Scottish Hydro Electric Power Distribution plc

Sanday-North Ronaldsay Replacement Marine Licensing Support

Marine Environmental Assessment

ASSIGNMENT A200853-S00
DOCUMENT A-200853-S00-A-REPT-001

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ABBREVIATIONS

TERM	DEFINITION
%	Percent
AA	Appropriate Assessment
AC	Alternating Current
AIS	Automatic Identification System
ADCP	Acoustic Doppler Current Profiler
ALARP	As Low as Reasonably Practicable
BEIS	Department of Business, Energy and Industrial Strategy
BSL	Benthic Solutions Limited
BWM	Ballast Water Management
CBA	Cost Benefit Analysis
CEMP	Construction Environmental Management Plan
CLMP	Cable Lay and Monitoring Plan
CLV	Cable Lay Vessel
CPMP	Cable Protection and Monitoring Plan
dB	Decibel
DC	Direct Current
DDM	Degrees and Decimal Minutes
DDV	Drop Down Video
DSV	Dive Support Vessel
EC	European Community
ECoW	Ecological Clerk of Works
EDR	Effective Deterrent Range
EEC	European Economic Community
EMF	Electromagnetic Fields
EPS	European Protected Species
EU	European Union
EUNIS	European Union Nature Information System

TERM	DEFINITION
FCS	Favourable Conservation Status
FIR	Fishing Industry Representative
FLMAP	Fisheries Liaison Mitigation Action Plan
FLO	Fisheries Liaison Officer
FO	Fibre Optic
FSA	Formal Safety Assessment
GEN	Genera Policy
GMF	Geomagnetic Field
GVI	General Visual Inspection
ha	Hectare
HES	Historic Environment Scotland
HF	High Frequency
HLNRA	High Level Navigational Risk Assessment
HMPA	Historic Marine Protected Area
HRA	Habitats Regulations Appraisal
HVAC	High Voltage Alternating Current
HWDT	Hebridean Whale and Dolphin Trust
IAMMWG	Inter-Agency Marine Mammal Working Group
IMO	International Maritime Organization
INNS	Invasive Non-Native Species
IRPCS	International Regulations for the Prevention of Collision at Sea
ITAW	Institute for Terrestrial and Aquatic Wildlife Research
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
KIS-ORCA	Kingfisher Information Service – Offshore Renewable and Cable Awareness
kHz	kilohertz
km	Kilometre
kV	Kilovolt
LF	Low Frequency
LSE	Likely Significant Effect
m	Metre
MarLIN	Marine Life Information Network

TERM	DEFINITION
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-Beam Echosounder
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate – Licensing Operations Team
MEA	Marine Environmental Appraisal
MEPC	Marine Environmental Protection Committee
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MLA	Marine Licence Application
MLWS	Mean Low Water Springs
µPA	Micro Pascal
MPA	Marine Protected Area
µT	Micro Tesla
MTS	Marine Traffic Study
NCMPA	Nature Conservation Marine Protected Area
NM	Nautical Mile
NMFS	National Marine Fisheries Service
NMPi	National Marine Plan Interactive
NOAA	National Oceanic and Atmospheric Administration
NSA	National Scenic Area
NtM	Notice to Mariners
OCT	Open Cut Trench
OIMD	Operation, Inspection, Maintenance and Decommissioning
OoS	Out of Service
OREI	Offshore Renewable Energy Installations
PAD	Protocol for Archaeological Discoveries
RCZ	Recommended Clearance Zone
PLGR	Pre-Lay Grapnel Run
PMF	Priority Marine Feature
ROV	Remotely Operated Vehicle
PW	Phocid Carnivores in Water
RYA	Royal Yachting Association
SAC	Special Area of Conservation

TERM	DEFINITION
SBP	Sub Bottom Profiler
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SCOS	Special Committee on Seals
ScotMER	Scottish Marine Energy Research
SEPA	Scottish Environment Protection Agency
SHEPD	Scottish Hydro Electric Power Distribution plc
SMWWC	Scottish Marine Wildlife Watching Code
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plans
SPA	Special Protection Area
SPL	Sound Pressure Level
SSEN	Scottish and Southern Electricity Networks
SSS	Side-Scan Sonar
SSSI	Site of Special Scientific Interest
t	Tonne
TJP	Transition Joint Pit
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
USBL	Ultra Short Baseline
UXO	Unexploded Ordnance
VHF	Very High Frequency
WCA 1981	Wildlife and Countryside Act 1981
WEWS	Water Environment and Water Services
WFD	Water Framework Directive

1 INTRODUCTION

Scottish Hydro Electric Power Distribution plc (SHEPD) holds a licence under the Electricity Act 1989 for the distribution of electricity in the north of Scotland including the Islands. It has a statutory duty to provide an economic and efficient system for the distribution of electricity and to ensure that its assets are maintained to provide a safe, secure and reliable supply to customers.

In February 2026 SHEPD identified a fault within the subsea cable connecting Sanday to North Ronaldsay in Orkney. An initial solution was trialled to reconfigure the faulted circuit, but this too faulted soon after, making this an unviable option for repair. After a subsequent options evaluation, the recommended approach is to carry out a full replacement of the faulted cable. The proposed cable replacement ('the Project') will involve the installation of a new 11 kilovolt (kV) subsea cable, associated cable stabilisation and protection and removal of the faulted cable at both shore ends and in subtidal sections. Installation of this cable is required to replace the existing faulted cable and restore a grid connection to the community on North Ronaldsay. Mobile diesel generation is currently being utilised to provide power to customers on a temporary basis, however, this is logically challenging and as such, an urgent replacement is required. The proposed cable and nearshore tubular cable protection system installation activities are currently planned to take place in Autumn 2026, with subsequent installation of cable protection/stabilisation in Spring / Summer 2027.

The proposed replacement cable will be approximately 11 kilometres (km) long (including 5% contingency) from Transition Joint Pit (TJP) to TJP, and will be located within a proposed cable corridor in the vicinity of the existing faulted cable. This Marine Environmental Appraisal (MEA) covers the proposed cable installation activities between Mean High Water Springs (MHWS) to MHWS. The proposed replacement cable is approximately 10.4 km long, from MHWS to MHWS. The proposed cable corridor extends between the Bay of Sandquoy on Sanday and South Bay on North Ronaldsay (Figure 1-1). The final cable route has not yet been determined. Therefore, to provide flexibility for final route engineering, a cable installation corridor with a total area of 9.2 km^2 is proposed. The final route selection will be based on further preinstallation surveys and detailed design parameters, while taking environmental and engineering constraints into account.

This MEA provides an assessment of the potential environmental impacts which may result from the Project and will be used to inform the Marine Licence, European Protected Species (EPS) Licence and Basking Shark Derogation Licence applications. The mitigation requirements identified by this MEA will be included in the accompanying Marine Construction Environmental Management Plan (CEMP) (Document Reference: A-200853-S00-A-PLAN-001) to ensure they are effectively disseminated to and implemented by SHEPD and the cable installation contractor during the proposed cable installation activities.

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

- Sanday – North Ronaldsay Project Description (Document Ref: A-200853-S00-A-REPT-002);
- Marine Licence Application (MLA) Form;
- Inshore European Protected Species (EPS) Licence Application Form;
- Basking Shark Derogation Licence Application Form;
- Marine Construction Environmental Management Plan (CEMP) (Document Ref: A-200853-S00-A-PLAN-001);
- High Level Navigational Risk Assessment (NRA) (Document Ref: A-200853-S00-A-REPT-003);
- North Coast and Orkney Fisheries Liaison Mitigation Action Plan (FLMAP);
- How SHEPD co-exists with other marine users document[1];

[1] *https://www.ssen.co.uk/globalassets/about-us/projects-and-live-works/subsea-cables/how-shepd-co-exists-with-other-marine-users.pdf.*

- Operation, Inspection, Maintenance and Decommissioning Strategy (OIMD); and
- Cost Benefit Analysis (CBA) Summary Report.

A Cable Lay and Monitoring Plan (CLMP) (*applicable to the 2026 cable installation campaign*) and a Cable Protection and Monitoring Plan (CPMP) (*applicable to the 2027 cable protection installation campaign*) will also be produced to detail the installation methods and materials once detailed route optioneering, benthic survey and On-Bottom Stability analysis results become available.

Figure 1-1 Sanday to North Ronaldsay Proposed cable corridor

1.1 Project Need

On February 2026, a fault was identified on one core of the 11 kV Sanday – North Ronaldsay cable which supplies electricity to the island of North Ronaldsay. An initial solution was trialled to reconfigure this circuit to run on a 2-core supply which faulted soon after and deemed unviable. Customers are currently being supplied through mobile diesel generation and as such, an options appraisal has recommended end-to-end replacement of the faulted cable is the preferred option to restore a grid connection to customers affected on North Ronaldsay. SHEPD therefore proposes to install a replacement subsea cable that will connect the Bay of Sanquoy on Sanday and South Bay on North Ronaldsay to tie into the existing network. The Project will benefit approximately 87 customers.

1.2 Consideration of Alternatives

Following the subsea cable fault, the following options were considered in order to restore grid connection to North Ronaldsay:

Option 1: Do Nothing. This was discounted as a viable option due to customers currently relying on temporary diesel generation. Due to limited ferry service, with unreliable crossing times to North Ronaldsay during wintertime when demand would be highest, there would be significant logistical issues around refuelling the generators and significant costs associated with it. This option would not support SHEPD's island decarbonisation ambitions and would produce a significant increase in carbon output whilst also reducing the network security for these customers.

Option 2: 11 kV Piece in Repair. This option has been discounted due to historic survey information showing cable serving and armour corrosion throughout the length of the cable. In addition, lifting the cable in its current condition to facilitate the repair may cause further damage which could lead to a secondary fault.

Option 3: Replacement with flexible solution. Given no distributed generation is currently present or expected on North Ronaldsay, this is not deemed as a feasible solution at this time

Option 4: 11 kV End-to-End Replacement. This is the preferred option to be carried forward. This option involves carrying out a full end-to-end cable replacement / installation. Stock 11 kV cable will be installed from a suitable Cable Lay Vessel (CLV) and connected into Transition Joint Pits (TJPs) at both shore ends. The cable will then tie into the existing overhead line (OHL) networks at each landfall via short sections of overhead line and underground cable.

Option 4 has been determined to be the most cost-effective solution in this situation, despite the expectation that it will be more expensive than a cable repair. This is due to the current condition of the existing cable and the likelihood of success of a repair being low. There is a high probability that even if a repair is successful, a failure may occur within the next three to five years. This will incur further repair or replacement costs, meaning the overall cost of rectifying the issue for the long term is higher.

It has been determined that it will be more beneficial to invest in a full cable replacement that is likely to operate for a minimum of 25 years. There is also the added advantage of being a more robust solution as no new subsea joints are introduced into the system. This option will improve the security of supply to the customers on North Ronaldsay.

2 LEGISLATIVE CONTEXT

This Section presents the key United Kingdom (UK) and Scottish legislation and policies which are applicable to the proposed cable installation activities and explains how and where these have been considered in the production of this MEA. This includes adherence to statutory legislation as well as to the policies presented in Scotland's National Marine Plan (Scottish Government, 2015) and the Orkney Islands Regional Marine Plan (2026). Where necessary, additional mitigation measures have been presented in topic specific Sections to ensure that the Project adheres to relevant legislation and policies and complies with the conditions required. The information is provided in table form for ease of reference, as shown in Table 2-1.

Table 2-1 Key UK and Scottish legislation and policies pertinent to the Project

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
Legislation		
Marine (Scotland) Act 2010	The Marine (Scotland) Act 2010 applies to Scottish territorial waters and makes provisions in relation to functions and activities in the Scottish marine area. The following regulations are pertinent to the proposed cable installation activities: • Under Section 21 of the Act a marine licence is required for any activity which involves: – Deposit of any substance or object in the sea or on or under the seabed; – Construction, alteration or improvement of works in or over the sea or on or under the seabed; and/or – Removal of substances or objects from the seabed. • Under Section 82 of the Marine (Scotland) Act 2010, Marine Directorate – Licensing Operations Team (MD-LOT), acting on behalf of the Scottish Ministers, is required to consider whether a licensable activity is capable of affecting (other than insignificantly) a protected feature of a Nature Conservation Marine Protected Area (NCMPA) or a marine historic asset in a Historic Marine Protected Area (HMPA); and • The seal haul-out sites, designated under The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 (as amended), are protected under Section 117 of the Act.	SHEPD will submit an MLA form alongside this MEA for the proposed cable installation activities. Section 5: Designated Sites assesses the potential impacts on NCMPAs and concluded that there are no NCMPAs within the vicinity of the proposed cable corridor. Section 7: Marine Megafauna assesses the potential for the proposed cable installation activities to injure or disturb seals. This assessment concluded that there should be no injury of seals and no significant disturbance to seals at designated seal haul-outs. Section 10: Marine Archaeology assess the potential impacts on marine archaeological protected features (including HMPAs). This assessment concluded that no significant effects on marine archaeology / HMPAs are to be expected.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland) (also known as 'the Habitats Regulations') **And** **The Conservation (Natural Habitats) (EU Exit) (Scotland) (Amendment) Regulations 2019**	The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland) transpose the European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) into Scottish Law. In addition, the Conservation (Natural Habitats) (European Union (EU) Exit) (Scotland) (Amendment) Regulations 2019 make provision for the selection, designation, registration and notification of sites to be protected under the European Community (EC) Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. The Habitats Regulations Appraisal (HRA) process forms part of these regulations. The HRA process requires that any proposal which has the potential to result in a Likely Significant Effect (LSE) to a European site or its designated features to be subject to an Appropriate Assessment (AA) carried out by the Competent Authority. The Conservation (Natural Habitats, & c) Regulations 1994 as amended make it an offence to deliberately or recklessly capture, kill, injure, harass or disturb an EPS. When EPS are present, licences to permit activities that will affect them can only be granted when: • There is a licensable purpose; • There are no satisfactory alternatives; and • The action authorised will not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status (FCS) in their natural range. The 2019 Regulations make amendments to the existing instruments that transpose the habitats and wild birds' directives so that they are operable.	Section 5: Designated Sites assesses the potential impacts on protected habitats and species, including European sites and their designated features. The proposed cable corridor overlaps with the Sanday SAC and is within the connectivity range of the East Sanday Coast SPA, Faray and Holm of Faray SAC and East Sanday Coast Ramsar Site (Scottish Government's stated policy position is that Ramsar Sites designated under The International Convention on Wetlands of International Importance ('Ramsar Convention') are considered European Sites) (Scottish Government, 2025). There is potential for disturbance to the features of these European sites and therefore LSE could not be ruled out. The assessment in Section 5.5 concluded that there will be no adverse effect on site integrity of the Sanday SAC, East Sanday Coast SPA and Faray, Holm of Faray SAC or East Sanday Coast Ramsar Site. Section 7: Marine Megafauna assesses the potential impacts on EPS which have potential connectivity with the installation activities (i.e., cetaceans and otters). This assessment concluded that that there will be no injurious impacts to marine megafauna receptors; however, as disturbance could not be ruled out, an EPS Licence Application will be submitted to MD-LOT.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
Wildlife and Countryside Act 1981 (WCA 1981) (as amended) and the Nature Conservation (Scotland) Act 2004	The primary legislation for the protection of birds in the UK is the WCA 1981 (as amended) in combination with the Nature Conservation (Scotland) Act 2004. Under these acts, it is an offence to harm wild bird species, their eggs and nests. Additional protection is provided for certain bird species listed on Schedule 1 of the WCA 1981, and it is an offence to disturb those species at their nest while it is in use. Licensing for wild birds does not cover development purposes, so any activity that could result in disturbance of a nesting Schedule 1 species should not proceed unless out-with the breeding season. In addition, the Conservation (Natural Habitats) (European Union (EU) Exit) (Scotland) (Amendment) Regulations 2019 also instrument an amendment to Section 27 of the WCA 1981 to ensure that existing protections continue. Basking sharks (*Cetorhinus maximus*) are protected under Schedule 5 of the WCA 1981 which prohibits the killing, injuring, or taking by any method of those wild animals listed on Schedule 5 of the WCA 1981. When basking sharks are present, licences to permit activities that will affect them can only be granted when: • There is a licensable purpose; • There are no satisfactory alternatives; and • The action authorised will not be detrimental to the maintenance of the population of the species concerned at a FCS in their natural range.	Section 9: Ornithology assesses the potential impacts on ornithological receptors. This assessment concluded that no significant effects on wild birds, their eggs, and nests are to be expected. Section 7: Marine Megafauna assesses the potential impacts on basking sharks. This assessment concluded that the risk of collision is low; however, as disturbance could not be ruled out, a Basking Shark Derogation Licence application will be submitted to MD-LOT.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	Policy	
Scotland's National Marine Plan (2015): General Policies – • **GEN 2 Economic benefit;** • **GEN 3 Social benefit;** • **GEN 5 Climate change;** • **GEN 6 Historic environment;** • **GEN 7 Landscape/seascape;** • **GEN 8 Coastal processes and flooding;** • **GEN 9 Natural heritage;** • **GEN 10 Invasive non-native species;** • **GEN 12 Water quality and resource;** • **GEN 13 Noise; and** • **GEN 18: Engagement.**	GEN 2 Economic benefit: Sustainable development and use which provides economic benefit to Scottish communities is encouraged when consistent with the objectives and policies of this Plan.	Section 1: Introduction outlines the social and economic benefits of the Sanday-North Ronaldsay Subsea Cable Replacement. The proposed cable installation activities will provide social and economic benefits to the region by improving network resilience, reducing the risk of future customer interruptions, and mitigating potential impacts such as future constrained generation or temporary generation, associated carbon emission impacts associated with a subsea cable outage and help prevent other outage related costs.
	GEN 3 Social benefit: Sustainable development and use which provides social benefits is encouraged when consistent with the objectives and policies of this Plan.	
	GEN 5 Climate change: Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change.	Climate change has been considered within the biological sections of the MEA including: Section 6: Seabed and Water Quality; Section 7: Marine Megafauna; Section 8: Benthic and Intertidal Ecology; and Section 9: Ornithology. Additionally, as described in Section 1.2: Consideration of Alternatives, climate change has been factored into the justification for the cable replacement given the carbon emissions which would have resulted from the supplying power to communities on North Ronaldsay with the temporary diesel generation.
	GEN 6 Historic environment: Development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance.	Section 10: Marine Archaeology assesses the potential interaction between the proposed cable installation activities and marine archaeological receptors including heritage assets. This assessment concluded that no significant effects on heritage assets are to be expected.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	GEN 7 Landscape/seascape: Marine planners and decision makers should ensure that development and use of the marine environment take seascape, landscape and visual impacts into account.	The Project will have no significant long-term landscape/seascape effects.
	GEN 8 Coastal process and flooding: Developments and activities in the marine environment should be resilient to coastal change and flooding, and not have unacceptable adverse impact on coastal processes or contribute to coastal flooding.	Section 6: Seabed and Water Quality assesses the potential impact on coastal processes and flooding. This assessment concluded that the proposed cable installation activities will not result in changes to coastal processes and will not contribute to coastal flooding.
	GEN 9 Natural heritage: Development and use of the marine environment must • Comply with legal requirements fort protected for protected areas and protected species; • Not result in significant impact on the national status of Priority Marine Features (PMFs); • Protect, and, where appropriate, enhance the health of the marine area.	The potential for the proposed cable installation activities to impact protected areas and protected species (including PMFs) is assessed within Section 5: Designated Sites as well as the biological sections of the MEA including: Section 6: Seabed and Water Quality; Section 7: Marine Megafauna; Section 8: Benthic and Intertidal Ecology; and Section 9: Ornithology.
	GEN 10 Invasive Non-Native Species (INNS): Opportunities to reduce the introduction of INNS to a minimum or proactively improve the practice of existing activity should be taken when decisions are being made.	Section 8: Benthic and Intertidal Ecology assesses the potential for the introduction of INNS as a result of the proposed cable installation activities. This assessment concluded that the likelihood of INNS being introduced is low.
	GEN 12 Water quality and resource: Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive (WFD), Marine Strategy Framework Directive or other related Directives apply.	Section 6: Seabed and Water Quality assesses the potential impacts on the water quality of designated waters. This assessment concluded that no significant effects on the water quality of designated waters are to be expected.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	GEN 13 Noise: Development and use in the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects.	The potential for sound and vibration associated with the proposed cable installation activities to affect sensitive species has been considered within Section 7: Marine Megafauna. The noise impact assessment concluded that there will be no injurious impacts on sensitive species; however, as disturbance could not be ruled out, an EPS licence application will be submitted to MD-LOT. The EPS licence Application form submitted alongside this MEA contains full consideration of alternatives to noise emitting activities, including the "do nothing" option.
	GEN 18 Engagement: Early and effective engagement should be undertaken with the general public and all interested stakeholders to facilitate planning and consenting processes.	SHEPD has made key stakeholders aware of the cable fault and the Project and sought advice to inform the MEA: • MD-LOT; • NatureScot; • Northern Lighthouse Board; • Royal Society for the Protection of Birds; • Maritime and Coastguard Agency (MCA); • Orkney Island's Council; and • Orkney Fishermen's Association. The advice has been incorporated throughout this MEA.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
Scotland's National Marine Plan (2015): Sea Fisheries Policies – • Fisheries 1; • Fisheries 2; and • Fisheries 3.	FISHERIES 1: Taking account of the EU's Common Fisheries Policy, Habitats Directive, Birds Directive and Marine Strategy Framework Directive, marine planners and decision makers should aim to ensure: Existing fishing opportunities and activities are safeguarded wherever possible; • An ecosystem-based approach to the management of fishing which ensures sustainable and resilient fish stocks and avoids damage to fragile habitats; • Protection for vulnerable stocks (in particular for juvenile and spawning stocks through continuation of sea area closures where appropriate); • Improved protection of the seabed and historical and archaeological remains requiring protection through effective identification of high-risk areas and management measures to mitigate the impacts of fishing, where appropriate; • That other sectors take into account the need to protect fish stocks and sustain healthy fisheries for both economic and conservation reasons; • Delivery of Scotland's international commitments in fisheries, including the ban on discards; and • Mechanisms for managing conflicts between fishermen and/or between the fishing sector and other users of the marine environment.	Section 12: Commercial Fisheries and Other Sea Users assesses the potential impacts on commercial fisheries. assessment concluded that due to the highly localised nature of the seabed disturbance footprint, the fact that the Project is replacing an existing cable, and the short duration, no significant effects on fish stocks, or the associated habitats on which these species depend, are anticipated. Please refer to the North Coast and Orkney Regional FLMAP for further detail on the proposed installation activities interaction with commercial fisheries. A High Level Navigational Risk Assessment (HLNRA) (Xodus Document No. A-200853-S00-A-ASMT-001) has been carried out which concluded no significant effects on fishers from the installation and operation of the cable.
	FISHERIES 2: The following key factors should be taken into account when deciding on uses of the marine environment and the potential impact on fishing: • The cultural and economic importance of fishing, in particular to vulnerable coastal communities;	As above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	• The potential impact (positive and negative) of marine developments on the sustainability of fish and shellfish stocks and resultant fishing opportunities in any given area; • The environmental impact on fishing grounds (such as nursery, spawning areas), commercially fished species, habitats and species more generally; and • The potential effect of displacement on: fish stocks; the wider environment; use of fuel; socio-economic costs to fishers and their communities and other marine users.	
	FISHERIES 3: Where existing fishing opportunities or activity cannot be safeguarded, a Fisheries Management and Mitigation Strategy should be prepared by the proposer of development or use, involving full engagement with local fishing interests (and other interests as appropriate) in the development of the Strategy. All efforts should be made to agree the Strategy with those interests. Those interests should also undertake to engage with the proposer and provide transparent and accurate information and data to help complete the Strategy. The Strategy should be drawn up as part of the discharge of conditions of permissions granted.	
Scotland's National Marine Plan (2015): Recreation and Tourism Policy – • Recreation and Tourism 2.	REC & TOURISM 2: The following key factors should be taken into account when deciding on uses of the marine environment and the potential impact on recreation and tourism: • The extent to which the proposal is likely to adversely affect the qualities important to recreational users, including the extent to which proposals may interfere with the physical infrastructure that underpins a recreational activity;	Section 12: Commercial Fisheries and Other Sea Users assesses the potential impacts on recreation and tourism. This assessment concluded that no significant effects on recreational users and/or tourism are to be expected.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	• The extent to which any proposal interferes with access to and along the shore, to the water, use of the resource for recreation or tourism purposes and existing navigational routes or navigational safety; • Where significant impacts are likely, whether reasonable alternatives can be identified for the proposed activity or development; and • Where significant impacts are likely and there are no reasonable alternatives, whether mitigation, through recognised and effective measures, can be achieved at no significant cost to the marine recreation or tourism sector interests.	
Scotland's National Marine Plan (2015): Shipping, Ports, Harbours and Ferries Policies – • **Transport 1; and** • **Transport 6.**	TRANSPORT 1: Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UN Convention on the Law of the Sea (UNCLOS). The following factors will be taken into account when reaching decisions regarding development and use: • The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and defined approaches to ports; • Where interference is likely, whether reasonable alternatives can be identified; and • Where there are no reasonable alternatives, whether mitigation through measures adopted in accordance with the principles and procedures established by the International Maritime Organization can be achieved at no significant cost to the shipping or ports sector.	Section 11: Shipping and Navigation and the HLNRA (Xodus Document No. A-200853-S00-A-ASMT-001) carried out assesses the potential impacts on shipping, ports, harbours and navigational safety around the proposed cable corridor during the proposed cable installation activities. This assessment concluded that no significant effects on shipping, ports, harbours and ferries are to be expected.
	TRANSPORT 6: Marine planners and decision makers and developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs,	

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	emissions and impact on journey frequency) and potential impacts on other users and ecologically sensitive areas.	
Scotland's National Marine Plan (2015): Submarine Cables Policies – • **Cables 1;** • **Cables 2; and** • **Cables 3.**	CABLES 1: Cable and network owners should engage with decision makers at the early planning stage to notify of any intention to lay, repair or replace cables before routes are selected and agreed. When making proposals, cable and network owners and marine users should evidence that they have taken a joined-up approach to development and activity to minimise impacts, where possible, on the marine historic and natural environment, the assets, infrastructures and other users. Appropriate and proportionate environmental considerations and risk assessments should be provided which may include cable protection measures and mitigation plans. Any deposit, removal or dredging carried out for the purpose of executing emergency inspection or repair works to any cable is exempt from the marine licensing regime with approval by Scottish Ministers. However, cable replacement requires a marine licence. Marine Licensing Guidance should be followed when considering any cable development and activity.	This MEA provides a description of how potential impacts on the marine environment associated with the installation of the new cable and removal of the existing faulted cable sections have been minimised. An MLA is being submitted alongside this application. A full description of the proposed installation activities, including cable protection methods, is provided in the Sanday – North Ronaldsay Cable Replacement Project Description (Document Ref: A-200853-S00-A-REPT-002). Given the extensive rocky habitat present throughout the proposed cable corridor, cable burial is not possible.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	CABLES 2: The following factors will be taken into account on a case-by-case basis when reaching decisions regarding submarine cable development and activities: • Cables should be suitably routed to provide sufficient requirements for installation and cable protection; • New cables should implement methods to minimise impacts on the environment, seabed and other users, where operationally possible and in accordance with relevant industry practice; • Cables should be buried to maximise protection where there are safety or seabed stability risks and to reduce conflict with other marine users and to protect the assets and infrastructure; • Where burial is demonstrated not to be feasible, cables may be suitably protected through recognised and approved measures (such as rock or mattress placement or cable armouring) where practicable and cost-effective and as risk assessments direct; and • Consideration of the need to reinstate the seabed, undertake post-lay surveys and monitoring and carry out remedial action where required.	As above.
	CABLES 3: A risk-based approach should be applied by network owners and decision makers to the removal of redundant submarine cables, with consideration given to cables being left in situ where this would minimise impacts on the marine historic and natural environment and other users.	A justification for the chosen method of cable replacement (including removal of sections of the faulted cable) is summarised in Section 1.2: Consideration of Alternatives.
Orkney Islands Regional Marine Plan (2026) General Policies – • **General Policy 2: Safety;**	General Policy 2: Safety The Orkney Harbour Authority should be consulted on proposals for development and/or activities that would have implications for any aspect of safety in harbour areas.	Engagement with shipping and navigation consultees including the Orkney Harbour Authority is built into the Project embedded mitigation (Section 4.3). A shipping and navigation impact assessment has been carried out in Section 11: Shipping and Navigation. Additionally, a high level NRA has been prepared to

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
• General Policy 3: Climate Change; • General Policy 4: Supporting Sustainable Social and Economic Benefits • General Policy 6: Water Environment; • General Policy 7: Coastal Development and Coastal Change; • General Policy 8: Historic Environment; • General Policy 9: Nature; • General Policy 10: Seascape and Landscape; • General Policy 11: Surface and Underwater Noise, and Vibration; • General Policy 13: Non-native and Invasive Non-native Species		demonstrate the risk is As Low As Reasonably Practicable (ALARP) (Document Ref: A-200853-S00-A-REPT-003).
	General Policy 3a: Climate crisis When considering proposals for development and/or activities, significant weight in decision making should be given to the global climate crisis including measures for mitigation and adaptation. General Policy 3b: Climate change mitigation Proposals for development and/or activities should demonstrate that measures have been taken to mitigate climate change including, where appropriate, measures to minimise greenhouse gas emissions over the proposal's life cycle as far as possible. General Policy 3c: Climate change adaptation and resilience Proposals for development and/or activities should demonstrate that: i. measures have been taken to adapt to climate change; ii. climate change adaptation and resilience measures have been built into the project over its lifetime; and iii. they include, where appropriate, nature-based solutions to enhance the resilience of infrastructure, coastal communities and/or the environment to the effects of climate change.	As per response to Scotland's National Marine Plan General Policy 5: Climate Change above.
	General Policy 4a: Supporting sustainable social and economic benefits Proposals for development and/or activities should demonstrate that:	As per response to Scotland's National Marine Plan General Policy 2: Economic Benefit and General Policy 3: Social Benefit above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	i. opportunities have been considered to maximise sustainable employment benefits and create skilled employment in local communities; ii. opportunities have been considered to support local businesses, skills development, supply chains and research and development; iii. opportunities have been considered to support synergistic benefits with existing marine and coastal development, activities and use; and iv. the social and economic benefits of the proposal outweigh any significant adverse impacts on existing social and/or economic activities. General Policy 4b: Impacts on local infrastructure, services and other marine and coastal users Developers should undertake early engagement with the local authority, any other relevant bodies, service providers and/or stakeholders if significant impacts on local infrastructure, services and/or the activities of other coastal and marine users are likely to result from proposed development and/or activities. General Policy 4c: Supporting sustainable social and economic benefits guidance Proposals for development and/or activities should have regard to the Orkney Islands Marine Region: Supporting Sustainable Social and Economic Benefits Guidance, where available.	
	General Policy 6: Water Environment Proposals for development and/or activities should:	As per response to Scotland's National Marine Plan General Policy 12: Water Quality and Resource above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	i. be accompanied by sufficient information to enable an assessment of the likely effects, including cumulative effects, on water quality and the benthic environment. ii. take existing activities that affect water quality in the proposed location into account, and demonstrate early engagement with relevant stakeholders, to ensure that suitable mitigation is provided for potentially incompatible activities, and where that is not possible, that they are not co-located. iii. Not cause any waterbody to deteriorate in status nor prevent the achievement of objectives in the River Basin Management Plan for the Scotland river-basin district. iv. consider contributing, where possible, towards objectives to improve the ecological status of coastal waterbodies and the environmental standard of marine waters.	
	General Policy 7b: Coastal Processes Proposals for development and/or activities that would significantly affect coastal processes should demonstrate that: i. significant adverse effects on coastal and marine habitats, species and geomorphological features, including, but not limited to, those that are caused by erosion, compaction, sediment transport, accretion, scouring, deposition and/or coastal flooding, have been avoided, minimised and/or appropriately mitigated. ii. significant adverse effects from the proposal on existing coastal and marine infrastructure and other assets, due to coastal erosion, flooding and/or wider coastal change, have been avoided, minimised and/or appropriately mitigated.	As per response to Scotland's National Marine Plan General Policy 8: Coastal Processes and Flooding above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	General Policy 8a: Historic assets and places i. Proposals for development and/or activities affecting the historic environment should, where relevant, have regard to: a. The National Planning Framework; and b. The Orkney Local Development Plan. ii. Proposals for development and/or activities with a potentially significant impact on historic assets or places should be accompanied by an assessment* which is based on an understanding of the cultural significance of the historic asset and/or place. The assessment should identify the likely visual or physical impact of any proposals for change, including cumulative effects, and provide a sound basis for managing the impacts of change. iii. Proposals should also be informed by national policy and guidance on managing change in the historic environment, and information held within Historic Environment Records. iv. Proposals for development and/or activities should, where appropriate, include a Protocol for Accidental Archaeological Discoveries (PAD)	As per response to Scotland's National Marine Plan General Policy 6: Historic Environment above.
	General Policy 9c: Protected areas Internationally designated sites i. Proposals for development and/or activities that could affect a European site (Special Area of Conservation and Special Protection Areas) must comply with the relevant legislation. Nationally designated sites	Internationally and nationally designated sites, including designated seal haul-out sites, have been considered as described under the legislation section above. PMFs have been assessed as per response to Scotland's National Marine Plan General Policy 9: Natural Heritage above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	ii. Proposals for development and/or activities that could affect an SSSI must comply with the relevant legislation for these protected areas. iii. Proposals for development and/or activities that could affect a Nature Conservation MPA must comply with the relevant legislation for these protected areas. Seal haul-out sites iv. Proposals for development and/or activities that could affect a designated seal haul-out site should demonstrate that they will not result in harassment of seals. Regard should be given to the Harassment at Seal Haul-out Sites: Guidance*	
	General Policy 9d: Priority Marine Features i. Assessment of impacts on Priority Marine Features Proposals for development and/or activities should demonstrate that they have considered, where possible, how any significant adverse impacts on Priority Marine Features have been avoided, minimised and/or appropriately mitigated. ii. Impacts on the national status of Priority Marine Features Proposals for development and/or activities should have regard to the relevant policy provisions in the National Marine Plan and Priority Marine Feature Guidance.	
	General Policy 10a: Seascape and landscape Development and/or activities should be located, sited and designed to avoid, minimise and/or appropriately mitigate significant adverse impacts on the landscape, townscape and seascape characteristics and sensitivities identified in the Orkney and North Caithness Landscape Character Assessment*, and should have regard to the natural and/or historic features that contribute to the quality of seascape and landscape.	As per response to Scotland's National Marine Plan General Policy 7: Landscape/Seascape above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	General Policy 11b: Noise sensitive species i. Proposals for development and/or activities that could cause noise, vibration and/or pressure wave impacts should include an assessment of the likely noise, vibration and/or pressure wave effects at an early stage of a proposal, to determine whether a noise, vibration and/or pressure wave management plan is required. ii. Proposals for development and/or activities that could affect European Protected Species must comply with the relevant legislation	As per response to Scotland's National Marine Plan General Policy 13: Noise above.
	General Policy 13: Non-native and Invasive Non-native Species i. Proposals for development and/or activities should demonstrate that the potential risks of introducing or spreading NNS/INNS have been adequately considered, having regard to the NatureScot Marine Biosecurity Planning Guidance*. A site-specific biosecurity plan may be required. ii. Appropriate prevention measures should be put in place when: a. moving, maintaining and cleaning equipment or boats; b. moving and/or introducing fish and shellfish and other farmed species such as seaweed; c. introducing structures suitable for settlement of aquatic NNS/INNS or which facilitate the movement of terrestrial NNS/INNS, including to islands; or d. undertaking habitat enhancement or restoration activities. iii. Proposals for development and/or activities in areas where NNS/INNS are known to exist should include necessary measures or a biosecurity plan approved by the consenting authority or regulator that seeks to minimise the risk of spreading the NNS/INNS or identifies ways to eradicate the organisms and prevent their reintroduction. Where appropriate, measures within a biosecurity	As per response to Scotland's National Marine Plan General Policy 10: INNS above.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	plan should include surveying and ongoing monitoring in areas where NNS/INNS are known to exist, and any subsequent spread of NNS/INNS should be notified to the Marine Directorate	
Orkney Islands Regional Marine Plan (2026) Commercial Fishing Policy	Sector Policy 1: Commercial Fishing i. Proposals for development and/or activities should avoid, minimise and/or appropriately mitigate significant adverse impacts: a. on commercial fishing opportunities, taking into account seasonality and the year-round operation of the affected fishery; b. on nursery, spawning and feeding areas for commercially fished species, and associated habitats and species; c. due to displacement, including related impacts on the wider marine environment, on fish stocks and the use of fuel by fishing vessels; d. on safe access to marine space for fishing vessels, including the seabed, water column and sea surface, and navigational access to and from landfall areas, e.g. ports, harbours or slipways; and e. on the social and economic importance of fishing, in particular to fragile island communities. ii. Proposals for development and/or activities should demonstrate appropriate consideration of the cultural importance of fishing in the area, and any impacts the proposal may have on this. iii. Orkney Regional Inshore Fisheries Group, Orkney Fisheries Association and/or fishers that use an area that could be affected by a proposed development and/or activity should be consulted at an early stage in the site selection, design and planning process.	As per response to Scotland's National Marine Plan Sea Fisheries Policy.
Orkney Islands Regional Marine Plan (2026) Shipping, Ports, Harbours and Ferries Policy	Sector Policy 3a: Safeguarding navigation, harbour infrastructure and operations i. Proposals for development and/or activities should avoid and/or appropriately mitigate significant adverse impacts on: a. navigational safety; b. existing, or planned (i.e. routes associated	As per response to Scotland's National Marine Plan Shipping, Ports, Harbours and Ferries Policies.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	with developments currently within the statutory consenting system), shipping and/or ferry routes*; c. Harbour Area operations; d. maritime access to and use of pier and harbour infrastructure, including marinas; e. harbours of refuge; f. designated ship-to-ship anchorages; g. anchor berths and other anchorages, as identified on the UK Hydrographic Office Charts, including the associated 1500m sensitive areas for safe vessel manoeuvring; and h. the Flotta Terminal Safeguarded Area. ii. The assessment of potential impacts on factors identified in (i) above should take into account vessel movements and harbour-related operations in all weather and tidal conditions. iii. Development and/or activities that would have significant adverse effects on factors identified in (i) above, but which cannot be avoided or appropriately mitigated, should not be permitted. iv. Proposals for development and/or activities should avoid, or appropriately mitigate, significant adverse impacts on the efficient use of shipping and/or ferry routes, including consideration of impacts on fuel costs, emissions, journey duration and frequency. v. Proposals for development and/or activities should avoid, or appropriately mitigate, significant adverse impacts due to displacement of shipping and/or ferry traffic on other marine users and/or the environment.	
Orkney Islands Regional Marine Plan (2026) Pipeline, Electricity, Telecommunications Infrastructure Policy	Sector Policy 4a: Water pipelines, electricity and telecommunications infrastructure development and/or activities i. Proposals for water pipelines, electricity and/or telecommunications development and/or activities including the laying, protection, replacement, maintenance and decommissioning of pipelines, electricity and/or telecommunication cables, and/or the	As per response to Scotland's National Marine Plan Cables Policy.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	development of associated onshore and/or marine infrastructure, should have regard to: a. The Orkney Local Development Plan; b. The National Marine Plan; and c. The National Planning Framework. ii. Network and cable owners should engage with public authority decision makers, appropriate statutory bodies, marine users and local communities at an early stage to avoid, minimise and/or appropriately mitigate impacts on the historic and natural environment, existing development and/or infrastructure assets, and other marine users. iii. Proposals for new or replacement water pipelines or cable development and/or activities should avoid, minimise and/or appropriately mitigate significant adverse impacts on: a. landscape and/or seascape character and visual amenity; b. nature conservation designations, protected species, and the wider biodiversity, including the national status of Priority Marine Features; c. seal haul-out sites; d. water quality and the benthic environment; e. historic environment assets; f. coastal processes, including those caused by erosion, flooding and wider coastal change; and g. other coastal and marine users including, but not limited to, commercial fishing, shipping and navigation, ports and harbour infrastructure/operations, active aquaculture sites, tourism, recreation, sport and leisure activities. h. amenity, including consideration of road traffic, noise, access, vibration, odour and litter impacts.	
Orkney Islands Regional Marine Plan (2026) Tourism, Recreation, Leisure and Sport Policy	Sector Policy 7b: Safeguarding tourism, recreation, leisure and sport uses i. Proposals for development and/or activities should consider options to avoid, minimise or appropriately mitigate significant adverse impacts on tourism, recreation, leisure and sport uses.	As per response to Scotland's National Marine Plan Recreation and Tourism Policy.

LEGISLATION OR POLICY	KEY REQUIREMENTS	RELEVANT SECTION (WHERE APPLICABLE)
	ii. Proposals for development and/or activities should demonstrate engagement and/or consultation with relevant tourism, recreation, leisure and sport bodies and/or users to ensure that the measures proposed to avoid, minimise and/or mitigate adverse impacts on tourism, recreation, sport and leisure uses are appropriate.	

3 PROJECT DESCRIPTION

3.1 Summary

A summary of the activities considered within this MEA is provided in the bullets below. Please refer to the Sanday – North Ronaldsay Cable Replacement Project Description for further detail (Document Ref: A-200853-S00-A-REPT-002).

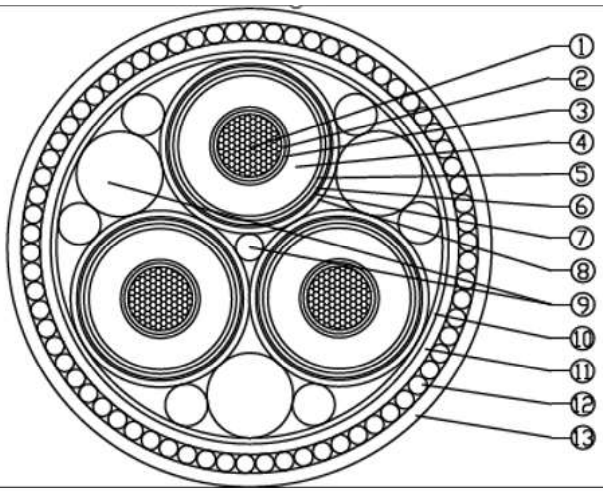
- Seabed preparation;
  - Pre-installation surveys to identify debris / obstructions;
  - Manual obstruction removal by using boulder pickers. Pre-Lay Grapnel Run (PLGR) is unlikely to be used due to the seabed being hard and uneven (primarily rocky reef); and
  - Removal of Out of Service (OoS) cable(s) to facilitate installation of the replacement cable, where required;
- Landfall establishment;
- Cable installation;
  - The subsea cable will be surface laid below MLWS,
  - In the intertidal zone, cable installation will be via Open Cut Trench (OCT) between MLWS and MHWS at each landfall location;
- Cable protection and stabilisation installation;
  - Cable protection measures will include tubular cable protection systems and rock bags,
  - Sea earths and associated protection will also be required;
- Landfall re-instatement; and
- Post-installation surveys.

3.2 Cable Installation and Replacement

This Section provides an overview of the proposed cable installation activities. The proposed cable installation activities for the Sanday – North Ronaldsay cable replacement are currently planned to be undertaken in two parts: cable and nearshore tubular cable protection system installation in Autumn 2026 before the adverse winter weather, and cable protection/stabilisation installation in Spring / Summer 2027. The licence duration being sought by SHEPD is 24 months for contingency in case the installation programme is delayed. Further detail on the cable installation methodology is provided in the Sanday – North Ronaldsay Cable Replacement Project Description (Document Ref: A-200853-S00-A-REPT-002), which should be read in conjunction with this MEA. The proposed cable installation activities are expected to take up to 37 days for the Autumn 2026 campaign and 60 days for the Spring / Summer 2027 campaign, for an overall duration of 97 days. This anticipated duration includes all nearshore and offshore works as well as cable pull-in.

In order to allow sufficient flexibility for detailed route engineering, SHEPD are seeking consent for the 9.2 km^2 proposed cable corridor that is considered by this MEA, which is approximately 10.4 km long (MHWS to MHWS) (including 5% contingency). The location of the proposed cable corridor is provided in Figure 1-1, with coordinates of the bounding points provided in Table 3-1.

The replacement subsea cable consists of a single three-core 11 kV High Voltage Alternating Current (HVAC) submarine cable (Figure 3-1).



1 - Copper round stranded compacted class 2 according to BS EN 60228 of nominal cross-section equal to 95 sq.mm, longitudinally water sealed.
2 - Semiconductive waterblocking tape (s) applied helically with overlap.
3 - Conductor non-metallic extruded screen: Extruded semiconducting compound with nominal thickness of 0.7 mm.
4 - Insulation: XLPE water-tree retardant type GP8 according to BS 6622, which satisfies the two years long duration test according to HD 605 Test No 5.4.15 (without 5.4.15.3.4.c)), of 3.4 mm min average thickness.
5 - Core non-metallic extruded screen: Extruded semiconducting compound firmly bonded to the insulation with nominal thickness of 0.8 mm.
6 - Semiconductive waterblocking tape(s) applied helically with overlap.
7 - Metallic screen and radial watertightness:
Cu/PE laminated tape of 0.2 mm copper nominal thickness, bonded to LLDPE sheath, longitudinally applied with overlap.
8 - Sheath: LLDPE of 1.6 mm min average thickness. Sheath colour: Black
9 - Non-hygroscopic fillers at the interstices between cores in order to give the cable a circular cross-section.
10 - Binding tape (one or two at manufacturer's option) helically applied with overlap.
11 - One layer of polypropylene yarns of approximate thickness of 1 mm.
12 - Armour consisting of one layer of helically applied bitumen compounded galvanized round steel wires of grade 34, class A, 6.0±0.09 mm diameter, according to EN 10257-2.
13 - Two layers of polypropylene yarns with total approximate thickness of 3.0 mm. Over the inner (first) layer bitumen is applied. Over the outer (Second) layer no bitumen is applied, but after winding of cable some bitumen will be transferred to the outer layer too.

Figure 3-1 Cross section of the replacement cable

Table 3-1 Coordinates for the proposed cable corridor (WGS84) in Degrees and Decimal Minutes (DDM)

LATITUDE (DDM)	LONGITUDE (DDM)
For the avoidance of doubt, the landward boundaries of the proposed cable corridor covered by this MEA are the Mean High Water Springs (MHWS). The landfall boundaries defined by the coordinates within this document should be considered approximations, due to the requirement to limit the number of vertices.	
59°21.494'N	2°26.079'W
59°21.480'N	2°25.962'W
59°21.450'N	2°25.841'W
59°19.918'N	2°25.330'W
59°19.332'N	2°26.978'W
59°18.292'N	2°27.717'W
59°18.084'N	2°27.285'W
59°17.705'N	2°26.914'W
59°17.579'N	2°26.793'W
59°17.529'N	2°26.831'W

LATITUDE (DDM)	LONGITUDE (DDM)
59°17.448'N	2°26.935'W
59°17.381'N	2°27.099'W
59°17.328'N	2°27.273'W
59°17.293'N	2°27.457'W
59°17.270'N	2°27.640'W
59°17.263'N	2°27.813'W
59°17.273'N	2°27.973'W
59°17.286'N	2°28.071'W
59°17.613'N	2°28.453'W
59°18.666'N	2°29.151'W
59°19.300'N	2°28.593'W
59°19.515'N	2°28.128'W
59°19.768'N	2°27.021'W
59°20.769'N	2°26.169'W
59°21.347'N	2°26.360'W
59°21.459'N	2°26.390'W
59°21.476'N	2°26.372'W
59°21.491'N	2°26.334'W
59°21.498'N	2°26.267'W
59°21.498'N	2°26.144'W

3.2.1 Seabed Preparation

Pre- and Post-Installation Surveys

Before cable installation commences, a pre-installation survey may be conducted using a Remotely Operated Vehicle (ROV) to assess seabed conditions and the presence of debris. If required, survey operations will likely be conducted from a small survey vessel before the Cable Lay Vessel (CLV) arrives. During installation a similar survey spread may also be utilised to monitor the installation process. Alternatively, an ROV or cable fish may be deployed from the CLV or other support vessel and operate touchdown monitoring and ROV surveys from this platform. During all ROV/cable fish operations, Ultra Short Baseline (USBL) positioning systems will be used to monitor the underwater position of the subsea equipment (21 – 31.5 kilohertz (kHz). Additional survey equipment may include a Multi-Beam Echosounder (MBES) (380 – 700 kHz) and high resolution cameras.

Following cable installation, as-built surveys of the new cable and cable protection/stabilisation will be undertaken. These surveys will record the as installed position of the cable, and the actual deposits utilised to stabilise and/or protect the cable. These may be carried out as part of the protection/stabilisation operations or using a separate survey vessel.

PLGR

Any obstructions or debris such as OoS cables, chains, wires, ropes, and fishing gear identified during the surveys which cannot be avoided may be removed. This may be achieved by conducting a PLGR in order to remove debris from the proposed cable corridor; however, no PLGR will be undertaken in areas where designated benthic habitats and species of the Sanday Special Area of Conservation (SAC) are identified within the proposed cable corridor:

- Reef; and
  - Including discord mussel (*Musculus discord*) beds.
- Intertidal mudflats and sandflats and subtidal sandbanks.
  - Including seagrass beds.

Preliminary benthic and geophysical survey results indicate that majority of the proposed cable corridor consists of hard, reefy seabed material. It is therefore unlikely that PLGR can be utilised during the seabed preparation. If PLGR is required, it is expected that this activity will be completed shortly in advance of the cable installation activities to ensure that the proposed cable corridor remains free of debris prior to installation. The PLGR will be carried on along the centre line of the new cable route, and as such no seabed disturbance beyond the cable installation footprint is anticipated. Alternative means of debris clearance may involve a grab. Any debris will be removed from the sea and appropriately disposed of above MHWS.

Any boulders within the working area will be avoided where possible. If clearance is however required, the boulders will be removed from the cable route using a boulder grab and placed within the proposed cable corridor (generally ± 25 m from the route). If large boulders are relocated within the proposed cable corridor, appropriate notifications to marine users will be provided.

OoS Cable Removal

OoS cables will be removed at both shore ends in the intertidal area (MHWS to slightly below MLWS) to allow the new cable to be installed in the best approach angle:

- Sanday shore end 250 m; and
- North Ronaldsay shore end 200 m.

Further discrete sections (~1 km) of the OoS cables may be removed in the subtidal to allow the new cable to cross the existing cable. A grapnel will likely be used to recover any OoS which may require removal below MHWS. Any cable ends will be cut and peeled back and secured with clump weights and left within the proposed cable corridor.

3.2.2 Intertidal Cable Installation

Open Cut Trench

The intertidal cable sections at the landfall locations will be trenched via OCT using land-based excavators with rock pecker attachments, with tidal working (excavations will not be conducted below the waterline). A landing craft may be used to access the landfall sites if the shore conditions permit. If required, the vessel will be used to mobilise and demobilise equipment that will be required during the installation works. Excavated materials will be retained for subsequent reinstatement. There will be one trench at each landfall from MLWS to above MHWS. The trenches will contain the replacement subsea cable and sea earths within intertidal area from MLWS to the TJP. The trench will be 1 m in width, and the target Depth of Lowering (DoL) to the top of the cable will be 0.8 m - 1.2 m below ground level (subject environmental factors e.g., ground conditions). The trench will require a 20 m wide working corridor (10 m either side of the cable route) to conduct the works.

Cable protection in the form of a tubular cable protection system (i.e., Uraduct or split pipe) will be installed from the TJP to MLWS. Once cable protection is installed through the intertidal zone, it will be trenched in sections, so no trench is left open through a tidal cycle, therefore minimising sedimentation (Section 6).

The total length of the trench excavations in the intertidal zone will be:

- MLWS to MHWS at Sanday – a maximum of 160 m; and
- MLWS to MHWS at North Ronaldsay – a maximum of 140 m.

Once the cable installation in the intertidal areas is completed, the excavated material will be backfilled into the trench, returning the intertidal area to original conditions.

Transition

The TJP is the location where the subsea cable is split out into its individual cores and terminated to a land cable (Figure 3-2). The TJP at Sanday will be located above MHWS. The TJP at North Ronaldsay may be located either below or above MHWS. The TJP for both shore ends will utilise a sea earth. Should the TJP in North Ronaldsay be located below MHWS, the permanent deposits would include a 10 m x 3 m concrete plinth and a 1 m x 1 m fibre box. The footprint of these deposits will be wholly encompassed within the temporary 20 m wide working corridor. The TJP will be reinstated using the excavated material.

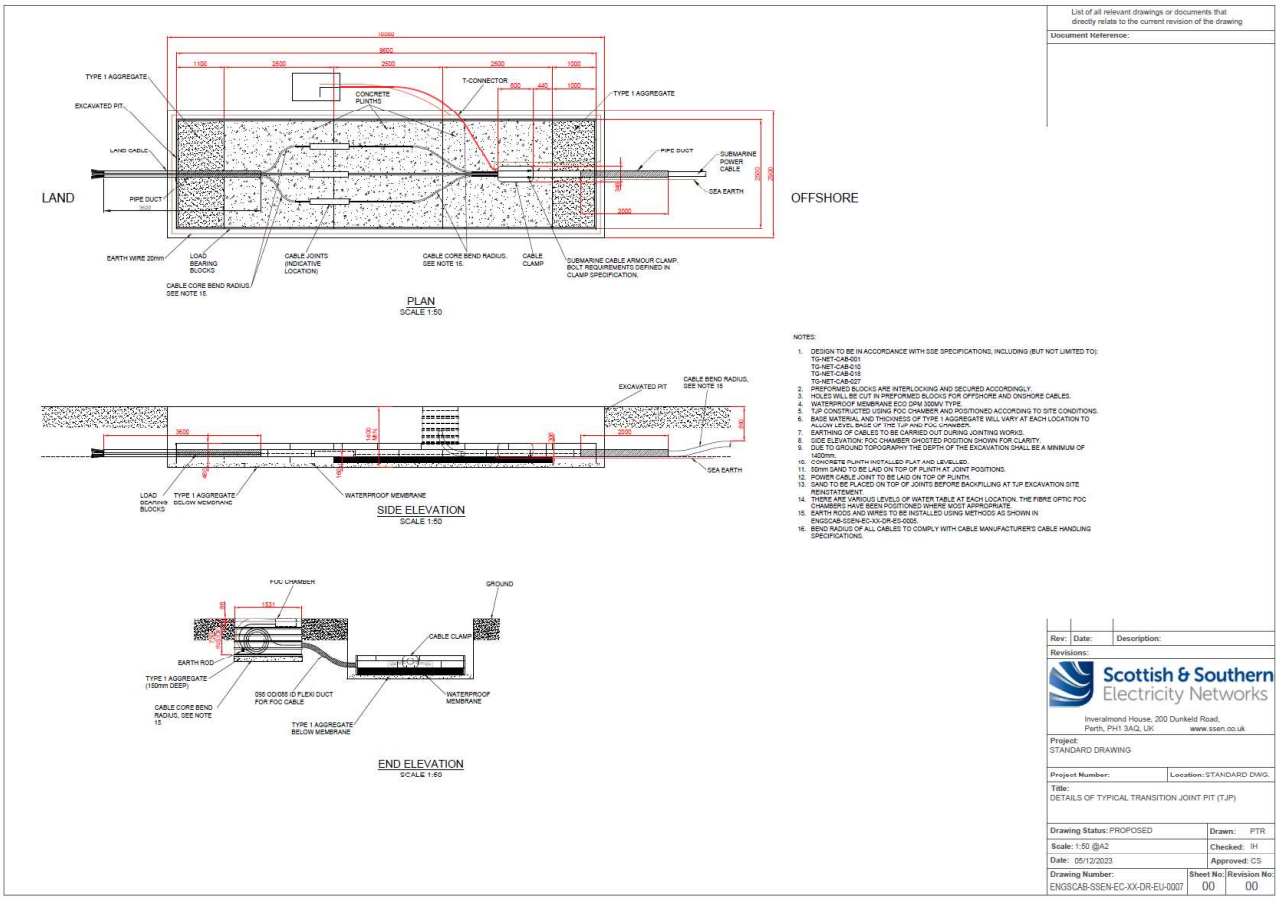


Figure 3-2 TJP layout

3.2.3 Subtidal Cable Installation

In the subtidal region the cable will be surface laid from MLWS to MLWS by the CLV, with any obstructions and/or debris avoided where possible or removed. No trenching is planned. The PLGR (if feasible), cable pull-in and offshore cable lay are planned for Autumn 2026.

3.3 Cable Protection and Stabilisation

Tubular Cable Protection System

The proposed cable protection and stabilisation may include a tubular cable protection system (such as Uraduct or split pipe) and rock bags. The cable protection will be placed where required along the cable route. No trenching is planned for any subtidal section of the cable due to the cable corridor having hard substrates with a low trenching potential along the majority of its length.

A tubular cable protection system may be used on cable shore ends and beach landings, as well as subtidal sections of cables. A worst-case of 4,000 m of tubular cable protection system may be required for the cable. The protection can be applied during the shore end installation, being fitted on the CLV whilst the cable is being paid out or retrofitted at low tide. The protection can also be installed by divers in the subtidal area using a Dive Support Vessel (DSV), after the cable has been laid on the seabed. Additional protection afforded by the tubular cable protection system has been incorporated into the route engineering with respect to both shore end landfalls and out to include the subtidal rocky outcrops. On either shore above the MLWS limit, where sufficient cable trenching depth cannot be achieved, tubular cable protection system will be fitted around the cable for additional protection in the event of exposure.

A summary of the cable protection requirements is presented in Table 3-2.

Table 3-2 Tubular cable protection system requirements

LOCATION	INTERTIDAL	SUBTIDAL	TOTAL
North Ronaldsay Shore End Out	500 m		500 m
Rocky Outcrops		2,300 m	2,300 m
Sanday Shore End Out	1,200 m		1,200 m
			4,000 m

Sea Earths

Sea Earths will also be installed to provide protection from surges and lightning strikes to the electrical circuit. It is expected that two earthing cables will be required at each shore end (four in total) using copper wires with a cross sectional diameter of 95 mm^2. One cable will earth the armour of the HVAC cable system, while the other provides an earth for the Fibre Optic (FO) armour (integral to the HVAC cable system). The earthing cables will be braided copper wire.

Rock Bags

A maximum of 276 (including 10% contingency) no. 2-tonne (t) rock bags (552 tonnes collectively) may be installed to stabilise and protect the proposed cable. Engineering studies are ongoing which may reduce the final quantity of cable stabilisation required. The worst-case scenario for each type of material is presented in the following sections,

noting that the actual cable stabilisation may be a combination of methods. Installation of rocks bags would either be from the CLV deck, a separate large installation vessel with ROV, or smaller multicat vessel.

Clump Weights / Rock Anchors

Up to six concrete clump weights (at a maximum of 40 kilograms (kg) each) may be used to anchor the sea earths at intervals / at their termination subsea. If used intertidally, they would be completely buried along with the sea earth. In the subtidal section (max 50 m beyond Lowest Astronomical Tide), the earth would be on the seabed surface and may be protected by clump weights. Up to 20 steel rock anchors (2 kg each) for the subsea earths may be used, in lieu of clump weights, where it is understood to be a harder seabed with less sediment cover.

Clump weights may also be used to secure ends of OoS cables if they require cutting and removal. Up to 12 concrete clump weights (at a maximum of 100 kg each) may be used for six OoS cable crossings.

The nearshore cable protection system will be installed during the cable laying campaign in Autumn 2026, with subtidal protection installed in Spring / Summer 2027.

4 ASSESSMENT METHODOLOGY

This MEA supports SHEPD's applications for authorisation to complete the proposed cable installation activities by providing an assessment of potential impacts on sensitive environmental receptors.

The scope of this assessment is exclusively focused on impacts to receptors pertaining to the proposed cable installation activities below MHWS.

Data sources used to input into the subsequent assessment have been derived from:

- Relevant information and reports supplied by SHEPD; and
- Publicly available literature and data.

Potential impacts have been evaluated to determine how the proposed cable installation activities could affect the environment and the corresponding significance of those impacts. Where potential significant adverse impacts are identified, specific mitigation measures have been prescribed.

It should be noted that benthic and geophysical survey interpretation is still ongoing at the time of the MLA submission. These results will be used for benthic habitat mapping and for route engineering. This MEA has therefore been based on publicly available data and preliminary benthic survey results (field observations). The CLMP will consider the benthic survey results in more detail in the description of cable lay methods and cable routing.

4.1 Marine Surveys

SHEPD has appointed a contractor to conduct a geophysical and benthic surveys of the cable corridor, including MBES and SSS data collection and seabed imagery through Drop Down Video (DDV) system. The subtidal environmental survey operations were carried out in the vicinity of the proposed cable corridor in June 2026. An intertidal walkover survey of the Sanday and North Ronaldsay landfall sites was carried out in April to May 2026. The survey data analysis is ongoing and the results will be made available to MD-LOT and NatureScot once completed. The results will be used to inform the final cable routing within the proposed cable corridor, including the final amount of cable protection required. The surveys are being undertaken within and in the immediate vicinity of the proposed cable corridor. The DDV analysis will be used in conjunction with the geophysical survey data to generate benthic habitat maps to inform cable routing. Preliminary results from field observations have informed this MEA, specifically the Benthic chapter.

A CLMP that details how the survey information has been used to inform cable lay operations and routing will be developed and issued post seabed survey data analysis completion and submitted to MD-LOT and relevant stakeholders (e.g., NatureScot). A separate CPMP for the Spring / Summer 2027 cable protection installation activities will be prepared and submitted following completion of the Autumn 2026 cable laying campaign. The aim of these plans is to ensure environmental impacts from the cable and cable protection installation are minimised as far as practicable through microrouteing of the cable and refinement of cable installation techniques, and the amount of cable protection required will be refined and reduced where possible.

4.2 Assessment Criteria

This MEA provides an assessment of potential impacts on environmental receptors, resulting from the effects of the proposed cable installation and operation. The terms effect and impact are different, as one drives the other. Effects are measurable physical changes in the environment (e.g. volume, time and area) arising from the proposed cable installation activities, while impacts consider the response of a receptor to an effect. Impacts can be defined as direct or indirect, beneficial or adverse.

In order to implement a systematic assessment of impacts between the different receptors, an overall approach to the assessment of impact significance has been implemented. The process considers:

- Sensitivity and value of a receptor;
- Magnitude of effect; and
- Determination and qualification of the significance of the impact.

4.2.1 Sensitivity and Value

The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is impacted. Sensitivity of a receptor is based on the following factors:

- Tolerance to change;
- Recoverability;
- Adaptability; and
- Value.

The scale of sensitivity is as follows: negligible, low, medium, high, very high.

4.2.2 Magnitude of Effect

The magnitude of an effect can be characterised by considering the following factors:

- Duration of the impact;
- Size and scale;
- Timing / seasonality; and
- Frequency.

Categorisation of the magnitude of effect will vary for specific topics. The magnitude categories are negligible, minor, moderate and major.

4.2.3 Significance of Impacts

The significance of potential impact has been determined by a combination of the sensitivity and value of a receptor and the magnitude of an effect. The general framework for assessing the significance of potential effects is outlined below (Table 4-1).

Table 4-1 Significance of impact

MAGNITUDE	SENSITIVITY / VALUE				
	NEGLIGIBLE	LOW	MEDIUM	HIGH	VERY HIGH
NEGLIGIBLE	Negligible	Negligible	Negligible	Minor	Minor
MINOR	Negligible	Negligible	Minor	Minor	Moderate
MODERATE	Negligible	Minor	Moderate	Moderate	Major
MAJOR	Minor	Minor	Moderate	Major	Major

In general, moderate or major impacts are classified as significant and will require additional mitigation in order to reduce the magnitude of effect to an acceptable level. Where a range of potential effects are identified, expert judgement will be used to determine the final significance.

4.3 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. During the assessment of impacts in the receptor specific assessment sections, all embedded mitigation is considered when assessing the significance of an impact. Details of the embedded mitigation which SHEPD is committed to implementing, and hence, the measures considered within the impact assessments presented in this MEA, are included in Table 4-2. All embedded mitigation is included within the Marine CEMP (Document Ref: A-200853-S00-A-PLAN-001). Where required, additional mitigation has been suggested on a receptor specific basis, informed by the impact assessments.

Table 4-2 Embedded mitigation and best practice relevant to the Project

MEASURE	DETAILS
Production of a Marine CEMP	The Marine CEMP is designed to provide a consolidated point of reference for SHEPD and their marine contractors. It ensures all embedded and additional mitigation measures identified by this MEA and supporting documents are effectively disseminated to and implemented by the Project team during Project activities, thus ensuring that any potential environmental impacts are minimised.
All Project personnel will be trained and informed of their responsibility to implement the environmental and ecological mitigation outlined in the Marine CEMP	Toolbox talks, inductions, and awareness notices will be used to disseminate this information among all relevant personnel.
Pre-installation surveys may be conducted to inform detailed route engineering	A pre-installation survey may be conducted using a ROV to assess seabed conditions and the presence of debris. Detailed geophysical and benthic survey data analysis is ongoing which will be used to inform the final cable routing within the proposed cable corridor, including the final amount of cable protection required. The surveys were undertaken within and in the immediate vicinity of the proposed cable corridor. An intertidal walkover survey also took place for purposes of habitat characterisation. These surveys and associated data analysis are ongoing and the results will be made available once completed. Where the surveys confirm the presence of sensitive benthic receptors in the proposed cable corridor, route engineering will seek to avoid sensitive habitats where possible and minimise interaction with these features. Furthermore, any Unexploded Ordnance (UXO) encountered would be avoided. As part of the route engineering process, a detailed UXO risk assessment within the proposed cable corridor has been carried out and mitigations captured as part of the installation campaign. The risk assessment concluded there is low risk throughout the proposed cable corridor (Hydrofix Ltd., 2026). Any requirement for UXO clearance will be subject to a separate marine licence.
Consideration of sensitive habitats and features	Additional mitigation will be in place for consideration of the sensitive habitats and features within the proposed cable corridor. SHEPD will avoid cable lay in areas where designated features of the Sanday SAC (reef, seagrass, discord mussel) are found as far as practicable. Furthermore, no PLGR will be undertaken in these areas throughout the proposed cable corridor.

MEASURE	DETAILS
Cable Laying and Monitoring	A CLMP that details how the survey information will be used to inform cable lay operations and routing will be developed and issued post seabed survey completion and submitted to MD-LOT and relevant stakeholders (e.g., NatureScot). The CLMP will include: • Details of the location of all works relating to the licence and cable laying techniques; • A summary of the survey work used to inform cable routing, including geophysical, geotechnical and benthic surveys, desk top studies and cable route studies where available; • A laying plan based on survey data, including details on laying methods and the avoidance of damage to reef (including discord mussel beds), intertidal mudflats and sandflats and subtidal sandbanks (including seagrass); and • Proposals for monitoring surveys of reef (including discord mussel) and seagrass on completion of the works, to determine how they have been impacted, whether they are likely to recover and if the wider habitats support new growth around the cable.
Cable Protection and Monitoring Plan	A separate CPMP for the Spring / Summer 2027 cable protection installation activities will be prepared and submitted following completion of the Autumn 2026 cable laying campaign. This plan will be developed following the cable installation.
Marine archaeological features	All wrecks or features of potential archaeological significance shall be avoided by a buffer of at least 25 m during detailed route design. The locations of wrecks and features of potential archaeological significance will be clearly identified on electronic charts on board the installation vessel and utilised to guide the proposed cable installation activities. The location of any wrecks or features of potential archaeological significance will be provided to Historic Environment Scotland (HES), and the United Kingdom Hydrographic Office (UKHO). A Protocol for Archaeological Discoveries (PAD) will be developed and implemented for the cable installation. Any features with archaeological potential encountered will be avoided.
Scottish Marine Wildlife Watching Code (SMWWC) and Basking Shark Code of Conduct	NatureScot developed the SMWWC as part of its duties under the Nature Conservation (Scotland) Act 2004. The SMWWC aims to minimise disturbance to marine wildlife (Scottish Natural Heritage, 2017). All Project vessels will adhere to the provisions of the SMWWC during the proposed cable installation activities, including reducing speed to the safest minimum when passing wildlife and avoiding sudden unpredictable changes in speed, direction and engine sound. Where animals are displaying signs of disturbance (e.g. sudden movement, aggressive behaviour), Project vessels will move away and if possible, take an alternative route or wait for the animals to move on. Additionally, all vessels will adhere to the Basking Shark Code of Conduct, such as reducing speed if basking sharks are sighted and avoiding sudden changes in speed (Shark Trust, 2026).
Lighting on board installation vessels will be kept to a minimum	Lighting on-board all installation vessels will be appropriately directed and kept to the minimum level required to ensure safe operations. This will minimise disturbance to seabird receptors, and the minimised light levels will reduce visual disturbance.

MEASURE	DETAILS
Vessels will be travelling at slow speeds during installation works	The slow speed of Project 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 the Project is minimised.
Control measures and Shipboard Oil Pollution Emergency Plans (SOPEP) will be in place and adhered to under International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I requirements for all vessels.	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 gross tonnage and above must carry an oil prevention plan as per the norms and guidelines laid down by IMO under Marine Environmental Protection Committee (MEPC) Act. Production of this plan will help to ensure that the potential for release of pollutants from installation, operation and decommissioning is minimised. In the event of an accidental fuel release occurring appropriate standard practice management procedures will be implemented accordingly.
Vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) IMO MARPOL Annex IV Prevention of Pollution from Ships standards	A Waste Management Plan will be developed and implemented to ensure the waste hierarchy is followed and all waste is sent onward to recycling or disposal via a licenced waste route. Additionally, all recovered debris will be taken ashore and sent for appropriate recycling or disposal at a licenced waste handling facility.
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 INNS introduction during the proposed cable installation activities is minimised, including: • Adherence to relevant BWM measures, where relevant. Vessels will be issued with an International Ballast Water Management Certificate; • Ballast Water Management Plans will be provided by contracted vessels in accordance with Regulation B-1 of the Convention, alongside Ballast Water Record Books as described by BWM Regulation B-2; • All vessels will consider the requirements of MEPC.207(62) guidelines, including for example the implementation of a biofouling management plan, and records of biofouling management practices kept in a biofouling record book; and • All vessels will have an International Anti-Fouling System Certificate (as appropriate).

MEASURE	DETAILS
Use of clean, inert, and virgin materials (cable and protection)	Only materials free from organic contaminants shall be used to reduce the risk of INNS. Monitoring surveys will be undertaken to determine the colonisation of cable protection measures from INNS. All equipment used in the proposed cable installation activities (e.g., ROVs), will be cleaned with freshwater prior to arrival on site.
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 North Coast and Orkney FLMAP	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 the proposed cable installation activities.
Consultation with commercial fishing stakeholders to identify acceptable and feasible mitigation options with the aim of minimising potential effects on commercial fishing	SHEPD will, in consultation with commercial fishing stakeholders, work towards identifying acceptable and feasible mitigation options with the aim of minimising any potential effects on commercial fishing associated with the replacement of submarine electricity cable. There are various options available to mitigate the risks, including: • Continuing effective positive liaison with commercial fishing stakeholders through the pre-installation, installation and operational phases of any cable replacement; • Continued employment of FLO/Fishing Industry Representative (FIR) services until the completion of the replacement works; • Ensuring contractors comply with the contractor's obligations outlined above so as to minimise any interference to commercial fishing activities; • Managing the cable replacement works so as to minimise any potential effects on the marine environment, habitats and commercial fishing; • Raising awareness of the danger of fishing in the vicinity of submarine cable; • Adopting a hierarchical approach to submarine cable protection, taking account of sea users concerns; • Organising an installation phasing workshop (if new cable is required) to inform commercial fishermen of planned activities; • Organising installation schedules (if new cable is required) as far as is practicably possible in order to reduce the combined loss of fishing area associated with safety zones; • Distributing weekly notice of operations; • Providing information in plotter format to enable fishermen to easily interpret the information; and/or • Scouting surveys to identify potting areas and any other relevant static gear areas. Additionally, discussions will be held with fish farm operators.

MEASURE	DETAILS
Notice to Mariners (NtMs), local notifications to marine users, Kingfisher bulletins, Radio Navigational Warnings, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices will 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. Notices will also be issued if any OoS cables are removed or moved and chart updates will be provided.
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 installation, 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 the Kingfisher Information Service – Offshore Renewable and Cable Awareness (KIS-ORCA) charts	Ensure navigational safety and minimise the risk of equipment snagging.
Engagement with Shipping and Navigation Consultees	Ongoing consultations with ports and harbour authority (i.e., Orkney Islands Council Harbour Authority) to ensure continued awareness and communication of installation and harbour specific details relevant to minimising disruption. Ongoing consultation with fisheries as detailed within the North Coast and Orkney FLMAP to discuss the potential impacts as a result of the installation activities. Engagement with the ferry operators (Orkney Ferries) and regular runners ensures awareness of the installation details which minimises disruption. Installation, maintenance and decommissioning schedules arranged to minimise impact on ferry schedules (North Ronaldsay – Papa Westray and Kirkwall – North Ronaldsay). This may extend to working in night-time hours where practicable. The contact details for the ferry operators will be shared with the installation contractor to aid in communication and awareness of upcoming works.

MEASURE	DETAILS
Mitigation for otters	A protected species survey has been carried out at each landfall. Pre-works checks will be conducted by an Ecological Clerk of Work (ECoW) prior to the commencement of the proposed cable installation activities and will include the cable landfall areas and a 200 m mitigation zone. Any identified otter holts, layups and couches will be identified and avoided by a 40 m buffer. Additionally, to mitigate the risk of otters becoming trapped within excavated trenches at the landfalls, ramps will be incorporated into trench designs to ensure otters are able to escape should they enter a trench.
Mitigation for designated seal haul-outs	The South North Ronaldsay seal haul-out site (used by both grey seals (*Halichoerus grypus*) and harbour seals ((*Phoca vitulina*)) and the Sanday SAC (designated for harbour seals) overlaps with the proposed cable corridor. Harbour seals are most sensitive to disturbance during the pupping season from 15 June to July and moulting which takes place in August. Therefore, there is no potential for overlap with the pupping season for harbour seals. For grey seals, breeding occurs September/October through to December with moulting until early April, therefore it is not possible to avoid the pupping season. For works near the beaches where seals may haul out, a Marine Mammal Observer (MMO) will carry out visual observations during daylight hours to monitor for the presence of seals before cable installation and preparatory works begin. Due to the urgency of the cable replacement programme, a 200 m mitigation zone to the seals will be maintained for the cable installation campaign in 2026, and for the cable protection installation in 2027, a 500 m mitigation zone will be in place. If the MMO confirms that no seals are hauled out onshore inside the designated haul-out site such that they would be within the mitigation zone, the works will be permitted to continue. If seals are found hauled out, the works will be delayed until no seals are within the mitigation zone. The Scottish Marine Wildlife Watching Code (SNH, 2017) will be adhered to during the works.

4.4 Cumulative Impact Assessment

The current 'Marine Projects' and "Applications" list on Marine Directorate's website (Marine Directorate, 2026a) was reviewed to identify other developments or activities with the potential to result in cumulative effects. A radius of search of 50 to 100 km was used to identify a number of projects and developments which are currently listed at pre-application, application, licence and post-consent status (Table 4-3). However, due to the highly localised nature of the effects likely to be associated with the Project, no potential cumulative effects were identified, and no further assessment is required. Furthermore, majority of the projects in Table 4-3 are due to be completed soon after the SHEPD Project starts or are existing fish farms which form part of the environmental baseline. Cumulative effects are therefore unlikely.

Table 4-3 Marine projects and applications listed on the Marine Directorate's website within the vicinity of the Project.

LICENCE APPLICATION NUMBER	APPLICATION NAME	APPLICANT	APPLICATION TYPE	LICENCE START/END DATE
BS 00011805	General Visual Inspection (GVI) survey Orkney to Dounreay cable route	Nexans Norway AS	Construction, alteration or improvement of any works	10/06/2026 – 30/09/2026
00008805	Bastavoe Farm	Cooke Aquaculture Scotland	Fish (including shellfish) farm	10/10/2020 – 09/10/2026
00008804	Lee of Burrafirth	Cooke Aquaculture Scotland Ltd	Fish (including shellfish) farm	17/10/2020 – 16/10/2026
07293/00008800	Quanterness Farm	Cooke Aquaculture Scotland Ltd	Fish (including shellfish) farm	05/12/2020 – 04/12/2026
00011365	Decommissioning of Penguin 1 – Billia Croo	Fortum Energy UK Ltd	Removal of any substance or object	01/01/2026 – 31/12/2026
00008892	Pegal Bay	Cooke Aquaculture Scotland Ltd	Fish (including shellfish) farm	12/01/2021 – 11/01/2027
00009016	Eday Sound	Scottish Sea Farms Ltd	Fish (including shellfish) farm	06/03/2021 – 05/03/2027
00011962	Sandy, Stronsay and Graemsay Cable Removal	Scottish Hydro Electric Power Distribution PLC	Removal of any substance or object	26/06/2026 – 26/06/2027
00009362	Capital Dredging and Sea Disposal – Scammalin Bay, Island of Faray	Orkney Islands Council	Dredging	18/07/2024 – 17/07/2027
00009296	South Cava Farm	Cooke Aquaculture Scotland Ltd	Fish (including shellfish) farm	13/10/2021 – 12/10/2027
00009279	Wick of Belmont Farm	Cooke Aquaculture Scotland Ltd	Fish (including shellfish) farm	15/10/2021 – 14/10/2027
06889 / 00010072 / 00010803	HVAC Cable – Orkney to Mainland Scotland	Scottish Hydro Electric Transmission PLC	Cable	08/06/2024 – 31/12/2027
00009349	Eynhallow Sound	Orkney Seafood Ltd	Construction, alteration or improvement of any works	02/02/2022 – 01/02/2028

LICENCE APPLICATION NUMBER	APPLICATION NAME	APPLICANT	APPLICATION TYPE	LICENCE START/END DATE
00011486	West Fara, Scapa Flow Farm	Cooke Aquaculture Scotland Ltd	Fish (including shellfish) farm	02/05/2026 – 08/02/2028
00010527 / 00010528	Geophysical Survey – North Coast and Orkney Marine region	Scottish Hydro Electric Power Distribution Plc	Other	01/02/2024 – 30/09/2028
00010221	Billia Croo Wave Test Site	Simply Blue Energy (Orkney) Limited	Renewables - Wave	06/04/2024 – 05/04/2030

5 DESIGNATED SITES ASSESSMENT

5.1 Introduction

This Section will provide the information required to support the HRA and MPA assessment processes. As such, the proposed cable installation activities will be assessed as to whether they have the potential to result in an LSE on a European Site, in line with the HRA process, or if they are capable of affecting (other than insignificantly), on an NCMPA. Therefore, magnitude and significance of impact will not be discussed within this Section, and these will be determined in the topic-specific sections.

LSE on European sites which include SPAs and SACs, as well as Ramsar sites, will be determined. In addition to this, the potential impact on NCMPAs and designated seal haul-outs will also be assessed as per sections 82 and 117 of the Marine (Scotland) 2010 Act.

5.1.1 Selection Criteria for Assessment of Protected Sites

The following selection criteria have been applied to identify protected sites with potential connectivity to the Project, that are taken forward for assessment:

- SACs and NCMPAs (including proposed and candidate sites) with cetaceans and basking sharks as qualifying features within 50 km of the proposed cable corridor;
- SACs (including proposed and candidate sites) with harbour seal interests within 50 km of the cable corridor and breeding grey seal within 20 km of the proposed cable corridor;
- Designated seal haul-outs or grey seal breeding sites that overlap with or are located within 500 m of the proposed cable corridor;
- SACs and NCMPAs (including proposed and candidate sites) with otter interests that overlap with or are located within 500 m of the proposed cable corridor;
- SPAs (including proposed sites), Ramsar Sites, and NCMPAs (including proposed sites) with birds as qualifying features that overlap with or are located within 2 km of the proposed cable corridor;
- SACs and NCMPAs (including proposed and candidate sites) with seabed / benthic protected features that overlap with the proposed cable corridor; or

- Other sites of importance, including Site of Special Scientific Interest (SSSIs), National Scenic Area (NSAs) and World Heritage Sites which transect the proposed cable corridor.

It should be noted that at-sea distances have been used for seal haul-out sites and SACs and NCMPAs with marine qualifying features, while a straight-line distance has been applied to SPAs, SSSIs, Ramsar sites, and MPAs with ornithological qualifying features.

Where protected sites are outwith the distances stated above, the site has been screened out of further assessment in this report. Where no LSE is predicted on a European site or the Project is not predicted to be capable of affecting (other than insignificantly) on a NCMPA, the site has been screened out for further assessment in this report. Where an LSE cannot be ruled out, a more detailed assessment has been carried out. Details of mitigation measures have then been presented where necessary. Further details on impacts to qualifying features will also be assessed in the topic-specific impact assessments.

5.2 Data Sources

The designated sites within the vicinity of the cable corridor have been identified through publicly available geospatial data (e.g., National Marine Plan Interactive (NMPi) (Marine Directorate, 2026b) and the Joint Nature Conservation Committee (JNCC) Marine Protected Area Mapper (JNCC, 2026) and supplemented with information from the preliminary results of the marine surveys. SHEPD have also liaised with local stakeholders with knowledge on seal haul-out locations in the course of the MEA preparation, and this anecdotal evidence has been used to inform the assessment.

5.3 Baseline and Receptor Identification

The designated sites located in the vicinity of the proposed cable corridor which have the potential to be impacted by the proposed cable installation activities subject to the selection criteria above are illustrated in Figure 5-1 and described in the following sections.

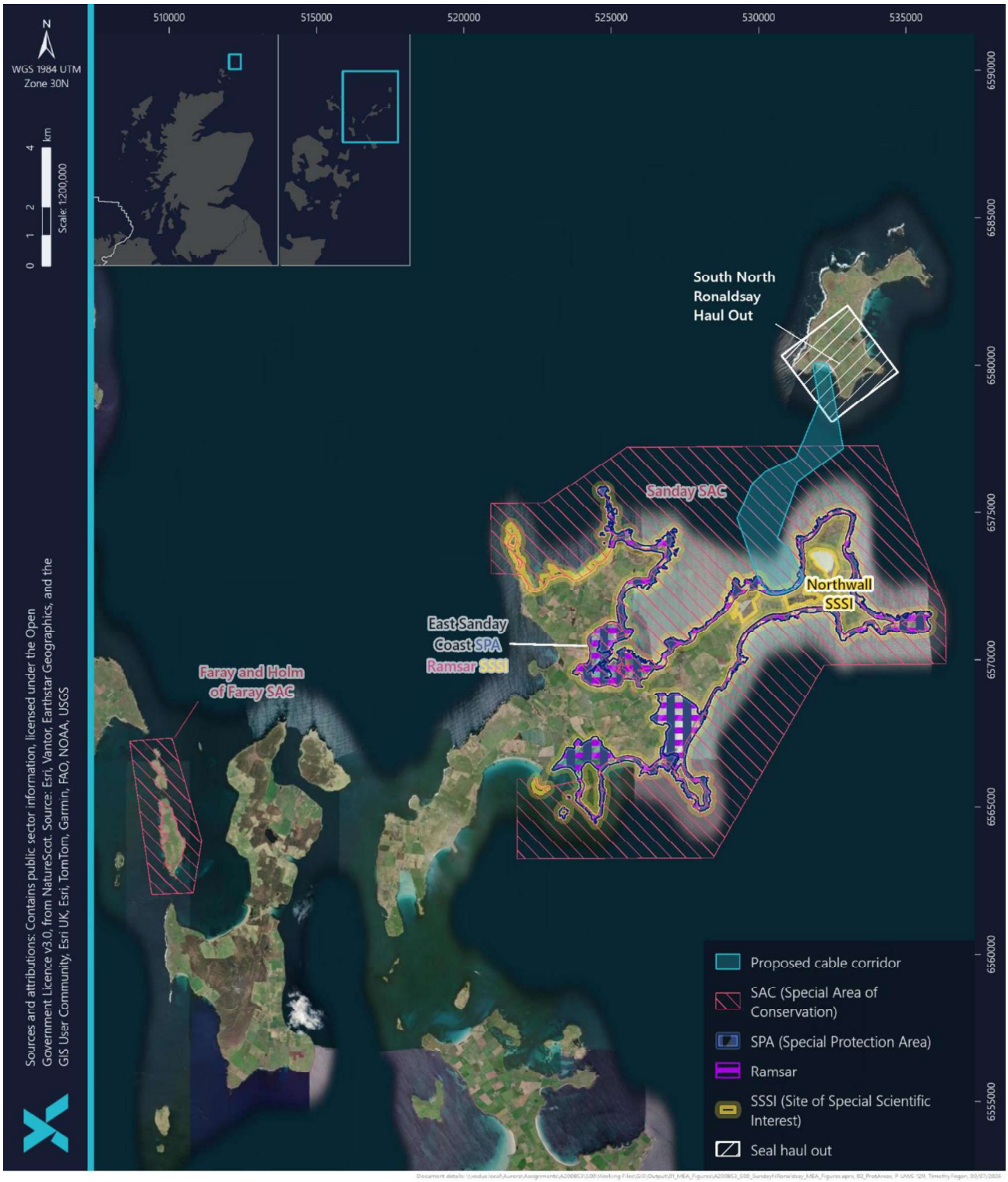


Figure 5-1 Designated Sites within the vicinity of the proposed cable corridor

5.3.1 SACs and NCMPAs with Cetaceans and Basking Sharks as Qualifying Features

All species of cetacean (whale, dolphin and porpoise) occurring in UK waters are listed in Annex IV of the Habitats Directive. Harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncates*) are listed under Annex II of the Habitats Directive and are provided additional protection through the designation of SACs for those species. Basking sharks are protected under Section 9 of the Wildlife and Countryside Act 1981 (as amended) which prohibits the killing, injuring, or taking by any method of those wild animals listed on Schedule 5 of the Act.

There are no SACs or NCMPAs with cetaceans or basking sharks as qualifying features within 50 km of the proposed cable corridor. Therefore, no ecological connectivity is expected due to the localised and short-term nature of the Project. As such, SACs and NCMPAs designated for cetaceans or basking sharks have not been considered further in this assessment.

5.3.2 SACs with Harbour or Grey Seal as a Qualifying Feature

There is one SAC with harbour seal (*Phoca vitulina*) as qualifying features within 50 km of the proposed cable corridor: the Sanday SAC, which overlaps with the proposed cable corridor. The East Sanday Coast SSSI also has harbour seal as a designated feature, but the interest will be considered within the SAC assessment for the species. There is one SAC with grey seal as a qualifying feature within 20 km of the proposed cable corridor: the Faray and Holm of Faray SAC, located ~20 km from the proposed cable corridor.

The first phase of the proposed installation activities will be undertaken in Autumn 2026, potentially overlapping with the breeding season for grey seals. The second phase of installation activities will be undertaken in Spring / Summer 2027, potentially overlapping with the harbour seal breeding season and moulting season for both seal species. Given the licence duration of 24 months, installation activities could continue into the breeding season for harbour seal if there are weather or other unforeseen delays. Therefore, SACs with harbour or grey seal as a qualifying feature are screened in for further assessment.

5.3.3 Designated Seal Haul-Outs or Grey Seal Breeding Sites

The South North Ronaldsay seal haul-out site overlaps with the proposed cable corridor and is the only site within 500 m of the proposed cable corridor. This site supports both grey and harbour seal populations. During the intertidal surveys, grey seals were present at the North Ronaldsay landfall, both in the water and hauled out (XOCEAN UK Ltd., 2026a). Anecdotal stakeholder evidence suggests that grey seals do not pup on the beach or anywhere near South Bay of North Ronaldsay and the main pupping beach is around the corner (to the East) of the landfall area past the Broch, and on Seal Skerries opposite the lighthouse (north tip of North Ronaldsay), although other stakeholders have advised that seal pups are found on beaches throughout North Ronaldsay.

Seals are inherently more susceptible to disturbance while ashore, particularly during the breeding and moult periods. The landfall works and presence of vessels very close to shore may result in seals flushing (rapidly returning to sea), if such activities are conducted in close proximity to a haul-out site. During the breeding season, this may lead to pup abandonment or crushing by adults. If disturbance at a haul-out occurs during the moult, seals returning to the sea will be subjected to thermoregulatory stress as their fur is not in suitable condition. As such it is recognised that disturbance of seal haul-outs by intertidal and nearshore installation activities may result in a reduction of fitness of seals at an individual or local population level, particularly if the disturbance occurs regularly and over multiple

seasons. Therefore, an offence of harassment under Section 117 of the Marine (Scotland) 2010 Act cannot be ruled out and impacts on designated seal haul-outs has been taken forward for assessment.

5.3.4 SACs and NCMPAs with Otter Interests

The Eurasian otter (*Lutra lutra*) are small, semi-aquatic mammals which inhabit riverine, brackish and coastal environments throughout the UK. They are listed in Annex IV of the Habitats Directive as EPS. Although land mammals, otters depend on both freshwater and marine environments for food. Their marine habitat comprises low, peat-covered coastlines with shallow, seaweed rich waters and a consistent freshwater supply (Department of Business, Energy and Industrial Strategy (BEIS), 2022).

There are no SACs or NCMPAs with otter interests that overlap or are within 500 m of the proposed cable corridor. Therefore, SACs and NMPAs with otter qualifying features are screened out and will not be considered further in the impact assessment.

5.3.5 SPAs and NCMPAs with Birds as Qualifying Features

There is one SPA located within 2 km of the proposed cable corridor: the East Sanday Coast SPA, designated for non-breeding (wintering) populations of bar-tailed godwit (*Limosa lapponica*), purple sandpiper (*Calidris maritima*) and turnstone (*Arenaria interpres*). East Sanday Coast SPA qualifies under Article 4.1 and 4.2 of the Conservation of Wild Birds Directive (79/409/EEC) by regularly supporting populations of European importance of bar-tailed godwit (1.2% of the UK population) and migratory populations of purple sandpiper and turnstone (2% of the Palearctic biogeographic population). There are no NCMPAs with birds as a feature within the vicinity of the proposed cable corridor.

Wintering birds could be present in the vicinity of the proposed cable corridor and may exhibit disturbance when foraging due to intertidal works and vessel presence. Therefore, the East Sanday Coast SPA is screened in for further assessment.

5.3.6 SACs and NCMPAs with Seabed / Benthic Protected Features

There is one SAC with seabed / benthic protected features overlapping the proposed cable corridor: the Sanday SAC, designated for Annex I benthic habitats such as reefs (including associated discord mussel beds and kelp beds) and intertidal mudflats and sandflats and subtidal sandbanks (including associated seagrass beds). The seabed habitat within the Sanday SAC is characterised by sandy beaches and sheltered inlets with areas of rocky headlands. Reefs provide habitat for a variety of species including kelp, echinoderms, sponges and dense carpets of discord mussel occupying sublittoral reefs (NatureScot, 2025). The proposed cable corridor overlaps with the Sanday SAC for approximately 7.1 km^2. The preliminary benthic survey results from field observations indicate extensive kelp forests and hard reef substrate throughout the cable corridor within the SAC, but no discord mussel beds were observed (although it should be noted that kelp obstructed the DDV view).

The proposed cable installation activities have the potential to result in direct and indirect disturbance and loss to these features (temporary and permanent), and as such SACs with seabed / benthic protected features are screened in for further assessment.

There are no NCMPAs with seabed / benthic protected features within the vicinity of the proposed cable corridor and therefore NCMPAs with seabed / benthic protected features are not screened in for further assessment.

5.3.7 Other Sites of Importance

The proposed cable corridor overlaps with the East Sanday Coast SSSI and Ramsar site. The East Sanday Coast SSSI is designated for non-breeding populations of bar-tailed godwit, purple sandpiper, ringed plover (*Charadrius hiaticula*), sanderling (*Calidris alba*), and turnstone, as well as a passage population for turnstone. Additionally, the East Sanday Coast SSSI is designated for harbour seal, rocky shore, sandflats, and vascular plant assemblage. The East Sanday Coast Ramsar site is designated for non-breeding populations of bar-tailed godwit, purple sandpiper, turnstone. There is potential for disturbance to birds as a result of the proposed cable installation activities and therefore the East Sanday Coast SSSI and Ramsar site are screened in for further assessment (noting that as the Ramsar Site has the same features as the SPA, the SPA assessment applies to both).

The proposed cable corridor overlaps with the Northwall SSSI is designated for machair and machair loch. As this feature is located above MHWS it is outwith the scope of this MEA and the Northwall SSSI has been screened out for further assessment.

5.4 Potential Connectivity with Designated Sites

Although there are designated sites within relatively close proximity to the proposed cable corridor, for a LSE to arise, there must be potential ecological connectivity between the installation activities and the qualifying features of a designated site. An initial consider has been provided within Table 5-1 identifying whether particular designated sites or particular impacts require a more detailed investigation of whether there is a potential LSE. Those sites or impacts for which no LSE is expected are not considered for further assessment.

Table 5-1 Designated sites within the vicinity of the proposed cable corridor as per the selection criteria and potential connectivity (JNCC, 2025)

DESIGNATED SITE	REASON FOR SELECTION	DISTANCE TO CABLE CORRIDOR (km)	RELEVANT QUALIFYING FEATURES	POTENTIAL IMPACT PATHWAY	REQUIREMENT FOR FURTHER ASSESSMENT
Sanday SAC	Overlaps with the proposed cable corridor.	0	• Reefs; • Sandbanks which are slightly covered by sea water all the time; • Mudflats and sandflats not covered by seawater at low tide; and • Harbour seal.	Cable and cable protection installation. Vessel presence offshore, vehicle presence at shore and use of geophysical equipment (noise emissions).	Y – There is potential connectivity to the site from disturbance to benthic habitats and species during the proposed cable installation activities. Therefore, further assessment is required.
South North Ronaldsay Seal Haul-Out Site	Overlaps with the proposed cable corridor.	0	• Harbour seal; and • Grey seal.	Cable and cable protection installation. Vessel presence nearshore and vehicle presence onshore.	Y – There is potential connectivity to the site from disturbance to seals during the proposed cable installation activities. Therefore, further assessment is required.
East Sanday Coast SPA and Ramsar	This site is located within 2 km of the proposed cable corridor.	0	• Bar-tailed godwit (wintering); • Great black-backed gull (breeding); • Purple sandpiper (wintering); • Ringed plover (wintering); • Ruddy turnstone (wintering); and • Sanderling (wintering).	Vehicle presence onshore, vessel presence nearshore and light disturbance.	Y- There is potential connectivity to the site from disturbance to birds during the proposed cable installation activities. Therefore, further assessment is required.

DESIGNATED SITE	REASON FOR SELECTION	DISTANCE TO CABLE CORRIDOR (km)	RELEVANT QUALIFYING FEATURES	POTENTIAL IMPACT PATHWAY	REQUIREMENT FOR FURTHER ASSESSMENT
East Sanday Coast SSSI	Overlaps with the proposed cable corridor.	0	• Harbour seal; • Bar-tailed godwit (non-breeding); • Purple sandpiper (non-breeding); • Ringed plover (non-breeding); • Sanderling (non-breeding); • Turnstone (passage); • Vascular plant assemblage (terrestrial feature) • Sandflats; and • Rocky shore.	Vehicle presence onshore, vessel presence nearshore and light disturbance. Use of geophysical equipment (noise emissions). Intertidal cable installation works.	Y – There is potential connectivity to the site from disturbance to seals and birds during the proposed cable installation activities. Therefore, further assessment is required.
Faray and Holm of Faray SAC	This site is located within 20 km of the proposed cable corridor.	20	• Grey seal.	Vessel presence offshore and use of geophysical equipment (noise emissions).	Y- There is potential connectivity to the site from disturbance to seals offshore during the proposed cable installation activities. Therefore, further assessment is required.

5.5 Assessment of Effects

The following Sections will assess the potential for LSE for SACs and SPAs which require further assessment, in addition to assessing the potential for significant effects on Ramsar sites, SSSIs and designated seal haul-outs. For each designated site that has the potential to be affected by the proposed cable installation activities, embedded mitigation measures have been considered based upon site-specific protected features.

5.5.1 SACs with Harbour or Grey Seal as a Qualifying Feature

As per the assessment of potential connectivity outlined in Section 5.4, there is one SAC with harbour seal as a qualifying feature within the connectivity range of 50 km: the Sanday SAC. Additionally, there is one SAC with grey seal as a qualifying feature within the connectivity range of 20 km: the Faray and Holm of Faray SAC. Further details on the assessment of potential impacts on pinnipeds is detailed within Section 7: Marine Megafauna.

Underwater Sound

Underwater sound emissions have the potential to cause physical injury or disturbance to seals, particularly if they fall within their generalised hearing range (Southall *et al.*, 2019; National Marine Fisheries Service (NMFS), 2018). As detailed in Section 7: Marine Megafauna, no injury risk to harbour or grey seals is associated with the Project, and the disturbance range is limited to approximately 207 m. The proposed cable installation activities are due to take place in Autumn 2026 and Spring / Summer 2027, with a licence duration of 24 months. Therefore, there is potential for the proposed cable installation activities to coincide with the pupping and moulting season for harbour seal and grey seal. The proposed cable installation activities will be highly localised, transient, temporary in nature. As such, there will be no Adverse Effect on Site Integrity (AEoSI) on the Sanday SAC or Faray and Holm of Faray SAC as a result of underwater sound emissions. Nonetheless the SMWWC (Scottish Natural Heritage, 2017) will be adhered to during the Project.

Vessel, Vehicle and Human Presence

There is no potential for LSE on the Faray and Holm of Faray SAC as a result of nearshore vessel presence and shore based activities given the distance between the proposed cable corridor and the Faray and Holm of Faray SAC.

For the Sanday SAC, the potential for LSE cannot be ruled out as a result of vessel presence; however, this activity will be highly localised, short-term, transient in nature and the seals are accustomed to vessel activity in the area due to the interisland ferry traffic. The SMWWC will be adhered to throughout the Project activities (Scottish Natural Heritage, 2017). As such, there will be no AEoSI on the Sanday SAC as a result of vessel presence.

For the intertidal cable installation activities, there is potential for disturbance from human and machinery presence to harbour seals hauled-out at the Sanday SAC. Seals pups and mothers are particularly sensitive to disturbance when on land, and any operations at the beach and intertidal area may prevent seals from hauling out on the beach. Therefore, LSE cannot be ruled out on the Sanday SAC as a result of shore based intertidal cable installation activities.

The boundary landfall will be within the Sanday SAC along the sandy beach of the bay of Sandquoy which is commonly used by locals for walking and other beach activities. However, the areas regularly utilised by seals (mainly grey seals with some presence of harbour seals) are the rocky areas to the west and east of the sandy beach located >500 m from the cable corridor centre (Sanday Development Trust, pers. comm) (Figure 5-2). The largest breeding groups of harbour seals in the Sanday SAC are usually found at Bea Ness on the south coast, Long Taing, Taing of Tor Sker and the Holms of Ire on the north coast and on tidal ledges within Otterswick, Whitemill and Tofts (NatureScot, 2025). The nearest to the landfall is the Taing of Tor Sker, which is the rocky area located west of the landfall.

Figure 5-2 Utilisation of the landfall location within Sanday SAC by harbour seals (in yellow) (Sanday Development Trust, pers. Comm; NatureScot, 2025). Cable installation activities would occur on the sandy beach.

It is likely that harbour seals will prefer the shoreline outside the cable landfall beach. Harbour seals are most sensitive to disturbance during the pupping season from mid-June to July and moulting in August. Therefore, there is unlikely to be overlap with intertidal works and the pupping season for harbour seals. The Project will avoid cable and cable protection installation activities during the harbour seal pupping season as far as practicable, and no activities are currently planned for this sensitive period.

Where intertidal works within the Sanday SAC during the harbour seal breeding period cannot be avoided, a search of the intertidal works area will be undertaken prior to commencement of cable installation activities. The intertidal cable installation activities will only be permitted to commence if seals are not found hauled out on the beach or in the water close to the intertidal area. Should any seals be detected within the 500 m mitigation zone, except in the event of a need to avoid critical delay to the Project in which case the mitigation zone for seals will be 200 m. The reduction in mitigation zone distance from 500 m to 200 m only applies to the cable installation campaigns in autumn 2026. For the cable protection installation in 2027, a 500 m mitigation zone will be maintained and the sensitive periods avoided as far as practicable. If the MMO confirms that no seals are hauled out onshore inside the designated haul-out site such that they would be within the mitigation zone, the works will be permitted to commence/continue. The SMWWC (Scottish Natural Heritage, 2017) will also be followed.

Considering that the proposed cable installation activities will be transient, temporary, and localised, with the implementation of the mitigation measures, there will be no AEoSI on the Sanday SAC as a result of the intertidal cable installation activities.

5.5.2 Designated Seal Haul-Outs

As per the assessment of potential connectivity outlined in Section 5.4, the South North Ronaldsay seal haul-out is the only designated seal haul-out site in the vicinity (within 500 m) of the proposed cable corridor. The proposed cable corridor overlaps with the South North Ronaldsay seal haul-out, designated for harbour seal and grey seal. Further details on the assessment of potential impacts on pinnipeds are detailed in Section 7: Marine Megafauna.

Vessel, Vehicle and Human Presence

There will be a number of vessels present on site during installation activities, including vehicles during intertidal works, which have the potential to result in disturbance risk to seals. The greatest potential for disturbance is during the breeding and/or moulting period. The proposed cable installation activities are due to take place in Autumn 2026 and Spring / Summer 2027, with a licence duration of 24 months. Therefore, there is potential for the proposed cable installation activities to coincide with the pupping and moulting season for harbour seal and grey seal:

- Grey seal sites: September – December (inclusive) for the breeding season and moult.
- Harbour seal sites: 15th June – August (inclusive) for the breeding season and moult.

Harbour seals are most sensitive to disturbance during the pupping season from mid-June to July and moulting in August. Therefore, there is no potential for overlap with the pupping season due to the Project activities taking place in autumn and spring. For grey seals, breeding occurs September/October through to December with moulting until early April, therefore it is not possible to avoid the pupping season.

The seals will be accustomed to vessel traffic in the area due to the interisland ferry service. As part of the embedded mitigation detailed in Section 4.3, all vessels will adhere to the SMWWC which will minimise disturbance to marine wildlife, lighting on board will be kept to a minimum to reduce potential light disturbance and vessels will be travelling at slow speeds.

Where intertidal works occur within the South North Ronaldsay seal haul-out during the harbour seal moult and the grey seal breeding period, relevant mitigation measures (Section 4.3) will be implemented.

Subject to further consultation and agreement with NatureScot, a search of the intertidal area for seals will be undertaken prior to commencement of shore based intertidal cable installation activities. The intertidal cable installation activities will only be permitted to commence if seals are not found hauled out on the beach or in the water close to the intertidal area. Should any seals be detected within the 500 m mitigation zone, except in the event of a need to avoid critical delay to the Project in which case the mitigation zone for seals will be 200 m. The reduction in mitigation zone distance from 500 m to 200 m only applies to the cable installation campaigns in autumn 2026, and for the cable protection installation in 2027, a 500 m mitigation zone will be maintained and the sensitive periods avoided as far as practicable. If the MMO confirms that no seals are hauled out onshore inside the designated haul-out site such that they would be within the mitigation zone, the works will be permitted to commence/continue. The SMWWC (Scottish Natural Heritage, 2017) will also be followed.

As such, no adverse effect on the South North Ronaldsay designated seal haul-out is expected from cable installation activities.

5.5.3 SPAs, RAMSAR and SSSIs with Birds as Qualifying Features

As per the assessment of potential connectivity outlined in Section 5.4, there is one SPA with birds as a qualifying feature within the vicinity of the proposed cable corridor: the East Sanday Coast SPA, which overlaps the proposed cable corridor. This assessment also considers potential impacts on the East Sanday Coast SSSI (direct overlap) and RAMSAR site (direct overlap). The East Sanday Coast SPA and RAMSAR site are designated for non-breeding (wintering) populations of bar-tailed godwit, purple sandpiper, and ruddy turnstone. The East Sanday Coast SSSI is designated for non-breeding populations of bar-tailed godwit, purple sandpiper, ringed plover, sanderling, and turnstone, as well as a passage population for turnstone. Further details on the assessment of potential impacts on birds are detailed in Section 9: Ornithology.

Vessel, Vehicle and Human Presence

Overwintering and migrating wading birds could be present in the vicinity of the proposed cable corridor and may exhibit disturbance when foraging due to vessel presence and shore based intertidal cable installation activities. The construction and supporting vessel activity will be highly localised, short-term and transient in nature. The baseline vessel traffic already includes ferries and there will not be a material change to the existing vessel traffic. As part of the embedded mitigation detailed in Section 4.3, lighting on board will be appropriately directed and kept to a minimum to reduce potential light disturbance and vessels will be travelling at slow speeds to reduce the potential collision risk. Therefore, there will be no AEoSI on the East Sanday Coast SPA and Ramsar site as a result of nearshore vessel presence, or significant effect on the East Sanday Coast SSSI.

The human and vehicle presence at the Sanday landfall site could also lead to an LSE on the East Sanday Coast SPA and Ramsar Site, and impacts the notified features of the SSSI. The shore based intertidal cable installation activities will be highly localised and short-term. The Sanday landfall beach is also commonly used by locals for walking and recreational uses, and as such the birds are accustomed to a baseline disturbance level. Therefore, any disturbance is expected to be minimal, with no adverse population consequences as a result. As such, no AEoSI on the East Sanday Coast SPA and Ramsar Site and no significant impacts on the notified features of the SSSI as a result of shore-based intertidal cable installation activities is expected.

5.5.4 SACs with Seabed / Benthic Features as Qualifying Features

As per the assessment of potential connectivity outlined in Section 5.4, the Sanday SAC is the only designated site for benthic and seabed features and overlaps with the proposed cable corridor. The Sanday SAC is designated for reefs (including discord mussel and kelp beds as the associated feature), and intertidal mudflats and sandflats and subtidal sandbanks (including seagrass beds as the associated feature). Further details on the assessment of potential impacts on benthic habitats are detailed in Section 8: Benthic and Intertidal Ecology.

As described above, the benthic surveys and associated data analysis are ongoing and the results will be made available once completed. The results will be used to inform the final cable routing within the proposed cable corridor, including the final amount of cable protection required. A CLMP that details how the survey information will be used to inform cable lay operations and routing will be developed and issued post seabed survey completion and submitted to MD-LOT and relevant stakeholders (e.g., NatureScot). A separate CPMP for the Spring / Summer 2027 cable protection installation activities will be prepared and submitted following completion of the Autumn 2026 cable laying campaign.

Cable Installation and Protective Structures (Direct / Indirect Habitat Loss)

There is potential for direct and indirect temporary habitat loss / disturbance as a result from pre-installation activities, including seabed preparation (OoS cable removal and boulder picking), intertidal trenching and the installation of the TJP (applicable to North Ronaldsay only) and the temporary placement of mooring anchors. No PLGR will be undertaken in areas where designated features of the Sanday SAC are found within the proposed cable corridor. As the majority of the cable corridor is expected to be reef, no PLGR is likely to be used during the Project. There is potential for direct and indirect permanent habitat loss / disturbance in the footprint of the surface laid cable and associated cable stabilisation (including the tubular cable protection system and rock bags). There will be no subtidal trenching. As per the embedded mitigation, SHEPD will avoid cable lay in areas where designated features of the Sanday SAC (reef, seagrass, discord mussel) are found, as far as is practicable.

Annex I Reef (including discord mussel and kelp)

The Sanday SAC supports extensive intertidal, shallow subtidal & offshore bedrock reef habitats, comprising an area of approximately 49 km^2 throughout the SAC (NatureScot, 2025). The Sanday SAC has an overall area of ~110 km^2. The Sanday SAC also supports the only known examples of discord mussel beds in Scottish waters (NatureScot, 2025). Dense carpets of the discord mussel cover sublittoral reefs that are exposed to fast currents in the North Ronaldsay Sound and to the south of Start Point; however, it is noted that the extent of this feature within the Sanday SAC has currently not been estimated (NatureScot, 2025). The Annex I reefs habitat feature condition is currently '*favourable maintained*' and therefore the Conservation Objectives seek to maintain this condition. As such, the Conservation Objectives state to ''maintain the current extent and distribution of reefs within the site' and 'to maintain the current extent and distribution of discord mussel beds within the site'.

The early field observations from the DDV benthic survey campaign indicate that the cable corridor is likely to consist of reef, although for majority of the corridor the view was obstructed by dense kelp beds. No discord mussel was observed, but it is noted that the visibility of the seabed was limited due to the kelp. Literature review indicates that the discord mussel occurs in dense mats and occasionally completely coats all available surfaces, with large areas of rock and many of the kelp plants being covered with a mat of the mussel within the SAC (White et al. 2002).

Annex I Intertidal Mudflats and Sandflats (including seagrass)

The Sanday SAC supports ~17 km^2 of intertidal mudflats and sandflats around Sanday. Sparse seagrass beds of *Ruppia sp.* have been identified on an intertidal transect at Cata Sand and also from an area within Otters Wick Bay (NatureScot, 2025). The Annex I intertidal mudflats and sandflats habitat feature condition is currently '*favourable maintained*' and therefore the Conservation Objectives seek to maintain this condition. As such, the Conservation Objectives state to ''maintain the current extent and distribution of intertidal mudflats and sandflats within the site' and 'maintain the current extent and distribution of intertidal seagrass beds within the site.'

The intertidal walkover survey (XOCEAN UK Ltd and Benthic Solutions Limited, 2026) did not record any seagrass and majority of the Sanday landfall was littoral sand.

Annex I Subtidal Sandbanks (including seagrass)

Subtidal sandbanks are confined to areas of sheltered, fine sand within Otters Wick, patches of tide-swept, coarse sediment in Sanday Sound and Kettletoft Bay, and inshore areas immediately adjacent to the open-coast bays, constituting an area of approximately 55 km^2 throughout the Sanday SAC. Beds of the seagrass *Zostera marina* have been recorded in the sublittoral along the Western coastline of Otters Wick Bay and at Backaskaill Bay, near Kettletoft (NatureScot, 2025). The Annex I subtidal sandbanks habitat feature condition is currently '*favourable maintained*' and therefore the Conservation Objectives seek to maintain this condition. As such, the Conservation Objectives state to 'maintain the current extent and distribution of subtidal sandbanks within the site' and 'maintain the current extent

and distribution of intertidal seagrass beds within the site.' The subtidal sandbanks present within the Sanday SAC also support the Scottish PMF 'kelp and seaweed communities on sublittoral sediment.'

Assessment of Potential Effects

A full assessment of the Annex I habitats and sub-features present with the proposed cable corridor is currently being undertaken by Benthic Solutions Limited (BSL), and the analysis and results will be made available once complete. The early field observations from the DDV benthic survey campaign indicate that some subtidal sand is present in the cable corridor alongside reef, but no records of seagrass in the Sanday SAC were recorded. An individual patch of seagrass was found in the corridor, but this was near the North Ronaldsay landfall, outside the Sanday SAC.

Intertidal sandbanks and mudflats

The intertidal works in the Sanday SAC involve the excavation of a 160 m OCT with a 20 m working corridor, equating to a temporal footprint of works of 3,200 m which will be within the Sanday SAC's intertidal sandbanks. As this site is however fully reinstated on completion of the intertidal cable installation and the impacts are short-lived and of limited extent, no AEoSI on the Sanday SAC's intertidal sandbanks and mudflats as a result of the proposed cable installation activities is concluded.

Reefs

A description of the methodology used to calculate temporary disturbance and permanent habitat change is outlined in Section 8.4.1. Given that the cable will be surface laid, disturbance from direct habitat loss is expected to be highly localised in extent, limited to the footprint of the cable and associated cable stabilisation (e.g. rock bags) (i.e., up to 0.1 km^2 temporary footprint and 0.002 km^2 permanent footprint) and within the small spatial scale footprint of the cable removal activities (Table 8-1; see Section 8.4.1). Any disturbance or loss of benthic habitats will be limited to the immediate footprint of the cable installation and removal activities, and hence, will impact a very small portion of the total area of the designated site's (i.e., 0.2% (temporary) and 0.004% (permanent) of the reef feature. Due to the extensive presence of reef in the cable corridor and the wider SAC, the minor disturbance and loss of the reef is unlikely to be significant and impact achievement of the maintenance conservation objective.

Furthermore, rocky reefs dominated by kelp communities have overall a moderate to high ability to recover from a range of pressures including abrasion (NatureScot, 2025). Whilst this pressure can cause the decline in typical species and overall species diversity, many of the species associated with these communities e.g., kelps, are known to be rapid colonizers and fast growing, although the re-establishment of a community containing the range of typical species may take several years. For the more exposed rocky reef communities that are dominated by animal communities, including soft corals and sponges, brittle stars and hydroids the ability to recover is moderate-high for pressures such as abrasion (NatureScot, 2025). Common typical species may be able recruit onto bare surfaces within 2 years, but it may take 5 years to become a dominant component of the community again. Local recruitment in discord mussel may be rapid, depending on the hydrographic regime. Hence, within a population or between adjacent populations recruitment is probably fairly rapid (NatureScot 2025).

Due to the limited footprint of impacts and the ability of the reef features (which are prevalent in the cable corridor) to rapidly recover from impacts through recruitment and recolonisation (NatureScot, 2025), there will be no AEoSI on the Sanday SAC as a result of the proposed cable installation activities.

Subtidal sandbanks

As the Sanday SAC also supports ~55 km^2 of subtidal sandbanks (including seagrass, although only a small patch found in the cable corridor) around Sanday landfall. Assuming the temporary (0.1 km^2) permanent (0.002 km^2) seabed footprint, it is concluded that less than 0.2% (temporary) and 0.004% (permanent) of Sanday SAC's subtidal sandbanks

will be affected due to the Project. Due to the very minor impacts and recoverability of the temporary footprint following installation, no AEoSI of the Sanday SAC subtidal sandbank feature is concluded.

5.5.5 Other Sites of Importance

East Sanday Coast SSSI

The proposed cable corridor overlaps with the East Sanday Coast SSSI is designated for harbour seal. The assessment for potential impacts on harbour seal is as described in Section 5.3.2 and Section 5.3.3 above. Therefore, given the embedded mitigation, no significant effects on harbour seal are anticipated. The East Sanday Coast SSSI is also designated for rocky shore, sandflats, and vascular plant (a feature above MHWS so not considered in this assessment). The intertidal cable installation works including OCT temporarily disturb the sandy sediments at landfall Sanday landfall, with potential impacts on the sandflats and rocky shore features of the East Sanday Coast SSSI. As the OCT will be reinstated following installation campaign, any impacts are considered to be temporary and fully recoverable. As such, no significant impacts on the SSSI are anticipated.

6 SEABED AND WATER QUALITY

6.1 Introduction

This Section provides an overview of potential impacts on seabed conditions and water quality resulting from the proposed cable installation activities (including seabed preparation (potential but unlikely PLGR and OoS cable removal), intertidal trenching, surface laying of the cable and associated protection and from the temporary placement of anchors). Details on baseline seabed conditions presented in this Section provides the relevant information for the purposes of the impact assessment and is not intended for engineering applications.

In the subtidal section between MLWS and MLWS, the proposed cable protection and stabilisation may include a tubular cable protection system (such as Uraduct or split pipe) and rock bags. The cable protection will be placed where required along the cable route. The cable lay will avoid areas where the sensitive benthic habitats and features of the Sanday SAC are found, as further described in Section 8. The working corridor in the subtidal area is expected to be 10 m wide. Discrete sections (~1 km) of OoS cable may be removed in the subtidal. Associated impacts on benthic features are discussed in Section 5.5.5 above and Section 8. As such, potential effects on seabed quality have been screened out of this assessment.

In the intertidal areas between MHWS and MLWS, the cable will be trenched at both landfalls using the OCT method. This will be conducted using conventional land-based excavators working within a tidal window, i.e., when the intertidal area is exposed, avoiding works below the waterline. One trench will be required at each landfall down to MLWS with a width of approximately 1 m. It is anticipated that a 20 m wide working corridor will be required (10 m either side of the route), accounting for the footprint of the excavator and the temporary storage of excavated material. Cable protection in the form of a tubular cable protection system will be installed from the TJP to MLWS. Once cable protection is installed through the intertidal zone, it will be trenched in sections, so no trench is left open through a tidal cycle, therefore minimising sedimentation. OoS cables may be removed in the nearshore (slightly below MLWS) at both shore ends to allow the new cable to be installed in the best approach angle. Any cable ends will be cut and pulled back and secured with clump weights and left within the proposed cable corridor.

The seabed footprint of the Project will be confined to the physical footprint of the proposed subsea cable and any cable protection or intertidal trenching. Intertidal trenching activities have the potential to result in sediment resuspension, therefore the potential impact of coastal sediment suspension is screened in for the water quality

assessment. Additionally, the potential impact of changes to sediment and water quality following accidental release of hydrocarbons is screened in for the water quality assessment.

6.2 Data Sources

Seabed sediments and bathymetry data have been characterised using preliminary interpretation of site-specific data and publicly available data. Water Quality and the presence of designated water bodies have been identified through the Scottish Environment Protection Agency (SEPA) River Basin Management 3 database (SEPA, 2026a).

6.3 Baseline and Receptor Identification

6.3.1 Seabed Sediments and Bathymetry

As described above, the site-specific surveys and associated data analysis are ongoing and the results will be made available once completed. Based on preliminary interpretation of the subtidal survey, the water depth along the proposed cable corridor ranges from approximately 0 m to 18 m below Lowest Astronomical Tide (Figure 6-1). Preliminary analysis of benthic survey video footage revealed that the sediment composition of the shallower, more sheltered nearshore region was comprised of fine rippled sand, while the slightly deeper, more exposed sections along the cable route are characterised by coarse gravelly sand on top of bedrock and rocky reef (XOCEAN UK Ltd., 2026b). In the intertidal area, both landfalls are comprised of predominantly sandy habitats towards the mid to lower shore, with varying sizes of cobbles and pebbles present along the upper shore (XOCEAN UK Ltd., 2026a).

6.3.2 Water Quality

Through the Water Environment and Water Services (Scotland) (WEWS) Act 2003 the EU Water Framework Directive (2000/60/EC) (WFD) is implemented into Scottish law and regulated through the Water Environment (Controlled Activities) (Scotland) Regulations 2011. The WFD ensures the protection of inland, transitional and coastal surface waters, and groundwaters through regulating individual pollutants, to remove and reduce pollution in water sources and prevent deterioration. It is a requirement that designated waterbodies are maintained at 'Good' status, both ecologically and chemically.

The proposed cable corridor is located within the Noup Head to Start Point designated coastal waterbody (ID: 200244). The Noup Head to Start Point designated coastal waterbody has an area of 623.5 km^2 and is listed in 'Good' overall condition, with 'Good' water quality status and 'High' physical condition and freedom from invasive species status (SEPA, 2026a). These statuses are applicable to the 2027 and long-term predictions as well. There are no designated bathing waters or shellfish water protected areas in the vicinity of the proposed cable corridor (SEPA, 2026b).

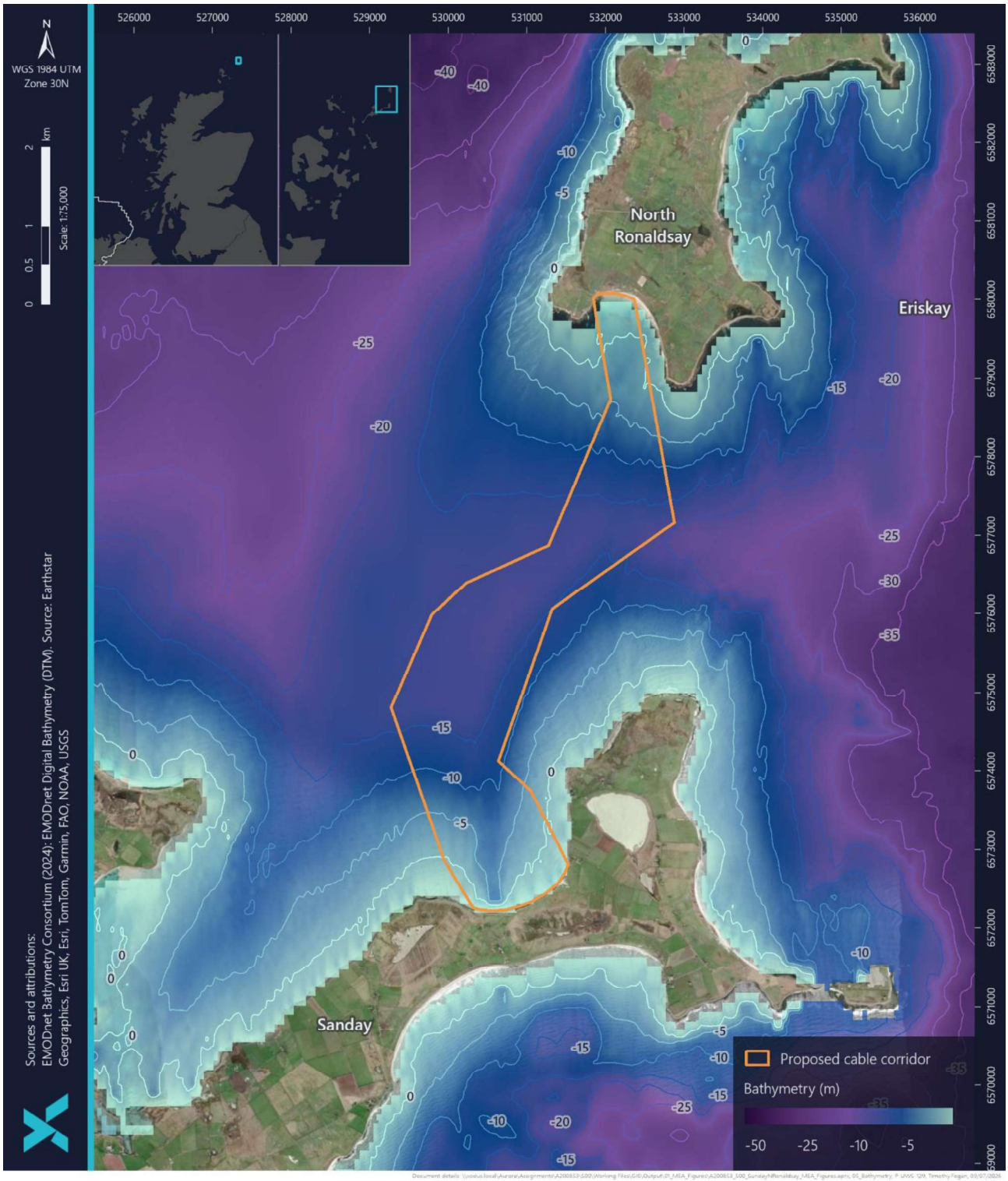


Figure 6-1 Bathymetry of the proposed cable corridor

6.4 Impact Assessment

6.4.1 Coastal Sediment Suspension

In the intertidal areas between MHWS and MLWS, the proposed subsea cable will be trenched at both landfalls using the OCT method. This will be conducted using conventional land-based excavators working within a tidal window, i.e., when the intertidal area is exposed, avoiding works below the waterline. Once cable protection is installed through the intertidal zone, it will be trenched in sections, so no trench is left open through a tidal cycle, therefore minimising the suspension of sediments. At the North Ronaldsay shore end, the TJP may be installed below MHWS; however, the footprint will be wholly contained within the temporary 20 m wide working corridor. The TJP will be reinstated using the excavated material. OoS cables may be removed in the nearshore (slightly below MLWS) at both shore ends. This will also be conducted at low tide. It is therefore expected that there will be no disturbance of submerged sediments resulting from these intertidal activities. The intertidal region is characterised by predominantly sandy habitats at both landfalls (XOCEAN UK Ltd., 2026a). As such, there may be temporary and highly localised increases in suspended sediment caused by the incoming tide interacting with the trench walls and associated spoil. However, this will not be significantly greater than that expected by natural wave action causing low-level erosion of the shoreline sediments.

Assessment of Impact Significance

The proposed cable corridor overlaps with the Noup Head to Start Point designated coastal waterbody; however, this coastal waterbody is currently in 'Good' overall condition with no pressures identified. There are no bathing waters or shellfish water protected areas located within the vicinity of the proposed cable corridor. Therefore, the overall sensitivity is **low.**

All proposed cable installation activities at the landfall locations will be tidally dependent, working at low water thereby reducing the extent of resuspended sediment. Increased suspended sediment in the intertidal region will only occur during the interaction between the incoming tide, the trench walls and spoil heaps. This will result in highly localised and temporary increases in suspended sediment which will be analogous to natural conditions. Therefore, the magnitude of effect is assessed as **minor**, resulting in a **negligible** consequence.

Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
Low	Minor	Negligible

Impact Significance – **NOT SIGNIFICANT**

6.4.2 Subtidal Sediment Suspension

The subtidal cable installation will be achieved through surface lay. The proposed cable protection and stabilisation may include a tubular cable protection system (such as Uraduct or split pipe) and rock bags. Seabed preparation in the subtidal area will be limited to PLGR (which may not be used due to hard and uneven seabed being prevalent in the cable corridor) and OoS cable removal. As such, given that no subtidal trenching is proposed, there will be minimal suspended sediment concentrations as a result of the proposed cable installation activities. The subtidal seabed sediments are comprised of fine rippled sand nearshore with sections of coarse gravelly sand in the deeper, more exposed areas, as well as sections of rocky reef (XOCEAN UK Ltd., 2026b). Any effects are anticipated to be

highly localised and limited to the immediate vicinity of the proposed cable installation activities, and temporary in nature as the sediment is anticipated to re-deposit over a short-term duration. Therefore, there will be no significant effects on the Noup Head to Start Point designated coastal waterbody.

Assessment of Impact Significance

As described in Section 6.4.1 above, the sensitivity of water quality receptors is assessed to be **low**. Given that the proposed cable installation activities will result in minimal suspended sediments, the magnitude of effect is assessed as **negligible**, resulting in a **negligible** consequence.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
Low	Negligible	Negligible

Impact Significance – **NOT SIGNIFICANT**

6.4.3 Changes to Sediment and Water Quality Following Accidental Release of Hydrocarbons

There is the potential for an unplanned spill to occur in the event of a collision with another vessel, if one of the Project vessels loses containment of hydrocarbon bunkers, or a hydraulic line leaks or fails (for example associated with cranes and ROVs). The main release risk associated with the proposed cable installation activities is a loss of diesel fuel from the installation and support vessels. Diesel has very high levels of light ends, evaporating quickly on release. The low asphaltene content prevents emulsification, therefore reducing its persistence in the marine environment. Light oil (such as diesel) tends to dissipate completely through evaporation and physical dispersion within 1 – 2 days and does not normally form emulsions. Some small-dispersed globules of semi-solid oil may persist for some time if the oil possesses wax or other persistent components. Any discharge of hydrocarbons will be limited to the inventory of each vessel during the proposed cable installation activities. Due to the low viscosity of diesel, it will spread very rapidly to form a thin sheen at the surface. The sheen will break up rapidly under the influence of spreading and evaporation. Diesel is unlikely to persist within the water column once the spill has occurred.

Based on the volume and components of marine diesel, it is unlikely that diesel will percolate to the seabed and deposit on sediments. Therefore, sediments are unlikely to be affected by a spill. As such, it is not considered to present a major risk to the environment.

Accidental releases of hydraulic fluids from the cranes on the Project vessels and used for the ROVs are possible. Hydraulic fluids are used as part of a closed system (i.e. lines) in cranes and other machinery equipment (such as ROVs). The potential impacts of a hydraulic fluid release depend on the properties and components of each hydraulic fluid. Hydraulic fluids can either be oil or water-based. Water-based hydraulic fluids used are unlikely to be toxic to the marine environment and will disperse rapidly as they tend to not bioaccumulate and are biodegradable. Any accidental spills of oil-based hydraulic fluid are unlikely to form a sheen, as the potential volume of hydraulic fluid spilled is likely to be small and mineral oil content is low. Equipment (cranes, ROVs etc.) used during the Project will be regularly maintained, reducing the likelihood of a release.

As outlined in Section 4.3, vessels will be MARPOL compliant and the Emergency Spill Response Plan and the SOPEPs in place for each vessel, these measures will minimise the risk of a spill occurring and provide a clear protocol in the event of a release scenario, resulting in rapid and effective remedial action, limiting the extent of any spill. A large spill of hydrocarbons or hydraulic fluids is very unlikely during the proposed cable installation activities. The impact of an accidental release (diesel or hydraulic fluid) is not considered to be significant.

Assessment of Impact Significance

As described above, the sensitivity of water quality receptors is assessed to be low. Best practice will be followed, and it is therefore unlikely that a spill would occur during the operations. Impact significance will vary depending on the size, volume and nature of the spill. Based on the very low likelihood of such an event, the magnitude of effect is assessed as moderate, resulting in a minor consequence. Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
Low	Moderate	Minor

Impact Significance – NOT SIGNIFICANT

6.4.4 Operation

The proposed subsea cable has been designed to be maintenance free, as such no planned ongoing maintenance activities are proposed. SHEPD will conduct routine inspections and surveys of the proposed subsea cable throughout its operational life to ensure it remains in good condition (please refer to the OIMD strategy submitted alongside this MEA). There is a potential for remedial cable repair works to be required, in the event the proposed subsea cable is damaged or the need for additional stabilisation materials is identified during the routine surveys; however, this would be subject to a separate licensing process.

If required, impacts on seabed conditions and water quality resulting from cable repairs will be analogous to those occurring during installation, although significantly reduced on both spatial and temporal scales. It should be noted that cable repair activities would be subject to a separate licensing process. As such, impacts during the operational phase are considered to be not significant.

6.5 Conclusion

There is potential for increases in coastal and subtidal sediment suspension resulting from the trenching of the proposed subsea cable in the intertidal areas and removal of sections of OoS cables in the subtidal region; however, the resulting increased suspended sediment concentrations will be temporary in nature and highly localised to the footprint of the cable in the subtidal region. The majority of proposed cable installation activities at the landfall locations will be tidally dependent. Increased suspended sediment will only occur during the interaction between the incoming tide, the trench walls and spoil heaps and as a result of cable removal activities. This will result in highly localised and temporary increases in suspended sediment which will not have a significant impact on coastal water quality or the status of designated waters. Therefore, the impact is considered negligible and not significant. Best practice will be followed by all installation vessels, therefore the likelihood of accidental hydrocarbon releases from the installation vessel is extremely remote. The level of impact is therefore considered minor and not significant.

7 MARINE MEGAFAUNA

7.1 Introduction

This Section of the report provides further detail on marine megafauna, including marine mammals (cetaceans, pinnipeds, and otters) and basking sharks, in the vicinity of the proposed cable corridor, and presents results from an assessment of potential impacts on key sensitive species. Management and mitigation measures to ensure impacts are kept to a minimum will also be suggested. This Section also provides an EPS and Protected Species Risk Assessment, with regard to potential impacts on cetaceans, basking sharks and otter which will support any required EPS or basking shark derogation licence applications.

7.2 Data Sources

The presence of marine mammals within the vicinity of the proposed cable corridor have been characterised through publicly available geospatial data (e.g., NMPi) and relevant literature sources, including the findings of the Small Cetaceans in European Atlantic waters and the North Sea (SCANS) SCANS-IV survey (Gilles *et al.*, 2023), Special Committee on Seals (SCOS) (2025) report and Carter *et al.*, (2025) updated seal at sea density mapping. As detailed in Section 5.3 and 5.5, local stakeholders were contacted to seek advice on prevalence of marine mammals, especially seals, in the vicinity of the cable corridor.

7.3 Baseline and receptor Identification

7.3.1 Cetaceans

Around twenty species of cetaceans have been sighted within Scottish waters with the most common including harbour porpoise, minke whale (*Balaenoptera acutorostrata)*, common dolphin (*Delphinus delphis*), bottlenose dolphin, white-beaked dolphin (*Lagenorhynchus albirostris*), and Risso's dolphin (*Grampus griseus*). All cetaceans within UK waters are listed under Annex IV of the Habitats Directive. With species including harbour porpoise listed as Annex II species. The following cetaceans have been identified within the area surrounding the Sanday to North Ronaldsay cable corridor (Reid, *et al.*, 2003):

- Harbour porpoise;
- Bottlenose dolphin;
- Minke whale;
- White-beaked dolphin;
- Risso's dolphin;
- Killer whale (*Orcinus orca*);
- Common dolphin; and
- Striped dolphin (*Stenella coeruleoalba*).

Data from the Small Cetaceans in European Atlantic Waters and the North Sea IV (SCANS-IV) shows that the cable corridor falls within block CS-K and provides density and abundance estimates for harbour porpoise, minke whale, Risso's dolphin and white-beaked dolphin (Gilles, *et al.*, 2023). There were no sightings of bottlenose dolphin in survey block CS-K during the SCANS-IV survey and therefore, the previous SCANS-III survey conducted in June 2021 (Hammond, *et al.*, 2021) provides the most up to date information for this species. The following provides a description of these species, including their density (animals/km^2) and abundances:

- Harbour porpoise: considered to be resident species surrounding Orkney and are present year-round with frequent sitings throughout the year. Harbour porpoises are commonly observed alone or in small groups of up to five animals (Hague, *et al.*, 2020). The abundance of harbour porpoise observed within block CS-K during the SCANS-IV survey was 11,357 with a density of 0.2813 animals / km^2 (Gilles, *et al.*, 2023);
- Bottlenose dolphin are present in Scottish waters year-round, with the highest encounter rates observed in coastal waters (Hague *et al.*, 2020). The Coastal East Scotland management unit ranges from Orkney to the Forth of Firth, with the highest frequency of sightings within the inner Moray Firth. The bottlenose dolphins found in the Moray Firth Special Area of Conservation (Moray Firth SAC) are part of a Scottish east coast population of approximately 200 animals that ranges south past Aberdeen to the Firths of Tay and Forth (Cheney, 2013). With regard to offshore individuals, bottlenose dolphins are encountered along the shelf edge to the north and west of Scotland and beyond, these individuals are most likely part of a migratory wide-ranging offshore group (covered by the Oceanic Water MU). The density of bottlenose dolphin around the North Coast and Orkney marine area is considered moderate in comparison to other Scottish coastal waters, with 0-0.025 animals km^2 (Hammond *et al*, 2021);
- Minke whale: considered frequent around Scottish waters with sightings occurring year-round (Hague, *et al.*, 2020). The abundance of minke whale observed within block CS-K during the SCANS-IV survey was with 467a density of 0.0116 animals / km^2 (Gilles, *et al.*, 2023);
- White-beaked dolphin considered resident and abundant year-round in Scottish waters (Hague, *et al.*, 2020). The abundance of white-beaked dolphin observed within block CS-K during the SCANS-IV survey was 5,460 with a density of 0.1352 animals / km^2 (Gilles, *et al.*, 2023);
- Risso's dolphin considered common in deeper offshore waters (Hague, *et al.*, 2020). Risso's dolphin are usually observed as part of small groups ranging between five to twenty five individuals The abundance of Risso's dolphin observed within block CS-K during the SCANS-IV survey was 1,519 with a density of 0.0376 animals / km^2 (Gilles, *et al.*, 2023); and
- Other species, such as killer whale, humpback whale, common dolphin and striped dolphin are seen infrequently in varying numbers and are occasional and/or seasonal visitors (Hammond et al, 2021; Reid et al., 2003). Over recent years killer whales have been sighted on a number of occasions off Orkney in the summer months, sometimes in pods, which are likely to migrate to Norwegian waters for the rest of the year (ORCA, 2026) These species do not occur frequently enough to require further assessment as there are no reliable population estimates to assess against.

Furthermore, the proposed cable corridor falls within an area where the Management Unit (MU) biogeographical population estimate has been calculated. This is based on the Inter-Agency Marine Mammal Working Group (IAMMWG) abundances for cetacean MUs in UK waters (IAMMWG, 2022).

Table 7-1 presents the assessment of the proportion of MU potentially affected by survey activities, based on the SCANS-IV data (Gilles, *et al.*, 2023) and the overall area of the cable survey corridors. The results of the assessment indicate that the estimated density (individuals / km^2) of harbour porpoise, minke whale and white-beaked dolphin is high due to the large spatial scale of the overall survey area.

Table 7-1 Population parameters of cetaceans potentially present within the vicinity of the proposed cable corridor (Gilles et al., 2023; Inter-Agency Marine Mammal Working Group (IAMMWG), 2022)

SPECIES	ESTIMATED DENSITY[2] (ANIMALS / km^2) (GILLES *et al.*, 2023)	ESTIMATED ABUNDANCE WITHIN THE PROPOSED CABLE CORRIDOR (9.2 km^2)	MANAGEMENT UNIT (MU) / BIOGEOGRAPHICAL POPULATION ESTIMATE (IAMMWG, 2022)	PROPORTION OF THE MU POTENTIALLY AFFECTED BY THE PROPOSED CABLE INSTALLATION ACTIVITIES (%)
Harbour porpoise	0.2813	2.58796	159,632	0.00162
Bottlenose dolphin[3]	0.0019	0.01748	224	0.000078
Risso's dolphin	0.0376	0.34592	8,687	0.00398
White-beaked dolphin	0.1352	1.24384	34,025	0.00366
Minke whale	0.0116	0.10672	10,288	0.00104
Killer whale	*Insufficient data*	*Insufficient data*	*Insufficient data*	*Insufficient data*
Common dolphin	*Insufficient data*	*Insufficient data*	57,417	*Insufficient data*
Striped dolphin	*Insufficient data*	*Insufficient data*	*Insufficient data*	*Insufficient data*

7.3.2 Seals

Two pinniped (seal) species regularly occur in the Scottish offshore and coastal environment: grey seals and harbour seals. Both grey and harbour seals are listed under Annex II of the Habitats Directive and are PMFs. Approximately 36% of the world's grey seals breed in the UK (of these, 81% breed at colonies in Scotland). Harbour seals are most sensitive to disturbance during the pupping season from mid-June to July and moulting in August. For grey seals, breeding occurs September/October through to December with moulting until early April.

Seals are central-place foragers, utilising a terrestrial 'base' for important life history events (i.e., breeding, pupping, moulting, etc.,) and to rest, and then undertake foraging trips at sea before returning to land (Vance *et al.*, 2021). While both species are associated with shallower shelf waters, grey seals often make longer foraging trips to deeper waters than harbour seals.

The Sanday SAC which is designated for harbour seal overlaps with the proposed cable corridor, and the Faray and Holm of Faray SAC located approximately 20 km from the cable corridor is designated for grey seal (Figure 5-1). Furthermore, the South North Ronaldsay Seal Haul-Out Site also overlaps with the proposed cable corridor and is designated for both grey and harbour seals. During intertidal survey in 2026, grey seals (*Halichoerus grypus*) were commonly present at the North Ronaldsay landfall, both in the water and hauled out (XOCEAN UK Ltd., 2026a).

Harbour seal counts surrounding Orkney and within the Sanday SAC were recently reviewed and found a decline in the population. In August 2019 harbour seal counts were 1,405 and 77 seals within Orkney and the Sanday SAC

[2] *Based on SCANS-IV block CS-K.*
[3] *Based on SCANS-III block S.*

respectively. However, these have decreased to 880 seals surrounding Orkney and 32 seals within the Sanday SAC in August 2025, showing a 37% and 58% decline in seal populations surrounding Orkney and the Sanday SAC respectively.

Carter *et al.*, (2022) modelled the habitat preference of grey and harbour seals and predicted at sea seal distribution on a 5 km x 5 km grid for both species. These data have been processed according to the method described in SCOS (2025), utilising scalars to generate estimates of number of seals within each grid cell (and 95% confidence limits). This is calculated by scaling the Carter *et al.*, (2022) relative density in a cell to an absolute at sea seal density (mean numbers of seals per cell) using the most recent independent estimate of the grey or harbour seal population and the proportion of the population at sea at a given time.

Recently, updated density models have been released (Carter *et al.*, 2025), incorporating expanded seal tracking datasets and recent haul-out count data to refine at-sea abundance estimates for both species. In line with these updates, Figure 7-1 presents the mean predicted absolute abundance of grey and harbour seals per 25 km^2. Within the proposed cable corridor, predicted densities range from 6– 25 harbour seals per 25 km^2 and 151 – 700 grey seals per 25 km^2, representing a high density in the proposed cable corridor.

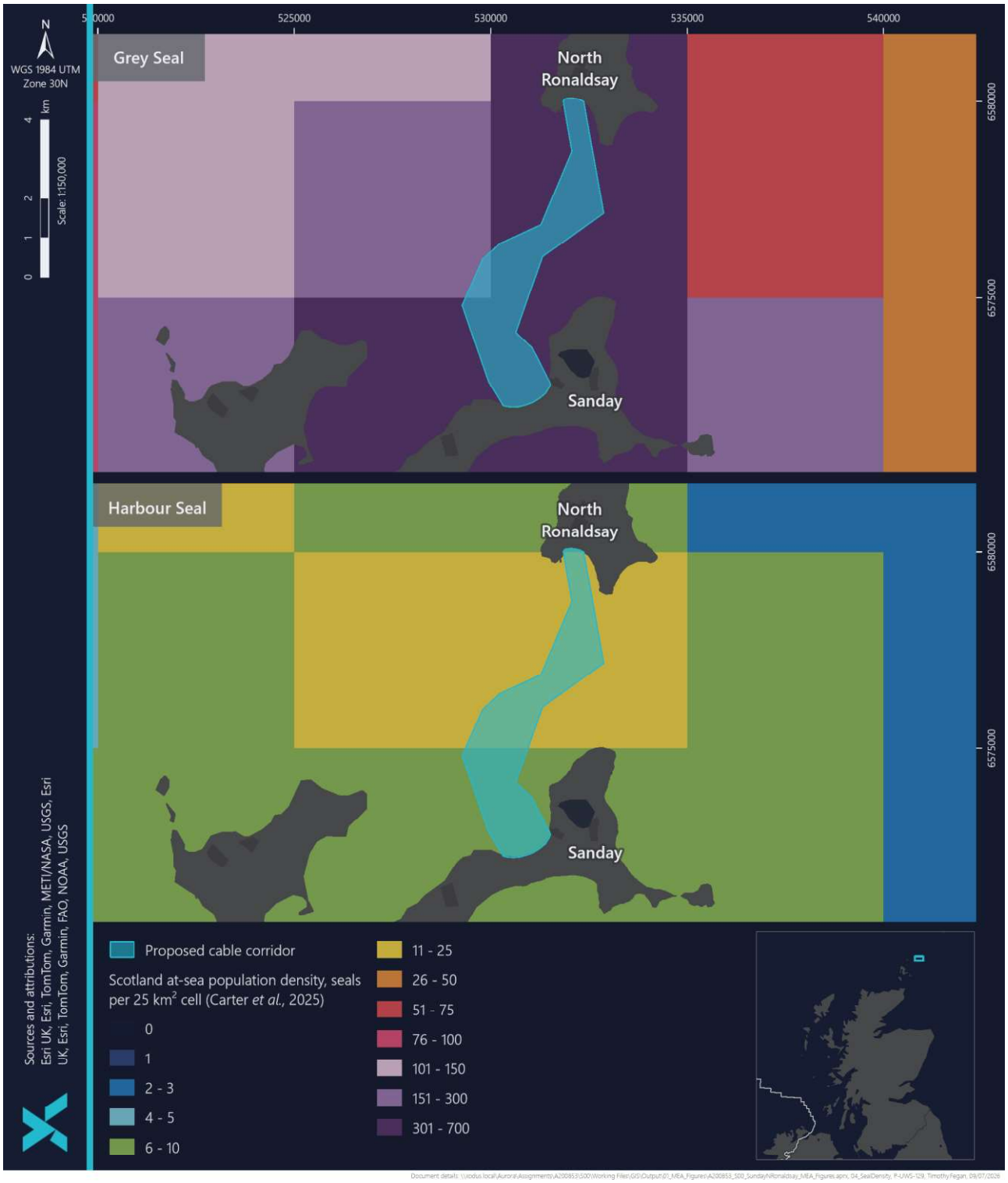


Figure 7-1 Seal density in vicinity of the cable corridor (Carter, et al., 2025)

7.3.3 Basking Sharks

Basking sharks are protected under Schedule 5 of the WCA 1981 which prohibits the killing, injuring, or taking by any method of those wild animals listed on Schedule 5 of the WCA 1981. The Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6 make amendments to the WCA 1981, strengthening the legal protection for threatened species to include 'reckless' acts, and specifically makes it an offence to intentionally or recklessly disturb or harass basking sharks.

Basking sharks are the second largest fish in the world (Sims, 2008). This species can be found throughout the offshore waters in the UK continental shelf (Sims, 2008) and are considered frequent visitors to the north and west coasts of Scotland with the waters here having a high suitability for basking sharks (HWDT, 2018; Witt *et al.*, 2012; Austin *et al.*, 2019). They are widely distributed in cold and temperate waters and feed predominantly on plankton and zooplankton e.g., barnacles, copepods, fish eggs and deep-water oceanic shrimps by filtering large volumes of water through their wide-open mouth. They typically move very slowly (around 4 miles per hour). In the winter, they dive to great depths to get plankton while in the summer they are mostly near the surface, where the water is warmer.

Due to their size, slow swimming speeds and preference for swimming in coastal waters during the summer months, basking sharks are considered to be at potential risk of collision with vessels associated with the proposed cable installation activities. Given that basking sharks are slow to mature and have a long gestation period, the species can be slow to recover if populations are rapidly depleted.

Basking sharks are primarily sighted on the West Coast of Scotland and are occasionally sighted around Orkney. Therefore, there is limited potential for the proposed installation activities to result in disturbance or harassment to this species. To compensate for any potential risks, a Basking Shark Derogation Licence application has been submitted in conjunction with this MEA.

7.3.4 Otters

Otters are small, semi-aquatic mammals which inhabit coastal environments throughout the UK and depend on the marine environment for food. During the intertidal survey in 2026, a single European otter was observed at the Sanday landfall, running from the coastline to the low water mark (XOCEAN UK Ltd., 2026a). Otters are listed under OSPAR Annex V.

As detailed in Section 5.3.4 there are no designated sites with otters as the qualifying feature in the vicinity of the proposed cable corridor.

7.4 Impact Assessment

This Section outlines the proposed cable installation activities which have the potential to impact upon marine megafauna species, including cetaceans, pinnipeds, basking shark and otters.

7.4.1 Identification of Potential Impacts

This Section reviews potential impacts to marine megafauna receptor species from the proposed cable installation activities and narrows down which activities require further assessment to identify the likelihood and significance of those impacts. Impacts from accidental releases from pollution for all marine megafauna have not been considered for further assessment, given that the likelihood of this is extremely low.

Marine Mammals Impacts - Noise

Underwater sound emissions from the proposed cable installation activities are likely to constitute the greatest potential risk to marine mammals within the vicinity of the proposed cable corridor. Underwater sound emissions have the potential to impact cetaceans and other marine species in two ways:

- Injury – physiological damage to auditory or other internal organs; and
- Disturbance (temporary or continuous) – disruptions to behavioural patterns, including, but not limited to: migration, breathing, nursing, breeding, foraging, socialising and / or sheltering (note: this impact factor does not have the potential to cause injury).

If a sound emission is composed of frequencies which lie outside the estimated auditory bandwidth for a given species, then the potential for auditory impact is considered to be very unlikely (NMFS, 2018). To understand the potential for sound-related impacts, the likely hearing sensitivities of different marine mammal hearing groups has been summarised in below in Table 7-2 (Southall *et al.*, 2019).

Table 7-2 Auditory bandwidth estimated for marine megafauna (Southall et al., 2019; NMFS, 2018)

HEARING GROUP	ESTIMATED AUDITORY BANDWIDTH
Low-frequency (LF) cetaceans (e.g. baleen whales, such as minke whales)	7 Hz to 35 kilohertz (kHz)
High-frequency (HF) (e.g. dolphins)	150 Hz to 160 kHz
Very high-frequency (VHF) cetaceans (e.g. harbour porpoises)	275 Hz to 160 kHz
Phocid carnivores in water (PW) (e.g. grey and harbour seal)	50 Hz to 86 kHz

The potential sources of underwater sound associated with proposed cable installation activities include:

- Vessel sounds;
- Sound associated with cable-laying activities;
- Sound from the USBL positioning device during installation – please refer to the EPS licence application form submitted alongside this MEA; and
- Sound from geophysical survey devices used during pre- and post-installation survey, and inspection including MBES and SSS.

Noise modelling used to inform the assessment can be found in Appendix A: Noise Impact Assessment. While vessel sound is broadband and will be audible to marine mammals, the duration of the cable installation campaign is relatively short-lived and the vessels will be slow moving. The animals therefore have plenty of alternative habitat to move to in order to avoid the noisy activities. The proposed cable corridor is already used by vessels, including a regular ferry service, with 163 vessel tracks from 297 unique vessels recorded between July 2025 and July 2026 and higher activity in spring and summer and lower activity in winter. As such the installation presence of vessels will not result in a significant increase to the existing soundscape in the area, hence, this aspect does not have the potential to result in adverse underwater sound impacts on marine mammals and is not considered further.

Underwater sound emissions resulting from the cable laying activities are expected to be minimal. Moreover, trenching activities in the intertidal area will be conducted at low water when the area is dry, and hence there is no potential for underwater sound emissions to result from this activity. As such, noise from cable laying activities does not have any potential for adverse effects on cetaceans and pinnipeds and is not considered further. Therefore, the

potential for underwater sound emissions to result from seabed preparation and cable installation is minimal. Further details on the cable lay methodologies are described in the supporting Sanday – North Ronaldsay Cable Replacement Project Description (Document Ref: A-200853-S00-A-REPT-002).

The MBES and SSS proposed for the pre-installation surveys will operate at frequencies > 200 kilohertz (kHz) and therefore are above the hearing threshold for marine mammals. However, USBL devices commonly operate in a frequency range which makes them audible to cetaceans and pinnipeds, and hence this equipment does have the potential to result in adverse effect on these receptors. The highly mobile nature of cetaceans and pinnipeds and the temporary, localised nature of USBL noise emissions associated with the activities dramatically reduces the likelihood of interactions between the Project and cetacean and pinniped receptors resulting in significant impacts. However, as the risk of injury or disturbance to a small number of individual cetaceans remains, an EPS licence may be required and hence impacts from noise emissions associated with USBL have been carried forward for further assessment.

Collision risk is another potential risk to marine mammals in the area and may cause mortality and sublethal injury (Laist *et al.*, 2001). However, marine mammals are highly mobile and as the proposed cable installation activities are due to take place from slow moving vessels operating in well-defined routes, collision risk is anticipated to be negligible. Any remaining residual risk from vessel movements will be further reduced on the basis of the embedded mitigation measures outlined in Section 4.3, which includes the management of vessel speeds and the commitment for vessels to adhere to the SMWWC. For this reason, vessel movements have not been identified as having the potential to cause adverse or significant impacts to the FCS of any marine mammal population and has therefore been screened out from further assessment.

The marine mammal species of interest in the area do not rely extensively on eyesight for hunting and navigation and potential impacts resulting from localised elevation of sediment, considering this and the fact that changes to water quality are expected to be minimal (as detailed in Section 6), water quality impacts are not discussed further.

Seals are particularly susceptible to disturbance during their respective pupping and moulting seasons, when the residency of seals at haul-outs and in surrounding waters elevates the relative density of each species. As outlined in Section 5.3.3 the proposed cable corridor overlaps with the South North Ronaldsay seal haul-out site and the Sanday SAC. Therefore, there may also be potential impacts from underwater sound and landfall / intertidal activities on seals. As a result, this impact pathway has been brought forward for further consideration.

Basking Sharks

The basking shark is an elasmobranch (sharks and rays) which is a group with generally low sensitivity to sound vibrations due to the fact they do not have a swim bladder. The hearing range of basking sharks is not known; however, five other elasmobranchs have been found to have a hearing range between 20 Hz to 1 kHz (Macleod *et al.*, 2011). It is acknowledged that this may not be entirely transferable to basking sharks, however since the USBL equipment operates at a minimum frequency of 20 kHz which is several orders of magnitude higher than 1 kHz, it is unlikely this equipment will be audible to basking sharks. Any sound emissions resulting from the cable installation equipment is also expected to be minimal and unlikely to result in any injury or significant disturbance (as described above). On this basis, the potential for sound emissions to impact upon basking sharks is screened out of further assessment.

Nonetheless, collision risk and disturbance from the cable installation vessels does pose a potential threat to this slow moving species and as such this impact pathway is considered further.

Otter Impacts

Otters are particularly sensitive to anthropogenic changes to their habitats, as their coastal habitat use is highly dependent on the presence of freshwater features (Loy *et al.*, 2022). As such, the location of their holts is restricted, and anthropogenic changes to their habitat may have dramatic repercussions, including localised extinctions.

Given that otters may be present within the vicinity of the Project activities due to noted sightings of an otter during the intertidal surveys, there is potential for vessel, vehicle and human presence to result in disturbance to otters during the intertidal works. Given that otters may be present it is recommended that pre-works checks are carried out by an ECoW prior to the commencement of proposed cable installation activities and will include the cable landfall areas and a 200 m mitigation zone as detailed within the embedded mitigation measures Table 4-2. Any otter holts, layups and couches will be identified and avoided by a 40 m buffer. The trenches in intertidal areas will be fitted with ramps to allow otter that may have entered the trenches to escape.

7.4.2 Injury of Disturbance from Sound Emissions

Underwater sound generated by USBL constitutes the only source of sound with the potential to cause injury or significant disturbance to marine mammals (assessment detailed in Appendix A: Noise Impact Assessment). USBL typically operates in the frequency range of 20 – 33.5 kHz, and as such is audible to all marine mammal species likely to be present in the vicinity of the proposed cable corridor. The USBL source level utilised during the proposed cable installation activities will be limited to 207 decibel (dB) re 1 Micro Pascal (µPa) (peak).

Whilst no injury impacts are expected, sound emissions have the potential to affect the behaviour of marine mammals in the vicinity of the sound source. Significant or strong disturbance may occur when an animal is at risk of a sustained or chronic disruption of behaviour or habitat use resulting in population-level effects.

As the vessel and / or the subsea equipment (e.g. an ROV) will generally not be stationary during USBL operations, animals within a particular area will not be exposed to extended periods of underwater sound. Rather, individuals would have to follow the moving equipment to be subjected to lasting or prolonged periods of acoustic disturbance. As such, the exposure to disturbance from USBL operations will be extremely limited in duration, and hence, does not have the potential to result in adverse effects at a population or species level.

Given the transient, highly localised and short-term nature of the USBL activities, it is very unlikely that any disturbance effects from use of USBL would negatively impact upon the FCS of any of the cetacean species which may be present in the survey area. Therefore, no additional mitigation to limit the potential impacts on marine mammals resulting from USBL operations has been implemented.

It is possible that a small number of cetaceans may experience some level of disturbance for the short period that they encounter the proposed cable installation activities. As such, an EPS licence is expected to be required for the USBL-related activities which will be conducted during the proposed cable installation activities.

Assessment of Impact Significance

As cetaceans are EPS, and therefore afforded strict protection under the Habitats Regulations, and also potentially vulnerable to underwater sound impacts, the sensitivity is assessed as high. Due to the potential vulnerability of seals to disturbance impacts during breeding and moult periods, combined with the protection afforded to seals under the Marine Scotland (2010) Act, seals are assessed as having a high sensitivity. There will be no injurious impacts to marine mammals as a result of sound-generating activities. However, there is potential for disturbance to marine mammals from underwater sound. Activity-related disturbance is expected to be localised and therefore will not

result in any adverse impact to the FCS of any marine mammal species. Therefore, the magnitude of effect is assessed as **minor**, resulting in a **minor** consequence.

As the impact is not significant, no additional mitigation measures are required. Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Minor	Minor

Impact Significance – **NOT SIGNIFICANT**

7.4.3 Potential Disturbance from Vessel Presence (Basking Sharks)

As discussed in Section 7.4.1, impacts on marine mammals resulting from vessel presence are screened out of this assessment. However, basking sharks are considerably less mobile than marine mammals and are therefore identified as being more sensitive to vessel presence. Additionally, basking sharks are occasionally sighted around Orkney.

Project vessels will be moving slowly during the cable installation works reducing the risk of collision and disturbance to basking sharks in line with the Basking Shark Code of Conduct (Shark Trust, 2026), and SHEPD are committed to ensuring vessels adhere to the SMWWC (Scottish Natural Heritage, 2017). The proposed cable installation activities also have a short duration. These factors considerably reduce the risk of injury or disturbance to basking sharks resulting from interaction with Project vessels. Therefore, with consideration of the embedded mitigation measures, the risk of collision between basking shark and Project vessels is considered to be low.

Considering these factors, it is concluded that vessel presence will not adversely affect the FCS of basking sharks. However, since the risk of disturbance cannot be entirely ruled out, a basking shark derogation licence may be required under the WCA 1981.

Assessment of Impact Significance

Due to the potential vulnerability of basking sharks to injury and disturbance resulting from vessel presence, combined with the protection of the species under the WCA, 1981, a high sensitivity has been assigned. The risk of injury or disturbance because of vessel presence during the proposed cable installation activities is extremely limited and not expected to affect FCS of basking sharks. Therefore, the magnitude of effect is minor, resulting in an overall minor consequence.

As the impact is not significant, no additional mitigation measures are required. Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Minor	Minor

Impact Significance – **NOT SIGNIFICANT**

7.4.4 Potential Disturbance from Nearshore and Intertidal Activities

There will be various vessels and vehicles present on site during Project activities, including onshore plant during intertidal works, which have the potential to result in visual disturbance risk to seals and otters.

Seal Impacts

The Sanday SAC, designated for harbour seal, overlaps with the proposed cable corridor. Additionally, the South North Ronaldsay seal haul-out site overlaps with the proposed cable corridor, designated for grey and harbour seals. Finally, the East Sanday Coast SSSI overlaps with the proposed cable corridor, designated for harbour seal. During the intertidal surveys, grey seals were present at the North Ronaldsay landfall, both in the water and hauled out (XOCEAN UK Ltd., 2026a). Anecdotal stakeholder observations detailed in Sections 5.5.1 and 5.3.3 suggests that seals do not tend to utilise the Sanday landfall beach but prefer the rocky shores further away on the coast, while at South North Ronaldsay seal haul-out site the grey seals do not appear to pup on the beach or near South Bay of North Ronaldsay and the main pupping beach is around the corner (to the East) of the landfall area past the Broch, and on Seal Skerries opposite the lighthouse (north tip of North Ronaldsay), although other stakeholders have advised that seal pups can be found on breaches throughout North Ronaldsay.

For the shore based intertidal cable installation activities, there is potential for disturbance from human presence to hauled-out seals. Seal pups and mothers are particularly sensitive to disturbance when on land, and any operations at the beach and intertidal area may prevent seals from hauling out on the beach. The proposed cable installation activities will take place across Autumn 2026 and Spring / Summer 2027, with a 24-month licence duration. Therefore, there is potential for the proposed cable installation activities to coincide with the pupping and moulting season for harbour seal and grey seal. The pupping and moulting seasons will be avoided where possible, but to restore the electricity supply to North Ronaldsay, the initial cable installation campaign is planned to overlap with the grey seal breeding season. Where shore-based surveys and intertidal works occur during the grey seal breeding periods, relevant mitigation measures (Section 4.3) will be implemented.

A search of the intertidal survey area for seals will be undertaken prior to commencement of shore based intertidal installation activities. The shore based activities will only be permitted to commence/continue if seals are not found hauled out on the beach or in the water close to the intertidal area. Should any seals be detected within the 500 m mitigation zone, except in the event of a need to avoid critical delay to the Project in which case the mitigation zone for seals will be 200 m. The reduction in mitigation zone distance from 500 m to 200 m only applies to the cable installation campaigns in autumn 2026. For the cable protection installation in 2027, a 500 m mitigation zone will be maintained and the sensitive periods avoided as far as practicable. If the MMO confirms that no seals are hauled out onshore inside the designated haul-out site such that they would be within the mitigation zone, the works will be permitted to commence/continue. The SMWWC (Scottish Natural Heritage, 2017) will also be followed. This will reduce the impacts from nearshore and intertidal works to not significant.

Otter Impacts

Vessel, vehicle and human presence have the potential to disturb otters at the landfall sites. This is due to the potential avoidance of areas at the landfall and intertidal areas where vessels, vehicles and site workers are present. Additionally, disturbance may be caused by temporary habitat change associated with proposed cable installation activities and equipment placement. Furthermore, as OCT will be utilised at landfalls, this also presents a risk to otter should they enter a trench and become trapped which has the potential to induce additional disturbance.

Although there is the potential for disturbance to otters, this is likely to be greatly reduced, owing to the temporary nature of the nearshore Project activities. As such, no permanent impacts are expected on otter habitats which could induce permanent and irreversible damage.

Although no significant impacts to otter populations are anticipated, there is still the potential for disturbance which could constitute an offence under the Habitats Regulations, and as such the following mitigation measures, aligning with the NatureScot advice, will be implemented to minimise any effects:

- Pre-construction otter surveys will be conducted prior to the commencement of the cable replacement operation, and will include the cable landfall areas and a 200 m mitigation zone;
- An appropriately qualified ECoW will be appointed to work with the cable installation personnel and ensure sensitive otter sites are not disturbed;
- Any otter holts, layups and couches will be identified and avoided by a 40 m buffer;
- To mitigate the risk of otters becoming trapped within excavated trenches at the landfalls, ramps will be incorporated into trench designs to ensure otters are able to escape should they enter a trench; and
- All mitigations will be compliant with terrestrial planning conditions including SHEPD's Otter Protection Policy.

These mitigation measures will minimise any disturbance to otters, or the habitats that they depend on. However, it is possible that a small number of otters may experience some level of disturbance for the short period that they encounter the proposed installation activities. Therefore, if evidence of otters is found during pre-construction otter surveys, SHEPD will consult with NatureScot to ascertain whether an EPS licence for otter disturbance is required for intertidal activities.

Assessment of Impact Significance

There is potential for disturbance risk to seals and otters from the presence of vessels and vehicles during installation activities as well as from the excavations of trenches in the intertidal. Due to the potential vulnerability of seals to disturbance impacts during breeding and moult periods, combined with the protection afforded to seals under the Marine Scotland (2010) Act, the overlap with the South North Ronaldsay seal haul out, and as a qualifying feature of the Sanday SAC and East Sanday Coast SSSI, seals are assessed as having a **high** sensitivity. Similarly, due to the protected afforded to otters as EPS, and the potential vulnerability to changes in their coastal habitat, otters are also assessed as having a **high** sensitivity.

With the implementation of the proposed embedded mitigations, no adverse impacts to harbour or grey seals are anticipated. Similarly, with the implementation of the embedded mitigation for otter, any disturbance to otters will be minimal. Therefore, the magnitude of impact is assessed as **minor**, resulting in a **minor** consequence. Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Minor	Minor

Impact Significance – **NOT SIGNIFICANT**

7.4.5 Operation

The proposed subsea cable has been designed to be maintenance free, as such no planned ongoing maintenance activities are proposed. SHEPD will conduct routine inspections and surveys of the proposed subsea cable throughout its operational life to ensure it remains in good condition (please refer to the OIMD strategy submitted alongside this MEA). There is a potential for remedial cable repair works to be required, in the event the proposed subsea cable is damaged or the need for additional stabilisation materials is identified during the routine surveys; however, this would be subject to a separate licensing process.

If required, impacts on marine megafauna resulting from cable repairs will be analogous to those occurring during installation, although significantly reduced on both spatial and temporal scales. As such, impacts during the operational phase are considered to be not significant.

Underwater sound from routine inspections and surveys of the cable will have the potential to affect marine mammals; however, this will be consented separately through the EPS licence regime and are not assessed further.

7.5 Conclusion

Underwater noise emissions are the impact mechanism most likely to affect marine megafauna in the area of activities. Noise modelling used to inform the assessment (see Appendix A: Noise Impact Assessment), demonstrates that whilst there may be some disturbance to marine mammals resulting from USBL operations, this is likely to be limited in space and time and should only affect a few individuals of any species.

There will be no injurious impacts to cetaceans, seals or otters as a result of proposed cable installation activities and no requirement to apply for an EPS licence in that respect; however, there is potential for disturbance to cetaceans, and therefore an EPS licence application has been submitted alongside this MEA. The disturbance is expected to be limited to one or a few individuals of the local population and will therefore not result in any adverse impact to the FCS of any marine mammal species.

No significant impacts to seals are anticipated from the nearshore activities with consideration of the mitigation measures. Furthermore, the proposed cable installation activities will not result in the catching or killing of seals, and thus the protection provided to the two species by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) will not be breached.

Potential impacts on otters as a result of nearshore activities are expected to be limited, and will not impair an otter's ability to survive, breed or reproduce, or rear or otherwise care for its young, and there will be no adverse impact on the FCS of otters in the region. Nonetheless, should evidence of otter be identified during pre-construction surveys, SHEPD will consult with NatureScot to ascertain whether an EPS licence for otter disturbance is required for the nearshore works prior to works commencing.

Finally, vessel presence will not adversely affect the FCS of basking sharks given the embedded mitigation measures. Nevertheless, SHEPD will apply for a basking shark derogation licence, as the risk of disturbance cannot be entirely ruled out.

Considering the temporary and localised nature of the activities there are not anticipated to be any significant impacts to individuals or populations of marine megafauna in the area.

8 BENTHIC AND INTERTIDAL ECOLOGY

8.1 Introduction

This Section provides detail on the benthic and intertidal habitats and species located within, and in the immediate vicinity of, the proposed cable corridor. An assessment of potential impacts on key sensitive habitats and species is presented, along with an outline of secondary mitigation requirements, which may be undertaken if potential significant impacts are identified. The impact assessment focuses on habitats that are protected or are qualifying features of conservation sites located within the proposed cable corridor and that have the potential to be impacted.

8.2 Data sources

The benthic and intertidal ecology baseline has been established through the preliminary interpretation of the site-specific benthic survey (XOCEAN UK Ltd., 2026a,b) and supplemented by publicly available geospatial data (Marine Directorate, 2026b). It should be noted that the benthic surveys and associated data analysis are ongoing and the results will be made available once completed. The intertidal survey was conducted via an Unmanned Aerial Vehicle (UAV) and an intertidal walkover survey with a 500 m buffer. The subtidal survey consisted of a series of DDV transects.

Where applicable, descriptions of features of conservation importance have been obtained through the Marine Life Information Network (MarLIN) database (MarLIN, 2026) and Tyler-Walters *et al.*, (2016) descriptions of Scottish PMFs.

8.3 Baseline and Receptor Identification

8.3.1 Overview

The following Sections characterise the seabed habitats and species likely to be present along the proposed cable corridor, including the potential presence of sensitive features (e.g., PMFs and Annex I habitats etc.,). Potential Annex I reef is illustrated in Figure 8-2, with Annex I habitats and PMFs illustrated in Figure 8-3. These are based on publicly available information, but the preliminary field observations from the subtidal benthic surveys suggest similar findings.

8.3.2 Subtidal

Preliminary analysis of video footage revealed a distinct difference in sediment composition between the shallower, more sheltered nearshore transects and the slightly deeper, more exposed transects situated along the centre of the route. Nearshore transects (ED3_S_NR_TR_001 to ED3_S_NR_TR_004, ED3_S_NR_TR_025 and ED3_S_NR_TR_026) comprised fine rippled sand, while the remaining transects were characterised by coarse gravelly sand on top of bedrock with a moderate to dense kelp coverage (XOCEAN UK Ltd., 2026b).

Publicly available data illustrated in Figure 8-1 indicates the presence of the EUNIS habitats A3.1 high energy infralittoral rock and A3.2 moderate energy infralittoral rock present throughout the subtidal region of the proposed cable corridor.

Subtidal Features of Interest

Potentially sensitive habitats were recorded during the subtidal survey, as described below. These features will be further assessed as part of the subsequent habitat assessment report to confirm the potential presence and extent of any sensitive habitats. The preliminary interpretation of the subtidal survey data indicates the potential for the following to be present (XOCEAN UK Ltd., 2026b):

- Annex I geogenic reefs - Aggregations of cobbles and boulders were observed in varying quantities across the survey area. In addition, rocky outcrops and areas of exposed bedrock were observed, which may indicate conformance to the Annex I geogenic reef habitat. These accumulations of cobbles and boulders, as well as bedrock outcropping, supported a range of encrusting and colonising fauna, as well as a diverse range of mobile species;
- Kelp beds – Various macroalgae and Laminaria sp. were observed in shallow, rocky areas along the survey route; and
- Seagrass beds – Seagrass was present across the shallow northern extent of the North Ronaldsay nearshore area.

Another species of interest associated with the reefs is the discord mussel, with the Sanday SAC supporting the only known examples of discord mussel beds in Scottish waters (NatureScot, 2025). The preliminary results from the benthic surveys did not suggest the presence of discord mussel beds, but White et al. (2000) reported that dense mats of the discord mussel can be found in Sanday, with the mussel being associated with the designated feature 'reefs' of the Sanday SAC. The historical survey data indicate that the proposed cable corridor through the North Ronaldsay Firth has the potential to interact with discord mussel habitat as the Sanday broad-scale seabed survey recorded *M. discors* within rocky and kelp-associated biotopes, with large areas of rock and kelp plants locally covered by mats of the species. Within the *Laminaria hyperborea* and foliose red seaweed biotope, *M. discors* was recorded at 40% frequency with a median abundance classified as Plentiful, while it was also recorded at 50% frequency and occasional abundance within exposed infralittoral rock habitat (White et al., 2000). These records provide evidence of historical presence and locally high abundance; however, as the survey data date from 1999–2000, contemporary survey information would be required to confirm its current distribution and abundance within the proposed cable corridor. The preliminary results from the cable corridor DDV surveys indicate that the cable corridor is covered by dense kelp forests, likely attached to rocky reef. No discord mussel beds were seen, but the view of the seabed was obstructed by the kelp and the preliminary results from field observations were unable to confirm the presence of this species.

8.3.3 Intertidal

Both landfalls consisted of predominantly sandy habitats towards the mid to lower shore along the central transects, with varying sizes of cobbles and pebbles present across some of the upper shore (XOCEAN UK Ltd., 2026a). Bedrock outcrops supported diverse assemblages of brown, green and red seaweeds in the infralittoral zone in the western area of the North Ronaldsay landfall, as well as to the east and west of the Sanday landfall. Assorted litter (plastic and rubber) was found at both landfalls, with the remains of a wooden wreck observed at Sanday (XOCEAN UK Ltd., 2026a).

Intertidal Features of Interest

During the intertidal survey in 2026, variable abundances of dog whelks (*Nucella lapillus*) were observed on bedrock outcrops and sheltering in crevices at both landfalls (XOCEAN UK Ltd., 2026a). Dog whelk is listed under OSPAR Annex V.

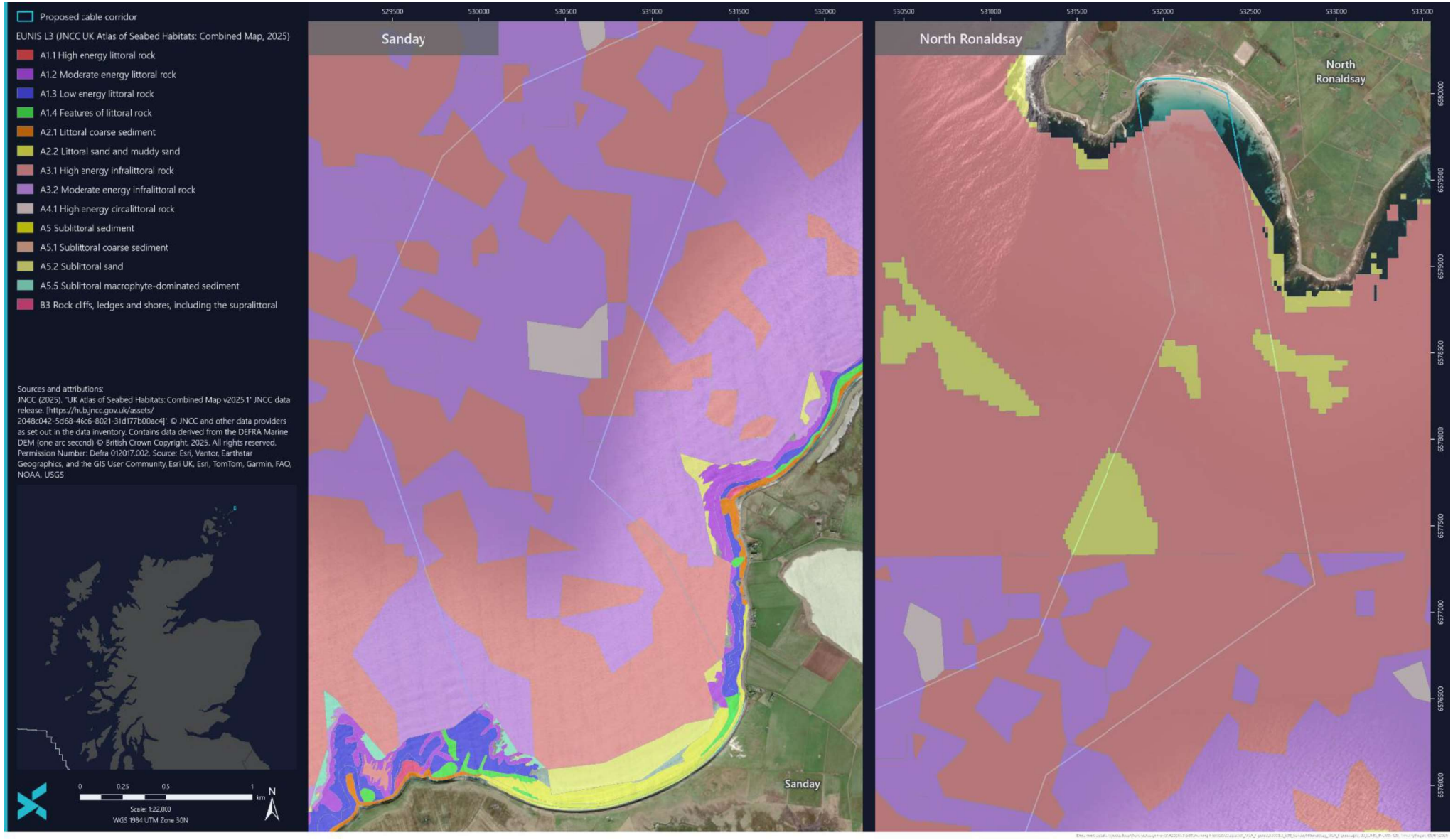


Figure 8-1 EUNIS habitats in the cable corridor

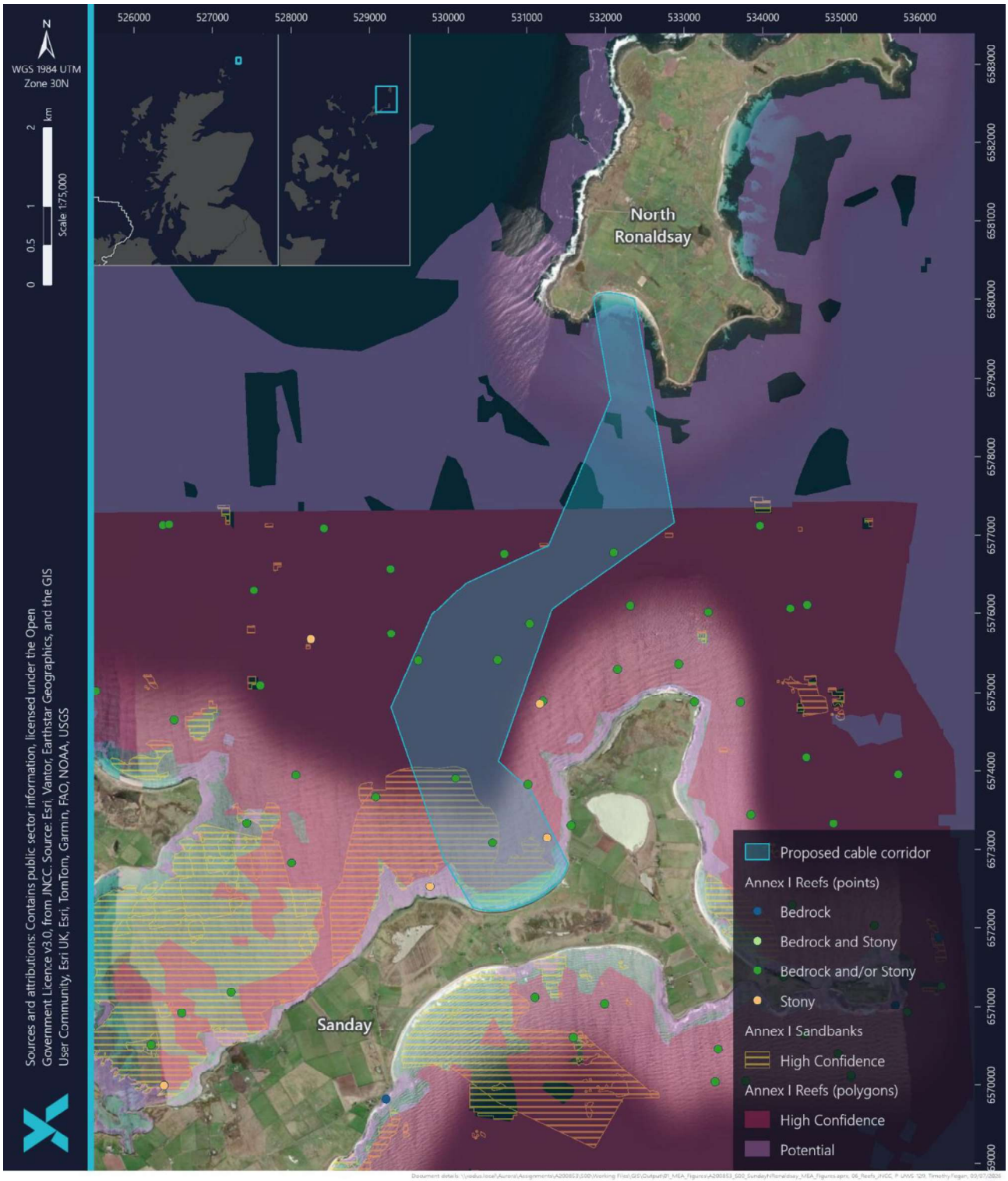


Figure 8-2 Annex I reef in the cable corridor

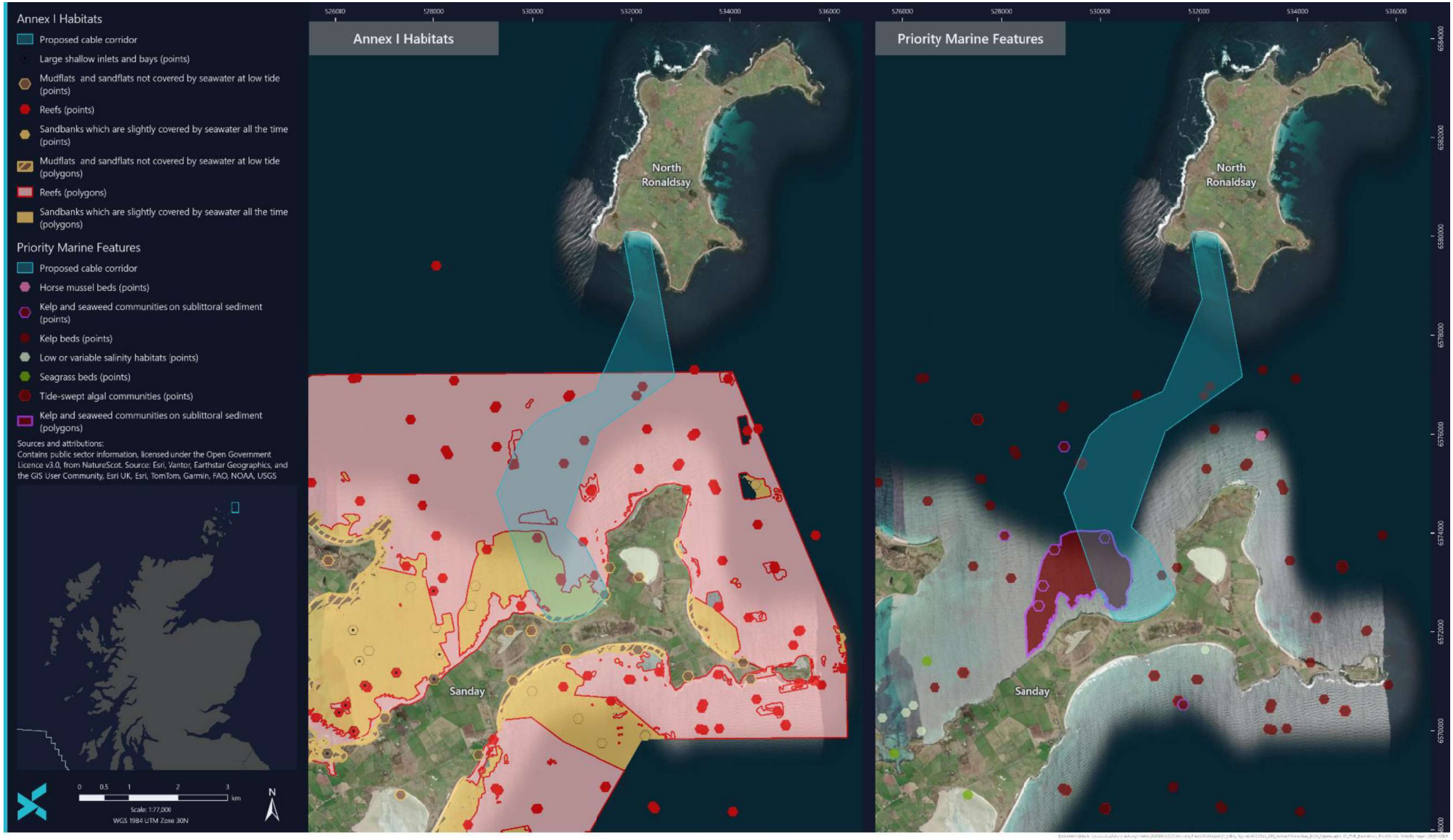


Figure 8-3 Annex I habitats and PMFs in the cable corridor

8.4 Impact Assessment

Potential impacts associated with the proposed cable installation activities and removal of sections of the OoS cable include the following:

- Temporary and permanent direct habitat loss or disturbance;
- Temporary increases in suspended sediment and associated deposition;
- Introduction and/or spread of INNS; and
- Accidental release of hazardous substances.

The placement of the proposed subsea cable (surface lay), cable trenching in the intertidal, seabed preparation activities (PLGR (although unlikely to be used) and OoS cable removal), use of cable stabilisation/protection and spud leg/mooring anchor deployments will be in direct contact with the seabed and have the potential for direct impacts on benthic species and habitats within the Project footprint. The proposed cable corridor will potentially overlap with sensitive benthic habitats and biotopes as described above. Additionally, there is direct overlap with the Sanday SAC (see Section 5.5.4). Avoidance of sensitive features is the first principal for the Project as noted in Section 4.3. No PLGR will be undertaken in areas where designated features of the Sanday SAC are found throughout the proposed cable corridor. Additionally, SHEPD will avoid cable lay in areas where designated features of the Sanday SAC are found, as far as is practicable. However, preliminary benthic survey results indicate that the SAC features are widespread throughout the cable corridor. PLGR is therefore unlikely to be feasible from a technical and environmental perspective and is unlikely to be used. Furthermore, avoidance and microrouteing of the cable around the SAC features may not be practicable, due to the presence of the features in the proposed cable corridor and the wider environment. Where individual occurrence of features have been observed, like seagrass at the North Ronaldsay landfall, these will be avoided with a suitable buffer zone where possible. This will be detailed in the CLMP and CPMP which will be submitted prior to cable (CLMP) and cable protection (CPMP) installation.

As discussed in Section 3, it is expected that the proposed subsea cable will be surface laid in the subtidal (MLWS to MLWS). In the intertidal areas between MHWS and MLWS, the proposed subsea cable will be trenched at both landfalls via OCT. At North Ronaldsay, there is potential for the TJP to be located below MHWS. OoS cable removal will be undertaken at both shore ends and in discrete sections (~1 km) in the subtidal.

8.4.1 Area of Impact

The estimated lengths of the proposed subsea cable to be surface laid is 10.1 km, with 300 m of the cable trenched in an OCT. The lengths and footprints of the proposed subsea cables and associated deposits have been included in Table 8-1. It is noted that the On-Bottom Stability analysis is still ongoing to determine potential movement of the cable prior to installation of cable protection. The cable is not however expected to move significantly prior to stabilisation due to the uneven and rocky reef seabed material fixing the cable in place. The previous faulted cable was found to follow the route position list recorded at the time of installation accurately during surveys following the fault occurring. This shows limited movement of the cable post installation. The following worst-case assumptions have been made for the area of seabed impacted:

- Temporary footprint:
  - The intertidal impact corridor for OCT (~ 1 m per trench) has been assessed, based on the length of the proposed intertidal cable expected to be trenched at each landfall (160 m Sanday and 140 m North Ronaldsay), with an assumed 20 m wide working corridor. The footprint of the TJP below MHWS at North Ronaldsay is included within the 20 m wide working corridor;

- The subtidal impact corridor is assessed as 10 m wide, to include disturbance arising from pre-installation activities (i.e., PLGR and removal of sections of OoS cable). It should be noted that use of PLGR is very unlikely due to the seabed type, so this number likely overestimates the impact;
- DSV Spud leg OR anchors: a maximum spud diameter of 0.4 m has been assumed for a seabed footprint of 0.13 m^2 per spud leg (total seabed footprint per barge placement, assuming four spud legs per movement, is 0.5 m^2). While the total number of deployments is unable to be predicted, it has been assumed that there will be a total of nine DSV placements, three set up locations at North Ronaldsay and six set up locations at Sanday, resulting in a total area of 4.5 m^2 in total; OR
- Alternatively, DSV mooring anchors may be used instead of spud legs. Each 2 t anchor (maximum expected size of anchor) impacts an area of 6.24 m^2 (based on 2.4 m x 2.6 m dimensions). Four anchors are required per set up which impacts a 24.96 m^2 area. With a total of nice DSV placements, three set up locations at North Ronaldsay and six set up locations at Sanday, resulting in a total area of 224.64 m^2 in total.

- Permanent footprint:
  - The surface laid cable (MLWS to MLWS) (without split pipe) has a cross sectional diameter of apprimately 103 mm (i.e., 0.103 m), with a total length of 6,400 m;
  - The surface laid with (MLWS to MLWS) (with tubular cable protection system) has a cross sectional diameter of 260 mm (i.e., 0.260 m), with a total length of 3,700 m;
  - Each 2 t rock bag has a diameter of 2.4 m, therefore impacting an area of 4.5 m^2 each;
  - Clump weights for the Sea Earthing cables are 1 m diameter with a footprint of 0.8 m^2; and
  - Clump weights for securing OoS cable ends are 1 m diameter with a footprint of 0.8 m^2.

Table 8-1 Footprint of cable installation methods and permanent materials along the proposed cable corridor

INSTALLATION METHOD	DESCRIPTION	AREA OF SEABED IMPACT (m^2)	AREA OF SEABED IMPACT (km^2)
Temporary Footprint			
Intertidal Impact Corridor	Total trenching length of 300 m, with a 20 m wide working corridor (noting the trench itself will be 1 m wide).	6,000	0.006
Subtidal Impact Corridor	The total length of the surface laid cables (MLWS to MLWS) is 10,100 m, assuming a 10 m wide corridor for seabed preparation (e.g., PLGR and OoS removal), noting this will exclude areas of sensitive habitats.	101,000	0.101
Anchor or spud Areas for DSV	Anchor or spud legs will be used for DSV station keeping (worst case footprint shown, for anchors)	225	0.0002
		Maximum Temporary Footprint (km^2)	***0.1***

INSTALLATION METHOD	DESCRIPTION	AREA OF SEABED IMPACT (m^2)	AREA OF SEABED IMPACT (km^2)
Permanent Footprint			
Surface Laid Cable (MLWS to MLWS) (without split pipe)	The surface laid will be 6,400 m, with a diameter of 0.103 m	659	0.0007
Surface Laid Cable (MLWS to MLWS) (with split pipe)	A total length of 3,700 m with a diameter of 0.260 m (total length of split pipe is 4 km, but 300 m will be within the OCT)	962	0.001
Rock Bags	Each 2 t rock bag mattress has a seabed footprint of 4.5 m^2. The quantity required will be up to 276.	1,242	0.001
Earthing Clump Weights	Each clump weight has a seabed footprint of 0.8 m^2. The quantity required will be up to six for the sea earths.	4.8	0.000005
Clump Weights (OoS Cables)	Each clump weight has a seabed footprint of 0.8 m^2. The quantity required will be up to 12.	9.6	0.00001
		Maximum Permanent Footprint (km^2)	***0.002***

8.4.2 Direct Loss / Disturbance to Benthic Habitats and Communities

The proposed cable installation activities have the potential to result in direct loss and/or disturbance of benthic habitats and communities, including the sensitive seabed features and habitats. As described in Section 5.3.6, there are a number of potentially sensitive subtidal habitats present based on preliminary interpretation, including Annex I geogenic reef, kelp beds and seagrass beds (although only one patch was observed at North Ronaldsay nearshore area). The benthic survey analysis is ongoing and a full assessment of sensitive habitats will be presented in the habitat assessment report. The results will be made available once analysis is complete.

Temporary habitat loss / disturbance will be associated with intertidal trenching, subtidal seabed preparation activities (PLGR and removal of OoS cables) and the spudding/anchoring areas. The maximum temporary footprint for habitat loss / disturbance is 0.1 km^2 (Table 8-1). Permanent habitat loss / disturbance will occur in the footprint of the surface laid cable and where there are deposits on the seabed (e.g., the tubular cable protection system and rock bags). The maximum permanent footprint for habitat loss / disturbance is 0.002 km^2 (Table 8-1).

It is unlikely that Annex I reef and sandflats can be avoided entirely during the cable installation due to the prevalence of these features in the proposed cable corridor. Avoidance of kelp is also unlikely. The avoidance of PLGR due to rocky reef seabed conditions will limit the temporary footprint of the cable installation, and the 0.1 km^2 is unlikely to be an overestimation as it assumed a 10 m working corridor. As the cable will be surface laid, the cable footprint will

be small, but any rock bags will increase the permanent footprint. The current rock bag estimate (276 x 2 t bags) is the highest estimate for the route, and will be further refined once the On-Bottom Stability assessment, route engineering and benthic survey results become available. The proposed number and further assessment will be provided in the CPMP which will be submitted prior to cable protection installation.

The indicative benthic survey results have identified a patch of seagrass in the vicinity of the North Ronaldsay landfall. This will be avoided with an appropriate buffer as far as practicable. It should be noted that the location of the seagrass is broadly similar to the potential wreck at the landfall (see Section 10), so microrouteing around the features is proposed.

Given that the cable will be surface laid, disturbance from direct habitat loss is expected to be highly localised in extent, limited to the footprint of the cable and associated cable stabilisation (e.g. rock bags) (i.e. up to 0.1 km^2 temporary footprint and 0.002 km^2 permanent footprint) and within the small spatial scale footprint of the cable removal activities (Table 8-1; see Section 8.4.1). Any disturbance or loss of benthic habitats will be limited to the immediate footprint of the cable installation and removal activities, and hence, will impact a very small portion of the total Annex I present in the vicinity of the Project. Furthermore, rocky reefs dominated by kelp communities have overall a moderate to high ability to recover from a range of pressures including abrasion (NatureScot, 2025). Whilst this pressure can cause the decline in typical species and overall species diversity, many of the species associated with these communities e.g., kelps, are known to be rapid colonisers and fast growing, although the re-establishment of a community containing the range of typical species may take several years. For the more exposed rocky reef communities that are dominated by animal communities, including soft corals and sponges, brittle stars and hydroids the ability to recover is moderate-high for pressures such as abrasion (NatureScot, 2025). Common typical species may be able recruit onto bare surfaces within 2 years, but it may take 5 years to become a dominant component of the community again. If discord mussels are present, local recruitment in may be rapid, depending on the hydrographic regime. Hence, within a population or between adjacent populations recruitment is probably fairly rapid (NatureScot 2025) and recovery from any disturbance is quick. Finally, as the cable is protected with rock bags, this offers additional hard substrate for colonisation of kelp and mussels.

Given the highly localised footprint of the temporary and permanent direct habitat / loss disturbance, the widespread presence of the sensitive features in Sanday, the embedded mitigation and quick recovery of the sensitive features extensive presence of infralittoral rock, reef and kelp as well as subtidal and intertidal sandbanks in the cable corridor and the wider area, the minor disturbance and loss of the Annex I habitats or PMFs is unlikely to have a significant effect on the regional and national status of the kelp PMF or the Annex I reef.

Assessment of Impact Significance

Given the presence of a number of habitats and species identified as having high conservation or national and international importance, the overall sensitivity is **high**.

There will be a permanent impact which will occur in a highly localised footprint. Overall, given the localised footprint, and the wider availability of these seabed habitats and species, and the feature's recoverability, the magnitude of effect is considered **minor**, resulting in a **minor** consequence.

Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQEUNCE
High	Minor	Minor

Impact Significance – **NOT SIGNIFICANT**

8.4.3 Temporary Increases in Suspended Sediment

In the intertidal areas between MHWS and MLWS, the proposed subsea cable will be trenched at both landfalls using OCT. This will be conducted using conventional land-based excavators working within a tidal window, i.e., when the intertidal area is exposed, avoiding works below the waterline. It is therefore expected that there will be no disturbance of submerged sediments resulting from these intertidal activities. There may be temporary and highly localised increases in suspended sediment caused by the incoming tide interacting with the trench walls and associated spoil. However, this will not be significantly greater than that expected by wave action causing low-level erosion of the shoreline sediments.

The habitat complexity of the intertidal zone supports a wide range of species that will demonstrate different sensitivities to increased turbidity and sediment deposition. The temporary reduction in water quality and resettlement of sediments is expected to occur locally around the proposed cable installation activities, and the impacts will be most applicable to sessile and less mobile fauna. Suspension and deposition of fine particles may have an effect on low mobility filter feeders; however, the intertidal benthic communities in sandy sediments will be generally adapted to high sediment loading and have a high tolerance to temporary and localised increases in suspended sediment, and associated sediment deposition.

A number of sensitive benthic features have been identified in the subtidal region of the proposed cable corridor, as described in Section 5.3.6. Seagrass is considered to have high sensitivity to changes in suspended solids (water clarity) and medium sensitivity to smothering and siltation rate changes (light) (d'Avack *et al.*, 2014). All other subtidal features are considered to be less sensitive to the temporary increases in suspended sediment concentrations. Any temporary increases in suspended sediment concentrations and associated deposition will be minimal in the subtidal, with effects being highly localised and limited to the immediate vicinity of the proposed cable installation activities.

The preliminary benthic survey results have identified a sparse patch of seagrass at the North Ronaldsay landfall. This will be avoided with a buffer through microrouteing where possible, and as such sedimentation effects will be minimised.

Assessment of Impact Significance

Given the presence of a number of habitats and species identified as having high conservation or national and international importance, the overall sensitivity is **high**.

Any temporary increases in suspended sediment concentrations and associated deposition will be minimal in the subtidal region given that no trenching is proposed. Any effects will be highly localised and temporary in nature. As such, the magnitude of effect is **minor** for all subtidal features of interest, resulting in a **minor** consequence.

Embedded mitigation measures considered as part of the Project design are listed in Section 4.3.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQEUNCE
High	Minor	Minor

Impact Significance – **NOT SIGNIFICANT**

8.4.4 Introduction and/or Spread of INNS

Ballast water discharges from vessels will be managed under the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention). Implementation of the BWM Convention will not mitigate the risk of an INNS being introduced via biofouling on a vessel. However, this vector is considered to carry a lower risk of INNS introduction than ballast water and the installation vessel movements are

unlikely to constitute a change from baseline conditions with respect to the potential for introducing INNS. Rock bags and clump weights will be new, and free from organic material. The protective deposits do not therefore present a risk of transport and introduction of INNS.

In addition to the above, larger vessels will utilise anti-fouling measures in order to reduce INNS impacts. Anti-fouling measures also help reduce the fuel consumption of the vessels being used which will in-turn reduce the volume of emissions.

The embedded biosecurity measures, including management of ballast water in adherence with the BWM Convention, will ensure that there are no pathways for INNS to be introduced by the proposed cable installation activities and subsequently spread. Therefore, the likelihood of introduction of INNS and the likelihood of spread and establishment are reduced to low, and the residual impact is not significant.

Assessment of Impact Significance

Given the presence of a number of habitats and species identified as having high conservation or national and international importance, the overall sensitivity is **high**. Nevertheless, the embedded mitigation measures as described in Section 4.3 will ensure that there are no pathways for INNS to be introduced and spread as a result of the proposed cable installation activities. Therefore, the magnitude of effect is **negligible**, resulting in a **minor** consequence.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Negligible	Minor

Impact Significance – **NOT SIGNIFICANT**

8.4.5 Accidental Release of Hazardous Substances

The use of vessels could lead to a fuel release, or of cleaning fluids, oils and hydraulic fluids used on board vessels and during ROV operations, which could be released overboard or accidentally discharged. These discharges can be potentially harmful and can lead to localised organic enrichment and a change in the balance of the food chain. However, as the vessels will be < 12 nautical miles from shore, there will be no discharge of grey water, sewage, food waste or drain water.

All vessels will be compliant with IMO and MARPOL requirements and as such, the risk of oils and other contaminants entering the marine environment is very low (6.4.3). Neither organic enrichment nor oxygen depletion is considered likely, due to the relatively small cumulative volume of any discharges. Any reduced water quality will be short-term and localised in nature within the proposed cable corridor, occurring sequentially with the location of the proposed cable installation activities, and near the seabed. A temporary and localised reduction in water quality is unlikely to cause a detectable change to the benthic species and habitats along the proposed cable corridor.

Assessment of Impact Significance

Given the presence of a number of habitats and species identified as having high conservation or national and international importance, the overall sensitivity is high. Nevertheless, the embedded mitigation measures as described in Section 4.3 will ensure the risk of releases of hazardous substances being released into the marine environment are minimised, impacts on benthic receptors are expected to be minimal. Therefore, the magnitude of effect is negligible, resulting in a minor consequence.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Negligible	Minor

Impact Significance – NOT SIGNIFICANT

8.4.6 Operation

Maintenance Activities

The proposed subsea cable has been designed to be maintenance free, as such no planned ongoing maintenance activities are proposed. SHEPD will conduct routine inspections and surveys of the proposed subsea cable throughout its operational life to ensure it remains in good condition (please refer to the OIMD strategy submitted alongside this MEA). There is a potential for remedial cable repair works to be required, in the event the proposed subsea cable is damaged or the need for additional stabilisation materials is identified during the routine surveys; however, this would be subject to a separate licensing process.

If required, impacts on benthic ecology resulting from cable repairs will be analogous to those occurring during installation, although significantly reduced on both spatial and temporal scales. As such, impacts during the operational phase are considered to be not significant.

Heating and Electromagnetic Fields (EMF)

While operational, subsea power cables generate heat since they are not made from perfect conductors, and as such in theory could result in increased temperatures in their surrounding environs. However, due to the very high specific heat capacity of sea water, this effect will be highly localised, and limited to the immediate vicinity (the surface) of the proposed subsea cable. As such, the impact resulting from heat emitted by the cable will be wholly within the footprint of the proposed subsea cable, and has therefore been assessed as habitat loss, so is not considered further.

The effects of EMF on benthic communities are currently not well understood as there has been limited research to date, as illustrated by the inclusion of impacts of EMF on benthic species as a key evidence gap within the ScotMER benthic evidence map (ScotMER, 2024). Recent studies on this subject have focussed on cables associated with marine renewables, transmission links and interconnectors which operate at much higher voltages than the proposed subsea cables. Where studies have investigated the effects of EMF on benthic species (e.g., crustaceans), the studies have considered the effects of Direct Current (DC) cables rather than Alternating Current (AC). The proposed subsea cable is a 11 kV subsea cable. The Feature Activity Sensitivity Tool (FeAST) defines a benchmark EMF changes with the potential to affect electro-sensitive species as a change in the local B-field variation from the natural geomagnetic field (GMF) of 10 µT due to anthropogenic means (FeaAST, 2026).

A study by Normandeau et al., (2011) presented modelling of EMF associated with HVAC cables ranging from 35 – 132 kV and found that the average B-fields for the modelled HVAC cables (assuming 1 m depth of lowering) were 7.85 µT at the seabed directly above the cable (i.e., horizontal distance from the cable = 0). As such the strengths of EMF resulting from the operation for the Project are anticipated to be below the FeAST benchmark of 10 µT.

Therefore, EMFs resulting from the operation of the proposed subsea cable is not anticipated to be of a magnitude which may result in adverse effects on benthic organisms according to the current literature and fall within the natural range of the earth geomagnetic field in the vicinity of the Project. Therefore, no significant effects are anticipated.

Assessment of Impact Significance

Given the presence of a number of habitats and species identified as having high conservation or national and international importance, the overall sensitivity is high. Nevertheless, EMFs resulting from the operation of the proposed subsea cable is not anticipated to be of a magnitude which may result in adverse effects on benthic organisms. Therefore, the magnitude of effect is negligible, resulting in a minor consequence.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Negligible	Minor

Impact Significance – NOT SIGNIFICANT

8.5 Conclusion

Physical disturbance and smothering of benthic habitat and species via sediment re-suspension and settlement are likely to occur within the footprint of the proposed installation activities; however, any effects are expected to be highly localised and temporary. Given the embedded mitigation measures, including biosecurity measures for the control of INNS, no significant impact on the benthic and intertidal ecology is anticipated to result from the proposed cable installation activities.

9 ORNITHOLOGY

9.1 Introduction

This Section of the report provides further detail on the bird receptors in the vicinity of the proposed cable corridor and presents results from an assessment of potential impacts which may result from the proposed cable installation activities. Management and mitigation measures to ensure the identified impacts are minimised will also be suggested where necessary.

9.2 Data Sources

This Section draws on a number of data sources including published papers (NatureScot, 2020) and publicly available geospatial data (Marine Directorate, 2026b).

9.3 Baseline and Receptor Identification

The Scottish coastal and marine environment forms vital habitat to a variety of seabird species (Scottish Government, 2020). While the marine environment forms important habitat to seabirds year-round, birds are most vulnerable to human disturbance at sea during the breeding season, and in the moulting period when many species become flightless and spend greater time on the sea surface (Scottish Government, 2020). After the breeding season ends, moulting birds disperse from their coastal colonies to head to offshore waters. This at sea period increases the likelihood of interactions with survey vessels and potential collision risk.

As discussed in Section 5.3.5, the proposed cable corridor overlaps with the East Sanday Coast SPA, SSSI and Ramsar site. The East Sanday Coast SPA and Ramsar site are designated for non-breeding (wintering) populations of bar-tailed godwit, purple sandpiper, and ruddy turnstone. The East Sanday Coast SSSI is designated for non-breeding

populations of bar-tailed godwit, purple sandpiper, ringed plover, sanderling, and turnstone, as well as a passage population for turnstone.

9.4 Impact Assessment

9.4.1 Installation

The proposed cable installation is scheduled for Autumn 2026 and Spring / Summer 2027. During this timeframe there is potential for disturbance to overwintering and migrating wading birds associated with the East Sanday Coast SPA, Ramsar and SSSI. As the birds are not breeding at the sites, no impact on breeding birds from human and vehicle presence at landfall sites are expected.

The installation works are short-term and transient in nature. Consequently, the likelihood of direct disturbance to foraging birds in coastal areas or to loafing birds on the sea surface is considered very low, given the high mobility of these species. The proposed cable installation activities are considered extremely unlikely to result in any adverse effects on the FCS of sensitive ornithological receptors. This is concluded for the following reasons:

- No adverse effects on water quality (and associated changes to prey availability) are anticipated as detailed in Section 6;
- Cable installation vessels will be slow moving, reducing the potential for disturbance;
- All vessels will adhere to the provisions of the SMWWC during the proposed cable installation activities;
- During night-time operations and intertidal operations, vessel lighting will be minimised insofar as possible whilst allowing for safety. This will reduce the potential for bird strikes or disturbance of seabirds;
- All nesting birds, if present, will be avoided and nests not disturbed; and
- The waters in the vicinity of the proposed cable corridor are subject to relatively high levels of vessel activity, predominantly associated with ferry vessel traffic (see Section 11.3.2). As such, the presence of the installation vessels required to facilitate the cable installation will not constitute substantive change from baseline vessel activity (and hence source of disturbance to seabirds).

Assessment of Impact Significance

The sensitivity is assessed as **high** with consideration of overwintering and migrating wading birds and seabird receptors. The presence of the installation vessels will not constitute a change from baseline conditions, and the nearshore works will be transient, localised and temporary nature of potential impacts. Furthermore, due to the embedded measures, effects on ornithological receptors are expected to be **minor**, and no adverse effects on the FCS of any species are anticipated. Therefore, the magnitude of effect is assessed as **minor**, resulting in a minor consequence.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Minor	Minor

Impact Significance – **NOT SIGNIFICANT**

9.4.2 Operation

The cable has been designed to be maintenance free, as such no planned ongoing maintenance activities are proposed. SHEPD will conduct routine inspections and surveys of the cable throughout its operational life to ensure it remains in good condition (please refer to the OIMD strategy submitted alongside this MEA). There is a potential

for remedial cable repair works to be required, in the event the cable is damaged or the need for additional stabilisation materials is identified during the routine surveys; however, this would be subject to a separate licensing process.

If required, impacts on ornithological receptors resulting from cable repairs will be analogous to those occurring during installation, although significantly reduced on both spatial and temporal scales. As such, impacts during the operational phase are considered to be not significant.

9.5 Conclusion

Overwintering and migrating wading birds and seabird species have the potential to be disturbed by the physical presence of vessels during the proposed cable installation activities in the intertidal and nearshore areas, including the protected features of the East Sanday Coast SPA, Ramsar and SSSI. However, the increase in vessels will be slow moving and SMWWC will be followed to minimise any effects from vessels. Given the implementation of the mitigation measures outlined in Section 4.3, no significant effects on wild birds, their eggs and nests are to be expected.

10 MARINE ARCHAEOLOGY

10.1 Introduction

This Section provides detail on marine archaeological features in the vicinity of the proposed cable corridor. An assessment of potential impacts on these features is then presented, along with recommendations for additional secondary mitigation measures that may be required in order to ensure losses of or impacts to the archaeological record are minimised.

10.2 Data Sources

A review of publicly available information pertaining to marine archaeological sites in the vicinity of the proposed cable corridor has been conducted in order to inform this assessment. The key sources utilised were:

- UKHO global wrecks and obstructions data (UKHO, 2026);
- Historic Environment Scotland (HES) – Trove (formerly known as 'Canmore') (HES, 2026a) and PastMap (HES, 2026b) databases

Preliminary results from the geophysical surveys have been used to supplement the baseline.

10.3 Baseline and Receptor Identification

Based on publicly available data (UKHO, 2026), there are no recorded wrecks or other marine archaeological interests directly overlapping with the proposed cable corridor. However, results from the geophysical surveys undertaken identified a potential wreck within the cable corridor (Figure 1-1). The potential wreck could be the unconfirmed wreck of the Helios, classified as wooden smack with date of loss cited as 1 December 1910 (HES, 2026a). As it was not possible to investigate the find further due to the depth and working around a buoy in the area, it has been assumed that the record has been assumed to have high archaeological value.

10.4 Impact Assessment

10.4.1 Installation

As described in Section 10.3, there is a potential wreck present within the cable corridor. It is anticipated that any potential for damage to or loss of the historic record would be limited to interactions with wrecks or artefacts during cable laying operations and the placement of stabilisation measures. Should such interactions occur, the damage or loss of archaeological features would be a permanent effect on a potentially highly sensitive receptor, which has no ability to recover, and as such could constitute a significant impact on historic records.

An additional pre-installation survey may be carried out along the proposed cable route and any geophysical and video data would be checked for archaeological features. During detailed route design, the following provisions shall be implemented with regard to wrecks or other features of potential archaeological value identified in the survey data.

- Suspected and confirmed wrecks or features of potential archaeological significance shall be avoided by a buffer of at least 25 m during detailed route design;
- The locations of confirmed wrecks and features of potential archaeological significance will be clearly identified on electronic charts on board the installation vessel and utilised to guide the proposed cable installation activities;
- The location of any wrecks or features of potential archaeological significance will be provided to HES, and the UKHO; and
- As a potential archaeological feature is present within the cable corridor, if conditioned by licence conditions, a PAD will be implemented during the cable installation activities.

Given the avoidance of features of archaeological significance through the route engineering process it is considered that the proposed cable installation activities will not result in significant adverse effects on marine archaeological receptors.

Assessment of Impact Significance

The damage or loss of archaeological features would be a permanent effect on a potentially highly sensitive receptor, which has no ability to recover, and as such could constitute a significant impact on historic records. Therefore, the sensitivity of marine archaeology receptors is assessed as **high**. The proposed cable installation activities are not anticipated to result in any disturbance or damage to marine archaeology receptors given the embedded mitigation (Section 4.3) that will be applied to ensure there will be no adverse effects on marine archaeology as a result of the proposed cable installation activities. Given the implementation of the embedded mitigation, the magnitude of effect is assessed as **negligible**, resulting in a **minor** consequence.

SENSITIVITY	MAGNITUDE OF EFFECT	CONSEQUENCE
High	Negligible	Minor

Impact Significance – **NOT SIGNIFICANT**

10.4.2 Operation

The proposed subsea cable has been designed to be maintenance free, as such no planned ongoing maintenance activities are proposed. SHEPD will conduct routine inspections and surveys of the proposed subsea cable throughout its operational life to ensure it remains in good condition (please refer to the OIMD strategy submitted alongside this

MEA). There is a potential for remedial cable repair works to be required, in the event the proposed subsea cable is damaged or the need for additional stabilisation materials is identified during the routine surveys; however, this would be subject to a separate licensing process.

If required, impacts on archaeological receptors resulting from cable repairs will be analogous to those occurring during construction, although significantly reduced on both spatial and temporal scales. As such, impacts during the operational phase are considered to be not significant.

10.5 Conclusion

One potential wreck was identified within the cable corridor based on the Project's geophysical survey data. Given the implementation of the embedded mitigation measures as described in Section 4.3, it is considered to be extremely unlikely that the proposed cable installation activities would result in the loss or damage of archaeological features. As such, this assessment concludes that the Project will not result in any adverse impacts on the historic record.

11 SHIPPING AND NAVIGATION

11.1 Introduction

The proposed cable corridor is located between Sanday and North Ronaldsay and as such there are a number of navigational considerations required to facilitate the installation and operations of the cable. Through good communication and understanding of stakeholder requirements, SHEPD aim to minimise any potential impacts shipping and navigation by agreeing mitigation strategies before the proposed cable installation activities begin. This approach continues through all phases of the Project, thus ensuring that all impacts to navigation are not significant.

Consultation meetings have been held with key navigational stakeholders since the cable fault to inform them of the proposed cable replacement, including meetings with MCA, Orkney Fishermen's Association, Orkney Islands Council Harbour Authority, Orkney Ferries and the Royal Yachting Association (RYA) to understand key concerns to navigation from the Project, which has supported the assessment of impacts. A consultation meeting was also held on 18 August 2026 with Orkney Islands Council Harbour Authority, Orkney Ferries and RYA to understand key concerns to navigation from the Project, which has supported the assessment of impacts.

The following impacts have been considered for the Project:

- Vessel collision (third party vessel with Project vessel) during installation and operation;
- Disruption to established vessel routes and areas during installation;
- Interactions with vessel anchors during installation;
- Interactions with vessel anchors during normal operations;
- Interactions with fishing gear during installation;
- Interactions with fishing gear during normal operations;
- Reduction in under keel clearance during normal operations; and
- EMF effects and compass deviation.

Full details of the navigational assessment are provided in the HLNRA (Xodus Document No. A-200853-S00-A-ASMT-001, which has been submitted alongside this MEA. A summary of the HLNRA is provided in the subsequent sections.

11.2 Supporting Documents

An HLNRA has been undertaken for the Project to ascertain the risks to shipping and navigation for all phases of the Project, including installation, operations, maintenance and decommissioning. The HLNRA was undertaken based on a Marine Traffic Study (MTS) established by undertaking a review of historic Automatic Identification System (AIS) data for a 10 NM corridor around the proposed cable corridor (the Study Area).

Following the MTS, a high level Formal Safety Assessment (FSA) was conducted in line with IMO 2018 guidance (IMO, 2018) and the MCA Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI) (MCA, 2021). The FSA identified hazards for the Project and provide an assessment of associated risks of these hazards and provide recommendations for further mitigations where required to ensure risks were ALARP.

Full details of the assessment, including methodology and outcomes of the FSA are provided in the HLNRA (Xodus Document No. A-200853-S00-A-ASMT-001), which has been submitted alongside this MEA.

11.3 Baseline and Receptor Identification

A summary of the key navigational receptors (Figure 11-1) and shipping baseline (Figure 11-2) are provided below, with full details available in the HLNRA.

11.3.1 Key Navigation Features

Ports and Ferry Routes

The "Kirkwall – North Ronaldsay – Papa Westray" ferry service is an inter-island maritime connection operated by Orkney Ferries Ltd. The route links the Orkney Mainland port of Kirkwall with the remote northern islands of North Ronaldsay and Papa Westray. Nouster Harbour serves as North Ronaldsay's ferry landing facility. The harbour is the island's primary marine access point and is located on the island's southern coastline within Nouster Bay. During stakeholder consultation, an additional ferry route which intersects the proposed cable corridor was identified by Orkney Ferries. Whilst confirmed as a formal ferry route, it is only taken when adverse weather conditions prohibit taking the less-sheltered primary routes which passes to the west of Sanday. The secondary route takes a southeastern path from North Ronaldsay to the east of Sanday. These adverse weather conditions are most likely to occur during winter months when the ferry reduces its operating schedule to two journeys per week.

The "Kirkwall – North Ronaldsay – Papa Westray" ferry route approaches approximately 100 m to the west of the proposed cable corridor within the Nouster Harbour Area on North Ronaldsay, in close proximity to where the North Ronaldsay landfall is planned.

Cables and Aids to Navigation

The only cable which intersects the proposed Project cable corridor is the existing Sanday to North Ronaldsay power cable which will be replaced as part of this Project. An active BT telecommunications cable is present within the eastern portion of the study area.

As confirmed during stakeholder consultation with the Orkney Islands Council Harbour Authority, seasonal small craft moorings will be removed in preparation for cable works.

There are a number of aids to navigation in the study area, but none are within the cable corridor.

No charted anchorage areas intersect the proposed cable corridor, with the closest being the Otterswick anchorage area, located approximately 2.2 km to the southwest.

Wrecks, Obstructions and Recreation

Wreck locations were identified using Marine Themes Vector data layers from Emapsite and the open-source Global Wrecks and Obstructions database provided by the UKHO.

The closest UKHO dataset wreck is named WANJA and categorised as "distributed remains of wreck". This wreck is located approximately 2.4 km west of the southern section of the proposed cable corridor. However, whilst not detailed in the UKHO nor Global Wrecks datasets, geophysical surveys of the cable corridor identified a structure, which is presumed to be a wreck. Whilst not confirmed, the structure will be treated as a wreck and avoided with a minimum 25 m buffer radius during cable routeing. The closest features identified from the Emapsite Marine Themes Vector data were submerged rock obstructions, the closest of which located approximately 490 m from the proposed cable corridor.

Neither the UKHO nor the Marine Themes Vector dataset display any wreck nor obstruction which intersects the proposed cable corridor.

No RYA clubs, training centres, marinas or recreational boating areas are identified within the study area.

11.3.2 Baseline Shipping Activity

A total of 907 and 163 vessel tracks were recorded within the study area and the proposed cable corridor respectively, between the dates of 14th of July 2025 to 13th of July 2026, the studied year. These tracks were associated with 297 unique vessels, and 187 unique routes, based on previous and next port information captured in the AIS data. The busiest routes were associated with the passenger vessels Earl Thorfinn, Northerly Venture, and Earl Sigurd (Figure 11-2). A summary of the vessel track data across the study area is provided below:

- Passenger vessels were the most frequently observed vessels within both the study area and the proposed cable corridor, accounting for 31.1% and 42.9% of total tracks respectively. Ro-Ro/Passenger vessels were the most common sub-category, with the *Earl Thorfinn* being the most frequently recorded vessel crossing the proposed cable corridor. Passenger vessel activity occurred predominantly during daylight hours;
- Recreational vessels accounted for 22.5% of tracks within the study area and 18.4% within the proposed cable corridor, with sailing vessels being the most common sub-category. Due to their size, recreational vessels are less likely to carry AIS equipment and may therefore be under-represented in the data;
- Fishing vessels accounted for 19.1% of tracks within the study area and 3.7% within the proposed cable corridor. Activity was observed primarily during the daytime, with no fishing vessel tracks recorded within the cable corridor at night. During stakeholder consultation, both Orkney Ferries and the Orkney Islands Council Harbour Authority advised that lobster creel fishing takes place in the study area, which is underrepresented in this MTS, as well as very limited evidence of scallop dredging. It should be noted that AIS data often underrepresents fishing vessel tracks due to their size. Overall, this poses a very low risk / likelihood of snagging.
- Other vessels accounted for 13.8% of tracks within the study area and 28.2% within the proposed cable corridor, making them the second most frequently observed vessel category within the corridor. Activity was mainly observed during daylight hours;
- Offshore industry vessels accounted for 8.6% of tracks within the study area and 2.5% within the proposed cable corridor. While relatively infrequent, more tracks were recorded at night than during the day within the study area; and
- Cargo vessels and tankers accounted for 5.0% of tracks within the study area and 4.3% within the proposed cable corridor, making them the least frequently observed vessel type within the study area. Cargo vessels were the predominant sub-category within this vessel group.

11.4 Approach to Mitigation

The FSA within the HLNRA undertook an assessment of identified impacts/ hazards. The assessment took the Project navigation safety specific embedded mitigations into account, as laid out in Table 4-2 and Table 13-1.

11.5 Conclusion

From the assessments undertaken in the HLNRA, a summary of the FSA outcomes is provided in Table 11-1, showing that all risks were assessed to be ALARP. Full details of the FSA are provided in the HLNRA (Xodus Document No. A-200853-S00-A-REPT-001).

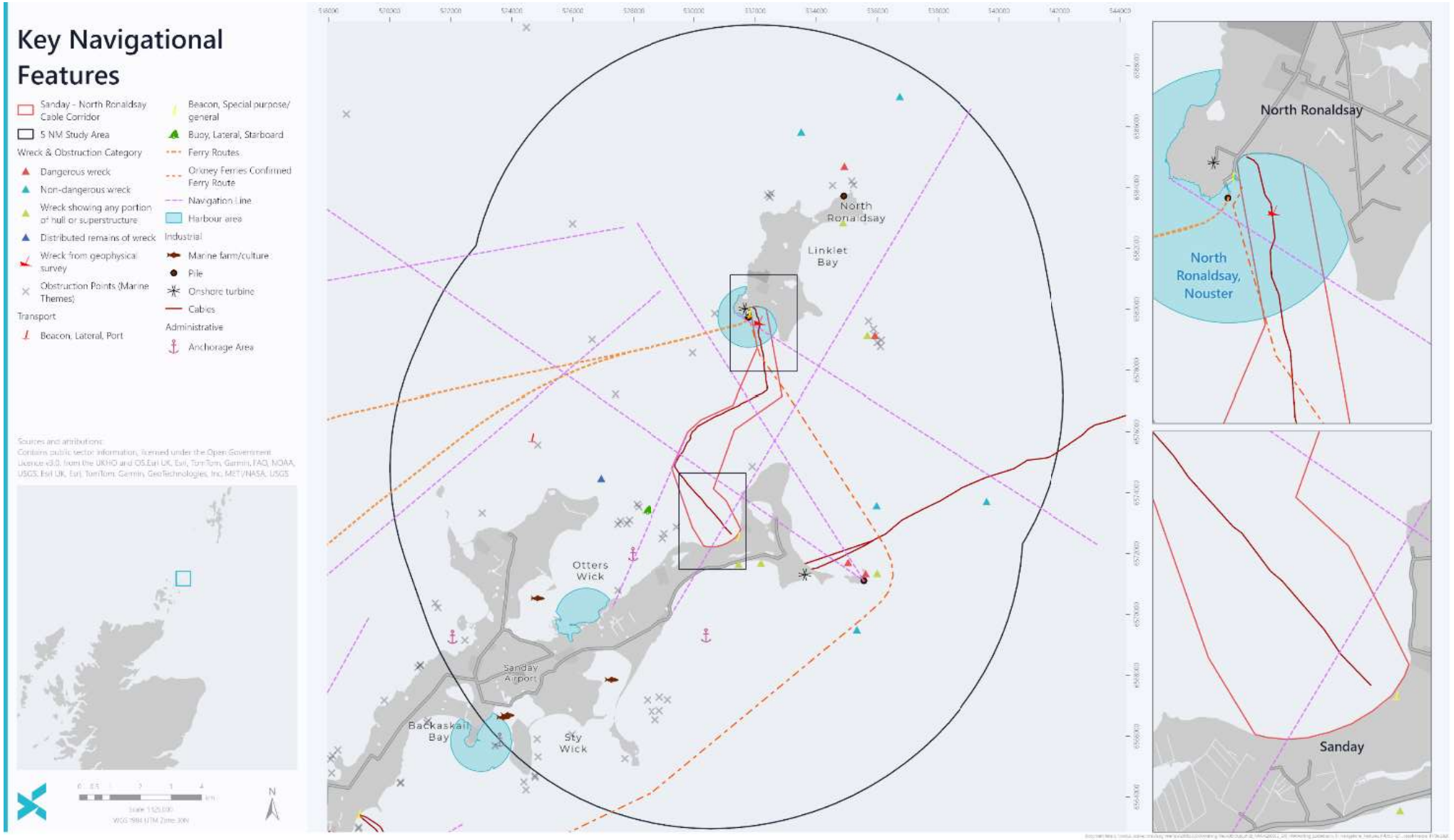


Figure 11-1 Key navigational features in the vicinity of the proposed cable corridor

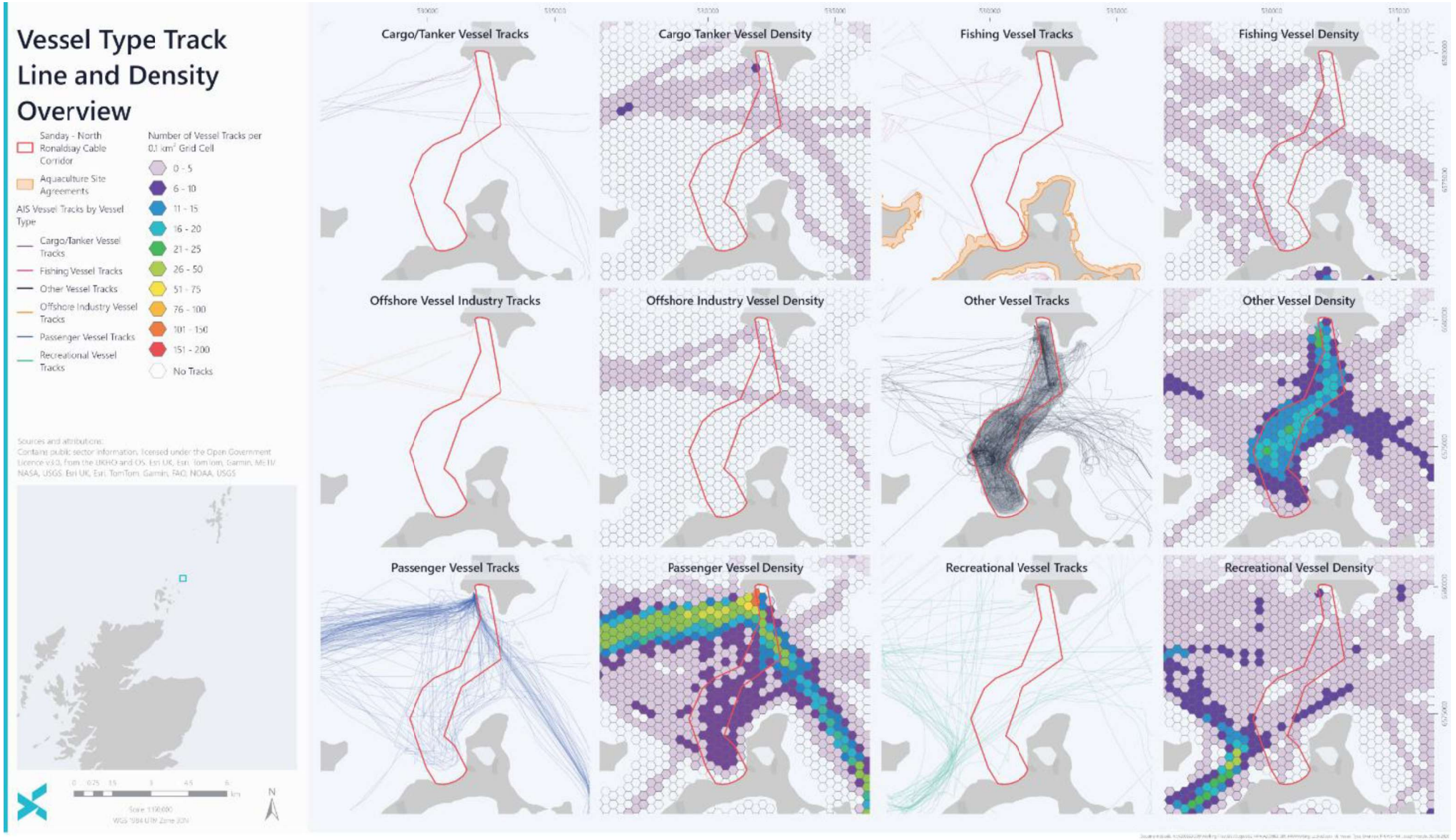


Figure 11-2 Vessel type track line and density overview

Table 11-1 HLNRA results

Hazard/ impact	Likelihood	Consequence	Initial Risk	Residual Risk
Vessel Collision Passing vessel collides with installation vessel (restricted in its manoeuvrability)	Remote	High	Tolerable	ALARP
Disruption to established vessel routes and areas	Remote	Medium	Broadly Acceptable	ALARP
Interactions with vessel anchors Vessel drags anchor across exposed cable	Remote	Medium	Broadly Acceptable	ALARP
Interactions with fishing gear Fishing activity conducted in vicinity of cable and installation activities	Remote	High	Tolerable	ALARP
Interactions with vessel anchors Vessel drags anchor across cable	Remote	Medium	Broadly Acceptable	ALARP
Interactions with fishing gear Fishing vessel drags gear across cable	Remote	High	Tolerable	ALARP
Reduction in Under Keel Clearance	Remote	Low	Broadly Acceptable	ALARP
Electromagnetic field effects disturb magnetic compass navigation	NA	NA	Broadly Acceptable	ALARP

12 COMMERCIAL FISHERIES AND OTHER SEA USERS

12.1 Introduction

Through good communication and understanding of viewpoints, SHEPD aim to minimise any potential impacts by agreeing mitigation strategies before the proposed cable installation activities begin. This approach continues through all phases of the Project, thus enabling co-existence with other marine users as SHEPD and their Contractors carry out the proposed cable installation activities. It should be noted that risks to navigational safety are specifically covered in Section 11 and the HLNRA.

Works are planned to keep unnecessary interference with other legitimate sea users to a minimum. SHEPD achieve this by actively engaging with legitimate sea users and those with consented development rights close to the operations.

SHEPD's consultations and agreements are tracked through the North Coast and Orkney FLMAP. This is a key document which shows the associated risks to the commercial fishing industry and other legitimate sea users, addresses the potential effects and identifies how to minimise and mitigate potential impacts. SHEPD will give as much notice as is practicably possible for the activities and provides updates when things change.

12.1.1 Stakeholder engagement

A consultation meeting was also held on 18 August 2026 with Orkney Islands Council Harbour Authority, Orkney Ferries and RYA to understand key concerns to navigation from the Project, which has supported the assessment of impacts. Orkney Ferries runs the ferry service in the vicinity of the proposed cable corridor which is located in the Orkney Islands Council Harbour Authority's Statutory Harbour Jurisdition Area at North Ronaldsay landfall. During the meeting the stakeholders were broadly content that all relevant commercial fisheries and other sea users had been identified. RYA noted that small leisure crafts should not be impacted by the cable due to the depth where it transitions from OCT to surface laid cable. During stakeholder consultation, both Orkney Ferries and the Orkney Islands Council Harbour Authority advised that lobster creel fishing takes place in the study area, which is underrepresented in the MTS, as well as very limited evidence of scallop dredging. It should be noted that AIS data often underrepresents fishing vessel tracks due to their size. Overall, this poses a very low risk / likelihood of snagging . All stakeholders stressed the importance of NtM to ensure local sea users are informed of the Project.

12.2 Supporting Documents

The purpose of the North Coast and Orkney FLMAP is to:

- Illustrate the associated risks to the commercial fisheries industry and other legitimate sea users (e.g., aquaculture, shipping (i.e., navigation risk) and address the potential effects (highlighted in the marine licenced evidence); and
- Identify how to minimise and mitigate potential impacts on local communities.

A summary assessment of all the potential marine interactions and activities which could influence or affect the proposed cable installation activities is provided within the North Coast and Orkney FLMAP.

12.2.1 FLMAP Delivery

The FLMAP Delivery Programme sets out how the FLO and Fishing Industry Representative (FIR) will communicate during the proposed cable installation activities and how the deliverables and mitigation, set out in the FLMAP, will be measured and fulfilled. This document will also highlight any regional specific communication and consultation

that is required, which may extend the notice period required to issue NtMs and communicate upcoming works. It will also highlight any ongoing issues which may arise throughout the works.

12.2.2 Co-Existence Between SHEPD and Other Marine Users

SHEPD have produced a co-existence strategy, 'How Scottish Hydro Electric Power Distribution co-exists with other marine users'. This document outlines SHEPD's approach to minimising interactions with other marine users as far as is practicable to maximise the potential for coexistence. The key principles of SHEPD's approach to co-existence include:

- Stage 1 – Identifying other marine users, and all relevant stakeholders potentially affected by the Project;
- Stage 2 – Identifying efficient communication channels for the promulgation of information to other marine users; and
- Stage 3 – Engaging and addressing the concerns of other marine users to agree co-existence plans and mitigation activities.

Further details on the specific mitigations to minimise impacts on other marine users (including recreational users and non-fishing vessel traffic) are detailed within the North Coast and Orkney FLMAP.

12.3 Approach to Mitigation

A summary of SHEPD's approach to mitigating interactions with commercial fisheries and other sea users during the installation and operation of the proposed cable replacement is presented in Table 12-1 below.

Table 12-1 Summary of mitigation for commercial fisheries and other sea users

MEASURE	DETAILS
Avoidance of Trawling and Anchoring	In line with guidance provided by the UKHO, the International Maritime Organisation (IMO) and the MCA within the Mariner's Handbook (NP100), and Marine Guidance Note (MGN) 661, SHEPD recommend that vessels should avoid demersal fishing and anchoring in proximity to subsea cables.
Production of a Marine CEMP	The Marine CEMP is designed to provide a consolidated point of reference for SHEPD and their marine contractors. It ensures all embedded and additional mitigation measures identified by this MEA and supporting documents are effectively disseminated to and implemented by the Project team during Project activities, thus ensuring that any potential environmental impacts are minimised.
All Project personnel will be trained and informed of their responsibility to implement the environmental and ecological mitigation outlined in the Marine CEMP	Toolbox talks, inductions, and awareness notices will be used to disseminate this information among all relevant personnel.
A FLO will be employed to manage interactions between cable installation vessels, personnel, equipment and fishing activity. This will be managed	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 the proposed cable installation activities.

MEASURE	DETAILS
through the North Coast and Orkney FLMAP	
Consultation with commercial fishing stakeholders to identify acceptable and feasible mitigation options with the aim of minimising potential effects on commercial fishing	SHEPD will, in consultation with commercial fishing stakeholders, work towards identifying acceptable and feasible mitigation options with the aim of minimising any potential effects on commercial fishing associated with the replacement of submarine electricity cable. There are various options available to mitigate the risks, including: • Continuing effective positive liaison with commercial fishing stakeholders through the pre-installation, installation and operational phases of any cable replacement; • Continued employment of FLO / FIR services until the completion of the replacement works; • Ensuring contractors comply with the contractor's obligations outlined above to minimise any interference to commercial fishing activities; • Managing the cable replacement works to minimise any potential effects on the marine environment, habitats and commercial fishing; • Raising awareness of the danger of fishing in the vicinity of submarine cable; • Adopting a hierarchical approach to submarine cable protection, taking account of sea users concerns; • Organising an installation phasing workshop (if new cable is required) to inform commercial fishermen of planned activities; • Organising installation schedules (if new cable is required) as far as is practicably possible in order to reduce the combined loss of fishing area associated with safety zones; • Distributing weekly notice of operations; • Providing information in plotter format to enable fishermen to easily interpret the information; and/or • Scouting surveys to identify potting areas and any other relevant static gear areas.
Notice to Mariners (NtMs), local notifications to marine users, Clyde Cruising Club, Orkney Marinas, Kingfisher bulletins, Radio Navigational Warnings, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices will 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. Notices will also be issued if any OoS cables are removed or moved and chart updates will be provided.

MEASURE	DETAILS
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 installation, 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 United Kingdom Hydrographic Office (UKHO) and Kingfisher for inclusion on Admiralty Charts and the Kingfisher Information Service – Offshore Renewable and Cable Awareness (KIS-ORCA) charts	Ensure navigational safety and minimise the risk of equipment snagging.
Engagement with Shipping and Navigation Consultees	Ongoing consultations with ports and harbour authority (Orkney Islands Council Harbour Authority) to ensure continued awareness and communication of installation and harbour specific details relevant to minimising disruption. Ongoing consultation with fisheries as detailed within the North Coast and Orkney FLMAP to discuss the potential impacts as a result of the installation activities. Engagement with ferry operator and regular runners ensures awareness of the installation details which minimises disruption. Installation maintenance and decommissioning schedules arranged to minimise impact on ferry schedules. This may extend to reducing Recommended Clearance Zones (RCZs) around cable installation vessels for the Orkney Ferries, and working during night-time hours where practicable.
Engagement with RYA)	Stakeholder consultations with RYA Scotland to confirm how best updated cable routes are communicated with the local recreational stakeholder.
Guard Vessels and Recommended Clearance Zones	A guard vessel or small support vessel, marshalling a 500 m RCZ may be used during the installation campaign where a potential risk to the asset or danger to navigation has been identified. The requirement for a guard vessel will be considered through consultation with the Harbour Authority, ferry operator (Orkney Ferries), and Installation Contractor.
Installation of AtoNs	Two new AtoNs will be installed as part of the Project to ensure navigational hazards are marked appropriately.

13 CONCLUSIONS

The MEA supports SHEPD's application for a marine licence and works licence to complete the proposed cable installation activities which are anticipated to take place in Autumn 2026 (cable installation) and spring/summer 2027 (cable protection installation). It provides a robust assessment of potential impacts of the proposed cable installation activities on groups of sensitive environmental receptors (Sections 5 to 12). Where relevant, these impact assessments have considered interactions with protected sites, and indirect impacts on other receptors. Specifically, environmental assessments of potential impact from the proposed cable installation activities have been carried out for the following receptors:

- Designated sites;
- Seabed and Water Quality;
- Marine Megafauna;
- Benthic and Intertidal Ecology;
- Ornithology;
- Marine Archaeology;
- Shipping and Navigation; and
- Commercial Fisheries and Other Sea Users.

Table 13-1 provides an overview of the findings from the environmental assessments undertaken within this MEA. Based on the findings and recommendations of the impact assessments presented in Sections 5 to 12, and the embedded mitigation requirements discussed in Section 4.3, it is anticipated that the proposed cable installation activities will be conducted without significant impact on any relevant environmental receptor.

Table 13-1 Outcomes of Environmental Assessment

ENVIRONMENTAL RECEPTOR	ASSESSMENT UNDERTAKEN	LEVEL OF IMPACT	ASSESSMENT OUTCOME	OVERALL SIGNIFICANCE	ADDITIONAL MITIGATION	RESIDUAL SIGNIFICANCE
Designated Sites (Section 5)	SACs and NCMPAs with cetaceans and basking sharks as qualifying features	No LSE	There are no SACs with cetaceans as qualifying features within 50 km of the proposed cable corridor. Therefore, no ecological connectivity is expected due to the localised and short-term nature of the Project. As such, SACs and NCMPAs designated for cetaceans or basking sharks have not been considered further in the assessment.	No LSE	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	No LSE
	SACs with harbour or grey seal as qualifying feature (Sanday SAC and Faray and Holm of Faray SAC)	Potential LSE	There is the potential for harbour seals and grey seals to be present in the proposed cable corridor and subject to impacts from underwater sound and vessel, vehicle, or human disturbance. No injury risk to harbour or grey seals is associated with the Project, and the disturbance range is limited to approximately 207 m. The proposed cable installation activities will be highly localised, transient, temporary in nature. It is unlikely that harbour seals will be present within the cable corridor at the landfall, and there is no potential for overlap with the pupping season for harbour seals, however there is potential for overlap with the moulting period. Where shore-based surveys and intertidal works within the Sanday SAC during the harbour seal breeding period cannot be avoided, should any seals be detected within the 500 m mitigation zone, except in the event of a need to avoid critical delay to the Project in which case the mitigation zone for seals will be 200 m. Considering that the proposed cable installation activities will be transient, temporary, and localised, with the implementation of the mitigation measures, there will be no AEoSI on the Sanday SAC as a result of shore based intertidal survey activities.	No AEoSI		No AEoSI
	Designated seal haul-out sites (South North Ronaldsay Seal Haul-Out Site)	Potential LSE	There is the potential for harbour seals and grey seals to be present in the proposed cable corridor and subject to impacts from underwater sound and vessel, vehicle, or human disturbance. No injury risk to harbour or grey seals is associated with the Project, and the disturbance range is limited to approximately 207 m. Harbour seals are most sensitive to disturbance during the pupping season from mid-June to July and moulting which begins in August. Therefore, there is no potential for overlap with the pupping season for harbour seals. For grey seals, breeding occurs September/October through to December with moulting until early April, therefore it is not possible to avoid the pupping season. Where shore-based surveys and intertidal works within the haul out site during the harbour seal breeding period cannot be avoided, should any seals be detected within the 500 m mitigation zone, except in the event of a need to avoid critical delay to the Project in which case the mitigation zone for seals will be 200 m. Considering that the proposed cable installation activities will be transient, temporary, and localised, with the implementation of the mitigation measures, there will be no AEoSI on the South North Ronaldsay Seal Haul-Out Site as a result of shore based intertidal activities.	No AEoSI		No AEoSI
	SACs and NCMPAs with otter interests	No LSE	There are no SACs or NCMPAs with otter interests that overlap or are within 500 m of the proposed cable corridor. Therefore, SACs and NMPAs with otter qualifying features are screened out of the impact assessment.	No LSE		No LSE
	SPAs with Birds as Qualifying features (East Sanday Coast SPA)	Potential LSE	There is the potential for disturbance to the seabird features of the East Sanday Coast SPA as a result of vessel presence and landfall installation activity. Vessel activity will not represent a significant deviation from baseline shipping levels and given the embedded mitigation (e.g., minimal lighting to reduce light disturbance), disturbance from vessel presence is expected to be minimal, short-lived and transient. As such, there will be no AEoSI on the East Sanday Coast SPA.	No AEoSI		No AEoSI
	SACs with seabed and benthic protected features (Sanday SAC)	Potential LSE	The proposed cable installation will result in only highly localised and small-scale temporary disturbance and permanent habitat loss within the Sanday SAC, confined to the immediate cable footprint and any associated stabilisation measures. The affected area represents a negligible proportion of the SAC's reef, intertidal mudflat and sandflat, and subtidal sandbank features, and their associated kelp and discord mussel sub features. Given the extensive distribution of these habitats within the SAC and the moderate to high recovery potential of features through recruitment and recolonisation, any impacts are expected to be temporary and limited in extent. Consequently, the proposed works will not adversely affect the extent, distribution, structure, function, or conservation objectives of the qualifying benthic features, and AEoSI is predicted for the Sanday SAC.	No AEoSI		No AEoSI

ENVIRONMENTAL RECEPTOR	ASSESSMENT UNDERTAKEN	LEVEL OF IMPACT	ASSESSMENT OUTCOME	OVERALL SIGNIFICANCE	ADDITIONAL MITIGATION	RESIDUAL SIGNIFICANCE
Seabed and Water Quality (Section 6)	Coastal sediment suspension	Minor	All proposed cable installation activities at the landfall locations will be tidally dependent. Increased suspended sediment will only occur during the interaction between the incoming tide, the trench walls and spoil heaps and because of any cable removal activities. This will result in highly localised and temporary increases in suspended sediment which will not have a significant impact on coastal or subtidal water quality. Additionally, no trenching is proposed in the subtidal and therefore subtidal sediment suspension will be minimal. Best practice will be followed by all installation vessels, therefore the likelihood of an accidental hydrocarbon release from one of the installation vessels is extremely remote. Overall, no significant effects on designated waterbodies are anticipated.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant
	Subtidal sediment suspension	Negligible				
	Changes to sediment and water quality following accidental release of hydrocarbons	Minor				
Marine Megafauna (Section 7)	Injury or disturbance from sound	Minor	An underwater sound impact assessment has been conducted based on sound modelling (Appendix A). The assessment concluded that there is no realistic risk of injury to any species resulting from the USBL operations, and hence, does not have the potential to result in adverse effects at a population or species level. Given the transient, highly localised and short-term nature of the USBL activities, it is very unlikely that any disturbance effects from use of USBL would negatively impact upon the FCS of any of the cetacean species which may be present in the survey area. It is possible that a small number of cetaceans may experience some level of disturbance for the short period that they encounter the proposed cable installation activities. As such, an EPS licence is applied for as a precaution for the USBL-related activities. Disturbance is expected to be limited to one or a few individuals of the local population and will therefore not result in any adverse impact to the FCS of any cetacean or pinniped species, and no mitigation is proposed for USBL operations. Given the transitory nature of the activities with the mobile nature of marine mammals, no significant impacts to individuals or populations of marine megafauna in the area are anticipated.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant
	Vessel presence (basking sharks)	Minor	Basking sharks are considerably less mobile than marine mammals and are therefore identified as being more sensitive to vessel presence. Basking sharks are also occasionally sighted around Orkney. Vessels will be slow moving and will adhere to the SMWWC and basking shark code of conduct, so the risk of collision is unlikely. Vessel activity will not represent a significant deviation from baseline shipping levels and therefore disturbance from vessel presence is expected to be minimal. Given the embedded mitigation and short-term duration of the proposed cable installation activities, no significant effects are anticipated. Overall, vessel presence will not adversely affect the FCS of basking sharks. Furthermore, since the risk of disturbance cannot be entirely ruled out, SHEPD will apply for a basking shark derogation licence alongside this MEA.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant

ENVIRONMENTAL RECEPTOR	ASSESSMENT UNDERTAKEN	LEVEL OF IMPACT	ASSESSMENT OUTCOME	OVERALL SIGNIFICANCE	ADDITIONAL MITIGATION	RESIDUAL SIGNIFICANCE
Marine Megafauna (Section 7)	Potential disturbance from nearshore activities (otter and pinnipeds)	Minor	There is potential for disturbance to seals and otters as a result of the nearshore and intertidal cable installation activities. Although there is the potential for disturbance to otters, this is likely to be greatly reduced, owing to the temporary nature of the nearshore Project activities. As such, no permanent impacts are expected on otter habitats which could induce permanent and irreversible damage. Although no significant impacts to otter populations are anticipated, there is still the potential for disturbance which could constitute an offence under the Habitats Regulations, and as such the mitigation measures will be implemented to minimise any effects to otters, or the habitats that they depend on. However, it is possible that a small number of otters may experience some level of disturbance for the short period that they encounter the proposed installation activities. Therefore, if evidence of otters is found during pre-construction otter surveys, SHEPD will consult with NatureScot to ascertain whether an EPS licence for otter disturbance is required for intertidal activities. The cable corridor overlaps with the South North Ronaldsay seal haul-out site and the Sanday SAC designated for harbour seal. The proposed cable installation has the potential to cause temporary disturbance to harbour seals of the Sanday SAC and grey and harbour seals South North Ronaldsay seal haul-out site, and East Sanday Coast SSSI through increased human activity in the intertidal area. Disturbance risk is greatest during sensitive pupping and moulting periods, particularly for grey seal mothers and pups. The sensitive periods will be avoided where possible, and works in the vicinity of beaches where seals are hauled out are only allowed to commence/continue where no seals are hauled out at the beach or in the shallow water within the mitigation zone. A 500 m mitigation zone around hauled-out seals (reduced to 200 m only where necessary to avoid critical Project delays during the autumn 2026 installation campaign) will be maintained and SMWWC will be adhered to. Given the mitigation measures, impacts on harbour and grey seals are expected to be not significant and will not adversely affect the conservation objectives or site integrity of the Sanday SAC or associated designated seal haul-out sites.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant
Benthic and Intertidal Ecology (Section 8)		Minor	The proposed cable installation will result in only highly localised and small-scale temporary disturbance and permanent habitat loss of Annex I habitat and benthic PMFs, confined to the immediate cable footprint and any associated stabilisation measures. The affected area represents a negligible proportion of the overall reef, intertidal mudflat and sandflat, and subtidal sandbank habitats in the proposed cable corridor, and kelp and discord mussels they support. Given the extensive distribution of these habitats within the SAC and the moderate to high recovery potential of features through recruitment and recolonisation, any impacts are expected to be temporary and limited in extent. Any areas of seagrass found will be avoided with a buffer as far as possible. Consequently, the proposed works will not adversely affect the regional and national status of these features.	Not Significant	Adherence to Section 4.3: Mitigation requirements for embedded mitigation. Once the benthic survey results become available, route design will aim to minimise impacts on these features as far as practicable. Details will be provided in the CLMP which will be submitted in due course.	Not Significant
Ornithology (Section 9)	Potential disturbance from nearshore activities to overwintering and migrating wading birds	Minor	The installation works are short-term and transient in nature. Consequently, the likelihood of direct disturbance to foraging birds in coastal areas or to loafing birds on the sea surface is considered very low, given the high mobility of these species. The proposed cable installation activities are considered extremely unlikely to result in any adverse effects on the FCS of sensitive ornithological receptors. No adverse effects on water quality (and associated changes to prey availability) are anticipated. Vessels will be slow moving and will adhere to the SMWWC, so the risk of bird strikes or disturbance of seabirds is unlikely. During night-time operations and intertidal operations, vessel lighting will be minimised insofar as possible whilst allowing for safety. Due to the embedded measures, no adverse effects on the FCS of any species are anticipated.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant

ENVIRONMENTAL RECEPTOR	ASSESSMENT UNDERTAKEN	LEVEL OF IMPACT	ASSESSMENT OUTCOME	OVERALL SIGNIFICANCE	ADDITIONAL MITIGATION	RESIDUAL SIGNIFICANCE
Marine Archaeology (Section 10)	Damage or loss of historic record – wreck sites	Minor	There is one potential wreck identified within the proposed cable corridor. It is anticipated that any potential for damage to or loss of the historic record would be limited to interactions with wrecks or artefacts during cable laying operations and the placement of stabilisation measures. The proposed cable installation activities are not anticipated to result in any disturbance or damage to marine archaeology receptors given the embedded mitigation (Section 4.3) that will be applied to ensure there will be no adverse effects on marine archaeology as a result of the proposed cable installation activities. Given the avoidance of features of archaeological significance through the route engineering process, it is considered that the proposed cable installation activities will not result in significant adverse effects on marine archaeological receptors.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant
Shipping and Navigation (Section 11)	Vessel collision – installation, maintenance and decommissioning	Tolerable	HLNRA has been undertaken for the Project and submitted alongside this MEA (see Xodus Document No. A-200853-S00-REPT-003-R01). The proposed cable corridor crosses a busy, well-marked navigational area between Sanday and North Ronaldsay, creating a potential hazard due to slow-moving, limited-manoeuvrability installation vessels. However, risks are minimal given the short duration of works, planned coordination with ferry operators and harbour authorities, standby support vessels, and implementation of a 500 m restricted zone. Additional measures include notifying mariners, marking landfall points, and updating UKHO and KIS-ORCA charts. No trawling or anchoring occurs near the route, and industry standards further reduce risk. Overall, navigation and seabed cable risks are considered ALARP.	Not Significant /ALARP	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not Significant /ALARP
	Disruption to established vessel routes and areas – installation, maintenance and decommissioning	Broadly Acceptable		Not Significant /ALARP		Not Significant /ALARP
	Interaction with vessel anchors – installation, maintenance and decommissioning, normal operations	Broadly Acceptable		Not Significant /ALARP		Not Significant /ALARP
	Interactions with fishing gear – installation, maintenance and decommissioning	Tolerable		Not Significant /ALARP		Not Significant /ALARP
	Interactions with fishing gear – normal operations	Tolerable		Not Significant /ALARP Not Significant /ALARP		Not Significant /ALARP Not Significant /ALARP
	Reduction in under keel clearance – normal operations	Broadly Acceptable		Not Significant /ALARP		Not Significant /ALARP
	EMF and compass deviation effects – normal operations	Broadly Acceptable		Not Significant /ALARP		Not Significant /ALARP
Commercial Fisheries and Other Sea Users (Section 12)	Assessment of impacts on commercial fisheries and other sea users which has been presented in the North Coast and Orkney FLMAP	Minor	The proposed cable installation activities have the potential to disrupt commercial fisheries and other sea users. SHEPD has taken a pro-active approach to minimising impacts on commercial fisheries and other sea users through the implementation of the North Coast and Orkney FLMAP. As outlined as part of the North Coast and Orkney FLMAP, appropriate mitigation measures and consultations will be in place to minimise potential impacts on commercial fisheries and other sea users. Once these consultations and mitigation measures have been implemented, no significant impact on commercial fisheries and other sea users is expected. This information has been provided in the North Coast and Orkney FLMAP.	Not Significant	No additional mitigation measures identified. See Section 4.3: Mitigation requirements for embedded mitigation.	Not significant

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APPENDIX A UNDERWATER SOUND IMPACT ASSESSMENT

During the cable lay, a Remotely Operated Vehicle (ROV) or Ultra-Short Baseline (USBL) will be utilised, deployed from the support vessel, to monitor the proposed subsea cables at the touch down locations with the seabed. This will capture seabed information at the contact point and helps observe the lay tension that is applied to the proposed subsea cables from the vessel. This will also help to minimise the potential for the proposed subsea cables to become suspended along the route.

This Section describes the potential impacts and disturbance to marine mammal species in the area as a result of utilising USBL.

A.1 Acoustic Injury or Disturbance Criteria for Marine Mammals

A.1.1 Injury

National Marine Fisheries Service (NMFS) (2018) defines two different types of sound that have the potential to result in acoustic injury:

- Impulsive: sounds which are short in duration (i.e., less than 1 second long) and temporary, occupy a broadband bandwidth, and have rapid rise and decay times with a high peak pressure level; and
- Non-impulsive: sounds which may occupy a broadband, narrowband or tonal bandwidth, can be brief, prolonged, continuous or intermittent in nature, and are not characterised by rapid rise and decay times or a high peak pressure level.

A dual-metric approach has been adopted which identifies the range of potential injury to marine mammals from both the peak sound pressure level (SPL_{PEAK}; also called the source level) and cumulative Sound Exposure Level (SEL) for the operation of USBL which is the only equipment identified to require consideration for sound-related injury. The thresholds above which each marine mammal hearing group may experience sound-related injury are presented in Table 14-1 below. These thresholds are derived from measurements of marine mammal hearing using weighting functions which account for peak hearing abilities for each hearing group (NMFS, 2018).

Table 14-1 Criteria considered in this assessment for the onset of injury in marine mammals from impulsive sound (NMFS, 2018; Southall et al., 2019)

MARINE MAMMAL HEARING GROUP	IMPULSIVE SOUND		NON-IMPULSIVE SOUND
	SPL_{PEAK} (dB re 1 µPa)	CUMULATIVE SEL (dB re 1 μPa^2S)	CUMULATIVE SEL (dB re 1 μPa^2S)
Low-frequency (LF) cetaceans	219	183	199
High-frequency (HF) cetaceans	230	185	198
Very high-frequency (VHF) cetaceans	202	155	173
Phocid pinnipeds (underwater)	218	185	201

A.1.2 Disturbance

There are currently no disturbance criteria which have been adopted or recommended by UK regulators or statutory nature conservation bodies. NatureScot have recently advised that the Effective Deterrent Range (EDR) of 5 km should be used as a proxy for disturbance range for sub-bottom profiler operations, however this is not considered appropriate for USBL, given that USBL is a significantly less powerful sound source than a sub-bottom profiler (SBP). As such auditory thresholds for disturbance, as defined by NMFS (2018), coupled with behavioural response criteria detailed in Southall *et al.*, (2007) have been adopted for the assessment of potential marine mammal disturbance from USBL. These thresholds, which utilise the behavioural response severity scale detailed in Southall *et al.*, (2007) for grading the strength of behavioural responses, are provided in Table 14-2.

Table 14-2 Disturbance threshold criteria for impulsive sound (Southall et al., 2007; NMFS, 2018)

BEHAVIOURAL EFFECT	THRESHOLD CRITERIA (SPL_{RMS})
Potential strong behavioural reaction (6 or more on the severity scale)	160

A.2 Sound Propagation Modelling

A.2.1 Approach

Modelling to identify the potential range (i.e., the straight-line distance from the source) in which sound impacts to marine mammals could occur was undertaken using Xposure, a semi-empirical propagation model developed by Xodus. Modelling was conducted at water depths bookending those expected in the survey area. The dual-metric modelling approach recommended by NMFS (2018) has been used to identify impacts from: (1) the peak Sound Pressure Level (SPL_{PEAK}); and (2) the cumulative SEL. The SEL represents the total energy produced by a sound-generating activity (i.e., USBL) standardised to a one-second interval. This enables comparison of the total energy attributed to different activities with different inter-pulse intervals. As described above, empirically-derived weighting functions (NMFS, 2018; Southall *et al.*, 2019) have been applied to the modelling outputs to account for peak hearing sensitivity for the respective marine mammal hearing groups.

The following assumptions have been applied to the models:

- Maximum SPLPEAK has been used for all calculations;
- Maximum pulse length and minimum turn around has been used where provided;
- Where source frequencies occur across a range of frequencies, a flat 1/3 octave spectrum has been used;
- Where data is unavailable, the time between pulses has been calculated as 1.5 times the ping length;
- Mammals swim at seabed depths (this represents the worst-case);
- Vessels are moving at slow speeds; and
- Survey equipment (i.e., USBL) likely to be used in the nearshore shallow water environment (i.e., < 10 m) will likely operate at a very high frequency to provide better resolution and will operate at a lower SPL, and so does not constitute a worst-case scenario.

The directional characteristics of sound are also an important factor affecting the received sound pressure levels from sound-generating activities. Sound source arrays are designed so that the majority of acoustic energy is directed downwards towards the ocean floor for data collection purposes. As such, the amount of energy emitted across the horizontal plane is significantly less (≥ 20 dB) than the amount of energy emitted downwards.

Due to the frequency-dependent nature of sound, the loss of pressure on the horizontal plane is more pronounced at higher frequencies than at lower frequencies. Directional corrections can be applied to the model outputs, which provide broadband normalised amplitudes at varying angles of azimuth and dip angle . Directivity corrections have been applied to the modelling outputs under the assumption that the animal is directly in-line with the vessel (i.e., at the 0º azimuth).

A.2.2 Injury Impacts

For the proposed cable installation activities, the expected frequency range for USBL operations overlap with the hearing range of all cetacean hearing groups. Potential injury to cetaceans (i.e., injury which results from a permanent threshold shift in hearing abilities) is limited to impulsive sound sources which exceed the injury thresholds defined in Table 14-1.

Modelling of ranges at which injury impacts are likely to result from deployment of USBL has been undertaken (Table 14-3). Impacts from sound sources which are strictly behavioural in nature (i.e., disturbance impacts) are covered in the subsection below.

Table 14-3 Sound modelling results for injury impacts from the impulsive sound source (N/E = no exceedance of thresholds)

ACTIVITY	DEPTH (m)[4]	FREQUENCY (kHz)	SOURCE LEVEL SPL_{PEAK} (dB re 1µPa)	INJURY RANGE (m)											
				CUMULATIVE SEL (STATIC MAMMALS)				CUMULATIVE SEL (MOVING MAMMALS)				PEAK SPL			
				VHF	HF	LF	PW	VHF	HF	LF	PW	VHF	HF	LF	PW
USBL	100	24 – 33.5	207	104	98	73	86	104	56	36	44	24	6	11	11
	10	24 – 33.5	207	12	11	11	11	12	11	11	11	36	10	16	17

USBL has the potential to cause injury to EPS and other marine mammals. As such, the operation of USBL associated with the Project may be potentially injurious to EPS species without appropriate mitigations.

Across modelling scenarios and metrics, the injury ranges were generally highest for the VHF hearing group (Table 14-3), which is represented by harbour porpoise in UK waters. Conversely, HF cetaceans seemed to constitute the hearing group with the lowest potential impact ranges for the peak SPL metric, while LF cetaceans had the lowest impact ranges for the cumulative SEL metric, when comparing between activity types (Table 14-3).

High frequency sounds attenuate more quickly than lower frequency sounds such that an animal would need to be much closer to the sound source for it to cause acoustic injury. The deployment of hull-mounted USBL in 100 m depths elevated the potential range of impact to a maximum of 104 m (cumulative SEL) for VHF cetaceans. However, the likelihood of a cetacean being this close to operational equipment is extremely unlikely when considering that the source is deployed from a moving vessel travelling at more than 2 ms^{-1} (i.e., 4 knots) and, in some cases, is being towed at depth (e.g., a USBL may be mounted on a towed device within a few metres of the seabed).

[4] *Depth refers to below the Project activity, which has been assumed to be hull-mounted or towed at the surface. These depths have been identified as representative of the nearshore and offshore depths in which the proposed cable installation activities are likely to occur across the proposed cable corridor, based on available bathymetry data.*

The majority of injury ranges were slightly reduced when considering animal movement during the cumulative SEL estimation. Swim speeds of the species most likely to be observed in the area have been shown to be several ms- 1 (e.g., cruising minke whale swim speed is 3.25 ms-1 and harbour porpoise may swim up to 4.3 ms^{-1}) (Blix and Folkow, 1995; Otani *et al.*, 2000). Further, NatureScot has provided standard values for mean swimming speeds of various marine mammal species likely to occur in the vicinity of the proposed cable corridor, including harbour seal / grey seal (1.8 ms^{-1}; Thompson, 2015); and minke whale (2.1 ms^{-1}; Williams, 2009). To offer a representative model of the predicted sound exposure ranges of marine mammals moving away from the sound source, a conservative mean swim speed of 1.5 ms^{-1} has been used in the calculations. Considering that USBL will be deployed while the vessel is moving, the cumulative SELs are expected to be lower than predicted based on the premise that animals are likely to move away from the mobile sound source, opposite to the direction of vessel travel.

It should also be noted that the modelling scenarios presented as part of this assessment are meant to define the worst-case injury ranges associated with the deployment of USBL. The in situ deployment of USBL will most frequently occur in waters of intermediate depths (i.e., between 10 to 100 m). Moreover, the source levels modelled constitute the lowest frequency and highest SPL that are likely to be used, meaning that the actual sound propagation in the marine environment is also likely to be less than those defined by the modelled outputs, thereby this assessment constitutes a conservative estimate.

As such, the assessment concludes that there is no realistic risk of injury to EPS which may result from the use of USBL with SPLPEAK source levels of up to 207 dB re 1µPa.

A.2.3 Disturbance Impacts

In addition to physical injury, sound emissions have the potential to result in behavioural disturbance of cetacean species within the vicinity of the sound source. Significant or strong disturbance (see Table 14-2; Southall *et al.*, 2007) may occur when an animal is at risk of a sustained of chronic disruption of behaviour or habitat use, which could result in a population-level effect. An assessment of potential disturbance impacts as a result of USBL operations impulsive and non-impulsive sound is provided in the sections below. The outputs of the sound modelling assessment against cetacean disturbance thresholds are provided in Table 14-4.

Table 14-4 Sound modelling results for disturbance impacts from impulsive sound sources

ACTIVITY	DEPTH (m)	FREQUENCY (kHz)	SPL_{RMS} (dB re 1 µPa)	RANGE OF BEHAVIOURAL CHANGE (m)
USBL	100	24 – 33.5	200	182
	10	24 – 33.5	200	207

The USBL activities have the potential to generate a strong disturbance event (i.e., a disturbance offence). The sound generated by the USBL has the potential to generate disturbance impacts on the order of a couple hundred metres (Table 14-4).

The number of individuals which may experience disturbance from the worst-case scenario for USBL has been calculated in Table 14-5 below, based on the population parameters supplied in Section 7: Marnie Megafauna. In these calculations, the impact range serves as a radius with which to calculate the total area of coverage for a potential disturbance event associated with each survey activity.

Table 14-5 Number of individual cetaceans and proportion of the mu which may experience disturbance from the cable installation activities, based on known population parameters of the most frequently occurring species

SPECIES	NUMBER OF INDIVIDUALS WHICH MAY INCUR A STRONG DISTURBANCE USBL (0.13 km^2 AREA)	MAXIMUM PROPORTION OF THE MU POTENTIALLY AFFECTED BY THE INSTALLATION ACTIVITIES
Harbour porpoise	< 0.1	< 0.01 %
Bottlenose dolphin	<0.1	< 0.1 %
Risso's dolphin	< 0.01	< 0.01 %
White-beaked dolphin	< 0.1	< 0.01 %
Common dolphin	0.1	< 0.01 %
White-sided dolphin	< 0.01	< 0.01 %
Beaked whale	< 0.01	N/A
Minke whale	< 0.01	< 0.01 %

The source levels associated with USBL have the potential to elicit a strong behavioural response in EPS which could be classed as a disturbance offence as defined under Regulations 39(1) or 39(2). However, for the relevant biogeographical population MU for harbour porpoise, bottlenose dolphin, Risso's dolphin, common dolphin and minke whale which all regularly occur in the area, this will not incur significant impacts. For these species, less than 0.1% of the biogeographic population will be impacted by sound-related disturbance (Table 14-5). Moreover, less than a tenth of any cetacean will be potentially disturbed by USBL deployment at any given time, making potential disturbance impacts from this survey equipment negligible.

Given the transient and short-term nature of the survey and vessel activities, it is highly unlikely that any disturbance offences from the use of USBL would negatively impact upon the FCS of any of the cetacean or seal species which may be present in the survey area. This is on the basis that the modelled level of disturbance is unlikely to affect the ability of any individual animal to survive or reproduce and will not have significant population-level impacts to any EPS. Regardless, it is possible that a small number of animals may experience some level of disturbance for the short period that they encounter the proposed survey activities.