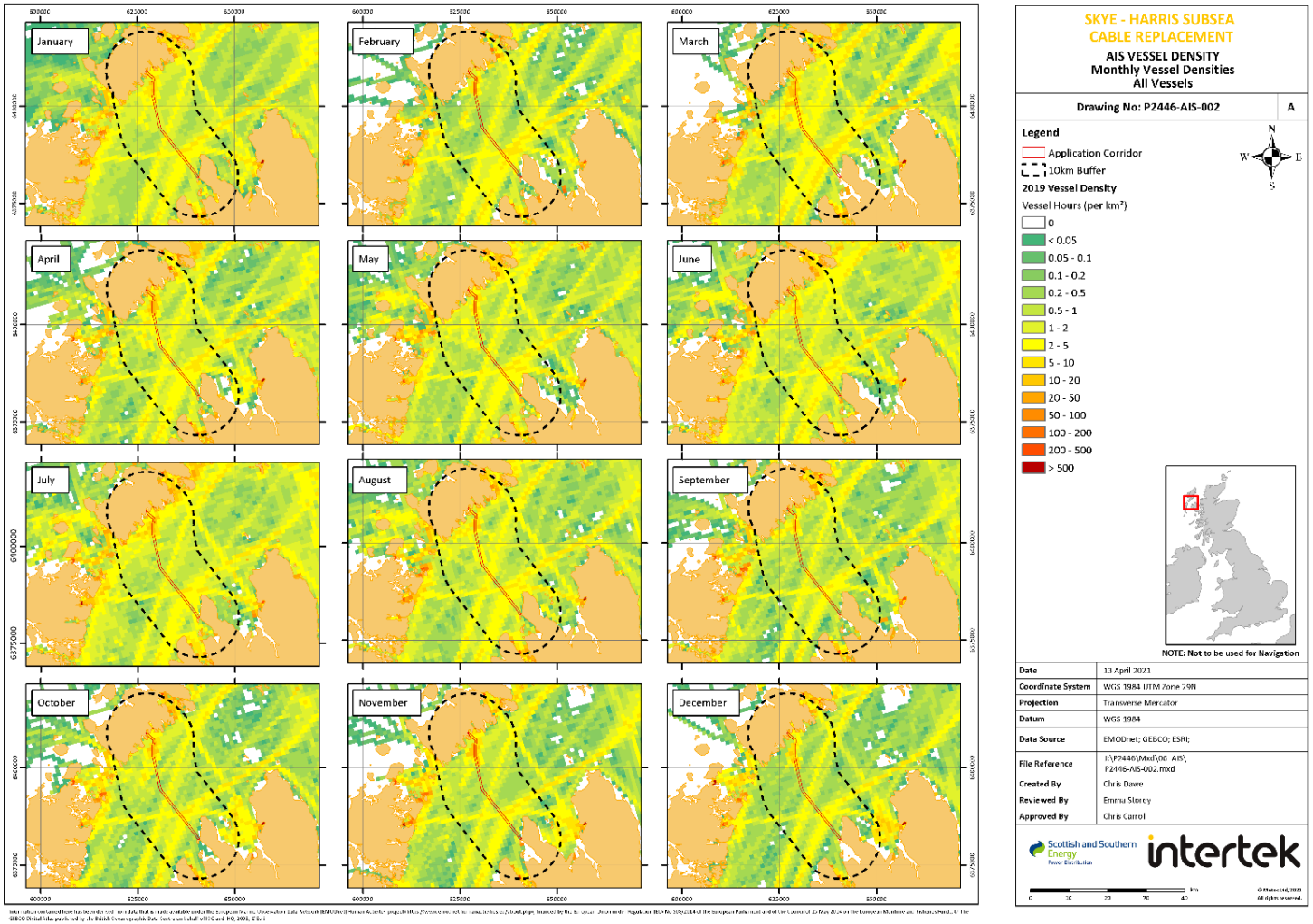


Figure 13-5 Figure 13-5Monthly EMODnet Shipping Density Across the Proposed Development (Ref: P2446-AIS-002)



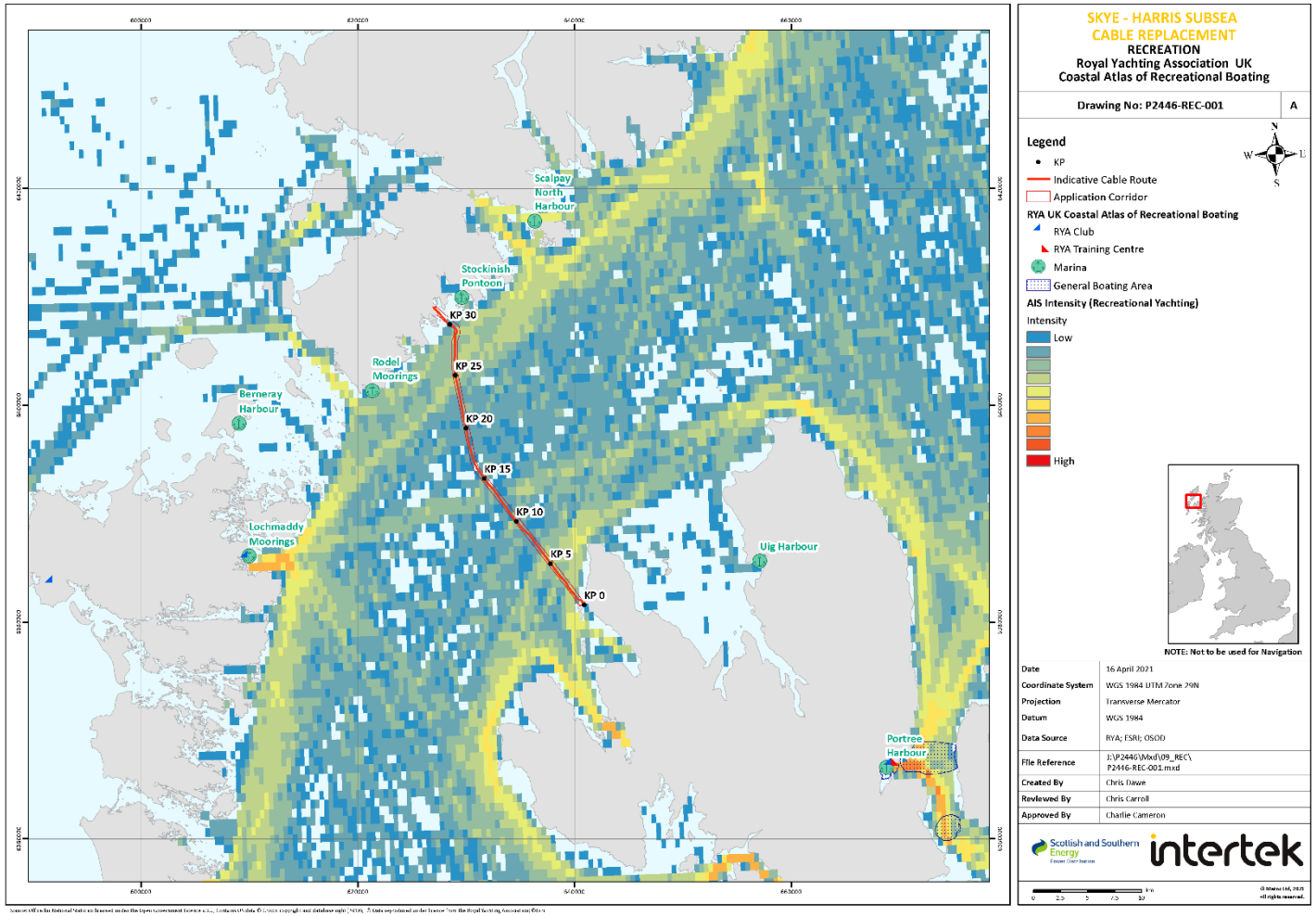
13.4.2 Navigational Features and Anchorages

No significant navigational features or official anchorages are observed within the study area.

13.4.3 Royal Yachting Association (RYA)

RYA clubs, training centres, marinas as well as the RYA AIS data and the Application Corridor are illustrated in Figure 13-6 (P2446-REC-001-A). The figure also presents a heat map of AIS data of the recreation boating activity across study area.

Figure 13-6 Recreational Boating Areas Across the Study Area (Ref: P2446-REC-001)



13.4.4 Fishing Overview

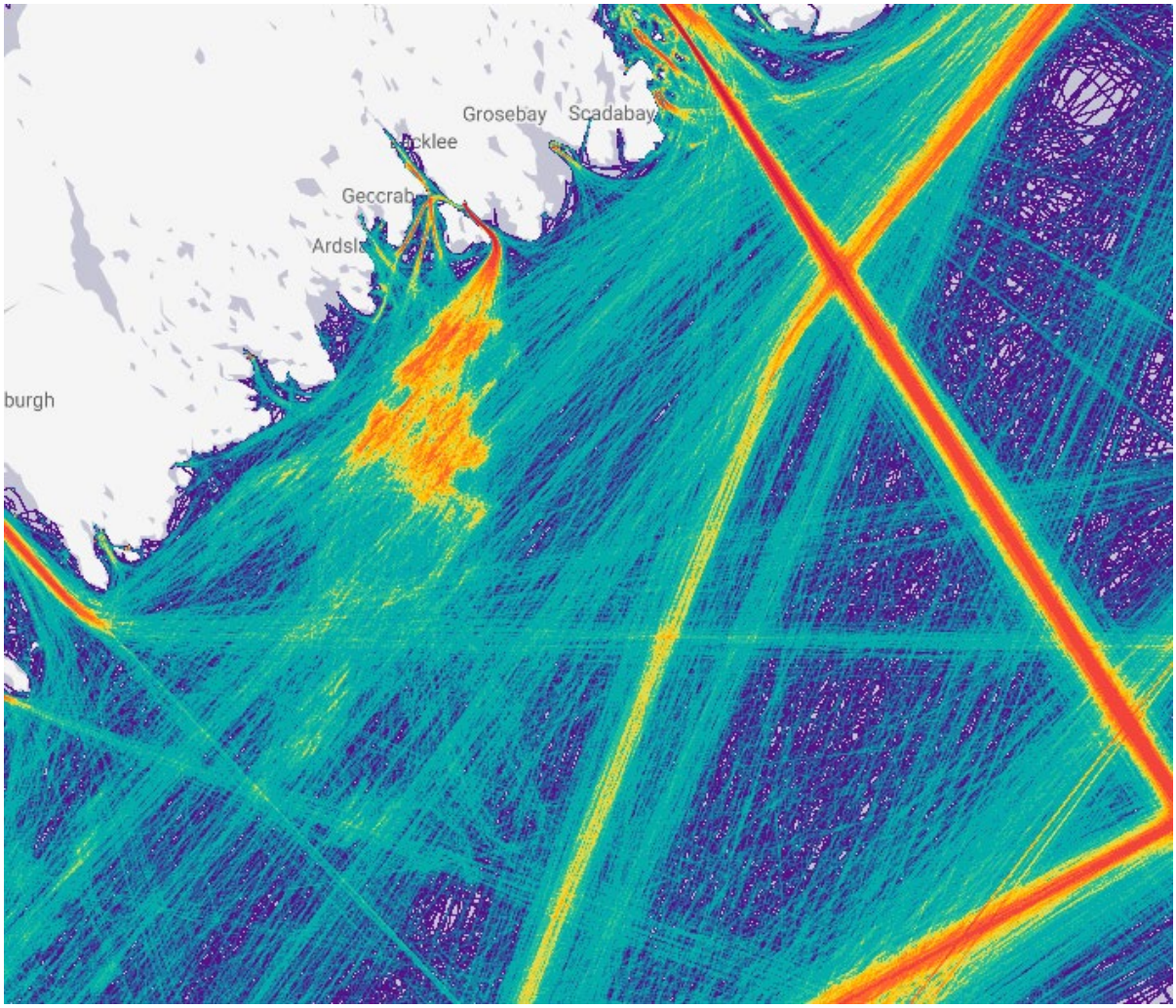
Section 12 of this report, Commercial Fishing, provides a detailed assessment of the effects that the installation/operation of the replacement cable and decommissioning of the nearshore ends of the existing cable could have on fishing within/in the vicinity of the Application Corridor.

Many different fishing gears and fishing methods are used by commercial fisheries. Each gear type is used for specific activities and different gears can have very different impacts on the marine environment and cable security.

This section has used information provided in the FLMAP (Appendix B) and vessel monitoring system (VMS)/vessel traffic data to identify the main areas of fishing in relation to the Project which may be disrupted during the offshore marine campaigns.

Fishing appears to be fairly consistent across the route with one area of intensity just offshore Harris. Figure 13-7 highlights this area shown as vessel traffic lines on marine traffic. This area is also evident within the VMS data shown as Demersal trawling in Figure 13-8 (Ref: P2442-FISH-003).

Figure 13-7 Fishing Activity Offshore Harris



Marine Traffic

By analysing the Fishing seasonality (Figure 13-9, Ref: P2442-AIS-004), it can be seen that monthly fishing activity is similar from month to month with the same high intensity, associated with trawling, observed offshore Harris (with the exception of October).

Figure 13-8 Fishing Activity Across the Study Area (Ref: P2442-FISH-003)

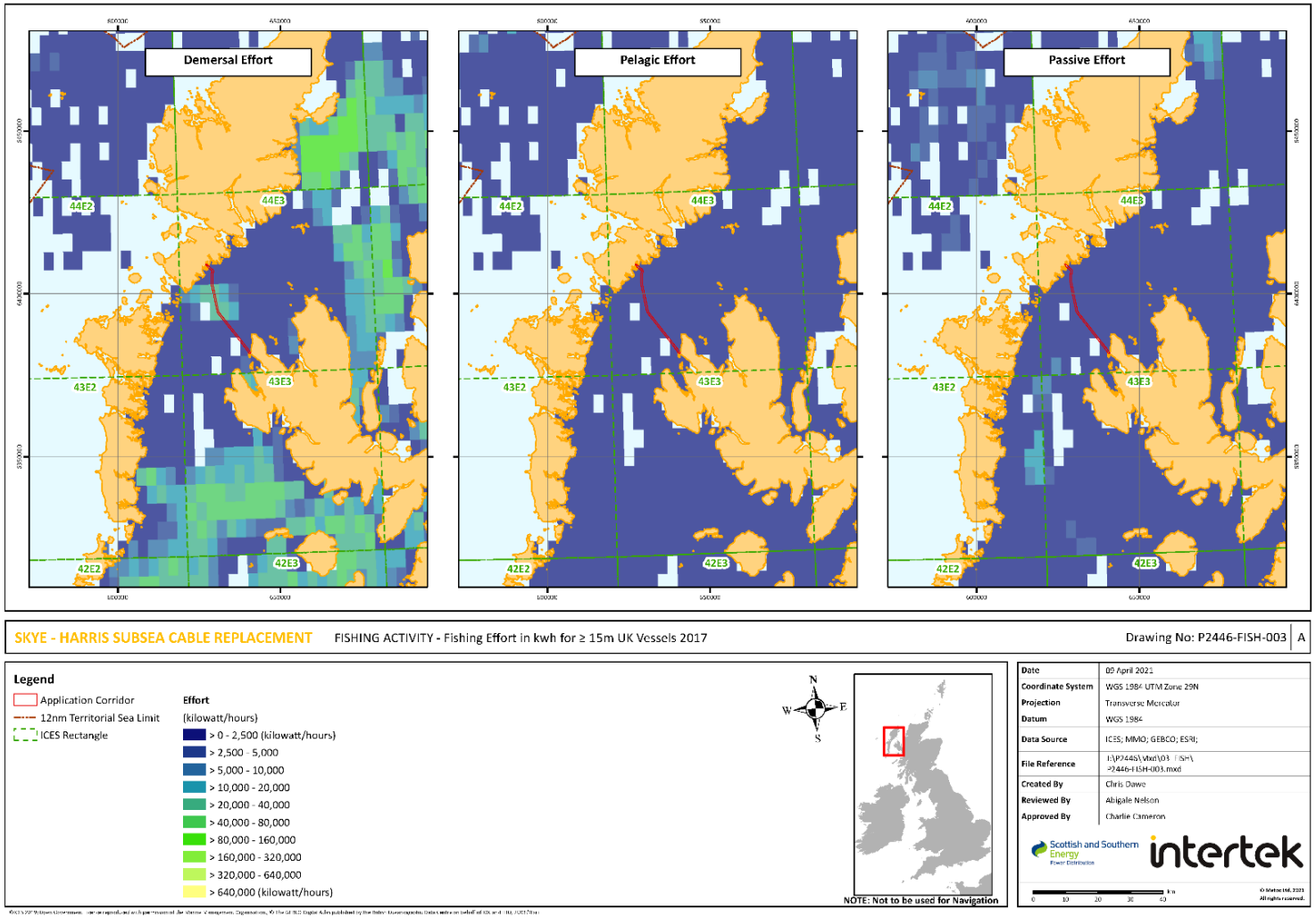
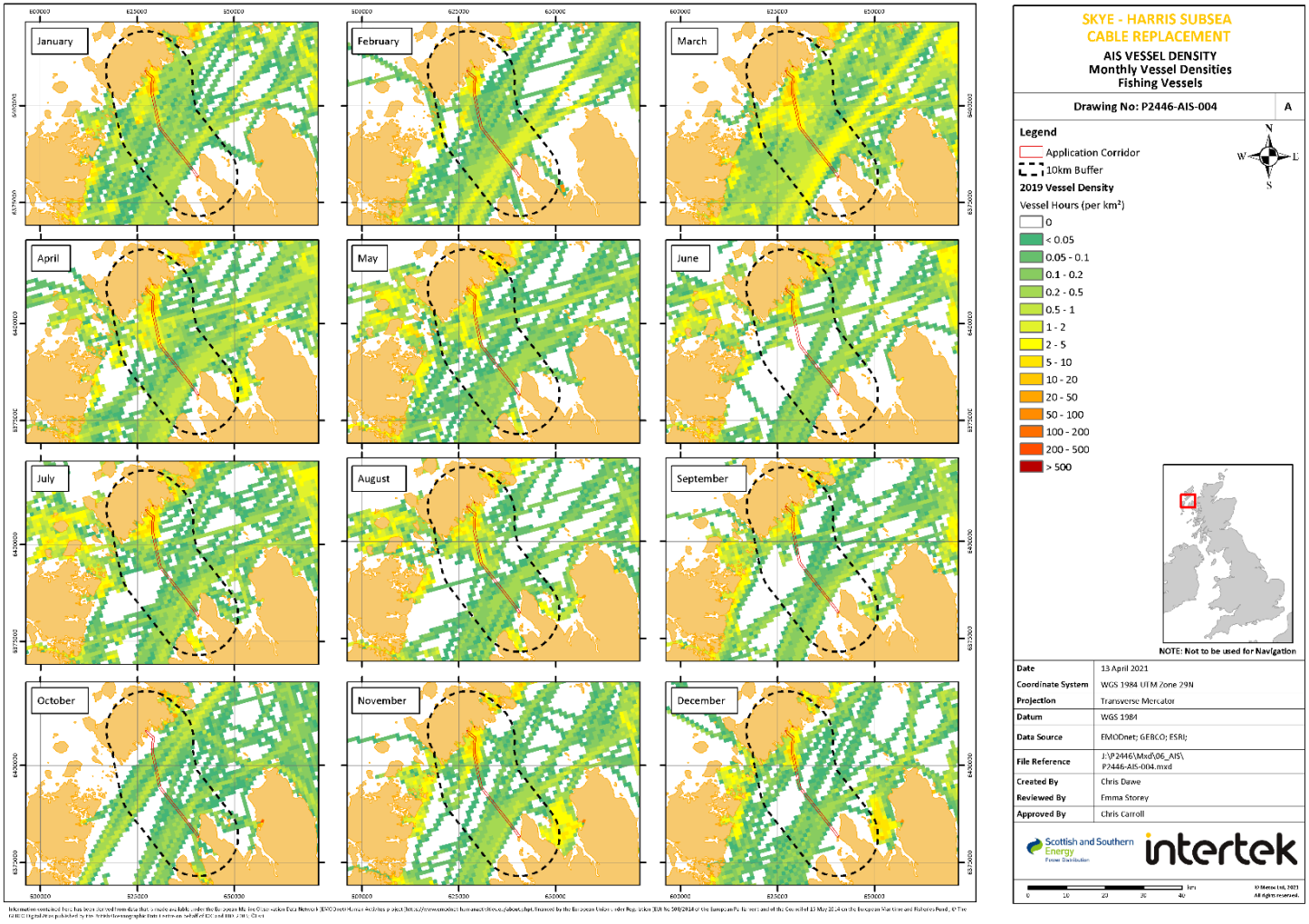


Figure 13-9 Monthly AIS Data for Fishing Vessels Across the Study Area (Ref: P2446-AIS-004)



13.4.5 Marine Accident data

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

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

13.4.5.1 RNLI

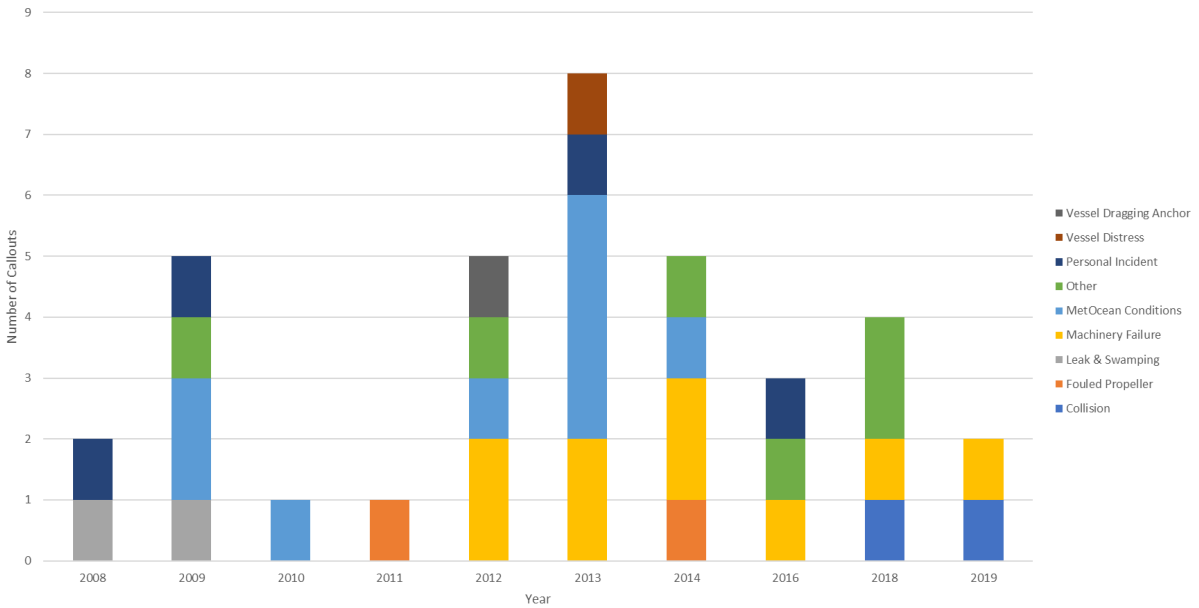
The most recent ten-year period available of RNLI data (collected between 2008 and 2019) has been plotted spatially and analysed across the study area.

The dataset is a condensed Return of Service data from RNLI callouts across the United Kingdom and the Republic of Ireland. It is worth noting that there are records present that have not been spatially adjusted to their exact locations but does give an indication of the number of marine incidences in the area (RNLI, 2021).

A total of 62 launches across the study area (all to unique incidents) were recorded by the RNLI (excluding hoaxes and false alarms). This corresponds to an average of around 6 incident per year indicating that the number of incidents in the Minch Sea is relatively low.

Incident type and corresponding years for across the study area are presented in Figure 13-10. RNLI categories that are not relevant to this assessment have assigned to the category 'other'.

Figure 13-10 RNLI Yearly Callouts

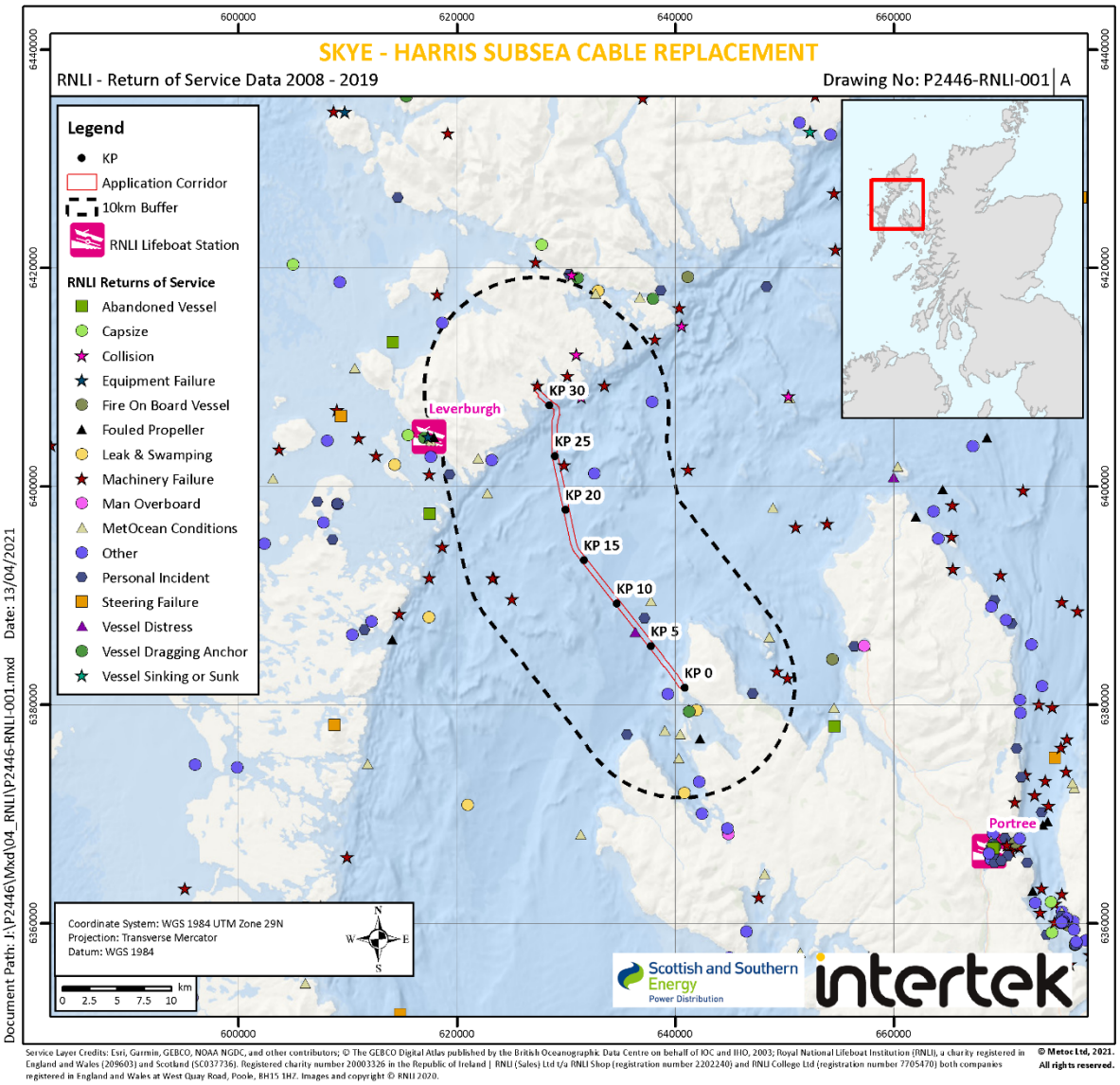


With the exception of 'other', which as mentioned above is not relevant to this assessment, it can be seen that for 'Machinery failure' and 'MetOcean Conditions' account for a large portion of the dataset Similarly, there were only two recorded collisions over the last 10 years.

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

Figure 13-11 (Ref: P2302-RNLI-001) presents the locations of incidences recorded by the RNLI.

Figure 13-11 Recorded Incidents between 2008 and 2019 (Ref: P2446-RNLI-001)



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13.4.5.2 MAIB

All UK-flagged commercial vessels are required by law to report accidents to MAIB. Non-UK flagged vessels do not have to report unless they are within a UK port/harbour or are within UK 12nm and carrying passengers to or from a UK port. However, the MAIB will always record details of significant accidents of which they are notified by bodies such as the Coastguard. The Maritime and Coastguard Agency, harbour authorities and inland waterway authorities also have a duty to report accidents to the MAIB (Gov.uk, 2021).

The last 5 years of annual MAIB reports from 2015 to 2019 have been analysed to determine if any accidents have occurred within the Minch Sea. The findings have been summarised below as:

- **2019**: Fatal man overboard from the UK registered fishing vessel May C (SY213) of Benbecula in the Outer Hebrides, Scotland.
- **2018**: No incidents or accidents relating to vessels at sea within the vicinity of the study area.
- **2017**: No incidents or accidents relating to vessels at sea within the vicinity of the study area.

- **2016**: 8th Aug – The Dutch-registered anchor handling tug *Alp Forward* lost its tow of the semisubmersible rig *Transocean Winner* west of the Outer Hebrides in severe weather. The rig grounded the next day on the north coast of the Isle of Lewis where it caused some pollution.
- 25th Sept – The ro-ro passenger vessel Hebrides grounded while approaching Lochmaddy, North Uist, Outer Hebrides. The vessel sustained damage but there were no injuries.
- **2015**: 4th Oct – A crewmember fell overboard and died from the creeler Annie T while shooting creels in the Sound of Mingulay, Barra in the Outer Hebrides.

A total of four marine incidents were reported across the study area, corresponding to an average of 0.8 incidences a year. In terms of yearly variations, this is around one incident per year and it can be seen that in 2017 and 2018, there were no incidents or accidents reported by MAIB.

It is worth noting that none of the incidents relate to a collision with other vessels so this area of the sea can be deemed relatively incident free.

13.5 Hazard Identification

Marine operations and their associated hazards have been identified and listed in Table 13-5. A hazard has been assigned to each aspect of the marine operation including the zone of influence, resulting in a worst-case assessment. The zones of influence are also presented in the table below.

Table 13-5 Marine Operations and Identified Hazards – Shipping and Navigation

Project Phase	Operation	Hazard Identified	Receptor	Zone of Influence
Route Clearance	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	1km wide x 32.256km along centreline (in any 24-hour period)
Installation	Shore End Operations (cable pull in)			1km wide x 14.4km along centreline (in any 24-hour period)
	Cable lay and burial			1km wide x 14.4km along centreline (in any 24-hour period)
	Offshore installation, post-lay inspection and burial (PLIB)			1km wide x 4.8 km long per 24-hour period.
	Surface Laid cable			1km wide x 6km along centreline (in any 24-hour period)
Operation	Additional external cable protection	▪ Additional cable protection, Rock berm and change in water depth	Commercial shipping, recreational boating, fishing vessels	Worst case external cable protection footprint: Rock Berm footprint up to max 1m high, 7.69km long and 13m wide

13.6 Risk Analysis

13.6.1 Displacement of vessels due to the avoidance of project vessels

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

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

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

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

13.6.2 Vessel collisions

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

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

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

13.6.3 Project vessels blocking navigational features

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

While the Skye – Harris route does not intersect any known anchorages some displacement of vessels may occur and consideration to existing vessels may need to be carried out for the pull in operations.

However, these effects are temporary, and the cable route does enter any port authority areas, so the probability is expected to be **Remote** but consequence **Significant.**

13.6.4 Fishing interaction with surface laid cable

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

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

A guard vessel will be used for areas of exposed cable where a risk to the asset or a danger to navigation has been identified.

During the installation phase, there will be a designated Fisheries Liaison Officer (FLO). With these services in place, there will be a FLO monitoring body present during the installation process. The

project FLO can disseminate information to the guard vessels regarding seasonal variations in fishing patterns.

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

13.6.5 Accidental anchoring on surface laid cable

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

As identified above, the project may have guard vessels during cable installation operations. Any guard vessels used will be required to possess the correct insurances and be on the approved SHEPD framework prior to their deployment.

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

13.6.6 Extreme weather conditions

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

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

13.7 Risk Assessment

In this risk assessment the hazard has been ranked by expected risk, based on the estimated frequency and consequence with no mitigation measures applied creating a 'Inherent Risk' to the project. The exercise was repeated with compliance mitigation (Table 13-6) and industry best practice (Table 13-7) measures which results in a residual risk allowing the hazards to be reduced to ALARP. No hazards more than a moderate risk are present as identified in the risk assessment.

13.7.1 Risk Control

13.7.1.1 Compliance Mitigation

The Compliance measures included in Table 13-6 below are required to be undertaken to meet environmental and health and safety legislation.

Table 13-6 Compliance Mitigation

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

13.7.1.2 Best Practice Mitigation

The Best Practice project mitigation relevant to shipping is provided in Table 13-7 below. When undertaking the assessment, it is assumed that these measures will be complied with; either as a matter of best practice or to ensure compliance with statute.

Table 13-7 Best Practice Mitigation

ID	Embedded mitigation
BP1	Early consultation with relevant contacts to notify of impending activity.
BP2	Notice to Mariners will be published to inform sea users via Notices to Mariners, Kingfisher Bulletins and MCA and UKHO. Vessels will be requested to remain at least 500m away from cable vessels during installation operations.
BP3	A guard vessel will be used for areas of exposed cable where a risk to the asset or a danger to navigation has been identified.
BP4	Appropriate cable protection to be installed as applicable along the cable route including over shallow burial areas 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 500m of the cable.
BP8	If cables are buoyed off whilst the vessel departs the area, buoy positions will be notified to the NTM distribution list including Kingfisher and 500m clearance will be requested.

13.8 Risk Assessment

Table 13-8 presents the risk assessment conducted on the marine operations and associated hazards. All hazards have reached a risk level tolerable to the project through the ALARP process.

Navigation Risk Assessment **Cable Route: Skye - Harris**

Risk Assessment: Operation	Hazard	Inherent Risk							Risk Mitigation	Residual Risk						
		Frequency	Consequence			Risk Rating				Frequency	Consequence			Risk Rating		
			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)			Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)	Effect on Human Safety	Effect on Ship(s)	Displacement of Vessel(s)
Route Clearance	Presence of Project vessels	3	1	1	2	3	3	6	COMP1, BP1, BP2, BP3, BP5 BP6, BP11	3	1	1	1	3	3	3
	Vessel collision	2	5	5	3	10	10	6		1	5	5	2	5	5	2
	Project vessels blocking navigational features	3	1	1	2	3	3	6		1	1	1	1	1	1	1
	Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
Shore end Operations	Presence of project vessels	4	1	1	3	4	4	12	COMP1, BP1, BP2, BP3, BP5 BP6, BP7, BP11	4	1	1	2	4	4	8
	Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
	Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
	Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	1	2	2	1
	Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
	Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
Cable Lay and Burial	Presence of Project vessels	3	1	1	3	3	3	9	COMP1, COMP3, BP1, BP2, BP3, BP5 BP6, BP7, BP11	3	1	1	1	3	3	3
	Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
	Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
	Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
	Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
	Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
Post Lay Inspection and Post Lay Burial	Presence of project vessels	3	1	1	3	3	3	9	COMP 1, COMP3, BP1, BP2, BP3, BP5 BP6 BP7, BP11	2	1	1	2	2	2	4
	Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
	Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
	Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	1	2	2	1
	Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
	Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
Surface Lay	Presence of project vessels	4	1	1	3	4	4	12	COMP1, COMP3, BP1, BP2, BP3, BP4 BP5 BP6, BP7, BP11	4	1	1	2	4	4	8
	Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
	Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
	Fishing interaction with Surface laid cable	3	2	2	2	6	6	6		1	2	2	2	2	2	2
	Accidental anchoring on surface laid cable	3	2	2	2	6	6	6		1	2	2	2	2	2	2
	Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
Additional External Cable Protection (where burial is not achieved)	Presence of project vessels	3	1	1	3	3	3	9	COMP1, COMP3, BP1, BP2, BP3, BP4 BP5 BP6, BP7, BP11,	2	1	1	2	2	2	4
	Vessel collision	2	5	5	4	10	10	8		1	5	5	3	5	5	3
	Project vessels blocking navigational features	3	1	1	3	3	3	9		2	1	1	2	2	2	4
	Fishing interaction with Surface laid cable	2	2	2	2	4	4	4		1	2	2	1	2	2	1
	Accidental anchoring on surface laid cable	2	2	2	2	4	4	4		1	2	2	2	2	2	2
	Extreme weather conditions	2	2	2	2	4	4	4		2	1	1	1	2	2	2
	Change in water depth	1	2	2	2	2	2	2		1	2	2	1	2	2	1

13.9 Conclusion

The overall vessel density across the Application Corridor is generally consistent across the Minch Sea and observed to be very low (0.2-2 vhpm) with localised areas of low (2-5 vhpm) density associated with shipping patterns related to unofficial shipping lanes, likely used by ferries, cargo/tanker and fishing vessels leaving and entering ports.

The intensity of recreational boating is also very low across the Application Corridor with a slight increase in intensity associated with the coastal areas as a result of being confined to shorter journeys between ports and harbours. The Application Corridor does not cross any official Traffic Separation Schemes nor interfere with significant navigational features.

Fishing across the Minch Sea is observed to be consistent throughout the year (as evident in vessel landing and AIS data) and one area of trawling, offshore Harris is observed to be a consistent area of increased fishing activity which may interact with some elements of the marine campaign works.

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

14. UXO AND EXISTING UTILITIES

14.1 Introduction

This section details the potential for unexploded ordnance (UXO) to be encountered within the Application Corridor as well as providing information on other existing utilities and infrastructure and the impacts that cable installation and decommissioning activities may have on them.

14.2 Data Sources

A separate report 'Skye to Harris: Background Information & Preliminary UXO Risk Assessment' (Hydrofix, 2021) has been used to inform the UXO baseline description. Data sources for existing utilities and other infrastructure located within/in the vicinity of the Application Corridor included:

- Marine Projects – Marine Scotland Information (Marine Scotland, 2021a); and
- KIS-ORCA: Marine cables information (KIS-ORCA, 2021).

14.3 Baseline and receptor identification

14.3.1 UXO Risk

A preliminary UXO risk assessment (Hydrofix, 2021) identified three sources of UXO risk in the vicinity of the Application Corridor as detailed in Table 14-1.

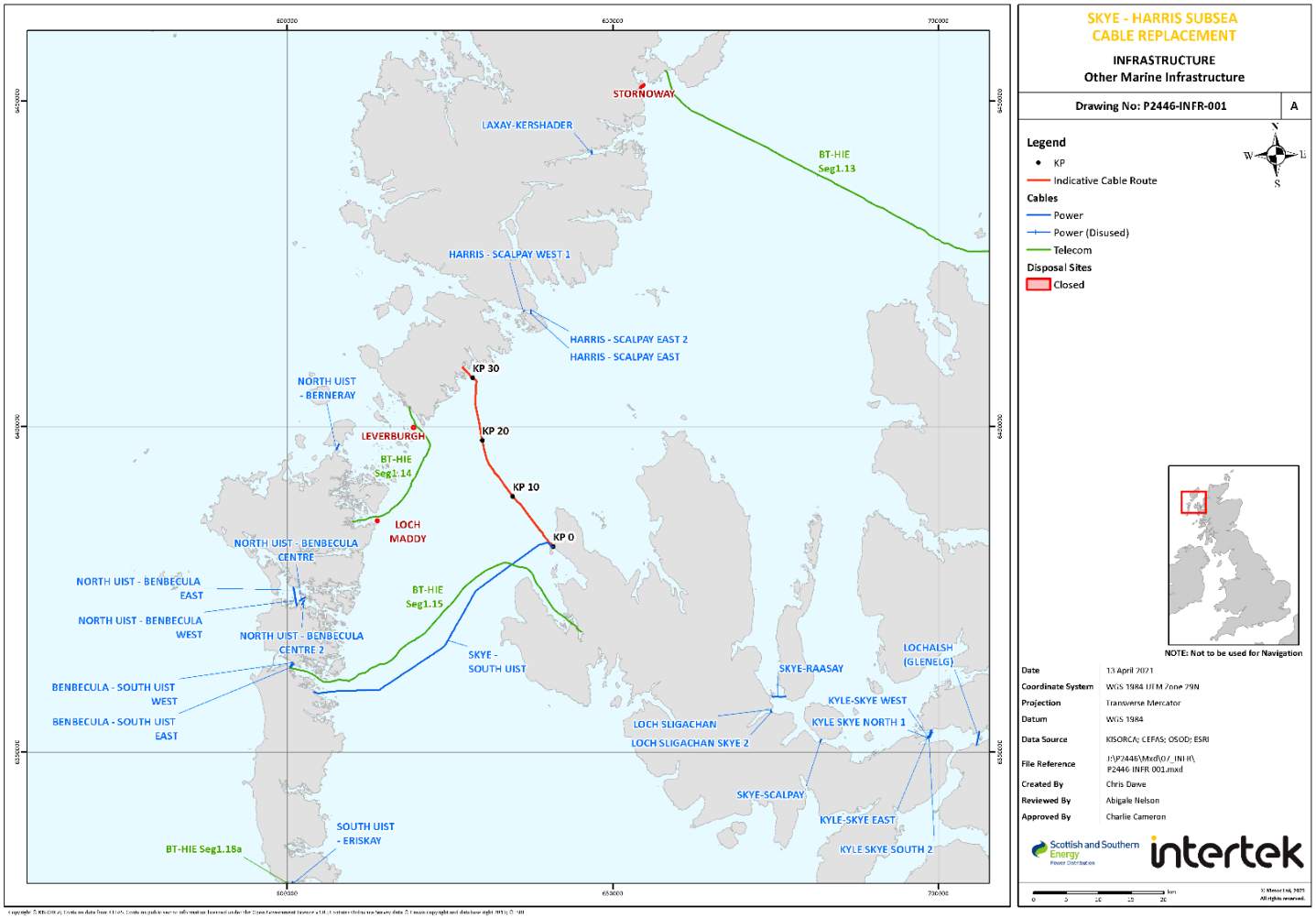
Table 14-1 Identified potential UXO risk (Hydrofix, 2021

UXO Source	Summary
Maritime Practice and Exercise Areas (PEXA'S)	The cable route is located within two PEXA locations X5725 Hermitray to the east and X5732 Waternish to the west. Neither of these exercise areas are defined as danger areas.
Wreck with Potential UXO Hazard	Two wrecks have been identified within a 5km distance from the cable route. Both are detailed as Army Landing Craft and having sunk in 1953. The British Army operated large Tank Landing craft to sea dump surplus munitions post World War Two. The nearest munitions disposal site is located in Loch Snizort 53km to the south east of the cable route.
WW1 German Sea Mining Activity	Sea mining activity has been identified at three locations in the channel between the Isle of Skye and the Outer Hebrides. None are located within a 5km distance but are located to the north, north east and south of the cable route. This activity is listed here to allow inclusion for potential munitions migration.

14.3.2 Existing utilities and other infrastructure

As shown in Figure 14-1 (Ref: P2446-INFR-001) below, the Application Corridor does not cross any other subsea cable infrastructure along the route. The closest cable is that of the Skye-South Uist power cable, which makes landfall on Skye to the east of the replacement Skye-Harris cable.

Figure 14-1 Marine infrastructure (P2446-INFR-001)



There are no current or planned oil, gas or offshore renewable infrastructure projects located within/in the vicinity of the Application Corridor. The Application Corridor is not located within any areas identified by the recently published Sectoral Marine Plan for Offshore Wind Energy for offshore wind leasing (Scottish Government, 2020).

14.4 Impact Assessment

While the preliminary UXO desktop assessment did not definitively identify any UXO sources within the Application Corridor, it concluded that there is a potential risk of encountering UXO on this site. Interactions with UXO could occur directly through installation activities such as pre-lay grapnel runs, trenching activities and placement of cable protection measures, or indirectly through cable movement on the seabed. In order to reduce the potential of encountering UXO within the Application Corridor, the following best practice and mitigation measures will be employed:

- Live footage viewing during cable installation will be conducted to ensure no UXO are present within the installation corridor.
- Cable protection (i.e. burying, rock placement) will prevent cable movement on the seabed.
- Implement the Crown Estate's 'Protocol for Archaeological Discoveries' (The Crown Estate, 2014) in the result of accidental discovery of UXO.

Through the implementation of these measures and existing data indicating the lack of any UXO with the Application Corridor, the risk of encountering UXO during installation/decommissioning activities will be negligible.

14.5 Conclusion

While there exists the potential for UXO to be present within the Application Corridor, through the implementation of the mitigation measures outlined above and existing data indicating the lack of any UXO with the Application Corridor, the risk of encountering UXO along the route will be negligible. There does not exist any current or future utilities or infrastructure within/in the vicinity of the Application Corridor that could be adversely affected by installation activities. Therefore, this assessment concludes that cable installation and decommissioning activities will not result in any adverse effects to UXO or existing utilities or infrastructure.

15. CONCLUSION

This MEA supports the Marine Licence Application being submitted on behalf of SHEPD for activities associated with installation of the replacement cable between Skye and Harris, and the decommissioning of nearshore sections of the existing cable installation. An assessment of the potential impacts of the cable installation/decommissioning activities on sensitive receptors was undertaken in Sections 5 – 14. Table 15-1 below provides a summary of these assessment findings. As a result of the findings of the above assessment, along with the embedded mitigation and best practice measures detailed in Section 4.2, it can be concluded that activities associated with installation of the replacement cable and decommissioning of the nearshore sections of the existing cable will not result in any significant effect on any relevant receptor.

Table 15-1 Assessment summary

Environmental receptor	Assessment Outcome	Additional Mitigation (where required)	Overall LSE / Impact Significance
Designated Sites (Section 5)	This assessment concluded that installation and decommissioning activities associated with the cable replacement will not adversely affect the conservation objectives of any designated sites within or in the vicinity of the Application Corridor, and that an Appropriate Assessment (AA) will not be required. Any disturbance caused by the installation of the replacement cable and decommissioning of the nearshore section of the existing cable will be minor and temporary due to their short-term, localised and transient nature. No LSE will occur as a result of installation/decommissioning activities.	N/A	**No LSE**
Physical Environment (Section 6)	The above assessment has demonstrated that installation and decommissioning activities associated with the cable replacement will not adversely affect the physical environment within or in the vicinity of the Application Corridor. Any sediment dispersion resulting from installation/decommissioning activities will predominantly settle within the immediate vicinity of such activities, with finer particles being dispersed to imperceptible levels in the water column through associated tidal and wave action.	N/A	**Not significant**
Marine Megafauna (Section 7)	Theis assessment concluded that installation and decommissioning activities associated with the cable replacement will not adversely affect any cetacean, pinniped or otter within or in the vicinity of the Application Corridor. Any disturbance caused by the	▪ If an otter shelter is discovered at the landfall nearshore areas, a protection zone with a minimum of 30 m radius will be set up and will be clearly demarcated/fenced off.	**Not significant**

Environmental receptor	Assessment Outcome	Additional Mitigation (where required)	Overall LSE / Impact Significance
	installation of the replacement cable and decommissioning of the nearshore section of the existing cable will be minor and temporary due to their short-term, localised and transient nature.		
Benthic and Intertidal Ecology (Section 8)	This assessment concluded that installation and decommissioning activities associated with the cable replacement will not significantly affect the benthic and intertidal ecology in the vicinity of the Application Corridor. Any impacts on the habitats and species within the Application Corridor will be temporary and localised. Micro-routing of the installation corridor will be undertaken to (where possible) avoid sensitive habitats and species to ensure they are not significantly affected by the installation activities.	▪ Micro-routing will be used to avoid sensitive species/habitats, e.g. sea pen and burrowing megafauna communities and maerl beds. ▪ Rock placement and articulated pipe will be minimised in areas identified as potential Annex I reef habitat and the footprint of the deposits will be the minimum required to ensure cable safety and stability.	**Not significant**
Ornithology (Section 9)	The proposed replacement cable installation and decommissioning of the nearshore sections of the existing cable will not result in any adverse effects on sensitive ornithological receptors. No significant disturbance to sensitive ornithological receptors will occur due to the temporary and localised nature of the installation and decommissioning activities.	N/A	**Not significant**
Marine Archaeology (Section 10)	The pre-lay geophysical survey works identified the potential presence of features of archaeological significance within the Application Corridor. This is in addition to a review of publicly available data indicating the potential presence of an 18th century wreck within the Application Corridor, close to the Skye landfall site. As such, it cannot be ruled out that cable installation and decommissioning works	▪ All wrecks or features of archaeological significance will be avoided by a buffer of ≥50 m during detailed route design; ▪ The locations of wrecks and features of archaeological significance will be identified on electronic charts onboard the installation vessel and will be utilised to guide installation operations; and	**Not significant**

Environmental receptor	Assessment Outcome	Additional Mitigation (where required)	Overall LSE / Impact Significance
	will not have a significant adverse effect on features of archaeological significance. Through the implementation of the mitigation measures detailed above and in Section 4.2: Mitigation Requirements however, damage or loss of any archaeological features will be avoided. Therefore, this assessment concludes that cable installation and decommissioning activities will not result in any adverse effects to features of archaeological significance.	▪ The locations of any wrecks or features of archaeological significance will be provided to Historic Environment Scotland and the UK Hydrographic Office (UKHO). ▪ The Crown Estate's 'Protocol for Archaeological Discoveries' (The Crown Estate, 2014) will be implemented during installation works.	
Fish and Shellfish (Section 11)	Spawning and nursery ground habitat for fish species will not be significantly reduced due to the minimal extent of cable protection measures that will be utilised across the Application Corridor and minimal baseline usage of the area as a spawning and nursery ground by fish species. Basking shark or other noise-sensitive species will not be significantly disturbed by the presence of installation vessels or sound generated by installation activities due to their short-term and transient nature. As such, there will be no significant impact to fish and shellfish.	N/A	**Not significant**
Commercial Fisheries (Section 12)	This assessment concluded that installation and decommissioning activities associated with the cable replacement will not significantly affect commercial fishing interests within or in the vicinity of the Application Corridor. Any loss of access to fishing grounds caused by the installation of the replacement cable and decommissioning of the nearshore section of the existing cable will be minor	N/A	**Not significant**

Environmental receptor	Assessment Outcome	Additional Mitigation (where required)	Overall LSE / Impact Significance
	and temporary due to their short-term, localised and transient nature. Aquaculture sites will not be affected by the installation and decommissioning activities due to low levels of sediment disturbance from installation and the distance of the nearest aquaculture sites from the Application Corridor.		
Shipping and Navigation (Section 13)	The overall vessel density across the Application Corridor is generally consistent across the Minch Sea and observed to be very low (0.2-2 Vessel Hours Per Month (vhpm)) with localised areas of low (2-5 vhpm) density associated with shipping patterns related to unofficial shipping lanes, likely used by ferries, cargo/tanker and fishing vessels leaving and entering ports. The intensity of recreational boating is also very low across the Application Corridor with a slight increase in intensity associated with the coastal areas as a result of being confined to shorter journeys between ports and harbours. The Application Corridor does not cross any official Traffic Separation Schemes nor interfere with significant navigational features. Fishing across the Minch Sea is observed to be consistent throughout the year (as evident in vessel landing and AIS data) and one area of trawling, offshore Harris is observed to be a consistent area of increased fishing activity which may interact with some elements of the marine campaign works. The risk assessment has identified that all identified hazards have been reduced to ALARP and, with the relevant best practice measures applied, no hazards	▪ Early consultation with relevant contacts to notify of impending activity. ▪ 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 500m away from cable vessels during installation operations. ▪ A guard vessel will be used for areas of exposed cable where a risk to the asset or a danger to navigation has been identified. ▪ Appropriate cable protection to be installed as applicable along the cable route including over shallow burial areas if required. ▪ 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. ▪ The UKHO will be informed of installation activities in order to issue Maritime Safety Information (MSI) broadcasts as appropriate. ▪ 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 500m of the cable.	**Not significant**

Environmental receptor	Assessment Outcome	Additional Mitigation (where required)	Overall LSE / Impact Significance
	exist that are above a moderate risk level. The greatest risk to the existing baseline has been assessed as vessel collision, either by project vessels interacting with the existing shipping or vice versa, however due to all vessels operating in compliance with COLREGs the frequency has been assessed as extremely remote, lowering the overall risk rating.	▪ If cables are buoyed off whilst the vessel departs the area, buoy positions will be notified to the NTM distribution list including Kingfisher and 500m clearance will be requested.	
UXO and Existing Utilities (Section 14)	While there exists the potential for UXO to be present within the Application Corridor, through the implementation of the mitigation measures outlined above and existing data indicating the lack of any UXO with the Application Corridor, the risk of encountering UXO along the route will be negligible. There does not exist any current or future utilities or infrastructure within/in the vicinity of the Application Corridor that could be adversely affected by installation activities. Therefore, this assessment concludes that cable installation and decommissioning activities will not result in any adverse effects to UXO or existing utilities or infrastructure.	▪ Live footage viewing during cable installation will be conducted to ensure no UXO are present within the installation corridor.	**Not significant**

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APPENDIX A

Project Description

APPENDIX B

Fisheries Liaison Mitigation Action Plan

APPENDIX C

European Protected Sites and Species Risk Assessment

APPENDIX D

Construction Environmental Management Plan

APPENDIX E

Pre-Application Consultation Report

APPENDIX F

Operations Inspection Maintenance and Decommissioning Plan