Western Isles Connection Project

Environmental Appraisal Non-Technical Summary

Scottish and Southern Energy plc

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Xodus Group
The Auction House, 63A George St
Edinburgh, UK, EH2 2JG

T +44 (0)131 510 1010
E info@xodusgroup.com
www.xodusgroup.com

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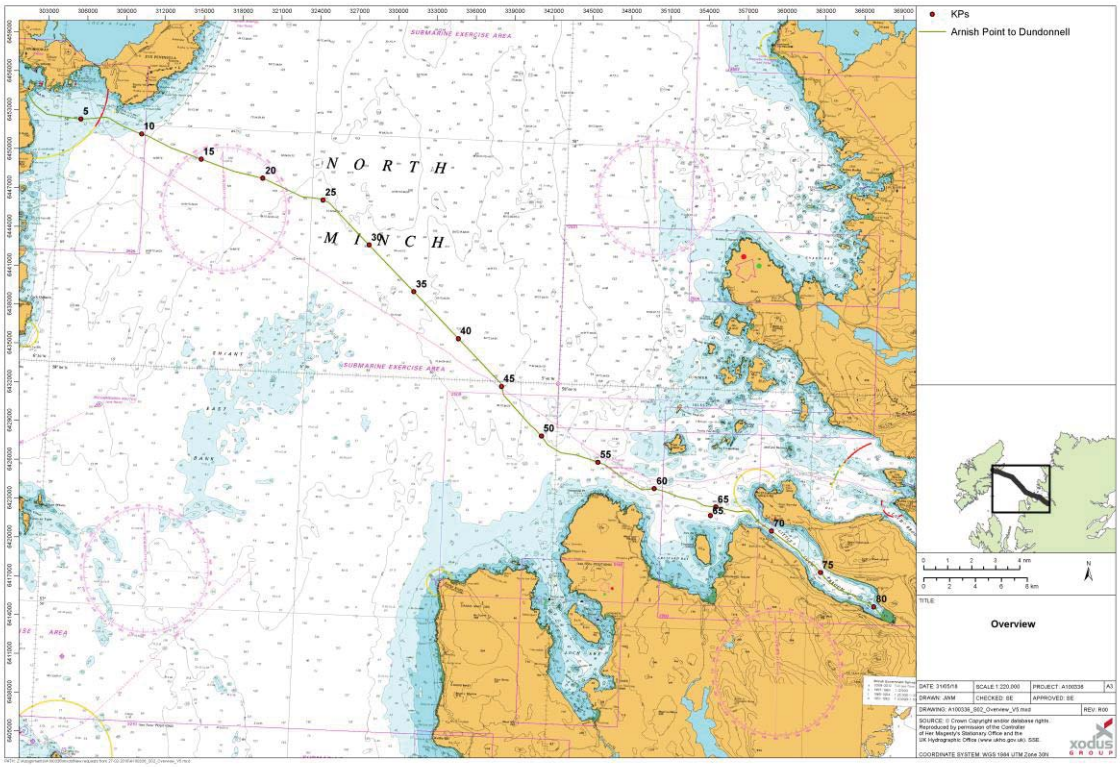
1 INTRODUCTION

1.1 Introduction

This document is a Non-Technical Summary of the Environmental Appraisal (EA) carried out in support of a Marine Licence application for the subsea cable section of the Western Isles Connection Project and prepared by Scottish Hydro Electric Transmission plc (SHE Transmission) in line with Part 4 of the Marine (Scotland) Act 2010.

The proposed cable route is shown in Figure 1.1. The purpose of this document is to provide a non-technical overview of the key findings of the EA undertaken for the Project.

Figure 1.1 Proposed cable route



1.2 Background

SHE Transmission, part of the SSE plc group of companies, is the licensed electricity Transmission Owner (TO) in the north of Scotland. It owns the 5,000 km network of high voltage underground cables and overhead lines that provides electricity across northern Scotland, and connects northern Scotland to central and southern Scotland and the rest of Great Britain. SHE Transmission is also responsible for maintaining and investing in this transmission network, which covers around 70% of Scotland.

SHE Transmission is currently looking at taking forward a number of strategic projects which are aimed at expanding the transmission network across northern Scotland. These projects, which involve both network reinforcements and upgrades, have been identified as being required to facilitate the substantial increase in renewable generation in the north of Scotland and the subsequent increasing demand for renewable energy connections and hence to support the growth of the low carbon economy. The Western Isles Connection Project is one of these projects.

1.3 Project need

At present the existing Western Isles system operates with a restricted capacity 132 kV connection to the Scottish mainland. The Western Isles possess attractive renewables resources which have been targeted by developers seeking to invest in onshore wind and marine generation projects. On Lewis and Harris today, a total of 435.5 MW of generation is either connected or contracted to connect in the future. There are further interests from developers of renewable energy projects in excess of 200 MW; a mixture of small community schemes up to larger 40 – 50 MW developments. There is no spare capacity on the existing Western Isles network to connect additional generation. Therefore, a higher capacity link to the Scottish mainland is proposed to facilitate export into the Great Britain Main Interconnected Transmission System (GB MITS). SHE Transmission has detailed plans to construct a 156 km 600 MW High Voltage Direct Current (HVDC) link between Beauly on the Scottish mainland (located North West of Inverness) and Arnish on the east coast of the Isle of Lewis via Dundonnell on the west coast of Scotland. The Western Isles Connection Project forms part of the overall link.

1.4 Environmental Appraisal process

A Marine Licence is required for the installation and operation of submarine cables in Scottish waters. However, submarine cables do not require a formal Environmental Impact Assessment (EIA) as they are not listed on either Schedule 1 or Schedule 2 of the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended). The information provided in the EA, and summarised in this NTS, was finalised following consultation to determine the type of studies to be undertaken in support of the application for a Marine Licence.

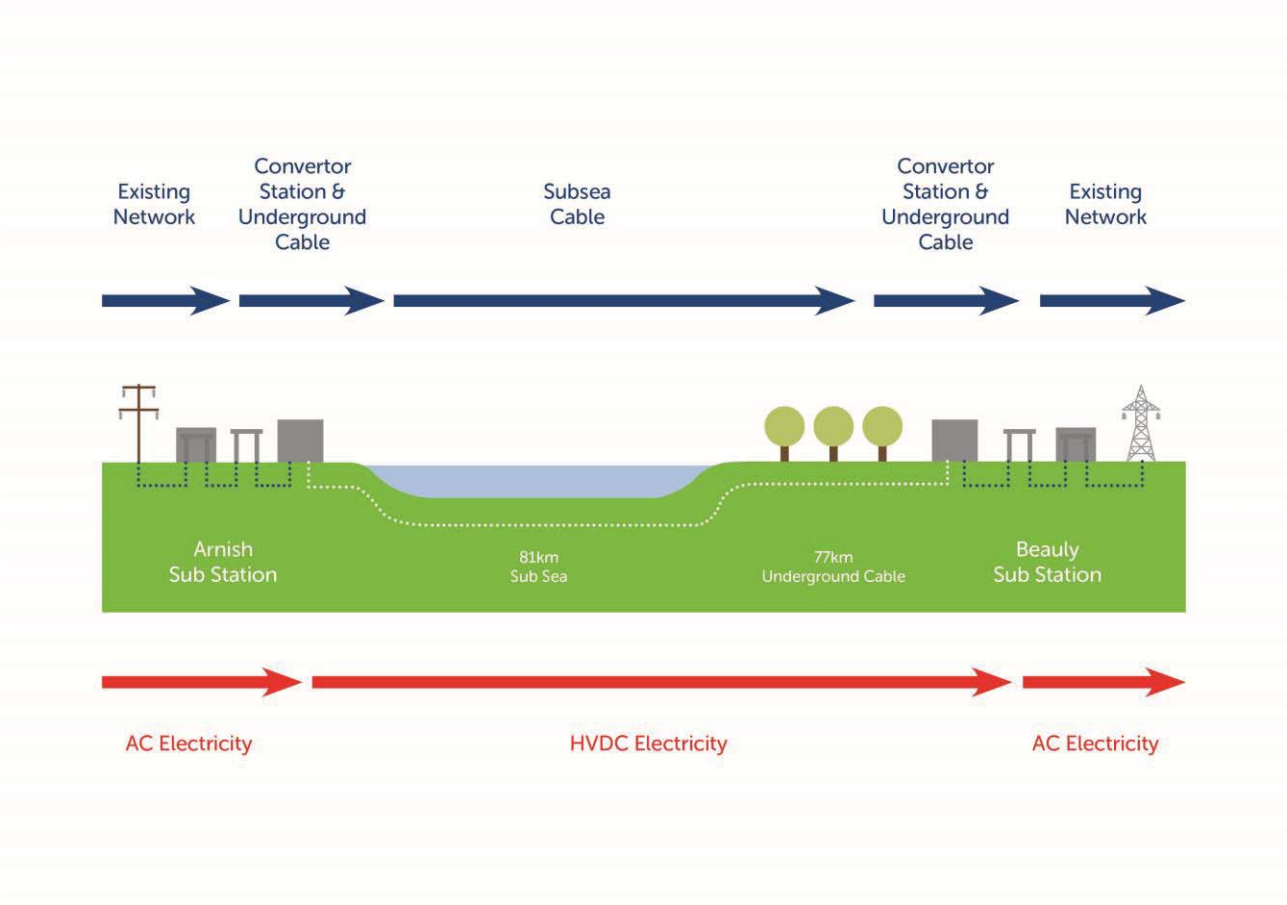
2 PROJECT DETAILS

2.1 Overview

The Western Isles Connection is a proposed High Voltage Direct Current (HVDC) Link, which will be approximately 81 km in length. The capacity of the proposed interconnector is up to 600 MW and the purpose is to allow the transfer of electricity between a landfall at Arnish Point (Stornoway) and a landfall at Dundonnell on the Scottish Mainland west coast.

As the cable leaves land and enters the sea, it will either be routed using one of two techniques. The first option is routing via ducts that are created by drilling under the seabed or through burying the cable in a traditionally excavated trench. Once offshore the subsea cable will be buried in the seabed. If the cable cannot be buried, due to hard seabed conditions or at crossings of other cables (and other assets), it will be protected by other methods such as cast iron shells or plastic ducting (for example High Density Polyethylene (HDPE)) or by placing rock or concrete mattresses over the cable.

The EA considers the marine components of the cable route from the high-water mark at both landfalls. An overview of the Western Isles HVDC Link is shown below:



2.2 Site selection and alternatives

2.2.1 Work completed to date

In September 2015, a desk based routing study was carried out to identify a preferred subsea cable route option between the landfall at Arnish Point (Stornoway) and a landfall on the west coast of the Scottish Mainland near Dundonnell. The aim of the study was to select a technically feasible and economically viable

route which causes the least disturbance to the environment and people who live, work, visit and enjoy it. The study involved the collation, mapping and analysis of various sources of data (environmental, social and technical) to identify potential landfall locations and subsea cable route options.

Landfall site visits were undertaken during June 2016 to enable a more detailed appraisal of the potential landfall locations and identify specific landfall points. This was followed by a marine survey to map the seafloor to provide a detailed understanding of the geology, seabed sediments and the flora and fauna it supports. The survey covered the entire subsea cable route including the landfall at Arnish Point (Stornoway) and the two potential landfalls on the Scottish Mainland, Dundonnell and Mungasdale (east of Gruinard Island approach).. A second route to the Mungasdale landfall, passing to the west of Gruinard Island was also surveyed.

Based on feedback received from key stakeholders and detailed analysis of data from the marine survey, it was concluded that the Mungasdale route option passing to the west of Gruinard Island would be discounted due to the detection of sensitive maerl (red seaweed, with hard, chalky skeletons) habitat detected along this route.

Following more detailed analysis of the 2016 marine survey and information provided by Scottish Natural Heritage (SNH) on protected features within the Wester Ross Nature Conservation Marine Protected Area a further survey of the east of Gruinard Island approach to the Mungasdale landfall was undertaken which confirmed the presence of live maerl habitat. Due to its distribution in relation to other seabed features, it was not possible to identify an alternative route that avoids maerl. In consultation with SNH and Marine Scotland, it was concluded that the route to the east of Gruinard Island into Mungasdale was not a suitable option given the conservation objectives of maerl within the Wester Ross NCMPA.

The information from the marine surveys has been combined with data on other marine factors including fishing, shipping and the suitability of the seabed sediments for cable burial to enable the development of the preferred subsea cable route between Arnish Pont (Stornoway) and Dundonnell on the Scottish Mainland.

2.3 Consultation

Consultation has been undertaken with statutory consultees, stakeholders and the public during key stages of the project. Consultation provided a focus and mechanism for gaining stakeholder views on the content of, and methodology for the EA. To ensure the EA covered the main issues of concern, a report (Additional Studies Required as Part of the Western Isles Subsea Cable Marine Licence Application, Xodus Reference: A100336-S00), was produced and submitted to the Scottish Ministers on the 28 November 2017. The objective of the report was to provide sufficient information on the project and the environment in which it would be constructed and operated, so that the regulator (with the assistance of statutory and other consultees) could advise which issues should be the focus of the EA. A response to this was received from Marine Scotland – Licensing Operations Team (MS-LOT) on the 12 March 2018, as to the content and level of detail of information to be provided in the EA.

2.4 Project schedule

The pre- and post- cable installation surveys, preparatory works and cable installation activities will take place over a period of three years from 2021 to 2023. The survey and installation works associated with the marine cable from high water limits on both shores are expected to be undertaken over a period of approximately 12 – 18 months (allowing for weather related delays). This work will not be continuous, but split into several periods of activity. A schedule of works will be made available nearer the time of construction.

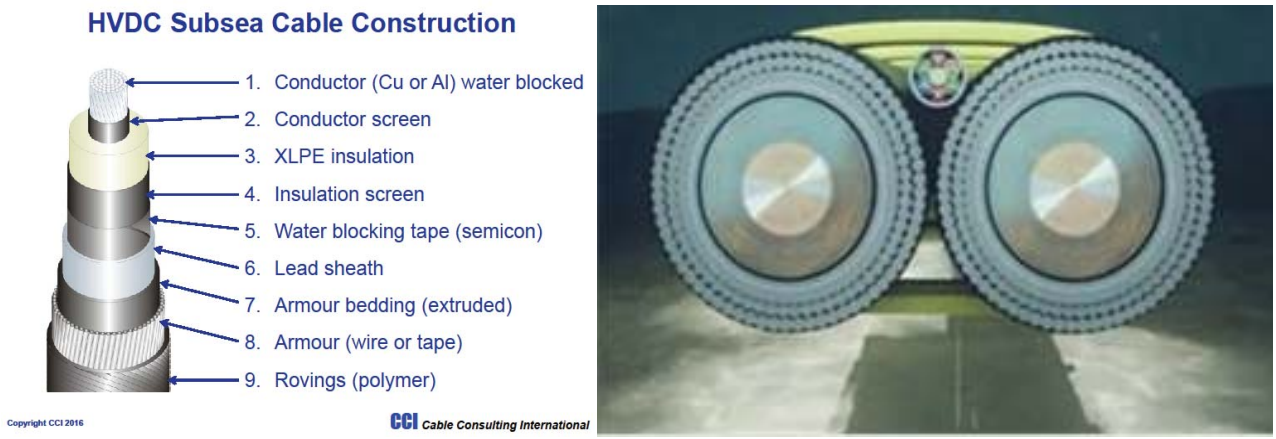
2.5 Marine route

The subsea cable route extends in a southeast direction from Arnish Point (Stornoway) across the stretch of water that flows between the Western Isles and west coast of mainland Scotland that is known as the Minch, or North Minch. As the route approaches mainland Scotland, it continues heading southeast along Little Loch Broom towards Dundonnell at the end of the loch. Little Loch Broom is one of the many sea lochs located on the Scottish mainland west coast. Water depths along the cable route generally range between 70 m and 110 m depth although sections of Little Loch Broom reach depths of up to 176 m (Bibby Hydromap, 2016a).

2.6 Cable design

Electricity will be transmitted using HVDC submarine cable technology. Two cables will be bundled for the full length of the route. Each cable is approximately 115 – 120 mm in diameter making the bundled unit 230 – 240 mm across (prior to any protection such as rock placement), and weighs approximately 45 kg/m. The cables will be bundled along with a fibre-optic cable for control and communication purposes. A typical cable structure and arrangement of two power cables and a fibre optic cable is shown in Figure 1.2.

Figure 1.2 HVDC cable structure (left) and typical bundle arrangement (right)



2.7 Pre-installation

2.7.1 Surveys

The final cable installation route will be optimised to take account of any seabed features including sensitive habitats and to maximise burial in softer sediments. This will be informed by a pre-installation route survey completed prior to commencement of cable installation. This will also confirm that no new obstructions have appeared on the seabed since the detailed engineering surveys and will also include an Unexploded Ordnance (UXO) survey. This typically takes place 3 – 6 months in advance of installation and will involve a range of standard geophysical and geotechnical survey techniques.

2.7.2 Route clearance and pre-lay grapnel run (PLGR)

Prior to cable installation a grapnel will be dragged along the seabed to ensure the cable route is free from obstructions such as discarded or lost fishing gear that could interfere with cable burial operations. The grapnel consists of a series of specially designed hooks and penetrates the surface of the seabed. Most old cable and scrap wire is normally found at, or just below, the seabed. If any unexploded ordnance not previously identified during the UXO Survey is discovered during this process, a registered Explosives and Ordnance Disposal (EOD) specialist will be available during installation to identify any potentially dangerous items and provide advice on appropriate remediation. The grapnel will not be deployed within 100 m of any live cables and will only be used following close consultation with infrastructure owners and relevant authorities. There may also be a requirement to clear the route of large stones or boulders that may be present along parts of the route so that the installation equipment can operate. This would be undertaken using a specialist boulder clearance plough or, alternatively, in areas of limited boulders using a grab known as an ‘Orange peel’ grab.

2.7.3 Pre-sweeping

Areas of sandwaves will be avoided where possible, however, where this is not possible pre-sweeping may be required to allow the cable burial equipment to operate effectively. Installation equipment can generally work on longer shallower inclines; however, the marine cable corridor may cross some areas of sandwaves where the seabed incline is too great for the installation equipment. If required special dredging machines will

reduce the height of sandwaves and produce a more level pathway for the cable burial equipment to operate. If required, pre-sweeping will be undertaken a short time ahead of cable laying operations to ensure that the profile maintains its shape prior to the arrival of the cable lay vessel. The volume of material produced from pre-sweeping will be small and it is expected that it will placed on the seabed in the immediate vicinity of pre-sweeping activity and within the consented cable corridor.

2.8 Installation

Cable lay operations will occur over a 24-hour period to reduce navigational impact on other sea users and to maximise periods of good weather and vessel availability. Notifications will be issued in accordance with statutory procedures to ensure navigational and operational safety. Guard vessels are also likely to be used during the cable lay operations to ensure other vessels remain outside the area of operations and to reduce collision risk. Navigational warnings will be broadcast by the CLV and guard vessel(s) to warn approaching vessels of the position and course of the operations and inform fishing vessels of the presence of the cable. If the cable needs to be cut and left on the seabed due to bad weather, or for a period prior to burial, a guard vessel will remain on site to maintain surveillance over the cable. The typical vessels to be utilised are outlined in Table 1.1.

Table 1.1 Vessel details

Vessel type	Vessel role	Example Image
Cable lay vessel	A specialist ship designed specifically to carry and handle long lengths of heavy power cables. The cable is loaded onto a powered turntable on the cable lay vessel at the cable factory. The vessel then travels to a port close to the worksite for final mobilisation of cable handling crew, client's staff and equipment prior to heading to the work site.	
Cable lay barge	May be required to lay and bury the cables at the landfalls, assisted by a team of small boats and divers, depending on the installation technique selected by the contractor. Barges may use anchors for positioning, and be equipped with specialised equipment including cable tensioners, cable burial tools and a full survey suite to provide accurate details on the final cable position.	
Rock placement vessel	Rock placement will be used to protect sections of the marine cables where burial is not possible (in areas of harder seabed for example). Rock placement vessels feature a large hopper to transport the rock, and a mechanism for deployment of the rock on site including: > Side dumping – rock is pushed or tipped over the side of the vessel; > Split hopper – the halves of the vessel separate releasing the rock; and > Flexible fall pipe – a retractable chute is used to control the flow of rock to the seabed.	

Vessel type	Vessel role	Example Image
	In areas of stronger currents fall pipe vessels have an advantage in that the rock can be more accurately placed on the seabed.	

2.8.1 Cable laying

The cable will be guided over the side of the CLV into the water (and into a plough, if burial is simultaneous with cable lay). It will either be laid onto the seabed for later burial, or will emerge from the plough at a point below the seabed consistent with the specified burial depth. Cable laying can progress at speeds of up to 500 m per hour. In severe weather, the vessel may have to cut and cap the cable and leave the worksite. In this case the vessel will return when the weather has subsided, recover the end of the cable, make a joint and continue the laying operations. The cable lay vessel will be equipped with a remotely operated vehicle (ROV) and supporting camera equipment. In selected areas, such as at cable crossings and close to any sand waves or boulder areas, the ROV will be used to check the position of the cable as it touches down on the seabed.

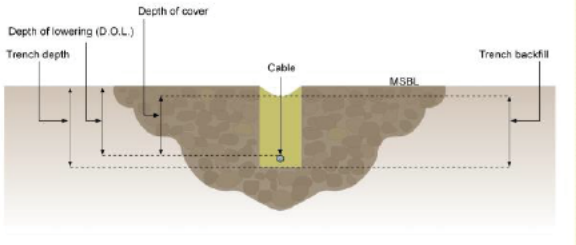
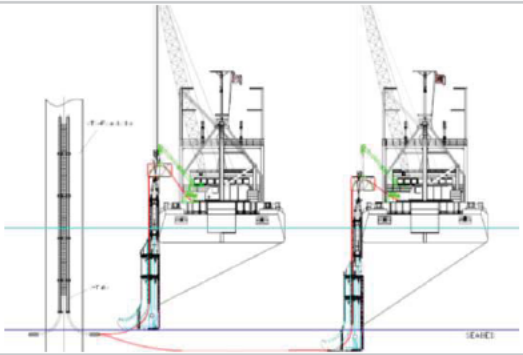
2.8.1.1 Cable jointing

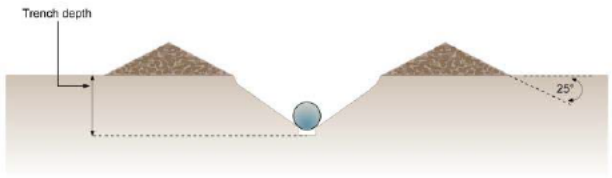
The Western Isles Connection submarine cables can be laid without joints. However, there are situations in which the cable installation may be abandoned, e.g. poor weather, where the cable may be cut to allow the vessel to return to port. In this event the free end of the cable will be recovered from the seabed and jointing performed on board the vessel. The joints and the short section of adjacent cables left on the seabed at the 'final' joint location will be buried using a jetting machine or protected by concrete mattresses or rock protection. SHE Transmission will ensure that if joints are required, as far as possible, they will not be located in sensitive areas, e.g. shipping channels, anchoring grounds, where the prolonged location of the installation spread is not desirable.

2.8.2 Cable burial

A variety of tools are available to support cable trenching and burial. The selection of trenching tool will be determined by the nominated installation contractor based on the dominant geotechnical conditions, the burial depths required and the characteristics of the cable. Table 1.2 details the available tool options and provides examples of typical tools available in the market, and the general performance characteristics of each, and describes the likely use within the Project.

Table 1.2 Burial technologies

Method	Description	Typical equipment	Likely use in the Project
Jet trenching	Jetting tools excavate a trench by directing a jet or multiple jets of water at or in to the seabed. **ROV jet trenchers** are self-propelled independent machines that can operate in a wide range of water depths and seabed conditions. **A Mass Flow Excavator (MFE),** sometimes referred to as Controlled Flow Excavation (CFE), form a subcategory of jet trenching tools. The general principal of operation is fundamentally the same and involves using a fan turbine to create a low pressure / high volume flow of water through a large diameter tube directed towards the point where excavation is required. **Vertical injectors** comprise a large flat 'blade' or share with a series of jetting nozzles to fluidise the seabed soils; the cable is placed through the share. The jetting water is pumped from the vessel and the tool is simply dragged through the seabed as the trenching operation progresses.  Typical trench profile using jet trenching	 ROV based Jet Trencher  Configuration of a Vertical Injector	> A jet trenching ROV is likely to be the base case for trenching operations. > It may be possible to mobilise this to the lay vessel to perform lay and trench operations at the same time, reducing the number of vessel days and hence Project cost.

Method	Description	Typical equipment	Likely use in the Project
Ploughing	**Cable ploughs** can trench through a variety of soils and are particularly suited to projects where long continuous lengths of cables are to be buried. Normally towed from a support vessel as a simultaneous cable lay and trenching operation. The simultaneous lay and burial of the cable is achieved as the cable vessel makes forward progress and the cable plough buries the cable. Typically require a relatively large support vessel with adequate pull, or an anchored support barge to provide the necessary tow force. Progress speeds vary from 1000 m/hr or more in soft clays to <100 m/hr in very stiff clays and very dense sands with <50 m/hr typical for rock. **Pre-cut ploughs** perform pre-cut trenching using a "V" shaped plough. Pre-cut ploughs are suitable across a wide range of soil conditions, including sands and very stiff clays. Pre-cut trenching must be scheduled sufficiently in advance of cable lay to ensure that trenching is completed but not so far in advance that the trench creates a hazard to other sea users for longer than necessary and to avoid the risk of trench wall collapse. Pre-cutting removes risk to the cable from burial operation but constrains the lay vessel which must ensure the cable is laid into the base of a trench.  Typical trench profile for pre-cut trench ploughing	 Cable plough  Pre-cut plough	> A cable plough would be a suitable alternative to an ROV jet trencher subject to cable diameter and minimum bending radius (MBR) restrictions, but does not allow for remedial trenching work. > Pre-cut trenching using a plough and associated backfill plough could also be used, but in some areas the load bearing capacity of the seabed sediment may be an issue as plough sinkage may occur.

Method	Description	Typical equipment	Likely use in the Project
Mechanical trenchers	Generally self-propelled tracked vehicles usually operated in post-lay burial mode to bury subsea cables that have been previously laid on the seabed and are typically used for shorter sections of cable burial. The tracks are positioned to straddle the cable which is then loaded into the trencher. Mechanical trenchers carry surveillance equipment and sensors which stream data to monitor the progress and performance of the tool. The cutting mechanism comprises a series of picks mounted on a rotating chain or wheel. Progress can be slow with this type of trencher with typical rates in the range of 50 m/hr to 200 m/hr	 Mechanical trencher	> Mechanical trenching could be used in conjunction with a jet trencher mobilised to the same spread. As with pre-cut trenching, tool sinkage may be an issue in the softest areas of the seabed.

2.8.3 Crossings

Routing studies for the Project have taken careful consideration of the number and type of potential crossings of existing assets. The cable route crosses existing British Telecom telecoms infrastructure in three locations and also crosses a Ministry of Defence (MoD) cable asset at an undisclosed location in the Minch.

The crossing of third party infrastructure is made with agreement of the owners following a negotiated formal Crossing Agreement. Prior to marine cable installation the selected contractor for the burial and protection scopes of work will propose a suitable crossing design.

2.8.4 Remedial protection

Remedial cable protection may be required where burial has not been successful leaving the cable unprotected. Types of remedial protection include:

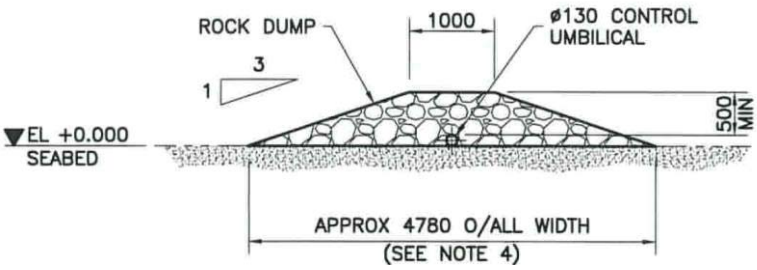
> **Cable protection systems**: Designed to protect the cable against impact damage (for example from fishing gear interaction).

Cast iron casing cable protection

> **Concrete mattresses:** Comprises a series of small interlinked concrete blocks which form a close-fitting and dense layer over the exposed product. Use of mattresses will likely be required at cable crossings.

Concrete mattress

> **Rock placement:** Rock placement is a commonly adopted remedial trenching technique. Rock of the required grade and specification is typically installed from a specialist vessel using a fall-pipe.



Typical rock berm profile

2.8.5 Cable landfall installation

The proposed landfall locations at Arnish (Stornoway) and Dundonnell have been selected, balancing a range of cost, technical and environmental factors. Engineering techniques for the landfall sites will not be finally confirmed until the detailed design stage but will include one of the following techniques or infrastructure:

- Transition joint pit (TJP) above the high-water mark at the landfall where the offshore cable is joined to the onshore cable.
- Horizontal directional drilling (HDD) under the Arnish landfall to a point on the seabed offshore.
- Either HDD or open-cut trench installation at the Dundonnell landfall.
- Duct installation at both landfalls through which the offshore cable will be pulled from offshore to the TJP.
- There may be a requirement for a temporary coffer dam infrastructure in the beach for the excavation of the duct and installation.

The cable will be floated ashore from the CLV or barge. When the cable reaches the water's edge, it will be pulled into the duct and through to the jointing pit. The cable will be continuously pulled in a single operation. Once a sufficient length of cable has been pulled into the jointing pit, the ducts and their seaward ends will be sealed, and the area around the ends of the conduits will be backfilled.

2.8.6 Noise

The predominant noise generating activities during the Project are as follows:

- Geophysical and geotechnical survey equipment;
- Cable trenching, mechanical cutting and mass flow excavation (if required);
- Rock or concrete mattress placement;
- Vessels using thrusters for dynamic positioning; and
- Support vessels.

These activities are required during installation, cable repair and maintenance and decommissioning. No noise will be produced during the operation of the cables.

2.8.7 Cable operation

The cables themselves produce no external electric field due to the presence of a metallic outer sheath. The system which involves current being transmitted along two separate cables in opposite directions will result in a cancellation of any magnetic fields when the cables are laid in close proximity to each other. As the cables will be bundled together in the same trench almost complete cancellation of magnetic fields will be achieved. The magnetic fields generated during cable operation are expected to reduce with distance from the cables falling to background levels within around 1 m from the cables. It is also proposed to bury the cables or for rock to be placed over the cables where burial cannot be achieved at crossings or in areas of harder seabed and therefore no magnetic fields are expected to be detectable at the seabed.

The cables will produce heat during operation; however, protection of the cables by burial or with rock placement will result in a negligible heating effect of the surrounding environment.

2.8.8 Maintenance and repair

The life expectancy of the cables is approximately 40 years although, with repairs and refurbishments, some cable systems can last upwards of 60 years. Once installed, submarine cables do not require routine maintenance. The electrical integrity of the cables will be monitored continuously to provide early indications of fault conditions.

It is likely that, particularly in the first three years of operation, surveys will be conducted to check for cable exposures or spanning, and should the local environmental conditions change or be suspected as having changed, to monitor the cables' buried depth. Surveys will utilise standard geophysical survey equipment and/or ROVs. All subsequent surveys are proposed to take place at five year intervals in line with existing asset management procedures.

Cable repairs to correctly installed and protected submarine cables are infrequent but may require operations similar to installation which temporarily intrude on the environment and the activities of other users of the sea. The most common reason for repair of a submarine cable is damage caused by external interaction, typically by trawlers and commercial ships' anchors.

A cable repair invariably requires the removal of the damaged section and insertion of a replacement section of cable along with two additional cable joints. The additional cable length can be up to three times the depth of water at the site and longer if the cables have been damaged over a distance.

The extra length of a repaired short cable section means it cannot be returned to its exact previous alignment on the seabed and therefore the excess cables will be laid on the seabed in a loop off to one side of the original route. The excess cables and first joint of a longer repair section can be laid 'in-line' along the original route whilst the final joint will form an 'omega' loop on the seabed.

The additional joints and the extra cable length will be buried, typically using jetting machines deployed from either the repair vessel itself or a separate specialised vessel. Where this is not practicable, rock placement will be deployed to maintain protection to the repaired section of cable.

A cable repair operation might be expected to have a duration of several weeks or months depending on the type and extent of damage and operational constraints such as weather and cable repair vessel availability. For the repair of a single cable in a bundled pair, both cables would be repaired as a precaution against undetected damage.

2.8.9 Decommissioning

Cables in Scottish territorial waters are installed on Crown Estate Scotland (CES) land and therefore a lease or licence is generally entered into for a set term. An Initial Decommissioning Plan (IDP) will be developed and appended to the Crown Estate's licence agreement entered into by SHE Transmission for this project. The technical and environmental challenges in recovering power cables, can be difficult and potentially environmentally damaging. Therefore, there may be a case for the cables to be left in place if the environment is best served by doing so, effectively recognising that recovering cables may lead to more damage to the environment or other seabed interests than leaving them in place. If this were the case SHE Transmission as the cable owner will retain liability for any residual cable sections in perpetuity. An Out of Service Deed will be entered into by SHE Transmission and CES to reflect this and the case for cable recovery will need to be the subject of an environmental and economic assessment in the years leading up to decommissioning.

2.9 The Baseline Environment

The west coast mainland and Minch area is a recognised area of geological importance with Little Loch Broom and surrounding sea lochs supporting a range of features of geological interest such as glaciated channels, slide scars, pockmarks, scattered moraines and shelf deeps. A sill located at the mouth of Little Loch Broom (between the outer loch and inner loch) is evidence of slide scars, created during de-glaciation as a response of the land to glacial retreat (uplift).

The Minch, and adjacent coastal waters, also supports a variety of marine wildlife such as marine mammals, birds and fish and a high diversity of important benthic habitats and species. Several of the sea lochs on both the west coast of the Scottish Mainland and east coast of the Western Isles are designated shellfish waters and also support a number of aquaculture sites. Fishing activity within the Minch is predominantly by Nephrops trawlers. Effort is generally low to moderate, although this increases towards the centre and north of the Minch. Pot fisheries (crab, lobster and Nephrops) are dominant closer to shore, and in the Wester Ross NCMPA where trawling is restricted.

Due to its relatively sheltered position, compared to waters off the west coast of the Western Isles, the Minch experiences high levels of shipping vessel traffic. The proposed subsea cable route crosses the main Ullapool to Stornoway ferry route. The Project area is also used by the MoD as a submarine practice area. Existing infrastructure in the Minch and near to the cable route is limited, although the proposed route runs close to, and crosses, the BT HIE broadband telecommunications cable (installed summer 2014) which also runs northwest-southeast through the Project area between Ullapool and Stornoway and also a MoD cable in the Minch.

The inshore / coastal waters also contain several wreck sites, anchorages and dumping / areas of foul ground. This includes a large anchorage and a large area of foul ground (harbour dredge disposal site) located off the Arnish Point landfall.

3 ENVIRONMENTAL APPRAISAL RESULTS

3.1 Introduction

The Western Isles Connection Project is exempt from the requirement to conduct a statutory EIA. However, a proportionate assessment of environmental impacts has been undertaken to support the application for a Marine Licence. The assessment that has been undertaken identifies the potential impacts of the Project. It requires a detailed understanding of the Project e.g. proposed installation, operation and maintenance, and decommissioning activities, and the environment within which the marine cables will be located. Potential impacts have been evaluated to determine how the installation and operation of the cables could affect the environment and the significance of those impacts. Where potential impacts are likely to be significant, specific measures have been identified for implementation either directly or through design or as part of the construction, operation and decommissioning of the Project. Where necessary the assessment has identified the requirement for appropriate monitoring to either confirm impact predictions and/or demonstrate compliance with legal requirements.

3.2 Ecologically protected sites

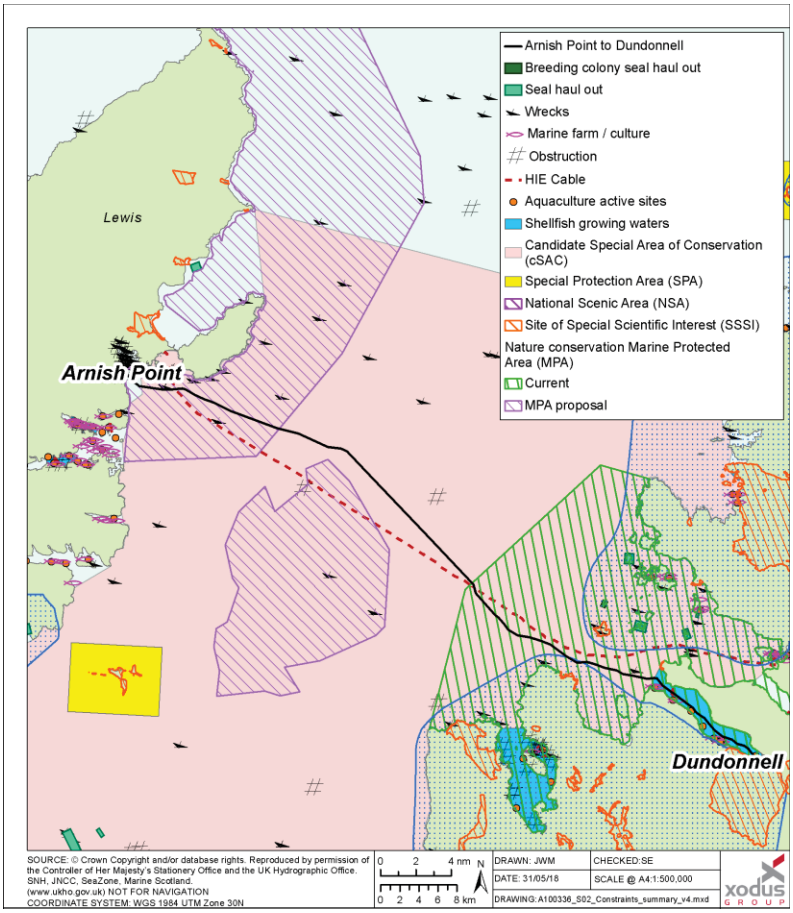
The predicted impacts of the Project on Ecologically Protected Sites have been assessed as **Not Significant**. The assessment that underpins this conclusion is summarised below.

Baseline

There are several protected sites with marine components located along, and in the immediate vicinity of the subsea cable route and landfall locations (Figure 3.1 and Table 3.1). Statutorily protected sites occurring in the vicinity are:

- Sites of international importance (SPAs and SACs), including proposed and candidate sites, designated under the European Birds and Habitats Directives respectively;
- NCMPAs designated under the Marine (Scotland) Act 2010;
- SSSIs designated under the Nature Conservation (Scotland) Act 2004;
- NSAs designated for their outstanding scenic value; and
- Seal haul out sites designated under Section 117 of the Marine (Scotland) Act 2010.

Figure 3.1 Protected sites in the Project vicinity



Assessment of impacts

Table 3.1 Protected sites in the vicinity of the Project

Site name	Designation	Overview description	Distance to Project
Minch and Inner Hebrides	cSAC	Designated for harbour porpoise.	0 km
Wester Ross	NCMPA	Designated for range of biodiversity and geodiversity features including northern feather star aggregations, maerl beds, flame shell beds and burrowed mud.	0 km
Shiant East Bank	pNCMPA	Designated for range of biodiversity and geodiversity features e.g. northern sea fan and sponge communities, shelf breaks and mounds.	2 km
North East Lewis	pNCMPA	Designated for Risso's dolphin and sandeel habitat.	0 km
Priest Island	SPA and SSSI	Qualifies under the Directive (79/409/EEC) by supporting populations of European importance of European storm petrel (*Hydrobates pelagicus*) during the breeding season.	2 km
Shiant Isles	SPA and SSSI	Qualifies under the Directive (79/409/EEC) by supporting over wintering populations of Barnacle Goose (*Branta leucopsis*), 172 individuals representing at least 0.6% of the wintering population in Great Britain. This site also qualifies under the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: Puffin (*Fratercula arctica*), 76,100 pairs representing at least 8.4% of the breeding population, Razorbill (*Alca torda*), 7,337 pairs representing at least 1.3% of the breeding population and shag (*Phalacrocorax aristotelis*), 1,780 pairs representing at least 1.4% of the breeding Northern Europe population. Under Article 4.2 of the Directive (79/409/EEC) the site qualifies for supporting a seabird assemblage. During the breeding season, the area regularly supports 200,000 individual seabirds including: guillemot (*Uria aalge*), kittiwake (*Rissa tridactyla*), fulmar (*Fulmarus glacialis*), puffin, razorbill and shag.	20 km
Wester Ross	NSA Coastal Site	Various scenic qualities	0.5 km
Assynt Coigach	NSA Coastal Site		3 km
South Lewis, Harris and North Uist	NSA		4 km

Only sites with marine elements or those with assumed connectivity were considered as part of the impact assessment. In accordance with the Habitats Directive and the Marine (Scotland) Act 2010, it was necessary to undertake an HRA screening and an NCMPA appraisal to determine whether there is potential for the Project to have an adverse effect on the integrity of either the Natura sites or the NCMPAs respectively.

An assessment on whether Likely Significant Effect (LSE) or significant risk of hindering the achievement of the conservation objectives in the case of NCMPA was made where it could not be ruled out at this stage, further assessment was undertaken in topic specific assessments.

For protected sites where marine mammals are qualifying features (The Minch and Inner Hebrides cSAC for harbour porpoise and North East Lewis pNCMPA for Risso's dolphin) LSE, or significant risk of hindering the achievement of the conservation objectives, could not be ruled out specifically in relation to disturbance as a result of underwater noise; therefore, the potential impacts to marine mammals was assessed further in a marine mammal impact assessment.

For protected sites where qualifying features were classed as benthic or intertidal features (Wester Ross NCMPA and Shiant East Bank pNCMPA), there is the risk of disturbance to species and habitats, and significant risk of hindering the achievement of the conservation objectives could not be ruled out. Therefore, a benthic and intertidal ecology impact assessment was carried out.

For protected sites where birds are a qualifying feature (Priest Island SPA and the Shiant Isles SPA) no impacts were predicted to have any LSE on the conservation objectives of the sites. Therefore, the sites were not assessed further.

Potential impacts on seals are unlikely due to the limited duration of cable works and the mobile nature of the species. However, it was noted that there are designated seal haul-out sites located in the vicinity of the Project.

Mitigation

Mitigation specific to the qualifying features of protected sites, where it was deemed there may be LSE or significant risk of hindering the achievement of the conservation objectives could not be ruled out, has been outlined in topic specific assessments for marine mammals and benthic and intertidal ecology.

3.3 Benthic and intertidal ecology

The predicted impacts of the Project on benthic and intertidal ecology have been assessed as **Not Significant**. The assessment that underpins this conclusion is summarised below.

Baseline

The Arnish Point landfall is classified as 'Atlantic and Mediterranean low energy infralittoral rock' for about 1 km. The route then goes through a patch of 'circalittoral mixed sediments' which opens onto 'circalittoral sandy mud'. The seabed habitats predicted in the subtidal section of the cable route is mostly classified as 'deep circalittoral mud'. The cable route passes through a rich and diverse area on the approach to the west coast of mainland Scotland, between Priest Island (north) and Opinan (south), with seabed classified as 'deep circalittoral coarse sediment' and 'deep circalittoral sand' until the route reaches the entrance of Little Loch Broom.

The Project area supports a rich and diverse range of benthic habitats and species. Of greatest significance are those identified as Priority Marine Features (PMFs). PMFs potentially occurring in the area include: maerl beds; flame shell beds, burrowed mud, kelp and seaweed communities on sublittoral sediment, maerl or coarse shell gravel with burrowing sea cucumbers, Northern feather star aggregations, sandeels and submarine structures made by leaking gases.

These are all qualifying features of the Wester Ross NCMPA that the cable route crosses. The 'northern sea fan and sponge communities' PMF is one of the designated features of the Shiant East Bank pNCMPA. To the north-east of the Isle of Lewis, the presence of sandeels designated as Scottish PMF has led, in part, to the proposal for the North-East Lewis pNCMPA designation.

Assessment of impacts

The PMF 'Northern sea fan and sponge communities' is found within the Shiant East Bank pNCMPA; however, given that the proposed cable route is 2 km to the east of the site it is highly unlikely that any feature associated with this site, would be directly affected by the Project.

Cable installation activities have the potential to impact the features of the Wester Ross NCMPA (burrowed mud, flame shell beds, kelp and seaweed communities in sublittoral sediments, maerl or coarse shell gravel with burrowing sea cucumber, maerl beds and northern feather star aggregations on mixed substrata). Of these features, only burrowed mud has been positively identified along the proposed cable route. Marine surveys identified possible live and dead maerl within Little Loch Broom; however, no maerl beds were found. Northern feather stars have previously been recorded on the outer sill at the mouth of Little Loch Broom.

Impacts to burrowed mud habitat will be highly localised, and restricted to the immediate footprint of the trenching work area. Cable installation activities are expected to be short-term and the potential for recovery of burrowing megafauna communities from smothering is expected to be high. Therefore, impacts on burrowed mud habitats are considered to be negligible and will not compromise the conservation objectives of the Wester Ross NCMPA. Cable installation works could also impact Northern feather stars if they are present at the entrance to Little Loch Broom through physical damage and displacement during installation.

Mitigation

A pre-lay survey will be undertaken and used to identify the presence of Northern feather star aggregations to allow avoidance where possible. Where installation constraints prevent this, the cable will be surface laid with external sleeving protection to minimise the installation footprint and avoid / minimise disturbance to Northern feather star aggregations. Impacts will be highly localised, restricted to the immediate footprint of the cables on the seabed. Impacts on the Northern feather star aggregations, due to the small area of impact, are not considered significant and will not compromise the conservation objectives of the Wester Ross NCMPA.

3.4 Marine mammals

The predicted impacts of the Project on marine mammals have been assessed as **Not Significant**. The assessment that underpins this conclusion is summarised below.

Baseline

Figure 3.2 Risso's dolphin

Key cetacean species occurring in the Project area include bottlenose dolphin, harbour porpoise, common dolphin, white-beaked dolphin, minke whale and Risso's dolphin (Figure 3.2). Killer whales and humpback whales are also occasional visitors to the area. There are two protected sites for marine mammals along the cable route: North-east Lewis pNCMPA, which is proposed for the protection of Risso's dolphin; and Minch and Inner Hebrides cSAC for harbour porpoise. Four designated seal haul out sites, and an additional grey seal breeding colony site are located in the Summer Isles. Both grey and harbour seals associated with these haul out sites have the potential to be present in the Project area.

Assessment of impacts

Of key concern to marine mammals in the vicinity of the Project is the potential impact as a result of underwater noise. Noise modelling undertaken to inform the assessment demonstrates that once the proposed mitigation is implemented, injury to marine mammals should not occur. Furthermore, whilst there may be some disturbance, this is likely to be limited to a few individuals only, and considering the short term and transitory nature of the Project activities there is not expected to be any significant impact on individuals or populations of cetaceans near the proposed cable route. Consequently, there will be no LSE on the integrity of either of the two sites in the area that are proposed for designation to protect Risso's dolphin or harbour porpoise. However, as there is the possibility of disturbance to some cetacean individuals, SHE Transmission will engage with MS-LOT to understand the need to apply for a European Protected Species (EPS) licence in advance of cable installation.

Mitigation

Where options are available, items of equipment will be selected and activities planned to limit the potential for disturbance (i.e. selection should consider the potential for noise disturbance and, where possible, low noise options chosen). Joint Nature Conservation Committee (JNCC) Guidelines for minimising the risk of disturbance and injury to marine mammals from seismic surveys will be implemented throughout the survey period. A Marine Mammal Mitigation Plan (MMPP) will be implemented and a Marine Mammal Observer (MMO) will be in place for the duration of the surveys and cable installation activities.

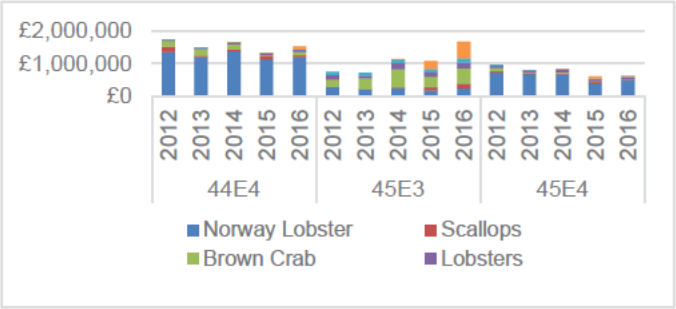
3.5 Commercial fisheries

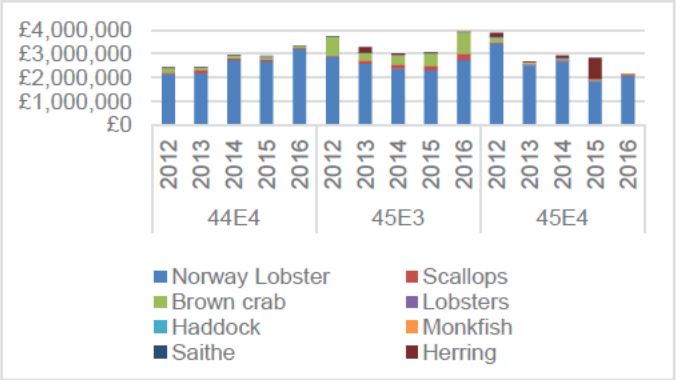
The predicted impacts of the Project on commercial fisheries have been assessed as **Not Significant**. The assessment that underpins this conclusion is summarised below.

Baseline

The area surrounding the proposed cable route is fished by vessels both under and over 10 m. Shellfish species dominate landings by all vessel sizes with Nephrops being the most valuable species landed in all three of the ICES rectangles which intersect the cable route (Figure 3.3). Demersal trawlers over 15 m in length, which target Nephrops, operate along the proposed cable route, although effort is greatest in the western section of the route closest to the landfall location on Lewis. Demersal trawling effort by vessels under 15 m in length is greatest in the eastern section of the cable route. Whitefish and pelagic species are also targeted along the cable route collectively comprising less than 10% of the average value of fish landed from 2012-2016. A number of aquaculture sites are located near to the cable route, most notably in Little Loch Broom.

Figure 3.3 Species caught in ICES rectangles which intersect cable route for vessels under 10 m (top) and over 10 m (bottom)





Assessment of impacts

Fishing activity will be displaced during the installation activities. However, due to the localised nature and short duration of activities, no significant impact is anticipated. Fishing will be able to resume in the cable corridor when the cable becomes operational. Changes in the distribution of commercially important species is not expected to occur. The potential for impacts to fish from sediment disturbance from trenching operations is considered to be restricted to the immediate vicinity of the cable trench. Suspended solid concentrations, although elevated immediately after trenching, are expected to fall to ambient levels within 66 m of trenching activity in hard ground areas and 70 m in sandy areas with fine deposition out to a maximum of 2 km from the trench. Finer material will be rapidly diluted and dispersed in the water. Far field deposition is predicted to be less than 1 mm for both trenching and ploughing. No significant impacts on commercial fisheries populations, including aquaculture, or migratory species from sediment disturbance are expected to occur. Therefore, commercial fisheries are not anticipated to be indirectly affected by any effects on fish species. Thus, no significant adverse impacts on commercial fisheries are anticipated as a result of the installation and operation of this cable.

Mitigation

Mitigation measures will be adopted to ensure that fishermen are aware of the location of the cable and the timing and duration of all installation and maintenance operations. These will include employment of a Fisheries Liaison Officer (FLO) to manage interactions during the surveys and cable installation, issue of Notices to Mariners (NtM's), maintaining contact with local Fishing Associations and updating Kingfisher Cable awareness charts.

3.6 Navigational Risk Assessment

The predicted impacts of the Project on shipping and navigation have been assessed as tolerable. With the implementation of mitigation measures, the potential impact is therefore considered to be **Not Significant**. The assessment that underpins this conclusion is summarised below.

Baseline

During the summer period of 2017, an average of 42 unique vessels per day was recorded within the Project area. Fishing vessels comprised 43% of the total vessels recorded in the area, with a further 22% from cargo vessels and 15% recreational craft. In the winter period of 2017, there was an average 27 unique vessels recorded per day within the study area. Cargo vessels accounted for 39% of the vessels recorded, followed by fishing vessels (32%) and tankers (9%). Recreational vessel activity was very limited in the winter period.

The busiest areas in terms of shipping were aligned with the recommended northbound/southbound routes used by commercial vessels transiting through the North Minch and the ferry routes between Ullapool and Stornoway. Stornoway harbour was also identified as being a busy area due to vessels entering and leaving the harbour.

Fishing activity is generally high within the North Minch, with the majority of vessels (74%) carrying demersal gear. Longer term AIS data (6 months 2017) was used to assess the anchoring activity in the vicinity of the cable. Anchoring activity was generally low with all vessels recorded with Dead Weight Tonnage less than 5,000. It is noted that small vessels such as fishing and recreational craft are likely to be under-represented in the small vessel anchorage areas and within the AIS data set.

Assessment of impacts

Prior to the assessment of potential impacts upon shipping and navigation, several embedded mitigation measures were assumed to be in place prior to construction, and during the operational and maintenance phases of the Project. Taking cognisance of these embedded mitigation measures, eleven potential impacts, which could occur during both the installation and operation of the cable route, were identified; Six of the identified potential impacts were considered broadly acceptable; the remaining five potential impacts were classed as “Tolerable”. The following “Tolerable” activities were identified as potentially occurring during the installation phase of the cable route; increased collision risk (passing vessel with installation vessels); disruption to vessel routeing/timetables; and disruption to fishing activities. The following activities were identified as potentially occurring during the operational phase of the proposed cable route; anchor dragging; and fishing gear snagging.

Mitigation

To reduce the potential impacts assessed as “Tolerable” to as low as reasonably practicable two additional mitigation measures have been recommended; targeted circulation of information about the project to regular commercial operators (e.g. ferry), and local small vessel stakeholders (fishing and recreation) two weeks prior to offshore work commencing; and Stornoway Port Authority should be kept consulted throughout the Project to manage access issues and any impacts on anchorages.

4 SUMMARY AND CONCLUSIONS

4.1 Introduction

This NTS reports upon the findings of the Western Isles Connection Project Environmental Appraisal. The EA assessed the potential impacts of the installation, operation, maintenance and decommissioning of the Western Isles HVDC Connection marine cables which are proposed to be installed between Arnish (Stornoway) and Dundonnell on the Scottish mainland. The preferred route option represents the most technically feasible and least environmentally disturbing option, taking cognisance of directness of the route, seabed conditions, environmental sensitivities and potential interactions with other sea users.

Following consultation with MS-LOT, three main potential issues were identified by the Scottish Ministers as follows:

- The footprint of the cable route will go through a very important and sensitive area for benthic habitats;
- Micro-routing and surface-lay evidence must be provided to demonstrate mitigation of impacts;
- Potential impacts to the fishing industry and other users during installation must be minimised.

4.2 Summary

Protected Sites

Four ecologically protected sites with marine components were identified within the immediate vicinity of the cable route and landfall locations: Minch and Inner Hebrides cSAC; Wester Ross NCMPA; North Lewis pNCMPA; and Shiant East Bank pNCMPA.

During the assessment, three benthic and intertidal features were identified as requiring further assessment: northern sea fan (Shiant East Bank pNCMPA); and northern feather stars and burrowed mud (Wester Ross NCMPA). Potential impacts arising as a result of the installation of the proposed cable route are considered not to be significant due to; distances between the proposed route and the designated features; small footprint of the cables; the localised, transient nature of the Project activities; and the short-term duration of the works. As such, the potential impacts upon the Shiant East Bank pNCMPA and the Wester Ross NCMPA are considered not to be significant, and they will not compromise the objectives of the designated sites.

Marine Mammals

Underwater noise has the potential to impact marine mammals within the vicinity of the proposed cable route, however, noise modelling undertaken to inform the assessment demonstrates that once the proposed mitigation is implemented, injury to marine mammals should not occur. Whilst there may be some disturbance, this is likely to be limited to a few individuals only, and considering the short term and transitory nature of the Project activities, there is not expected to be any significant impact on individuals or populations of cetaceans near to the proposed cable route. Given there is a possibility of disturbance to some cetacean individuals, SHE Transmission will engage with MS-LOT to understand the need to apply for a EPS licence in advance of the cable installation.

Fish Ecology

The potential for impacts to fish from sediment disturbance from trenching operations is considered to be restricted to the immediate vicinity of the cable route trench. Suspended solid concentrations are expected to fall to ambient levels within 66 - 70 m of the cable route, with fine deposition out to a maximum of 2 km from the trench. Far field deposition is predicted to be less than 1 mm for both trenching and ploughing. No significant impacts on fish populations or migratory species from sediment disturbance are expected to occur.

Commercial Fisheries

During the installation phase of the proposed cable route, fishing activities will be displaced. Nephrops are the most valuable species for commercial fishing, with whitefish and pelagic species also being targeted along the cable route. Due to the localised nature and short duration of activities, no significant impact is anticipated. Fishing will be able to resume in the cable corridor when the cable becomes operational. A change in the

distribution of commercially important species is not expected to occur. Therefore, commercial fisheries are not anticipated to be indirectly affected by any effects on fish species. Thus, no significant adverse impacts on commercial fisheries are anticipated as a result of the installation and operation of this cable. Mitigation measures will be adopted to ensure that fishermen are aware of the location of the cable and the timing and duration of all installation and maintenance operations.

Shipping and Navigation

A Navigational Risk Assessment (NRA) has been undertaken to assess the effect of the cable on shipping and navigation. Based on the baseline assessment, stakeholder consultation and general industry experience, the impacts / hazards associated with the different phases of the planned cable were assessed. No hazards were identified as being unacceptable, with all being either tolerable or broadly acceptable following implementation of mitigation measures.

Cumulative Effects

It is concluded that there will be no significant cumulative environmental impacts with other existing and proposed marine developments during the installation and operation of the Western Isles HVDC connection. SHE Transmission note the proposed harbour extensions at Newtown Marina and Arnish Deep Water Port and the potential for timings to coincide with cable installation with potential cumulative impacts Ongoing discussions will be held with key stakeholders, including SNH and Stornoway Port Authority to agree their requirements and to mitigate any potential impact.

4.3 Conclusions

The EA has determined that the proposed installation of the cable route between Arnish (Stornoway) and Dundonnell on the Scottish mainland does not pose any significant adverse effects to ecological protected sites, benthic and intertidal ecology, marine mammals, commercial fisheries, and shipping and navigation within the vicinity of the Project area. It is also concluded that there will be no significant cumulative environmental impacts with other existing and proposed marine developments during the installation and operation of the Western Isles HVDC connection. The EA has established a schedule of mitigation measures that shall be implemented during the construction, operation and maintenance phases of the Project.