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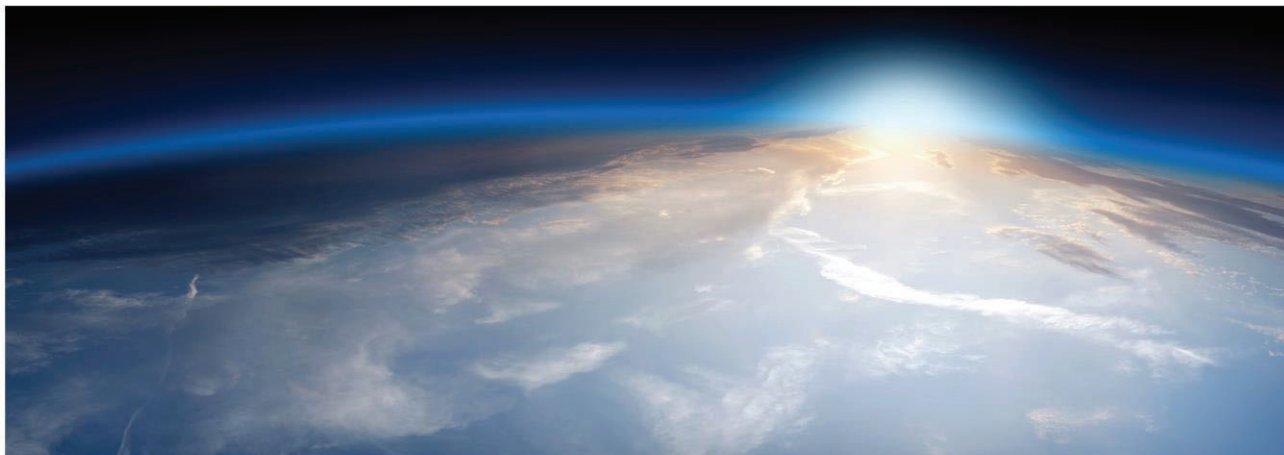
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**XODUS**  
PROJECTS



# LT09 Shetland HVDC Link

## Inspection, Repair & Maintenance Plan

Scottish and Southern Energy plc

Assignment Number: A200409-S04

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## Inspection, Repair & Maintenance Plan

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## 1 PROJECT OVERVIEW

Shetland is not presently connected to the UK mainland electricity Transmission grid and as such is solely reliant on island-based generation, this generation is in the majority derived from fossil fuels with the support of onshore wind.

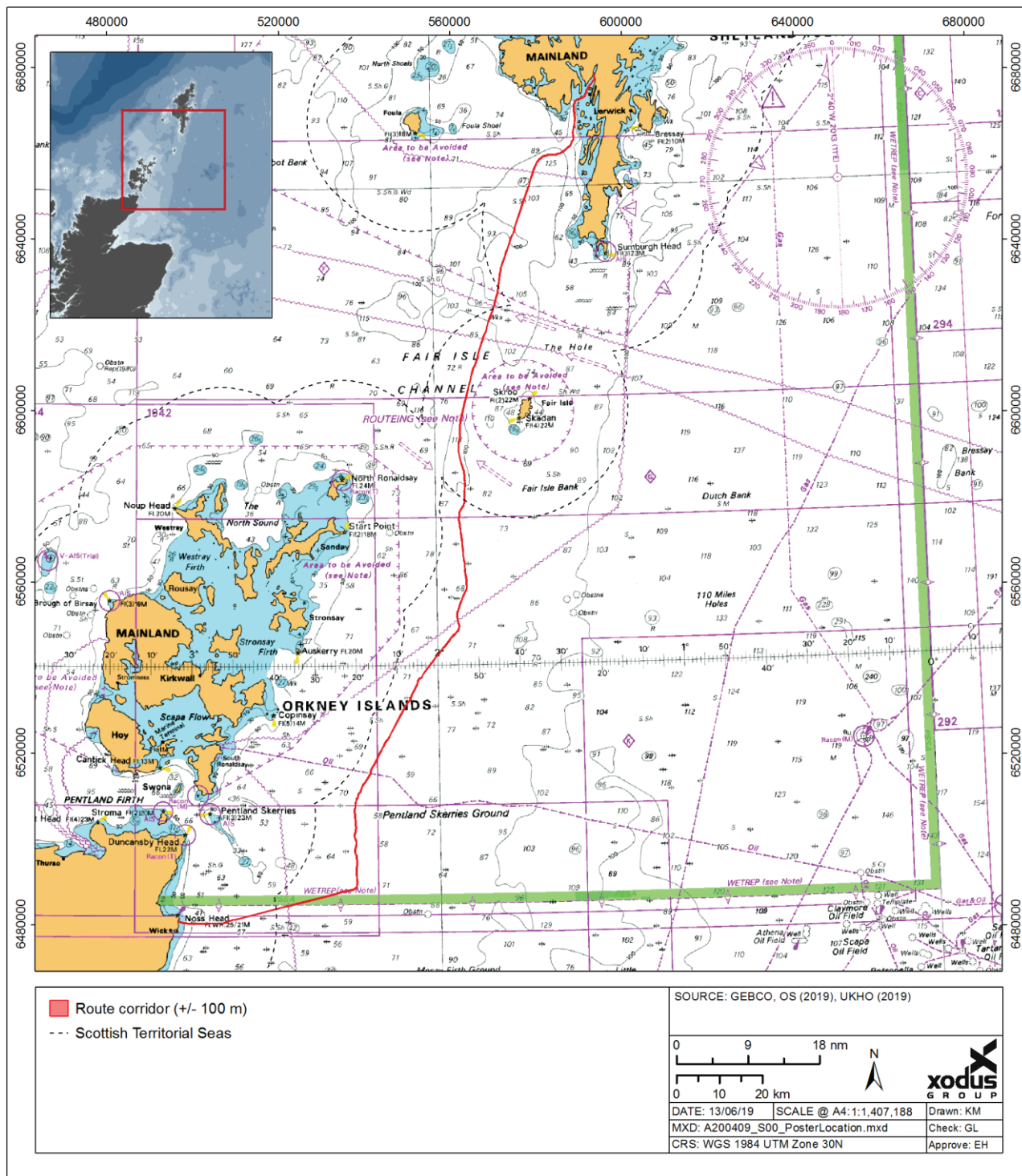
There is currently approximately 600MW of consented renewable energy generation on the Shetland Isles, which will require connection to the UK mainland transmission network once these projects are constructed. Scottish Hydro Electric Transmission Plc (SHE Transmission) is the licenced Transmission Owner in the north of Scotland, and as such, has a requirement to provide a connection to the UK's network when requested by a generator.

In order to meet the dual requirement of the provision of reliable transmission level supply, and export surplus renewable generation, SHE Transmission are planning to install a single circuit 253km long, 600MW High Voltage Direct Current (HVDC) link between Weisdale Voe in Shetland and Noss Head in Caithness ('Shetland HVDC Link' or 'the Project'). The marine cable infrastructure will consist of a single bundle comprising two conductor cables and one fibre optic communications cable, to allow control of the substation and HVDC converter station. Marine cable solution provider, NKT, will be responsible for the manufacture and installation of the subsea cable.

An overview of the marine installation corridor is provided in Figure 1-1. Further details on the planned construction and associated marine survey activities are available in the Shetland HVDC Link Marine Construction Method Statement (CMS) (NKT, 2021).



Figure 1-1 Shetland HVDC Link Marine Installation Corridor





## 2 SCOPE

This document outlines the requirements for the post installation Inspection, Repair and Maintenance (IRM) of the Shetland HVDC Link marine cables, and associated seabed infrastructure. It provides details of the following aspects of SHE Transmission's IRM requirements in respect to this asset:

- > Periodic inspection activities;
- > Types of survey and equipment to be utilised; and
- > Condition based maintenance activities, including proposed mitigation if deburial, free spans, movement or other dangers to legitimate users of the sea are identified.

This plan does not include detail of the immediate as-built survey operations, since these are considered to be part of the installation works, and hence are not within the scope of this document. Further details are available in the CMS.

## 3 PERIODIC INSPECTIONS

### 3.1 Survey and Inspection Schedule

SHE Transmission are committed to ensuring the marine cable infrastructure is regularly inspected to ensure that it remains adequately protected and does not pose a heightened risk to other legitimate users of the sea. In order to facilitate this, the following periodic inspection regime will be implemented:

- > Within 12 – 18 months of the completion of the installation of the Shetland HVDC Link, SHE Transmission will conduct a survey of the entire marine cable route;
- > Following the initial 1<sup>st</sup> year survey, the entire marine cable route will be surveyed again after 2 years unless the first survey indicates areas of changes or the anthropogenic threat to the cable changes;
- > The trends observed in the preceding surveys will be used to inform future survey plans, This risk based approach will allow survey effort to be targeted to the highest risk areas, however it is envisaged that the full cable will be surveyed every 3 - 5 years;
- > Findings from all cable inspection surveys will be documented and compared with as-built survey documentation, together with the results from the previous post installation surveys. SHE Transmission will identify discrete critical areas where more frequent inspection is required, based on discrepancies between the most recent survey and data from the as-built survey data or previous routine inspections. Critical areas are likely to include regions of mobile sediments or increased scour; and
- > SHE Transmission will ensure that any critical areas identified are surveyed more frequently. However, the actual frequency and extent of these inspections will be dependent on the nature of the seabed feature, threat to the cable or other discrepancy, and specifically according to the perceived risk to the cable infrastructure or other legitimate users of the sea.

### 3.2 Survey and Inspection Scope

The survey scope will be optimised to understand the condition of the asset, its protection and any adjacent changes to the seabed, including:

- > Changes in seabed level or profile;
- > Recovery of the seabed where seabed intervention has taken place;
- > Rock berm profile;
- > Evidence of trawl marks;
- > Habitat; and
- > Depth of burial.

In addition, SHE Transmission is committed to understanding the long-term impact and recovery of the Noss Head Nature Conservation Marine Protected Area (NCMPA) in relation to the installation of both the existing Caithness Moray HVDC Link and the proposed Shetland HVDC Link. SHE Transmission will utilise the data collected as part of the Shetland HVDC Link periodic surveys to inform assessments of on the condition of the



horse mussel beds in the vicinity of the Shetland HVDC Link, including consideration of both acoustic and visual data.

SHE Transmission will also provide relevant survey data from within the Noss Head NCMPA to Marine Scotland and NatureScot, in line with the following provisions:

- > All existing data will be provided in its original format, following completion of the installation works, or once it is no longer commercially sensitive to SHE Transmission; and
- > Any additional survey data (collected following this correspondence) will be provided on completion of the installation works or once the cable installation is complete, within 1 year of collection. All new data will be MEDIN compliant.

### 3.3 Survey and Inspection Spread

The TBI surveys may be conducted using one or more of the following survey platforms:

- > Offshore survey vessels with dynamic positioning system;
- > Nearshore survey vessels;
- > Unmanned Surface Vessels (USV);
- > Remotely Operated Vehicle (ROV) or Autonomous Underwater Vehicle (AUV).

The following survey sensors may be utilised during the surveys, depending on the specific inspection requirements:

- > Multibeam Echo Sounder (MBES) for the provision of bathymetric information and 3D images of external cable protection:
  - MBES will be hull mounted, towed close to the seabed, or deployed on a ROV/AUV;
- > Side Scan Sonar (SSS) for provision of high-resolution acoustic images of the seabed and cable protection, including identification of free spans:
  - SSS will be towed close to the seabed or deployed on an ROV/AUV;
- > Sub-Bottom Profiler (SBP) to acquire acoustic seabed profiles, and inform cable burial depth assessment:
  - SSB will be towed close to the seabed or deployed on an ROV/AUV;
- > High or ultra-high definition video and still cameras will be used to collect visual data along the cable route:
  - Cameras will be deployed on an ROV/AUV;
- > Cable/Pipeline tracking systems in order to assess depth of lowering of the cable system or other seabed infrastructure:
  - Cable/Pipeline tracker will be deployed on an ROV;
- > Ultra-Short Baseline (USBL) underwater positioning system, used to determine the 3-dimensional position of ROV/AUVs and other subsea equipment.

SHE transmission actively pursues the use of new technology, as such this scope will be reviewed and updated as survey technology develops.

## 4 CONDITION BASED MAINTENANCE ACTIVITIES

Dependant on the findings of the periodic survey operations, SHE Transmission will plan and execute any necessary Condition Based Maintenance (CBM) or interventions in order to ensure the subsea cable and associated protection measures remains operational, in good condition, and do not pose a threat to other legitimate users of the sea. CBM activities may include, but are not limited to:

- > Maintaining designed cable protection levels through re-burial, or remedial rock placement;
- > Maintaining rock berms at subsea asset crossings;
- > Removing potential snagging risks;
- > Rectification of free-spans;



- > Remediation of threats to the cable system associated with mobile sediments; and
- > Removal of other threats to the cable system, including:
  - Boulders;
  - UXO;
  - Dropped objects and debris; and
  - Lost fishing gear.

Initially SHE Transmission will utilise a 5-year Long-Term Service Agreement (LTSA) it will have in place with the cable manufacturer NKT to deliver the following tasks:

- > Ensure spare Shetland HVDC Link subsea cable and all associated spare accessories (i.e. joint kits) are in good condition;
- > Ensure there is a Cable Repair Preparedness Plan in place for the Shetland HVDC Link and ensure it is reviewed annually with SHE Transmission over the 5 years; and
- > Expedited response to any major Shetland HVDC Link subsea cable faults, to help identify location and subsequently carry out any repair on the subsea cable.

Note: It is expected that there will always be a LTSA(s) in place to cover the Shetland HVDC Link and all other Transmission subsea cables, which will cover the expedited response to subsea cable faults as a minimum.

## 5 ADMINISTRATIVE REQUIREMENTS

### 5.1 Licences and Permits

SHE Transmission will work with relevant regulators including Marine Scotland and Shetland Islands Council to ensure all necessary licences and permits are in place prior to conducting survey and maintenance operations. For example, European Protected Species licences may be required for geophysical survey operations, and Marine Licences may be necessary for certain maintenance activities.

### 5.2 Stakeholder Liaison

Prior to conducting survey or maintenance operations, SHE Transmission will ensure that all necessary steps are taken to inform stakeholder's and other legitimate users of the sea of the planned operations. This will be done in accordance with the provisions of the Shetland HVDC Link Communications Plan (Xodus, 2021).

## 6 ASSOCIATED DOCUMENTS

- > NKT, 2021. Shetland HVDC Link Marine Construction Environmental Management Plan.
- > Xodus, 2021. Shetland HVDC Communications Plan.