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Scotland to England Green Link (SEGL) ~ Eastern Link 1 Marine Scheme

Scoping Report

30th March 2021

For: National Grid Electricity Transmission and Scottish Power Transmission

Quality information

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1. Introduction

1.1 General Introduction

National Grid Electricity Transmission (NGET) and Scottish Power Transmission (SPT) are jointly developing proposals for a subsea High Voltage Direct Current (HVDC) Link between Torness in East Lothian and Hawthorn Pit in County Durham, referred to as Scotland England Green Link 1 (SEGL1) or Eastern Link 1 (EL1) (hereafter referred to as 'the Project').

As part of the Project, NGET and SPT will be submitting marine licence applications to the Marine Scotland Licensing Operations Team (MS-LOT) and the Marine Management Organisation (MMO) for the marine elements of the Project referred to as the 'Marine Scheme'. While your advice received on the 3rd February and 15th March 2021 respectively confirmed that you do not consider the Marine Scheme to be 'EIA Development', NGET and SPT - in line with their statutory obligations - consider it important to provide information about the Project's potential environmental impacts in a non-statutory Environmental Appraisal Report.

This Scoping Report sets out the proposed scope of and approach to the Environmental Appraisal which will be undertaken and seeks feedback on this from the MMO and MS-LOT and other stakeholders should they wish to comment.

1.2 Scotland England Green Link 1 ~ Eastern Link 1 Overview

1.2.1 Need for the Project

The UK is a world leader in offshore wind energy and its target of becoming net-zero in all greenhouse gases by 2050 for England and Wales and 2045 for Scotland is now enshrined in law. In addition, the UK Government is committed to developing offshore wind at scale through the recent Ten Point Plan and Energy White Paper (UK Government, 2020), identifying a target of delivering 40 gigawatts (GW) of wind energy by 2030, enough to power every home in the UK.

North Sea developments, including offshore wind, interconnectors[1] and transmission system reinforcements will be essential to meeting these climate change targets and driving economic growth across the country.

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 (UK Government, 2020). To move this green energy from its source and into people's homes and businesses we need to increase the capability of our electricity transmission network to accommodate it.

To help bring Scotland's vast reserves of renewable energy to millions of homes across the rest of the UK, two new High Voltage Direct Current (HVDC) Links, one from Torness, near Edinburgh, to Hawthorn Pit in Country Durham, and another from Peterhead in Aberdeenshire to Drax near Selby, via the East Riding of Yorkshire, are proposed. **Figure 1-1** below shows the different parts of a HVDC transmission link. These are being developed jointly by National Grid Electricity Transmission (NGET), Scottish Power Transmission (SPT) and Scottish and Southern Energy Networks (SSEN), as the three Transmission Owners (TOs) in the UK.

1.2.2 Project Overview

Scotland to England Green Link (SEGL), also known as Eastern Link (EL) is a major reinforcement of the electricity transmission system which will provide additional north-south transmission capacity between southern Scotland and northern England. These reinforcements are essential to ensuring an

[1] The Project Marine Scheme will form part of the UK transmission system and is not an interconnector.

efficient network that can facilitate achieving the net-zero target. The remainder of this Scoping Report refers to the **Scotland England Green Link 1 (or Eastern Link 1) Project only**, which extends between Torness, East Lothian, and County Durham (hereafter referred to as the 'Project').

The Project specifically comprises HVDC cable connection from Torness in Scotland to County Durham in England.

The Project comprises the components described below:

- **Scottish Onshore Scheme:** A converter station located west of Thurston Manor and 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 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 HVAC cable;
- **Marine Scheme:** Approximately 176 km of subsea HVDC cable from Thorntonloch Beach, Torness in East Lothian, to Seaham, County Durham of which 37.5 km is in Scottish waters and 138.5 km is in English waters; and
- **English Onshore Scheme:** Approximately 10 km of underground HVDC cable from the landfall north of Seaham, west along the Sunderland/County Durham county 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 scoping report is for the Project Marine Scheme, comprising those Project components proposed within the marine area between Mean High-Water Springs (MHWS) at the Scottish landfall at Thorntonloch and MHWS at the English landfall north of Seaham (the Marine Scheme).

The indicative cable route for the Project Marine Scheme is shown in **Figure 1-2**.

1.3 The Applicants

The Project Marine Scheme is being developed jointly by National Grid Electricity Transmission Ltd (NGET) and Scottish Power Transmission Ltd (SPT). NGET and SPT own the high-voltage electricity transmission network in England and Wales, and in northern / southern and central Scotland respectively. They are responsible for ensuring electricity is transmitted safely and efficiently from generation to user.

National Grid Electricity System Operator is a legally separate business, and balances supply and demand to ensure homes and businesses in Great Britain have the electricity they need on a minute-by-minute basis.

NGET and SPT are statutory undertakers holding transmission licences and are required under the Electricity Act (1989) to '*to develop and maintain an efficient, coordinated and economical system of electricity transmission'* as well as specific responsibilities under Schedule 9 with regard to the preservation amenity.

Both NGET and SPT are responsible for the cost of the projects they promote as those costs will ultimately be borne by all electricity users. They also have a duty to 'consider the desirability of preserving amenity'.

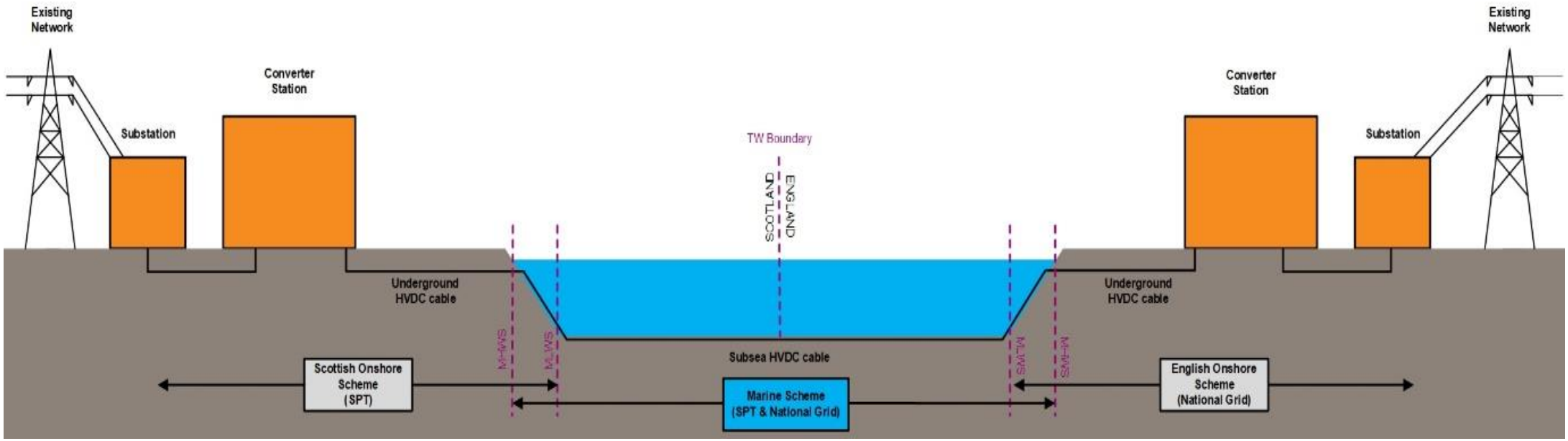


Figure 1-1: Overview of a HVDC transmission link

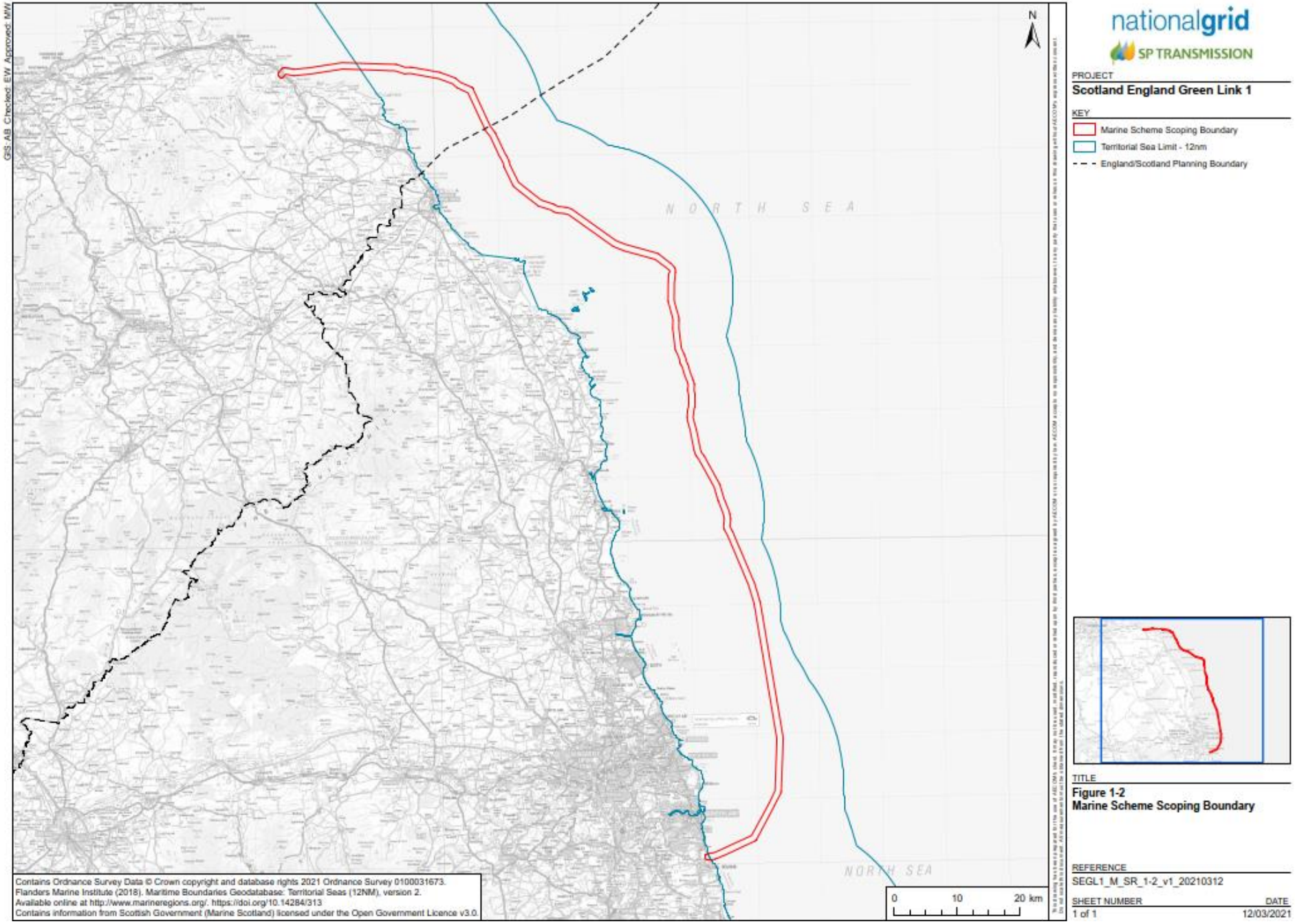


Figure 1-2: The Project Marine Scheme Cable Route

1.4 This Scoping Report

1.4.1 Objective

Screening decision letters from MS-LOT and the MMO were received on the 3rd February and 15 March 2021 respectively (MS-LOT Pers. Comm, 2021; MMO Case Reference EIA/2021/00006, 2021). These determined the Project Marine Scheme not to be 'EIA development'. On this basis, an Environmental Appraisal will be carried out and an Environmental Appraisal Report (EAR) will be submitted in support of future planning / marine licence applications.

Scoping is a key part of the Environmental Appraisal process, providing a framework for identifying likely significant environmental effects arising from the Project and distinguishing the environmental topics to be addressed within the EAR.

The objective of this Scoping Report is to outline the proposed approach to the Environmental Appraisal of the Project Marine Scheme including identifying the environmental receptors that may be significantly impacted. This Scoping Report will inform consultation with MS-LOT and the MMO and enable key stakeholders to comment on the proposed structure, methodology, and content of the Environmental Appraisal. This will ultimately lead to the Applicants receiving a 'scoping opinion' from MS-LOT and the MMO, as informed by their consultees.

1.4.2 Scoping Report Boundary and the Study Area

The Project Design Envelope (PDE) approach will be applied throughout Project documentation.

A preliminary PDE has been defined by a 1 km width corridor to inform this scoping assessment as indicated in **Figure 1-2** (hereafter referred to as the 'Scoping Boundary'). This preliminary PDE will be refined during the preparation of the Environmental Appraisal and application documentation and it is currently anticipated that consent will likely be sought for a narrower PDE of estimated 500 m width throughout the Project. See **Section 4.2** for further information.

Additionally, where required, each of the technical disciplines have identified individual technical Study Areas in order to ensure Zones of Influence (ZoI), which vary depending on the receptors under consideration, have been given appropriate consideration.

1.4.3 Structure of Scoping Report

This report has been structured in order to document the consideration to the potential for significant environmental effects across a broad range of potential environmental receptors. This report also integrates relevant consideration of other applicable and related environmental legislation including Habitat Regulations, Marine Conservation Zone Assessment requirements and the requirements of the Water Framework Directive to ensure compliance with water quality standards.

The Project Marine Scheme scoping report follows the structure set out below:

Chapter 1:	Introduction
Chapter 2:	Project Description
Chapter 3:	Legislative and Policy Framework
Chapter 4:	Approach to Environmental Impact Assessment
Chapter 5:	Environmental Identification (ENVID)

Scoping Evaluation of Potential for Significant Environmental Effects

Chapter 6:	Physical Environment
Chapter 7:	Benthic Ecology, including Intertidal Ecology
Chapter 8:	Fish and Shellfish Ecology

Other Supporting Studies

2. Project Description

2.1 Overview of Project

The development of the Project Marine Scheme has included the identification and assessment of potential landfall locations in north east Scotland as well as along the Yorkshire coastline in north east England. The approach to the identification of the marine cable route connecting the two landfall locations has been informed by strategic optioneering as well routeing and siting. Seabed surveys for the Project are currently in progress and are supported by previous surveys undertaken in 2012.

The approach used to identify and assess landfall sites and the marine cable route sought to ensure integrated and iterative consideration of potential impacts on the environment and local communities alongside technical and engineering feasibility with an aim to identify sites or routes which best balance these factors. This process has been undertaken in line with National Grid's Approach to Options Appraisal guidance (National Grid, 2012).

Approximately 37.5 km of the Project Marine Scheme from the Scottish landfall is within the consenting jurisdiction of MS-LOT, before entering English waters, and into the consenting jurisdiction of the MMO for the remaining 176 km of the route.

The Project Marine Scheme includes three distinct components, which are summarised, from north to south, below:

- **Scottish Landfall**: This is the area where the cable route transitions between the marine and terrestrial environment in Scotland.
- **Marine Cable Route**: This is the cable route from landfall, to the 12 Nautical Mile (NM) limit, and beyond, within the seaward limit of the UK marine area. The cable follows a broad north to south alignment from Scotland toward landfall in England with distance along the cable route indicated as KP (kilometre point) markers with KP 0 defined at the Scottish landfall.

  Note that for the purposes of Scoping, a 1 km wide scoping boundary has been used; it is anticipated that this will be refined and rationalised as the Environmental Appraisal and design process evolves.

  The Project Marine Scheme comprises the landfalls up to MHWS at either end of the indicative cable route along which subsea HVDC cables will be installed, as well as activities required for the installation and operation of the subsea HVDC cables themselves, including:

  - The ground preparation and cable laying activities within/beneath the intertidal zone at the landfall;
  - Pre-lay seabed preparation activities along the route below Mean Low Water Springs (MLWS); including route clearance, pre-lay grapnel run and sweep;
  - Installation of the subsea cables and placement of cable protection (as required);
  - Operation of the subsea cables; and
  - Principles that will apply to the eventual decommissioning of the subsea cables.
- **English Landfall:** this is the area where the cable route transitions between the marine and terrestrial environment in England.

NGET and SPT intend to submit Marine Licence Application(s) to MS-LOT and the MMO for the relevant parts of the Project Marine Scheme.

The PDE approach will be used to help inform these applications (see **Section 4.2** for further explanation).

2.2 Cable Landfalls

2.2.1 Scottish Landfall – Near Thorntonloch Beach, East Lothian

The Scottish landfall is the interface between the Scottish Onshore Scheme and the Project Marine Scheme. The location for the landfall area is the southern end of Thorntonloch Beach in East Lothian, as shown in **Figure 2-1**. The intertidal area itself (i.e. the extent of soft sediment beach that lies between MHWS and MLWS at the landfall location) extends for approximately 150 m.

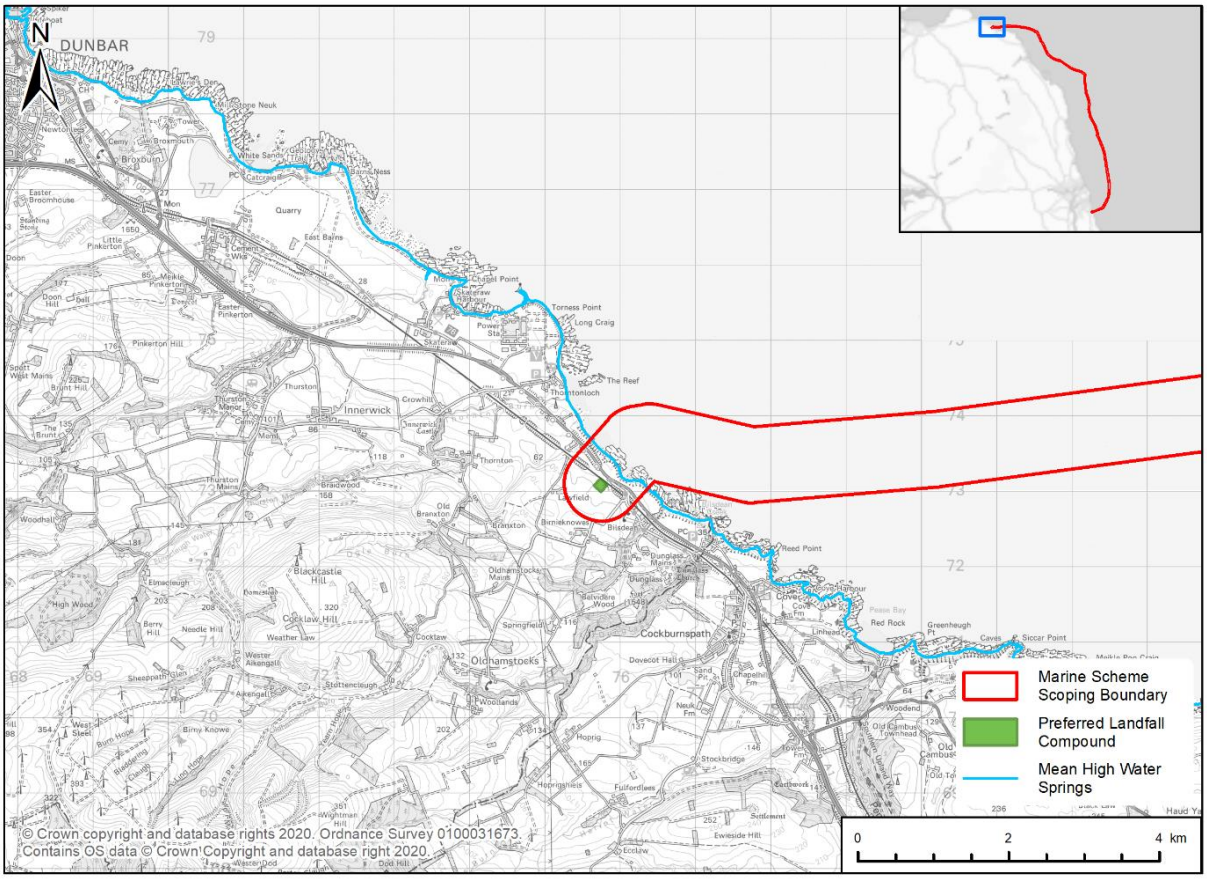


Figure 2-1: Scottish Landfall Area

This scoping report considers the potential Project Marine Scheme interactions with the receiving environment at landfall up to MHWS and the buried Transition Joint Pit (TJP) which defines the point at which the subsea cables connect to the onshore cable system. Potential interactions with the receiving environment landward of this point are considered in the associated Project Scottish Onshore Scheme scoping report. The alignment of the cable through the intertidal zone will be informed by considerations of technical, environmental and other relevant criteria as well as the outputs from various technical and engineering studies. The cable alignment across the landfall will also be dependent on the chosen alignment for the onshore infrastructure. This is discussed further in the Project Scottish Onshore Scheme scoping report.

A Horizontally Directional Drilled (HDD)-led landfall is being progressed for the landfall at Thorntonloch Beach. An indicative location for the proposed landfall is included within **Figure 2-1** above (noting that the approximate area required for the HDD drill compound is anticipated to be 100 m x 100 m).

2.2.1.1 HDD Installation

Both Project Marine Scheme landfalls will be achieved using a Horizontally Directional Drilled (HDD) technique; a summary of this technique is included below.

HDD is a trenchless installation technique commonly used to install cable ducts underneath sensitive environmental features such as sea defences, dune system, etc. Subject to the size of the duct(s) required and the ground conditions expected to be encountered, drilling operations typically comprise

the initial drilling of a small diameter pilot hole which is then increased in stages using reaming/hole opening techniques; following drilling, a duct will be installed to line the hole and a messenger (draw) wire installed at this point to facilitate future cable pull activities. Small volumes of a drill fluid such as bentonite will likely be used.

It is expected that a maximum of four cable duct(s) will be installed beneath the intertidal zone.

It is currently assumed that the length of each conduit will likely extend from the HDD drill compound location above MHWS to conduit breakout locations between the 10 and 15 m subtidal water depth contour, to facilitate the safe operating depth of the Cable Lay Vessel (CLV). Breakout locations will be defined by the geological suitability of the seabed.

A temporary HDD drill compound will be required to be installed landward of the intertidal zone. It is anticipated that this drill compound will be located in proximity to the TJP which defines the point at which the subsea cables connect to the onshore cable system and will be situated as close as is technically feasible above MHWS, based on the geological and geotechnical suitability of the ground. The exact size and location of an HDD compound has not yet been confirmed.

2.2.2 English Landfall - Seaham, County Durham

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

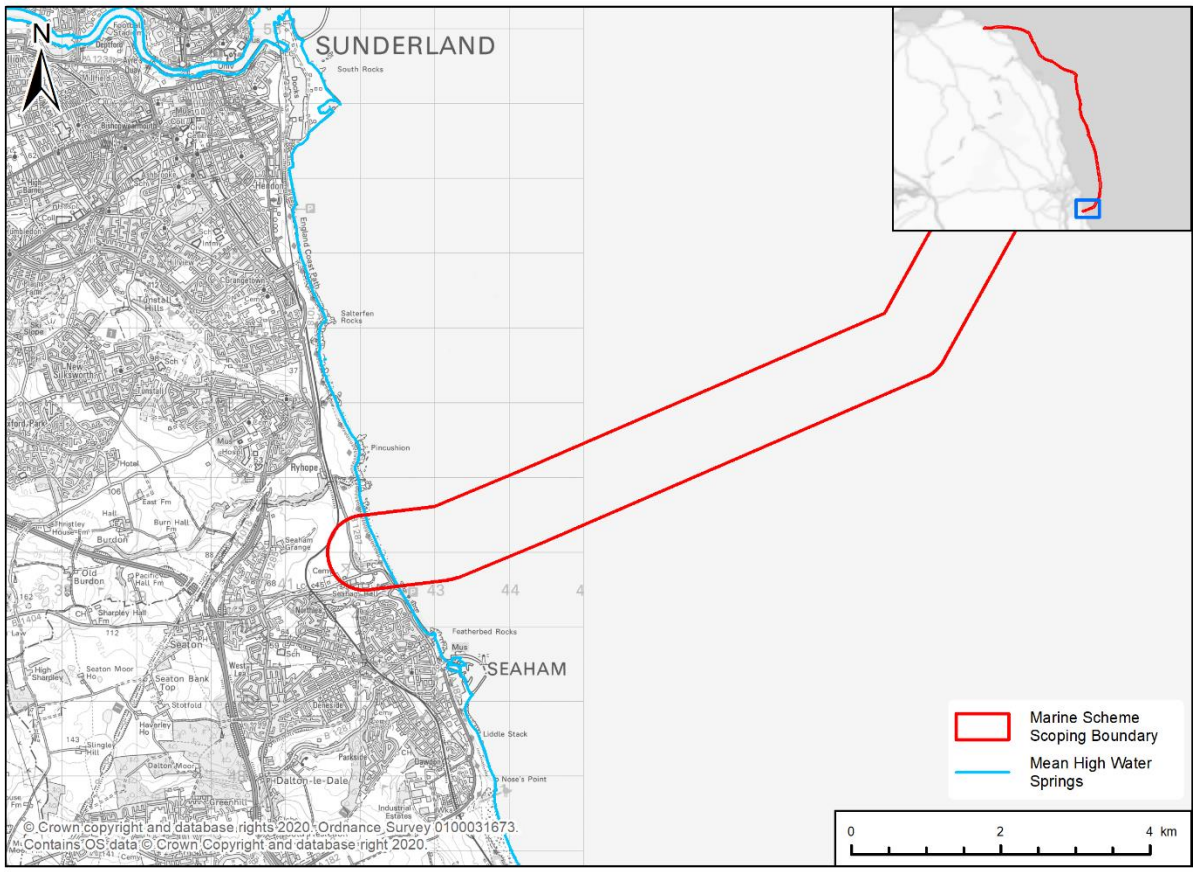


Figure 2-2 English Landfall Area

The alignment of the cable through the intertidal zone will be informed by considerations of technical, environmental and other relevant criteria as well as the outputs from various technical and engineering studies. The cable alignment across the landfall will also be dependent on the chosen alignment for the onshore infrastructure. As with the Project Marine Scheme, this will be informed by a range of technical and environmental factors; this is discussed within Project English Onshore Scheme scoping report.

2.3 Marine Scheme

The Project Marine Scheme installation operations will include: the ground preparation and cable laying activities within the intertidal zone at the landfall sites; pre-lay seabed preparation activities along the route, below MLWS, including route clearance, pre-lay grapnel run and sweep; construction of cable crossings; installation of the subsea cables and placement of cable protection (as required).

The main installation phase activities are expected to comprise:

2.3.1 Pre-installation activities

Engineering surveys will be carried out immediately prior to installation to reconfirm existing geotechnical and geophysical information about seabed conditions, bathymetry and other seabed features. These may include swathe bathymetry; Multi-Beam Echo Sounder (MBES); Side-Scan Sonar surveys etc. In additional visual inspection may also be made using a Remotely Operated Vehicle (ROV) or other visual inspection system. Pre-installation activities may also include additional specialist studies, including geotechnical investigations.

2.3.1.1 Cable Route Clearance

Route preparation is expected to involve clearance activities to ensure the installation area is clear of boulders, dropped object debris, and other obstacles. This is likely to require a seabed plough to be towed across the surface. A pre-lay grapnel run is also expected to be completed involving towing a heavy grapnel with a series of specially designed hooks (grapnels) along the centre line of the route, to confirm the installation site is clear of obstructions. Cable route clearance using the methods described here will seek to avoid areas of known sensitive habitats and / or nearby third party assets.

2.3.1.2 Pre-sweeping dredging (if required):

Pre-sweep dredging may be required if areas of sand waves are identified along the route, during the marine survey.

2.3.1.3 Unexploded Ordinance (UXO)

An initial high-level assessment has been undertaken to inform the management of UXO and the Project will seek to avoid potential UXO where at all possible through careful micro-routing of the cable as appropriate during design and installation. If UXO clearance is considered necessary, the activity will be subject to separate and appropriate permit applications, as necessary.

2.3.2 Cable Installation

The detailed configuration of the cable infrastructure is still under development at this stage. However, the cable system is expected to comprise a bi pole system made up of HVDC cables with opposite polarity, installed alongside each other; and as a worst case, a maximum of four cable duct(s) will be installed. These cables will be installed either as a single bundle (including a fibre optic control cable) within a single trench, or as separate cables laid in parallel to each other in separate trenches.

It is not yet confirmed which subsea trenching techniques will be used to install the cables, however it is anticipated that mechanical ploughing or cutting and/or water jetting or Mass Flow Excavation (MFE) techniques will be used at different points along the route, in response to the seabed sediment conditions. Installation of the cables into soft sediments will seek to achieve a target burial depth of at least 1.5 m to 2 m and below the depth of mobile sediments depending on the nature of the seabed and potential hazards (e.g. anchorage areas and/or specific legislative requirements).

It is expected that cable laying operations will be performed on a 24 hour basis, in order to minimise installation time and the duration of any disruption to sensitive environmental receptors as well as navigation and other sea users. This will maximise ability to utilise available weather opportunities and vessel and equipment availability.

Cable installation is expected to require a Cable Laying Vessel (CLV) or Cable Laying Barge (CLB) and support vessels potentially including a guard vessel and anchor handling vessel. Dredging vessels and/or other specialist vessels may also be required for limited periods and in response to localised conditions along the Project Marine Scheme route. Cable installation may be achieved through a

simultaneous process of cable laying followed immediately by burial/trench back filling or it may occur through cable laying followed by a subsequent Post Lay Burial operation (PLB).

For the purposes of this assessment, it has been assumed that during cable installation a 'rolling' 500 m safety zone will be applied around installation vessel and activities.

2.3.3 Cable Protection

Burial of cable is the preferred method of protection, and any requirement for rock placement will be minimised by design throughout the Project Marine Scheme, particularly in areas of known sensitive habitats or features.

Rock placement may be required in specific locations where the target burial depth cannot be achieved, to protect subsea cables by covering them in a continuous, profiled berm of graded rock or through the use of other suitable cable protection measures. As above, this will be minimised and analysis of modifications to target burial depth, exact installation methodology and/or repeat burial will be considered ahead of rock placement with this being the 'last resort'.

The potential requirement for additional cable protection will be confirmed through further design development both pre and post consent development and will be informed by marine survey information, as it becomes available. Where rock placement is required, an estimated cumulative footprint of rock placement will be identified to inform the Environmental Appraisal; where available, this will detail the volume and estimated grades of rock to be used. This will be provided in order to characterise the nature and extent of cable protection required within UK (both Scottish and English) territorial waters.

Where cable protection cannot be avoided a targeted placement method e.g. fall pipe vessel will be used rather than using vessel-side discharge methods.

2.3.4 Cable Crossings

In certain places including locations where the Project Marine Scheme will cross other cables and/or pipeline infrastructure, crossing agreements will be made with other parties owning these pipelines and cables. In these locations, protection features potentially including rock placement, mattresses etc. may be required to be installed, prior to or during cable installation.

2.3.5 Vessel Activities

A range of different vessels are expected to be used during cable installation. These are expected to include:

- *Cable Lay Vessel (CLV)*: The CLV will be a specialist ship designed to carry and handle long lengths of heavy power cables, it is expected the CLV will be equipped with Dynamic Position (DP) system. The shallowest depth in which the cable ship can operate will depend on the vessel used, however at this stage it has been assumed that Larger vessels such as a CLV would not be expected inshore of 10 -15 m depth contour.
- *Support vessels (s):* Including smaller guard vessel(s), which may be required to accompany the CLV, particularly in areas of high-density other users/shipping and potentially other specialist vessels required to install required cable protection systems (other than rock placement).
- *Rock placement vessel:* A rock placement vessel features a large hopper to transport rock and a mechanism for deployment of the rock at the placement location where target burial depth cannot be achieved. For the purposes of this scoping report it has been assumed that a Flexible fall pipe mechanism for rock placement will be used.
- *Cable Laying Barge (CLB):* A CLB may be required at landfall, in the event that vessel operation is required in water depths less than 10 m. A CLB may be anticipated to require a four to six point anchor mooring system covering an area of between 500 m and 1,000 m radius from the vessel to allow barge to hold station whilst the installation work is undertaken.

2.4 Consideration of Alternatives and Route Refinement

A number of landfall and subsea options between these identified connection points have been considered to deliver the increased electrical transmission capacity that has been identified as required. These options were set out within a Strategic Options Appraisal Report produced in May 2019 by RPS Group (RPS, 2019a), in August 2019 by RPS Group (RPS, 2020a) and a subsequent Phase 3 Marine Survey Corridor Development and Selection Report was produced by RSK in May 2020 (RSK, 2020).

The analysis of the route options was undertaken by considering a wide range of environmental, socio-economic, economic and technical analysis. Through the options appraisal process, and ultimately the 'scoring' of each route, a preferred option emerged; Route Option 2 – Torness to Hawthorn Pit was the highest rated option and is the chosen route for the Project.

The Project Marine Scheme detailed within this report and summarised in **Figure 1-2** represents the culmination of a significant volume of optioneering, technical analysis and route refinement completed on behalf of NGET and SPT.

Marine surveys are ongoing to help inform the final preferred alignment of the cable within the corridor presented above, in **Figure 1-2**. Pending the technical and environmental outputs from these surveys, where appropriate, the submarine cable will be refined to avoid technical / engineering obstacles and specific sensitivities along the route. This will be reported further within the Environmental Appraisal alongside a high level consideration of alternatives.

2.5 Climate Change

In the UK, National Grid's Electricity Transmission business has set a target to achieve carbon neutral construction by 2026 on all projects. The Electricity System Operator has also committed to be able to fully operate Great Britain's electricity system with zero-carbon by 2025. These commitments are relevant to the delivery and operation of the Project Marine Scheme.

Furthermore, the Project Marine Scheme will itself help the UK deliver on its target of becoming net-zero in all greenhouse gases by 2050 for England and Wales and 2045 for Scotland, as it will help facilitate the transmission of electricity generated from a variety of renewable sources around the UK.

3. Legislative and Policy Framework

3.1 Requirement for Marine Licence

3.1.1 Scottish Marine Area

Part 4 of Marine (Scotland) Act (MSA) 2010 defines the marine licencing requirements for the cable installation and associated activities within 12 NM of the Scottish coast (MHWS). Requirements for the consideration of potential effects on Marine Protected Areas are also set out within the MSA at Section 82. The consenting authority for the Scottish marine area is MS-LOT. Marine cables between Low Water (LWS) and High Water (HWS) fall within the coverage of the MSA but also fall under the provisions of the Town and Country Planning (Scotland) Regulations 1997 (as amended). The consent authority for requirements under these regulations is East Lothian council. A separate scoping consultation has been submitted to East Lothian council.

3.1.2 English Marine Area

The MCAA sets out the requirements for marine licencing for the cable installation and all associated activities within 12 NM of the English Coast (i.e. MHWS out to the 12 NM limit). The requirements for Marine Conservation Zone (MCZ) assessment are also set out within the MCAA at Section 126. The consenting authority for the English marine area is the MMO. Marine cables between MLWS and MHWS also fall under the provisions of the Town and Country Planning act 1990 (as amended) (the T&CP Act). The consenting authority for requirements under the T&CP Act is Durham County Council. A separate scoping consultation has been submitted to Durham County Council.

3.2 Screening for EIA

The Environmental Impact Assessment Directive (Council Directive 85/337/EC) (as amended 2003/35/EC and most recently 2014/52/EU) requires that certain types of project with the potential to significantly affect the environment have an EIA before a licence decision is made.

The following EIA Regulations (including Schedules) transpose the requirements of the Environmental Impact Assessment Directive (2014/52/EU) into UK law. The EIA Regulations set out the requirement for the EIA process as they may be expected to apply to the various components of the Project. Key regulations include:

- Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Town and Country Planning (Environmental Impact assessment) (Scotland) Regulations 2017;
- Town and Country Planning (Environmental Impact Assessment) Regulations 2017;
- The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017; and
- Marine Works (EIA) Regulations 2007, as amended.

The EIA Regulations apply independently and in parallel with the requirements of the Conservation of Habitats and Species Regulations 2017, which set out the requirements for the competent authority (in this case MS-LOT in Scottish waters and the MMO in English waters) to specifically consider potential for significant effects on the integrity and/or conservation objectives of European Protected Sites.

On the 3rd February 2021, MS-LOT confirmed that the Project Marine Scheme in Scottish waters is not considered to be EIA development (MS-LOT Pers. Comm, 2021). On the 15th March 2021, the MMO confirmed 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 (MMO - Case Reference EIA/2021/00006, 2021).

3.3 UK Marine Policy Statement

The UK Marine Policy Statement (UK MPS) was prepared and adopted by HM Government and the devolved administrations of Scotland, Wales and Northern Ireland for the purposes of Section 44 of the Marine and Coastal Access Act 2009.

Marine Plans (see below) set out how the MPS will be implemented in specific areas. They provide detailed policy and spatial guidance for an area and help ensure that decisions within a plan area contribute to delivery of UK, national and any area specific policy objectives. The UK MPS may also form a relevant consideration as part of the marine licensing decision making process.

3.4 Marine Planning

The Project Marine Scheme lies within two UK marine plan areas; each area and the associated Marine Plan, is summarised below:

- National Marine Plan Area for Scotland - Scotland's National Marine Plan; and
- North East Inshore Marine Plan Area – draft North East Inshore and draft North East Offshore Marine Plan.

At the time of writing, the North East Inshore and Offshore Plan has not been formally adopted yet this is expected imminently; for this reason, both the MPS and the Marine Plans above have been considered. A summary of each Marine Plan – and relevant plan policies – is provided in **Section 3.4.1** and **Section 3.4.2** below; the applicant intends to provide a Marine Plan compliance checklist with the Environmental Appraisal.

3.4.1 Scottish National Marine Plan

The Scottish National Marine Plan covers the management of Scottish inshore waters (out to 12 NM) and offshore waters (12 to 200 NM) and was published in 2015. Eleven Regional Marine Plans are implemented at a local level and cover each of the Scottish Marine Regions, extending out to 12 NM.

The overall objective of the plan is 'to integrate both the ecosystem approach and the guiding principles of sustainable development to deliver a robust approach to managing human impact on Scotland's seas'. The plan includes several high-level marine objectives including the objectives to maximise sustainable activity, prosperity and opportunities for all.

3.4.2 North East [England] Inshore and Offshore Marine Plan

The North East Inshore Marine Plan area covers the marine area within 12 NM of MHWS between the Scottish border and Flamborough Head, in Yorkshire. The plan covers approximately 6,000 square kilometres. The North East Offshore Marine Plan covers the area from 12 NM extending out to the seaward limit of the Exclusive Economic Zone. The plan covers an area of approximately 50,000 square kilometres of sea. The combined North East Inshore and North East Offshore Marine Plan was published in Draft in January 2020 for consultation.

The plan covers 13 local authorities and includes three main tidal rivers, the Tyne, Wear and Tees as well as a number of ports including Tyne, Tees and Blyth. The area includes some areas with limited activity, however there are also areas where a high volume of activities take place.

The area covered by the offshore marine plan contains important shipping lanes for transiting traffic. Oil and gas production and processing are important activities within the plan area. The area includes sections of coastline which are important for tourism and recreational activities in Northumberland and North Yorkshire and contains a wide range of internationally significant habitats and species.

3.5 National Policy Statement (England)

The UK Government produces National Policy Statements (NPSs), which set out the UK Government's objectives for the development of Nationally Significant Infrastructure Projects (NSIP) in a particular sector, within England.

The Project Marine Scheme is not an NSIP, to which NPSs directly apply, but the guidance set out in the Overarching NPS for Energy (EN-1) and NPS for Renewable Energy Infrastructure (EN-3), in terms of consideration of effects, is generally applicable to offshore infrastructure projects and will be detailed within the ensuing Environmental Appraisal.

3.6 Habitats Regulation Assessment (HRA)

As part of the assessment of a Project Marine Scheme, it is necessary to consider whether the scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (known as European sites: Special Areas of Conservation, Special Protection Areas and, as a matter of government policy, Ramsar sites). A detailed consideration of the HRA process as relevant to the Project Marine Scheme is provided within **Chapter 16** and for brevity, is not repeated here.

3.7 Marine Conservation Zones (MCZs)

Alongside Marine Licensing, a fundamental component of the Marine and Coastal Access Act 2009 is the provision of powers to the appropriate authority to designate Marine Conservation Zones (MCZs); in England the Secretary of State. MCZs set out to protect a range of nationally important marine wildlife, habitats, geology and geomorphology, and can be designated anywhere in English and Welsh territorial and UK offshore waters. A detailed consideration of the MCZ process as relevant to the Project Marine Scheme is provided within **Chapter 17** (alongside consideration of Scottish protected areas, as required); for brevity, this is not repeated here.

3.8 The Natural Environment and Rural Communities (NERC) Act 2006

The Natural Environment and Rural Communities (NERC) Act imposes a duty on public authorities to conserve biodiversity. Section 40 (1) of the NERC Act states that '*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity'*. Further consideration of NERC will be detailed within the ensuing Environmental Appraisal.

3.9 Protected Species

There are a range of specific species which are protected by international, European and national wildlife legislation throughout the UK. This includes protection from intentional or reckless disturbance, taking, harming and killing, and in some cases possession or sale of the species. Further consideration of Protected Species will be detailed within the ensuing Environmental Appraisal.

3.10 Third-Party Infrastructure and Crossing Agreements

The Project Marine Scheme will cross several third-party infrastructure assets. The crossing of third-party marine infrastructure is made with prior agreement of the owners following a negotiated formal Crossing Agreement. This will be detailed further within the ensuing Environmental Appraisal.

This agreement describes the rights and responsibilities of the parties and also the detailed design of the crossing. The design addresses the need to protect both the cables and the third-party infrastructure and other aspects such as crossing angle and vertical separation.

The applicant is in the process of negotiating formal Crossing Agreements with existing cable and pipeline owners.

3.11 Additional Topic-Specific Legislation and Guidance

There is a wide variety of additional legislation which may be of relevance to the Project Marine Scheme; this may include but is not necessarily limited to:

- Protection of Wrecks Act 1973;
- Ancient Monuments and Archaeological Areas Act 1979;

- Protection of Military Remains Act 1986;
- Environmental Permitting (England and Wales) (Amendment) Regulations 2016 (including and encompassing the Flood Risk Activity Permit – “FRAP” – process;
- The Water Framework Directive 2000;
- Shellfish Waters Directive 2006; and
- Bathing Waters Directive 2006.

Similarly, there is a range of topic-specific guidance which may be of relevance to the assessment of potential impacts on specific receptors. For brevity, neither topic-specific legislation or guidance is reported here and is instead detailed within each chapter as appropriate.

4. Approach to Environmental Appraisal

4.1 Overview of the Environmental Appraisal Methodology

The assessment methodology follows a systematic approach in order to assess the potential impacts and subsequent effects of the Project on physical, biological and human receptors in a robust and transparent manner.

The Project will follow best practice by integrating environmental considerations into the design process at all stages. This has already begun through route development and optimisation work comprising both desk studies and initial baseline surveys that have sought to avoid or reduce disturbance of known environmental constraints, wherever possible.

A detailed methodology, inclusive of a project-glossary, can be found within **Appendix B.**

The Environmental Appraisal should identify potentially significant adverse environmental effects and, if any, propose project specific mitigation measures to avoid, reduce or offset adverse environmental effects or maximise environmental benefits. These can then be incorporated into the further, post-consent configuration refinement of the Projects. The Environmental Appraisal process involves the following main steps:

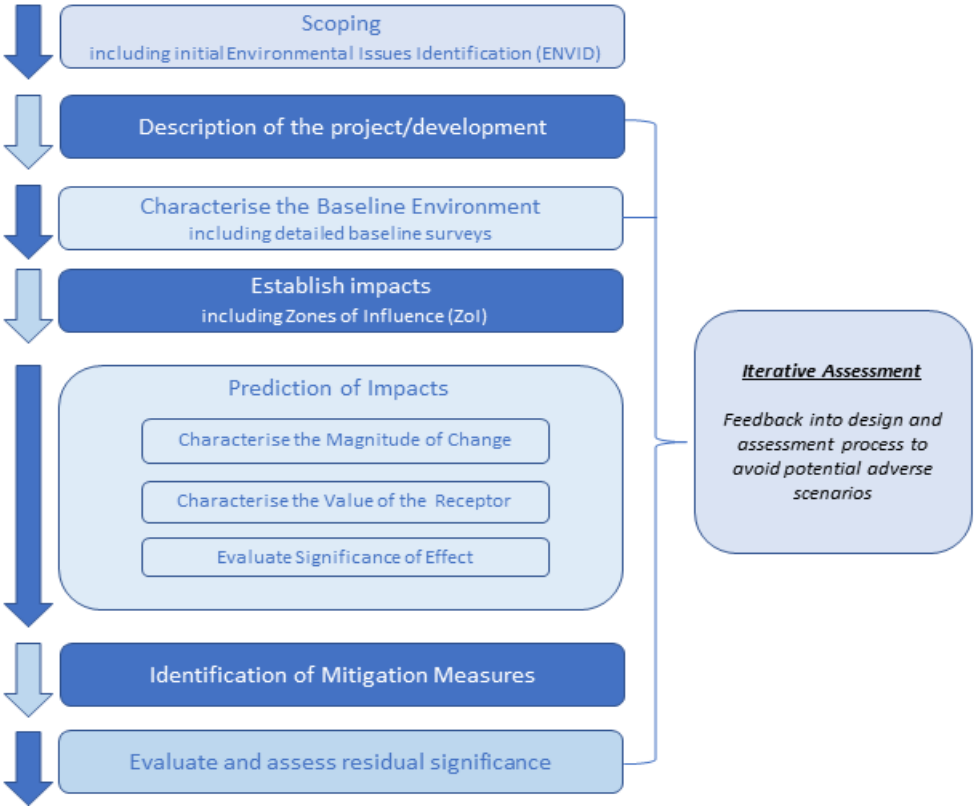


Figure 4-1 Overview of the Environmental Appraisal Process

4.2 The 'Project Design Envelope' Approach

The PDE approach will be applied throughout these applications. Consent will be sought for a PDE with a corridor of 500 m width throughout the Project. This 500 m width PDE will form the basis for the Environmental Appraisal.

Whilst the 500 m represents the PDE, in some cases, individual topic-specific assessments may consider a wider Zone of Influence arising from the Project Marine Scheme; this will be made clear in each of the ensuing chapters.

This allows specific maximum parameters for the landfalls and cable route to be assessed for which the likely significant effects are established and assessed on a realistic 'worst case' basis. This allows

sufficient flexibility for detailed design to be undertaken within these parameters. Such an approach is common for major infrastructure projects and is also frequently referred to as a 'Rochdale Envelope' after the legal cases which established its precedent (R. v Rochdale MBC ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No. 2) [2000]).

4.3 Approach to Consultation

An integrated programme of consultation will be undertaken for the Project Marine Scheme, including provision for discussion with regulatory authorities, statutory and non-statutory stakeholders and with the public. Key consultation tasks include:

- Environmental stakeholder consultation:
  - Statutory Stakeholder Initial Briefing and Project Introduction (carried out in Autumn 2019 and Summer 2020);
  - Statutory Stakeholder Consultation – Scoping; and
  - Ongoing technical consultation through Environmental Appraisal preparation.
- Public Consultation:
  - Phase 1 Consultation; and
  - Phase 2 Information.
- Consultation Analysis and Preparation of report on Consultation.

4.3.1 Pre-Application Consultation (Scotland <12 nm Only)

In addition, a formal process of Pre-Application consultation will be completed under the Marine Licensing (Pre-application Consultation (Scotland) Regulations 2013 (the 2013 PAC Regulations).

4.3.2 Statutory Stakeholders

Statutory stakeholders include:

- Natural England;
- NatureScot;
- Scottish Environment Protection Agency (SEPA);
- Joint Nature Conservation Committee (JNCC);
- Environment Agency;
- North Eastern Inshore Fisheries and Conservation Authority (NEIFCA);
- Northumberland Inshore Fisheries and Conservation Authority (NIFCA);
- Historic England;
- Historic Environment Scotland;
- The Ministry of Defence;
- Royal Yachting Association;
- The Crown Estate;
- The Crown Estate Scotland;
- The Commissioners of Northern Lighthouses (Northern Lighthouse Board) (NLB);
- Maritime and Coastguard Agency (MCA);
- Trinity House (TH); and
- any delegate for a marine region where the application for a marine licence is for an activity which is to be carried out wholly or partly in that region.

4.3.3 Non-Statutory Environmental Stakeholders

A wide range of non-statutory stakeholders with interests which may interaction with the Project are expected. Relevant stakeholders will be identified as appropriate to each of the technical receptor groups to be considered. Further details of technical consultation requirements are set out within the technical scoping chapters as appropriate, throughout the remainder of this report.

4.3.4 Environmental Advisers

In addition to consultees identified above, under the provisions of the MCAA, the MMO may choose to consult any person or body as they see fit to help inform the Marine Licensing process. In practice, for the majority of Marine Licence Applications, this results in the Centre for Fisheries, Environment and Aquaculture Science (Cefas) being used to help inform the licensing decision making process.

Broadly, there are six key teams within Cefas; their role and focus is summarised below:

- SEAL;
- Coastal Processes;
- Fisheries;
- Underwater Noise;
- Benthic Construction; and
- Plankton.

For Marine Licence Applications in Scotland, MS-LOT will engage with their colleagues in MS-Science, who encompass the majority of this technical expertise in-house. However, like the MMO, MS-LOT have the flexibility to consult with individuals and bodies as they see fit.

5. Environmental Issues Identification (ENVID)

5.1 Potential for Environmental Interactions

Systematic consideration has been given to the potential for interactions to occur between activities required to facilitate the installation and operation of the Project components within the marine area and known environmental sensitivities within the Study Area.

These interactions have been recorded in a simple Environmental Issues Identification (ENVID) matrix as set out within **Appendix B.**

Where potential interactions with the potential to result in significant effects on the receiving environment are not expected (for example, as a result of specific design parameters or already committed mitigation), these integral environmental design features have been identified. Specifically:

- Discharges to Air, with potential effects on **Air Quality and Greenhouse Gases** have been considered within the ENVID. The Project is committed to vessel emission and Air Quality management practices consistent with the requirements of the International Convention for the prevention of pollution from ships (MARPOL), specifically and Annex VI with Regulations for the Prevention of Air Pollution from Ships and with the NOx Technical code (2008) Guidelines for Implementation, 2017 edition (IMO, 2017);
- Sediment disturbance resulting in increases in suspended sediment as well as accidental releases of fuels and/or chemicals affecting **Plankton** communities have been considered within the ENVID, along with the potential for operating cable Electro-magnetic fields (EMF) to affect plankton. Potential interaction with plankton communities were considered at scoping stage, however given the extensive nature of the planktonic communities and the localised and temporary effects of any increases in suspended sediment concentrations (SSC), particularly when considered within the context of the geographic area covered by the planktonic communities, no feasible pathway to significant effect has been identified. In addition, based on the static and relatively localised nature of EMF effects, combined with the continual and wide-ranging movement of plankton within the water column, including the larvae of some fish species which are known to be sensitive, there is considered to be no realistic pathway for impact to plankton from EMF.

Where potential interactions have been identified, these have been given further consideration throughout the scoping analysis sections within the remainder of this scoping report.

Appendix A also contains a short annotation where possible interactions were considered, but deemed unlikely to occur, and therefore are not considered further.

6. Physical Environment

6.1 Introduction

This chapter identifies the interconnected elements of the physical environment setting for the Project Marine Scheme development and considers the potential impacts from the construction, operation (including maintenance) and decommissioning phases. For the purposes of this marine scoping report, the physical processes are defined as encompassing the following elements:

- Geomorphology and Sediments;
- Meteorological and Oceanographic Conditions (wind, waves and tides);
- Sediment transport Process; and
- Water Quality.

Changes in physical processes within the Study Area as a result of the Project Marine Scheme are considered as ‘sources’ of a change and 'pathways' for effects which have potential influence on other environmental ‘receptors’. In some cases, a physical process can also be considered as a receptor, such as metocean conditions. Changes in the metocean conditions can affect other processes such as sediment transport which may in turn affect shoreline evolution at the cable landfall areas (and potentially more widely in local coastal systems) demonstrating a complex interaction between each of these processes.

It will also be important to consider the influence of external effects, such as climate change, to understand how receptors may be affected in the future. A summary of the proposed approach for the assessment of each identified potential effect is provided in this section.

6.2 Baseline Environment and Study Area

6.2.1 Study Area

RSK (2020) reviewed the cable route in detail and optimised the Project Marine Scheme route to minimise the total cable length, interaction with environmentally sensitive areas, and possible future exposure risk in areas subject to active sediment migration.

The Project Marine Scheme comprises a subsea cable route extending approximately 176 km from the Scottish landfall at Thorntonloch Beach (KP 0) to the English landfall north of Seaham (KP 176). The cable route has a varying water depth with depths greater than 30 m in the offshore area over the majority of its length and shallower depths limited to the nearshore landfall sites.

The Study Area includes a 1 km wide offshore cable corridor (500 m either side of the indicative route alignment indicated in **Figure 1-2**) and two landfall sites extending up to MHWS at either end of the route. In terms of metocean conditions, environmental influences originate from outside of this specific corridor and therefore the environmental baseline covers a much wider regional area.

6.2.2 Geomorphology and Seabed Sediments

RSK (2020) and RPS (2020b) provide geomorphology and seabed sediment information using high-resolution bathymetry, published geological information and survey data from National Grid & SSE (NGET, 2013).

It is understood that for the majority of the route a varying thickness of sands and gravels overlie predominantly glacial till (firm to stiff clay with occasional cobbles and boulders). For large parts of the route, particularly between KP 30 and KP 115 and on the approaches to the landfall areas, the surficial deposits are likely to consist of a veneer less than 1 m thick.

Areas of sub/outcropping rock may be encountered, particularly on the landing approaches and to the east and south-east of the Farne Islands. There is a risk of encountering boulders along the entire route. The risk is highest in areas close to subcropping rock such as the approaches to landfall areas and

possibly in the vicinity of the Farne Islands; for the remainder of the route the environment is characterised by glacial sediments and/or areas subject to glacial processes. Some seabed preparation including the removal of boulders may be required.

Based on existing survey data and reporting through the strategic appraisal and routeing and siting process, sandwaves are not considered as a notable receptor along the Project Marine Scheme Route; this will be reviewed when additional survey outputs are available.

6.2.2.1 Suspended Sediment

Cefas (CEFAS, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) between 1998 and 2005 for the majority of the UK continental shelf (**Figure 6-1**). The largest plume concentrations are associated with large rivers such as the Humber, Thames and Severn estuaries and Liverpool Bay, where the mean values of SPM are above 30 mg/l. Based on the data presented in Cefas (2016), the SPM associated with the Project Marine Scheme cable route has been estimated as approximately 1 mg/l to 2 mg/l. Higher levels of SPM up to 5 mg/l may be present at the nearshore cable landfall areas as a result of wave action.

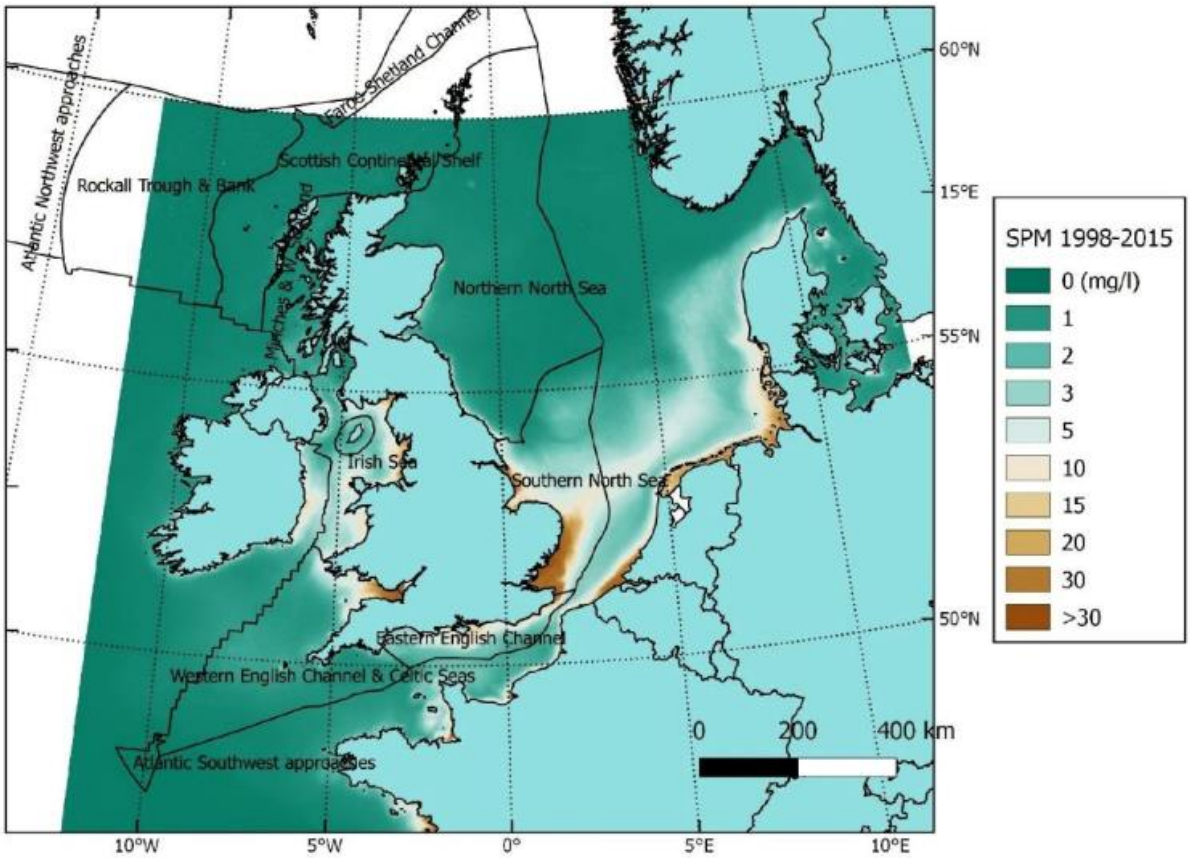


Figure 6-1 Average Suspended Sediment Around the UK (Source: Cefas (2016))

6.2.3 Metocean Conditions

The metocean conditions provided in the Atlas of UK Marine Renewables Resources (subsequently referred to as 'The Atlas') have been used for this scoping stage, supplemented by information from existing offshore windfarm and coastal process studies adjacent to the Project Marine Scheme cable route. It is anticipated that the physical environment will vary as a continuum along the entire cable route. Metocean data provided in The Atlas for three locations (**Figure 6-2**) have been extracted which provides details of tidal currents, wind and waves.

6.2.3.1 Tides and Currents

There is a range of data available from which tidal behaviour can be inferred.

The tidal range (the difference in elevation between high and low water) in the nearshore region of Blyth, 35 km from Seaham, is described in North Sea Link - Marine Environmental Statement (National Grid, 2014) with mean Spring and Neap tidal ranges of 4.3 m and 2.1 m, respectively. Current speeds in the nearshore area were found to be relatively uniform, with peak currents on a mean spring tide of 0.51 m/s to 0.55 m/s.

Tidal currents represented in The Atlas are derived from a 3-dimensional model. The currents are taken from the layer which represents conditions at mid-depth; the spring and neap peak flow speeds are found to be in a range of 0.26 m/s to 0.61 m/s. Based on the tidal excursion ellipses presented in The Atlas, predominant axis of the tidal current directions has a predominantly south-east/north-west alignment along the route in both Scottish and English waters.

HR Wallingford (2009) provided an overview of the tidal current flows for the Berwick Bank wind farm located in the outer Firth of Forth, 39.2 km east of the East Lothian coastline, Scotland. Metocean surveys were conducted to support the development of the characterisation of the Wind Farm Zone. The highest recorded current speed that occurred during the survey period was 0.91 m/s which coincided with a period of spring tides.

Figure 6-2 Metocean Data Sites

6.2.3.2 Waves and Winds

The wave regime along the cable route includes both swell waves generated elsewhere in the North Sea and locally generated wind waves. Strong winds in the North Sea can occur with wave heights varying greatly due to available fetch lengths and water depth limitations in nearshore areas. Wave and wind data were also extracted from The Atlas.

Annual mean significant wave heights along the route are in the range of 1.22 m and 1.01 m, which are shown to decrease slightly towards the south in English waters. Mean annual wind speeds are between 6.42 m/s and 8.29 m/s along the cable route corridor. The extracted data show the strong seasonal variability of the wind speed and wave height with higher waves and stronger winds experienced during the winter period.

National Grid (National Grid, 2014) describes wave conditions in the North Sea with the average annual wave height varying from 0.8 m close to Blyth off the east coast of England to 2.1 m near the NSN Link median line. The highest monthly average significant wave heights occur in winter, ranging from 1.1 m near the coast to 2.9 m near the median line. The 1-year extreme significant wave height is 5.2 m near the coast rising to 9.5 m further offshore.

6.2.3.3 Climate Change

For the assessment of changes to physical processes under a different future climate change scenario, the UK guidance for projected sea level rise and increased storminess are applied to the baseline (present day) conditions.

Changes in future wind and wave conditions are provided in Environment Agency (2016), 'Flood Risk Assessments: Climate Change Allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances). The guidance developed for coastal flood studies advises that wind speeds and wave heights should be increased by 5% between 1990 and 2055 and by 10% for 2056 to 2115.

UKCP18 provides the most up-to-date assessment of how the climate may change up to 2100 and post-2100. Sea level rise data along the UK coastline can also be downloaded from the Met Office UKCP18 website (https://ukclimateprojections-ui.metoffice.gov.uk/) for the relevant grid square. Sea level rise of 0.3 m – 0.4 m within the Study Area is expected by 2055, depending on the selected climate change scenario.

6.2.4 Physical/Coastal Processes

Seabed sediments along the Project Marine Scheme cable corridor, and throughout the Study Area, are variable, reflecting differences in both the prevailing hydrodynamics, wave conditions and underlying geology. For large parts of the route the thickness of the seabed sediment is likely to be a veneer less than 1 m thick.

The Torness landfall site is located to the south of Thorntonloch Beach, characterised as a having a smooth sandy seabed. The intertidal area between MHWS and MLWS extends for approximately 150 m. Dynamic Coast interactive GIS maps (http://www.dynamiccoast.com/webmap.html) used by SEPA provide information on historical shoreline changes at Thorntonloch Beach. These have been reviewed and indicate that the coastline along Thorntonloch Beach is relatively stable with no significant erosion or accretion occurring at the proposed landfall site.

The landfall at Seaham is characterised by sandy beaches and cliffs, being actively eroded by the sea which reaches the base of the cliffs at high tide. Erosion by the action of waves causes deepening of the area fronting the cliffs. As the offshore waves transfer to shallower coastal areas (i.e. from offshore sections of the cable corridor to the landfall), the waves begin to interact with the seabed in the shallower areas.

However, due to the local bathymetry, the coast is typically subjected to maximum wave energy from the North Sea with little attenuation before the cliff line. In the medium term (up to 2055), the retreat of the cliff is estimated to be approximately 75 m for the unprotected cliff assuming no protection works are undertaken (National Coastal Erosion Risk Mapping https://data.gov.uk/dataset/7564fcf7-2dd2-4878-bfb9-11c5cf971cf9/national-coastal-erosion-risk-mapping-ncerm-national-2018-2021).

Climate change is not expected to have any effect on the type or distribution of sediments within the design life of the proposed development. However, there is considerable uncertainty about how the shoreline change will respond to the future climate change, such as sea level rise and increase in wave climate. The shoreline position under the climate change scenario should therefore be assessed for the cable corridor design life to ensure adequate allowances are made for this response.

A range of erosion predictions are provided within the Shoreline Management Plans (SMPs) for the coastline landward of the Project Marine Scheme; where appropriate, Scottish Border to River Tyne SMP2 and River Tyne to Flamborough Head SMP2 will be used to help inform the Environmental Appraisal and to help determine the requirement for any further studies.

6.2.5 Water Quality

The Water Environment and Water Services (Scotland) Act 2003 (WEWSSA) is in place to protect the water environment by preventing deterioration, protecting and enhancing aquatic ecosystems, promoting sustainable water use and reducing pollution. The main regulatory bodies are the Scottish Ministers and SEPA.

A programme of monitoring and water classification is undertaken by SEPA (SEPA, 2017) as part of the WFD and WEWSSA requirements. The most recent classification data available from SEPA (https://www2.sepa.org.uk/bathingwaters/locations.aspx) shows that the nearshore and landfall site at Thorntonloch Beach falls into the 'Good' waterbody category.

Water quality at designated bathing water sites in England is assessed by the Environment Agency (https://environment.data.gov.uk/bwq/profiles/). The classification data indicates that the 'Bathing Water' near the landfall site at Seaham Beach falls into the 'Good' water body category based on measurements.

Sediment quality will be reviewed in further detail during the Environmental Appraisal, as informed by relevant Environment Agency, Cefas and SEPA thresholds / levels, as appropriate.

A Water Framework Directive Screening Assessment has been completed in support of this scoping report and is included in **Chapter 18**.

6.3 Planned Surveys

New seabed surveys are being carried out and site-specific geophysical and benthic data for the marine sections will be made available during subsequent stages of the Project Marine Scheme.

A site-specific geophysical survey including swath bathymetry, multibeam echo-sounder (MBES) and side-scan sonar will be carried out to provide key baseline data for the project. Information on sub-surface geology, seabed sampling and sediment quality will also be provided.

A metocean survey for the measurement of waves, wind, tidal currents and water levels will not be carried, an approach consistent with that for similar interconnector cable studies. Instead, where such information is required this will be obtained from alternative sources such as numerical models and existing measured datasets, where available.

6.4 Assessment Method

6.4.1 Data Sources

The environmental baseline for physical processes relates to the distribution of sediments and bathymetric features, sediment transport and metocean conditions. This includes seabed geology and surficial sediments, general bathymetry, bedform features (sandwaves), water levels and waves.

An initial desk-based review of literature and data sources for the northern part of the North Sea has been used to support the scoping exercise. The key data sources identified to inform Scoping and the Environmental Appraisal identified are summarised below:

The following key desktop reports and Metocean datasets have been identified:

- Marine Survey Corridor Development and Selection - RSK (2020), RPS (2020a);
- Cefas (2016). Suspended sediment climatologies around the UK;
- European Centre for Medium-range Weather Forecast (ECMWF) (https://www.ecmwf.int/): historic wind speed and wave datasets;
- Cefas wavenet (http://wavenet.cefas.co.uk/Map): wave measurements;
- National Oceanography Centre BODC (https://www.bodc.ac.uk/): Tidal levels and current measurements;
- Atlas of UK marine renewables resources (https://www.abpmer.co.uk/experience/atlas-of-uk-marine-renewable-energy-resources/): modelled wave, wind and tidal current;

- UK Met Office (https://www.metoffice.gov.uk/): modelled wave and wind data;
- USA NOAA (https://www.ncdc.noaa.gov/): modelled wave and wind data;
- United Kingdom Hydrographic Office (UKHO) - Published Charts and Tide tables: tidal diamonds with current stream data;
- Coastal Flood Boundary Dataset (CFBD) (https://data.gov.uk/dataset/73834283-7dc4-488a-9583-a920072d9a9d/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018): extreme water levels;
- UK Climate Projections (UKCP): sea level rise (https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index);
- EA 'Flood Risk Assessments: Climate Change Allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances): increase in wave height and wind;
- Dynamic Coast interactive GIS maps (http://www.dynamiccoast.com/webmap.html);
- Environment Agency Water Quality (https://environment.data.gov.uk/bwq/profiles/);
- National Coastal Erosion Risk Mapping (NCERM) - National (2018 - 2021) https://data.gov.uk/dataset/7564fcf7-2dd2-4878-bfb9-11c5cf971cf9/national-coastal-erosion-risk-mapping-ncerm-national-2018-2021;
- Shoreline Management Plans: SMP 2 The Tyne to Flamborough Head and SMP2 Scottish Border to The Tyne; and
- Existing offshore wind farm study and coastal process schemes in the vicinity of the Project Marine Scheme.

6.4.2 Guidance

The assessment of physical processes within the Environmental Appraisal will follow the approach set out in **Appendix B**. Specific to the marine physical processes assessment, the following guidance documents will be considered[2]:

- Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide. (ABPmer and HR Wallingford, 2009);
- Suspended sediment climatologies around the UK (Cefas, 2016);
- Environmental impact assessment for offshore renewable energy projects (BSI, 2015);
- Review of environmental data associated with post-consent monitoring of licence conditions of offshore wind farms (Fugro, 2014);
- Guidelines for Data Acquisition to Support Marine Environmental Appraisals of Offshore Renewable Energy Projects (Cefas, 2011);
- Offshore wind, wave and tidal energy applications: consenting and licensing manual (Scottish Government, 2018);
- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Wind farm Industry (BERR, 2008);
- Environment Agency / SEPA Databases, including access to the WIMS and/or the Environment Agency Water Quality Sampling Data pool where appropriate;
- Historical sedimentological data, including analysis of material adjacent to the corridor route submitted for neighbouring marine consents;
- UK Climate Projections (UKCP): sea level rise (https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index); and
- EA 'Flood Risk Assessments: Climate Change Allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

[2] There is a wealth of technical guidance associated with the construction, operation and (albeit to a lesser extent) decommissioning of Offshore Wind projects. Environmental Assessment of Offshore Wind typically includes consideration of Export Cable Routes and much of the technical best-practice and 'lessons learned' from this industry are deemed applicable. Where available, technical guidance related to electricity cables will be used to inform the Environmental Assessment.

6.4.3 Assessment Method

This section describes the approach that will be applied to assess the potential effects of the Project Marine Scheme cable route. The assessment will be based on Project Design Envelope of 500 m width either side of the indicative cable route. The worst-case scenarios will be identified for the different elements of the Project Marine Scheme during the construction, operation and decommissioning phases.

The characteristics of the existing environment will be established using data from various of sources including desk-based literature/data collection and site-specific surveys. The impact assessment will be carried out using a range of evaluation techniques including desk-based studies, reference to standards/guidelines and best practice established from assessment work for similar schemes in the marine and coastal environment.

No project-specific modelling is proposed; as described above, the wealth of data available regarding the existing coastal environment will be used to inform the technical assessment. This is consistent with other comparable projects of this type.

The assessment will make use of the results from a range of studies which have been previously undertaken, including North Sea Link - Environmental Statement (National Grid, 2014), Blyth Offshore Demonstration Project (EDF, 2020) and Berwick Bank Wind Farm (RPS, 2020b).

It is considered likely that there is sufficient similarity between these and other recent comparable studies and the Project Marine Scheme in terms of the environmental setting and the nature of the proposed activities. For this reason, it is proposed that, these results will also be used to inform the assessment using an evidence-based approach, where appropriate. A wide range of potential impacts will be considered, including waves, currents, sediment disturbance, water quality and shoreline response, including consideration of climate change effects.

Potential impacts will be addressed using standard desk-top assessment approaches and assessed applying the methodology as set out within **Appendix B**.

For each parameter, **Table 6-1** summarises the proposed data sources and intended approach to assess the effects on physical processes and water quality. Where it is evidenced through previous studies in the North Sea and supported by initial data analysis that a potential impact is unlikely to occur or to be significant, it will be recommended that these matters be 'scoped out' from further consideration within the Environmental Appraisal process.

Table 6-1 Assessment of potential effects on physical processes and water quality

Potential Effect	Data and Studies	Approach to Assessment
Increases in SSC	To estimate the potential changes in levels of suspended sediment concentration and extent of plume during the cable installation, operation and operational phases of the Project Marine Scheme cable route, the following data and studies will be used: • Existing & planned bathymetric surveys; • Existing metocean surveys: ADCP surveys and wave buoys; • Existing & planned seabed sediment samples & particle size analysis; • Existing database: Atlas of Marine Renewable Energy Resources • Relevant literature; and • Previously assessments of similar activities for the cable routes.	To identify receptors potentially sensitive to modification of the natural concentration levels of suspended sediment. If sensitive receptors are found to be present, historical and new survey data will be used to inform conceptual understanding of the potential impact. The existing modelling and analysis results would be used as the evidences to inform assessments of direct and indirect impacts on any sensitive receptors provided that there is sufficient similarity in the environmental setting and cable burial activities causing sediment disturbance.
Disturbance of coastal morphology at the landfall sites on the basis of the	To determine the potential changes to coastal morphology at the landfall sites during the construction and operational phases, the following data and studies at the landfall site will be used:	To identify potentially sensitive receptors including the morphology of the coastline and any designated features in areas of special protection. The desktop analysis will be undertaken to understand coastal process at

Potential Effect	Data and Studies	Approach to Assessment
proposed landfall methods	• Historical imagery and topographic data; • Historical descriptions and studies; and • Previous assessments of similar activities for other projects.	the landfall using the available data. The magnitude and extent of potential impacts will be estimated on the basis of the proposed landfall installation methods. Reference will be made to any relevant evidence or experience from actual cable landfall activities, where the environmental setting and proposed construction methods are sufficiently similar.
Changes in water quality of 'Bathing Waters' due to construction activities at the cable landfall sites[3]	Updated desk-based assessment and review of water quality data collected by SEPA and EA. Review of survey data to supplement site specific baseline	To identify the sensitive receptors and recreational users within Scottish and English landfall areas and estimate sediment displacement due to cable landfall installation
Increase in metocean conditions and shoreline erosion at the landfall sites as a result of climate change	To qualify the significance of sea level rise, increase in wind and wave by climate change and study the potential impact on sediment transport and shoreline erosion at the landfall sites. The following data and studies will be used: • Existing and planned bathymetric surveys and sediment samples • Existing metocean surveys: wave buoys, current measurements; • EA and SPEA climate change guidance and database; and • Relevant literature.	Sea level rise and wave height increase due to climate change will be estimated for the defined lifespan using EA and SEPA guidance. If they are found to be significant, further studies may be carried out to inform the Environmental Appraisal.

6.5 Identification of Potential Effects

The following potential effects arising from the Project Marine Scheme have been identified:

- Increases in suspended sediment concentrations as a result of seabed disturbance during installation, maintenance activities during operation and potentially during decommissioning;
- Disturbance to coastal morphology / processes at landfall locations;
- Effects on water quality affecting WFD water quality status; and
- Impact of changes in Metocean conditions and shoreline erosion at landfall sites as a result of climate change.

6.5.1 Increases in Suspended Sediment Concentrations

Laying down the cable on the seafloor will be carried out by specialised installation vessels. These vessels are equipped to transport the cables, and then to install them and cover the cable with sediment or appropriate installation protection, where required. The firm to stiff glacial clays should enable cable burial to be achieved either by ploughing or mechanical cutting. It is possible that jetting may also be possible in some of the firm glacial clays (RSK, 2020).

Installation of cables will cause disturbance to the seabed and generate additional suspended sediment load in the water column. The scale of this disturbance will vary depending on the installation techniques. Research undertaken by ABPmer (ABPmer et al 2010) suggests that the relative changes in suspended sediments from offshore wind farm construction work and cable laying are typically within the natural baseline range of suspended sediment concentration variability. Significant impacts of sediment plumes arising from cable laying activities are not anticipated but further desktop study will be necessary during the Environmental Appraisal to confirm this.

[3] Note that a Water Framework Directive (WFD) assessment is provided within **Chapter 18**.

The construction process has the potential to result in the re-suspension into the water column of contaminated sediments or the release of chemicals used during the construction process. This may include drilling fluid and coagulant, such as bentonite and/o other comparable slurry, released during the HDD process. Best practice construction methodologies and the application of suitable controls, such as a Construction Environmental Management Plan (CEMP) would help to minimise releases. Any residual small-volume releases can be expected to be diluted rapidly and furthermore, it is expected that drilling fluids and other chemicals would be benign and/or 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).

Whilst significant impacts as a result of contaminated sediments are considered unlikely within the Study Area, the potential impact will be determined through analysis of seabed sediment samples and consideration of sediment plume dispersion. Further consideration of how construction processes will be managed will be provided within the Environmental Appraisal. Disturbance of Coastal Morphology at Landfall Sites

As described in **Chapter 2**, HDD is the proposed method for both landfalls, linking the Project Marine Scheme and the Scottish and English Onshore Schemes.

The use of HDD reduces impacts on the environment although some trenching is still required. Disturbance of coastal morphology at the landfall sites is not anticipated by the buried cables assuming HDD techniques are used and at this early stage, no local scour protection is predicted to be required.

The unprotected cliff at Seaham is currently suffering from rapid erosion. It is very likely that the currently eroding Seaham Beach will experience increased erosion rates due to sea-level rise and increased storminess. The landfall site is therefore likely to be affected within the design life as a result of climate change. To ensure that the TJP is located sufficiently far inland to avoid erosion effects, a desk study will be completed to consider the significance of predicted erosion in the medium term (20–50 years). This will inform the decision on any further studies and mitigation requirements.

An assessment of climate change impacts on shoreline change at the Thorntonloch landfall site is excluded as no significant historical erosion has been identified at this site. The potential impacts will be discussed within the Environmental Appraisal, but it is thought unlikely at this stage that further detailed investigations will be required.

6.5.2 Effects on Water Quality

Stage 2 WFD Assessments will be carried out as part of the Environmental Appraisal in order to evaluate potential Project impacts on the waterbodies identified as part of the stage 1 WFD assessment. The Stage 1 assessment is documented in **Chapter 18**.

6.5.3 Potential Effects considered, but scoped out from further consideration

6.5.3.1 Change to Bathymetry and Bedforms:

The construction associated with trenching for the cable corridor will result in a temporary disturbance to the seabed from within the cable trench. However, the installation footprint is narrow, so only a small part of any local feature area would be affected. It is anticipated that the trenching and backfill will only have a short-term effect and the seabed will eventually return to pre-installation conditions under natural processes. The significance of the impact is therefore considered to be negligible.

6.5.3.2 Change to Metocean Conditions as a result of Project activities:

Installation of the subsea cable and the presence of vessels and other equipment are considered to be relatively small-scale and transient. These activities will not therefore influence metocean conditions such as water levels, currents and waves. These issues can therefore be scoped out from further consideration.

6.5.3.3 Waste

It is anticipated that waste generated by the Project Marine Scheme will be minimal.

During the course of cable route clearance, pre-lay grapnel runs will be completed. In the event that during route clearance, abandoned, lost or discarded fishing gear ('ALDFG') is encountered, it may be necessary in certain circumstances to bring ALDFG onto the vessel deck. In these instances, marked ALDFG will be returned to the local MMO/IFCA office for onward retrieval by the owner of the marked gear, in line with existing best practice. Not all gear (particularly 'active' gear) is marked; if necessary to bring onto the vessel deck, unmarked gear will be disposed of via conventional onshore waste channels.

A range of potential subsea trenching techniques may be used to install the cables all of which involve the simultaneous displacement and re-instatement of sediment during the installation process. This is not considered to be a 'dredging and disposal' operation, an approach consistent with previous cable installation case management by UK Marine Regulators.

The Project Marine Scheme will maintain compliance with the high-level principles of the Waste Hierarchy, as enacted through The Waste (Scotland) Regulations 2012 (HMSO, 2012) and The Waste (Circular Economy) Regulations 2020 (HMSO, 2020). On this basis, waste associated with the Project Marine Scheme does not require further assessment and will be subject to appropriate control via existing best-practice and regulatory control under the Marine Licensing regime.

6.6 Summary

The information in this section provides an overview for the required Environmental Appraisal in relation to the Project Marine Scheme. This sets out the proposed approach for the assessment of the marine environmental impacts arising from the development proposals. The study has investigated and reviewed the geomorphology, sediment and metocean data and provides an outline of the key environmental issues likely to be associated with various stages of the development. Based on the preliminary investigations undertaken to inform this scoping report, the following desktop studies will be considered within the Environmental Appraisal and the potential impact associated for the relevant parameters:

- Assessment of sediment plumes resulting from cable installation activities (including magnitude of change, extent and duration);
- Cable protection (if present) for the cable route at landfall sites;
- Climate change impacts, as required[4] landfalls;
- Changes to water quality from sediment disturbance.

It is recommended the following issues are scoped out of the requirement for further assessment:

- Changes to hydrodynamics due to the presence of cable route and vessel activities;
- Impacts on offshore morphology;
- Disturbance of coastal morphology at the landfall sites (subject to HDD techniques being used).

[4] Historical data related to the landfall area at Thornonloch indicates that the beach is relatively stable with no significant erosion or accretion. The landfall at Seaham is therefore likely to be subject to an increased level of assessment in terms of Climate Change. This will be considered further within the Environmental Appraisal.

7. Benthic Ecology (Including Intertidal)

7.1 Introduction

This chapter of the scoping report provides a high-level overview of relevant benthic ecology baseline information as well as a summary of the potential interactions between the Project Marine Scheme and this receptor group. Any survey work that will be completed to help characterise the benthic ecology baseline is identified, and the assessment methodology that will be used for the impact assessment is highlighted. Benthic ecology refers to the diversity, abundance, and function of organisms living on (epifauna) or in (infauna) the seabed. Benthic communities can range from those found in the deepest parts of our oceans to those found in intertidal habitats. Physical factors such as water depth, sediment type, and supply of organic matter determine the habitat types present, and therefore the composition of benthic communities.

7.2 Intertidal Ecology

7.2.1 Baseline Environment and Study Area

The landfall in Scotland is located at Thorntonloch Beach, south of Torness Point, East Lothian. British Geological Survey (BGS) data indicates the intertidal habitat at the Scottish landfall is primarily rock platform with banks of gravel[5], which falls into the European Nature Information System (EUNIS) broad scale habitat type A3 infralittoral rock and other hard substrata. This rocky shore habitat will likely be dominated by macroalgae including species of the genera *Fucus, Ascophyllum* and *Pelvetia* and at the very low tide mark kelp may be present. The landfall is located within the Outer Firth of Forth and St Andrews Bay Complex SPA[6]. This site hosts a variety of habitats which support a diversity of fish and invertebrates, many species of which may be prey items for birds. Divers, grebes, puffins, shags and sea duck feed by surface diving, whilst gannets and terns dive from flight. These rich and sheltered waters provide excellent foraging habitat for both wintering and breeding birds.

The English landfall, near Seaham, County Durham, is characterised by a sandy foreshore, which may support wading birds, with rock platform backshore[5]. The English landfall is not located within any designated sites, however, the Northumbria Coast SPA[7] and Ramsar[8] are located approximately 0.43 km to the north and 0.64 km to the south of the Project Marine Scheme; these sites are designated for breeding populations of little tern *Sternula albifrons*, and non-breeding populations of the purple sandpiper *Calidris maritima* and turnstone *Arenaria interpres*.

The Study Area for intertidal ecology is a nominal 2 km corridor around the cable route, adjusted as required based on the maximum of zone of influence (ZoI) of potential impact pathways in relation to coastal morphology (presence of a bay for example).

7.3 Subtidal Ecology

7.3.1 Baseline Environment and Study Area

The Study Area for subtidal benthic ecology is an area within 10 km of the Project Marine Scheme, which encompasses all likely zones of influence for benthic habitats.

Subtidal benthic communities are those found on or in the seabed below the low water mark. Physical factors such as water depth, sediment type, and supply of organic matter determine the habitat types present, and therefore the composition of subtidal benthic communities.

Benthic habitats identified along the Project Marine Scheme route are generally dominated by areas of mud, sand and coarse sediments[9]. 'Deep circalittoral mud' (EUNIS habitat A5.37), 'Deep circalittoral sand' (EUNIS habitat A5.27) and 'Deep circalittoral coarse sediment' (EUNIS habitat A5.15); with

[5] DEFRA Habitat Mapping. Available online: https://magic.defra.gov.uk/magicmap.aspx
[6] Designated site fact sheet. Available online: https://jncc.gov.uk/our-work/outer-firth-of-forth-and-st-andrews-bay-complex-spa/
[7] Designated site fact sheet. Available online: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006131.pdf
[8] Designated site fact sheet. Available online: https://jncc.gov.uk/jncc-assets/RIS/UK11049.pdf
[9] EMODnet seabed habitat mapping. Available online: https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/?zoom=3&center=-15.000,51.600&layerIds=3&baseLayerId=-3&activeFilters=

patches of 'Deep circalittoral mixed sediments' (EUNIS habitat A5.45) and 'Faunal communities on deep low energy circalittoral rock' (EUNIS habitat A4.33). These habitat types qualify as NERC (2006) priority habitats. A variety of other habitats are distributed throughout the length of the Project Marine Scheme, with a greater diversity of benthic habitats in the higher energy, coastal, areas of the route.

Key sites designated for the protection of benthic features within 10 km of the Project Marine Scheme in English waters[10] include:

- **Berwickshire and North Northumberland Coast SAC.** The extreme north of the SAC is approximately 600 m from Project Marine Scheme at the closest point. The site, which covers an area of approximately 65,226 Ha, is designated for several Annex I habitats including large shallow inlets and bays, intertidal mudflats and sandflats, reefs and submerged or partially submerged sea caves. Other qualifying species include the permanent Annex II grey seal *Halichoerus grypus*, for which this is considered to be one of the best areas in the United Kingdom;
- **Durham Coast SAC.** The southern boundary of this SAC is approximately 400 m from the Project Marine Scheme at the closest point. The site is designated for 'Vegetated sea cliffs of the Atlantic and Baltic Coasts'. The site covers an area of approximately 389 Ha;
- **Coquet to St Mary's MCZ[11].** At the closest point, the MCZ is approximately 8.4 km from the Project Marine Scheme. The site is designated for several Annex I habitats including rock, mud, sand and mixed sediments; and
- **Farnes East MCZ**. The Project Marine Scheme cable route passes through this MCZ which includes both inshore and offshore waters along the Northumberland coast. The site is designated for a number of different features including bedrock and a range of different sediment habitats. The MCZ is also designated for sea-pen and burrowing megafauna communities and the ocean quahog *Artica islandica,* both listed on the OSPAR list of threatened and/or declining species and habitats. The site covers an area of approximately 945 km^2.

There are no key sites designated for the protection of benthic features within 10 km of the Marine Scheme in Scottish waters.

7.3.2 Planned Intertidal and Subtidal Surveys

It is proposed that intertidal Phase I biotope mapping and Phase II faunal sampling will be completed at both English and Scottish landfall sites for the provision of detailed project-specific data. This will enable the potential impacts of the Project Marine Scheme to be assessed.

Subtidal benthic surveys will be completed along the length of the Project Marine Scheme in both Scottish and English waters for the provision of detailed project-specific data. Subtidal surveys will include the collection of grab samples for the analysis of fauna, habitats and sediment characteristics including particle size analysis and sediment chemistry. Drop-down video (DDV) footage will be collected in areas where sensitive habitats are thought to occur, and side-scan sonar data will be collected to aid habitat characterisation and sampling station selection.

7.3.3 Assessment Method

The assessment methodology for intertidal benthic ecology will follow the standard methodology outlined for ecological receptors in **Appendix B**, in line with CIEEM guidance for ecological impact assessments (CIEEM, 2018).

Key data sources used for the assessment will include, but not be limited to:

- Project-specific survey data;
- European Marine Observation Data Network (EMODnet) Seabed Habitats Project (https://www.emodnet-seabedhabitats.eu/) for broad-scale habitat maps of the Study Area;

[10] Natural England designated site fact sheets. Available online: https://designatedsites.naturalengland.org.uk/SiteSearch.aspx
[11] Berwick to St Mary's MCZ is located approximately 1.1 km from the Project Marine Scheme route and is designated for its nationally important numbers of breeding common eider. It is not designated for the protection of benthic features and is therefore not included within this sub-section. See **Chapter 10** for further details on Ornithology and **Appendix C** for details of the HRA.

- European Union Nature Identification System (EUNIS) (EEA, 2012) for classifying benthic habitats; and
- Relevant Environmental Statements.

Consultation with stakeholders including the MMO, MS-LOT, SEPA, Cefas, JNCC, Natural England, Environment Agency and IFCAs (among others, where relevant) will also take place.

7.3.4 Identification of Potential Effects

The potential impacts for all stages of the Project Marine Scheme (construction, operation and decommissioning) on intertidal ecology are outlined in **Table 7-1**.

Table 7-1 Potential impacts of the Project Marine Scheme on Intertidal Ecology

Project phase	Potential impact
Route preparation and cable installation	Temporary physical disturbance to of intertidal benthic habitats and species
	Temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity and smothering effects
	Changes to marine water quality from the use of HDD drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils
Cable operation and maintenance	Disturbance to benthic habitats and species due to subsea cable thermal emissions
	Maintenance potential effects the same as route preparation and cable installation
Decommissioning	Potential effects the same as route preparation and cable installation

The potential impacts for all stages of the Project Marine Scheme (construction, operation and decommissioning) on benthic ecology are outlined in **Table 7-2.**

Table 7-2 Potential impacts of the Project Marine Scheme on Benthic Ecology

Project phase	Potential impact
Route preparation and cable installation	Temporary physical disturbance to subtidal benthic habitats and species
	Permanent loss of and/or disturbance subtidal benthic habitats and species due to placement of hard substrates on the seabed
	Temporary increase in SSC and sediment deposition leading to contaminant mobilisation, turbidity and smothering effects
	Changes to marine water quality from the use of HDD drilling fluids and accidental spills from vessels, including loss of fuel oils
Cable operation and maintenance	Disturbance to benthic habitats and species due to subsea cable thermal emissions
	Maintenance potential effects the same as route preparation and cable installation
Decommissioning	Potential effects the same as route preparation and cable installation

7.3.5 Potential effects considered, but scoped out from further consideration

Two potential impacts have been scoped out from further assessment – underwater sound disturbance and EMF disturbance.

7.3.5.1 Underwater Sound Impacts on Marine invertebrates

There has been very little research into the impact of underwater sound on marine invertebrates (including shellfish) which are believed to be sensitive to particle motion rather than to sound pressure (Popper and Hawkins, 2018). At present there are no published sensitivity thresholds for this receptor group. However, effects to invertebrates have been recorded in some studies such as Solan et al. (2016) where a number of species tested, including the crustacean *Nephrops norvegicus* and the bivalve *Ruditapes philippinarum*, demonstrated behavioural responses to impact pile driving sound source

levels in a controlled laboratory environment. It is worth noting that not all species tested demonstrated any behavioural response to underwater sound (e.g. the brittlestar *Amphiura filiformis*) although sound did compromise physiological processes in a number of individuals and the authors suggest an increased variability between individuals does not exclude the possibility that responses to environmental sound can be subtle and may take extended periods of time to be expressed across a population or become detectable at an ecosystem level. In other laboratory experiments, Wade et al (2013) found some evidence for a stress response in green shore crab *Carcinus maenas* subject to ship playback sound, particularly in larger individuals. However, repeated exposure responses indicated that the crabs habituated or become tolerant to it. Therefore, there is currently very limited evidence to suggest that the type and duration of underwater sound that will be generated by the Proposed Marine Scheme (e.g. by vessel movements and dredging as opposed to impact pile driving) will have any effect on benthic invertebrates or benthic communities. Thus, underwater noise disturbance is scoped out from requiring further consideration. EMF Impacts on Benthic Invertebrates

There is evidence that some benthic invertebrates are able to detect EMF. For example, in laboratory test conditions the brown crab *Cancer pagurus* showed a clear attraction to EMF and reduced their time spent roaming (Scott, 2018). However, the test used an EMF strength of 2.8 mT (millitesla) which is higher than that produced by active subsea DC cables. Scientific experiments around an active cable in Puget Sound found the cable had no impact on crab behaviour, including when they were moving across the cable (Love *et al.,* 2017). Other studies also indicate that invertebrates do not have a notable sensitivity to EMF. For example, there was no impact observed on crustaceans *Crangon crangon*, the round crab *Rhithropanopeus harrisii*, the isopod *Saduria entomon*, and edible mussel *Mytilus edulis* exposed to EMF for several weeks and there was no reduction in gonad index and condition in mussels exposed for three months during the reproductive season (Bochert and Zettler, 2004). Therefore, there is considered to be no realistic interaction between EMF emitted during the operation of the Project and benthic invertebrates or communities; thus, EMF disturbance has been scoped out from requiring further consideration.

7.4 Summary

In summary:

- A range of potentially sensitive intertidal and subtidal habitats representative of Annex I and NERC (2006) priority habitats may occur within proximity to the Project Marine Scheme in both English and Scottish waters;
- A variety of sites designated for the protection of benthic habitats and/ or species are located within 10 km of the marine scheme in both English and Scottish waters;
- Intertidal and subtidal benthic surveys will be completed to ensure the full range of habitats and any potentially sensitive and/ or protected species located within proximity to the Marine Scheme are identified;
- A detailed assessment of the potential impacts identified above will be completed, forming part of the ensuing Environmental Appraisal; and
- Underwater sound disturbance and EMF disturbance are scoped out of further consideration for subtidal benthic ecology.

8. Fish and Shellfish Ecology

8.1 Introduction

This chapter of the scoping report provides a high-level overview of relevant fish and shellfish baseline information as well as a summary of the potential interactions between the Project Marine Scheme and this receptor group. Any survey work that will be completed to help characterise the fish and shellfish baseline is identified, and the assessment methodology that will be used for the impact assessment is highlighted.

Please note that alongside this, **Chapter 13** provides a wider overview of potential impacts associated with commercial fishing activity.

8.2 Baseline Environment and Study Area

The Study Area for fish and shellfish ecology is an area within 10 km of the Project Marine Scheme, which encompasses all likely zones of influence for this receptor group. However, an initial designated sites screening distance of 50 km is adopted to ensure any migratory fish species that may pass through the project area are considered.

Fish spawning and nursery areas for a number of fish species are known to be present along the Project Marine Scheme cable route with high intensity spawning by sandeel and high intensity nursey areas for herring, cod and whiting (Ellis *et al*., 2012). Electro-sensitive fish, including commercial skate species (thornback ray, spotted ray, and cuckoo ray), may also be present within the Study Area.

A number of species of commercial importance are found along the length of the Project Marine Scheme depending on location; this is discussed in detail within **Chapter 13**. Whilst the presence of benthic species may change with location, pelagic species are highly mobile and may be changeable along the route. In general, species of key importance include cod *Gadus morhua*, whiting *Merlangius merlangus*, plaice *Pleuronectes platessa*, mackerel *Scomber scombrus*, hake *Merluccius merluccius* and anglerfish *Lophius piscatorius*. Lobster and crab fisheries are also of importance in some areas.

Transitional habitats, such as estuaries, generally fall well outside of the Project Marine Scheme and for the majority of the cable route, transitional habitats are located well outside of the Study Area (notable exceptions relate to the landfall areas in Scotland and England). As a result, there is limited scope for important populations of diadromous species (i.e. those that migrate between freshwater and marine environments) to fall within the Study Area. However, it is possible that some individuals of protected diadromous species, such as the Atlantic salmon *Salmo salar*, European eel *Anguilla anguilla*, sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis* may migrate through the Project Marine Scheme as part of their annual life cycles.

Key sites designated for the protection of fish and shellfish within 50 km of the Marine Scheme in English waters include:

- **Tweed Estuary SAC.** This site is located approximately 11.4 km from the Project Marine Scheme. The Annex II species present as a qualifying feature, but not a primary reason for site selection, are sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis*.

No sites designated for the protection of fish and shellfish have been identified within 50 km of the Marine Scheme in Scottish waters.

8.3 Planned Surveys

Project-specific fish and shellfish surveys will not be completed for the project due to the relatively plentiful data on fish and shellfish populations in the North Sea combined with the likely limited potential for adverse effects to this receptor group as a result of the Scheme. However, where ad-hoc data on fish and shellfish are collected during the subtidal benthic grab sampling survey this will be incorporated into the baseline assessment.

8.4 Assessment Method

The potential impacts to fish and shellfish ecology will be assessed in line with the UK Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for ecological impact assessment (CIEEM, 2018). Full details of the assessment methodology are presented in **Appendix B**.

Key data sources used for the assessment will include, but not be limited to:

- Project-specific survey data (where applicable);
- FishBase (www.fishbase.org) for general fish ecology, distribution and biological information;
- EMODnet biological data portal (http://www.emodnet.eu/biology) for records of rarer fish and shellfish species;
- Cefas Sensitivity Maps (Coull et al., 1998; (Ellis, Milligan, Readdy, Taylor, & Brown, 2012)) which provide spatial data highlighting spawning and nursery grounds in UK waters;
- MarineSpace et al. (2013a and 2013b) for herring and sandeel spawning habitat classifications;
- The International Convention for the Conservation of Nature (IUCN) Red List of Threatened Species (https://www.iucnredlist.org/);
- MMO landings statistics (MMO, 2015 - 2019);
- Cefas demersal fish data for the southern North Sea (ICES division IVc) (Parker Humphrey, 2005);
- International Council for the Exploration of the Seas (ICES) data (https://www.ices.dk/Pages/default.aspx); and
- Relevant Environmental Statements.

Consultation with stakeholders including the MMO, MS-LOT, SEPA, Cefas, JNCC, Natural England, Environment Agency, the National Federation of Fishermen's Organisations (NFFO), Scottish Fishermen's Federation (SFF) and, IFCAs (amongst others where relevant) will take place.

8.5 Identification of Potential Effects

The potential impacts for all stages of the Project Marine Scheme (construction, operation and decommissioning) on fish and shellfish are outlined in **Table 8-1**.

Table 8-1 Potential impacts of the Project Marine Scheme on Fish and Shellfish

Project phase	Potential impact
Route preparation and cable installation	Underwater noise effects on fish and shellfish
	Changes to marine water quality from the use of HDD drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils
	Temporary physical disturbance to fish and shellfish habitats and species during cable lay
	Permanent physical disturbance to and/or loss of fish and shellfish habitats and species due to placement of hard substrates on the seabed
	Temporary increased suspended sediment concentrations, and subsequent settlement of sediment causing smothering of fish habitat
Cable operation and maintenance	Effects of Electromagnetic field (EMF) emissions
	Maintenance potential effects the same as route preparation and cable installation
Decommissioning	Potential effects the same as route preparation and cable installation

8.5.1 Potential effects considered, but scoped out from further consideration

The potential impact of thermal emissions from operational cables has been scoped out from further consideration.

Due to the temperatures at-depth, it is generally the case that cool seawater tends to dissipate any discernible thermal energy from a cable. Where cables are buried within sediment, research indicates that there may be some limited increases in substratum temperature (Taormina et al, 2018). However, it is important to recognise that much of this research has been based on shallow-depth research (i.e. 1 m below sea level). This is substantially shallower than the likely depths along the length of the Project Marine Scheme route).

Whilst sediments may be exposed to temperature increases, the cables have negligible capacity to heat the overlying water column due to the high thermal capacity of surrounding seawater. Therefore whether buried or not, pelagic or demersal fish and shellfish species or life stages which remain in direct contact with the overlying water column are not predicted to be at risk of thermal effects from the buried cables as any heat would be instantly dissipated by currents. Consequently, there is considered to be no interaction between this impact and any fish and shellfish receptors.

8.6 Summary

In summary:

- The Project Marine Scheme passes through high intensity spawning and nursery habitat for a variety of fish species, including commercially important species, in both English and Scottish waters;
- No protected sites designated for the protection of fish and shellfish receptors are located within 10 km of the Project Marine Scheme in either English or Scottish waters. However, the Tweed Estuary SAC is located within 11.4 km of the Marine Scheme;
- The baseline assessment will include a more detailed review of key fish and shellfish habitat within proximity to the Marine Scheme;
- A detailed assessment based on the potential impacts identified above will be carried out, forming part of the basis of the ensuing Environmental Appraisal; and
- Potential impacts from cable thermal emissions have been scoped out of further consideration.

9. Marine Mammals

9.1 Introduction

This chapter of the scoping report provides a high-level overview of relevant marine mammal baseline information as well as a summary of the potential interactions between the Project Marine Scheme and this receptor group. Any survey work that will be completed to help characterise the marine mammal baseline is identified, and the assessment methodology that will be used for the impact assessment is highlighted.

9.2 Baseline Environment and Study Area

Recognising the highly mobile and transient nature of marine mammal species and the potential implications of local impacts on wider populations, the Study Area for the baseline encompasses the Greater North Sea Ecoregion (North Sea, English Channel, Skagerrak and Kattegat) (ICES, 2018) but with a focus on the western North Sea along the east coast of Scotland and England where the Project Marine Scheme is located. This more focused Study Area of approximately 100 km from the Project Marine Scheme is adopted for all marine mammals, reflecting their wide-ranging mobile nature. This extent takes into consideration (where available) species specific Management Units published by the Inter Agency Marine Mammal Working Group (IAMMWG) (IAMMWG, 2015).

Within the Greater North Sea Ecoregion, four cetacean species occur commonly or are resident (ICES, 2019). These species are:

- Harbour porpoise *Phocoena phocoena*;
- Bottlenose dolphin *Tursiops truncatus*;
- White-beaked dolphin *Lagenorhynchus albirostris*; and
- Minke whale *Balaenoptera* acutorostrata.

A further five cetaceans, the short-beaked common dolphin *Delphinus delphis*, Atlantic white-sided dolphin *Lagenorhynchus acutus*, long-finned pilot whale *Globicephala melas*, killer whale *Orcinus orca*, and Risso's dolphin *Grampus griseus*, occur regularly but are less common.

Although the UK is no longer a member of the EU, the basis for designating protected species under the Conservation of Habitats and Species Regulations 2017 (as amended) remains as defined in the Annexes to the EU Directives.[12]

'The 2019 Regulations establish management objectives for the national site network. These are called the network objectives. Any references in the 2017 Regulations to meeting the 'requirements of the Directives' includes achieving the network objectives.

The network objectives are to:

- *maintain or, where appropriate, restore habitats and species listed in Annexes I and II of the Habitats Directive to a favourable conservation status (FCS)*
- *contribute to ensuring, in their area of distribution, the survival and reproduction of wild birds and securing compliance with the overarching aims of the Wild Birds Directive'*

All cetaceans are European Protected Species (EPS) under Annex IV of the EC Habitats Directive. Harbour porpoise and bottlenose dolphin are also listed under Annex II of the EC Habitats Directive.

Approximate abundance and density for the four key cetacean species known to be present within the vicinity of the proposed Project Marine Scheme cable route are provided in **Table 9-1** below. This data is based on the most recent SCANS-III surveys for survey Block O and R (Hammond *et al.,* 2017).

[12] https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017

Block O has a particularly high abundance and density of harbour porpoise whilst Block R immediately to the north has a high abundance and density of all four species (in relative terms), and so appears to be of greater importance to cetaceans.

Table 9-1 Summary of abundance and density estimates for the four key cetacean species by SCANS-III survey block

SCANS-III Survey Block	Species	Density (individuals/km^2)	Total population size per block
O (East coast of England)	Harbour porpoise	0.888	53,485
	Bottlenose dolphin	0	0
	White-beaked dolphin	0.002	143
	Minke whale	0.010	603
R (North east of England and east of Scotland)	Harbour porpoise	0.599	38,646
	Bottlenose dolphin	0.030	1,924
	White-beaked dolphin	0.243	15,694
	Minke whale	0.039	2,498

Source: Hammond et al. (2017)

The harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus* are also found to occur within the Study Area. Both grey and harbour seal are protected by the Conservation for Seals Act 1970 and are listed as protected species under Annex II and V of the EC Habitats Directive.

Approximately 30% of European harbour seals are found in the UK. Harbour seals are widespread around the west coast of Scotland and throughout the Hebrides and Northern Isles. On the east coast of the UK their distribution is more restricted with concentrations in the major estuaries of the Thames, The Wash, Firth of Tay and the Moray Firth, although small populations are found elsewhere in areas such as Teesside and Holy Island (SCOS, 2018). The UK grey seal population represents about 40% of the world population and 95% of the EU population. Of those breeding in the UK, 86% are breeding in Scotland. The main concentrations are in the Inner and Outer Hebrides and in Orkney (Duck, 2010). The east coast of Scotland and England is also home to a number of breeding populations (SCOS, 2018).

The cable route is within the vicinity of three breeding sites for grey seal, Isle of May and Fast Castle in Scotland, and the Farne Islands in England. The Isle of May and Fast Castle are monitored as part of the Firth of Forth region[13], which supports approximately 12 % of the of the total grey seal pup production (2016) in Scotland (SCOS, 2019). The Farne Islands support approximately 26 % of the of the total grey seal pup production (2016) in England (SCOS, 2019).

All marine mammal species listed above are also protected by The Wildlife and Countryside Act 1981. In addition, all cetaceans are European Protected Species (EPS) under Annex IV of the EC Habitats Directive. Harbour porpoise and bottlenose dolphin are also listed under Annex II of the EC Habitats Directive. Both grey and harbour seal are protected by the Conservation for Seals Act 1970 and are listed as protected species under Annex II and V of the EC Habitats Directive.

Key sites designated for the protection of marine mammals within the relevant management units but restricted to a distance of approximately 100 km, reflecting the potential ZoI associate with the activities of this Project Marine Scheme. Professional judgement has been applied where the possibility of a designating feature passing into the Study Area could be considered likely.

In Scottish waters this includes:

- **Isle of May SAC**. This site is located 26.1 km from the Project Marine Scheme route. The Annex II grey seal *Halichoerus grypus* is a primary reason for site designation;

[13] Note the Firth of Forth region also includes the Inchkeith breeding site, but the Marine Scheme is unlikely to interact with this site.

- **Firth of Tay and Eden Estuary SAC**. This site is located approximately 50.1 km from the Project Marine Scheme route, the Annex II species, harbour seals *Phoca vitulina*, are a primary reason for the SAC site selection; and
- **Southern Trench pMPA.** This site is located approximately 162.9 km from the Project Marine Scheme at the closest point. It is designated for the protection of the minke whale (amongst other features).

In English waters sites include:

- **Berwickshire and North Northumberland Coast SAC**. The extreme north of the SAC is approximately 600 m from the Project Marine Scheme at the closest point. The Annex II grey seal (*Halichoerus grypus*) is a primary reason for site designation; and
- **Southern North Sea SAC.** This site is located approximately 110.5 km from the Project Marine Scheme at the closest point. It is designated for the protection of the harbour porpoise.

9.3 Planned Surveys

Whilst no specific marine mammal surveys will be completed for the project, geophysical survey work is required along the full length of the Project Marine Scheme. A requirement for mitigating the potential impacts of geophysical survey work (such as underwater noise) is the use of Marine Mammal Observers to identify marine mammals within proximity to the works and to ensure appropriate action is taken to avoid harm when observed. As a result of this, data will be collected on any marine mammal observations throughout the duration of the survey work; this will be incorporated into the baseline assessment where relevant.

9.4 Assessment Method

The assessment methodology for marine mammals will follow the standard methodology outlined for ecological receptors in **Appendix B**. which is in line with CIEEM guidance for ecological impact assessments (CIEEM, 2018). Key data sources used for the assessment will include, but not be limited to:

- Project-specific survey data (where applicable);
- SCANS (Small Cetacean Abundance in the European Atlantic and North Sea) data;
- The Atlas of Cetacean distribution in north-west European waters (Reid, et al., 2003);
- The Sea Watch Foundation marine mammal sightings distribution maps; and
- Relevant Environmental Statements.

Consultation with stakeholders including the MMO, NatureScot, MS-LOT, SEPA, Cefas, JNCC, Natural England, Environment Agency, IFCAs (amongst others where relevant) will take place.

9.5 Identification of Potential Effects

The potential impacts for all stages of the Project Marine Scheme (construction, operation and decommissioning) on marine mammals are outlined in **Table 9-2**.

Table 9-2 Potential impacts of the Project Marine Scheme on Marine Mammals

Project phase	Potential impact
Route preparation and cable installation	Effects of underwater noise
	Alteration of water quality due to unplanned, releases, accidental leaks and spills from vessels and plant
	Vessel collision risk
Cable operation and maintenance	Effects of electromagnetic field (EMF) emissions
	Maintenance potential effects the same as route preparation and cable installation
Decommissioning	Potential effects the same as route preparation and cable installation

9.5.1 Potential effects considered, but scoped out from further consideration

There are some potential impacts which have already been scoped out from further assessment. These include pre-sweep dredging through sandwaves, thermal emissions from operational cables and temporary increases in suspended sediment concentrations (SSC).

Whilst the underwater sound impacts of pre-sweep dredging will be considered, the physical effects of this dredging activity on marine mammals are not considered significant in the context of this assessment. Whilst thermal emissions from cables may alter the localised temperature of sediments, they have negligible capacity to heat the overlying water column due to the high thermal capacity of water. Regardless of whether or not the cables are buried, it is considered highly unlikely that marine mammals would be exposed to any potential thermal effects. Consequently, there is considered to be no interaction between this impact and any marine mammal species

Effects associated with increased SSC levels are not assessed for marine mammals due to their highly mobile nature and the abundance of alternative adjacent habitat for them to disperse into and forage within.

9.6 Summary

In summary:

- The harbour porpoise is the most abundant cetacean species likely to occur close to the Project Marine Scheme, followed by the white beaked dolphin, the minke whale and the bottlenose dolphin. In addition to this, grey seal and harbour seal are likely to occur within the Study Area;
- Several sites designated for the protection of marine mammals are located within 100 km of the Project Marine Scheme in both English and Scottish waters;
- A detailed assessment based on the potential impacts identified above will be carried out, forming part of the basis of the ensuing Environmental Appraisal; and
- Various impact pathways have been scoped out of further consideration, including; pre-sweep dredging through sand waves, thermal emissions from operational cables and temporary increases in suspended sediment concentrations (SSC).

10.Ornithology

10.1 Introduction

This chapter of the scoping report provides a high-level overview of relevant seabird baseline information as well as a summary of the potential interactions between the Project Marine Scheme and this receptor group. Any survey work that will be completed to help characterise the seabird baseline is identified, and the assessment methodology that will be used for the impact assessment is highlighted.

This section focuses on birds likely to interact with the Project components proposed to be constructed within the marine area between MHWS at the Scottish landfall area at Thorntonloch Beach in East Lothian, and MHWS at the English landfall area at Seaham, County Durham.

This includes any waterbirds using intertidal areas between MHWS and MLWS and cliff nesting seabirds on the interface between the Project Marine Scheme and both the English and Scottish Onshore Schemes.

For some ornithological receptors there will be potential interactions with both the Marine and Onshore Schemes. Therefore, the assessment of ornithological receptors relevant to the Project Marine Scheme will also draw on baseline information collected and presented as part of the Project English and Scottish Onshore Schemes. Bird species that will primarily interact with onshore components of the scheme are covered by the Project Scottish and English Onshore Scheme scoping reports.

10.2 Baseline Environment and Study Area

Recognising the highly mobile and wide-ranging nature of birds in the marine environment and the potential implications of local impacts on wider populations, the Study Area for the baseline encompasses all sites designated for birds with a marine component within 10 km of the Project Marine Scheme scoping boundary and selected sites beyond 10 km in recognition of their often extensive foraging distances.

Only qualifying bird species which have the potential to be present in the vicinity of the Project Marine Scheme will be considered further within the Environmental Appraisal. For example, wintering waders and waterfowl do not forage offshore, preferring to feed along the coast. Where such birds are important to sites in close proximity to the Project Marine Scheme, e.g. intertidal habitats, they will be included but for sites further afield, these species are screened out from further assessment.

The Project Marine Scheme passes directly through two sites 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 route passes Holy Island south of Berwick-upon-Tweed.

The Outer Firth of Forth and St Andrews Bay Complex SPA is an extensive site (2,720.68 km^2) off the south-east coast of Scotland. The cable alignment runs through the SPA for approximately 17.2 km. It is designated for 21 seabird and waterbird species, including both breeding and overwintering species. The site harbours particularly large proportions of the GB populations for common eider *Somateria mollissima mollisima* (35.9%), long-tailed duck *Clangula hyemalis* (17.7%), velvet scoter *Melanitta fusca* (23.2%), common tern *Sterna hirundo* (8.8%, breeding) and Atlantic puffin *Fratercula arctica* (5.3%). A seabird assemblage of 40,000 seabirds also forms a qualifying feature of the site. The SPA also includes marine foraging grounds for breeding common tern, Arctic tern and European shag nesting in SPA colonies within the Outer Firth of Forth and St Andrews Bay Complex SPA.

The Northumberland Marine SPA is located off the north-east coast of England. The cable route runs through the SPA for a distance of approximately 6.3 km and elsewhere, is parallel to the eastern boundary of the SPA (approximately 600 m at the closest points which are east of Seahouses and Amble on the Northumberland coast). This site is designated for a range of breeding birds, including Arctic tern *Sterna paradisaea*, Common tern *Sterna hirundo*, Guillemot *Uria aalge*, Little tern *Sternula albifrons*, Puffin *Fratercula arctica*, Roseate tern *Sterna dougallii* and Sandwich tern *Thalasseus sandvicensis*. A wider seabird assemblage (breeding) also forms part of the designation.

In addition to this, five other sites designated for the protection of seabirds are located within proximity to the Project Marine Scheme (Natural England, 2018). These sites include:

- St Abb's Head to Fast Castle SPA (including its marine extension; Scotland) (2 km to the south-west);
- Lindisfarne SPA / Ramsar (England) (9.2 km to the south-east);
- Northumbria Coast SPA / Ramsar (England) (421 m to the north of the proposed landfall site at Seaham);
- Farne Islands SPA (England) Closest island (Knivestone) (7.1 km to the south-west); and
- Coquet Island SPA (England) (14.6 km to the west).

Despite the fact that a number of these sites are likely to fall outside of the ZoIs of project related impact pathways[14], due to the highly mobile and transient nature of seabirds it is possible the qualifying features of these sites could interact with the Project Marine Scheme regardless. Further specific detail on these designated sites, including qualifying features can be found in **Chapter 16** and **Appendix C.**

A significant amount of publicly available ornithological data exist for the Study Area. A large proportion of this information has been produced for existing and historic offshore developments such as offshore wind farms and subsea cable projects which have required Environmental Appraisal. Where relevant, this information will be used to inform the ornithological baseline for the Environmental Appraisal. This includes the following sources of data and information:

- The Joint Nature Conservation Committee (JNCC) website for details of Special Protection Areas (SPAs) including site information and designation details;
- The British Trust for Ornithology (BTO) website for site specific data from the Wetland Bird Survey (WeBS), a partnership between the BTO, the Royal Society for the Protection of Birds (RSPB) and JNCC (the last on behalf of Natural England (NE), Natural Resources Wales (NRW), Scottish Natural Heritage (SNH) and the Department of the Environment Northern Ireland (DENI)) in association with the Wildfowl and Wetlands Trust (WWT);
- Relevant Environmental Statements and associated appendices detailing the results of project specific ornithological surveys, such as Blyth Offshore Demonstrator Phases 1 and 2;
- The Joint Nature Conservation Committee (JNCC) atlas of seabird distribution in north-west European waters; and
- FAME (Future of the Atlantic Marine Environment) and STAR (Seabird Tracking and Research) seabird tracking projects.

10.3 Planned Surveys

No specific marine ornithology surveys will be completed for the project, however the Environmental Appraisal for the Project Marine Scheme will draw upon surveys undertaken for the English and Scottish Onshore Schemes at the landfall areas, where relevant. Bird surveys that will be completed and are of relevance to the Project Marine Scheme include breeding bird surveys and SPA Wintering bird (intertidal habitats) surveys. Specific details of these surveys can be found in the following locations:

- Project English Onshore Scheme Scoping Report, Chapter 5 (Ecology & Nature Conservation); and
- Project Scottish Onshore Scheme Scoping Report, Chapter 5 (Ecology).

10.4 Assessment Method

The assessment methodology for ornithology will follow the standard methodology outlined for ecological receptors in **Appendix B**, which is in line with CIEEM guidance for ecological impact assessments (CIEEM, 2018).

[14] It is widely understood and accepted that there are limited impact pathways for significant effects 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.

10.5 Identification of Potential Effects

Due to the highly mobile nature of ornithological receptors, the limited disturbance associated with a typical cable installation project and the abundance of surrounding habitat (i.e. the largely unrestricted and open North Sea), significant effects are not anticipated. Notwithstanding, this will be subject to formal assessment in the Environmental Appraisal; the potential impacts for all stages of the Project Marine Scheme (construction, operation, and decommissioning) on ornithological receptors are outlined in **Table 10-1**.

Table 10-1 Potential impacts of the Project on seabirds*

Project phase	Potential impact
Route preparation and cable installation	Physical disturbance associated with sound, visual impacts and physical presence from vessel and construction activity in intertidal and offshore environments
	Alteration of water quality due to unplanned, releases, accidental leaks and spills from vessels and plant
	Disturbance to the seabed and intertidal habitats resulting in changes in prey availability
Cable operation and maintenance	Potential effects the same as route preparation and cable installation
Decommissioning	Potential effects the same as route preparation and cable installation

*Note that a range of periphery linked considerations, such as functional linkage and prey resource, are given detailed consideration within the HRA. Please refer to Appendix C for further information.

10.6 Summary

In summary:

- The Project Marine Scheme will pass directly through Outer Firth of Forth & St Andrews Bay Complex SPA and the Northumberland Marine SPA. These are the only site designated for the protection of seabirds through which the Project Marine Scheme will directly pass. However, up to five other sites designated for seabirds could still be affected and will need considering in detail;
- There is the potential for foraging breeding and non-breeding seabirds from designated sites to be subject to temporary disturbance and displacement during construction, operation and decommissioning; and
- A detailed assessment based on the potential impacts identified above will be carried out, forming part of the basis of the ensuing Environmental Appraisal (and specifically, the HRA).

11. Marine Archaeology

11.1 Introduction

This chapter of the Project Marine scoping report outlines the marine archaeology and cultural heritage receptors of relevance to the proposed Project Marine Scheme (**Figure 1-2**).

Marine archaeological and cultural heritage receptors located within the scoping boundary will be considered against the following categories:

- Seabed Prehistory: for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. handaxes;
- Maritime Archaeology: maritime archaeological sites consist broadly of vessel remains, wreckage and submerged vessel/cargo debris; and
- Aviation Archaeology: this comprises all military and civilian aircraft crash sites and related wreckage.

Other themes relevant to the marine archaeological baseline include intertidal heritage receptors and the historic seascape character in and around the area.

The baseline summary for Seabed Prehistory will be based on a review of geological mapping of seabed sediments, solid geology and bathymetry from published BGS sources. This will be enhanced by the geoarchaeological review of geotechnical and geophysical datasets gathered for the project, as explained in **Chapter 2**.

Regarding the assessment of intertidal heritage receptors, whilst some assessment has been provided within this scoping report, it is intended that a range of national and local Historical Environment Record data sets and further relevant data (such as Rapid Coastal Zone Assessment Surveys) will be used to inform the Environmental Appraisal in this area.

11.2 Baseline Environment and Study Area

The following section provides a brief summary of the marine archaeology and cultural heritage receptors within the proposed Project Marine Scheme, compiled from sources listed below. The aim is to establish the known and potential historic environment resource that could be affected by the proposed development. The known heritage receptors are illustrated in **Figure 11-1.**

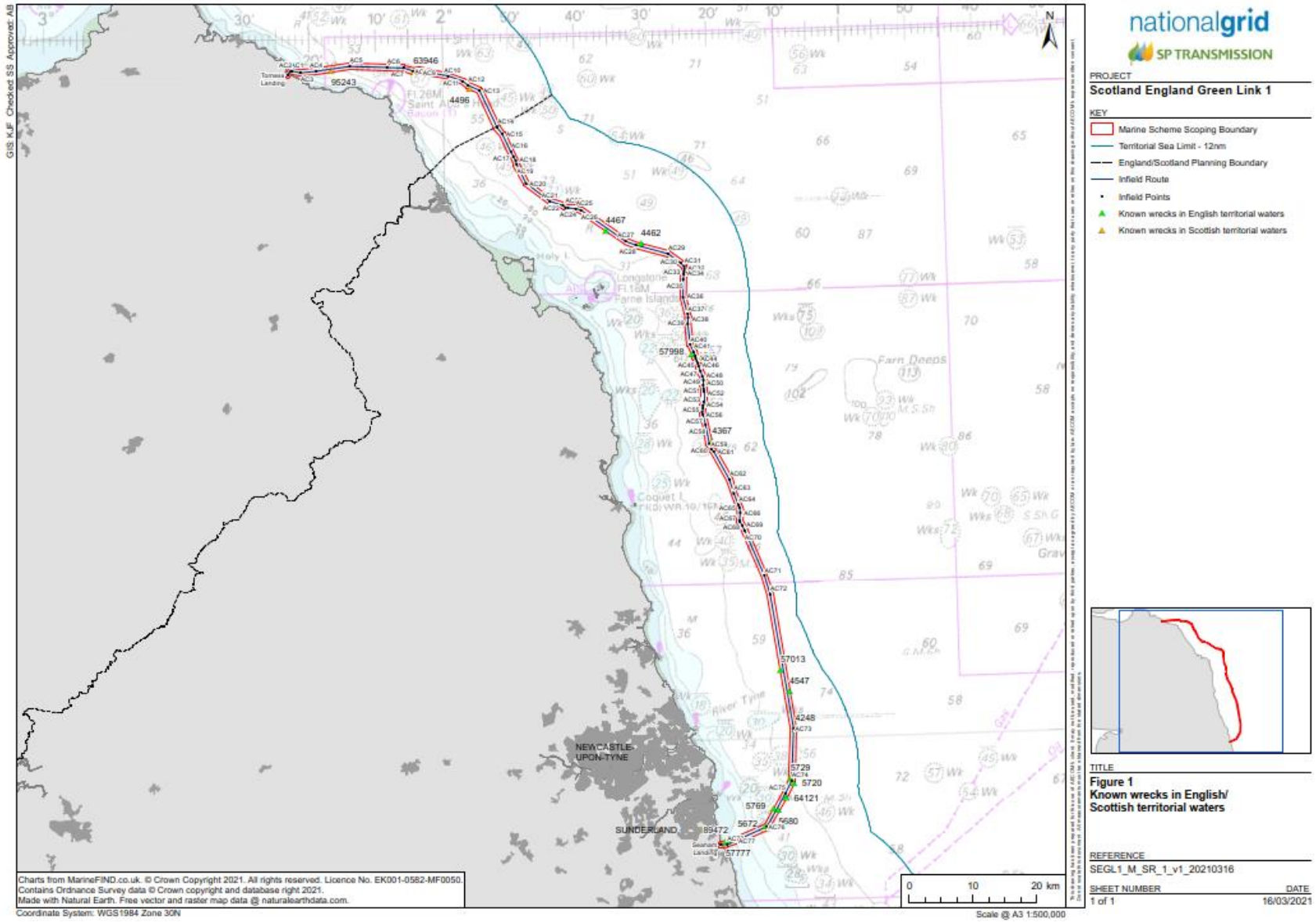


Figure 11-1 Known Marine Archaeology Receptors

The North Sea contains prehistoric submarine archaeological remains which date back to around 100,000 years ago, as clearly attested by the emergent landscape popularly known as 'Doggerland'. Evidence for Palaeolithic activity in the North East of the North Sea area is sparse, despite there being reports of Lower Palaeolithic hand-axes being found. Recent work at Howick suggests that Early Mesolithic tools could derive from offshore deposits or from coastal boulder clay washed back inshore (Petts & Gerrard 2006). Mesolithic activity is well attested from the coasts and marine areas of the British Isles, represented through ex-situ artefacts from marine environments.

Geophysical survey data off Northumberland has helped place the recorded sites of Howick and Low Hauxley in a palaeolandscape context. The reconstructions illustrated the changing coastal landscapes during the Early Holocene sea-level rise. This helped to highlight the potential for nearshore palaeo-islands (Farnes and Coquet Island) which may have been important centres for early prehistoric activity, dating from the Early Mesolithic and Holocene periods. (Bicket *et al*. 2016). This study has shown that the coastline along the north-east coast of England and south-east Scotland has the potential for the presence of as yet undiscovered *in situ* prehistoric sites and finds, located within the inundated nearshore palaeogeography.

11.2.1 Maritime Archaeology

Maritime archaeological sites can be considered to comprise two broad categories; the remains of vessels that have been lost as a result of stranding, foundering, collision, hostile military / wartime action and other causes, and those sites that consist of vessel-related material.

Wreck related debris includes (but is not limited to) equipment lost overboard or deliberately jettisoned such as fishing gear, ammunition and anchors or the only surviving remains of a vessel such as its cargo or a ballast mound.

Shipwrecks on the seabed provide an insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered more likely in sediments which promote the preservation of wreck sites (e.g. finer grained sediments that are not subject to high levels of mobility), particularly where such sediments have seen limited, recent disturbance.

The Study Area for Marine Archaeology is a 1 km wide linear corridor along the length of the Project Marine Scheme.

11.2.1.1 Scotland

There are currently no records within the Study Area that are subject to statutory protection as Historic Marine Protected Areas, Scheduled Monuments, or under the Protection of Military Remains Act 1986.

There are three known wreck sites within the Study Area considered to be of high value (**Table 11-1**). These consist of an anomaly, 48 m in length, found by multi-beam (UKHO95243); a fishing vessel sunk in 2004 (UKHO63946); and a Danish steam ship, *Baron Stjernblad*, sunk in 1917, which is still largely intact (UKHO4496).

Table 11-1 UKHO charted wrecks located within the Study Area - Scottish Marine Area

UKHO ID	Name	Type	Description	Latitude	Longitude	Nearest KP	Sources
95243	Unknown	-	-	55.954500	-2.280422	AC4	UKHO
63946	Unknown	fishing vessel	-	55.952156	-2.074421	AC8	UKHO
4496	*BARON STJERN BLAD*	steam ship	Lost 1917	55.927443	-1.933514	AC12	UKHO

The UKHO lists 15 records within 2.5 km either side of the indicative route alignment in the Scottish Marine Area. Six of these are listed as 'Dead', i.e. they have not been detected by repeated surveys,

and are therefore considered not to exist (however, archaeological material could still be preserved beneath sediments).

Drawing focus into the Study Area specifically, there are 28 records in Canmore that fall within the 1 km wide corridor, 20 of which are maritime sites and eight of which are terrestrial. A number of these are in the intertidal zone, including the recorded location of four vessels which were reported to have wrecked or stranded in the vicinity of Thorntonloch.

East Lothian Council HER also lists ten maritime sites, eight terrestrial sites and one building within the 1 km wide corridor. Scottish Borders Council HER also lists nine sites within the 1 km wide corridor, all of which are maritime.

11.2.1.2 England

There are currently no protected or designated wrecks within the Study Area.

There are two wrecks protected under the Protection of Military Remains Act 1986, consisting of the RFA *Creosol* and HMS *Patia*. However, these are located beyond the Study Area, some 4 km away and have therefore not been scoped in this assessment.

There are 14 known wreck sites recorded by the UKHO and one known obstruction within the Study Area (**Table 11-2**). Three of the sites are recorded as 'Dead' by the UKHO, and therefore have not been detected by repeated survey, and therefore may not exist in their reported locations.

Additionally, there are 14 receptors reported in the Tyne and Wear HER, and four in the Canmore records that lie within the 1 km corridor of the English Marine Area. Some of these may correspond to the UKHO records.

There appear to be no intertidal receptors within English Marine Area.

Table 11-2 UKHO charted wrecks located within the Study Area - English Marine Area

UKHO ID	Name	Type	Description	Latitude	Longitude	Nearest KP	Sources
4467	MAYSTONE (POSSIBLY)	steam ship	Lost 18.10.1949	55.72292	-1.597199	AC27	UKHO
4462	GUDVEIG	steam ship	Lost 25.01.1940. DEAD.	55.70406	-1.509871	AC28	UKHO
57998	LUNESDALE (POSSIBLY)	steam ship	Lost 12.03.1929.	55.54698	-1.390001	AC41	UKHO
4367	MORLAIX (PROBABLY)	steam ship	Lost 06.05.1924.	55.42273	-1.344578	AC59	UKHO
4248	EVENTIDE	fishing vessel	Lost 19.06.1976.	55.01302	-1.156477	AC73	UKHO
4547	LAGAN LOMEA	fishing vessel	Lost 06.08.1991. DEAD.	55.0665	-1.167941	AC73	UKHO
57013	Unknown	-	-	55.09689	-1.188862	AC73	UKHO
5720	ZEELAND (POSSIBLY)	steam ship	Lost 01.08.1916	54.93712	-1.163421	AC74	UKHO
5729	Unknown	-	Angular structure, possible lattice construction.	54.94362	-1.171882	AC74	UKHO

UKHO ID	Name	Type	Description	Latitude	Longitude	Nearest KP	Sources
64121	BLUE DAWN	fishing vessel	Lost 13.02.2004.	54.9164	-1.18352	AC75	UKHO
5680	Unknown	-	-	54.89976	-1.203252	AC75/76	UKHO
5769	JENNY M (POSSIBLY)	fishing vessel	Lost 06.09.1983	54.90145	-1.214731	AC75/76	UKHO
5672	SAGA (POSSIBLY)	steam ship	Lost14.02.1918.	54.8776	-1.236242	AC76	UKHO
89472	Unknown	-	-	54.85712	-1.328483	AC78	UKHO
57777	NORMAN	steam ship	Lost 10.06.1881. DEAD.	54.85644	-1.334117	AC78	UKHO

11.2.2 Aviation Archaeology

Marine aviation archaeology receptors comprise the remains or associated remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945.

Although there are currently no known aircraft crash sites located within the Study Area for in either Scotland or England, there is the potential for the discovery of previously unknown aircraft-related debris to exist on the seafloor within the Study Area, with a higher potential for material dating to the Second World War.

A number of recorded losses are located within the wider area; at least 28 recorded aircraft crash sites have been identified at sea within the 12 NM limit, including two that lie within 1 km of the Study Area, as recorded in the HER's for the area. As these are recorded losses, the positional data is unreliable and serves only to provide an indication of the types of aircraft that flew over this coastline. In many cases the location is only a set of general coordinates, a general distance and bearing from a landmark, or the location of the crew's dinghy, or recovered remains. Nonetheless, these highlight the potential for further archaeological material to be present within the Study Area.

These aircraft include a range of types and designs. There are at least 11 airfields in Northumberland, and 11 in North Yorkshire, that date to the Second World War or before, combining both training and active airfields with corresponding levels of loss through accidents or battle damage both overland and on the journey to and from the European mainland. As aircraft are protected under the Protection of Military Remains Act 1986, and maritime aircraft crash sites can retain a significant amount of material, whilst being an ephemeral target to identify, with the potential for burial means that there is a significant possibility that aircraft material may be present within the proposed Project Marine Scheme cable route.

11.3 Planned Surveys

Further primary data will be obtained from geophysical and geotechnical surveys covering the proposed Project Marine Scheme. The data will be archaeologically assessed to provide a full assessment of the known and potential underwater heritage receptors. An intertidal walkover survey will be undertaken at the two landfall options in order to ground truth previously recorded heritage receptors and to identify any new receptors that may be of relevance to the assessment. The results will be incorporated into a full desk-based assessment, which will be undertaken using data from the UKHO, and national and local authority sources.

11.4 Assessment Method

11.4.1 Baseline

For this Scoping report, the baseline of known marine archaeology and cultural heritage receptors within the proposed Project Marine Scheme refers to data obtained from the United Kingdom Hydrographic Office (UKHO) archives, which contains records relating to charted wrecks and other seabed obstructions that are considered navigational hazards. The UKHO data obtained covers the extent of the Study Area.

Data for the location of receptors has also been obtained from the following national and local authority sources:

Scotland

- Historic Environment Scotland Records (Canmore); and
- East Lothian Council and Scottish Borders Council Historic Environment Records (HERs).

England

- Historic England's National Record of the Historic Environment (NRHE);
- Databases of designated assets held by Historic England; and
- Durham County Council and Tyne and Wear County Council Historic Environment Records (HERs).

This data collection has been completed in line with the Chartered Institute for Archaeologists' (CIfA) *Standard and guidance for historic environment desk-based assessment* (CIfA 2014, updated 2020). This information will feed into a full desk-based assessment undertaken as part of the impact assessment process. The Environmental Appraisal documents will be prepared following standard industry practice and guidance for marine archaeology including but not necessarily limited to the following:

- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (Historic England 2008);
- JNAPC Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee and The Crown Estate 2006);
- Historic Environment Guidance for Offshore Renewable Energy Sector (COWRIE 2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology 2008);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for Renewable Energy Sector (Gribble & Leather 2011);
- Protocol for Archaeological Discoveries: Offshore Renewables Projects ('ORPAD') (The Crown Estate 2014);
- Our Seas – A shared resource: High level marine objectives (DEFRA 2009); Model Clauses for Archaeological Written Schemes of Investigations (The Crown Estate and Wessex Archaeology 2010, draft 2020);
- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (English Heritage and Bates, R., Dix, J. K., Plets, R. 2013);
- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England), 1998);
- Military Aircraft Crash Sites: Guidance on their significance and future management (English Heritage (now Historic England), 2002);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011);
- Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012); and

- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015).

In order to define the scope of the Environmental Appraisal receptors, liaison between key stakeholders and Archaeological Curators may be required. Key consultees would include:

- Marine Scotland Licencing Organisation Team (MS-LOT) and Marine Management Organisation (MMO);
- Historic Environment Scotland and Historic England; and
- Local Authority Archaeology advisors with responsibilities at the landfall.

11.5 Identification of Potential Effects

This section described the interactions on marine archaeological receptors which might potentially occur from the construction, operation and maintenance, and decommissioning of the proposed works. This assessment considers the methods described within **Chapter 2;** a summary of project phases and the source of potential impacts is summarised in **Table 11-3** below.

Table 11-3 Potential impacts of the Project Marine Scheme on Marine Archaeology

Project phase	Potential impact
Route preparation and cable installation	Seabed preparation, including cable route clearance and route preparation
	Laying and installation of cables
	Scour protection and non-burial protection measures
	Vessel activities.
Cable operation and maintenance	Potential effects comparable to route preparation and cable installation
Decommissioning	Potential effects comparable to route preparation and cable installation

11.6 Construction

All seabed receptors have the potential to be damaged or destroyed if they directly interact with seabed preparation or construction activities. All damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial, limiting further interactions.

Direct damage to marine archaeological receptors during the construction phase may arise from:

- seabed preparation, including cable route clearance and route preparation;
- laying and installation of cables;
- scour protection and non-burial protection measures; and
- vessel activities.

The indirect interactions upon the known and potential marine archaeological receptors considered here are those which occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the construction activities. These interactions may occur from the clearance works during route preparation but may also occur through sediment deposition or the placement of non-burial cable protection on the seabed.

11.6.1 Operation and Maintenance

Operational interactions will be limited to those arising from repair/replacement activities, installation of additional protection, and maintenance or any monitoring that may be required. These may result in the alteration of sediment transport regimes, indirectly interacting with marine heritage receptors, but may also lead to potential direct damage to known and unknown heritage receptors from sediment disturbance and deposition.

11.6.2 Decommissioning

Impacts arising during the decommissioning phase are expected to be similar to those experienced during the construction phase. There would be a temporary impact from the activities on site to remove structures, but this would be of relatively short duration, however any impact could still be potentially destructive to archaeological remains. The establishment of the archaeological environmental baseline and subsequent assessment of impacts will result in the production of a detailed map of features of archaeological significance. This will facilitate the decommissioning works while minimising any impacts upon features of archaeological significance.

11.6.3 Potential Cumulative Impacts

Individual known archaeological receptors within the Study Area would not be subject to direct impacts from other known plans or projects as they are discrete and there would be no physical overlap of different infrastructure. Given that indirect impacts (i.e. impacts from scour or sediment transport changes) are likely to be highly localised and small scale it is not considered likely that there are pathways for cumulative indirect impacts. There is potential though for cumulative impacts through the additive effect of small impacts across many projects, although to a great extent implementation of mitigation on each project should reduce this to impacts upon unknown receptors. Each project would have an agreed Written Scheme of Investigation (WSI) which would cover the approach to unknown receptors.

Although individual receptors are discrete, taken together they could have collective heritage value, therefore multiple impacts upon similar receptors could have a cumulative additive impact. In addition, there is potential for multiple developments to affect the larger-scale archaeological features such as palaeo-landscapes and historic landscapes/seascapes. A wider consideration of potential cumulative and in-combination effects is provided within **Chapter 19**.

11.6.4 Mitigation

Impacts to both known and potential marine archaeological receptors are addressed through the application of embedded mitigation. Known archaeology would be avoided through the application of Archaeological Exclusion Zones (AEZs) and subsequent micro-siting of infrastructure on the seabed.

Unavoidable impacts to potential receptors would be addressed through a series of agreed mitigation measures to deal with the discoveries once impacts have occurred and been identified. These measures would be set out in the project Written Scheme of Investigation (WSI) which would clarify the methodologies to address unavoidable impacts associated with the worst-case scenario (project design envelope) in accordance with the *Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects* (The Crown Estate 2010).

11.7 Summary

There are no designated marine archaeological receptors within the Study Area. There are three UKHO charted wrecks within the Study Area of the Scottish Marine Area, and 14 wreck sites and one known obstruction recorded by the UKHO within the Study Area of the English Marine Area.

There is the potential for as yet undiscovered marine archaeology receptors within the Study Area. These include maritime and aviation archaeological sites, as well as *in situ* prehistoric sites and finds, and intertidal heritage receptors.

12.Shipping and Navigation

12.1 Introduction

This chapter of the scoping report presents a high-level overview of baseline shipping activity and key navigational features within the vicinity of the Project, before proposing the scope and methodology for the shipping and navigation assessment that will be conducted during the Environmental Appraisal.

Shipping and navigation has been identified as a key receptor for consideration by the Environmental Appraisal, due to potential interactions between existing vessel traffic and the Project Marine Scheme, particularly during the installation phase. It is therefore necessary to identify and assess the potential interactions, to understand the impacts, identify possible mitigation measures and ultimately demonstrate that the project will not adversely affect vessel traffic.

It is noted that the recent COVID 19 pandemic is likely to have affected shipping activity within the study area. As such, vessel traffic data during the pandemic may underrepresent the true level of baseline shipping activity. In order to mitigate this, the Shipping and Navigation assessment will be based on data predating the pandemic, as detailed in **Section 12.2.3** and **Section 12.4.2**.

12.2 Baseline Environment and Study Area

12.2.1 Study Area

As detailed within **Chapter 1**, the scoping boundary for the Project Marine Scheme comprises a 1 km wide linear corridor. However, with respect to shipping and navigation receptors, the ZoI of the project may be substantially larger.

As such, the shipping and navigation Study Area comprises a 10 NM corridor, centred on the indicative route alignment, which the runs from Thorntonloch Beach in East Lothian, Scotland to Seaham in England. The Project Marine Scheme cable route is approximately 176 km long; approximately the first 38 km of the proposed route is within Scottish waters and the remaining route (from KP 38 to KP 176) is within English waters. **Figure 12-1** below illustrates the Scoping Boundary, and 10 NM shipping and navigation Study Area against Admiralty charts to show the wider navigational context.

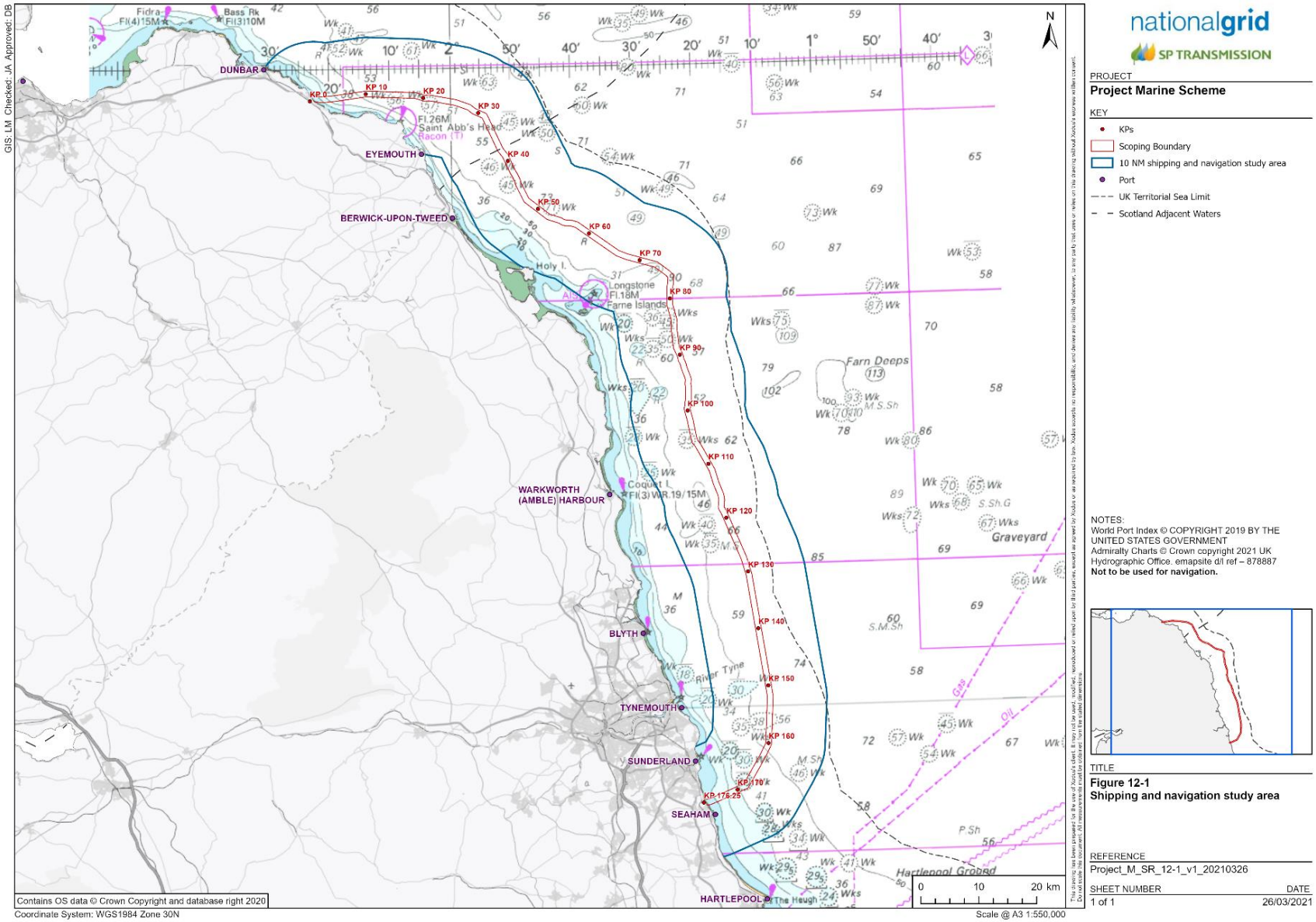


Figure 12-1 Shipping and Navigation Study Area

12.2.2 Key Navigational Features

As shown in **Figure 12-2** Scottish waters (between approx. KP 0 and KP 37) the ports of Dunbar and Eyemouth lie at the edge of the Project Marine Scheme 10 NM Study Area, both are located approximately 9 km from the Scoping Boundary. Dunbar has two Royal Yachting Association (RYA) Training Centres and a Sailing Club whilst Eyemouth has a marina.

Although the Forth Ports harbour limits are outside the Study Area (18 km to the north-west of the scoping boundary), Forth Ports will be a relevant harbour authority as much shipping traffic in the wider region will route to and from their facilities within the Firth of Forth.

Within English waters (from approximately KP 38 onwards), the 10 NM Study Area runs parallel to the coastline intersecting three RYA General Boating areas between approx. 5.7 and 8.8 km from the Scoping Boundary. The Project Marine Scheme Study Area also crosses into a General Boating area between KP 160 and the landfall at KP 176.25 (see **Figure 12-2**).

The harbour limit of the port of Seaham is approximately 0.6 km to the south of the scoping boundary at the closest point, additionally Sunderland port limit lies approx. 0.6 km to the north. The ports of Tynemouth and Hartlepool do not fall within the 10 NM Study Area (they are approximately 13.1 km and 11.7 km away from the scoping boundary respectively), however much shipping traffic in the region will route to and from these locations and will intersect with the Study Area, and hence these will be relevant harbour authorities for the project.

In Scottish waters there is an anchorage location within the 10 NM Study Area near Eyemouth port which is approximately 6.7 km away from the scoping boundary. In English waters, an anchorage is located to the east of Seaham port which is approximately 1.1 km away from the scoping boundary. Also within the 10 NM Study Area are two anchorage locations (3.6 km and 6.4 km from the scoping boundary) and a pilot boarding location (6.7 km from the scoping boundary) outside Sunderland port. An anchorage area associated with Hartlepool and Teesport overlaps with the 10 NM Study Area to the south, approximately 7.6 km from the scoping boundary at the closest point.

There are no Traffic Separation Schemes (TSSs) or other routing measures in the vicinity of the Project Marine Scheme Study Area.

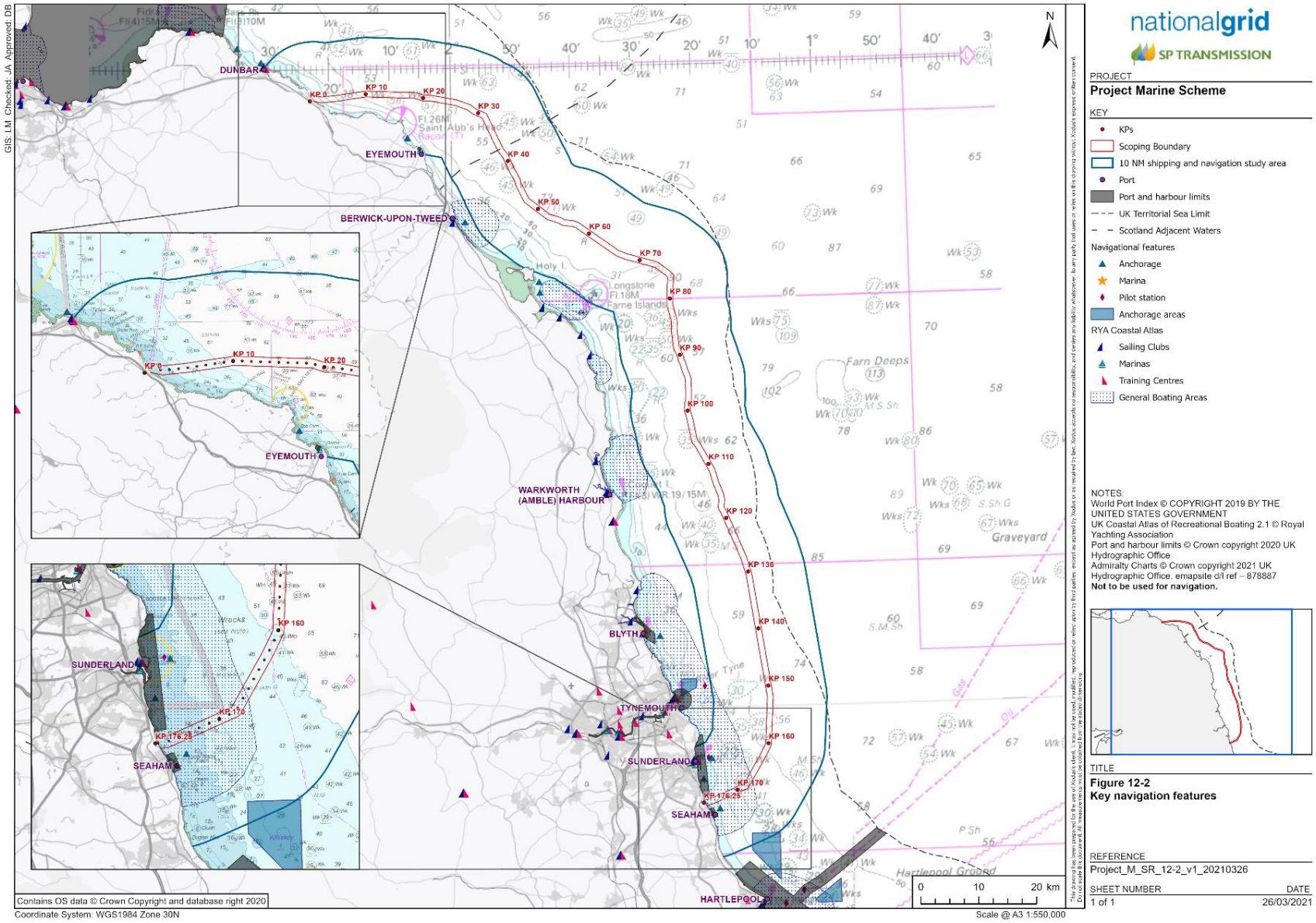


Figure 12-2 Key Navigational Features

12.2.3 Shipping Activity

An overview of the shipping activity in the vicinity of the Project Marine Scheme Study Area based on historic Automatic Identification System (AIS) data for 2017 is shown in **Figure 12-3**, showing that shipping activity is high throughout the 10 NM Study Area, but particularly concentrated transiting to and from a number of ports and along both the Scottish and English coastlines. Traffic routing to and from Dunbar and Eyemouth in Scottish waters and Tynemouth and Sunderland in English waters account for the high density of vessel traffic between KP 10 – 37 and KP 135 – 170 respectively.

Figure 12-4, shows AIS vessel tracks classified by vessel type. In Scottish waters, high levels of vessel activity are observed between KP 10 – KP 37, this primarily results from fishing vessels working from the harbours of Dunbar and Eyemouth, as well as cargo vessels and tankers transiting along the coast, to and from the Firth of Forth, in a direction broadly parallel to the Scoping Boundary. Within English waters, vessel traffic density remains relatively high between KP 38 – KP 100, this is primarily due to cargo vessels and tankers transiting along the coast to and from the Firth of Forth. The number of vessel tracks within the Study Area then decreases between KP 100 – KP 135.

Vessel activity increase again from KP 135 to KP 170, this is associated with a range of vessel types, but predominantly fishing, cargo vessels and tankers routing to and from the ports of Blyth, Tynemouth, Sunderland, and Hartlepool. A dense band of passenger vessel tracks is observed at approximately KP 160, this is likely to be the Newcastle – Ijmuiden ferry vessel traffic. On the approach to the English Landfall, between KP 170 – 176, the scoping boundary parallels an area of dense cargo vessel traffic transiting to and from Seaham Harbour.

In 2017, there were 12,010 vessel tracks within a 10 NM Study Area around the Project Marine Scheme scoping boundary. **Figure 12-5** details the distribution of shipping vessel types within the 10 NM corridor around the Project Marine Scheme scoping boundary showing that fishing vessel tracks comprised 49% of the vessel tracks within the area in 2017, followed by 16% tankers.

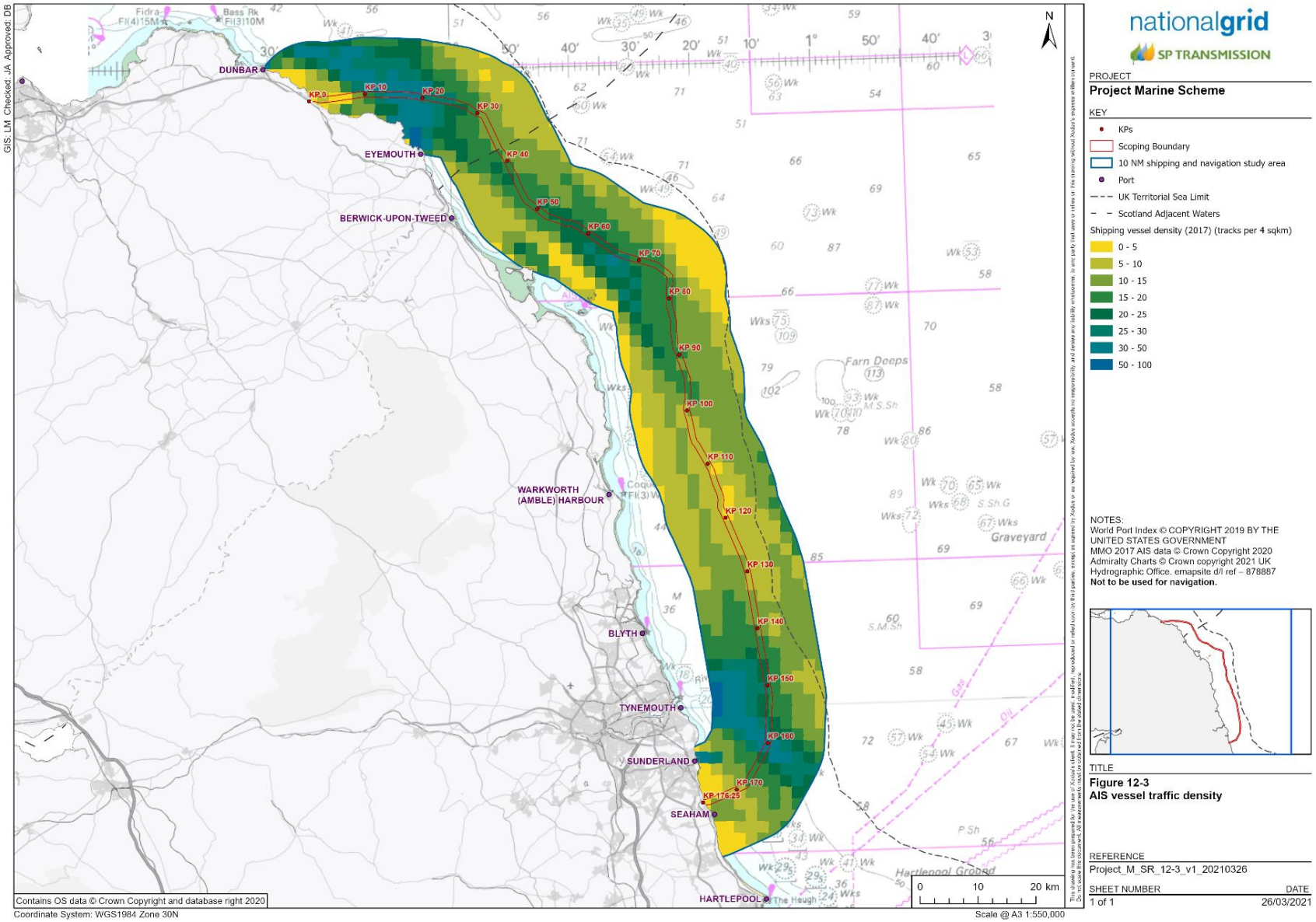


Figure 12-3 AIS Vessel Traffic Density

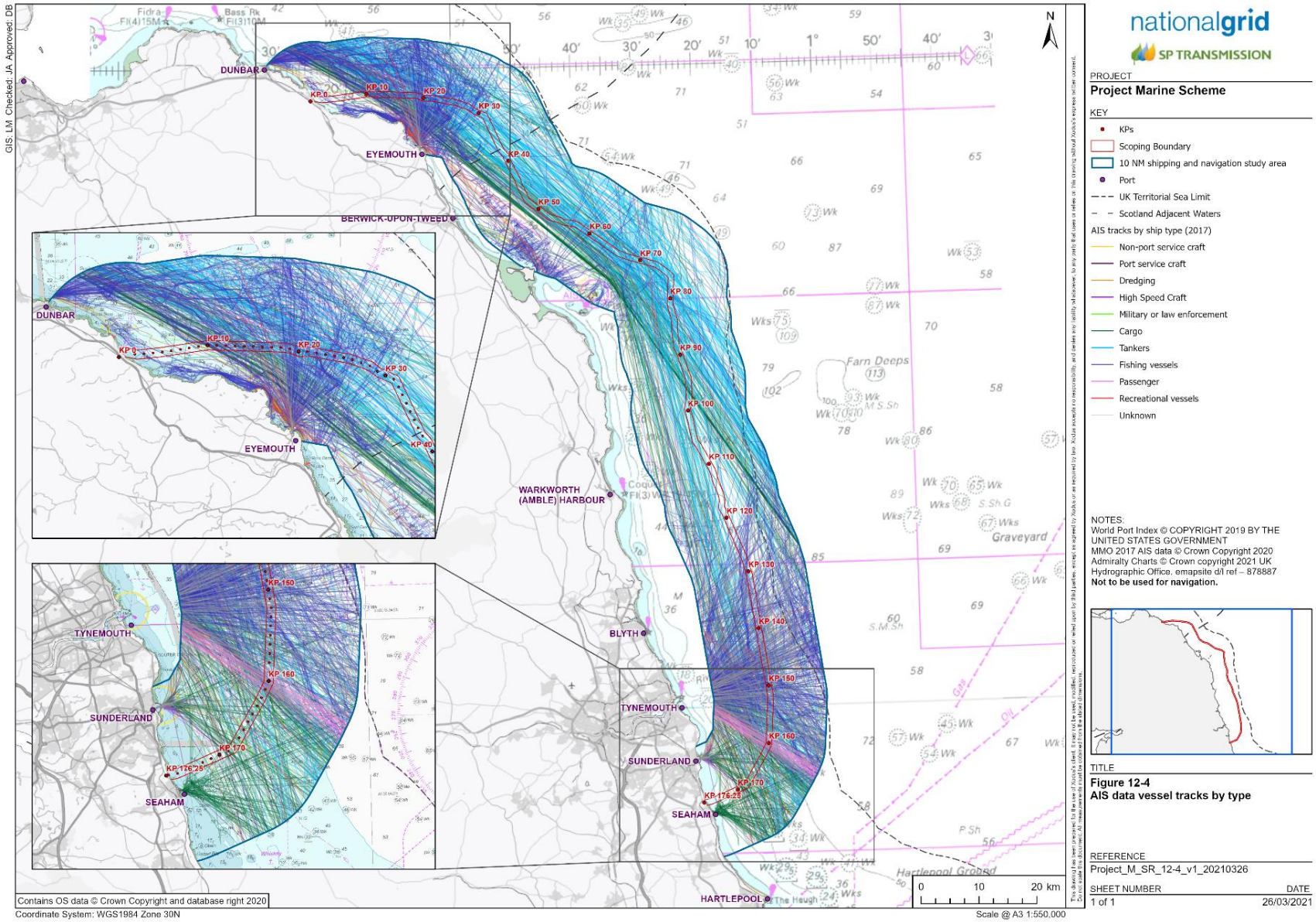


Figure 12-4 AIS data Vessel Tracks by Type

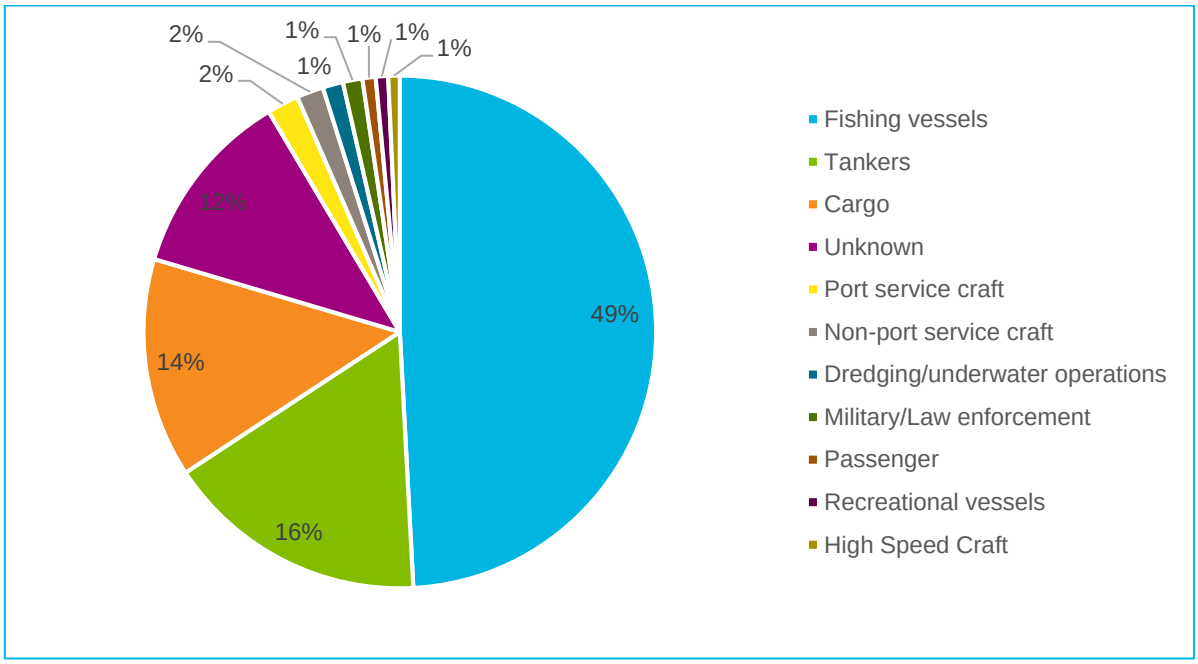


Figure 12-5 Vessel type distribution within 10 NM Study Area

12.3 Planned Surveys

No further primary data surveys are proposed to inform the Environmental Appraisal.

12.4 Assessment Method

12.4.1 Overview

A Navigational Risk Assessment (NRA) including Marine Traffic Survey (MTS) and Formal Safety Assessment (FSA) shall be undertaken to understand and address the effects. The NRA will form the shipping and navigation assessment chapter within the Environmental Appraisal.

The assessment methodology will be aligned to the following best practice guidance documents in so far as relevant for a cable project:

- International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA) - MSC-MEPC.2/Circ.12/Rev.2 (9 April 2018); and
- MCA MGN 543 (M+F) Offshore Renewable Energy Installations Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA, 2016).

To provide a detailed understanding of shipping activity in the Study Area, the MTS shall identify navigational features and patterns of vessel activity within the vicinity of the Project Marine Scheme, using publicly available data to establish baseline conditions to inform the subsequent FSA. Stakeholder consultations shall also inform the baseline understanding of shipping in the area. Subsequent risk assessment will identify and log hazardous outcomes such as collision, snagging and disruption to shipping against risk categorisation, mitigation measures, and ultimately, acceptability.

The FSA process provides a systematic method for evaluating and controlling risk, within a structured framework. The process reflects the Environmental Appraisal methodology set out in **Appendix B.** Baseline shipping patterns and navigational features along with stakeholder consultations provide the basis for establishing potential hazards, or impacts. These impacts are then characterised in their magnitude and likelihood, which ultimately provides for risk categorisation against a risk matrix.

Additional control or mitigation measures are then identified to provide a reduction in risk. The residual effects are assessed to determine risk acceptability in accordance with the principles of ALARP (As Low As Reasonably Practicable). Where necessary or appropriate, mitigation measures are assessed to determine/justify an ALARP position.

In summary, the Shipping and Navigation assessment shall comprise the following elements:

- Marine Traffic Survey;
- Hazard / Impact identification;
- Risk assessment, considering existing mitigation measures;
- Identification of additional risk mitigation measures;
- Cost benefit considerations; and
- Risk Assessment Table.

The outcome of these six steps is the formulation of recommendations to inform decision-making for all relevant parties. Further detail on each step is provided below.

12.4.2 Marine Traffic Survey

An MTS will be undertaken as part of the NRA and shall involve the purchase of detailed AIS data for a 10 NM wide corridor around the proposed Project Marine Scheme cable route. The International Maritime Organisation (IMO) requires that all ships of ≥ 300 gross tonnage engaged on international voyages, cargo vessels of ≥ 500 gross tonnage not engaged on international voyages, and all passenger ships regardless of size built on or after 1st July 2002, are fitted with an AIS. All European Union (EU) registered fishing vessels of length 15 m and above are required to carry AIS equipment by EU directive. Smaller fishing vessels (below 15 m) as well as recreational craft are not required to carry AIS but a proportion does so voluntarily, however are likely to be under represented in the AIS data.

AIS data will be used to assess the patterns and intensity of shipping activity in the vicinity of the project. To avoid possible abnormalities in vessel activity arising from the COVID-19 pandemic, 2019 AIS data will be used with six months of AIS data being purchased for a summer period May - July 2019 (inclusive), and winter period Nov 2019 - January 2020 (inclusive). In addition, 2017 (and earlier) AIS data which is publicly available and will be used to provide context but not specifically analysed.

Due to the likely under representation of small fishing and recreational vessels in the AIS data, additional data sources including VMS data, the RYA Coastal Atlas, and consultation will be used to validate the findings of the AIS analysis.

Additional analysis shall consider key navigational features and fishing activity. Key navigational features will be extracted from additional sources of data.

Additional data sources that will be reviewed for the Marine Traffic Study include:

- Historic AIS vessel traffic data;
- Fishing vessel traffic data – VMS and AIS;
- Admiralty charts for the area;
- Maritime incident data in the area (RNLI, SARH);
- The Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating;
- Sailing and Pilot books; and
- Relevant studies from nearby developments.

12.4.3 Consultation

In order to inform the Shipping and Navigation Assessment and NRA, consultation with key relevant maritime stakeholders will be undertaken in order to obtain supplementary information, which may not be available through the data sources outlined above. Parties consulted will include, but may not be limited to:

- MCA;
- Northern Lighthouse Board (NLB);
- Trinity House;
- Chamber of Shipping;

- The RYA;
- Commercial Fisheries representatives (see **Chapter 13**); and
- Relevant port and harbour authorities including:
    - Forth Ports;
    - Port of Tyne;
    - Port of Sunderland;
    - Seaham Harbour; and
    - Tees and Hartlepool Port Authority.

Consultee input shall be incorporated where appropriate into the NRA such that concerns and impacts are recorded and addressed/minimised.

12.4.4 Hazard Identification

Taking into account the project components and activities, baseline information provided in the MTS, consultation responses and expert judgement/industry experience, a list of relevant impacts to marine navigation, shall be compiled as a desktop exercise.

The list shall be captured in a table and retained as an auditable hazard log. Hazards relating to separate project phases shall be identified. Note that hazards shall be identified according to a North to South order and in reference to Kilometre Points (KP) and both Scottish and English waters on the installation corridor. The potential consequences or effects of the hazards and the likelihood of the outcomes are then assessed using a risk assessment matrix.

12.4.5 Risk Assessment

The risk assessment process is implemented using a classic risk matrix approach. Each hazard/impact is individually evaluated against specific criteria and assigned categories for 'severity of consequence' (Magnitude) and 'frequency of occurrence' (Likelihood). This assessment of risk shall be conducted in consideration of the embedded mitigation outlined above.

The risk matrix has been designed to reflect the Environmental Appraisal structured approach and terminology as outlined in **Appendix B** with respect to the definitions for likelihood and consequence. However, the risk assessment categorisations directly reflect the UK Health and Safety Executive principles of ALARP. The entire approach is consistent with relevant marine guidance from the International Maritime Organisation (IMO, 2019) and the UK Maritime Coastguard Agency (MCA, 2016). The definitions of the categories for outcome severity / magnitude and the frequency or likelihood are captured in the following tables. The Risk Matrix which combines them is included further below:

Table 12-1 Indicative Hazard Outcome Severity Criteria

Severity / Magnitude	Criteria
High	Loss of a crew member, or multiple serious injuries Major/Severe damage to infrastructure or vessel
Medium	Serious injury to person Notable damage to infrastructure or vessel
Low	Minor injury(s) to person Minor/Local damage to equipment or vessel
Negligible	No significant operational impacts

Table 12-2 Indicative likelihood criteria

Definition	Indicative description*
Remote	Never occurred during Company's activities but has been known to occur in the wider industry
Unlikely	Has occurred in Company's activities in the past but as an isolated incident under exceptional circumstance.
Occasional	Has occurred on more than one occasion during Company's activities in the past
Likely	Occurs regularly during Company's activities

The likelihood and consequence categories are combined for each hazard/impact using the risk matrix shown below, which is used to derive a risk tolerability level of either Unacceptable, Tolerable or Broadly Acceptable, with unacceptable or tolerable risks being considered to be significant in Environmental Appraisal terms. Definitions of each risk tolerability level are provided further below.

Table 12-3 Risk Matrix

Frequency/ Likelihood	**Likely**	Broadly Acceptable	Tolerable	Unacceptable	Unacceptable
	Occasional	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Unlikely	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Remote	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	**Low**	**Medium**	**High**
	Severity of Consequence / Magnitude				

Table 12-4 Tolerability Definitions

Tolerability	Definition
Broadly Acceptable (Low Risk - not significant)	Generally regarded as acceptable and adequately controlled. At these risk levels the opportunity for further reduction is limited.
Tolerable if ALARP (Moderate Risk - significant)	Typical of the risks from activities which people are prepared to tolerate to secure benefits. There is however an expectation that such risks are properly assessed, appropriate mitigation measures are in place, residual risks are as low as reasonably practicable (ALARP) and that risks are periodically reviewed to monitor if further controls are appropriate.
Unacceptable (High Risk - significant)	Generally regarded as unacceptable whatever the level of benefit associated with the activity. Significant risk mitigation or design modification required to reduce to tolerable (ALARP).

12.4.6 Identification of Additional Mitigation Measures

Where risks are assessed as being unacceptable or tolerable (significant) after factoring in the embedded mitigation measures already identified, further additional risk mitigation measures are identified and considered.

12.4.7 Cost-Benefit Analysis

In order to formulate recommendations for decision-making, any additional risk mitigation measures identified are subjected to a qualitative cost-benefit comparison in order to justify the measure and establish a residual risk categorisation and basic ALARP position.

12.4.8 Risk Assessment Table

The Risk Assessment shall be captured in a table such that the hazards and impacts for each of the project phases and the relevant embedded mitigation measures and any additional mitigation measures identified, are captured to provide an auditable hazards and effects register or log shown below:

Table 12-5 Hazard and Effects Register Example

Hazard/ Impact	Phase	Existing Mitigation measures	Causes	Consequence	Likelihood	Risk	Additional Mitigation measures	CBA	Residual Risk
Collision	Installation	• Notice to Mariners • COLREGS • etc	Human Error	High	Remote	Tolerable	Specific Procedures	Measure Justified	ALARP

*Table entries are indicative for example only

12.4.9 Cumulative Effects and Future Case

Cumulative effects and future case will be included by review of future projects potentially affecting or influencing the Study Area and the wider general area and assumption of a general increase in traffic density.

A list of potential projects and activities shall be compiled and is expected to include windfarm extensions and offshore industry activities in the North Sea. Each hazard/impact will be qualitatively reviewed against the potential direct and indirect cumulative effects from any of the projects listed as well as general increases in traffic density.

Any issues shall be captured, and further risk mitigation measures considered where deemed appropriate. It is noted that as a subsea cable, no surface infrastructure will remain following installation therefore no lasting cumulative effect, with the exception of seabed interactions, is foreseen.

Cumulative and in-combination effects are discussed more widely within **Chapter 19**.

12.5 Identification of Potential Effects

Potential impacts to shipping and navigation have been mitigated as far as practicable through avoidance of the main navigational features in the area such as charted anchorages, maintained channel depths and prohibited regions. However, it is not possible for the development to avoid commercial navigation areas. **Table 12-6** below summarises the key potential impacts to Shipping and Navigation.

Table 12-6 Potential impacts of the Project Marine Scheme to Shipping and Navigation

Project phase	Potential impact
Route preparation and cable installation	Increased risk of vessel-to-vessel collision
	Deviation from established and identified vessel routes and areas
	Interaction with Fishing Gear
Cable operation and maintenance	Interaction with vessel anchors and anchoring activity
	Reduction in under keel clearance resulting from laid cable and associated protection
	Interference with marine navigational equipment
Decommissioning	Potential effects comparable to route preparation and cable installation

12.5.1 Increased risk of vessel-to-vessel collision

The presence of construction/installation and/or maintenance, vessels with limited manoeuvrability, increases the risk of a vessel-to-vessel collision in high traffic density locations. Standard mitigations including promulgation of information and minimum safe passing distances will be in place to mitigate this risk.

12.5.2 Deviation from established and identified vessel routes and areas

During construction/installation and/or maintenance, traffic will be required to alter their planned routes due to the installation vessels and observe the minimum passing distance. To mitigate this potential disruption/impact Notice to Mariners (NtM) will be issued on a frequent basis before and during the cable installation period. This will inform sea users of which areas require to be avoided at particular times in the project.

12.5.3 Interaction with vessel anchors and anchoring activity

The cable corridor locations have been selected to minimise the risk from dragged anchors, by avoiding designated anchorage areas, however due to the expected level of shipping, vessels that regularly visit the ports and features adjacent to the cable corridor, may drop anchor in the vicinity and risk dragging their anchors across the cable corridor. Embedded mitigations shall include Admiralty Chart marking and a cable burial risk assessment will also establish appropriate burial depths and protections etc to specifically address the risk. Nonetheless, assessment within NRA will address anchoring activity near the cable and in respect of traffic volume and characteristics.

12.5.4 Interaction with fishing gear

The presence of a range of fishing activity presents the risk of gear snagging, should the cable not be adequately buried and or protected. Embedded mitigation of the charted presence of the cable location shall minimise this risk to a considerable extent. However, the NRA shall address the locations types and volume of fishing vessels and in the context of the cable burial risk assessment such that any hazardous areas or sections are identified and addressed.

12.5.5 Reduction in under keel clearance

The cable and protections shall follow relevant legislative requirements and cable burial risk assessment. Nonetheless, any potential hazard to deep draught vessels shall be identified and addressed in the NRA.

12.5.6 Interference with marine navigational equipment

Electrical cables generate local magnetic fields. This can result in interference with magnetic navigational equipment when in close proximity to the affected area. The vast majority of vessel traffic use Gyro compasses which are unaffected by EMF. However, it is noted however that in poor visibility magnetic compasses may be relied upon.

Nonetheless, it is expected that the installation methodologies described in **Chapter 2** will mean that the net magnetic field effects to a deviation of less than 5 degrees, at the surface, even in shallow water. The NRA shall capture and address this risk so as to ensure that it is indeed acceptable.

12.5.7 Embedded mitigation

Embedded risk mitigation are identified such that they can be incorporated into the assessment process. These include industry standard practice and any project specific measures that are considered implemented through the project design. The risk assessment is based on the inclusion of these existing or embedded measures. Additional mitigation measures are identified to further reduce the risk if/where necessary. The existing or embedded mitigation measures, shall include but may not be limited to:

- The cable installation corridor has been identified in consideration of relevant shipping and navigation constraints. Potential impacts to shipping and navigation have been mitigated through

avoidance of the main navigational features in the area such as charted and known anchorages, maintained channel depths and prohibited regions;

- All vessels will adhere to the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs);
- Notice to Mariners (NtM), Radio Navigational Warnings, NAVTEX and/or broadcast warnings, and Kingfisher Notifications will be promulgated in advance of works, including the time and location of work being carried out, and emergency event procedures;
- Appropriate lights and shapes will be displayed on installation vessels;
- Installation Vessels shall broadcast their status on AIS at all times, to indicate the nature of the work in progress, and restricted manoeuvrability;
- Guard vessel(s), using RADAR with Automatic RADAR Plotting Aid (ARPA) to monitor vessel activity and predict possible interactions, will be employed to work alongside the installation vessel(s) during cable installation works;
- Temporary 500 m (advisory) safety zones (referred to as Recommended Clearance Zones (RCZ) to avoid confusion with legislative safety zones) will be established around the installation vessels, notified via NtM and navigation warnings as appropriate and monitored by the guard vessels;
- Consultation with the Maritime and Coastguard Agency (MCA), Northern Lighthouse Board (NLB), Trinity House, and relevant harbour and port authorities in the area;
- The use of a Fisheries Liaison Officer (FLO) will be considered and implemented during installation and associated marine activities, as required; and
- Notification of regular runners (e.g. ferry operators) identified as potentially being impacted by the installation operations.

12.6 Summary

The NRA shall be based on real shipping patterns and navigational features from up-to date AIS Data and publicly available navigational sources. Increased shipping volume and cumulative effects shall be taken into account. The assessment shall be centred around an FSA which reflects the project Environmental Appraisal, relevant marine guidance and the principles of ALARP. The risk matrix approach aims to identify effects on shipping such as collision and disruption such that they can are recorded auditable and effectively managed. Existing and additional or recommended mitigation measures and their justification, where appropriate shall also be recorded.

13.Commercial Fisheries

13.1 Introduction

This chapter of the scoping report provides a high-level overview of relevant commercial fisheries baseline information as well as summarising potential interactions that have been identified between the Project Marine Scheme and commercial fisheries receptors.

The Project Marine Scheme falls within the management areas of the following Inshore Fisheries and Conservation Authorities (IFCAs) (England):

- North Eastern IFCA (NEIFCA), covering the marine area between 0 and 6 NM from MHWS between the River Tyne and North East Lincolnshire (Cleethorpes); and
- Northumberland IFCA (NIFCA).

IFCAs are either committees or collaborative (joint) committees of the local authorities that fall within a given Inshore Fisheries Conservation district; they are primarily tasked with the sustainable management of inshore fisheries resources in their district. IFCAs have a number of different specific roles including fisheries management inside of 6 NM, marine conservation & management of protected areas, sustainable management of fisheries and 'good regulation' implemented through a range of measures, including local bylaws. Section 174 of the MCAA also requires IFCAs to collaborate with other neighbouring IFCA districts and public authorities involved in marine regulation.

Between 6 nm and 12 NM fisheries management is the responsibility of the UK fisheries authorities. For English waters this is the MMO. For Scottish waters this is Marine Scotland. Fisheries across all Scottish territorial waters (within 12 NM from MHWS) are managed by Marine Scotland.

As of 1st January 2021 following the UK's exit from the European Union and the end of the associated transitional arrangement period, the United Kingdom Single Issuing Authority (UKSIA) as part of the MMO manages fishing vessel licencing for foreign vessel access to UK waters within the British Fishery Limits[15] on behalf of the UK sea fish licensing authorities of England and Scotland[16]. The UK fisheries authorities remain responsible for the administration and management of UK vessel licensing within the UK EEZ (UK Government, 2021).

13.2 Baseline Environment and Study Area

The Project Marine Scheme is aligned through International Council for Exploration of the Sea (ICES) Rectangles 41E7, 40E8 (Scottish waters) and 40E8, 39E8, 38E8 (English waters). as shown in **Figure 13-1** below.

[15] which are defined by the UK Exclusive Economic Zone (UKEEZ)
[16] (and Wales and Northern Ireland)

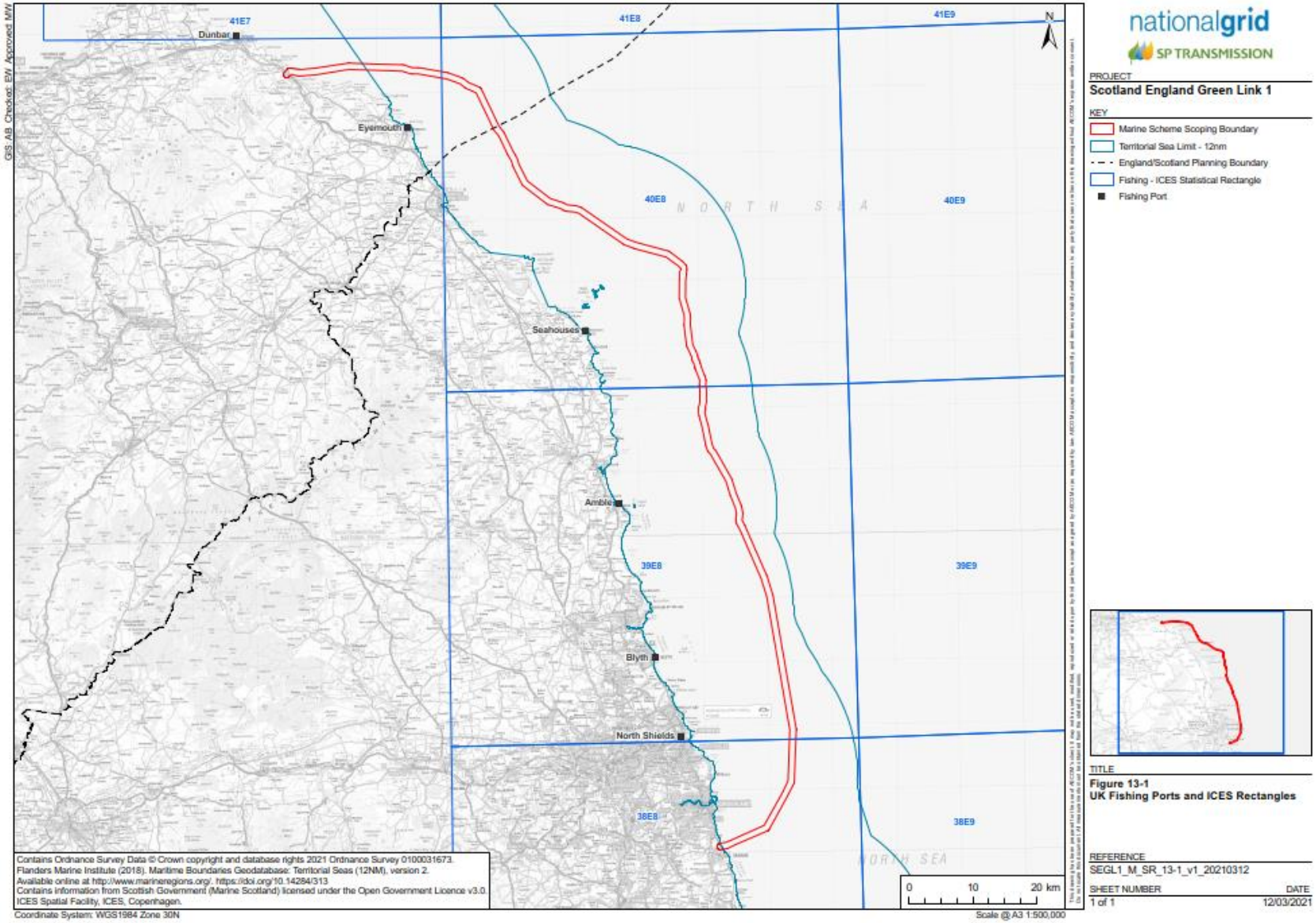


Figure 13-1: UK Fishing Ports and ICES Rectangles within the Study Area

The inshore waters off East Lothian and Scottish borders stretching down into north east English coast through which the Project passes are also areas of extensive fishing activity, with primary sensitivities related to inshore potting areas extending along the route, as well as *Nephrops* grounds.

A number of fishing ports and harbours are located along the coast parallel to the Project Marine Scheme. **Figure 13-1** indicates east coast ports/harbours that recorded a total landed catch value of >£1million in 2019 (MMO, 2015 - 2019).

Significant fishing activity particularly takes place out of Dunbar harbour, in East Lothian and Eyemouth in the Scottish borders at the northern end of the Project with the area between KP10 and KP30 notably utilised by fishing vessels, recorded on AIS tracking data. Other smaller ports and harbours also support important local fisheries. Craster and Seahouses on the Northumbrian coast provide examples of harbours supporting local important, predominantly shellfish, fisheries using pots and traps for lobster, crab and whelk.

Value and landed weight varies along the route through ICES areas as indicated in **Figure 13-2**.

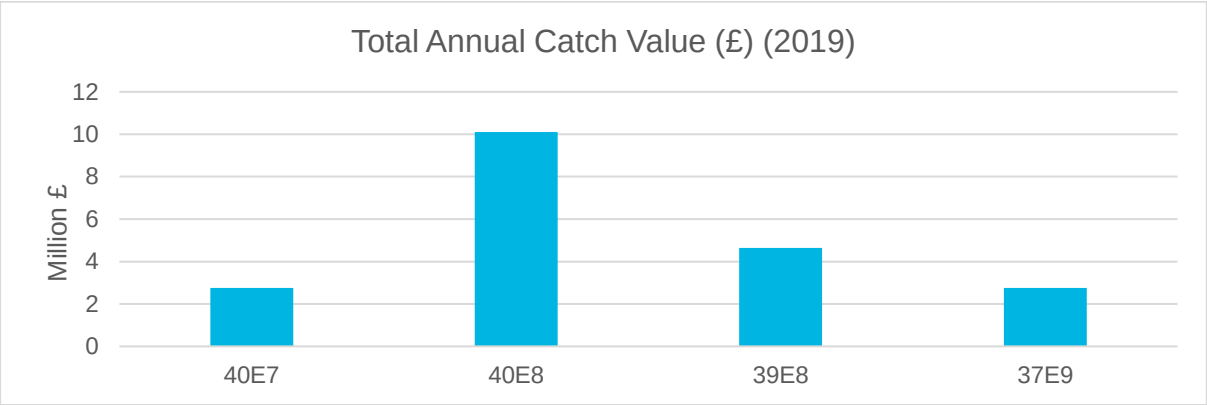


Figure 13-2: Annual Catch Value (£) by ICES rectangle (2019) (MMO, 2015 - 2019)

ICES area 40E8 makes the most significant contribution to the local fisheries industry by annual catch value and is understood to coincide with known *Nephrops* grounds as well as known scallop and static gear grounds fished by local vessels including from the harbour at Eyemouth.

Demersal trawl /seine fishing also contributes to the commercial contribution of these areas to the fishing economy.

At the southern end of the Project AIS tracking data records frequent crossings of the Project between approximately KP 140 and KP 160 corresponding with access routes into Tynemouth. As the Project Marine Scheme approaches landfall it is understood to pass through lobster and crab potting grounds in the near shore waters (between 3 to 6 NM) which are fished particularly by boats from Seaham immediately to the south of the landfall location.

13.3 Planned Surveys

No surveys specific to the topic of Commercial Fisheries are proposed.

13.4 Assessment Method

The Study Area that will be applied for the commercial fisheries assessment will comprise the Project Design Envelope and will extend to incorporating the relevant (ZoI) of the Project impacts.

At this stage, the ZoI for commercial fisheries is anticipated to include the area of fishing grounds through which the Project passes and therefore which may be directly affected by cable installation, operation and maintenance and decommissioning. The ZoI will therefore also include the commercial fisheries fleet segments (defined by vessel size and gear type, incorporating target species) whose fishing activities may either be directly affected by Project activity or indirectly through potential disruption to steaming routes. Impacts arising from potential indirect effects e.g. through sedimentation or effects on fish or shellfish as ecological receptors will be primarily documented in the relevant receptor chapters of the Environmental Appraisal. Any residual effects once mitigation measures have

been applied will then if necessary, be considered for their secondary impact on commercial fishing activity.

The assessment methodology used in this assessment will be consistent with the Environmental Appraisal methodology set out in **Appendix B**.

13.4.1 Data Sources

A range of baseline data sources will be used to help inform the assessment:

- UK Annual fisheries Statistics 2019 – source MMO. UK sea fisheries annual statistics report 2019 - GOV.UK (www.gov.uk);
- UK Fishing Vessel List – source MMO. UK fishing vessel lists - GOV.UK (www.gov.uk);
- Scottish Sea Fisheries Statistics – source MS 2019 Scottish Sea Fisheries Statistics - Fishing Effort and Quantity and Value of Landings by ICES Rectangles | Marine Scotland Data Publications;
- Vessel Monitoring System (VMS data, MMO landings data); and
- Other publicly available reports and information received from consultations.

13.4.2 Consultations

Notwithstanding, during the course of the Environmental Appraisal, an appropriate level of engagement with fisheries stakeholders at national regional and (if possible) targeted local will be carried out in order to appropriate understanding the characteristics of fishing activity and the Project's potential interactions with them.

It is anticipated these technical consultees will include: NEIFCA, NIFCA, Marine Scotland and other relevant fisheries organisations including but not limited to National Federation of Fishermen's Organisations (NFFO), Scottish Fishermen's Organisation (SFO) and SWFP.

13.5 Identification of Potential Effects

Potential effects on commercial fisheries will be considered alongside the consideration of effects on fish and shellfish ecology as discussed in **Chapter 8** above and are summarised in **Table 13-1** below.

Table 13-1 Potential impacts of the Project Marine Scheme to Shipping and Navigation

Project phase	Potential impact
Route preparation and cable installation	Physical presence of installation vessel(s) may require temporary safety restrictions around installation vessels, resulting in corresponding temporary restrictions to access to fishing grounds Temporary removal or relocation of other seabed features which may cause obstruction may be required at limited and specific locations, e.g. temporary lifting of static gear fishing pots Direct loss or damage to fishing grounds as a result of cable burial activities. Any Project interaction with known *Nephrops* grounds, scallop dredging areas or lobster/crab potting grounds will be specifically considered Loss or damage to habitat as a result of sediment disturbance, including increased turbidity within the water column and smothering during cable burial; Sensitivity of fish stocks to this effect is likely to be variable and seasonal. Any Project interaction with known *Nephrops* grounds, scallop dredging areas or lobster/crab potting grounds will be specifically considered. Nursery and spawning locations and times of year for commercial species may also be particularly sensitive to potential effect Accidental leaks and spills from installation vessels resulting in contaminant release affecting commercial fish stocks and/or their habitats Potential for small scale employment of local boat(s) to provide guard vessel services, but they will have to meet certain standards and final decision will be made by the installation contractor
Cable operation and maintenance	Potential for permanent change to/loss of commercial fish habitat due to cable protection measures (rock protection) may occur

Project phase	Potential impact
	Potential for cable protection measures to affect seabed profile and overtrawl-ability etc will also be given consideration within the Environmental Appraisal
Decommissioning	Potential effects comparable to route preparation and cable installation

Navigation risk and safety issues associated with the interaction between the Project Marine Scheme and the operation of fishing vessels including any potential for interference with magnetic compass used by fishing vessels for navigation has been considered under **Chapter 12**.

13.6 Summary

In summary the waters off the east coast of the UK support extensive and valuable mixed fisheries operating from a range of both larger and small fishing ports and harbours, all of which support local community providing valuable socio-economic function.

The Project, through both the proposed scope of the Environmental Appraisal will seek to work with the fishing community to manage potential interactions during installation and to ensure that, once installed, the Project will operate safely and un-intrusively alongside the commercial fisheries activities within the area.

14.Other Sea Users

14.1 Introduction

This chapter of the scoping report identifies the potential interactions between the Project Marine Scheme and other sea users. of relevance for the Project. It also sets out the approach to the assessment of potential effects resulting from the Project activities on these receptors, including offshore infrastructure, tourism and recreational uses.

Alongside this wider consideration of other sea users, topic specific assessments are included within the Project Marine Scheme scoping report. This chapter should therefore be read in conjunction with **Chapter 12** (Shipping and Navigation) and **Chapter 13** (Commercial Fisheries); potential cumulative and in-combination effects arising from the Project Marine Scheme are considered within **Chapter 19** (Cumulative and In-Combination Effects).

Where appropriate, this chapter cross refers to these topic-specific assessments.

14.2 Baseline Environment and Study Area

The Project Marine Scheme comprises a preliminary 1 km wide scoping boundary.

For the purpose of this scoping report and baseline characterisation, an initial buffer zone of 10 km to either side of the cable corridor has been adopted. This Study Area has been used to support the identification of other users of the sea who may be directly or indirectly affected by the Project.

Where consideration has been given to offshore infrastructure, this chapter includes both existing and planned offshore infrastructure where there is a reasonable volume of information about such infrastructure to enable assessment[17].

The Project Marine Scheme falls within the UK marine areas covered by the North East [England] Inshore Marine Plan and Scottish National Marine Plan Offshore Marine Plan. One of the aims of Marine Planning is to help ensure coexistence between a wide range of sea users whilst supporting sustainable development; this is discussed further in **Chapter 3**.

This baseline characterisation provides an overview of other sea users activities within the Study Area, including but not necessarily limited to: recreational activities; marine tourism; Oil and Gas (O&G) operations; renewable energy development (i.e. offshore wind, tidal and wave deployment); marine mineral and aggregate extraction; dredging and disposal sites/activities; military practice areas; pipelines and cables; and aquaculture. Baseline conditions for the Environmental Appraisal will be established through a desktop review of literature and datasets from relevant organisations.

Socioeconomics conditions, employment opportunities etc are considered within the Project Onshore Scheme sopping reports. This is expected to include consideration of receptors who may utilise the marine environment, but are terrestrially-based; examples include swimmers, canoe users, surfers and beach anglers.

14.2.1 Marine Tourism and Recreation

The coastal-marine environment supports numerous tourism and recreation activities. Tourism is a general term that encompasses any time spent away from home to pursue leisure or relaxation activities, while recreation refers to leisure activities undertaken for enjoyment by local residents in their free time, near where they live.

The NMPi and MMO data portals compile several data sources which provide an overview of recreational activities around the Scottish and English Coast, respectively (NMPi, 2021; MMO, 2021a).

[17] Where key information about planned or proposed third party infrastructure is not available, it is not possible to complete a detailed appraisal of potential interactions between the Project Marine Scheme and that infrastructure. As the Project Marine Scheme progresses through the Marine Licensing process, the applicant will periodically review information available about third party infrastructure to ensure a robust assessment of other sea users at the time of submission. This is discussed further within Chapter 19 (Cumulative and In-Combination Effects).

The Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating (accessed through NMPi) provides a Geographical Information System (GIS) dataset of recreational boating activity around the UK. The dataset provides spatial data which indicates location of RYA clubhouses, training centres and marinas, general boating areas, and AIS recreational intensity (RYA, 2019).

It is noted that all recreational activities are highly seasonal and dependant on certain weather conditions. Furthermore, due to the current COVID-19 pandemic, contemporaneous data on recreation generally may under-predict the extent of activity in 'normal' periods (i.e. false-lows); the Environmental Appraisal will be cognisant of this risk and mitigate it through longer-term reviews of historical trends.

At the time of writing, the MMO has recently commissioned a series of marine recreation activity maps to help inform their management of non-licensable (recreational) activities within Marine Protected Areas (ABP Mer, 2021; MMO, 2021b). This includes activities such as anchoring, launching and recovery of powerboats and sailing vessels, marine areas used by recreational craft, marine areas used by motorised and non-motorised personal watercraft and recreational diving sites. It is expected that this data will be published ahead of the completion of the Environmental Appraisal; where available, this data will be reviewed and used to inform the impact assessment, as required. Should this resource not be available, targeted desk-based research will be completed to consider recreational activity along the Project Marine Scheme route, weighted toward Scottish and English landfall areas.

14.2.1.1 Tourism in Thorntonloch Beach, Scotland

Scotland's marine and coastal areas support a range of recreational, sporting and visitor activities, ranging from coastal walking to international sporting events. Some of the most popular recreational activities includes recreational sea angling, sailing, wildlife watching, diving, surfing, windsurfing, and personal watercrafts (Scottish Government, 2014).

A review of the tourism in the East Lothian region, including the landing site in Thorntonloch Beach, suggests approximately 62% of East Lothian tourists visit the beach and approximately 55% undertake sightseeing and tours. In 2018, nearly half (48%) of all visitors undertook some kind of sporting activity, although only 5% undertook outdoor water sports, and 2% practiced fishing (STR, 2019).

14.2.1.2 Tourism in Seaham, England

Tourism and recreation are widely recognised as important sectors within the north east marine plan areas, providing numerous economic and social benefits to coastal communities, as well as increasing the health and wellbeing of residents and visitors to the region. The extensive sandy beaches and consistent wave quality provide numerous recreational activities, such as coasteering, surfing and kite surfing.

Beaches and seaside towns along the north east coast are some of the key attractions in the area, offering local residents and visitors' numerous leisure, sport and recreation activities (MMO, 2020b). A survey undertaken in the County of Durham revealed that 19% of the visitors corresponded to families travelling during the season for holidays at the beach. These group also corresponded to 19% of the total visitors' expenditure (Kubi Kalloo Segmentation Report (2017) cited in (Visit County Durham, 2019).

Whilst a large proportion of leisure and recreation activities occur within the inshore north east marine plan area, it is recognised that some activities such as wildlife watching and boating do cross into the offshore marine plan area (MMO, 2019a).

14.2.1.3 Recreational Boating

In Scottish waters, there are two registered marinas within the proximity of the cable; the Dunbar Sailing Club (which is approximately 9.2 km to the north west of the landfall site at Thorntonloch Beach) and the Eyemouth Harbour Trust (which is approximately 8.2 km from the cable route at its closest point, KP 20) (RYA, 2019).

In English waters, there are more than twenty sailing clubs and marinas along the coast, including five clubs which are recognised by the RYA as training centres. There are five large areas along the English coast parallel to the Project Marine Scheme which are identified as General Boating Areas, one of which is anticipated to be crossed at the cable landing, at Seaham. These areas cover approximately 60% of

the coast extension parallel to the cable route. These areas consist of racing and training areas, defined through the RYA UK Coastal Atlas of Recreational Boating, issued in September 2019 (RYA, 2019).

Other recreational users throughout the Study Area could potentially be impacted by the Project Marine Scheme although the individual behaviour and navigation of recreational mariners is inherently difficult to predict.

Automatic Identification System (AIS) data can be used to provide an insight into the average vessel density in the area surrounding the Project, visually represented as a density grid. It must be noted, however, that AIS are not mandatory for the vast majority of recreational vessels, although a proportion does so voluntarily.

AIS data of recreational boating show high intensity traffic in the proximity of the cable landing and along the route, especially in the proximity of Eyemouth, with intensities varying from low to medium (RYA, 2019).

In England, the AIS data show some traffic along the route, varying from low to medium in the majority of the extension, reaching high levels when approaching Blyth (approximately 19 km from the cable route at KP 135) and Newcastle (approximately 16 km from the cable route at KP 150). In the vicinity of the cable landing, specifically, traffic of recreational vessels (AIS data only) was recorded as being of low medium to low intensity. Overall, boating activity considerably reduces along the cable route as the distance offshore increases (RYA, 2019).

The baseline conditions and receptors for shipping and navigation are covered in **Chapter 12** (Shipping and Navigation), which is complimentary to this section.

14.2.1.4 Recreational Fishing

Sea fishing is a popular recreational activity, which occurs from many different platforms including from shore, kayak, personal boat and charter vessels. In the UK, a range of fishing gear is used and the activity occurs widely around substantial areas of the UK coast. Recreational sea fishing occurs year round; typically, this does change throughout the seasons based on, for example, conditions and local behaviour of target species (MMO, 2020a).

In the UK, recreational sea fishing is usually synonymous with angling. Angling pertains to fishing with lines, and within the UK this is almost entirely by line with rod and reel (MMO, 2020a).

A survey carried out for the Scottish Government in 2009 estimated that annual sea angler days spent in Edinburgh, Fife and South East Region totalize approximately 250,000, suggesting that the cable route may cross areas which support recreational sea angling (The Scottish Government, 2009).

In England, sea angling activities along the cable route are anticipated to be of low to medium intensity (MPC, 2014).

Commercial fishing is covered in a separate section, **Chapter 13** (Commercial Fisheries).

14.2.1.5 Other Recreational Activities

Other recreational activities may take place sporadically along the east coast; in the most part, recreational activity is primarily expected to be a feature of the nearshore area with some individual exceptions, discussed below.

Due to the sporadic and largely unregulated nature of recreational activities, it is difficult to predict the exact nature and extent of each receptor. On this basis, a selection of notable examples is included below – this is intended to provide a high-level characterisation and is not intended to be an exhaustive list.

The following recreational activities were identified in Scottish waters:

- **Scuba diving:** There are several scuba diving sites in the proximity of the cable landfall and along the Project Marine Scheme route in Scottish waters, including Petico Wick, St Abbs Marine Park, Weasel Loch, Green Ends gully and Nest Ends Gully. There is no 'limit' to the seaward extent of scuba diving, however generally, dive sites are typically no more than 10-15 km from shore (i.e. day-trip diving). On the east coast, the harsh conditions of the north sea also mean that there is generally a tendency for inshore diving or diving within and around sheltered inshore features. This

is also driven by the fact that these are typically the locations where more reef, flora, fauna and wreck features can be found (PADI, 2021; Finstrokes, 2021);

- **Surfing:** Surfing activities were not explicitly identified nearshore in the proximity of the cable landfall area. The closest notable surfing areas are in Belhaven bay and Pease bay, approximately 10.5 km north west and 4 km south east from the landfall point (Magic Seaweed, 2021);
- **Windsurf and kite surfing:** not identified in the proximity of the cable landfall area (NMPi, 2021); and
- **Bathing waters:** the cable landfall area is within the proximity of an area identified for bathing, in Thorntonloch which is approximately 800 m north from the cable landfall area. Four bathing areas are identified along the coast (NMPi, 2021).[18]

The following recreational activities were identified in English waters:

- **Scuba diving:** Several Scuba diving sites have been identified along the coast parallel to the Project Marine Scheme; notable examples include The Farne Islands, Beadnel point and Rumbling Kern, Collywell bay, St Mary's Island, Browns Bay, and Haven Point (PADI, 2021; Finstrokes, 2021);
- **Surfing:** Surfing was not identified at the cable landfall. The closest notable surfing areas are in Sunderland, over 10 km from the landing point (Magic Seaweed, 2021); and
- **Bathing waters:** The cable landing will overlap with designated bathing waters at Seaham (EEA, 2021).

14.2.2 Other Sea Users and Offshore Infrastructure

The following potential users of the sea have been identified within the Study Area in both Scottish and English Waters.

14.2.2.1 Oil and Gas Operations

There are no O&G installations or infrastructure identified within the Study Area (i.e. within a 10 km distance from the cable route corridor) (OGA, 2021).

The closest O&G Licensed Block (Block number 41/1) lies approximately 10 km from the cable route at KP 154, in English waters (OGA, 2021).

14.2.2.2 Carbon Capture and Storage

There are no carbon capture and storage sites within the Study Area or within a distance of 10 km from the cable route. Therefore, Carbon, Capture and Storage projects will not be considered further within this Project Marine Scheme Scoping Report (CES, 2020a; TCE, 2020a).

14.2.2.3 Offshore Wave and Tidal Projects

There are no wave and tidal projects identified within the Study Area or within a distance of 10 km from the cable route. Therefore, Wave and Tidal projects will not be considered further within this Offshore Scoping Report (TCE, 2020b; CES, 2020a).

14.2.2.4 Offshore Wind Farms

In Scottish waters, the export cable route corridor for Neart Na Gaoithe Offshore Wind Farm is approximately 80 m to the north west of the Project Marine Scheme cable corridor at its landfall (KP 0 to KP1) (CES, 2020a).

Based on the current published project boundary for Berwick Bank Offshore Wind Farm, there are two potential final landfall approach options. The Project Marine Scheme cable route is parallel to these cable route corridors and the landfall is also currently planned at Thorntonloch Beach (SSE, 2020). The Marr Bank Offshore Wind Farm is located adjacent to Berwick Bank; this is in pre-planning phase however it is expected that the export cable route will follow either a similar route to landfall at Thorntonloch or potentially Skateraw.

[18] Indirect effects to recreational activities and bathing waters associated with water quality are considered in Chapter 6 – Physical Environment. As discussed above, the Project Terrestrial Scheme scoping report also considers terrestrial-based receptors in further detail.

In English waters, the Blyth Offshore Demonstration wind farm sites falls as close as 4.5 km west from the cable route at KP 137. The Phase 1 of the development is operational and located approximately 11.5 km from the Project Marine Scheme. Phase 2 is at planning stage, and will consist of 2 separate site, array A3 and array 4, lying approximately 9.5 km at KP 128 and 4.5 km at KP 137, respectively (TCE, 2021). In addition, the cable intersects (KP 160 to KP 175) with the Durham Coast wider area for potential future offshore wind developments (TCE, 2019).

14.2.2.5 Mineral and Aggregate Extraction

There are no licensed aggregate extraction or mineral mining sites within the Study Area or within a 10 km distance from the Project Marine Scheme cable route.

In Scotland, marine aggregate licences have historically been issued to two sites in Scotland, one site in the Firth of Forth and the second site in the Firth of Tay, these are not currently active (Scottish Government, 2014). Whilst there are no current licences for marine aggregate extraction, there is a potential for further activity if extraction becomes viable under different economic conditions or if increased dredging capability (in terms of ability to dredge in deeper water depths) offers opportunity for extraction in new areas *(Scottish Government, 2014).*

In English waters, there are two areas identified as having potential for marine mineral resources within the Study Area, although not to be crossed by the cable route. These are located approximately 3 km north east of KP 58, and 8 km SE of KP 171 (MMO, 2021a).

14.2.2.6 Dredging and Disposal Sites

Navigational dredging sites in two ports along the coast and a number of disposal sites (dumping/spoil grounds) have been identified in the proximity of the cable (MMO, 2021a; MMO, 2021c):

Scottish Waters:

- Only two licensed disposal sites have been identified in the proximity of the cable landing at Near Thorntonloch Beach, both closed and not anticipated to be crossed by the cable route.
- A third site with open status is found within the 10 km buffer zone of the cable route, at approximately 7000 m to the SW of KP 27.

English Waters:

- Includes disposal sites classified as ‘open’ and ‘close’ status. None of them anticipated to be crossed by the cable route, and all of these sites are located between the cable route and the shore.
- Navigational dredging sites are found in two ports along the coast parallel to the cable route, at the Port of Sunderland (approximately 7 km north west of KP 172, its closest point) and Seaham harbour (1.4 km south of the landfall at KP 176).

14.2.2.7 Military Areas

There are several military practice zones identified in the proximity of the cable route, including Areas of Intense Aerial Activities (AIAA), submarine exercise area, and practice and exercise area (surface fleet), surface danger areas, and firing danger areas (UKHO, 2021). These are located east of the cable route between KP 76 and KP 150, within distances varying from 9 to 11 km; and south east of KP 166 within approximately 5 km. None of these areas will be crossed by the cable route. Therefore, the project interaction with military areas will not be considered further within the Project Marine Scheme scoping report. Effects to any shipping and navigation associated with these areas will be covered in **Chapter 12**.

14.2.2.8 Pipeline and Cable crossing

There are no cable crossings identified in Scottish waters.

In English waters, the cable route will cross a limited number of planned and in service cables, including the North Sea Link Interconnector, due to be installed by 2021 (North Sea Link, 2021).

14.2.2.9 Aquaculture

There are no active, inactive or deregistered marine aquaculture sites, or harvesting agreements, in the proximity of the cable landing near Thorntonloch Beach, in Scottish waters, and in Seaham, in English waters.

In Scottish waters, parallel to the Project Marine Scheme and approximately 6 km S of KP 19, there is one active site for seawater finfish and shellfish, at St Abbs Marine Station. Notwithstanding, the Scottish National Marine Plan sets out the high-level continuing presumption against further marine finfish farm developments on the north and east coasts to safeguard migratory fish species (NMPi, 2021).

In English waters, there is one aquaculture site identified along the English coast parallel to the Project Marine Scheme route, approximately 10 km SW of KP 52 which is located at Holy Island, for Native Oyster shellfish and pacific oyster shellfish production (MMO, 2021a).

The North East Marine Plan in England recognizes that aquaculture as a key area for development through its potential to contribute to the sustainability and security of the United Kingdom food supply which, and potential to provide a future source of employment in deprived or peripheral areas, or those with a limited numbers of alternative employment options. It is seen as an industry where development could occur particularly at local levels (MMO, 2020b). In this context, the plan defines strategic areas of sustainable aquaculture production, many of which will be crossed by the cable route (MMO, 2019b; MMO, 2021a).

14.2.2.10 Other Developments

Other developments identified within the proximity of the Project Marine Scheme include the Torness Nuclear Power Station, located at Dunbar Coast approximately 2.4 km to the north west of the landfall site. The power plant activities at sea consist of repair and maintenance works to their cooling water system (seawater intake), which may be unplanned due to emergency safety requirement (MMO, 2021c).

14.3 Planned Surveys

No further primary surveys are planned to inform the Environmental Appraisal.

14.4 Assessment Method

The assessment of potential impacts identified in this Scoping Report will follow the methodology as set out within **Appendix B**.

Specific to the other sea users, the following guidance documents will also be considered:

- The European Subsea Cable Association (ESCA) guideline no.6 'The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters' (ESCA, 2016)
- International Cable Protection Committee (ICPC) recommendations:
    - Recommendation No.2. Cable Routing and Reporting Criteria (ICPC, 2015);
    - Recommendation No.3. Telecommunications Cable and Oil Pipeline / Power Cables Crossing Criteria (ICPC, 2014); and
    - Recommendation No.13. The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013).

Given the availability of suitable data to inform the baseline, no site surveys are anticipated to inform the Environmental Appraisal. Consultation with relevant stakeholders is proposed to confirm the data available to describe the other sea users' activities and infrastructure are accurate; inform the project scope; adopted mitigation by design to avoid or minimize effects to other sea users; and anticipate potential conflicts and additional mitigation measures to be evaluated.

The list of relevant stakeholders to be considered in the Project consultation include:

- Windfarm developments in the proximity of the Project (windfarm sites and/or cable agreements);

- Oil and Gas Authority;
- Dredging and open licensed disposal sites which could be potentially affected by the Project;
- Ministry of Defence;
- Pipeline and cable owners;
- Other developments identified in the proximity of the cable landfall, which could be affected by the Project (e.g. Torness Nuclear Power Station); and
- The city councils at the Project landfall (to be consulted in association with the Onshore Project Scheme).

14.5 Identification of Potential Effects

Systematic consideration has been given to the potential for interactions between the Project activities and other sea users within the Study Area or likely to be affected by project activities. This has been identified through an ENVID exercise, as described in **Appendix B**.

Embedded mitigation measures and potential effect to other sea users (including offshore infrastructure, tourism and recreation) as a result of the Project Marine Scheme are outlined below.

14.5.1 Embedded Mitigation Measures

At this early stage in the Environmental Appraisal process, it is not possible to identify all of the individual mitigation measures which will be adopted; as the design – and Environmental Appraisal process progresses, embedded mitigation will evolve, as informed by the output from a range of technical and environmental studies. A preliminary list of embedded mitigation measures which have been identified thus-far include:

- The evolution of the route has been informed by consideration of a number of different marine features; where possible, interaction with features such as spoil grounds, extraction areas, harbour limits and military training areas have been minimised where possible (RSK, 2020);
- Timely and efficient communication will be given to sea users in the area via Notices to Mariners, Kingfisher Bulletins, Navigational Telex (NAVTEX), and NAVAREA warnings;
- A 500 m safety distances around installation vessels will be adopted. Guard vessels will be employed during installation; and
- Crossing Agreements will be agreed with cable and pipeline owners. The Crossing Agreement describes the rights and responsibilities of the parties and also the design of the crossing. Crossing design will be in line with industry standards, using procedures and techniques agreed with the cable and pipeline owners.

14.5.2 Potential Effects to Other Sea Users

Complimentary to the assessment of effects to other sea users, the interaction with shipping and navigation, commercial fishing, and water quality affecting recreational uses will be further considered within **Chapter 12** (Shipping and Navigation), **Chapter 13** (Commercial Fisheries), and **Chapter 6** (Physical Environment). Potential effects on other sea users are summarised in **Table 14-1** below.

Table 14-1 Potential impacts of the Project Marine Scheme to Shipping and Navigation

Project phase	Potential impact
Route preparation and cable installation	Disruption to other users of the sea activities or offshore infrastructure during cable installation within the sites specified for the activity[19] Risk of damage or interference with third party cable assets - there is potential risk for damage to existing submarine cables and pipelines during installation at crossing locations. Other restrictions and interference to existing submarine cables and pipelines assets may occur where the cable cross, or run parallel to an asset, in a

[19] Interaction with Shipping and Navigation is also discussed in Chapter 12.

Project phase	Potential impact
	manner which may require further specific management, such as coexistence / third-party agreements Temporary displacement of recreational vessel - temporary displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels) due to safety zones around installation vessels may result in a loss of recreational resource Temporary displacement of recreational activities nearshore - temporary displacement of recreational fishing (shore angling) and other recreational activities (kite surfing, surfing and windsurfing, scuba diving and beach users) due to advisory safety distances in the nearshore and intertidal section of the proposed export cable corridor may prevent access to the area for recreation users, resulting in a loss of recreational resource The cable installation activities could lead to a temporary disruption on tourism during activities taking place on shore which require temporary closures of the beach. Given the short-term interruption, any effects would be highly localized and temporary. Any closures would be implemented to maintain as much access as possible for users of these amenities.
Cable operation and maintenance	Influence upon future development options – future developments in the proximity of the Project Marine Scheme will need to consider the presence of the cable infrastructure alongside other known and existing offshore infrastructure
Decommissioning	Potential impacts during decommissioning are expected to be either comparable to impacts characterised during construction.

14.6 Summary

This chapter has identified the potential environmental effects of the Project Marine Scheme as they may affect other sea users, including offshore infrastructure, tourism and recreational uses. The chapter also outlines the proposed assessment scope and methodology, along with the likely significant effects and mitigation opportunities.

The Project Marine Scheme is located in an area of intense marine activity. Potential environmental effects during the installation phase may relate to disruption to other users of the sea activities and risk of damaging or interfering with existing infrastructure.

A preliminary list of embedded mitigation measures includes early consultation and appropriate communication with relevant developments potentially affected by the Project Marine Scheme, crossing agreements and agreements with offshore wind farm cable owners in the vicinity of the project, in line with the guidelines established by the ESCA and ICPC.

15. Landfall Interface with Project Onshore Scheme

15.1 Introduction

This chapter of the scoping report identifies the potential interactions between the Project Marine Scheme and the characteristics of the receiving environment at the Project landfalls. This chapter considers the landfalls up to MHWS at either end of the indicative cable route along which subsea HVDC cables will be installed. To aid with review, this chapter summarises the interface between the Project Marine Scheme and the landfall area for both the Project Scottish Scheme and the Project English Onshore Scheme.

15.2 Baseline Characterisation

15.2.1 Scottish Landfall – Thorntonloch, East Lothian

The landfall at Thorntonloch Beach is the interface between the Scottish Onshore Scheme and Project Marine Scheme as further described in **Section 2.2.1** and as shown in **Figure 2-1**.

A specific location for the Transition Joint Pit (TJP), which marks the connection point between the subsea and terrestrial cable systems, remains unconfirmed. At this early stage, an approximate location for the TJP is between 55°57'1.3”, -2°23'23.9" (KP 0) and 55°57'18.4", 2°22'56.9" (KP 1). This is approximately 2 km south of Torness Point. South west of this point, an approximate location for the HDD compound has been identified at 55°57'1.2" (KP 0 – i.e. the start point for the Project Marine Scheme at the Scottish landfall), above MHWS and just west of the A1.

The intertidal area itself (i.e. the extent of soft sediment beach that lies between HWS and LWS at the landfall location) extends for approximately 150 m. The landing was chosen to minimise the length of the horizontal directional drill (HDD) crossing the intertidal and to enable it to exit into what appears to be, from the bathymetry data, smooth sandy seabed.

Further information on the baseline characteristics of the intertidal environment is set out in each of the technical scoping chapters both in this document and in the Project Onshore Scheme Scoping Reports. Particular consideration is given to intertidal ecology in **Chapter 7** and to seabirds utilising and crossing the intertidal area in **Chapter 10** and **Appendix C.**

15.2.2 English Landfall – north of Seaham, County Durham

The location for the landfall area is approximately 2 km to the north of Seaham in County Durham, as shown on **Figure 2-2**. The intertidal area, approximately 475 m wide, consists of an area of sand. The offshore bedrock consists of mudstone and gypsum-stone.

The final 8-10 km of the approach to the landing have attempted to avoid obvious rock outcrops as far as possible but it is highly likely that extensive areas of rock will be encountered on the approach to Seaham.

It is anticipated that HDD will be required from the car park, underneath the cliffs, to a sub-tidal location approximately 300 m from the cliff base.

15.3 Planned Surveys

Intertidal Phase I biotope mapping and Phase II faunal sampling will be completed at both Scottish and English landfall sites for the provision of detailed project-specific data. This will enable the potential impacts of the Project on intertidal benthic habitat to be accurately assessed.

15.4 Assessment Method

Potential impacts in the intertidal zone will be assessed primarily as part of the specialist technical subject areas throughout the Environmental Appraisal.

15.5 Potential Effects

Systematic consideration has been given to the potential for interactions to occur between activities required to facilitate the installation and operation of Project Marine Scheme components through the intertidal zones at both Scottish and English landfalls. These interactions have been recorded in a simple Environmental Issues Identification (ENVID) matrix as set out within **Appendix A.**

Where potential interactions are not expected as a result of specific design parameters or already committed mitigation these integral environmental design features have been identified. Where potential interactions have been identified, these have been given further consideration throughout the scoping analysis sections within the remainder of this scoping report.

Potential for significant effects identified in the intertidal zone as a result of an HDD landfall are identified within **Table 15-1** below, which also identifies where within the Project Environmental Reports each potential effect will be further assessed:

Table 15-1 Summary of Onshore and Marine Interfaces for HDD

Potential Effect	Identified Receptors	Scottish Landfall	English Landfall	Reference for further Scoping Discussion
Presence of HDD drill compound above MHWS	Sensitive transitional / coastal habitats	X	X	Onshore Scheme Scoping Reports
	Landscape / Seascape	X	X	Onshore Scheme Scoping Reports
	Setting of nearby listed/historic buildings	X	X	Onshore Scheme Scoping Reports
	Disruption to core paths	X	X	Onshore Scheme Scoping Reports
	Traffic access requirements to HDD drill compound	X	X	Onshore Scheme Scoping Reports
Drilling activity generating airborne noise	Local Community Sensitive Receptors, potentially including recreational and tourist use of the beach area.	X	X	Onshore Scheme Scoping Reports
Traffic access requirements to installation site, including a small number of HGV, and Light Vehicle traffic	Local road network and sensitive receptors	X	X	Onshore Scheme Scoping Reports
Subtidal drill conduit breakout points resulting in potential sediment disturbance and/or release of small volumes of drill fluids (e.g. bentonite)	Seabed Sediments	X	X	Project Marine Scheme Scoping Report **Chapter 6**
	Water Quality, SSCs.	X	X	Project Marine Scheme Scoping Report **Chapter 6**
	Benthic Ecology	X	X	Project Marine Scheme Scoping Report **Chapter 7**
Accidental leaks and spills from drill equipment at HDD compound	Local water courses and / or groundwaters or coastal waters	X	X	Scottish Onshore Scheme Scoping Report – RSK
Accidental leaks and spills from vessels	Coastal waters	X	X	Project Marine Scheme Scoping Report **Chapter 6** and **Chapter 18**.

Potential Effect	Identified Receptors	Scottish Landfall	English Landfall	Reference for further Scoping Discussion
Use of shallow draft barge with anchor spread on approach to landfall	Seabed sediments	X	X	Project Marine Scheme Scoping Report **Chapter 6**
	Benthic habitats	X	X	Project Marine Scheme Scoping Report **Chapter 7**
Potential requirement for additional cable protection / rock placement at breakout point	Seabed Sediments	X	X	Project Marine Scheme Scoping Report **Chapter 6**
	Benthic habitats	X	X	Project Marine Scheme Scoping Report **Chapter 7**
	Localised changes to coastal flow dynamics	X	X	Project Marine Scheme Scoping Report **Chapter 6**
	Other Sea Users	X	X	Project Marine Scheme Scoping Report **Chapter 14**

15.6 Summary

This chapter summarises the consideration given to potential for significant effects of the Project at the intertidal points of interface between the Project Marine Scheme and the Project Onshore Schemes.

Consideration of these impacts will be addressed in the relevant primary technical chapters across both the Marine Scheme and Onshore Scheme reports and then be collated and summarised in a standalone Chapter of the Environmental Appraisal which will draw together all technical impacts to provide a cohesive analysis of the anticipated effects of Project activities within the intertidal area.

16.Habitat Regulations Assessment

As part of the assessment of a proposed scheme it is necessary to consider whether the scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (known as European sites: Special Areas of Conservation, Special Protection Areas and, as a matter of government policy, Ramsar sites).

European sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales), the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended; relevant to Scotland) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).

The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 (“the Withdrawal Act”). However, the most recent amendments to the Habitats Regulations – the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 – make it clear that the need for HRA continues to apply.

There is no formal Scoping phase associated with the HRA process. Notwithstanding, an approach to the forthcoming HRA has been provided and is attached within **Appendix C**.

17. Marine Protected Areas (Scotland) and Marine Conservation Zones (England): Information to Inform a Screening Assessment

17.1 Introduction

Specific consideration of the potential for impact on Scottish Marine Protected Areas (MPAs) and English Marine Conservation Zones (MCZs) is required for any marine license application in Scottish and English waters respectively. The need for the consideration of MPAs is set out in Section 83 of the Marine (Scotland) Act 2010, and the need for consideration of MCZs is set out in Section 126 of the Marine and Coastal Access Act 2009 (MCAA).

The assessment process for MCZs considered during the licensing process is outlined by the MMO in the guidance document 'Marine conservation zones and marine licensing' (MMO, 2013). No formal guidance on the MPA assessment process has been issued by Marine Scotland. Therefore, the screening assessment will follow the assessment steps and procedures as set out in the MMO (2013) guidance document 'Marine conservation zones and marine licensing' and it is intended the information provided will be used to inform the consideration of MPAs and MCZs by MS-LOT and the MMO respectively.

17.2 Legislative Context

MPAs are designated under the Marine (Scotland) Act 2010 and MCZs under the Marine and Coastal Access Act 2009 (MCAA) in order to protect a range of important marine habitats, species and geological formations in Scottish and English waters and UK offshore waters. These sites contribute to an ecologically coherent network of Marine Protected Areas (MPAs) in the North East Atlantic.

17.2.1 Marine Protected Areas (Scotland)

The development of the Scottish MPA network has involved work between Marine Scotland, the Joint Nature Conservation Committee (JNCC), Natural England (NE), Historic Environment Scotland, the Scottish Environment Agency (SEPA) and NatureScot (formerly Scottish Natural Heritage (SNH)). The approach for identifying MPAs followed a science-based process as set out in the Scottish MPA Selection Guidelines[20]. To date 35 MPAs have been designated for nature conservation[21].

Section 83 of the Marine (Scotland) Act 2010 places specific duties on Marine Scotland relating to MPAs and marine license decision making. Section 83 applies where:

a. *A public authority has the function of determining an application (whenever made) for authorisation of the doing of any act, and*

b. *The act is capable of affecting (other than insignificantly):*

   (i) *a protected feature in a Nature Conservation MPA,*

   (ii) *a stated purpose for a Demonstration and Research MPA,*

   (iii) *a marine historic asset in a Historic MPA,*

   (iv) *any ecological or geomorphological process on which the conservation of any protected feature in a Nature Conservation MPA, or on which the stated purpose for a Demonstration and Research MPA, is (wholly or in part) dependent.*

[20] https://www.webarchive.org.uk/wayback/archive/3000/https://www.gov.scot/Resource/0051/00515466.pdf
[21] https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/marine-protected-areas/scotlands-marine-protected-area-network

To ensure Marine Scotland remains compliant with Marine (Scotland) Act 2010, specific consideration must be given to MPAs during the licence decision making process.

17.2.2 Marine Conservation Zones (England)

MCZs in English waters have been identified through the MCZ Project. The MCZ Project was set up in 2008 and led by the Joint Nature Conservation Committee (JNCC) and Natural England (NE). The purpose of the MCZ Project was to identify and recommend MCZs to Government for designation. To date a total of 91 sites have been designated (JNCC, 2019).

Under Section 126 of the Marine and Coastal Access Act, the MMO has a duty to consider MCZs during marine licence decision making. To meet the requirements of Section 126, the MMO has implemented an MCZ assessment process which will be integrated into the marine licence decision making procedures. The process comprises three main stages, i) screening, ii) Stage 1 Assessment, and iii) Stage 2 (this is fully explained in **Chapter 3**).

Section 126 of the Marine and Coastal Access Act (MCAA) (2009) places specific duties on the MMO relating to MCZs and marine license decision making. Section 126 applies where:

a. *A public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and*

b. *The act is capable of affecting (other than insignificantly):*

   i. *The protected features of an MCZ;*

   ii. *Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or part) dependent.*

To ensure the MMO remains compliant with MCAA obligations, the MCZ assessment process has been integrated into the existing marine license decision making process. Hence, there is a requirement for specific information relating to potential project interactions with MCZs within waters licenced by MMO (i.e. English waters).

17.3 MPA and MCZ Assessment Process

In the absence of formal guidance from MS-LOT in relation to the assessment of Scottish MPAs during the licence decision making process, the MMO guidance (2013) for English MCZ assessments will be applied to Scottish MPAs to ensure adequate information is provided to enable Marine Scotland to appropriately consider MPAs, thereby remaining compliant with the Marine (Scotland) Act 2010.

Guidance published by the MMO (2013) describes how MCZ Assessments could be undertaken during the process of marine license decision making. These MMO guidelines recommend a staged approach to assessment, involving three sequential stages: screening, stage 1 assessment and stage 2 assessment. Full details of these stages have been provided in the following sections.

The MCZ Assessment process applies to all features and conservation objectives of both designated MCZs and proposed MCZs[22].

If particular sites, activities or impacts are screened into the MCZ Assessment process, these are taken forward to consideration within the stage 1 assessment. If significant risks to the achievement of MCZ conservation objectives are identified in the stage 1 assessment, these are then taken forward to stage 2 assessment.

The purpose of this MCZ Screening Assessment is to determine which sites should be screened in and taken forward to a future next stage assessment (MCZ Stage 1 assessment). At this initial screening stage, further assessment stages have not yet been completed Screening Approach

For Scottish MPAs, in the absence of formal guidance on the approach to screening, the MCZ process has been followed to enable MS-LOT to determine whether section 83 of the Marine (Scotland) Act 2010 should apply to the application.

[22] Proposed sites are those selected from the list of rMCZs subsequently put forward for designation.

In England, all marine licence applications need to be screened to determine whether section 126 should apply to the application. MMO (2013) guidelines state section 126 will apply if:

- The licensable activity is taking place within or near an area being put forward or already designated as an MCZ; and
- The activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

Thus, to determine whether section 126 applies, it is necessary to consider the geographical proximity of the Project Marine Scheme to the MCZ, and the potential for proposed activities to affect the designated features of an MCZ or the ecological/ geomorphological processes upon which designated features are reliant.

A risk-based approach is recommended by the MMO when determining the proximity of an activity to an MCZ. The application of appropriate buffer zones to the protected features of an MCZ under consideration, as well as consideration of the potential risk of impacts from activities at greater distances from the MCZ is necessary.

If the screening stage determines that section 126 does apply, it is necessary for the MMO to assess which elements of section 126 should apply to a marine license application. This is determined through a two staged approach.

17.4 MPA and MCZ Background Information

17.4.1 MPAs (Scotland)

The Project Marine Scheme does not pass directly through any MPAs. However, Firth of Forth Banks Complex is located within 10 km (**Table 17-1**), which is considered to be a sufficiently precautionary buffer around the Project that exceeds the maximum ZoI of project related activities that are likely to impact MCZs in this instance. **Table 17-3** provides a summary of these ZoIs.

Table 17-1 MPAs and their designated features, within 10 km of the Project Marine Scheme

Site Name	Designation	Proposed or Designated Biodiversity Features	Distance from Project Marine Scheme (km)
Firth of Forth Banks Complex	MPA	Ocean quahog aggregations; Offshore subtidal sands and gravels; Shelf Banks and Mounds; and Moraines representative of the Wee Bankie Key Geodiversity Area	1.8 km

17.4.2 MCZs (England)

The Project Marine Scheme passes directly through Farnes East MCZ and is also within close proximity to Berwick to St Mary's and Coquet to St Mary's MCZs.

In line with the precautionary approach encouraged by the MMO, the MCZ screening has considered any MCZ site within 10 km of the Project Marine Scheme. This is on the basis that this is the maximum likely ZoI associated with project related activities with the potential to impact MCZs designated for seabed features. A summary of impact pathways and associated ZoIs are presented in **Table 17-2**.

Table 17-2 MCZs and their designated features, within 10 km of the Project Marine Scheme route

Site Name	Designation	Proposed or Designated Biodiversity Features	Distance from Project Marine Scheme (km)
Farnes East	MCZ	Moderate energy circalittoral rock Subtidal coarse sediment Subtidal mixed sediments Subtidal sand Subtidal mud Sea-pen and burrowing megafauna communities Ocean quahog (*Arctica islandica*)	0 (within)
Berwick to St Mary's	MCZ	Eider (*Somateria mollissima*)	1.1
Coquet to St Mary's	MCZ	Low energy intertidal rock Moderate energy intertidal rock High energy intertidal rock Intertidal mixed sediments Intertidal coarse sediment Intertidal sand and muddy sand Intertidal mud Intertidal under-boulder communities Peat and clay exposures Moderate energy infralittoral rock High energy infralittoral rock Moderate energy circalittoral rock Subtidal coarse sediment Subtidal sand Subtidal mixed sediments Subtidal mud	8.4

17.4.3 Potential Impacts, Effects and Zones of Influence

The designated features of identified MPAs and MCZs fall into one of three categories; 'intertidal and subtidal benthic habitats', 'subtidal benthic species' or the 'presence of birds'. Hence, the impact pathways and associated ZoIs (the extent of the potential impact from the activity) considered within the assessments are those that specifically relate to these receptors. A summary of impact pathways and associated ZoIs are presented in **Table 17-3.**

Note that the ZoIs indicated are indicative only at this stage, based on previous experience and will be confirmed as part of the Environmental Assessment. Should any of these assumptions change during the Environmental Assessment, this screening position will be revisited.

Table 17-3 Summary of impact pathways and associated ZoIs that could affect benthic habitats and species and seabirds

Project phase	Potential impact	Zone of influence
Route preparation and cable installation	Temporary physical disturbance to intertidal and subtidal benthic habitats and species	15 m width, widening to 40 m when pre-sweep is required through sand waves
	Temporary physical disturbance of marine avifauna due to vessel presence	50 km
	Permanent loss of subtidal benthic habitats and species due to placement of hard substrates on the seabed	Highly localised (~/<10m) from the cable

Project phase	Potential impact	Zone of influence
	Temporary increase in suspended sediment concentrations (SSC) sediment deposition leading to contaminant mobilisation, turbidity and smothering effects on subtidal habitats and species	3000 m
	Changes to marine water quality effects from the use of HDD drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils	700 m
Cable operation and maintenance	Disturbance to intertidal and subtidal benthic habitats and species due to subsea cable thermal emissions	Localised to a few metres from the cable, dependent upon the heat carrying capacity of particular sediments
	Maintenance potential effects the same as route preparation and cable installation	As above
Decommissioning	Potential effects the same as route preparation and cable installation	As above

17.4.3.1 Temporary physical disturbance - intertidal and subtidal benthic habitats and species

Construction activities associated with route preparation and cable installation can lead to direct physical disturbance (i.e. reworking) of substrate which may lead to disturbance and/or loss of benthic habitats and species within the footprint and immediate vicinity of the works. Sensitivity to physical disturbance varies between receptor; for mobile receptors displacement, physiological/morphological damage may occur whilst for sedentary or less mobile receptors, the likely impacts are physiological/morphological damage and mortality.

17.4.3.2 Permanent loss - subtidal benthic habitats and species

The permanent placement of cable protection such as rock placement, concrete mattressing or other types of cable protection on the seabed could lead to disturbance and/or loss of benthic habitats and species. This would also introduce artificial hard substrata which could have the capacity to function as an artificial rocky reef allowing species dependant on hard substrates to colonise areas that might have previously been unsuitable.

17.4.3.3 Suspended Sediment Concentrations (SSC) - subtidal habitats and species

Construction activities have the potential to increase SSCs creating a plume within the water column. This in turn can lead to increased deposition as suspended sediments settle out of the water column. Increased SSC can lead to elevated turbidity levels which may reduce the feeding efficiency and subsequent growth rates of filter feeders if clogging of feeding structures occurs. Any contaminants, such as heavy metals and toxins, within the sediments, can also be released into the water column and may alter marine water quality with subsequent indirect effects on benthic species.

Increased deposition can smother the seabed potentially resulting in changes to seabed geomorphology, sediment structure and habitats. This would have an impact on species that currently rely on these habitats for food and refuge, leading to potential indirect effects on survival, growth, reproduction and displacement of individuals.

17.4.3.4 Water Quality

Changes to marine water quality arising from the use of HDD drilling fluids and additives, accidental leaks and spills from vessels and the release of sediment bound contaminants and bacteria has the potential to indirectly effect benthic habitats and species through toxicity and bacteriological contamination.

17.4.3.5 Thermal emissions - subtidal benthic habitats and species

Operation of buried subsea HVDC cables generates heat due to resistance in the conductor components which can warm the cable surface and adjacent environment (i.e. sediments). The rate of heat loss, and magnitude of environmental heating, is dependent on several factors; most notably the amount of power passing through the cables; the design of the cables; and the thermal properties of the surrounding substrates which in turn is influenced by sediment grain size.

17.4.4 MPA (Scotland) Screening Assessment

Based on the application of the MMO (2013) MCZ Assessment Guidelines to Scottish MPAs, it is considered that section 83 of the Marine (Scotland) Act 2010 would apply if it is determined through the course of screening that "the activity is capable of affecting (other than insignificantly) either: (i) a protected feature in a Nature Conservation MPA; (ii) a stated purpose for a Demonstration and Research MPA; (iii) a marine historic asset in a Historic MPA; or (iv) any ecological or geomorphological process on which the conservation of any protected feature in a Nature Conservation MPA, or on which the stated purpose for a Demonstration and Research MPA, is (wholly or in part) dependent".

17.4.4.1 Firth of Forth Banks Complex

Located in offshore waters to the east of Scotland, approximately 1.8 km at its closest point to the Project Marine Scheme, the Firth of Forth Banks Complex MPA includes the Berwick, Scalp and Montrose Banks, and the Wee Bankie shelf banks and mounds.

The MPA is designated for its mosaic of different types of sands and gravels, which create a unique mixture of habitats that support ocean quahog aggregations. Furthermore, the MPA includes moraines, which are scientifically important for their role in improving the understanding of the history of glaciation around Scotland.

Based on a distance of 1.8 km from the Project Marine Scheme, this MPA is considered to fall outside of the ZoI of the following project related impact pathways:

- Temporary physical disturbance to intertidal and subtidal benthic habitats;
- Permanent loss of subtidal benthic habitats and species due to placement of hard substrates on the seabed;
- Temporary physical disturbance of marine avifauna due to vessel presence;
- Changes to marine water quality effects from the use of HDD drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils; and
- Disturbance to intertidal and subtidal benthic habitats and species due to subsea cable thermal emissions.

However, Firth of Forth Banks Complex MPA falls within the ZoI of the following impact pathway:

- Temporary increase in suspended sediment concentrations (SSC) sediment deposition leading to contaminant mobilisation turbidity and smothering effects on subtidal habitats and species.

Due to the potential for temporary increases in SSC to have an impact on the Firth of Forth Banks Complex MPA, particularly ocean quahog aggregations, this site has been screened in for Stage 1 assessment. This will be addressed in a full MCZ Assessment which will accompany the Environmental Appraisal.

17.4.5 MCZ (England) Screening Assessment

The MCZ Assessment Guidelines (MMO, 2013) indicate that following the identification of MCZs to be considered, section 126 would apply if it is determined through the course of screening that "the activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant."

17.4.5.1 Farnes East MCZ

The Project Marine Scheme passes through the Farnes East MCZ for approximately 26 km. The site is designated for a variety of benthic habitats including sea-pen and burrowing megafauna communities in mud and the potentially very long-lived bivalve species the ocean quahog (*Arctica islandica*).

Therefore, Farnes East MCZ falls within the ZoI for all identified impact pathways:

- Temporary physical disturbance to intertidal and subtidal benthic habitats and species;
- Permanent loss of subtidal benthic habitats and species due to placement of hard substrates on the seabed;
- Changes to marine water quality effects from the use of HDD drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils;
- Disturbance to intertidal and subtidal benthic habitats and species due to subsea cable thermal emissions; and
- Temporary increase in suspended sediment concentrations (SSC) sediment deposition leading to contaminant mobilisation turbidity and smothering effects on subtidal habitats and species.

Due to the potential for a number of different impacts to habitats and species the Farnes East MCZ has been screened in for Stage 1 assessment. This will be addressed in a full MCZ Assessment which will accompany the Environmental Appraisal.

17.4.5.2 Berwick to St Mary's MCZ

Berwick to St Mary's MCZ is located approximately 1.1 km from the Project Marine Scheme route and is designated for its nationally important numbers of breeding common eider. The area also supports regionally and nationally (England) important numbers of common eider in the non-breeding season. Given that the eider is known to dive for crustaceans and molluscs, they can be found rafting on the sea surface.

Based on a distance of 1.1 km from the Project Marine Scheme, this MCZ is considered to fall outside of the ZoI of the following project related impact pathways:

- Temporary physical disturbance to intertidal and subtidal benthic habitats;
- Permanent loss of subtidal benthic habitats and species due to placement of hard substrates on the seabed;
- Temporary physical disturbance of marine avifauna due to vessel presence;
- Changes to marine water quality effects from the use of HDD drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils; and
- Disturbance to intertidal and subtidal benthic habitats and species due to subsea cable thermal emissions.

However, Berwick to St Mary's MCZ falls within the ZoI of the following impact pathway:

- Temporary increase in suspended sediment concentrations (SSC) sediment deposition leading to contaminant mobilisation turbidity and smothering effects on subtidal habitats and species.

Due to the potential for temporary increases in SSC to have an impact on Berwick to St Mary's MCZ and the ability for the eider (designating feature) to forage and/or raft in the area, this site has been screened in for Stage 1 assessment.

17.4.5.3 Coquet to St Mary's MCZ

Coquet to St Mary's MCZ is located approximately 8.4 km from the Project Marine Scheme route and is designated to protect a variety of different intertidal and subtidal benthic habitats and species. This MCZ falls outside of the ZoIs associated with the impact pathways that have the potential to affect the designated features and therefore, St Mary's MCZ has been screened out and does not require a Stage 1 assessment.

17.5 Conclusion

The MPA screening assessment concludes there is potential for the Project Marine Scheme to impact the Firth of Forth Banks Complex MPA. Therefore, this site will be taken forward for a Stage 1 assessment.

The MCZ screening assessment concludes there is potential for the Project Marine Scheme to impact the Farnes East MCZ and Berwick to St Mary's MCZ. Both designated sites will therefore be taken forward for a Stage 1 assessment.

18.Water Framework Directive Screening

18.1 Introduction

The Water Framework Directive (WFD) (2000/60/EC) is implemented in England under The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and in Scotland under the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act).

Following Brexit, a body of EU-derived laws (of which WFD was one), was preserved by the UK and converted into domestic UK law under the European Union (Withdrawal) Act 2018 (EU(W)A 2018), effective on the repeal of the European Communities Act 1972. WFD was therefore fully transposed into UK law and thus remains in place.

Consideration of the WFD is required for projects which have the potential to detrimentally impact the chemical and/or ecological status of a water body or to prevent improvements that may otherwise result in a water body meeting its WFD objectives. Whilst the UK is no longer part of the EU, the implementation of the WFD remains the same. The WFD aims to protect and enhance (or improve) the ecological status/potential of all WFD water bodies including surface water bodies (i.e. rivers, lakes, transitional waters and coastal waters) and groundwater bodies.

18.2 Legislative Context

The WFD requires the management of the water environment to consistent standards. All natural water bodies must achieve both Good Chemical Status and Good Ecological Status (GES) and all Artificial and Heavily Modified Water bodies (A/HMWB) must achieve Good Ecological Potential (GEP). This should be achieved through a number of objectives, which include:

- To prevent deterioration of the status of surface waters and groundwater;
- To achieve objectives and standards for protected areas, i.e. Drinking Water Protected Areas Safeguard Zones (SgZs), Shellfish Waters, Bathing Waters, Nitrate Vulnerable Zones (NVZ), sites listed Urban Waste Water Treatment Directive, and Natura 2000 sites;
- To aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status;
- To reverse any significant and sustained upward trends in pollutant concentrations in groundwater;
- The cessation of discharges, emissions, and loses of priority hazardous substances into surface waters; and
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.

Any new development must ensure that these fundamental requirements of the Directive are not compromised.

In England, the Environment Agency (EA) is the competent authority for implementing the WFD, and in Scotland, the Scottish Environmental Protection Agency (SEPA) is the competent authority. The relevant competent authorities must make sure that development does:

- Not result in a deterioration of status of the water body;
- Not prevent the achievement of 'good' status by 2027;
- Not infringe other legislation; and,
- Where possible, enhance the environment.

New developments that therefore have the potential to impact the current or targeted WFD status of a water body are required to assess their compliance against the WFD objectives of the potentially affected water bodies.

18.3 Assessment Process

In accordance with relevant guidance for competing WFD Appraisals for coastal and transitional waters (Planning Inspectorate, 2017) and the Planning Inspectorate's Advice Note Eighteen (EA, 2015)[23], a three-stage approach is adopted for WFD assessment:

- **Stage 1: WFD Screening** – Identification of the Project activities that are to be assessed and determination of which WFD water bodies could potentially be affected through identification of a ZoI. This step also provides a rationale for any water bodies screened out of the assessment. This stage identifies the water bodies which may potentially be affected by the Project;
- **Stage 2: WFD Scoping** – For each water body identified in Stage 1, an assessment is carried out to identify the effects and potential risks to quality elements from all activities. The assessment is made taking into consideration embedded mitigation (measures that can reasonably be incorporated into the design of the Project) and good practice mitigation (measures that would occur with or without input from the WFD Impact Assessment process). This stage identifies the WFD parameters which need to be considered to inform WFD Impact Assessment (Stage 3);
- **Stage 3: WFD Impact Assessment** – A detailed assessment of the water bodies and activities carried forward from the WFD screening and scoping stages. It involves:
    - The baseline conditions of the concerned water bodies;
    - An assessment of the risk of deterioration (either in isolation or cumulatively);
    - A description of any additional mitigation that is required (if applicable) and how it will be implemented; and
    - An explanation of any positive contributions to the RBMP objectives proposed, and how they will be delivered.

This report covers the first 'screening' stage of the WFD Appraisal process.

18.4 Screening Assessment

18.4.1 Project activities

Drawing on the Project Description outlined in **Chapter 2,** the primary activities associated with the Project that are relevant to the WFD assessment include:

Intertidal works (MHWS to MLWS)

- Horizontal Directional Drilling (HDD) of cable conduits through the upper and mid-shore;
- Excavating the seabed at the HDD duct breakout points (which may require construction of a temporary cofferdam); and
- Installation of the marine cables through the HDD duct.

Subtidal works

- Pre-installation activities including engineering and other specialist surveys;
- Route preparation activities including cable route clearance, pre-sweeping through areas of sandwaves etc.;
- Cable installation activities which are anticipated to include mechanical ploughing or cutting and/or water-jetting at different locations in response to the seabed sediment conditions;
- Cable protection which may be required in specific locations where the target burial depth cannot be achieved, to protect subsea cables; and
- Excavating the seabed at the HDD duct breakout points.

[23] The Project Marine Scheme is not an NSIP. However, the guidance provided by the Planning Inspectorate may provide useful material to help inform the WFD assessment insomuch as it represents current best-practice which has been developed alongside the Environment Agency.

18.4.2 Avoidance Measures/Mitigation by Design

To avoid impacts to WFD water bodies, the Project would implement the following best practice mitigation measures:

- The use of an HDD cable installation method to minimise habitat loss and disturbance within the intertidal zone. HDD conduits will be drilled to a sufficient depth to ensure disturbance to surface habitats and species as a result of HDD drilling vibrations will not occur;
- HDD drilling fluids required for HDD operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include;
    - The use of biodegradable HDD drilling fluids (i.e. from the OSPAR List of Substances/Preparations Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR substances)) where practicable;
    - HDD drilling fluids will be tested for contamination to determine possible reuse or disposal;
    - If disposal is required, HDD drilling fluids would be transported by a licensed courier to a licensed waste disposal site;
- Designated (and as minimal as possible) anchoring areas and protocols shall be employed during marine operations to minimise physical disturbance of the seabed;
- A Construction Environmental Management Plan (CEMP), Emergency Spill Response Plan and a Waste Management Plan shall be developed and implemented for the installation phase of the Project in accordance with in the coastal and marine environmental site guide (John *et al*., 2015);
- The latest guidance from the GB non-native species secretariat (2015)[24] will be followed and a Biosecurity Plan produced to cover cable installation and any maintenance or cable repair works;
- All project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of Invasive NonNative Species (INNS);
- All Project vessels will be required to comply with the International Regulations for Preventing Collisions at Sea (1972) and regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) with the aim of preventing and minimising pollution from ships. Most critically, all vessels shall have a contingency plan for marine oil pollution (Shipboard Oil Pollution Emergency Plan);
- Where practicable, the cable route will be microrouted around sensitive benthic ecology receptors as identified from project-specific surveys;
- Route preparation works (e.g. sandwave dredging) would be carried out as locally as possible to minimise disturbance to benthic ecology receptors;
- Cable installation will be carried out on a 24-hour basis in order to reduce the overall installation time and associated disturbance of ecological receptors; and
- Cable protection features (e.g. rock placement, mattresses and grout bags) will be installed only where considered necessary for the safe operation of the Project, and /or ensure the safety of other sea users (e.g. fishing trawlers, etc.).

18.4.3 Zone of Influence

WFD water bodies have been screened into this assessment using a ZoI approach and on the basis of whether they are:

- A designated WFD water body within the ZoI; and
- A designated WFD water body indirectly affected by the ZoI (principally related to migratory fish species).

Table 18-1 sets out the pathways to an effect, the extent of the ZoI and the water bodies that are directly within the ZoI.

[24] http://www.nonnativespecies.org/home/index.cfm

Table 18-1 ZoIs and Relevant WFD Water Bodies

Potential pathway	ZoI and basis for determination	Relevant water bodies
Increased suspended sediment concentrations (SSC)	3000 m is expected to be the maximum distance at which increased to SSC are likely to have an impact (based on SSC modelling for similar projects in the North Sea)	North Berwick to Barns Ness* (200467); Barns Ness to Wheat Stack (200038); Firth of Forth Outer – Offshore* (200055); Tyne and Wear (GB650301500002)
Changes to marine water quality from the use of drilling fluids and accidental leaks and spills from vessels, including loss of fuel oils	Footprint of the proposed works plus 700 m buffer; based on professional judgement and consideration of worst-case	North Berwick to Barns Ness* (200467); Barns Ness to Wheat Stack (200038); Firth of Forth Outer – Offshore* (200055); Tyne and Wear (GB650301500002)
Temporary physical disturbance to benthic sediments and habitats	15 m width along the full length of the Marine Scheme, widening to 40 m when pre-sweep is required through sand waves	North Berwick to Barns Ness* (200467); Barns Ness to Wheat Stack (200038); Firth of Forth Outer – Offshore* (200055); Tyne and Wear (GB650301500002)

*Sites listed with an Asterix included under precautionary principle whilst approximate distance unavailable due to SEPA cyber-attack.

18.4.4 Relevant Water Bodies

18.4.4.1 North Berwick to Barns Ness

The Project Marine Scheme marine scheme approaches Scottish landfall south[25] of the North Berwick to Barns Ness water body (200467). There are currently no pressures identified on this water body, which currently has high ecological potential and passes chemical status, resulting in an overall water body status of good. A description of the North Berwick to Barnes Ness water body is summarised in **Table 18-2**.

Table 18-2 Characteristics of the North Berwick to Barns Ness water body

Water body*	Description, notes or more information
WFD water body name	*North Berwick to Barns Ness*
Water body ID	*ID: 200467*
River basin district name	*Scotland, Forth*
Water body type (estuarine or coastal)	*Coastal Water*
Water body total area (km^2)	*134.5*
Overall water body status (2016)	*Good*
Ecological status	*Good*
Chemical status	*Pass*
Target water body status and deadline	*Good (2021 & 2027)*
Hydromorphology status of water body	*High*
Heavily modified water body and for what use	*Not designated artificial or heavily modified*
Phytoplankton status	*High*
Associated protected areas	*Firth of Forth - SPA* *Dunbar (Belhaven) - EC BATHING WATER* *Barns Ness Coast - SSSI* *Lothian / Borders - NITRATE VULNERABLE ZONE* *Bass Rock - SSSI* *Firth of Forth - SSSI*

[25] Approximate distance unavailable due to SEPA cyber-attack. AECOM was unable to download GIS data for Scottish water bodies at the time of writing.

	Forth Islands - SPA *Whitesands - EC BATHING WATER* *Dunbar (East) - EC BATHING WATER* *Seacliff - EC BATHING WATER*

* *Water body information can be found in the associated data sheet, which is available from the Scottish Environment Protection Agency (SEPA) website.*

18.4.4.2 Barnes Ness to Wheat Stack

The approach to the Scottish landfall will pass through the Barns Ness to Wheat Stack water body (200038). There are currently no pressures identified on this water body, which currently has high ecological potential and passes chemical status, resulting in an overall water body status of good. A description of the Barnes Ness to Wheat Stack water body is summarised in **Table 18-3**.

Table 18-3 Characteristics of the Barnes Ness to Wheat Stack water body

Water body*	Description, notes or more information
WFD water body name	*Barns Ness to Wheat Stack*
Water body ID	*ID: 200038*
River basin district name	*Scotland, Forth*
Water body type (estuarine or coastal)	*Coastal Water*
Water body total area (km^2)	*98.3*
Overall water body status (2016)	*Good*
Ecological status	*High*
Chemical status	*Pass*
Target water body status and deadline	*Good (2021 & 2027)*
Hydromorphology status of water body	*High*
Heavily modified water body and for what use	*Not designated artificial or heavily modified*
Phytoplankton status	*High*
Associated protected areas	*Thorntonloch - EC BATHING WATER* *Pease Bay Coast - SSSI* *Lothian / Borders - NITRATE VULNERABLE ZONE* *St Abbs Head to Fast Castle - SPA* *Berwickshire and North Northumberland Coast - SAC* *Barns Ness Coast - SSSI* *Siccar Point - SSSI* *Pease Bay - EC BATHING WATER* *St Abbs Head to Fast Castle Head - SSSI* *Berwickshire Coast (Intertidal) - SSSI* *St Abb's Head to Fast Castle - SAC*

* *Water body information can be found in the associated data sheet, which is available from the Scottish Environment Protection Agency (SEPA) website.*

18.4.4.3 Firth of Forth Outer-Offshore

The Project Marine Scheme approaches the Scottish landfall in relative proximity[25] to the Firth of Forth Outer – Offshore water body (200055). There are currently no pressures identified on this water body, which currently has high ecological potential and passes chemical status, resulting in an overall water body status of good. A description of the Firth of Forth Outer – Offshore water body is summarised in **Table 18-4**.

Table 18-4 Characteristics of the Firth of Forth Outer – Offshore water body

Water body*	Description, notes or more information
WFD water body name	*Firth of Forth Outer – Offshore*
Water body ID	*ID: 200055*
River basin district name	*Scotland, Forth*
Water body type (estuarine or coastal)	*Coastal Water*
Water body total area (km^2)	*446.62*
Overall water body status (2016)	*High*
Ecological status	*High*
Chemical status	*Pass*
Target water body status and deadline	*Good (2021 & 2027)*
Hydromorphology status of water body	*High*
Heavily modified water body and for what use	*Not designated artificial or heavily modified*
Phytoplankton status	*High*
Associated protected areas	*Forth Islands - SPA* *Isle of May - SSSI* *Isle of May - SPA*

* *Water body information can be found in the associated data sheet, which is available from the Scottish Environment Protection Agency (SEPA) website.*

18.4.4.4 Tyne and Wear

The Project Marine Scheme English landfall will pass through the Tyne and Wear water body (GB650301500002). The water body currently has moderate ecological potential and failing chemical status, resulting in an overall water body status of moderate. A description of the Tyne and Wear water body is summarised in **Table 18-5**.

Table 18-5 Characteristics of the Tyne and Wear water body

Water body*	Description, notes or more information
WFD water body name	*Tyne and Wear*
Water body ID	*GB650301500002*
River basin district name	*Northumbria*
Water body type (estuarine or coastal)	*Coastal Water - Moderately exposed, Mesotidal*
Water body total area (km^2)	*126.388*
Overall water body status (2016)	*Moderate*
Ecological status	*Good*
Chemical status	*Fail*
Target water body status and deadline	*At present, there are no measures within this operational catchment which the predicted improvements in the status of water bodies by 2021 are based upon. Other measures may be taking place, but there is not enough confidence (in location or scale of improvement) to predict specific outcomes based upon them.*
Hydromorphology status of water body	*Supports good*
Heavily modified water body and for what use	*Not designated artificial or heavily modified*
Phytoplankton status	*High*
Associated protected areas	*Northumbria Coast - SPA* *Newbiggin North – EC BATHING WATER* *Crimdon – EC BATHING WATER* *Teesmouth & Cleveland Coast - SPA* *Durham Coast - SAC* *Hawthorn Burn from Source to North Sea - NITRATE VULNERABLE ZONE* *Seaham Hall Beach – EC BATHING WATER* *Whitley Bay – EC BATHING WATER* *Tynemouth Cullercoats – EC BATHING WATER* *South Shields – EC BATHING WATER* *Seaton Sluice – EC BATHING WATER* *Tynemouth Long Sands South – EC BATHING WATER* *Blyth South Beach – EC BATHING WATER* *Roker – Sunderland – EC BATHING WATER* *Seaburn – Sunderland – EC BATHING WATER* *Newbiggin South – EC BATHING WATER* *Tynemouth King Edwards Bay – EC BATHING WATER* *Marsden – EC BATHING WATER* *Seaham Beach – EC BATHING WATER* *Tynemouth Long Sands North – EC BATHING WATER*

* *Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.*

18.4.5 Conclusion

The WFD screening assessment concludes a potential of impact on coastal WFD water bodies at both ends of the Project Marine Scheme.

The Project Marine Scheme will intercept Barnes Ness to Wheat Stack (ID: 20008) within the proximity of the Scottish landfall, passing in relatively close proximity to both North Berwick to Barns Ness (ID: 200467) and Firth of Forth Outer-Offshore (ID: 2000055).

The Project Marine Scheme will intercept Tyne and Wear water body (GB650301500002) on the approach to the English landfall. All four water bodies will therefore be taken forward to the next stage of assessment.

In addition to this, all associated protected areas (listed above in Tables 18-2 – 18-5 inclusive) lie within 3 km of the proposed Marine Scheme in both English and Scottish jurisdictions and will therefore also need appropriate consideration at the next stage of assessment.

19.Cumulative and In-Combination Effects

19.1 Introduction

19.1.1 Background

This chapter provides a summary of the proposed assessment of cumulative and in-combination effects arising from the Project Marine Scheme.

The approach to assessment is informed by the MMO Strategic Framework for Scoping Cumulative Effects (MMO, 2014) and has considered the guidance set out in Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications, Marine Scotland (2018). Whilst the Project Marine Scheme is not a Nationally Significant Infrastructure Project, the approach to the assessment of Cumulative and In-Combination Effects provided within Planning Inspectorate Advice Note Seventeen (PINS, 2019) provides a contemporaneous and well-tested process to help guide this assessment.

The term cumulative effects refer to effects upon receptors arising from the Project Marine Scheme when considered alongside other plans and projects that result in an additive impact with any element of the Project Marine Scheme. Cumulative effects can be described as the net effect of both direct and indirect cumulative pressures, from different activities. An individual effect alone may be considered insignificant, but the additive effects of more than one effect, from any number of sources, could result in a significant cumulative effect, either beneficial or adverse.

The cumulative effects assessment of the Project Marine Scheme will consider the following types of effect:

- **Combined Effects**: these effects derive from combinations of Scheme-specific impacts which, when acting together, would result in a new or different likely significant effect or an effect of greater significance that one impact would result in when considered in isolation.
- **Cumulative Effects:** these effects derive from Scheme-specific impacts which, when considered together with the impacts of other planned developments, could result in a new or different likely significant effect or an effect of greater significance than the Scheme's effect when considered in isolation.

The assessment is based on the best available data from other plans, projects and marine activities and associated information which is currently in the public domain or has been provided to the project. The assessment assumes that publicly available information is accurate; the assessment is also reliant on collaboration with a range of statutory consultees to the Marine Licensing process, neighbouring authorities and other developers to identify changes in information which may be pertinent to the assessment.

Where there are specific limitations associated with data, they will be highlighted as the assessment progresses.

19.1.2 Requirement

The UK Marine Policy Statement (HM Government, 2011) reiterates this requirement, stating:

"When considering potential benefits and adverse effects, decision makers should also take into account any multiple and cumulative impacts of proposals, in the light of other projects and activities."

And:

"The marine plan authority will need to consider the potential cumulative impact of activities and, using best available techniques, whether for example:

- *the cumulative impact of activities, either by themselves over time or in conjunction with others, outweigh the benefits;*

- *A series of low impact activities would have a significant cumulative impact which outweighs the benefit; or,*
- *An activity may preclude the use of the same area/resource for another potentially beneficial • activity*.

Scotland's National Marine Plan states in policy GEN21:

"Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation."

The East Inshore and East Offshore Marine Plans (HM Government, 2014) states in policy ECO1:

"Cumulative impacts affecting the ecosystem of the East marine plans and adjacent areas (marine, terrestrial) should be addressed in decision-making and plan implementation."

19.2 Approach to Cumulative Assessment

In conjunction with professional judgement, the following guidance will be used to inform the scope of the combined and cumulative effects assessments, and to assist the identification and mitigation of likely significant effects:

- **Cumulative Effects Assessment – Advice note seventeen**: Cumulative effects assessment relevant to nationally significant infrastructure projects (PINS, 2019): This guidance will be applied when undertaking a staged process of identification and assessment of other planned developments within the assessment of cumulative effects;
- **MMO Strategic Framework for Scoping Cumulative Effects** (MMO, 2014); and
- **Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy** Applications, Marine Scotland (2018).

19.2.1 Data Sources

A holistic approach is taken to the identification of projects, plans and activities which will be included in the assessment; in line with the PINS Advice Note Seventeen and the MMO Strategic Framework, in order to achieve a focused assessment, it is necessary to include details of third-party projects only where there may be receptor or activity-based pressures.

Projects considered within marine cumulative assessment include, but are not limited to:

- Offshore Wind Farms;
- Marine Aggregate Sites (including areas identified as having large-scale potential for marine aggregate extraction);
- Licenced Disposal Sites;
- Cables and Pipelines;
- Oil and Gas Infrastructure; and
- Coastal Energy.

Data on these – and other – projects, plans and licensable activities have been established through a desktop review of published information; this includes the following sources:

- MMO Public Register;
- MS-LOT Public Register;
- KIS-ORCA Marine Cables Information;
- National Infrastructure Planning website;
- The Crown Estate / Crown Estate Scotland Websites – Offshore Wind data;
- The Crown Estate / Crown Estate Scotland websites – aggregate digital data;
- Department for Business, Energy and Industrial Strategy (BEIS) Oil and Gas Asset Map;

- Seagreen Windfarm Project Website; and
- Berwick Bank and Marr Bank Project Website (previously known as Seagreen 2 and Seagreen 3).

19.2.2 Data Limitations

The data herein, and that which will be obtained throughout the Environmental Appraisal, is subject to the following limitations and/or assumptions:

- Given the timeframes for the Project Marine Scheme, the information on some other projects (such as timescales and detailed construction information) is not available at this stage and may not be available at the stage when the Environmental Appraisal is finalised. A 'watching brief' will be maintained on these sources as the Project Marine Scheme progresses through the Environmental Appraisal process, such that the most appropriate level of information is used for the assessment at the time of submission;
- Where information cannot be found, but an assumption of the spatial extent of an impact could be inferred based on expert knowledge, these projects have been taken forward for assessment; and
- Where there is limited information or there is not enough certainty to carry out the assessment, these projects have been scoped out of the CEA. It should be noted that best efforts have been made to either source publicly available information or contact appropriate developers prior to the decision to scope out a project based on lack of information. This process is in line with the MMO (2014) guidance and ensures that only cumulative effects for which there is a high degree of confidence are assessed; and
- Third party and publicly available data is correct at the time of publication of the Environmental Statement.

19.2.3 Consultation

Consultation is a vital element of the cumulative assessment process; feedback on the scope, extent and approach of this assessment is welcomed during the Environmental Appraisal process. Consultation responses to the Project Marine Scheme scoping report – and where appropriate, pre-application consultation – will be documented in the ensuing assessment.

19.2.4 Assessment of Combined Effects

The assessment of combined effects will consider whether an individual environmental receptor or resource would likely be affected by more than one type of impact as a result of the construction and operation of the Project Marine Scheme. The assessment methodology will involve the identification of impact interactions associated with the Project Marine Scheme upon separate environmental receptors and resources, in order to understand the overall environmental effect of the Project Marine Scheme.

Potential interactions will be identified by reviewing the topic conclusions within the Environmental Appraisal topics identified in this Scoping Report, in order to establish where individual impacts may combine and result in likely significant effects. The significance of combined effects upon environmental receptors and resources will be determined using professional judgement, with input provided by from those responsible for the production of the individual Environmental Appraisals.

19.2.5 Assessment of Cumulative Effects

In accordance with the approach contained within Advice note seventeen (PINS, 2019), the following stages will be undertaken within the cumulative assessment:

19.2.5.1 Planning Inspectorate AN17 Approach

Stage 1: Establishing the long list of 'other existing development and/or approved development'

This stage will involve establishing the Scheme's Zones of Influence (ZoI) associated with the topic areas assessed, within which a long list of other planned developments and development allocations will be identified. The preliminary list included in this chapter will be issued to the relevant consultees and if any further developments which are likely to result in cumulative effects with the Project Marine Scheme are identified, these will be added to the long list for consideration.

Stage 2: Establishing a shortlist of 'other existing development and/or approved development'

This stage will involve a review of the long list of planned developments, in order to identify those to be taken forward into the cumulative effects assessment. In determining which of the developments should be shortlisted for consideration in the assessment, professional judgement will be applied, and the following items will be considered:

- Whether there is a suitable level of information available to conduct an assessment;
- The certainty of the planned developments;
- The likelihood of construction programme overlap;
- The distance between the Scheme and the planned developments;
- The probability of significant cumulative effects occurring; and
- The category and size of the planned developments.

Stage 3: Information Gathering

This stage will involve reviewing the available information relating to the shortlisted developments, in order to establish the details of their likely environmental effects. This is expected to include, but not be limited to, the following:

- The location and boundary of the development project or allocation;
- Design information, for example elevation drawings and layout plans;
- Programmes for construction, operation and decommissioning and temporal (timescale) overlaps;
- Baseline information relating to environmental receptors and resources;
- Details of potential or likely significant effects; and
- The ZOI of environmental topics assessed.

Stage 4: Assessment

Those developments which meet the inclusion criteria set out in the above stages shall be incorporated into the cumulative effects assessment, which will involve identifying where effects are likely to occur and assessing the significance of those effects on environmental receptors and resources, taking into account any mitigation measures.

19.2.5.2 MMO Strategic Framework for Scoping Cumulative Effects

The MMO Strategic Framework for Scoping Cumulative Effects is primarily designed as a tool to aid the MMO with their (internal) assessment of cumulative and in-combination effects; notwithstanding, it remains a valuable resource to help inform the proponents of infrastructure projects as they progress through the Marine Licensing process.

Broadly, the MMO's strategic framework for assessment can be summarised by the following steps:

- Step 1 - Define the purpose of the CE assessment;
- Step 2 - Identify primary focus (receptor or activity);
- Step 3 - Identify receptor-pressures;
- Step 4 - Identify activity-pressures;
- Step 5 - Define the Study Area;
- Step 6 - Define sources and pathways;
- Step 7 - Identify other activities; and
- Step 8 - Assessment phase.

19.2.6 Initial Screening of Other Development Projects and Allocations

As part of the scoping exercise, a preliminary review has been undertaken to identify other development projects and development plan allocations that are likely to require consideration within the cumulative effects assessment.

A number of other proposed developments have been identified in the vicinity of the Project Marine Scheme that could potentially result in cumulative impacts during its construction and operation. For the purposes of scoping, as a general rule and basis for the Study Area developments within 10 km of the Project Marine Scheme have been included in the preliminary long list. However, where a large-scale development has been identified outside of 10km and at this stage of the assessment cumulative effects cannot be discounted, the development has been included in the list as a precautionary measure.

Production of the long list of other developments is an iterative process and relevant consultees will be approached for comments and suggestions of additional developments which should be considered for inclusion in the final cumulative effects assessment. Once the long list has been completed, consultation will continue to take place to compile information which will enable the shortlisting and assessment process. A preliminary long list is provided within **Table 19-1** below.

As part of the Environmental Appraisal, plans and projects will be mapped where there is available geospatial data; at this early stage, for illustration, **Figure 19-1** below depicts Offshore Wind projects which have been identified so far.

19.2.7 Other Components of the Project

In addition to consideration of the potential for cumulative effects between the Project Marine Scheme and other proposed and committed developments, the cumulative assessment scope also includes other components of the Project, which are anticipated to be brought forward within the same or similar timeframes.

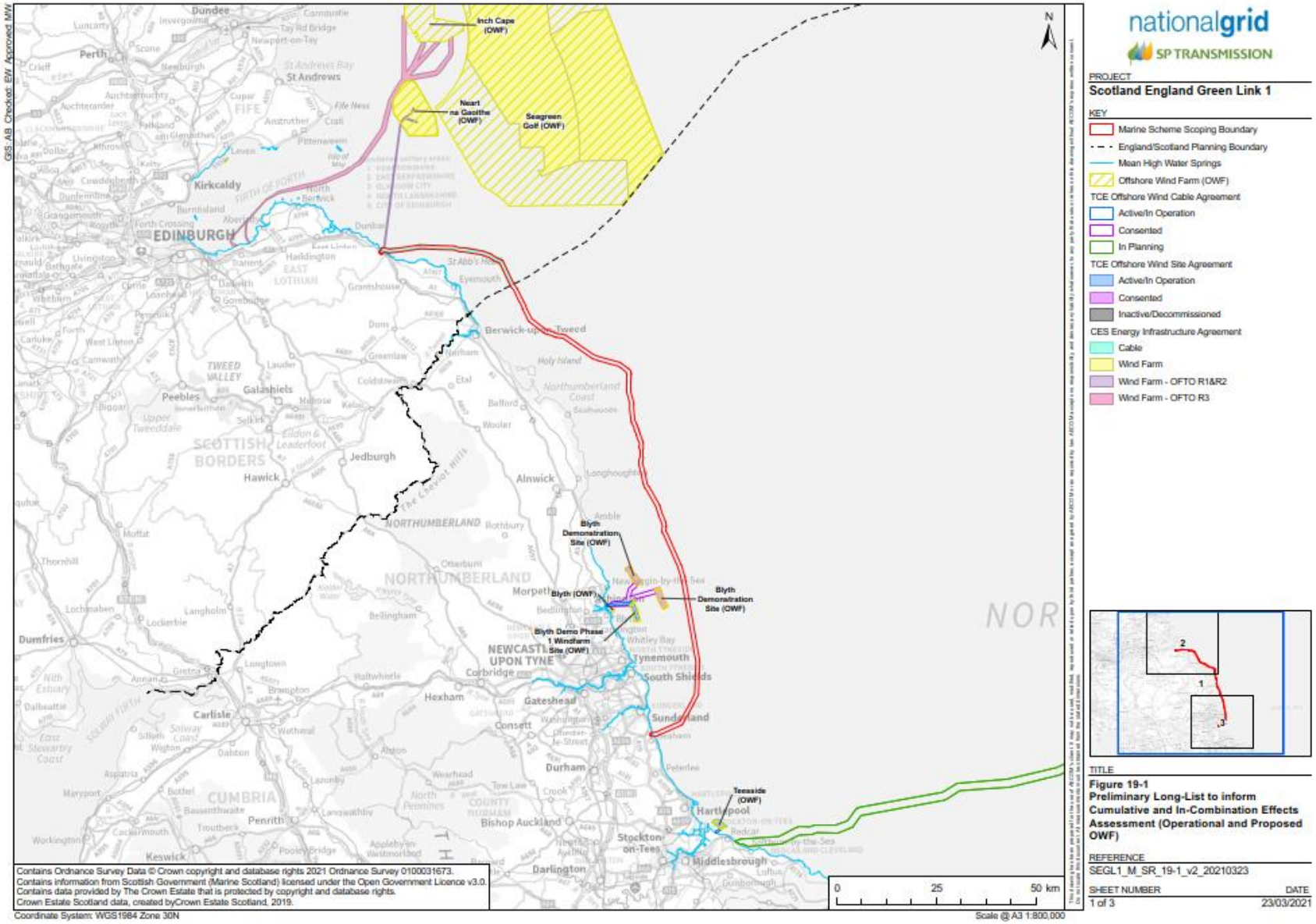
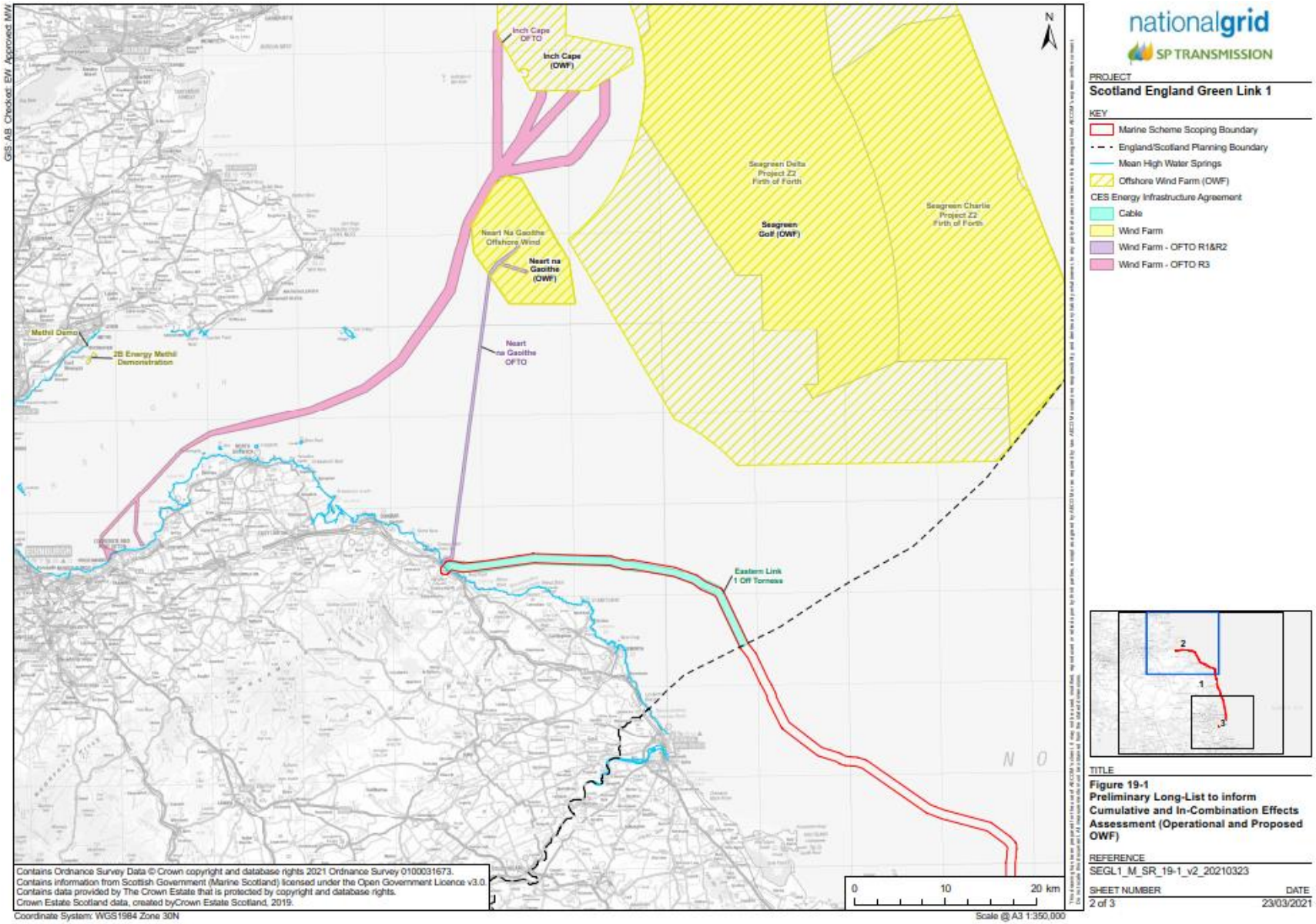


Figure 19-1 Illustrative Mapping (Sheets 1 – 3)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Contains Ordnance Survey Data © Crown copyright and database rights 2021 Ordnance Survey 0100031673.
Contains information from Scottish Government (Marine Scotland) licensed under the Open Government Licence v3.0.
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Crown Estate Scotland data, created byCrown Estate Scotland, 2019.
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SP TRANSMISSION
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Marine Scheme Scoping Boundary
England/Scotland Planning Boundary
Mean High Water Springs
Offshore Wind Farm (OWF)
CES Energy Infrastructure Agreement
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Wind Farm
Wind Farm - OFTO R1&R2
Wind Farm - OFTO R3
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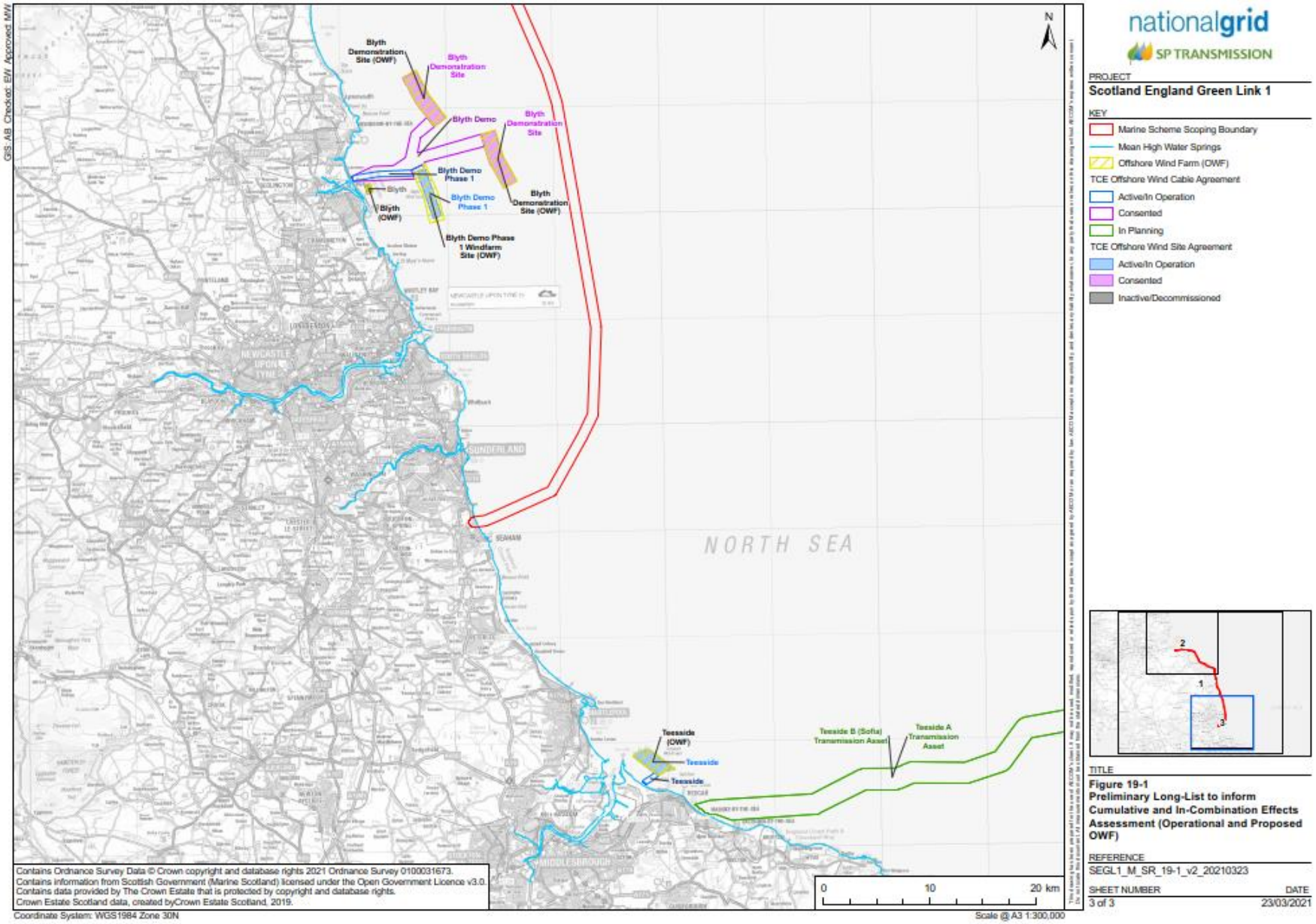
Figure 19-1
Preliminary Long-List to inform Cumulative and In-Combination Effects Assessment (Operational and Proposed OWF)
REFERENCE
SEGL1_M_SR_19-1_v2_20210323
SHEET NUMBER
2 of 3
DATE
23/03/2021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Blyth Demonstration Site (OWF)
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Blyth Demonstration Site (OWF)
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NEWCASTLE UPON TYNE
SUNDERLAND
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Teesside B (Sofia) Transmission Asset
Teesside A Transmission Asset
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Contains Ordnance Survey Data © Crown copyright and database rights 2021 Ordnance Survey 0100031673.
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Crown Estate Scotland data, created byCrown Estate Scotland, 2019.
Coordinate System: WGS1984 Zone 30N
Scale @ A3 1:300,000
nationalgrid
SP TRANSMISSION
PROJECT
Scotland England Green Link 1
KEY
Marine Scheme Scoping Boundary
Mean High Water Springs
Offshore Wind Farm (OWF)
TCE Offshore Wind Cable Agreement
Active/In Operation
Consented
In Planning
TCE Offshore Wind Site Agreement
Active/In Operation
Consented
Inactive/Decommissioned
2
1
3
TITLE
Figure 19-1
Preliminary Long-List to inform Cumulative and In-Combination Effects Assessment (Operational and Proposed OWF)
REFERENCE
SEGL1_M_SR_19-1_v2_20210323
SHEET NUMBER
3 of 3
DATE
23/03/2021

Table 19-1 Preliminary long list of 'other developments'

ID*[26]	Application	Marine consenting authority	Applicant for 'other development' and brief description	Approximate distance from the Project	Status
-	Scotland England Green Link /Eastern Link 1 Onshore Components (Scotland)	East Lothian Council	SP Transmission – onshore components including converter station, substation and underground cable.	0 km	Pre-planning.
-	Scotland / England Green LinkEastern Link 1 Onshore Components (England)	Durham County Council	National Grid – onshore components including converter station, substation and underground cable.	0 km	Pre-planning
-	Seagreen 1 – offshore windfarm	Marine Scotland	Phase 2 – Berwick Bank: expected capacity range between 1400MW to 2300MW expected to be operational by 2027. Phase 3 – Marr Bank expected capacity range between 900MW and 1850MW – timescale currently unknown.	0 km (OWF Export Cable Route only)	Phase 2 and 3 in early planning stages.
-	Blyth Offshore Demonstrator – Phase 2 (i.e. tranche 2 of 3)	MMO	EDF – offshore wind turbines on floating sub structures.	Unknown	Commenced project planning.
-	Blyth Offshore Demonstrator – Phase 3 (i.e. tranche 3 of 3)	MMO	EDF – offshore wind farm.	Unknown	Commenced project planning.
-	North Sea Link Cable Corridor	MMO	Statnett and National Grid North Sea Link Limited – construction of an electricity link between Norway and the UK, North Sea Link (NSL).	0 km	Under construction. Expected completion: end of 2021.
-	Marine Licences and Applications: MLA/2020/00458	MMO	NO-UK Fibre Optic Cable System - subsea telecommunication cable connection in the North Sea.	0 km	Application submitted. Proposed start date: 01-02/2021. Proposed end date: 31/12/2048.
	Energy Infrastructure Agreements: Neart	Marine Scotland	Neart Na Gaoithe Offshore Wind – pipeline/cable.	1.2 km from KP 1 (OWF Export Cable Route only)	Under construction.

[26] *An ID reference is included for illustration; as the list is refined during the course of the Environmental Assessment, each plan or project will be assigned an individual ID code.

	Na Gaoithe Offshore Wind				
-	Marine Licences and Applications: MLA/2017/00047/1	MMO	Blyth Offshore Demonstrator Limited - the deposit of secondary cable protection along the export cable route from landfall to the Blyth Offshore Demonstrator (BOD) wind farm Array 2, and within the array itself.	5.0 km	Start: 01/07/17. End: 31/12/27.
-	Marine Licences and Applications: MLA/2012/00122/9	MMO	Blyth Offshore Demonstration Project – post consent surveys.	5.0 km	Start: 01/11/16. End: 03/10/50.
-	Marine Licences and Applications: MLA/2013/00436/4	MMO	National Grid NSN Link Limited - electrical high-voltage direct current (HVDC) interconnector between Norway and the United Kingdom.	0 km	Start: 01/12/2014. End: 01/12/2114.
-	Marine Licences and Applications: MLA/2019/00319	MMO	AQUA COMM – cable installation.	0 km	Start: 25/06/20. End: 25/06/46.

20. Summary, Recommendations and Next Steps

20.1 Proposals for site specific survey

A marine survey comprising geotechnical, geophysical survey and environmental survey including chemical and biological sample analysis is currently ongoing. The data which will become available as a result of this survey will be used to support the assessment to be documented within the Environmental Appraisal. This will include review of the geophysical survey results, evaluated for evidence of known or unknown anthropogenic seabed features, anomalies, or other receptors, such as potential wreck sites.

20.2 Structure of the Environmental Appraisal

The Environmental Appraisal Report is expected to be structured into three volumes.

- Volume 1: Non-Technical Summary;
- Volume 2: Main Environmental Appraisal Report; and
- Volume 3: Figures and Appendices.

An indicative structure for Volume 2 is set out below. The final structure and content will be confirmed following receipt of any scoping representations

Chapter 1:	Introduction
Chapter 2:	Project Description
Chapter 3:	Legislative and Policy Framework
Chapter 4:	Approach to Environmental Appraisal
Chapter 5:	Alternatives and Design Development
Chapter 6:	Consultations and Stakeholder Engagement
Assessment of Significant Environmental Effects	
Chapter 7:	Physical Environment
Chapter 8:	Benthic Ecology, including Intertidal Ecology
Chapter 9:	Fish and Shellfish Ecology
Chapter 10:	Marine Mammals
Chapter 11:	Ornithology
Chapter 12:	Marine Archaeology
Chapter 13:	Shipping and Navigation
Chapter 14:	Commercial Fisheries
Chapter 15:	Other Users of the Sea
Chapter 16:	Interface with Project onshore scheme
Other Supporting Studies	
Chapter 17:	Cumulative and In-Combination Effects
Chapter 18:	Schedule of Mitigation Commitments.
Chapter 19:	Summary and Conclusions

It is not proposed to include separate chapters covering Underwater Noise and Vibration and EMF. Technical Appendices setting out the acoustic and EMF profile(s) that have been assumed for the project will be included in the Environmental Appraisal. Potential effects associated with noise and EMF will be considered within the biological environment chapters relating to key receptors: e.g. Marine Mammals and Fish and Shellfish Ecology.

20.2.1 Habitat Regulations Assessment

A separate stand-alone Habitat Regulations Assessment (HRA) report will be produced and will be included as an Appendix to the Environmental Appraisal.

20.2.2 Marine Protected Area and Marine Conservation Zone Assessment

A separate stand-alone Marine Protected Area (MPA) and Marine Conservation Zone Assessment (MCZ) report will be produced and will be included as an appendix to the Environmental Appraisal. This report will be prepared using the Scottish Government's Feature Activity Sensitivity Tool (FEAST)[27] as a source of information for determining the sensitivity of designated features to pressures of the Marine Scheme and potential management requirements for the effected Nature Conservation MPAs and MCZs.

20.2.3 Water Framework Directive Assessment

A separate stand-alone Water Framework Directive Assessment (WFD) report will be produced and will be included as an appendix to the Environmental Appraisal.

20.3 Next Steps

Taking account of the content of this scoping report, the Applicants wish to seek comment from the MMO and from MS-LOT on the proposed scope of assessment to be included within Environmental Appraisal.

Specifically, the Applicant would welcome comments on the following:

- To the best of your knowledge, is the proposed scope of the Environmental Appraisal adequate?
- Is the evidence base proposed for use in the assessment appropriate? If not, please explain why and what you would expect to see and any additional work you deem required.
- Do you agree with the conclusions reached i.e. receptors have been scoped out of subsequent assessment?
- Are the proposed mitigation and monitoring measures likely to be sufficient?
- Is the project description sufficiently clearly presented?
- Are the appropriate receptors scoped into the Environmental Appraisal?
- Is the proposed methodology and assessment sufficiently clear, and proposed approach justified?
- Are the proposed data sources and methods for data collation appropriate?
- Are appropriate quality standards or assurance methods identified and proposed for use?
- Do you agree with the evaluation of potential for and the proposed methodology for assessing cumulative/in combination effects?

[27] https://www.marine.scotland.gov.uk/feast/Index.aspx

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