Scotland England Green Link 1 / Eastern Link 1 - Marine Scheme

Environmental Appraisal Report
Volume 1

Non-Technical Summary

nationalgrid SP TRANSMISSION

National Grid Electricity Transmission and Scottish Power Transmission

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1. Introduction

National Grid Electricity Transmission (NGET) and Scottish Power Transmission (SPT) are together proposing the construction of a subsea High Voltage Direct Current (HVDC) link between Torness in East Lothian and Hawthorn Pit in County Durham. This is known as the Scotland to England Green Link 1 (SEGL1), or Eastern Link (EL1), which is referred to as “the Project”. NGET will be the Transmission Operator (TO) within English jurisdiction and SPT will be the TO within Scottish jurisdiction.

NGET and SPT are submitting Marine Licence Applications to the Marine Scotland Licensing Operations Team (MS-LOT), the regulator for marine licences applications in Scotland, and to the Marine Management Organisation (MMO), responsible for marine licensing in English waters for the marine element of the Project, which is referred to as “Marine Scheme”.

The onshore components of the Project, known as the Scottish Onshore Scheme and the English Onshore Scheme, will be subject to two separate planning applications. These planning applications have been submitted to East Lothian Council and Durham County Council, supported by the relevant environmental studies.

The MS-LOT and MMO confirmed the Marine Scheme is not considered to be ‘Environmental Impact Assessment (EIA) Development’. However, as it is important to provide comprehensive information about the Project’s potential environmental impacts, these have been presented in an Environmental Appraisal Report (Volume 2 and 3) and prepared to accompany the Marine Licence Applications to the MS-LOT and the MMO.

This Non-Technical Summary (NTS) presents the findings of the Environmental Appraisal Report for the Marine Scheme in non-technical language.

The Environmental Appraisal Report is made up of three volumes:

1. Volume 1: Non-Technical Summary
2. Volume 2: Main Report
3. Volume 3: Technical Appendices

The Environmental Appraisal Report has been co-ordinated by AECOM on behalf NGET and SPT. Technical chapters have been completed by a combination of authors from AECOM, Xodus Group, Wessex Archaeology and Brown and May Marine Ltd.

1.1 Why Do We Need the Marine Scheme?

As part of their commitments to tackling climate change, the UK and Scottish governments have set legally binding targets to become net-zero in all greenhouse gases by 2050 for England and Wales and 2045 for Scotland.

The Government has also identified a target of delivering 40 gigawatts (GW) of renewable wind energy by 2030, which is enough to power every home in the UK.

As the UK transitions away from traditional forms of fuel to power vehicles and heat homes there will be a greater need for renewable and low carbon electricity. By the end of this decade, every home in the country has the potential to be powered by renewable energy. To move this renewable and low carbon energy from its source and into people's homes and businesses, the UK needs to increase the capability of its electricity transmission network.

Renewably generated electricity in Scotland has and is significantly growing, with wind generation set to triple by 2030. To help deliver this greener energy to homes and businesses across the UK, there is a need to increase the capability of the electricity transmission network between Scotland and England, in particular at least a doubling of transfer requirements from northern Scotland to the Midlands over the next 10 years. Reinforcement projects, such as this one, will be required to ensure this happens.

A second HVDC link, Scotland England Green Link 2 (SEGL2) / Eastern Link 2 (EL2) from Peterhead in Aberdeenshire to Drax near Selby, via the East Riding of Yorkshire, is being developed jointly by NGET and Scottish Hydro Electric (SHE) Transmission Plc. However, that project is separate to this and will not be further discussed in this NTS.

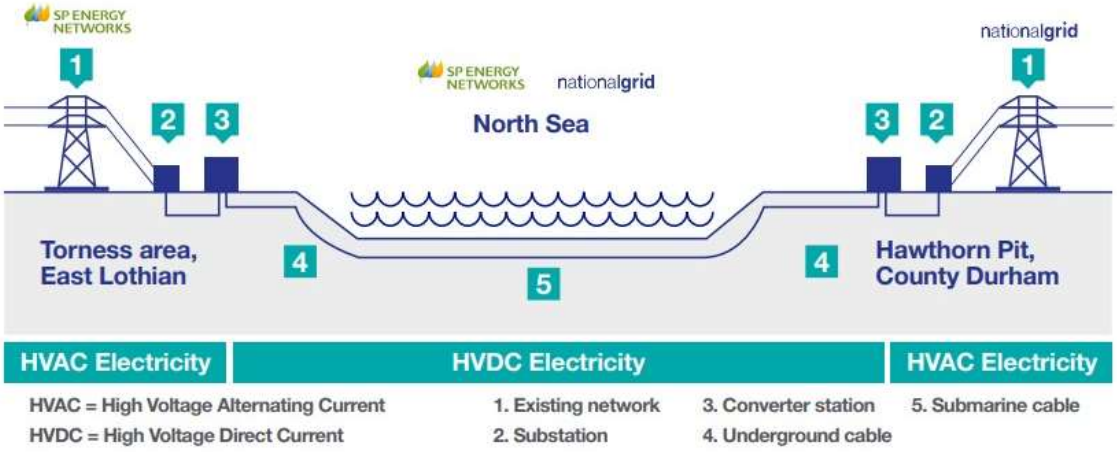
The Project has been identified through National Grid Electricity System Operator who produce annual reviews to find credible ways in which the energy system could evolve, and to ensure that energy is delivered efficiently and reliably to where it is needed. The annual reviews include:

- **Future Energy Scenarios (FES)** – these represent a range of different, credible ways in which the energy system could evolve taking account of policy and legislation, including net zero targets.
- **Electricity Ten Year Statement (ETYS)** – using data from the FES, National Grid Electricity System Operator undertakes and annual assessment to identify points on the transmission system where more network capability is needed to ensure that energy is delivered efficiently and reliably to where it is needed.
- **Network Options Assessment (NOA)** – the Transmission Owners and other stakeholders respond to ETYS with solutions to address network capability requirements. These are assessed by National Grid Electricity System Operator so that the most economic and efficient solutions are recommended to proceed, and others told to hold or stop.

The Project was given a 'proceed' signal in the first NOA published in 2015/16. It has continued to appear in each yearly NOA Report and is included in the most recent NOA 2021/22, published in January 2022.

The Project, once completed, will be able to carry enough electricity to power up to **2 million homes** across the UK.

1.2 How the Project Will Work



The Project will allow the transfer of electricity from Scotland to England (and vice versa as required) via a cable under the seabed. This will be connected to a converter station and electricity substation in each country via an onshore underground cable.

The national electricity transmission system in England and Scotland uses High Voltage Direct Current (HVDC) technology as this allows electricity to be transmitted efficiently in large volumes. However, the distribution networks in England and Scotland both operate using predominantly High Voltage Alternative Current (HVAC). Converter stations are to be located at either end of a transmission link which will convert the electricity between HVDC and HVAC.

The Project is made up of the following components:

- **Scottish Onshore Scheme:** A converter station located in the Torness area, to the east of the Dunbar Energy Recovery Centre and a new 400kV substation at Branxton in East Lothian, Scotland, with approximately 7.5 km of buried HVDC cable to a landfall south-east of Thorntonloch Beach. The substation at Branxton was part of a separate planning application (reference 21/01569/PM). The converter station and substation will be connected by approximately 5 km of High Voltage Alternating Current (HVAC) cable. The substation connects the Project to the existing transmission system. The scope of the Scottish Onshore Scheme ends at MLWS and a separate consent application has been made to East Lothian District Council;
- **Marine Scheme**: Commencing at MHWS at Thorntonloch Beach, East Lothian, approximately 176 km of subsea HVDC cable, comprising 37.5 km in Scottish waters and 138.5 km in English waters, will extend to MHWS at Seaham, County Durham. This is subject to MLAs to MS-LOT and the MMO, which this EAR supports; and
- **English Onshore Scheme:** Commencing at MLWS approximately 10 km of underground HVDC cable will be laid from the landfall north of Seaham, west along the Sunderland City/County Durham administrative boundary and then south-west through County Durham, to a converter station at Hawthorn Pit. The converter station will be connected to a new 400 kV substation by approximately 1 km of HVAC cable. The new 400 kV substation will connect the Project to the existing 275 kV Hawthorn Pit substation and the existing electricity transmission system. This is subject to a separate consent application which has been made to Durham County Council.

This Non-Technical Summary, and corresponding Environmental Appraisal Report in Volumes 2 and 3 is written in regard to the Marine Scheme.

2. The Marine Scheme

2.1 Overview

The Marine Scheme is a subsea cable system which will be made up of two High Voltage Direct Current (HVDC) single core metallic conductors and a fibre optic (FO) cable, will be installed within a 500 m wide corridor called the 'marine installation corridor'. The marine installation corridor is approximately 176 km long. The cable will provide 2 Giga Watts (GW) of transmission reinforcement from Scotland to England.

The marine installation corridor extends from Mean High Water Spring[1] (MHWS) at the landfall on Thorntonloch Beach, Scotland, crossing Scottish and English territorial seas to MHWS at the landfall at Seaham, England.

The marine installation corridor follows a broadly north to south alignment from the kilometre point (KP) 0, at the Scottish landfall, to KP 176 at the English Landfall. The KPs are used to provide a reference point so that features and environmental impacts can be adequately described in the Environmental Appraisal Report. Approximately 37.5 km of the marine installation corridor lies within Scottish territorial waters, with approximately 138.5 km within English territorial waters.

2.2 Consideration of Alternatives

In the early stages of the Project, a number of options were put forward to identify connection points to Scottish and English electricity transmissions systems technology and a selection of subsea cables routes through Scottish and English waters.

Over 200 potential options have been considered as part of this process. A shortlist of options were subject to a detailed appraisal based on National Grid guidance, aiming to reach the best compromise between environmental, social, economic and technical drivers. This was carried out over three stages:

- **Phase 1**: Strategic Options Appraisal. This stage focussed on the preliminary identification of key environmental, social and technical constraints;
- **Phase 2:** Marine Route Optioneering. This included a high-level assessment of 33 sub-routes associated with the six onshore/offshore options as part of the refinement of the potential routes; and
- **Phase 3:** Marine Survey Corridor Development & Selection. This further considered multidisciplinary constraints of the preferred SEGL1 / EL1 route from Torness to Hawthorn Pit Substation, identifying key constraints, crossing requirements and the development of a suitable survey route corridor.

2.3 Cable Landfalls

The landfall zones needed to be near existing connection points at or close to the coast. Torness was the preferred Scottish landfall due to the proximity of the Torness Substation. Unfortunately, no suitable connection point was identified close to the coast in England, the nearest being Hawthorn Pit Substation which is approximately 7 km inland.

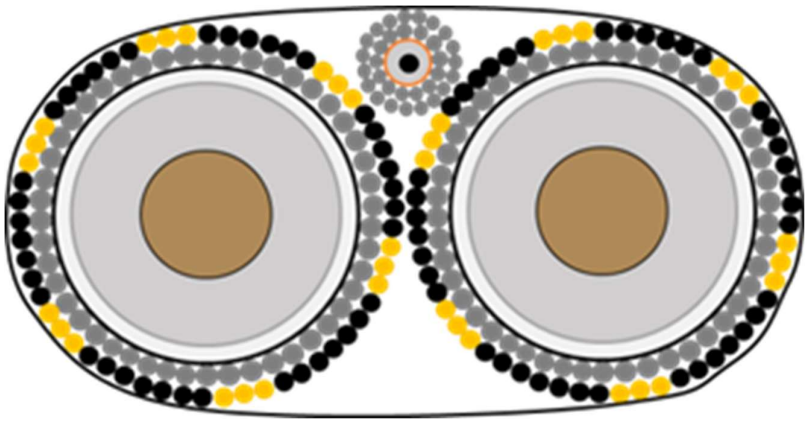
[1] The height of mean high water springs is the average throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.

3. Project Components

3.1 Subsea HVDC Cables

There will be two subsea HVDC cables which may be bundled together in a single trench or may each be buried separately in their own trench. It is most likely they will be bundled in a single trench.

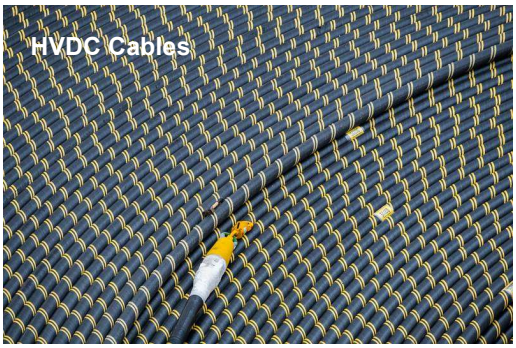
One of the cables will be accompanied by an FO cable.



Bundled HVDC cables with piggy backed fibre optic cable

The cables will be buried to a target depth of 1.5 m (where this is possible to achieve) but will be buried to a minimum depth of 0.6 m. Each trench will be between one and six metres wide (depending on the nature of the seabed). There is the potential of for seabed disturbance in an area up to 15 m wide in some places. Route preparation activities that will be undertaken pre-installation in some parts of the marine installation corridor will lead to limited wider areas of disturbance of up to 25 m.

The cables used will be non-draining, containing no free oil. The cables contain no liquid or gases that can be released into the marine environment even in the event of severe mechanical damage to the cables. The subsea cables will be designed to withstand mechanical forces during installation and repair / recovery operations.



3.2 Landfalls

Scottish Landfall – Thorntonloch Beach, East Lothian

The Scottish landfall is the interface between the Scottish Onshore Scheme and the Marine Scheme. The Scottish landfall is located at the southern end of Thorntonloch Beach in East Lothian, as shown in Volume 2 EAR Chapter 2: Project Description, Figure 2-2.

English Landfall – Seaham, County Durham

The English landfall is the interface between the Marine Scheme and the English Onshore Scheme. The location for the landfall area is north of Seaham, County Durham, as shown on EAR Volume 2 Chapter 2: Project Description, Figure 2-2.


The beach and cliffs under which the HVAC cable will be installed via HDD

4. Installation

4.1 Subsea cable installation

Further surveys will be undertaken to inform the best route for the cable within the marine installation corridor, and aid in the planning of the cable installation. The surveys will confirm if there are any obstructions or significant changes to seabed conditions and bathymetry (depth of water), and also help to inform a detailed unexploded ordnance (UXO) assessment.

Before the cables are installed, there will be a series of route preparation activities including:

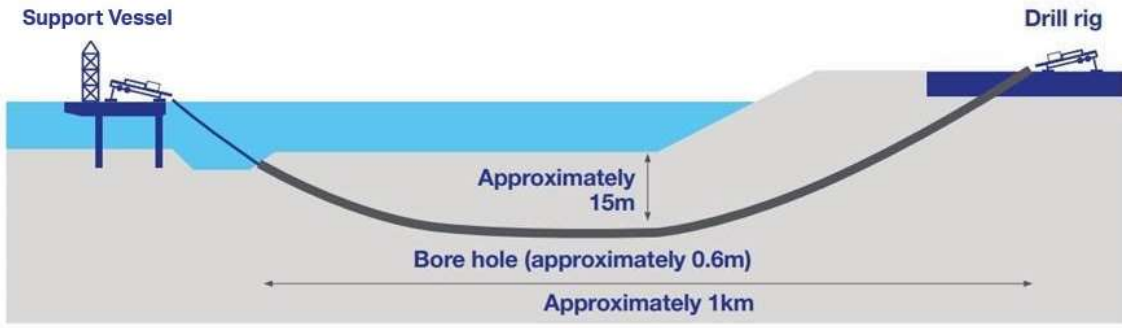
- Sea trials (trial subsea cable burial tools in areas of very hard or very soft seabed);
- Cable route clearance (to remove any obstructions such as boulders);
- Pre-lay grapnel[2] run (to remove any seabed debris, such as wires); and
- Pre-lay subsea intervention e.g. installation of crossing infrastructure (specific measures to protect in-service cables / pipelines).

After these activities, the cables will be installed in sections and will either be laid and buried at the same time or laid and buried later. The cables will have to cross eight existing assets and special crossing agreements have been made with those who own these assets.

4.2 Landfall Installation

The cables will be installed using Horizontal Directional Drilling[3] as shown in the image below. This will reduce the environmental impacts at the landfall points and means that no installation work will be required within the sensitive intertidal zone (the area where the ocean meets the land between high and low tides). Horizontal Directional Drilling will start from temporary drilling compounds, one within each of the Scottish and English Onshore Schemes.

The temporary drilling compounds will be located close to the Transition Joint Bay, where the subsea cables will connect to the onshore cable system at either end. Each compound will be located above Mean High Water Springs and outside the Marine Scheme. The Horizontal Directional Drilling work may take up to six months to complete at each landfall, with vessels being on site for a much smaller portion of that time.



4.3 Operation

Following installation, the cable system is designed to avoid the need for routine maintenance and therefore no planned maintenance work is anticipated for the cables or their infrastructure during the lifetime of the Marine Scheme.

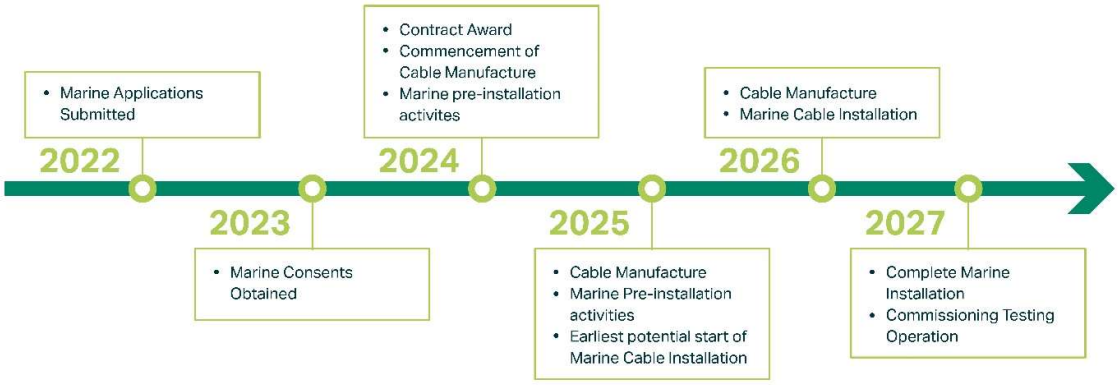
Surveys will be undertaken to monitor the condition of the cables and supporting infrastructure.

[2] A small anchor
[3] Horizontal Directional Drilling is a construction technique where a tunnel is drilled under the waterway and the cable is pulled through the drilled underground tunnel.

4.4 Decommissioning

In the years leading up to the end of the Marine Scheme's operational life, the options for decommissioning will be assessed. The objective in undertaking these assessments will be to minimise the short and long-term effects on the environment. The current methods for the recovery and disposal of redundant cables are often difficult, expensive and potentially harmful to the environment.

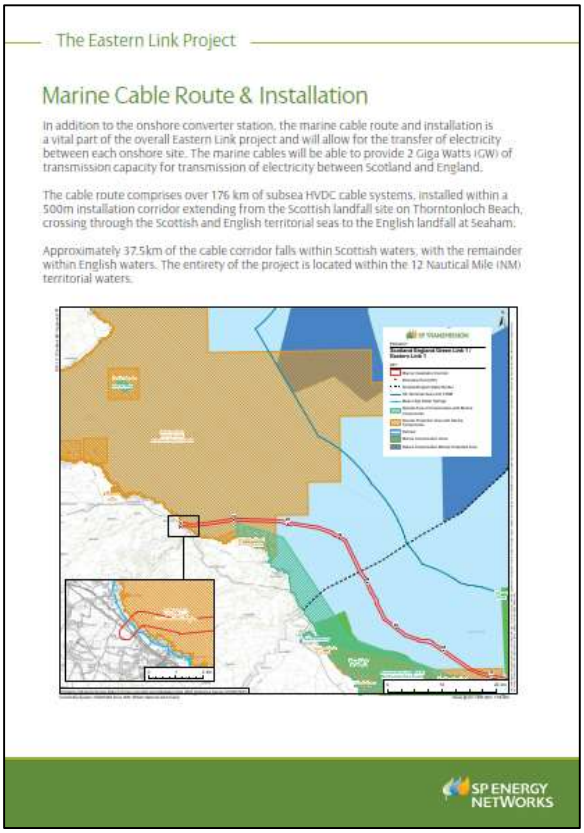
4.5 Indicative Project Programme



4.6 Consultation

To ensure that the plans take account of the views of local communities, NGET and SPT delivered comprehensive pre-application consultations to gauge local residents' and stakeholders' views. The consultation primarily focussed on the onshore elements of the Project, but also included information about the Marine Scheme. The aim of the public consultations was to inform consultees about the Project at an early stage, understand their views and concerns and collate their feedback.

In Scotland, the pre-application public consultation took place in two phases, with the first being a public consultation that took place between Monday 24 May and Friday 18 June 2021 which was followed by public information events in early-2022 and was led by SPT. The second took place between Monday 31st January 2022 to Monday 28th February 2022. The consultation was a statutory requirement both as a pre-application requirement for the planning submission of the onshore elements of the Project and for the marine licence application which are two separate applications required for this Project. The consultation website received views on the exhibition banners and other material held online. Responses were received including video and phone calls and a written form submission. The feedback received was all in relation to the Onshore Scottish Scheme and has been considered and addressed in the Scottish Onshore EIA Report and PAC (Pre-Application Consultation) Report.



Public consultation in the English part of the Marine Scheme was led by NGET. The pre-application consultation was split into two phases, with the first being a public consultation event that took place in Summer 2021 and was followed by public information events in early-2022. The consultation primarily focussed on the onshore elements of the Project, but also included information about the Marine Scheme. During the public consultations a range of feedback was received, from neutral to negative, however, the negative feedback made up a small fraction of the overall feedback. Feedback which related to the Marine Scheme specifically included concerns on the impact on marine environments, marine archaeological receptors and electromagnetic fields. These have all been appraised as part of the EAR which concludes with no significant effects.

Taking place eight months after the phase 1 public consultation, the Public Information Exhibition Events (PIEEs) took place, providing the public and stakeholders with more detailed information on the Project, including how the design had progressed since the phase 1 public consultation, as well as the likely effects of the Project on the local area.

5. Environmental Appraisal

5.1 Requirement for Environmental Appraisal

The Marine Scheme does not require a statutory (legal) Environmental Impact Assessment (EIA) however, an environmental appraisal has been undertaken in accordance with relevant EIA best practice. This was confirmed by MS-LOT in February 2021. The Marine Management Organisation confirmed in March 2021 that installation of a cable within the UK Marine Area is not considered to constitute a 'Project' under either Schedule A1 or A2 of the Marine EIA Regulations and therefore an EIA is not required.

5.2 About Environmental Appraisal

NGET and SPT have statutory obligations as transmission licence holders under the Electricity Act 1989. Therefore, it was considered in the best interests of the Marine Scheme to undertake a voluntary, non-statutory EIA. This is known as an Environmental Appraisal and is the process of identifying, evaluating and mitigating the likely significant environmental effects of a proposed development. It helps to identify and evaluate the likely significant environmental effects of the development so that appropriate mitigation can be designed.

Appropriate mitigation includes measures which either avoid, reduce or offset significant adverse effects. In this environmental appraisal, mitigation is either embedded mitigation (which is incorporated into the design of the Marine Scheme) and Project Specific Mitigation which have been proposed to reduce the significance of the environmental effect.

The environmental appraisal ensures that decision makers and statutory consultees, as well as other interested parties, are aware of a Marine Scheme's potential environmental effects and whether these may be significant or not. Decision makers and statutory consultees will take the environmental appraisal into consideration in the determination of an application for the marine licenses.

Further details of the approach to environmental appraisal can be found in Volume 2 Chapter 4: Approach to Environmental Appraisal.

5.3 Approach to Environmental Appraisal

The environmental appraisal follows a systematic approach to identifying potential impacts of the Marine Scheme on the physical, biological and human receptors. This is explained below.

Scoping Stage

The potential interactions between the Marine Scheme and known environmental sensitivities were recorded through an Environmental Issues Identification (ENVID) matrix and presented in the non-statutory scoping report.

The scoping report was submitted to the Marine Management Organisation on 31 March 2021, and MS-LOT on the 01 April 2021. The responses received are provided in each of the technical chapters (7-16) in Volume 2.

Baseline Studies

In order to appraise the potential effects resulting from the Marine Scheme, the existing environmental conditions had to be understood. This is known as the baseline environment.

The baseline environment is understood by collecting information through some or all of the following sources:

- Review of field surveys undertaken for the Marine Scheme;
- Review of specialist baseline studies (desk-based technical reviews);
- Detailed review of secondary sources (i.e. existing documentation and literature); and
- Stakeholder consultation.

The key data sources used to establish the baseline are described in each technical appraisal chapter (EAR Volume 2 Chapters 7-16).

Appraisal of Potential Effects

The methodology for the appraisal has been developed to incorporate The Guidelines for Environmental Impact Assessment by Institute of Environmental Management and Assessment, published in 2004 and the “source-pathway-receptor” model.

The terms ‘interaction’, ‘impact’ and ‘effect’ have been used throughout the appraisal. These terms are defined in Table 1 below and were used appropriately throughout the appraisal.

Table 1: Definition of Interaction, Impact and Effect

Terms	Definition
Interaction	The link between an activity and the receptor. There must be an interaction for an effect to occur.
Impact	The action that occurs as a result of an identified interaction. The predicted change in the baseline environment.
Effect	An observable consequence of impacts, usually measurable. Effects only occur when an activity or environmental impact is present within an environment that is sensitive to it.

There are different types of impacts which could potential occur as a result of interaction with the Marine Scheme. The impacts are defined in Table 2 below.

Table 2: Impact Definitions

Terms	Definition
Direct impact	Impacts that result from a direct interaction between The Marine Scheme activities and the receiving environment.
Indirect impact	Impacts on the environment, which are not a direct result of the Marine Scheme / Marine Scheme activities, often produced away from the activity or as a result of a complex pathway.
Cumulative impact	Impacts that result from incremental changes caused by other present or reasonably foreseeable actions together with the Marine Scheme (European Commission 1999). Generally considered to be the same impact but from different projects e.g. underwater noise from two separate projects combining to affect marine mammals.
Beneficial impact	An impact that is considered to represent an improvement on the baseline condition or introduces a new desirable factor.
Adverse impact	An impact that is considered to represent an adverse change from the baseline condition or introduces a new undesirable factor.

The magnitude of change is the degree (including scale, duration and frequency) to which a receptor can change. These are explained in Table 3.

Table 3: Definition of Magnitude of Change Parameters

Terms	Definition
Scale of change	The scale of change refers to the degree of change to or from the baseline environment caused by the impact being described.
Spatial extent	The scale of change refers to the degree of change to or from the baseline environment caused by the impact being described.
Duration and frequency	The duration is the period within which the impact is expected to last prior to recovery or replacement of the feature. Frequency refers to how often the impact will occur.

The magnitude of change can be described as high, medium, low or negligible, based on the criteria presented in Table 4**.**

Table 4: Magnitude of Change Criteria

Magnitude	Criteria
High	Long term (> 5 years) and/or regional level loss; or major alteration to key elements/features of the baseline condition such that post development character/composition of the baseline will be fundamentally changed.
Medium	Medium term (1- 5 years) loss and/or local level change (greater than the Marine Scheme footprint) or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
Low	Short term (<1 year), site specific and/or a minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a “no change” situation.

How sensitive a receptor is, is determined based on its vulnerability, recoverability and importance. These are presented in Table 5.

Table 5: Definition of Receptor Sensitivity Parameter

Terms	Definition
Vulnerability	The vulnerability of the receptor relates to its capacity to accommodate change i.e. the tolerance/intolerance of the receptor to change.
Recoverability	The ability of the receptor to return to the baseline state before the Marine Scheme impact caused the change.
Importance	The importance of the receptor or feature is a measure of the value assigned to that receptor based on biodiversity and ecosystem services, social value and economic value. Importance of the receptor is also defined within a geographical context, whether it is important internationally, nationally or locally.

The receptor sensitivity is given a criterion of high, medium, low or negligible based on the criteria presented in Table 6.

Table 6: Receptor Sensitivity Criteria

Receptor Sensitivity	Definition
High	Receptor has little or no ability to absorb change without fundamentally altering its character. For example: • Receptor has low/no capacity to return to baseline conditions within Project life, e.g. low tolerance to change and low recoverability such as a physical feature formed over a geological time scale, or loss of access with no alternatives. • The receptor is a designated feature of a protected site, or is rare or unique. • Receptor is economically valuable.
Medium	Receptor has moderate capacity to absorb change without significantly altering its character, for example: • Receptor has intermediate tolerance to change. • Medium capacity to return to baseline condition, e.g. 5 to 10 years. • The receptor is valued but not protected.
Low	The receptor is tolerant to change without significant detriment to its character. For example: • Receptor has high tolerance to change. e.g. disturbance to unconsolidated seabed sediments or sandwaves. • High capacity to return to baseline condition, e.g. within 1 year or up to 5 years. • The receptor is common and/or widespread.
Negligible	The receptor's character, survival or viability has a high tolerance to change.

Evaluating the Significance of Effect

Once the receptor has been assigned a sensitivity criterion and the magnitude of change determined, the overall significance of effect is determined using the matrix shown in Table 7. **Moderate** and **major** effects are considered to be **significant** whereas **minor** or **negligible** effects are considered to be **not significant.**

Table 7: Significance Matrix

		Magnitude of Change			
		Negligible	**Low**	**Medium**	**High**
Receptor Sensitivity	**High**	Negligible/Minor	Moderate	Major	Major
	Medium	Negligible	Minor	Moderate	Major
	Low	Negligible	Negligible	Minor	Moderate
	Negligible	Negligible	Negligible	Negligible	Negligible/Minor

Identification of Mitigation Measures

Embedded mitigation measures (those incorporated into the design of the Marine Scheme) and Project Specific Mitigation (identified through the appraisal process) has been incorporated into Volume 2 Chapter 17 Schedule of Mitigation. A standard approach to identifying mitigation requirements was used:

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

6. Results of Environmental Appraisal

6.1 Introduction

The following sub-sections provide a summary of the results of each of the specialist appraisals undertaken (EAR Volume 2 Chapters 7-16). It is intended to highlight key sensitivities or receptors identified in undertaking baseline studies, outline the key mitigation measures and overall appraisal outcomes and significance of effects.

6.2 Physical Environment

The potential interaction of the Marine Scheme with the physical marine environment is appraised in EAR Volume 2 Chapter 7: Physical Environment. Information and data from a wide range of sources has been collated and used to inform the environmental baseline appraisal. A bespoke survey covering the entire marine installation corridor has been undertaken which provides detailed information on the seabed geology, surficial sediments, bathymetry, bedforms (i.e. sandwaves) and other seabed features. The presence of boulders, wrecks and seabed protection, associated with existing cables or pipelines, have also been mapped.

Embedded mitigation measures have been incorporated into the design of the Marine Scheme to minimise potential interactions with the physical marine environment. An example of this is the cable will be buried in the sea bed and in areas where burial is not possible, cable protection methods will be used. Another example, as explained in the landfall installation section of this NTS, is that Horizontal Directional Drilling will be used to install the section of the cable from the landfall to MLWS. This means that no installation work will be required within the sensitive intertidal zone (the area where the ocean meets the land between high and low tides).

The impacts that the Marine Scheme could have on the physical environment include seabed disturbance, increases in suspended sediment concentrations, alteration of seabed morphology, changes in water quality and changes in the hydrodynamic regime.

No project specific mitigation measures or monitoring have been recommended as a result of the impact appraisal.

During all three phases (installation, operation and decommissioning), and the residual (remaining) environmental effects are reported as between **negligible** and **minor**, which are considered to be **not significant**.

6.3 Benthic Ecology

EAR Volume 2 Chapter 8: Benthic Ecology of the EAR appraises of the potential interaction of the Marine Scheme with benthic ecology.

The appraisal establishes a baseline of intertidal[4] and subtidal[5] benthic ecology. The Scottish landfall intertidal habitat is characterised by a primarily rock platform with banks of gravel and foreshore as bedrock slabs with occasional areas of overlying coarse sediment; the English landfall is characterised by a sandy foreshore, which may support wading birds, with rock platform backshore, and foreshore as sand in the lower shore, with coarse sediment (sand, pebbles, cobbles) in the upper shore backed by cliffs. The subtidal benthic habitats identified along the marine installation corridor are generally dominated by areas of mud, sand and coarse sediments. A variety of other habitats are distributed throughout the length of the Marine Scheme, with a greater diversity of benthic habitats in the higher energy, coastal areas of the route. The subtidal section of the Marine Scheme survey area comprised rich and diverse macrofaunal communities, made up of infaunal and epifaunal[6] invertebrates.

There are five key designated sites for the protection of benthic features within 10 km of the Marine Scheme in English waters; three of which overlap with the marine installation corridor. These are Outer Firth of Forth and St Andrew's Bay Complex Special Protection Area (SPA) designated to protect seabirds and waterbirds, the Northumberland Marine SPA, designated to protect seabirds, and the Farnes East Marine Conservation Zone (MCZ), designated to protect several marine benthic habitats.

Embedded mitigation measures have been incorporated into the design of the Marine Scheme to minimise potential interactions with the benthic ecology. For example, the cable will be microsited within the marine installation corridor to avoid sensitive areas of the seabed, and route preparation works will be carried out as locally as possible to minimise disturbance to sensitive habitats.

The potential impacts of the Marine Scheme on benthic ecology are temporary physical disturbance to or permanent loss of subtidal benthic habitats and species; temporary increase in suspended sediment concentrations, sediment deposition and changes to marine water quality.

No project specific mitigation measures or monitoring for benthic ecology have been recommended as a result of the impact appraisal.

The appraisal concluded with potential effects ranging from **minor** to **negligible,** which are considered to be **not significant**.

6.4 Fish and Shellfish

EAR Volume 2 Chapter 9: Fish and Shellfish of the EAR appraises the potential interaction of the Marine Scheme with fish and shellfish ecology.

The appraisal establishes a baseline of general fish and shellfish communities, spawning and nursery grounds and relevant designated sites and species, and species important for commercial fisheries. Fish and shellfish receptors taken forward for appraisal have been determined based upon potential activity / receptor interactions (source – pathway -receptor).

Those species considered to have greatest sensitivity to a particular impact have been appraised at species level, whereas those species with lower sensitivity have been assessed either at a high taxonomic (species classification) level and include elasmobranchs (comprising sharks, rays and skates)) or by functional group and include demersal (fish living close to the sea bed such as sandeel and Atlantic cod), pelagic (fish living neither close to the sea floor or the shore, such as herring or mackerel) and migratory (such as European eel or Atlantic salmon).

Embedded mitigation measures have been incorporated into the design of the Marine Scheme to minimise potential interactions with the fish and shellfish. An example of this is the choice of drilling fluids for HDD operations, which will be selected from the OSPAR List of Substances/Preparations Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR). Drilling fluids and other chemicals selected will be biodegradable.

[4] The area where the waterbody meets the land between high and low tides.
[5] The area below the level of low tide, that is always underwater.
[6] Epifaunal organisms are typically on the outer surface of the environment, as opposed to within it, e.g. living on top of the sediment at the seafloor, such as infaunal organisms.

The potential impacts of the Marine Scheme on fish and shellfish ecology are temporary physical disturbance or permanent loss of habitats and species, temporary increase in SSC and sediment deposition, changes to marine water quality and underwater sound effects.

No project specific mitigation measures or monitoring have been recommended for fish and shellfish ecology as a result of the impact appraisal.

The appraisal concluded with residual effects ranging from **negligible** to **minor** which are considered to be **not significant**.

6.5 Marine Mammals

The potential interaction between the Marine Scheme and marine mammals is appraised in EAR Volume 2 Chapter 10: Marine Mammals.

The appraisal establishes a baseline of two groups of marine mammals occurring in UK waters, namely cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals). A total of 28 cetacean species have been observed and two species of seal are present in UK waters; however, most are occasional visitors and within the Greater North Sea Ecoregion[7]. This baseline also considers the two seal species present in the UK, the harbour seal and grey seal.

The embedded mitigation measures for marine mammals include the mitigation measures recommended in the JNCC guidelines (2017) for minimising the risk of injury in marine mammals which will be adopted. The mitigation measures will be included in a Marine Mammal Protection Plan (MMPP), as part of the CEMP developed for the project.

The potential impacts of the Marine Scheme on marine mammals include changes in underwater sound and water quality, and collision risk between vessel and marine mammal.

Following implementation of embedded and project specific mitigation measures as set out above; residual effects have been appraised as **minor** and therefore are considered to be **not significant**.

6.6 Ornithology

EAR Volume 2 Chapter 11: Ornithology of the EAR appraises the potential interaction of the Marine Scheme and ornithology.

The Marine Scheme passes directly through two sites internationally designated for the protection of seabirds:

- Outer Firth of Forth & St Andrews Bay Complex SPA as it leaves the Scottish landfall; and
- Northumberland Marine SPA for a short distance as the marine installation corridor passes Holy Island south of Berwick-upon-Tweed.

Five other sites internationally designated for the protection of marine and coastal birds are also located within the study area. Despite the fact that a number of these sites are likely to fall outside of the Zone of Influence (ZoI) of project related impact pathways[8], due to the highly mobile nature of birds in the marine environment it is possible the qualifying features of these sites could still interact with the Marine Scheme.

[7] The Greater North Sea ecoregion includes the North Sea, English Channel, Skagerrak, and Kattegat
[8] It is widely understood and accepted that there are limited impact pathways for significant impacts associated with the installation of a subsea cable. This is largely due to the fact that vessel movements and installation activities present a very small source of potential disturbance against the context of a largely open and unrestricted marine environment, as well as the highly-mobile and transient nature of marine birds.


Kittiwake during the breeding season

The breeding season for seabirds varies between species but broadly extends between April and August, with the core breeding period between May and July. There are also ten non-breeding waterbird species within the study area.

Embedded mitigation measures have been incorporated into the design of the Marine Scheme to avoid and minimise effects on marine ornithological receptors. This includes a commitment to be included with the CEMP to ensure that transiting vessels move at low speeds allowing any rafts of birds to disperse naturally well in advance of an approaching vessel, where the marine installation corridor passes through the Outer Firth of Forth & St Andrews Bay Complex Special Protection Area (SPA) as it leaves the Scottish landfall and the Northumberland Marine SPA.

The potential impacts of the Marine Scheme on ornithology include temporary physical disturbance and displacement of species associated with sound, visual effects and presence from vessel and construction activity, disturbance to the seabed and / or water quality due to increased SSC resulting in changes in prey availability, and alteration of water quality due to unplanned releases, accidental leaks and spills from vessels and plant.

No project specific mitigation measures or monitoring have been recommended as a result of the impact appraisal.


Puffin during the breeding season

The appraisal concluded with residual effects ranging from **negligible** to **minor** which are **not significant**.

6.7 Marine Archaeology

The potential interaction of the Marine Scheme with the known and potential marine archaeology and cultural heritage resource below Mean High Water Springs (MHWS) is appraised in EAR Volume 2 Chapter 12: Marine Archaeology.

The appraisal establishes a baseline of seabed prehistory, seabed features (maritime and aviation), marine recorded loses and intertidal heritage potential. There are 11 palaeogeographic features of archaeological potential, one within Scottish territorial waters and ten within English territorial waters.

There is seabed features including 247 features of possible archaeological potential, two charted wrecks in Scotland, and eight charted wrecks within England. There are no known aircraft crash sites but a recorded number of losses, and potential for aircraft, or aircraft related debris to exist on the seafloor.

Embedded mitigation measures have been incorporated into the design of the Marine Scheme to avoid and minimise effects on marine archaeology and cultural heritage resources. For example, a Written Scheme of Investigation (WSI) and for the protection of known archaeological assets is avoidance, achieved through the implementation and monitoring of Archaeological Exclusion Zones (AEZs).

The potential impacts of the Marine Scheme on marine archaeology include direct and indirect damage to known and unknown assets.

Project specific mitigation is also proposed such as the implementation and monitoring of Archaeological Exclusion Zones (AEZs).

The marine archaeology appraisal concluded with all residual effects appraised as **negligible**, which is **not significant**.

6.8 Shipping and Navigation

EAR Volume 2 Chapter 13: Shipping and Navigation of the EAR appraises the potential interaction of the Marine Scheme with shipping and navigation.

The appraisal establishes a baseline of key navigational features, emergency response, maritime incidences, and marine traffic.

Embedded mitigation measures have been incorporated into the design of the Marine Scheme to ameliorating each identified impact, such as issuing a Notice to Mariners (including Kingfishers) and using AIS Broadcast at all times to mitigate against the potential for vessel-to-vessel collision.

The potential impacts of the Marine Scheme on shipping and navigation include vessel-to-vessel collision, deviation from established vessel routes and areas, interaction with vessel anchors and anchoring activity and interaction with fishing gear.

Project specific mitigation is also proposed such as the duration between cable laying and associated burial and protection works will be minimised insofar as is practicable, in order to minimise the period when exposed cables are present on the seabed.

Following the implementation of the project specific mitigation measures, the residual risk, from all phases of the Marine Scheme, can be considered **ALARP** (‘as low as reasonably possible’).

6.9 Commercial Fisheries

EAR Volume 2 Chapter 14: Commercial Fisheries of the EAR appraises the potential interaction of the Marine Scheme with commercial fisheries.

The appraisal establishes a baseline of principal fishing activities, lobster and crab fishery, squid fishery and scallop dredge fishery.

During the installation phase of the Marine Scheme, the potential impacts include temporary loss or restricted access to fishing grounds, displacement of fishing activity into other areas, interference with fishing activities, snagging risk (loss or damage to fishing gear) and impacts on target species for commercial fisheries. During the operational phase of the Marine Scheme, the potential impacts are the same, but instead, the long-term impact on fishing grounds are considered.

During the operational phase, project specific mitigation is required for commercial fisheries relating to where static gear may be removed or relocated. This mitigation will be implemented for affected vessels following an evidence-based approach, in line with Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) guidance, via the establishment of co-operation agreements.

The commercial fisheries appraisal concluded with residual effects appraised as **negligible** to **minor** which are **not significant**.

6.10 Other Sea Users

EAR Volume 2 Chapter 15: Other Sea Users of the EAR appraises the potential interaction of the Marine Scheme with other sea users.

The appraisal establishes a baseline of marine recreational activities (including recreational boating and fishing, scuba diving, kayaking, paddleboarding and canoeing, surfing; windsurfing and kite surfing (at Scottish landfall only) and open water swimming), offshore wind farms, cable crossings, dredging and disposal sites, aquaculture and other developments.

Embedded mitigation measures have been built into the Marine Scheme to avoid and / or minimise impacts to other sea users. This includes the establishment of an advisory safety zone of 500 m. Furthermore, Proximity and Crossing Agreements will be agreed with cable and pipeline owners.

The potential impacts of the Marine Scheme on other sea users are disruption to marine recreational users, disruption to vessel routeing and access to other sea user working areas, and the risk of damage to or interference with a third-party cable or pipeline asset.

No project specific mitigation measures or monitoring for other sea users have been recommended as a result of the impact appraisal.

Following implementation of appropriate mitigation measures set out in this chapter; the other sea users' appraisal concluded that all residual effects would be **negligible** and therefore **not significant**.

6.11 Cumulative and In-Combination Effects

EAR Volume 2 Chapter 16: Cumulative and In-Combination Effects of the EAR appraises the potential interaction of the Marine Scheme with other developments.

The appraisal has been based on the best available data from other plans, projects, marine activities, and associated information that is currently in the public domain or has been provided to the Marine Scheme. A long list of other developments within a study area of 10km of the Marine Scheme was established and each development screened for its potential interaction with the Marine Scheme.

The shortlisted developments included in the cumulative appraisal comprise:

- Scotland England Green Link / Eastern Link 1 Onshore Components (Scotland);
- Scotland England Green Link / Eastern Link 1 Onshore Components (England);
- Berwick Bank Offshore Wind Farm (export cable only);
- Blyth Offshore Demonstrator Array 4 (Phase 2);
- Havhingsten Segment 2.1 South; and
- Dunbar East Beach Sea Defence.

Each shortlisted development was screened for potential cumulative effects for each technical chapter of this EAR. These sections were subsequently summarised against each development, detailed their potential for interaction, potential impact pathways, potential for cumulative effect and where appropriate, proposed mitigation. The outcomes of the cumulative effects appraisal range between **negligible** to **minor** effects which are **not significant**.

In-combination effects are where receptors could be affected by more than one environmental impact. Where a receptor has been identified as only experiencing one effect or where only one topic has identified effects on that receptor, there is no potential for in-combination effects. The receptor groups within this EAR do not interact between chapters, therefore receptors have been wholly appraised within their respective topic chapter and therefore, in-combination effects have not been identified within this appraisal

6.12 Summary and Conclusions

The Project is a major reinforcement of the UK electricity transmission system which will provide additional transmission capacity from north and south across transmission network boundaries, ensuring that green energy is transported from where it is produced to where it is needed economically and efficiently.

In the medium to the long-term there are significant increases in north to south power flows across a diverse and credible range of scenarios including a tripling of wind generation connected across the Scottish networks by 2030, driving higher north-to-south power transfers, and at least a doubling of transfer requirements from northern Scotland to the Midlands over the next 10 years. New reinforcements will be required to facilitate these power flows through the North of England. The Project is one of those reinforcements.

National Grid Electricity Transmission and Scottish Power Transmission are committed to ensuring that adverse environmental effects associated with the development are minimised and beneficial effects are maximised. As the project moves forward, National Grid Electricity Transmission and Scottish Power Transmission will continue to ensure that the design, construction and installation techniques utilised take account of environmental factors. It is recognised that ongoing communication with stakeholders is key to the project's successful implementation.

All of the residual environmental effects identified as **negligible** or **minor**, which are considered to be **not significant**. All adverse impacts could be reduced by applying project specific mitigation measures to reduce their effect levels sufficiently to render them non-significant in environmental appraisal terms.

7. Next Steps

The results of the environmental appraisal will be considered as part of the decision to grant or refuse the marine licence. As described within this NTS, one of the key aims of the EAR is to ensure that the environmental effects of the Marine Scheme are known and understood so that these may be considered before deciding whether or not to proceed with a marine licence.

Should a marine licence be granted, a contractor(s) will be appointed and the detailed design of the Marine Scheme will be progressed.

8. Contact Us

This Environmental Appraisal Report forms part of the Marine Licence Application to the Marine Management Organisation and the Marine Scotland Licensing Operations Team.

Electronic copies of this EAR are available through:

- MMO Marine Case Management System: https://marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_LOGIN/login;
- MS-LOT Marine Licence Details: All applications | Marine Scotland Information;
- Project websites:

  SPT: https://www.spenergynetworks.co.uk/pages/eastern_link_introduction.aspx

  NGET: https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/segl1; and
- Projects communication team at:

  SPT: easternlink@spenenergynetworks.co.uk

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