

CAMBOIS CONNECTION MARINE SCHEME

Volume 1: Environmental
Impact Assessment Scoping
Report



REVISIONS & APPROVALS

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ACRONYMS

Acronym	Description
AA	Appropriate Assessment
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ATBA	Areas to be Avoided
ATT	Admiralty Total Tide
BBWF	Berwick Bank Wind Farm
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BTO	British Trust for Ornithology
Cefas	Centre for Environment Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CNS	Central North Sea
CSEMP	Clean Seas Environmental Monitoring Programme
DDV	Drop-Down Video
DEFRA	Department for Environment, Food and Rural Affairs
ECMWF	European Centre for Medium-Range Weather Forecasts
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EPS	European Protected Species
ES	Environmental Statement
ESAS	European Seabirds at Sea
ESO	Electricity System Operator
EU	European Union
FAME	Future of the Atlantic Marine Environment
FEAT	Feature Activity Sensitivity Tool
FEED	Front End Engineering Design
FIR	Fishing Industry Representative
FLO	Fisheries Liaison Officer
GCR	Geological Conservation Review
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HES	Historic Environment Scotland
HND	Holistic Network Design

Acronym	Description
HPMAs	Highly Protected Marine Areas
HRA	Habitats Regulation Appraisal / Assessment [note that terminology varies slightly between Scotland and England but 'HRA' refers to the same fundamental process].
HVDC	High Voltage Direct Current
IAMMWG	Inter-Agency Marine Mammal Working Group
IBTS	International Bottom Trawl Survey
ICES	International Council for Exploration of the Seas
IDP	Initial Decommissioning Plan
IEMA	Institute of Environmental Management and Assessment
IFCA	Inshore Fisheries Conservation Authority
IHLS	International Herring Larvae Survey
IMO	International Maritime Organization
IPC	Infrastructure Planning Commission
IUCN	International Union for Conservation of Nature
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LPA	Local Planning Authority
LSE	Likely Significant Effects
MAIB	Marine Accident Investigation Branch
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-Beam Echo Sounder
MCA	Maritime and Coastguard Agency
MCCIP	Marine Climate Change Impacts Partnership
MCZ	Marine Conservation Zones
MFE	Mass-Flow Excavator
MGN	Marine Guidance Note
MHWN	Mean High Water Neap
MHWS	Mean High Water Springs
MIS	Marine Information System
MLA	Marine Licence Application
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPA	Marine Protected Areas
MSL	Mean Sea Level
MS-LOT	Marine Scotland Licensing Operations Team
MSS	Marine Scotland Science
MTS	Marine Traffic Survey

Acronym	Description
MU	Management Units
NBN	National Biodiversity Network
NCC	Northumberland County Council
NCMPA	Nature Conservation Marine Protected Area
NECR	Natural Environment and Rural Communities
NEIFCA	North East Inshore Fisheries Conservation Authority
NFFO	National Federation of Fishermen's Organisations
NOC	National Oceanography Centre
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRHE	National Record of the Historic Environment
NSIPs	Nationally Significant Infrastructure Projects
OCT	Open-Cut Trench
OTNR	Offshore Transmission Network Review
OWF	Offshore Wind Farm
PAC	Pre-Application Consultation
PDE	Project Design Envelope
PEXA	Practice and Exercise areas
PHA	Preliminary Hazard Analysis
PLG	Pre-Lay Grapnel
PoMRA	Protection of Military Remains Act
SEGL	Scotland to England Green Link

GLOSSARY

Term	Description
Berwick Bank Wind Farm	Refers to the wind farm from which the Cambois Connection will export electricity. The Berwick Bank Wind Farm encompasses the revised boundaries of two former opportunities (Berwick Bank and Marr Bank).
Converter Station	Infrastructure used to convert electricity from Direct Current (DC) to Alternating Current (AC).
Cumulative Effect	Changes to the receiving environment which are caused by a combination of present and future plans, projects and proposals.
EIA Regulations	Collectively, this term is used to refer to the relevant suite of Environmental Impact Assessment Regulations which are of relevance to the Marine Scheme.
Environmental Impact Assessment	Assessment of the consequences of a plan, project or activity on the receiving environment
Firth of Forth	Scottish estuary flanked by Fife to the north and Lothian to the south.
Horizontal Directional Drilling	Horizontal Directional Drilling or 'HDD' refers to a trenchless method of drilling generally used for installation of underground utilities which does not require any direct works and which can aid installation of crossings with sensitive or challenging features and obstructions.
High Voltage Direct Current	Refers to high voltage electricity in direct current ('DC') form. In relation to transmission, HVDC is often selected for longer transmission infrastructure on the basis that losses are typically lower when compared to transmission infrastructure utilising alternating current.
High Voltage Alternating Current	Refers to low voltage electricity in alternating current ('AC') form.
Intertidal	The area of seabed located between Mean High Water Springs and Mean Low Water Springs.
Landfall	Activities that occur seaward of MHWS to bring the offshore export cables carrying power from the wind farm to the shore and connect the offshore and onshore infrastructure.
Local Planning Authority	Local Planning Authority (or 'LPA') refers to the local government body legally empowered to exercise terrestrial (onshore) planning functions for a given area. In the case of the Cambois Connection, this is Northumberland County Council (NCC).
Marine Licence	A licence granted under the Marine and Coastal Access Act 2009, or the Marine (Scotland) Act 2020.
Marine Scheme	Activities required as part of the Cambois Connection below Mean High Water Springs.
Maximum Design Parameters	The maximum range of design parameters of each Marine Scheme asset.
Mean High Water Springs	Monthly tides are defined as 'Springs' or 'Spring tides' when the tidal range is at its highest and 'Neaps' or 'Neap tides' when the tidal range is at its lowest. The height of Mean High Water Springs (MHWS) is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest (Spring tides).
Mean Low Water Springs	The height of Mean Low Water Springs (MLWS) is the average throughout a year of the heights of two successive low waters during periods of 24 hours (approximately once a fortnight).
Natura 2000	Natura 2000 is a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types which are protected in their own right. Following Britain's exit from the European Union, these are now referred to as the national site network (please see below) under the Conservation of Habitats and Species Regulations 2017 (as amended).
National Site Network	Formerly referred to as 'EU Sites' or 'European Designated Sites', this refers to the creation of a national site network within the UK territory comprising the protected sites already designated under the Nature Directives, and any further sites designated under these Regulations.
Offshore Converter Station Platforms	Offshore substation used to convert and transfer the energy collected by the wind turbines to the shore.
Offshore Export Cable	High voltage cable used for exporting power from the offshore substation platforms/Offshore converter station platforms located within the array area to onshore export cables at an onshore landfall.
Onshore Export Cable	High voltage cable used for exporting power between the offshore export cables and the converter station.
Open Cut	Method of cable installation involving trenching.

Term	Description
Onshore Scheme	Activities required as part of the Cambois Connection above Mean High Water Springs.
Planning Permission	The need for such permission is the fundamental basis of the system for controlling onshore development in the UK. Before land can be developed, planning permission for development must be granted by the local planning authority. In the case of the Cambois Connection, this is Northumberland County Council (NCC).
Project Design Envelope	A series of maximum design parameters which are defined for the Marine Scheme (and which are considered to be a worst case for any given assessment).
Proposed Development	The Cambois Connection
Substation	Refers to the point at which electricity is connected into the UK electricity network. For the Onshore Scheme, this is the National Grid substation at Blyth.
Transition Joint Bay	A concrete structure where offshore export cables and onshore cables are spliced together.

UNITS

Unit	Description
%	Percentage
£	Pound Sterling
GW	Gigawatt (power)
Ha	Hectares
km	Kilometres (distance)
M	Metre (distance)
m ³	Cubic metres
MW	Mega Watt
NM	Nautical mile (distance)

1. INTRODUCTION

1.1. INTRODUCTION

In line with the UK's statutory target to achieve net zero emissions by the year 2050, Berwick Bank Wind Farm Limited (BBWFL) (hereafter referred to as 'the Applicant') is planning to submit an application for the development of offshore export cables, onshore export cables, an onshore converter station and associated onshore grid connection at Cambois in Northumberland (the 'Cambois Connection' / 'the Project').

The purpose of this infrastructure is to facilitate the export of green energy from the (separately consented¹) generation assets associated with the Berwick Bank Wind Farm (BBWF), located in the outer Firth of Forth. Figure 1-1 depicts the overall Cambois Connection Project, encompassing both the Scoping Boundaries for both the Onshore Scheme and the Marine Scheme. Figure 1-2 depicts the Scoping boundary for the Marine Scheme, e.g. corridor within which the offshore export cables will be installed.

In March, August and October 2022, the Applicant engaged with the Marine Scotland Licensing Operations Team (MS-LOT) and the Marine Management Organisation (MMO) regarding the requirement for an Environmental Impact Assessment (EIA); subsequently, the Applicant confirmed² with both MS-LOT and the MMO the commitment to complete an EIA for the Cambois Connection.

Further to the recent discussions and the confirmation of the requirement for an EIA, the purpose of this report is to define the scope of the proposed Marine EIA required for the Cambois Connection. This Scoping Report has been prepared in support of a request for a formal Scoping Opinion in relation to the Cambois Connection from both MS-LOT and the MMO. Figures to support this Scoping Report are provided in Volume 2: Supporting Figures.

A separate Scoping Report has been prepared in relation to those aspects of the Cambois Connection above Mean Low Water Springs (MLWS). This separate Scoping Report has been submitted to Northumberland County Council (NCC) (the local planning authority (LPA) for the Onshore Scheme) in support of a formal Scoping Opinion request for the Onshore Scheme.

1.2. BACKGROUND

1.2.1. THE APPLICANT

The Applicant is a wholly owned subsidiary of SSE Renewable Developments (UK) Limited (SSER) which is a leading developer, owner and operator of renewable energy across the United Kingdom (UK) and Ireland, with a portfolio of around 4 GW of onshore wind, offshore wind and hydropower. Part of the FTSE-listed SSE plc, its strategy is to drive the transition to a net zero future through the world class development, construction and operation of renewable energy assets.

SSER is currently constructing one of the world's largest offshore wind energy projects, the 3.6 GW Dogger Bank Windfarms in the North Sea, which is a joint venture with Equinor and Eni, as well as Scotland's largest and the world's deepest fixed bottom offshore site, the 1.5 GW Seagreen Offshore Windfarms in the Firth of Forth, a joint venture with TotalEnergies.

When complete, Dogger Bank and Seagreen Offshore Wind Farm will help power millions of UK homes and businesses and drive the transition to net zero carbon emissions. These assets will join the Applicant's existing operational offshore wind portfolio which consists of 487 MW across two offshore joint venture sites, Beatrice and Greater Gabbard, both of which are operated on behalf of asset partners.

1.2.2. THE CONSULTANT

Xodus has supported the Applicant with the production of this EIA Scoping Report. Xodus is a global energy consultancy with a range of specialist capabilities across the energy sector. Through their UK environment team, Xodus has established a strong track record of carrying out robust and efficient EIAs for major marine infrastructure projects, including offshore wind and subsea cables. Forming a key part of the EIA project team for the Cambois Connection, Xodus have provided a suite of qualified and experienced specialists to support the Applicant.

1.3. ONSHORE AND MARINE SCHEMES

The Cambois Connection comprises two distinct proposals, or 'Schemes':

Marine Scheme: The Applicant is proposing the installation of offshore export cables from within the BBWF array area to a proposed landfall³ location near Cambois, Northumberland; those aspects of the Cambois Connection which are seaward of MHWS are the subject of this Scoping Report which has been prepared in support of a formal request for a Scoping Opinion to MS-LOT and MMO.

Onshore Scheme: The Applicant is proposing the installation of a cable landfall, onshore High Voltage Direct Current (HVDC) cables, an onshore converter station, High Voltage Alternating Current (HVAC) grid cables and works to integrate into the existing National Grid substation at Blyth. This includes all aspects of the Onshore Scheme, down to the seaward-extent of the landfall at Mean Low Water Springs (MLWS) (there is a necessary level of overlap between the two schemes within the intertidal area – this is discussed in further detail below).

¹ BBWF is subject to a separate consenting process (further details are provided below). The Applicant is currently finalising the application to be submitted to MS-LOT in late 2022.

² During engagement meetings with MS-LOT and the MMO, it was agreed that EIA would be carried out via Screening by Agreement (under Regulation 5 of the Marine Works EIA Regulations 2017 with the MMO and by following these principles (for a voluntary EIA) with MS-LOT.

³ 'Landfall' refers to the area along the coastline where the Marine Scheme and the Onshore Scheme interface (the exact location of this landfall has not yet been confirmed). Works at the selected landfall will include operations within the marine environment (i.e., seaward of MHWS) as well as onshore (i.e., landward MLWS). Further details are provided in section 3 below.

Figure 1-3 provides an overview of the key components of the Onshore and Marine Schemes for the Cambois Connection.

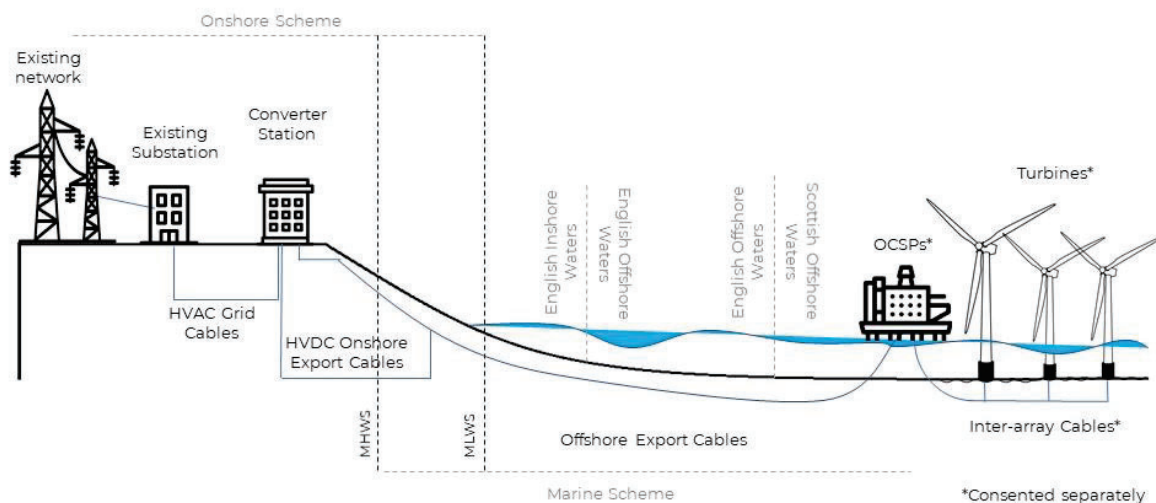


Figure 1-3 Overview of the key components of the Cambois Connection

This Scoping Report relates to the Marine Scheme which will comprise the following:

- Subsea HVDC cables (offshore export cables) from within the BBWF array area located in Scottish waters. The offshore export cables will originate at OCSPs which are located within the Scoping Boundary (and also within the wider BBWF array area)⁴. From this point, offshore export cables will be installed along a route with a broad north-south alignment to a proposed landfall location along the Cambois coastline, Northumberland. The offshore export cables will be approximately 170 km in length and installed using a combination of burial (the preferred method of installation) with cable protection techniques applied where burial is not achieved;
- The application of cable protection techniques, such as rock placement, where required along the route and where the offshore export cables cross third party assets, such as existing cables and pipelines;
- A new landfall, to be located on the Cambois coastline; and
- Supporting works to facilitate the safe and effective installation of offshore export cable, including pre-installation surveys⁵ (an investigation of potential Unexploded Ordnance (pUXO) will be considered as a separate marine licence with its own environmental assessment and, therefore, has not been considered as part of this Scoping Report).

1.3.1. SUMMARY OF CONSENTS REQUIRED

The Onshore Scheme and Marine Scheme of the Cambois Connection will require separate consents.

Consent for the Onshore Scheme will be via a Planning Application to NCC as the LPA under Section 57 of the Town and Country Planning Act 1990.

The Marine Scheme is located in both Scottish and English waters. In Scotland, the Marine Scheme is entirely within offshore waters (i.e., between the 12 Nautical Mile (NM) limit and the Scottish Exclusive Economic Zone (EEZ)). In England, the Cambois Connection is within offshore waters and inshore waters. The primary consents which will be sought in support of the Marine Scheme are as follows:

- A Marine Licence from MS-LOT under the Marine and Coastal Access Act 2009 for the offshore export cables beyond the 12 NM in Scotland;
- A Marine Licence from the MMO under the Marine and Coastal Access Act 2009 for offshore export cables and supporting activity beyond the 12 NM limit in England; and
- A Marine Licence from the MMO under the Marine and Coastal Access Act 2009 for offshore export cables, landfall works and supporting activity for the portion of the Marine Scheme which is within the 12 NM limit.

In Scottish waters, no elements of the Cambois Connection are within the 12 NM limit and for this reason, the Applicant will not be seeking consent under the Marine (Scotland) Act 2010.

⁴ It is important to note that whilst the Scoping Boundary for the Cambois Connection Marine Scheme overlaps with the BBWF array area, this is only to accommodate the offshore export cables and supporting works; no OCSPs or generation assets are included within the scope of the Cambois Connection.

⁵ Insofar as those which are 'licensable activities' as part of the Marine and Coastal Access Act 2009

1.3.2. BERWICK BANK WIND FARM

The Cambois Connection is a proposed development linked to the BBWF, which is currently in the development stage.

Located in the North Sea, in the outer Firth of Forth, BBWF has the potential to deliver up to 4.1 GW of installed capacity, making it one of the largest offshore opportunities in the world. The array area for the BBWF and the existing planned connection to Braxton, East Lothian, are wholly within Scottish waters. Previously, the BBWF project was comprised of two separate proposals called 'Berwick Bank Wind Farm' and 'Marr Bank Wind Farm'. Following initial rounds of consultation, the Applicant combined proposals into one single opportunity – BBWF.

Following the review and refinement process noted above, an updated Scoping Report was prepared and submitted to Marine Scotland in October 2021. Alongside this, a Habitats Regulation Appraisal (HRA) Screening Report was prepared to inform the HRA process for the BBWF, providing information about the potential for the BBWF to have a likely significant effect (LSE) on designated nature conservation sites.

The BBWF requires the following primary consents, licences and permissions:

- A Section 36 consent under the Electricity Act 1989;
- A Marine Licence under the Marine and Coastal Access Act 2009; and
- A Marine Licence under the Marine (Scotland) Act 2010 for those aspects of the project within 12 nautical miles (NM) of the coast.

The Scoping Boundary for the Cambois Connection Marine Scheme overlaps with the BBWF array area as the offshore export cables as part of the Cambois Connection will connect into Offshore Converter Station Platforms (OCSPs) located within the BBWF array area; it is important to note that whilst linked to the Cambois Connection, the BBWF is subject to separate consenting, as described above.

1.3.3. HOLISTIC NETWORK DESIGN REVIEW

The Applicant has three signed grid connection agreements with the network operator. Two agreements are for a substation in Scotland (Braxton), with a third additional connection at Blyth substation, Northumberland (the Cambois Connection). The third additional connection agreement (Cambois Connection), was confirmed in June 2022 following National Grid's Electricity System Operator (NGESO) Holistic Network Review, results from which were published in July 2022, and will enable BBWF to reach full generating capacity (4.1 GW) by early 2030's.

It is important to note that the BBWF is being consented separately and will be considered cumulatively with the Cambois Connection as part of the application; this is discussed further in section 1.3 below.

1.4. EVOLUTION OF THE CAMBOIS CONNECTION AND ASSESSMENT OF ALTERNATIVES

As described above, the grid connection at Blyth (Cambois) provides an opportunity for the BBWF to be developed to full generating capacity (4.1 GW) by early 2030's. This is critical for assisting Scottish and UK Governments to meet targets for net zero by 2045 and 2050 respectively and achieving Scotland's ambitions for 11 GW of offshore wind capacity to be in operation in Scottish waters by 2030.

Based on the location of the BBWF and the grid connection offer from National Grid at Blyth substation, a number of potential options for fulfilling the strategic objectives of BBWF have been considered; Figure 1-4 below provides a high level summary of this process.



Figure 1-4 Overview of the development process for the Cambois Connection

1.4.1. DETAILED ROUTEING AND NEXT-STEPS

Alongside this Scoping process, the Applicant is undertaking assessments of different route options for the Marine Scheme. The Applicant has had consideration of the Cable Route Protocol outlined within The Crown Estate (2021) Cable Route Identification and Leasing Guidelines. This process involves the creation of a geospatial data catalogue including both project-specific procured data, as well as proprietary sources. Based on the available data, the Applicant has identified the likely surface and sub-surface conditions, as well as the main potential hazards and route constraints along the length of the offshore export cable corridor.

Key data sets considered included:

- Bathymetry;
- Geology (seabed sediment types, quaternary lithology & thickness and solid geology);
- Marine Environmental Designations (Special Areas of Conservations (SAC), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), Marine Protected Areas (MPAs) / Marine Conservation Zones (MCZs), Ramsar sites);
- Shipwrecks; and
- Existing and Planned Infrastructure (such as cables and offshore wind developments).

This appraisal process has also been informed by the emerging feedback from stakeholders, in particular engagement with the commercial fishing industry, which the Applicant has gained through a series of pre-application engagement meetings, as discussed in section 5.

The analysis of this data and the ensuing detailed professional appraisal has culminated in the identification of a range of potential offshore export cable route options. Each of these options has been subject to a detailed appraisal to consider various environmental, social, commercial, geotechnical and engineering factors to help identify offshore export cable route options which represent the best on-balance solution. This process included:

- Minimising the length of the offshore export cable route through environmental designations and highly fished inshore areas where possible;
- Minimising interactions with existing infrastructure;
- Avoiding seabed conditions and known / identified geological constraints which would likely lead to challenging (or be potentially prohibitive to) cable installation, and/or require additional rock placement; and
- Minimising cable length through areas of shallow quaternary cover.

This process led to the identification of over ten individual offshore export cable route options, each of which was ranked based on their interaction with environmental designations, cable length and technical risk. From this process, two leading options were identified which represented the best on-balance solution for achieving the objective of the Marine Scheme, and indeed the overall Cambois Connection. Geophysical surveys and benthic surveys (see sections 6 and 8) of the options have been undertaken and the results of these will allow for further refinement and section of the route.

At this early stage, it remains the case that there are a number of potential options for the configuration of the Cambois Connection and for this reason, the current Marine Scheme boundary provided within this Scoping Report leaves a necessary level of flexibility. Specifically, this includes a relatively broad corridor encompassing the two aforementioned offshore export cable route options, flexibility to connect into two OCSPs within the BBWF array area, and a wide intertidal zone for the Marine Scheme.

Building upon the earlier appraisals carried out, the Applicant is in the process of completing a further detailed assessment of offshore export cable route options within the boundary provided for the Marine Scheme; this appraisal is due to be completed in late 2022.

The boundary for the Marine Scheme will be further refined as it is informed by a number of different activities, such as:

- The ongoing appraisal of leading offshore export cable route options, which is focussed on environmental impacts;
- A number of other technical and engineering studies which are being carried out by the Applicant;
- Survey activities (including the current offshore survey campaigns);
- Review of survey data for the BBWF; and
- Ongoing stakeholder engagement and undertaking the EIA for the Marine Scheme itself.

As part of the ensuing EIA for the Marine Scheme, the Applicant will carry out an assessment of alternatives, with the results presented in the Environmental Statement (ES) used to support consent applications to MS-LOT and the MMO in Scotland and England respectively.

1.5. MARINE SCHEME SCOPING REPORT

Pursuant to Part 4, Regulation 14 of the Marine Works EIA (Scotland) Regulations 2017 ('request for Scoping opinions') and Part 3, Regulation 13 of the Marine Works EIA Regulations 2017 (as amended) ('Scoping opinions'), this Scoping Report has been prepared in support of a formal request for a Scoping Opinion from MS-LOT and the MMO for aspects of the Cambois Connection in Scottish and English waters respectively.

The objective of this Scoping Report is to determine the scope of the EIA which will be completed for the Marine Scheme. The Scoping Report outlines the proposed approach to EIA and is intended to provide the basis for review and feedback both from MS-LOT and the MMO, as well as their supporting stakeholders and specialist advisers. The Scoping Report has also been developed to help identify the potential impacts on a wide range of environmental, human and physical receptors. The report follows the structure outlined in Table 1-1.

Table 1-1 Structure of Scoping Report

Section Number	Title
Section 1	Introduction
Section 2	Legislative Policy and Context
Section 3	Project Description
Section 4	Approach to Scoping and EIA Methodology
Section 5	Stakeholder Engagement
Section 6	Offshore Physical Environment and Seabed Conditions
Section 7	Benthic Subtidal and Intertidal Ecology
Section 8	Fish and Shellfish Ecology
Section 9	Offshore and Intertidal Ornithology

Section Number	Title
Section 10	Marine Mammals and Other Megafauna
Section 11	Commercial Fisheries
Section 12	Shipping and Navigation
Section 13	Marine Archaeology and Cultural Heritage
Section 14	Other Sea Users
Section 15	Summary of Scoping Report
Section 16	Appendices and Figures
Section 17	References

2. LEGISLATIVE POLICY AND CONTEXT

Marine Licence Applications for the Marine Scheme will be sought from both MS-LOT and the MMO as detailed above. This section of the Scoping Report provides a high level overview of the policy and legislation context relevant to the Marine Scheme. A more detailed appraisal of policy and legislation will be supplied within the ES and Marine Licence Applications prepared for submission to MS-LOT and the MMO.

2.1. INTERNATIONAL COMMITMENTS

The UK is a signatory to the Kyoto Protocol which commits signatories to reductions in greenhouse gas (GHG) emissions by setting internationally binding emission reduction targets (the Kyoto Protocol came into effect in 2005). The Kyoto Protocol commitments were transposed into UK law by the Climate Change Act 2008.

The Climate Change Act 2008 was subsequently revised through the Climate Change Act 2008 (2050 Target Amendment) Order 2019. This revision set a “net zero target” of GHG emissions for the year 2050 to be 100% lower than the 1990 levels. In Scotland, the net zero target must be delivered by 2045 in accordance with the Climate Change (Scotland) Act 2009.

2.2. DOMESTIC COMMITMENTS

In the UK and Scotland, there are a range of other targets and environmental legislation which relate to the wider effort to reduce GHG emissions and tackle climate change; this includes:

- UK The 2020 ('20-20-20') targets (which will seek to reduce by 20% the emissions of greenhouse gases compared to 1990 levels, increase by 20% the energy efficiency in the EU and to reach 20% of renewables in total energy consumption in the EU by 2020);
- The UK net zero target by 2050 and interim 2035 targets;
- Scotland's net zero target by 2045;
- The Scottish Government's target to increase offshore wind capacity to 11 gigawatts (GW) of energy installed by 2030;
- The UK Government's target to increase offshore wind development to 50 GW by 2030 (increased earlier in 2022 from 40 GW by 2030);
- 2030 Targets, including those associated with the European Union Renewable Energy Directive;
- 2050 Low Carbon Economy;
- The Climate Change Act 2008;
- The Climate Change (Scotland) Act 2009;
- The Energy Act 2013; and
- The Scottish Energy Strategy.

2.3. MARINE CONSENTING LEGISLATION

2.3.1. REQUIREMENTS FOR A MARINE LICENCE: SCOTLAND (OFFSHORE)

A Marine Licence will be required for the Marine Scheme in line with The Marine and Coastal Access Act 2009 for licensable activities taking place between 12 NM and the boundary of the Scottish EEZ. The Marine Licence application will be made to MS-LOT and the supporting EIA will be carried out in accordance with the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as Amended); this is discussed further below.

2.3.2. REQUIREMENTS FOR A MARINE LICENCE: ENGLAND (INSHORE AND OFFSHORE)

Similarly to the Scottish requirements, a Marine Licence will be required for the Marine Scheme in line with the Marine and Coastal Access Act 2009 for licensable activities taking place between 12 NM and also those licensable activities within the boundary of the English EEZ. Unlike the Scottish regime, one Marine Licence application can be utilised for all activities, both inshore and offshore.

The Marine Licence application will be made to the Marine Licensing team within the MMO, and the supporting EIA will be carried out in accordance with the Marine Works EIA Regulations 2007 (as Amended); this is also discussed further below.

2.4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS

Requirements for EIA are defined in the EIA Directive (85/337/EEC codified by EIA Directive 2011/92/EU and then amended by EU Directive 2014/52/EU) which has been transposed into UK and Scottish law. The purpose of the EIA Directive is to ensure that the potential effects of a project on the environment are taken into consideration before development consent is granted. If a development is deemed to have potential to cause a significant effect on the environment by virtue of factors such as size or location then an EIA is required. The results from an EIA must be provided by the Applicant to the decision maker in the form of an ES.

The requirements of the EIA Directive are enacted through UK law; key regulations include:

- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2007 (as amended);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- The Marine Works (EIA) Regulations 2017 (as amended).

Collectively, they are referred to as 'the EIA Regulations'. The EIA Regulations set out the statutory process and minimum requirements for an EIA, to which the Marine Scheme of the Cambois Connection will adhere. The EIA Regulations apply independently however they are often applied in parallel with additional associated regulatory assessments, including those associated with the requirements of the Conservation of Habitats and Species Regulations (2017) and the Conservation of Offshore Marine Habitats and Species Regulations 2017.

As detailed in section 1.1 above, in October 2022 it was confirmed between the Applicant and both MS-LOT and the MMO that an EIA would be carried out for the Cambois Connection.

2.5. MARINE PLANNING

2.5.1. UK MARINE POLICY STATEMENT

The UK Marine Policy Statement, prepared and adopted for the purposes of Section 44 of the Marine and Coastal Access Act 2009, aims to contribute to the achievement of sustainable development in the UK marine area.

The UK Marine Policy Statement is implemented throughout the UK through marine plans which provide detailed policy and spatial guidance for a marine area that will contribute to the overall aims of the UK Marine Policy Statement. The UK Marine Policy Statement may also form a relevant part of the marine licensing decision-making process for the Cambois Connection (Department for Environment, Food and Rural Affairs (DEFRA), 2011). The relevant marine plans for the Marine Scheme have been summarised below.

2.5.2. NATIONAL POLICY STATEMENT (ENGLAND)

The National Policy Statement (NPS), as introduced by the UK Government, outlines the objectives for the development of Nationally Significant Infrastructure Projects (NSIPs) within England and Wales. The NPS forms a key part of the wider national planning policy framework which is taken under consideration during the appraisal process of a planning application. NSIPs are defined in Part 3 of the Planning Act 2008. The list of projects comprising NSIPs is provided in Section 14 of the Planning Act 2008; none of the projects listed relate to the development of offshore export cables. Development consent is required for 'development to the extent that the development is or forms part of a NSIP', as set out within Section 31 of the Planning Act 2008.

BBWF itself does not comprise an NSIP, as it is located in Scottish Waters, and therefore does not require development consent under the Planning Act 2008. Similarly, the Marine Scheme associated with the Cambois Connection is not an NSIP in its own right and does not form part of a NSIP. Therefore, the Cambois Connection does not require development consent under the Planning Act 2008 and does not fall to the Planning Inspectorate to consider⁶.

NPSs are a statement of government intention relating, in this case, to renewable energy projects, therefore can be taken into consideration during the preparation of the Cambois Connection ES, as follows:

- The Overarching NPS for Energy (EN-1);
- NPS for Renewable Energy Infrastructure (EN-3); and
- NPS for Electricity Networks Infrastructure (EN-5)

EN-1 notes that the need for the UK to continue to develop and secure electricity supplies is critical as the UK moves towards a low carbon economy. EN-1 also sets out the relationship between NPS and marine licensing decisions undertaken by the MMO during the course of their assessment of licensable activities, as defined by Section 66 of the Marine and Coastal Access Act 2009 ('licensable marine activities').

EN-3, in combination with EN-1, provides the basis for consent decisions for renewable energy NSIPs.

EN-5 recognises that the new electricity generating infrastructure that the UK needs to move to a low carbon economy will be 'heavily dependent on the availability of a fit for purpose and robust electricity network'. EN-5 also highlights that 'when considering impacts for electricity networks infrastructure, all of the generic impacts covered in EN-1 are likely to be relevant, even if they only apply during one phase of the development [...] or only apply to one part of the development'.

The NPS documents will be used to inform the EIA and a wider review of these policies will be provided within the ES. The Energy White Paper (December 2020) announced a review of the existing energy NPS; at the time of writing revisions to the current energy NPS are in draft however any updates will be incorporated into the EIA, where applicable.

2.5.3. MARINE PLANS

2.5.3.1. National Marine Plan for Scotland

The management of Scottish inshore waters (out to 12 NM) and offshore waters (between 12 NM and 200 NM) is covered within the Scottish National Marine Plan, published in 2015. Each of the Scottish Marine Regions are covered by eleven Regional Marine Plans which are implemented at a local level, extending out to 12 NM. The Cambois Connection is entirely within the 'Forth and Tay' region.

The Scottish National Marine Plan aims to 'integrate both the ecosystem approach and the guiding principles of sustainable developments to deliver a robust approach to managing human impact on Scotland's Seas' (Scottish Government, 2015). The plan adopts high level objectives to improve the sustainability of Scotland's offshore environment and improve opportunities for all that rely on it.

2.5.3.2. North East Inshore and Offshore Marine Plan (England)

The North East Inshore Marine Plan covers the marine area between MHWS and 12 NM, extending approximately 6,000 km² from the Scottish border to Flamborough Head in Yorkshire. The North East Offshore Marine Plan covers the marine area from 12 NM extending seaward to the limits of the English EEZ (MMO, 2021).

The North East Inshore and Offshore Marine Plan, prepared for the purposes of Section 51 of the Marine and Coastal Access Act 2009, aims to help enhance and protect the marine environment and promote sustainable economic growth for communities both within the marine plan area and for adjacent marine plan areas.

⁶ This matter was discussed with both MS-LOT and the MMO during pre-application discussions in August 2022. As requested by the MMO, the Applicant provided clarity regarding the relevance of the Planning Act 2008, and the fact that the Cambois Connection is not an NSIP.

The inshore plan covers 13 local authorities, three tidal rivers and economically important ports, including the Ports of Tyne, Tees and Blyth. The offshore plan covers a number of commercially valuable shipping lanes, oil and gas production fields and marine areas considered important for tourism and recreational activities (MMO, 2021).

2.6. HABITATS REGULATIONS

The UK left the European Union on the 31 January 2020, however the most recent amendments to the Habitats Regulations maintain the requirement for HRA to be undertaken. Amended after the UK's departure from the European Union, the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (the '2019 Regulations') grant protection through the designation of a UK national site network, which was previously granted through European Sites.

The Council Directive 92/43/EEC (the Habitats Directive) was adopted in 1992. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status.

The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) provides a framework for the conservation and management of wild birds within Europe. The Directive affords rare and vulnerable species listed under Annex I of the Directive, and regularly occurring migratory species, protection through the identification and designation of Special Protection Areas (SPAs).

The Directives have been transposed into UK and Scottish Law by various regulations, those of relevance to the Marine Scheme include:

- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- The Conservation of Habitats and Species Regulations 2017 (as amended); and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017.

Hereafter known as the 'Habitats Regulations'.

The 2019 Regulations amended the 2017 Habitat Regulations to decouple the 2017 Habitats Regulations from the EU Directives.

The 2017 Habitats Regulations (as amended) act to enable the protection of sensitive sites which host habitats and species of European value and importance. Such sites are summarised below (they are collectively referred to as a national site network, formerly European Sites). This national site network includes Ramsar sites (not 'formally' covered by the Regulations but are included in the process as a result of guidance in the National Planning Policy Framework (NPPF)). Sites are as follows:

- Special Area of Conservation (SAC);
- Special Protection Area (SPA); and
- Ramsar Sites.

The Habitats Regulations Appraisal (HRA) process (also called Habitats Regulations Assessment outside of Scotland) forms part of these regulations. The HRA process requires that any proposal which has the potential to result in a negative Likely Significant Effect (LSE) to site within the national site network or its designated features, to be subject to an HRA by the Competent Authority, and if necessary, an Appropriate Assessment (AA). Through this process, the Competent Authority will ascertain whether a project will adversely affect the integrity of a site in view of the conservation objectives of the site. Sufficient information on the potential impacts of the Marine Scheme on sites within the national site network must be provided by the Applicant to enable the Competent Authority to undertake the HRA and AA.

The UK left the European Union on the 31 January 2020 however the most recent amendments to the Habitats Regulations maintain the requirement for HRA to be undertaken. Amended after the UK's departure from the European Union, the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (the '2019 Regulations') grant protection through the designation of a UK national site network, which was previously granted through European Sites.

Informed by the ensuing Scoping Opinion from MS-LOT and MMO as well as advice from key stakeholders, such as NatureScot and Natural England, a HRA will be completed for the Marine Scheme. Owing to the fact that all of the relevant designated sites (from a HRA perspective) are marine-focused and/or are relevant due to the potential for designated features to interact with the Marine Scheme, it is the intention of the Applicant to prepare a single, over-arching HRA which will support both the Marine and Onshore scheme.

The Applicant will carry out a detailed screening for LSE following submission of this Scoping Report.

2.7. MARINE CONSERVATION ZONES / MARINE PROTECTED AREAS

2.7.1. MCZ ASSESSMENT

In accordance with the requirements of the Marine and Coastal Access Act 2009, consideration of the potential for impacting a MCZ is required.

MCZs are designated under the Marine and Coastal Access Act 2009 and seek to protect a range of nationally important marine habitats, species and geological and geomorphological features in English and Welsh Territorial Waters, as well as UK offshore waters. A detailed consideration of the potential impacts arising from the Marine Scheme on MCZs will be undertaken (alongside a consideration of Scottish protected areas, which is discussed below).

Guidance published by the MMO on the approach to MCZ assessment will be adopted to help inform this process (MMO, 2013). A staged approach to assessment will be adopted and will be applied to all features and conservation objectives of relevant MCZs. Broadly, this can be summarised as follows:

- **MCZ Screening:** The purpose of the MCZ Screening process is to identify which sites *could* be impacted. Should there be potential for impacts to an MCZ, it should therefore be screened in and taken forward for further assessment;
- **Stage 1 Assessment:** If particular sites, activities or potential impacts are screened-in, they will be taken forward to a Stage 1 Assessment. If significant risks to achieving the conservation objectives of the MCZ are identified, only then would a Stage 2 assessment be triggered; and
- **Stage 2 Assessment:** A further more detailed, rigorous appraisal of potential impacts on an MCZ.

In England, all marine licence applications need to be assessed to determine whether Section 126 of the Marine and Coastal Access Act 2009 are applicable applies. The requirement for an MCZ assessment will apply if:

- The licenced activity will take place within or near an already designated or potential MCZ area; and
- The licenced activity had the potential to affect; (1) either the protected features or an MCZ or (2) any ecological or geomorphological process which are protected under the conservation objectives of the MCZ (wholly or in part) (MMO, 2013).

To determine if the Section 126 guidance applies to a licenced activity, it is necessary to consider the geographical proximity of the licenced activity to the MCZ and the potential for activities relating to the project to affect the designated features or conservation objectives of the MCZ. It is noted a risk-based approach to assessment is recommended by the MMO and a developer should consider the need to apply appropriate buffer zones to the protected features of an MCZ.

2.7.2. MPA ASSESSMENT

NCMPAs are designated under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in Scottish inshore and offshore waters respectively. Based on the location of the Marine Scheme (i.e., beyond 12 NM) and in the absence of MS-LOT guidance on the assessment of Scottish MPAs in relation to offshore developments, the MMO (2013) guidance for the assessment of English MCZs will be applied to the Scottish MPA assessment. This will ensure that an appropriate level of information is provided to allow Marine Scotland to make an informed decision on the potential impacts of the Marine Scheme on Scottish MPAs. This will allow the Applicant to remain compliant with requirements made within Section 83 of the Marine (Scotland) Act 2010.

Figure 2-1 depicts the key MCZ and MPA designations of relevance to the Marine Scheme.

2.7.3. HIGHLY PROTECTED MARINE AREAS

On the 06 July 2022, Defra launched an open consultation regarding Highly Protected Marine Areas (HPMAs), which are defined as areas of the sea that allow the protection and recovery of marine ecosystems by prohibiting 'extractive, destructive and depositional uses and allowing only non-damaging levels of other activities to the extent permitted by international law' (Benyon Review, 2021; Defra, 2022). The candidate HPMAs are depicted in Figure 2-2 below.

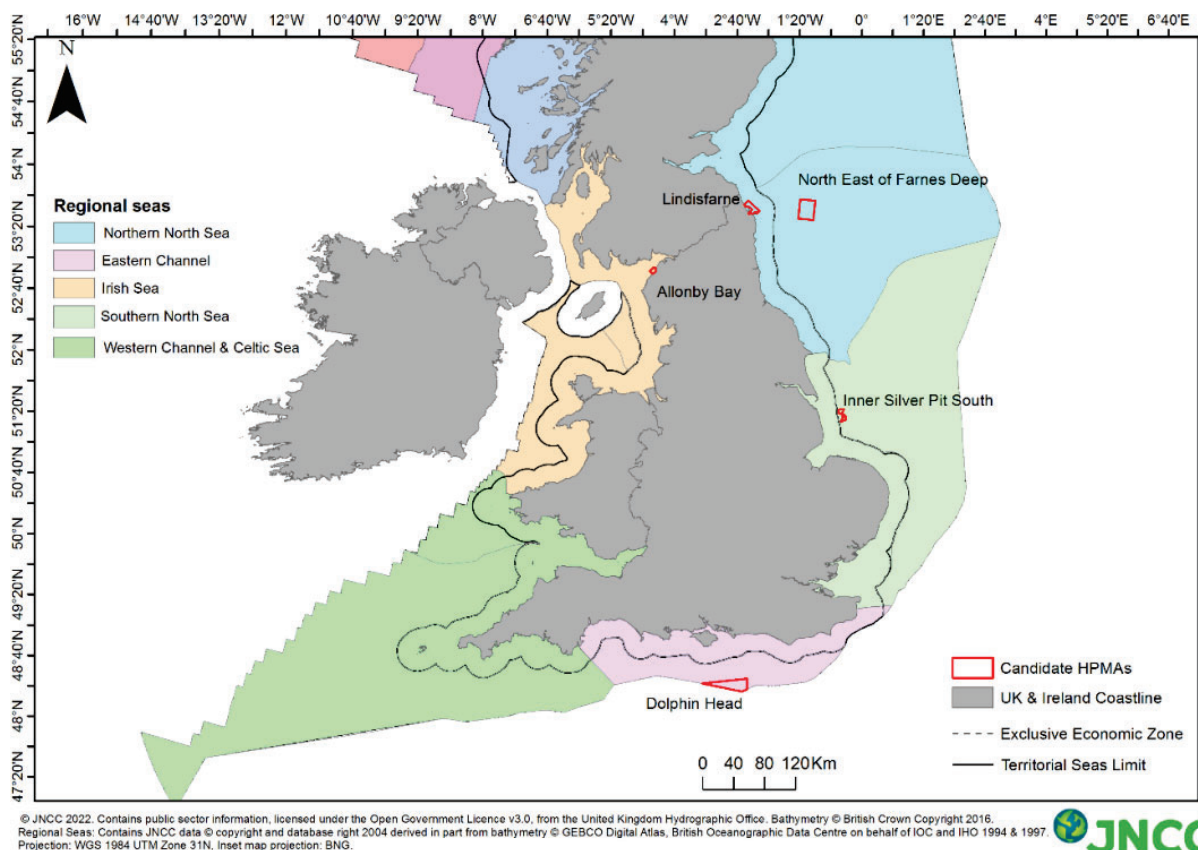


Figure 2-2 Extract from HPMa Consultation Documentation showing Candidate HPMAs

Whilst still subject to ongoing consultation, HPMA's would be designated as MCZs in English inshore and offshore regions through the provisions of the Marine and Coastal Access Act 2009.

As part of the ongoing consultation, there are two 'pilot' HPMA's which are of potential relevance to the Marine Scheme; they are Lindisfarne Inshore (encompassing an area of approximately 129 km²) and North-East of Farnes Deep (encompassing an area of approximately 492 km²).

The Marine Scheme is greater than 10 km from both potential pilot HPMA's. Whilst appreciating that the HPMA consultation is ongoing and neither site is 'designated', based on the scale, nature and extent of the offshore export cables installation process, no potential pathways to either HPMA have been identified. The Applicant is committed to monitoring the outcome of the HPMA consultation and considering the sites further if and when required.

2.7.4. MARINE NET GAIN

In line with the Environment Act 2021, all planning applications in England will be required to demonstrate how future development will enhance biodiversity and protect habitats from 2023 onwards. The Environment Act 2021 sets out several key components associated with mandatory Biodiversity Net Gain (BNG), including the minimum 10% net gain required for Town and Country Planning Act 1990 applications, which shall be calculated using Biodiversity Metric. However, the Environment Act 2021 does not apply to marine development.

Between June and September 2022, Defra carried out consultation on the principles of Marine Net Gain (MNG) (Defra, 2022). This consultation was carried out to gather views from stakeholders on the 'first principles' of MNG, and how they may be applied. The consultation also sets out Defra's position that MNG will, like Biodiversity Net Gain in the terrestrial environment, be a mandatory requirement for marine developments in English waters. The Applicant will consider the outcomes from this consultation within the EIA (where applicable) once they are publicly available.

2.8. NATURAL ENVIRONMENT AND RURAL COMMUNITIES ACT 2006 ('NERC')

Section 40(1) of the Natural Environment and Rural Communities (NERC) Act 2006 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' by imposing duties upon public authorities. Consideration of the NERC Act 2006 will be detailed further within the EIA (Natural England, 2006).

2.9. EUROPEAN PROTECTED SPECIES LICENSING

EPS are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under the Habitats Regulations. If any activity is likely to cause disturbance or injury to an EPS a licence is required to undertake the activity legally.

Activities which can be licenced under EPS licences include those such as subsea noise disturbance to marine mammals due to construction activities. EPS licences are obtained from the MMO/Natural England, Marine Scotland/NatureScot or government Ministers, depending on the reason for the licence application. Although the grant of EPS licences is separate to the marine licence application process, it can be considered in parallel by the competent authorities in order to constrict timelines.

Should additional pre-installation licences be required, these will be discussed and agreed with the relevant consenting authority during the pre-installation phase of the Marine Scheme.

2.10. WIDER CONTEXT

2.10.1. INTERACTIONS WITH THIRD PARTY ASSETS AND INFRASTRUCTURE

The Marine Scheme will interact with several third party infrastructures and assets. Any crossing of third party assets or infrastructures will be made subject to prior agreement with the owners following discussions and negotiation of a Crossing Agreement prior to construction of the Cambois Connection. The details of any Crossing Agreements will be detailed further within the EIA.

The Crossing Agreement will describe the rights and responsibilities of all parties involved and details of the crossing design. The design will address the need to protect both Project infrastructure and third party infrastructure.

The Applicant is in the process of negotiating formal Crossing Agreements with the relevant third party infrastructure owners.

3. PROJECT DESCRIPTION

3.1. INTRODUCTION

The Marine Scheme is still in the early stage of development. As such, it has been necessary for the Applicant to define a broad Scoping Boundary and Project Design Envelope (PDE) to retain flexibility in the design of the Marine Scheme until necessary surveys and technical studies required to inform selection of the final export cable route and landfall location (as discussed previously in section 1.4) have been completed.

3.2. THE PROJECT DESIGN ENVELOPE / ROCHDALE ENVELOPE

The EIA will be carried out on the basis of a PDE in line with the principles of the Rochdale Envelope⁷. By following a PDE approach, a maximum design scenario can be defined for key components of the Marine Scheme, such as the offshore export cables. Based on this maximum design scenario, potential for significant effects can be established and assessed on a realistic (albeit precautionary) basis. Flexibility to respond to emerging environmental and economic circumstances and technological advances is essential if the Cambois Connection is to proceed and be successful. A degree of flexibility will therefore be built into the design for the application by applying a PDE approach. Throughout this Scoping Report and future environmental appraisals, the PDE approach is being taken, to allow meaningful assessments of the Cambois Connection to proceed, whilst still allowing reasonable flexibility for future design decisions, where this is required. The adoption of the PDE approach is common for developments of a similar nature to the Cambois Connection.

At this early stage, the PDE remains indicative and will be refined following the completion of environmental surveys, technical studies and discussions with stakeholders. The key components of the Marine Scheme have been outlined below, hereby providing the first version of the PDE.

3.3. OVERVIEW OF THE WIDER PROPOSED DEVELOPMENT

The requirement for the Cambois Connection is driven by the need to export electricity generated by the BBWF. The Cambois Connection will enable the Applicant to deliver maximum generating capacity from the BBWF by early 2030s which is critical for assisting both the Scottish and UK Governments with meeting targets for net zero and generation from renewable energy, in particular offshore wind. The Cambois Connection is formed of two schemes, described in detail above and summarised below:

- **Marine Scheme:** The Applicant is proposing offshore export cables from within the BBWF array area to a proposed landfall location near Cambois, Northumberland, with the scope of the Marine Scheme extending through the Scottish offshore region (the EEZ), through English territorial waters and making landfall in England, up to MHWS; and
- **Onshore Scheme:** The Applicant is proposing the installation of a cable landfall, onshore HVDC export cables, an onshore converter station, grid cables and works to connect into the existing National Grid substation in Blyth. This includes all aspects of the Onshore Scheme, down to the seaward extent of the landfall as MLWS.

Throughout the Scoping Report, it is identified where there may be necessary overlap associated with the EIA for the two schemes (in the intertidal area, as discussed below).

3.4. CABLE INSTALLATION

The installation of the offshore export cables for the Marine Scheme will include a range of activities including pre-installation surveys, seabed preparation and clearance, installation of offshore export cables, construction of crossing infrastructure (where required), installation of cable protection where required and installation of the offshore export cables where they make landfall at Cambois, Northumberland. Key activities associated with the cable installation are summarised below.

3.4.1. PRE-INSTALLATION SURVEYS

The extent of any pre-installation surveys, insofar as those which are classified as 'licensable' for the purposes of the Marine and Coastal Access Act 2009, is currently unknown. It is anticipated that some pre-installation surveys would be required ahead of the cable installation process; they may include:

- Confirmatory geophysical and/or benthic surveys, building on the surveys currently being undertaken along the route to inform the EIA;
- Confirmatory geotechnical surveys, where additional samples are required to help improve confidence in a specific area of the seabed or where the surveys currently being undertaken have identified an area of concern/interest;
- Targeted archaeological surveys; and
- Surveys of UXO, or potential UXO (pUXO) involving Remotely Operated Vehicles (ROVs) and/or divers.

These and any other identified comparable survey required for the Cambois Connection will be carried out using a range of available methodologies at the time of cable installation; this is expected to include but is not necessarily limited to Multi-Beam Echo Sounder (MBES), Side-Scan Sonar, Drop-Down Video (DDV), ROV/diver-based surveys, magnetometer surveys, grab sampling and core sampling.

3.4.2. PRE-INSTALLATION ACTIVITIES

3.4.2.1. Cable Route Clearance

Prior to the installation of the offshore export cables, obstacles will need to be cleared from the offshore export cable route; it is anticipated that several cable route clearance techniques will be required along the length of the offshore export cable route. Anticipated techniques required may include: a subsea plough (to be towed across the surface of the seabed), a pre-lay grapnel run (PLGR), use of grab techniques and other comparable methodologies. Boulders will also be removed along

⁷ The Rochdale Envelope is an approach commonly adopted for major infrastructure projects and is so named after the legal case upon which it was established (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]).

the offshore export cable route and, where areas cannot be avoided (e.g., where areas of higher boulder density are present), pre-sweeping may be required to allow for the effective burial of the cable.

Where a plough is deployed, this will involve either displacement or non-displacement methods to ensure that the installation area is clear of boulders, debris and other obstacles. Where a PLGR is used, this will involve a heavy grapnel with a series of specially designed hooks along the centreline of the route. This technique will help gather debris to ensure an adequate base installation area ahead of cable installation itself.

3.4.2.2. Pre-Sweep

At this early stage, the requirement for pre-sweep clearance cannot be confirmed. If required, due to the presence of areas of sand waves or similar along the offshore export cable route, some limited clearance may be carried out to ensure a level and stable installation area ahead of cable installation itself. This is likely to be achieved through the use of a Mass-Flow Excavator (MFE) or similar.

In the event that MFE cannot achieve the necessary levelling and other methods of clearance are required (i.e. those which are typically considered as a 'dredging and disposal' activity), the Applicant will adhere to the relevant sediment sample plan and analysis process.

3.4.2.3. UXO Clearance

The development of the offshore export cable route has been informed by consideration of a range of environmental, technical and commercial criteria; this has included consideration of UXO risk at a high level and based on available information in advance of offshore surveys. This has sought to, where possible, avoid areas of particularly high UXO risk (i.e., areas where based on modern history and available datasets, there is a higher likelihood that a UXO would be encountered).

Informed by the ongoing survey activities, the Applicant will seek to further refine the offshore export cable corridor such that it avoids areas of highest UXO risk, and indeed individual potential targets which have been identified through survey outputs / engineering studies.

Notwithstanding, some UXO investigation may be required along the offshore export cable route in advance of construction. If required, this is expected to include:

- More detailed investigation of potential UXO (pUXO), including invasive / penetrative techniques if required;
- Use of ROVs and/or divers to investigate the pUXO;
- Excavation of seabed sediment from around the pUXO to ascertain potential risk, and/or the requirement for clearance; and
- Movement of the pUXO.

The investigation and disposal of UXO / pUXO is not included within the scope of the Marine Scheme for a number of reasons. This is principally because there is no exact information available at this stage of the Cambois Connection surrounding the exact locations of UXO / pUXO and therefore a meaningful assessment would not be possible. This approach is considered appropriate and is consistent with similar strategies adopted for similar UK marine infrastructure projects.

If required, future (separately licenced and assessed) UXO investigation and disposal would be undertaken in line with the relevant prevailing industry guidance and clear mitigation measures, such as those in the Joint Nature Conservation Committee (JNCC) guidance (JNCC, 2010). In the event UXO clearance is required, the Applicant would seek to develop and agree a detailed Marine Mammal Mitigation Protocol (MMMP) (if required) with either MS-LOT and the MMO, as relevant.

3.4.3. CABLE INSTALLATION

3.4.3.1. Cable Installation Methods

At this early stage, the exact configuration of the offshore export cables is unknown however the maximum design parameters are expected to comprise two monopole systems of up to four cables installed in separate trenches alongside each other. The offshore export cables will also have fibre optic (FO) and communications cables to adequately monitor their performance over the operational lifetime of the Cambois Connection⁸.

It is expected that the offshore export cables will be buried along the majority of the route. Where cable burial is not possible based on seabed conditions or where third party crossings are required, additional cable protection methods will be adopted as discussed below.

The installation of the offshore export cables is expected to be achieved through the following methods:

- Mass Flow Excavation (MFE): A method of trenching and/or deburial which can be used to precisely excavate material without direct interaction with the seabed by using a specialist MFE tool;
- Jet trenching: Jet trenching tools use water jets to fluidise the seabed which allows the cable to sink into the seabed under its own weight. Jet trenching tools are most effective in soft, fine grained sediments (e.g. sands and soft clays). Jet trenching machines can be towed, free swimming or tracked;
- Mechanical trencher: Mechanical trenchers are usually mounted on tracked vehicles and use chainsaw or wheeled arms with teeth or chisels to cut a defined trench. They are suitable for a range of sediments including hard/coarse seabed, although they are less effective in glacial tills or boulder clays as the boulders can damage the teeth; and
- Cable ploughs: Cable ploughs are usually towed either from a vessel or vehicle on the seabed. There are two types of plough: displacement plough which creates a V shaped trench into which the cable can be laid; or the non-displacement plough which brings the cable into the soil. Cable ploughs can be used for a range of sediments.

⁸ Hereafter, the terms 'offshore export cables' and 'Marine Scheme' are used without explicit reference to FO and communications requirements, owing to their minor and limited extent.

The main options being considered for the burial of the offshore export cables are as follows:

- Separate cable lay and burial campaigns (the cable is buried by a plough or trencher after it has been placed on the seabed (post-lay burial);
- Simultaneous cable lay and burial with a plough or trencher; and
- Separate trench and burial campaigns (in this case, the trench would be pre-cut by a plough or trencher and the cable laid, followed by backfill by plough, natural backfill or rock placement over the cable).

3.4.3.2. Cable Protection Methods

Cable routing is the principal method of avoiding hazards and sensitive features of the seabed. Detailed investigation into seabed conditions along the route of offshore export cables also allows for selection of preferred installation corridors where there is the greatest confidence in success of burial. The Applicant is committed to achieving burial as the preferred method along the route where this is possible based on local seabed conditions.

In areas where there is insufficient sediment to cover or bury the offshore export cables, and at crossings with third party infrastructure, additional cable protection may be required. At this early stage, it is expected that cable protection may include the following options:

- Rock placement;
- Concrete mattresses (frequently used to protect subsea cables, to construct crossings over existing subsea cables and pipelines);
- Sand/rock/grout bags (smaller bags filled with sand/rock/grout can be used to provide localised protection; and
- Cable physical protection (additional protection can be provided in the form of articulated half shells generally made of polyurethane (PU) or cast-iron).

The Applicant is aware of the potential need for crossings with third party infrastructure; discussions are ongoing with asset owners regarding the necessary proximity / crossing agreements which will be sought between the Applicant and each asset owner. Further information surrounding the volume, location and type of crossings required along the offshore cable route will be set out in the ES.

3.4.4. OFFSHORE EXPORT CABLE LANDFALL

In order to bring the offshore export cables ashore at Cambois, a landfall will need to be developed; this is a key interface between the Marine Scheme (below MHWS) and the Onshore Scheme (above MLWS). Further to the details provided above, the development of a landfall will require construction work within the marine environment (i.e., below MHWS) as well as onshore work (i.e., above MLWS). At this early stage, the exact location of the proposed landfall is not yet known but it will be along the Cambois coastline, as depicted within Figure 1-2. The description of the landfall techniques below is not specific to a single location, and they will be relevant along the Cambois coastline, irrespective of exactly which site is chosen for the landfall.

The exact alignment of the offshore export cables at the landfall location will be informed by the outputs from surveys being undertaken (as outlined in section 1) and a range of environmental, technical and commercial criteria.

At the landfall, a transition joint bay (TJB) will be required to house the interface joint between the offshore export cables for the Marine Scheme and the underground cables for the Onshore Scheme. The TJB will comprise a concrete, box-like structure which will be used to safely and securely 'anchor' the cables together. Following connection of the cables within the TJB, the TJB will be backfilled to protect the joint and the area will then be reinstated, leaving little to no sign of construction after natural cover (i.e., grass or other) is in place. Either a single, large TJB will be used for all cables (anticipated to be the likely configuration) or one TJB will be installed for each of the cables. As part of the landfall installation process, a temporary construction compound will be required close to the landfall site as well as some limited temporary access roads.

Regarding the landfall methodology, there are two techniques which can be used to install the cable at the landfall:

- Option 1: Horizontal Directional Drilling (HDD); and
- Option 2: Open-Cut Trench (OCT).

HDD

HDD is a trenchless method of drilling generally used for installation of underground utilities which does not require any direct works. HDD techniques are commonly used at the landfall section of cable routes, within the intertidal area (i.e. between MHWS and MLWS). HDD installation can either be completed through a shore-led or marine-led campaign; it is more typical for HDD to be completed via a shore-led campaign, which involves the establishment of drilling compound (above HMWS), drilling of boreholes to accommodate cable ducts, installation of cables within the ducts and supporting activity below MLWS where the cables 'break-out' into the marine environment.

OCT

The OCT process involves the excavation of a trench for cable installation using mechanical excavators and supporting plant equipment down to (approximately) MLWS. Excavated material would be temporarily retained on the Cambois coastline (alongside the working area) for future backfill. As part of the OCT process, a cofferdam may be required; this is a sheet-piled structure installed to protect the OCT from excessive water ingress.

3.4.5. LANDFALL DESIGN ENVELOPE

The exact method and approach to landfall is subject to further detailed assessment and design and will be confirmed at a later stage following investigation of the ground conditions. Similarly, the exact landfall location for the Cambois Connection has not yet been determined; this will also be confirmed at a later stage as informed by the outputs from technical and design studies however, it will lie within the Scoping Boundary, as depicted in Figure 1-1. Those aspects of the landfall constructed landward of MLWS will be subject to a Planning Application to the LPA (NCC).

Further details surrounding the landfall parameters will be provided within the EIA, as informed as far as practicable in the absence of detailed design studies.

3.4.6. VESSELS

It is anticipated that the vessels required to complete cable installation works may include:

- Cable lay vessels, including specialist jack-up / shallow-hull barges;
- Pre-lay support vessels;
- Post-lay support vessels, such as those associated with cable protection / rock placement, where required;
- Guard vessels; and
- Support vessels.

3.5. OPERATION AND MAINTENANCE

Once in place and buried (where possible), offshore export cables do not typically require regular routine maintenance. It is likely that inspection of the offshore export cables will be required to monitor condition and burial throughout the life of the Marine Scheme. Any inspections would be undertaken using offshore surveys, including the use of ROVs. Where inspection work concludes that work may be required along any length of the offshore export cable route, maintenance would be carried out. This may involve re-positioning of rock protection or placement of additional rock protection, and provision for this will be included within the MLA and considered in the EIA.

3.6. DECOMMISSIONING

The lease for cables installed within waters governed by The Crown Estate are generally granted for a set term after which projects are required to be decommissioned. For the purpose of the EIA the Applicant assumes that the decommissioning will occur 35 years after the commencement of operation. At the end of the project life, an Initial Decommissioning Plan (IDP) will be submitted for approval under The Crown Estate seabed lease. Cable recovery may require an environmental and economic impact assessment for years prior and post cable removal to assess the impacts of the decommissioning activities.

It is proposed that offshore export cables will be removed where possible and appropriate to do so. This approach will be reviewed at the time of decommissioning following the most up to date and best available guidance. Impacts arising during the decommissioning phase of the Marine Scheme are expected to be similar to or less than those anticipated during the installation phase. Any potential impacts would be temporary and would occur over a short period, however there is still the potential for impact to the offshore environment, which will be considered within the EIA.

4. APPROACH TO SCOPING AND EIA METHODOLOGY

4.1. INTRODUCTION

EIA is a process which identifies the potential impacts of a development and then seeks to avoid, reduce or offset any adverse impacts through mitigation measures where possible. The EIA process is both iterative and cyclic and runs in tandem with project design. As potential impacts are identified, the design of the Marine Scheme can be adjusted, and mitigation measures proposed. Consultation, a vital component of the EIA process, continues throughout each stage and contributes both to the identification of potential impacts and the development of mitigation measures.

4.2. SCOPING ASSESSMENT AND METHODOLOGY

The EIA Regulations as defined in section 2.4, provide requirements for the information which should be provided within a Scoping Report to inform a formal request for a Scoping Opinion. These requirements have been used to inform the development of this Scoping Report. It is through this report that the potential impacts on all offshore receptors are appraised through a review of existing data and information and the contribution of professional expertise. The potential impacts of the Marine Scheme on the environment will be considered at all stages, including the construction, operation and maintenance, and decommissioning phases.

This Scoping Report provides a high level assessment of the potential impacts. This process has been undertaken using best judgement of the available data and professional expertise, and used the following approach:

- Review of existing available data and information;
- Review of potential impacts that might be expected to arise from the Marine Scheme;
- Where an impact has been considered but is deemed to insignificant, it will be scoped out of the proposed EIA;
- Where an impact is considered to need assessment at the EIA stage a determination on whether available data is sufficient to undertake robust assessments for EIA and HRA with confidence; and
- Where data is lacking, identification of further data and surveys required in order to carry out EIA and HRA.

A full explanation of the assessment methodology for the EIA will be presented in the ES.

The predictions of impacts will be made using the defined PDE parameters of the Marine Scheme (as detailed in section 3 above) and through the experience of similar projects. The prediction of impacts includes consideration of the construction, operations and maintenance and decommissioning phases of the Marine Scheme.

4.3. TOPIC-SPECIFIC STRUCTURE

The structure of the technical chapters within this Scoping Report have, where appropriate, followed the suggested structure:

- Introduction;
- Legislative Policy and Context;
- Study Area;
- Key Data Sources;
- Baseline Environment;
- Designed In Measures;
- Scoping of Potential Impacts;
- Potential Cumulative and Transboundary Impacts;
- Proposed EIA Methodology; and
- Scoping Questions.

4.4. OVERVIEW OF THE PROPOSED EIA METHODOLOGY

The methodology for ensuring EIA for the Marine Scheme follows a systematic, staged process in order to assess the potential impacts and effects arising from the Marine Scheme on a range of different receptors. The methodology has been informed by relevant industry guidance, best-practice and experience from previous comparable projects.

Throughout the course of the EIA, the Marine Scheme will consider best practice guidance by ensuring that, where practicable, environmental considerations are integrated into the design of the Marine Scheme, i.e., through route refinement and optioneering.

The EIA will identify potentially significant adverse environmental effects on the environment and, where any are identified, project-specific mitigation measures will be adopted to avoid, minimise, reduce or offset such adverse environmental effects. Similarly, where there is the potential for the Marine Scheme to benefit the environment, measures will be put in place to maximise these benefits.

The EIA for the Marine Scheme will follow the robust process as outlined in Figure 4-1.

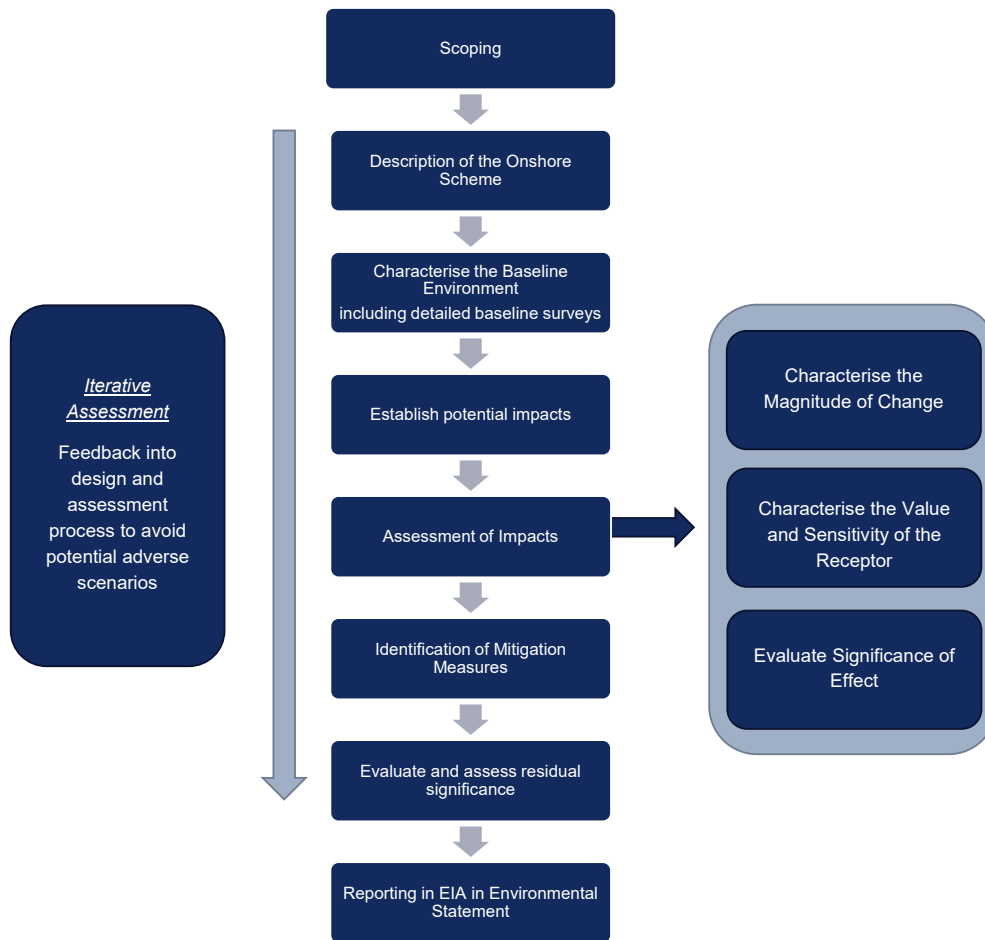


Figure 4-1 Proposed EIA Process for the Marine Scheme

Characterising the Marine Baseline Environment

In order to robustly assess the potential impacts arising from the Marine Scheme, it is necessary to establish the environmental baseline conditions which exist within the relevant local areas of study and vicinity of the Marine Scheme. Furthermore, beyond the characterisation of the existing baseline, it will be necessary to understand the potential evolution of the study area(s) throughout the lifetime of the Marine Scheme, such that future impacts can be adequately understood.

The development of the environmental baseline for the Marine Scheme will be established through stages such as those detailed below:

- Primary baseline studies where appropriate (including offshore surveys and reporting to inform the EIA);
- Review of secondary sources (desk-based assessment and review of existing information and data local to / or relevant to the Marine Scheme); and
- Stakeholder engagement (detailed discussions with a range of stakeholders to help expand on the findings from wider field and desk-based studies).

The EIA will include a detailed baseline for each technical chapter, as informed by the stages described above and the outputs from this formal request for a Scoping Opinion.

4.5. ASSESSMENT OF IMPACTS

The Marine Scheme EIA will be developed in accordance with the Institute of Environmental Management and Assessment (IEMA) guidance on impact assessment, which state that the EIA should “follow a clear progression, from the characterisation of ‘impact’ to the assessment of the significance of the effects taking into account the evaluation of the sensitivity and value of the receptors” (IEMA, 2004). A range of leading industry guidance and best practice will be used to inform the Marine Scheme EIA; this shall include:

- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR, 2008);
- Guidelines for Data Acquisition to support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2011);
- General advice on assessing potential impacts of and mitigation for human activities on MCZ features, using existing regulation and legislation (JNCC and Natural England, 2011);
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (JNCC and Natural England, 2019);

- The Statement of Environmental Impact Assessment Practice in the UK (IEMA, 2011);
- EIA Guidance for Offshore Renewable Energy Projects – Guidebook (BSI, 2015);
- Environmental Impact Assessment Guide to Shaping Quality Development (IEMA, 2015);
- Delivering Proportionate EIA (IEMA, 2017);
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017);
- A Handbook on Environmental Impact Assessment: Guidance for Competent Authorities, Consultees and others involved in the EIA Process in Scotland (SNH, 2018); and
- IEMA Impact Assessment Strategy (IEMA, 2019).

In September 2022, Natural England and JNCC published industry-specific guidance surrounding nature conservation considerations for subsea cables, alongside environmental best practice (Natural England and JNCC, 2022). This provides a suite of guidance associated with environmental considerations that are considered to be 'essential for cable operations across English inshore waters and UK offshore waters'. The advice focusses upon three main cable types (renewable energy export cables, electricity cables and telecommunication cables). This advice is relevant to the Marine Scheme; it has been considered during the development of this Scoping Report and will be used to inform the EIA.

The approaches discussed within this section of the Scoping Report will apply throughout the ensuing EIA however it is important to note that for some specialist assessments, there may be small deviations to reflect the topic-specific assessment and best-practice. By way of example, as part of the assessment of impacts associated with shipping and navigation, the approach of reducing 'risk' to a level which is As Low as is Reasonably Practicable (ALARP) is adopted, as opposed to assessment of significance.

For consistency and to aid with review of conclusions in the ensuing ES, where a topic-specific assessment does deviate from 'generic' assessments of significance, a judgment relating to a conclusion of 'significant' or 'not significant' will still be provided.

4.5.1. APPRAISAL OF IMPACTS AND EFFECTS

The identification of potential impacts will be carried out to determine the effects of the Marine Scheme on a range of environmental receptors. The definitions which will be used to describe this process are summarised in Table 4-1 below.

The EIA scoping assessment considers designed in measures that are built into the Marine Scheme either through design or implementation of industry best practice.

Table 4-1 Impact terminology

Impact terminology	Definition
Direct Impact	Impacts which result from a direct interaction between the Marine Scheme and relevant environmental receptors.
Indirect Impact	Impacts on relevant environmental receptors which are not as a direct result of the Marine Scheme but which may still require consideration in the EIA (this can include complex pathways or activities carried out off-site, for example).
Cumulative Impacts	Impacts which result from the cumulative effect of past, present or reasonably foreseeable developments, together with the Marine Scheme.
In-Combination Impacts	<p>Impacts arising from combinations of impacts as a result of the Marine Scheme which, when acting together, would result in a new or different likely significant effect. This is linked to the concept of inter-related effects and whilst this summary is related to 'impacts', a definition is also provided below.</p> <p>Inter-related effects refer to the inter-relations between individual topics within an EIA which, when considered in their completeness, may lead to environmental effects by virtue of difference (increased) pressures on receptors.</p>
Beneficial Impact	An impact which would result in an improvement to the baseline environment.
Adverse Impact	An impact which would result in a deterioration to the baseline environment.

The terms 'impact' and 'effect' are not one-and-the-same; broadly, they are defined as follows:

- Impact: defined as a change which is caused by an action; and
- Effect: defined as the *consequence* of an impact.

By way of an example, the installation of the offshore export cables associated with the Marine Scheme (the 'action') will result in seabed disturbance and suspension of sediment (the 'impact') with the potential to disturb benthic habitats and species (the 'effect').

4.5.2. MAGNITUDE OF CHANGE

The EIA will also consider the *magnitude* of change associated with a given impact. The main factors which will typically influence this consideration include:

- Scale of Change;
- Spatial Extent of Change; and
- Duration and Frequency of Change.

The EIA will consider the magnitude of each potential impact; the broad impact magnitude criteria are summarised in Table 4-2 below which is based on standard practice industry guidance as summarised above.

Table 4-2 Impact magnitude

Impact magnitude	Criteria
High	The impact occurs over a large spatial extent resulting in widespread, long-term, or permanent changes in baseline conditions or affects a large proportion of a receptor population. The impact is very likely to occur and/or will occur at a high frequency or intensity.
Medium	The impact occurs over a local to medium extent with a short- to medium-term change to baseline conditions or affects a moderate proportion of a receptor population. The impact is likely to occur and/or will occur at a moderate frequency or intensity.
Low	The impact is localised and temporary or short-term, leading to a detectable change in baseline conditions or a noticeable effect on a small proportion of a receptor population. The impact is unlikely to occur or may occur but at low frequency or intensity.
Negligible	The impact is highly localised and short-term, with full rapid recovery expected to result in very slight or imperceptible changes to baseline conditions or a receptor population. The impact is very unlikely to occur; if it does, it will occur at a very low frequency or intensity.
No Change	No change from baseline.

4.5.3. RECEPTOR SENSITIVITY

The EIA will consider the sensitivity of each receptor, a factor which is typically influenced by the vulnerability of a receptor to change, the recoverability of a receptor or feature and its importance, as detailed in Table 4-3. The sensitivity value given to a receptor is typically determined by balancing considerations of these factors.

Table 4-3 Receptor sensitivity

Receptor sensitivity	Definition
Very high	The receptor has no capability to 'absorb' or accommodate change and no ability to recover or adapt.
High	The receptor has very limited capability to 'absorb' or accommodate change without fundamentally altering the character of the receptor.
Medium	The receptor has some capacity to absorb or accommodate change without significantly altering character, however some damage to the receptor is anticipated to occur.
Low	The receptor is considered tolerant to change without significant detriment to its character; some limited or minor change may occur.
Negligible	The receptor is tolerant to change with no effect on its fundamental character.

4.5.4. EVALUATING SIGNIFICANCE OF EFFECT

Based on the magnitude of change and the sensitivity of a receptor, the significance of the effect can be ascertained and informed by baseline information, professional judgment and stakeholder advice. A significance matrix may also be used to help inform this process; an example is included in Table 4-4 below. Any effect with a significance of moderate or greater is generally considered 'significant' in EIA terms and additional mitigations may be required. Effects identified as minor or negligible are generally considered to be 'not significant' in EIA terms. However significance will be assessed based on the prevailing topic-specific assessment methodology during the EIA and using professional judgement where appropriate.

The matrix approach described above is consistent with the general approaches identified in the Design Manual for Roads and Bridges (Highways England, 2019) and the suite of guidance discussed above. Minor refinements to the approach to EIA have been made to reflect both the nature of the Marine Scheme and to promote greater proportionality, in line with the guidance discussed above;

- Where a magnitude of 'no change' is identified it will not be assessed;
- Where a magnitude of 'negligible' is identified it will not be assessed; and
- Receptors of negligible importance, value or sensitivity will not be assessed.

This is on the basis that for each of these outcomes, the outcome will always be an effect which is 'not significant'.

Table 4-4 Significance of effects matrix

		Magnitude of Impact				
		No Change	Negligible	Low	Medium	High
Sensitivity of Receptor	Negligible	Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor
	Low	Negligible	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate
	Medium	Negligible	Negligible to Minor	Minor	Moderate	Moderate to Major
	High	Negligible	Minor	Minor to Moderate	Moderate to Major	Major
	Very High	Negligible	Minor	Moderate to Major	Major	Major

4.5.5. APPROACH TO MITIGATION

Certain designed in measures are likely to be adopted as part of the Marine Scheme development process in order to reduce the potential for impacts to the environment. These designed in measures are considered as 'built in' to the Marine Scheme. At the Scoping stage, it is not possible to provide a detailed review of designed in measures. Notwithstanding, the Applicant is committed to adopting mitigation and some likely concepts which will be explored in further detail as the EIA progresses are summarised in each technical section.

Where the impact assessment identifies a significant adverse environmental effect, mitigation measures will be incorporated into the assessment process to avoid impacts or reduce them to acceptable levels. This is referred to as 'secondary mitigation' (whereby additional mitigation is specifically developed due to specific findings within the EIA). Consistent with best-practice and accepted methodology for EIA, a standard hierarchal approach will be adopted when identifying mitigation requirements; this is summarised below.

- **Avoid or Prevent:** Measures which avoid creating impacts from the outset. For example, careful siting of infrastructure to avoid direct impacts on receptors, or scheduling of works outside sensitive ecological windows;
- **Reduce:** Measures taken to reduce the duration, magnitude and/or extent of impacts that cannot be completely avoided. For example, curtailing noisy machinery to reduce noise pollution, or siting infrastructure to reduce interaction with ecology; and
- **Offset:** Measures implemented to compensate for any residual effects that could not be appropriately avoided or reduced. For example, restoration of degraded habitats, or improving public access.

After the consideration of any project-specific mitigation measures, the residual significance of an effect will be considered. Generally, residual effects which are identified as being significant after adoption of designed in measures will typically require further additional analysis, assessment, consultation and further mitigation where appropriate.

4.5.6. MONITORING

The ES may include, where they are deemed to be required, recommendations for monitoring certain impacts attributed to the Marine Scheme. Monitoring will be recommended for where significant impacts only are likely. Monitoring proposals will be linked to clearly defined criteria. Monitoring is liable to occur where there is either uncertainty in the original impact assessment or where an impact is deemed to be significant.

4.6. INTER-RELATED EFFECTS

Inter-related effects refer to the inter-relations between individual topics within an EIA which, when considered in their completeness, may lead to environmental effects by virtue of different (increased) pressures on receptors. There are two main types of inter-related effects:

- **Project Lifetime Effects:** these are effects which occur over time at more than one phase of the Marine Scheme (i.e. construction, operation, decommissioning) and may interact together to potentially create a more significant effect when compared to if only assessed in isolation; and
- **Receptor-Led Effects:** these are effects which may interact spatially and/or temporally resulting in the potential for inter-related effects on a specific receptor. Receptor-led inter-related effects may be short term, temporary or incorporate longer-term, potentially permanent effects.

An assessment of inter-related effects will be undertaken as part of the EIA for the Marine Scheme; this will be conducted in a focused manner and related to receptor groups where there is considered potential for significant inter-related effects (i.e. rather than a specific assessment for every individual receptor considered within the EIA).

4.7. CUMULATIVE IMPACTS

4.7.1. INTRODUCTION

As part of the ES for the Marine Scheme, it is necessary to consider the potential cumulative effects of the Marine Scheme. An assessment of cumulative effects is required under several key pieces of legislation and policy; this includes:

- The Marine Policy Statement which sets out that when considering potential benefits and adverse effects, decision makers should also consider 'multiple and cumulative impacts of proposals in the light of other projects and activities';
- The consideration of cumulative and in-combination effects as part of the decision-making process is set out under Regulation 63 of the Conservation of Habitats and Species Regulations (2017) and also Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations (2017);
- Regulation 48 of the Conservation (Natural Habitats, &c) Regulations (1994) (as amended) also state that in-combination effects must be considered ahead of a consent decision;
- Under Schedule 3 (Part 5) of The Marine Works EIA Regulations (2017) (as amended) and Schedule 4 (Part 6) of the Marine Works EIA (Scotland) Regulations (2007) (as amended); and
- Both Scotland's National Marine Plan and the North East Inshore and North East Offshore Marine Plan set out that cumulative impacts should be addressed in marine decision making.

Cumulative effects are those which may arise from impacts associated with the Marine Scheme acting together with an effect arising from a third party development or activity which could result in new or different likely significant effects or an effect which is of greater significance when compared to the effect in isolation.

4.7.2. GUIDANCE

There is no single, agreed approach to the completion of cumulative and in-combination assessments however the following guidance has been used to help inform the approach to the assessment of cumulative effects:

- Cumulative Effects Assessment (Planning Inspectorate Advice Note Seventeen) (PINS, 2019) provides guidance on the assessment of cumulative and in-combination effects relevant to NSIPs. Whilst the Marine Scheme for the Cambois Connection is not an NSIP, the well-tested and robust methodology is valuable to informing approach to assessment;
- A strategic Framework for Scoping Cumulative Effects (MMO, 2014) provides guidance for the assessment of cumulative effects within the marine environment; and
- Marine Scotland (2018) Consenting and Licensing Guidance: for Offshore Wind, Wave and Tidal Energy Applications.

As detailed within Advice Note Seventeen (PINS, 2019), this approach follows a systematic and staged process; this is summarised in further detail in Figure 4-2 and below.

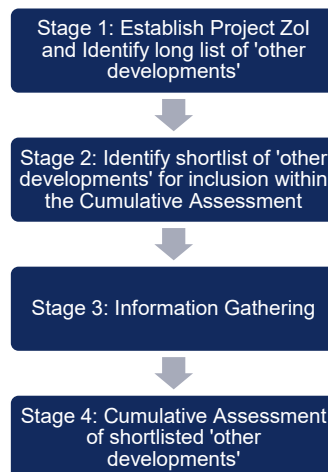


Figure 4-2 Process to assess cumulative effects

PINS (2019) recommend that in order to identify a long list of other developments which may result in likely significant effects, the spatial and temporary impacts of a project be determined first. The Zone of Influence (Zol) for each environmental topic considered within this Scoping Report has been used to inform the study area for the cumulative and in-combination assessment. On a precautionary basis, a 20 km Zol has been used as the basis for the initial long-list of other developments which is considered to appropriately cover the potential Zol for each environment topic assessed as part of the Marine Scheme.

Stage 1 - Initial Screening and establishing the Long-List

As part of the development of this Scoping Report, a review has been completed in order to identify other developments which have the potential to act cumulatively with the Marine Scheme. The results of this preliminary screening exercise have been summarised in Table 4-5 below. This is an initial screening; ahead of the EIA, a further search will be carried out to inform a long-list contemporaneous to the EIA which will be agreed with consultees.

Table 4-5 Long List of projects which may require consideration within the Cumulative Impact Assessment

Development Description	Status	Proximity	Details
BBWF	In Planning	0 km (direct overlap)	The boundary for the BBWF overlaps with the northern extent of the Marine Scheme. This is by virtue of the fact that the Marine Scheme includes provision for offshore export cables from OCSFs within the BBWF array area. Construction of BBWF is planned for 2025 onward; it is anticipated to be operational from 2030.
Eastern Green Link (EGL) 2	In Planning	Approximately 3 km	The EGL2 project is currently progressing through the marine consenting process with MS-LOT (Scotland) and the MMO (England). It is a transmission reinforcement project with landfalls in Peterhead, Aberdeenshire and Bridlington, East Riding of Yorkshire. Construction from 2025 onward; anticipated to be operational from 2030
Scotland to England Green Link (SEGL) 1	In Planning	0 km (potential for direct overlap)	The SEGL1 project is currently progressing through the marine consenting process with MS-LOT (Scotland) and the MMO (England). It is a transmission reinforcement project with landfalls in Torness, East Lothian and Seaham, County Durham. Construction from 2025 onward; anticipated to be operational from 2030
Newbiggin Bay Beach Management Area (MLA/2011/00012)	Operational / Completed	Approximately 1 km	Small-scale beach management licence, and work has been completed. Work Complete - Inactive
North Sea Link Interconnector Cable	Operational	0 km (potential for direct overlap)	Interconnector cable linking UK and Norway (landfalls at Cambois). Work Complete – Operational.
Cambois Connection Onshore Scheme		0 km (potential for direct overlap)	Onshore works (above MLWS) associated with the Cambois Connection project (whilst subject to separate consents, is linked to the Marine Scheme). Works relate to a landfall for a HVDC cable, onshore HVDC cable route, construction of a converter station and onshore grid cable route. Construction 2025 onward; anticipated to be operational from 2030.
Northumberland Energy Park (Phase 1)	Operational / Completed	0 km (potential for direct overlap)	NEP Phase 1 is based on the site of the old Blyth Power Station facility (twin coal-fired power stations which were demolished between 2001 and 2003). The site, which encompasses approximately 36 hectares of development land, is the first of a three-phase regional strategic redevelopment initiative. NEP Phase 1 is part of Energy Central (a partnership between Advance Northumberland, Port of Blyth, NCC and the Offshore Renewable Energy Catapult. Marine works, which included quay wall stabilisation within the Phase 1 area, have been completed.
Northumberland Energy Park (Phases 1-3)		Approximately 1 km	Linked to Phase 1, NEP Phase 2 and 3 relate to wider strategic redevelopment activities within the Blyth / Cambois area; notably, the development area for Phase 2 includes the NSL cable whilst Phase 3 includes the BritishVolt 'gigafactory' battery manufacturing facility. All of the Phase 2 and Phase 3 activities are understood to be terrestrial in nature.
Blyth Demonstrator Offshore Wind Farm	Operational	0 km (potential for direct overlap)	Consented demonstrator wind farm to the East of Blyth, comprising five OWF turbines constructed on gravity-base foundations.
Blyth Demonstrator Offshore Wind Farm 2	Consented	Approximately 3.5 km	In addition to the existing operational turbines within the Blyth Demonstrator, a further five floating OWF turbines have been consented by the MMO under variation to the existing Blyth Demonstrator marine licence. They are planned for installation in 2023, becoming operational thereafter.
NO-UK Fibre Optic Cable System	Operational	Approximately 5 km	NO-UK Fibre Optic Cable System - subsea telecommunication cable connection in the North Sea.
Blyth Offshore Wind Decommissioning Project	Completed	0 km (potential for direct overlap)	Historical decommissioning project – Inactive.
Tyne / Tyne Industrial / Howden Area (Disposal Areas)	Completed	Approximately 1 km	All Closed – Inactive
North Tyne Disposal Area	Operational	Approximately 11 km	Disposal site with frequent use from a number of third parties.

Stage 2 - Short Listing

Prior to the EIA, an additional search will be undertaken to ensure that any recent and relevant proposals are included in the Cumulative Impact Assessment (CIA), in addition to those projects identified above. The status of projects considered within the cumulative assessment will be monitored and, if still relevant, will be included within the CIA.

In accordance with the guidance above, only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA. By way of illustration, there will be a greater level of information associated with a project where a consent application has been submitted when compared to a project identified for future *potential* development. The final list of projects to be included in the of the CIA will be agreed with MS-LOT / the MMO.

Based on the nature of a topic-specific assessment and dependent on the individual ZOI, the consideration of the potential for cumulative effects will vary from topic-to-topic (this is to be expected based on the variation in geographical extent of potential impact and is in accordance with the guidance noted above).

All assessments will consider the potential cumulative effects, in accordance with the EIA Regulations, and the extent of each assessment will be defined within each receptor chapter of the ES.

4.8. TRANSBOUNDARY IMPACTS

Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s). The EIA Directive requires the assessment of transboundary effects. This report will identify relevant transboundary impacts to be considered within the EIA or state if no transboundary impacts are anticipated.

The potential for transboundary impacts will be considered fully within the EIA on a topic-by topic basis; this is discussed in each technical section within this report and summarised in section 16.

4.9. SCOPING REPORT EXCLUSIONS

Based on the nature of the Marine Scheme for the Cambois Connection and in line with the Applicant's commitment to achieving an EIA which is appropriate and proportionate to the nature of the Marine Scheme, some topics are proposed to be scoped out of the EIA and have therefore been excluded from this Scoping Report. This approach is consistent with the range of industry guidance and best-practice encouraging a streamlined and focused EIA, including IEMA (IEMA, 2017). Table 4-6 below provides a summary of topics proposed to be Scoped-Out, alongside the rationale.

Table 4-6 Rationale for exclusion from Scoping Report

Topic	Rationale
Aviation, Military and Radar	<p>The Marine Scheme relates to the installation of a subsea cable – no permanent infrastructure above the surface of the sea is planned or expected. No generation assets (such as wind turbines or OCSPs) are included within the Marine Scheme</p> <p>Outcome: there is no potential for significant impacts associated with radar and aviation across construction, operation and maintenance and decommissioning of the Marine Scheme and Radar and Aviation is therefore proposed to be scoped out of the EIA for the Marine Scheme.</p>
Seascape, Landscape and Visual Impact Assessment (SLVIA)	<p>Once installed, the Marine Scheme will be entirely subsea with no infrastructure above the level of the sea meaning that even when directly adjacent to it, the subsea cable would be indiscernible from a landscape and seascape perspective. During installation of the subsea cable and particularly during construction works associated with the landfall, there would be some temporary visual impacts along the Cambois coastline, where marine works (such as those described in section 3 above) would be discernible. This would primarily relate to limited marine traffic (i.e., vessels and support craft) as well as other specialist vessels and operations associated with the landfall installation, including potential jack-up barge. The effects of these subsea cable installation works will be small in scale and seen in the context of an open seascape where vessels of various sizes are a baseline feature. Based on the lack of any permanent seascape and landscape impacts associated with the Marine Scheme, the EIA for the Marine Scheme will not include a detailed assessment of this topic.</p> <p>Notwithstanding, the Applicant is committed to completing a detailed landscape and visual assessment for the Onshore Scheme. Recognising that temporary construction-phase impacts caused by the Marine Scheme will actually relate to onshore receptors, this potential impact – and any required mitigation – will be considered by the EIA for the Onshore Scheme.</p> <p>Outcome: there is no potential for significant seascape, landscape and visual impacts across construction, operation and maintenance and decommissioning of the Marine Scheme and SLVIA is therefore proposed to be scoped out of the EIA for the Marine Scheme.</p>
Major Accidents and Disasters	<p>The construction, operation and maintenance and decommissioning of the Marine Scheme is not anticipated to include activities which are likely to give rise to a risk of major accidents or could foreseeably create circumstances which would amount to a disaster. The Marine Scheme relates to a series of specialist installation activities which are well-understood and have been completed – without risk of a major accident or disaster – around the UK, and indeed at the landfall location at Cambois (notably, this includes recent interconnector works for NSL). A desk-based review of local infrastructure indicates that there are no significant third party facilities which could reasonably be expected to be put at-risk due to the Marine Scheme.</p>

Topic	Rationale
	<p>The investigation and disposal of UXO / pUXO is not included within the scope of the Marine Scheme as detailed in section 3.4.2.3.</p> <p>As described above, third party infrastructure crossings will be required. They will be managed appropriately through the established crossing/proximity agreement process and informed by engagement with respective asset owners. No infrastructure crossing along the route is considered to be at risk of leading to a major accident or disaster. Regarding the landfill, based on a review of the Control of Major Accidents and Hazards (COMAH) database held by the Health and Safety Executive, there nearest COMAH site to the Marine Scheme is a single (lower tier) fuel bunkering facility site located approximately 2 km to the south of a central point within the Onshore Scoping boundary. Given the intervening distance and terrestrial location of the site, it is scoped out of the EIA for the Marine Scheme. In advance of construction, the Applicant will produce a Project Environmental Management Plan which shall consider site waste management and chemical risk, as well as other factors.</p> <p>Outcome: there is no potential for significant major accidents and disasters across construction, operation and maintenance and decommissioning of the Marine Scheme and Major Accidents and Disasters is therefore proposed to be scoped out of the EIA for the Marine Scheme.</p>
Human Health	<p>There will be no discernible impacts to human health as a result of the Marine Scheme, nor will any long-term operational impacts result in an impact on human health. For this reason, a dedicated quantitative assessment of human health has not been included within this Scoping Report, nor is it proposed within the EIA. An assessment into the potential impacts of the Marine Scheme on human receptors can be found within section 15, Other Sea Users.</p> <p>Outcome: there is no potential for significant human health impacts across construction, operation and maintenance and decommissioning of the Marine Scheme and Human Health is therefore proposed to be scoped out of the EIA for the Marine Scheme</p>
Socio-economics	<p>A dedicated quantitative assessment of socio-economics is not included within the Scoping Report, nor is it proposed within the EIA. Unlike an OWF project, for example, the potential socio-economic impact during the installation of offshore export cables is limited and related to limited numbers of installation vessels and relatively small numbers of supporting specialist contractors. During the operation and maintenance phase, the potential socio-economic impact is low and associated with limited, sporadic maintenance activity. Consistent with other contemporaneous assessments of marine infrastructure (including subsea cables), a limited (qualitative) consideration of the topic of 'Marine Socio-economics' will be considered within the EIA. Potential socio-economic impacts, both beneficial and adverse, will however be considered within the scope of the Onshore Scheme EIA; this is discussed further within the separate Scoping Report prepared in support of a request for a formal Scoping Opinion from NCC.</p> <p>Impacts on recreation and tourism is addressed separately to socio-economics in a dedicated appraisal provided in section 15. Temporary disturbance to coastal tourism during installation is proposed to be scoped out of the EIA for the Marine Scheme.</p> <p>Impacts on commercial fisheries is addressed separately to socio-economics in a dedicated appraisal provided in section 12, and has not been scoped out of the EIA for the Marine Scheme.</p> <p>Outcome: there is no potential for significant socio-economic impacts across construction, operation and maintenance and decommissioning of the Marine Scheme and socio-economics is therefore proposed to be scoped out of the EIA for the Marine Scheme</p>
Climate Change	<p>The topic of climate change encompasses a number of individual considerations; they are considered individually below.</p> <p>GHG Impacts</p> <p>This specific consideration relates to the effects on the climate arising from GHG emissions which may arise from the Marine Scheme, including how the Marine Scheme may impede on the ability of the UK and Scottish Governments to meet their climate targets. As recognised by relevant industry best-practice and 'Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022), the approach to consideration of GHG emissions should be proportionate (and indeed in some cases, an assessment may not be required at all). The nature of the offshore export cables associated with the Marine Scheme means that the installation process is a relatively discrete, specific activity involving (primarily) a single cable installation vessel, supported by other specialist vessels, as discussed in section 3 above.</p> <p>Construction materials associated with the Marine Scheme are limited, and primarily associated with the cable itself and any protection required. Transportation of the materials required for the Marine Scheme will be highly coordinated and not involve repeated transport to and from shore (by way of example, specialist cable lay vessels can be expected to install large 50-100 km sections of cable within single campaigns, dependent on carousel sizing). Based on the nature of the installation process for offshore export cables, there are no notable requirements for the combustion of fuel to generate energy to support the construction process (similarly, the installation process for offshore export cables does not require treatment and transport of water for use during construction).</p> <p>Whilst it is acknowledged that IEMA guidance (2022) considers that 'all GHG emissions from projects will contribute to climate change and may be considered significant', it is not considered that the emissions associated with the Marine Scheme will be at a level where they would have the potential to impact the UK Government's ability to meet statutory GHG reduction targets outlined in sections 2.1 and 2.2. On this basis, it is considered that there is no potential for significant impacts associated with emissions. Moreover, the Marine</p>

Topic	Rationale
	<p>Scheme will help support the export of renewable electricity from BBWF, thereby supporting the delivery of low-carbon energy to the UK energy network which will displace the need for energy to be produced via other high-carbon methods.</p> <p>Climate Change Risk Review</p> <p>The Marine Scheme relates to offshore export cables and associated landfall at Cambois, Northumberland. The nature, size and location of the Marine Scheme means that overall, it is not considered likely that it will be vulnerable to climate change. Along the majority of the route for the offshore export cables, the cables will be protected by trenching (the preferred method of installation) or additional protection where required (through the use of cable protection, such as rock placement).</p> <p>In-Combination Climate Change Impact (ICCI)</p> <p>The Applicant has considered the ways in which projected climate change will influence the significance of the Marine Scheme on the surrounding environment, i.e., whether anticipated future climate change exacerbates the effects of the Project on environmental receptors in accordance with IEMA guidance (IEMA, 2020). Having completed a detailed review of interactions between the Marine Scheme and receptors in the surrounding environment, no climatic hazards - as informed by UKCP18 – have been identified either now, or indeed in the future baseline for the Marine Scheme, to result in ICCI.</p> <p>Outcome: there is no potential for significant climate change impacts across construction, operation and maintenance and decommissioning of the Marine Scheme and Climate Change is therefore proposed to be scoped out of the EIA for the Marine Scheme.</p>

5. STAKEHOLDER ENGAGEMENT AND CONSULTATION

5.1. TECHNICAL ENGAGEMENT

The Applicant is committed to carrying out continuous and targeted dialogue and engagement with stakeholders, regulators, and communities under a robust programme of meaningful stakeholder engagement and consultation activity to inform the EIA process.

The Applicant has undertaken engagement with a range of stakeholders in advance of submission of this Scoping Report, particularly in relation to the refinement of offshore export cable corridor route options.

Engagement with Marine Licensing bodies – MS-LOT and the MMO – has been carried out together, to ensure both regulators are informed about the Marine Scheme in a coordinated manner ahead of the submission of this Scoping Report.

Alongside this, technical engagement has been carried out with statutory nature conservation bodies, such as Natural England, to help inform the onward approach to surveys and the EIA itself.

Local fisheries organisations and individual fishermen have been contacted at an early stage in the EIA process to provide information about the Marine Scheme and to seek information on fishing activity in order to inform the refinement of offshore export cable corridor options, understand the location of fishing gear for undertaking surveys as well as the approach to the EIA. A Fisheries Liaison Officer (FLO) has been appointed to undertake consultation with the fishing industry, as discussed in section 12.9.

Prior to the submission of this Scoping Report, the Applicant has carried out a number of engagement meetings with relevant stakeholders; this is summarised in Table 5-1 below.

Table 5-1 Summary of Stakeholder Engagement to Date

Stakeholder and Date	Summary
NCC (13 January 2022)	The Applicant held an introductory meeting with NCC, as the LPA for the Onshore Scheme associated with the Cambois Connection. Owing to the requirement for a landfall along the Cambois frontage, the approach to the impact assessment for this area was discussed (including in terms of any potential overlap in assessments). It was discussed and confirmed that NCC is not a signatory to the Coastal Concordat (MMO, 2019) ⁹ , however the Applicant confirmed their intention to adopt these principles where practicable to help guide the EIA process.
MMO and MS-LOT (16 March 2022)	The Applicant introduced the Cambois Connection to both relevant marine regulators for the Marine Scheme. The approach to the ensuing EIA and MLAs was presented, as well as the intended approach regarding MLA submissions in both Scotland and England.
Natural England (17 March 2022)	The Applicant introduced the Cambois Connection and discussed a range of topics of relevance to ecology and nature conservation, as well as the intended approach and scope of the ensuing EIA and HRA. The intended approach to the impact assessment for ornithology was discussed
Natural England (06 July 2022)	<p>The Applicant held a further meeting with Natural England to discuss the scope of and approach to a suite of surveys planned for 2022, including offshore geophysical and benthic surveys. Interactions with relevant designated sites were discussed, as was the Applicant's position with regards to overwintering birds.</p> <p>Subsequent discussions were held with Natural England, and a discretionary advice service response was received by the Applicant; broadly, this:</p> <ul style="list-style-type: none"> • Provided further information surrounding the scope of and approach to specialist assessments; • Set out Natural England's agreement with the scope of and approach to offshore surveys; • Set out Natural England's agreement to the scope of onshore surveys, including any consideration of nearshore receptors; and • Provided a clear request for non-breeding bird surveys ("overwintering" surveys) in the event work outside of the breeding season cannot be avoided.
Blyth Harbour Authority, North East Inshore Fisheries Conservation Authority (NEIFCA) and Fishing Industry Representative (FIR) (21 July 2022)	<p>The Applicant introduced the Cambois Connection, provided information about surveys which would be undertaken and how Notice to Mariners (NtMs) could be distributed.</p> <p>There was discussion surrounding the selection of preferred cable routes and the input already received from commercial fishermen through the Project FLO with help from the FIR. The Applicant discussed how this engagement with commercial fisheries would continue throughout the refinement of the route options, the EIA and as the Project progresses.</p>

⁹ A Coastal Concordat for England (MMO, 2019) is a set of guiding principles which can be used to help inform how regulatory bodies work together in coastal environments.

Stakeholder and Date	Summary
NCC (03 August 2022)	The Applicant met with NCC to provide an update on the Cambois Connection and seek confirmation around the Project being classified as EIA development (NCC confirmed during the meeting and in subsequent correspondence that the Cambois Connection would indeed be classed as EIA development).
MMO and MS-LOT (31 August 2022)	<p>The Applicant held a further joint-MMO/MS-LOT workshop in August 2022 to discuss the approach to EIA; specifically, this included a confirmation of the intended approach to Screening by Agreement / conduct voluntary EIA.</p> <p>During the workshop, it was agreed with both MS-LOT and the MMO that the Applicant would carry out an EIA for the Marine Scheme (MS-LOT acknowledged this approach and confirmed agreement following the workshop; similarly, the MMO acknowledged this approach and confirmed agreement via a Screening by Agreement letter, agreed and finalised with the applicant in October 2022).</p>
MMO, Centre for Environment, Fisheries and Aquaculture (Cefas), Natural England and Joint Nature Conservation Committee (JNCC) (15 September 2022)	The Applicant and their benthic survey contractor held a meeting with stakeholders to discuss the approach to the benthic survey and sampling plan for the Marine Scheme. The Applicant presented the proposed survey design, methodology, sampling locations and approach to reporting. Stakeholders followed up in writing to confirm their agreement on the approach presented. Whilst MS-LOT and NatureScot were invited to the meeting they were unable to attend, however, both stakeholders also confirmed in writing their agreement on the approach.

As part of the formal request for a Scoping Opinion, it is anticipated that both MS-LOT and the MMO will carry out technical consultation with a range of statutory and non-statutory consultees, pursuant to Part 4, Regulation 14 of the Marine Works EIA (Scotland) Regulations 2017 and Schedule 4, Part 6 of the Marine Works EIA Regulations 2007. The Applicant will have due regard for these consultation responses and any technical feedback received will be used to inform the EIA. The Applicant will provide a summary of how consultation responses have been considered as part of the ES prepared for the Marine Scheme.

As the EIA progresses, technical engagement will be carried out with a range of relevant stakeholders in relation to the Marine Scheme; this is anticipated to include, but is not limited to, bodies such as:

- Blyth Harbour Authority;
- Cefas;
- The Crown Estate (TCE)
- Crown Estate Scotland (CES);
- Environment Agency;
- Historic Environment Scotland (HES);
- Historic England;
- Maritime and Coastguard Agency (MCA);
- Marine Scotland Science (MSS);
- Ministry of Defence (MoD);
- MMO;
- MS-LOT;
- Natural England;
- NatureScot;
- Northern Lighthouse Board;
- Northumberland County Council;
- National Federation of Fishermen's Organisations (NFFO);
- Royal Society for the Protection of Birds (RSPB);
- Royal Yacht Association (RYA);
- Scottish Environmental Protection Agency (SEPA);
- Scottish Fishermen's Federation (SFF);
- Scottish White Fish Producers Association (SWFPA);
- Scottish Wildlife Trust;
- Trinity House;
- UK Chamber of Shipping;
- The Wildlife Trust; and
- Whale and Dolphin Conservation.

5.2. COMMUNITY AND PUBLIC ENGAGEMENT

Consultation with stakeholders and local communities is a key part of the consenting processes. The Applicant is actively seeking input; with all comments and opinions provided carefully considered and used to help shape the development of the Cambois Connection. Figure 5-1 below provides a summary of the Marine Scheme EIA stakeholder engagement strategy.

Public exhibitions (in person, virtual or hybrid) will be held to introduce and update on the progress of the Project. The events will also allow the Project team to respond to any queries and questions the public may have. Pre-application consultation will be the main opportunity for communities and members of the public to; review the plans; provide comments; submit feedback; and to shape the development of the Project design prior to submission of the applications for the Marine Scheme and the Onshore Scheme. The Applicant will ensure that communities and wider public stakeholders who are most affected by the proposals are engaged in the development of the Project and have the opportunity to comment on the proposals at key decision making points.

The Applicant will offer a range of ways for the public to contact the Project team, and share their views based on the most appropriate mechanisms for the community.

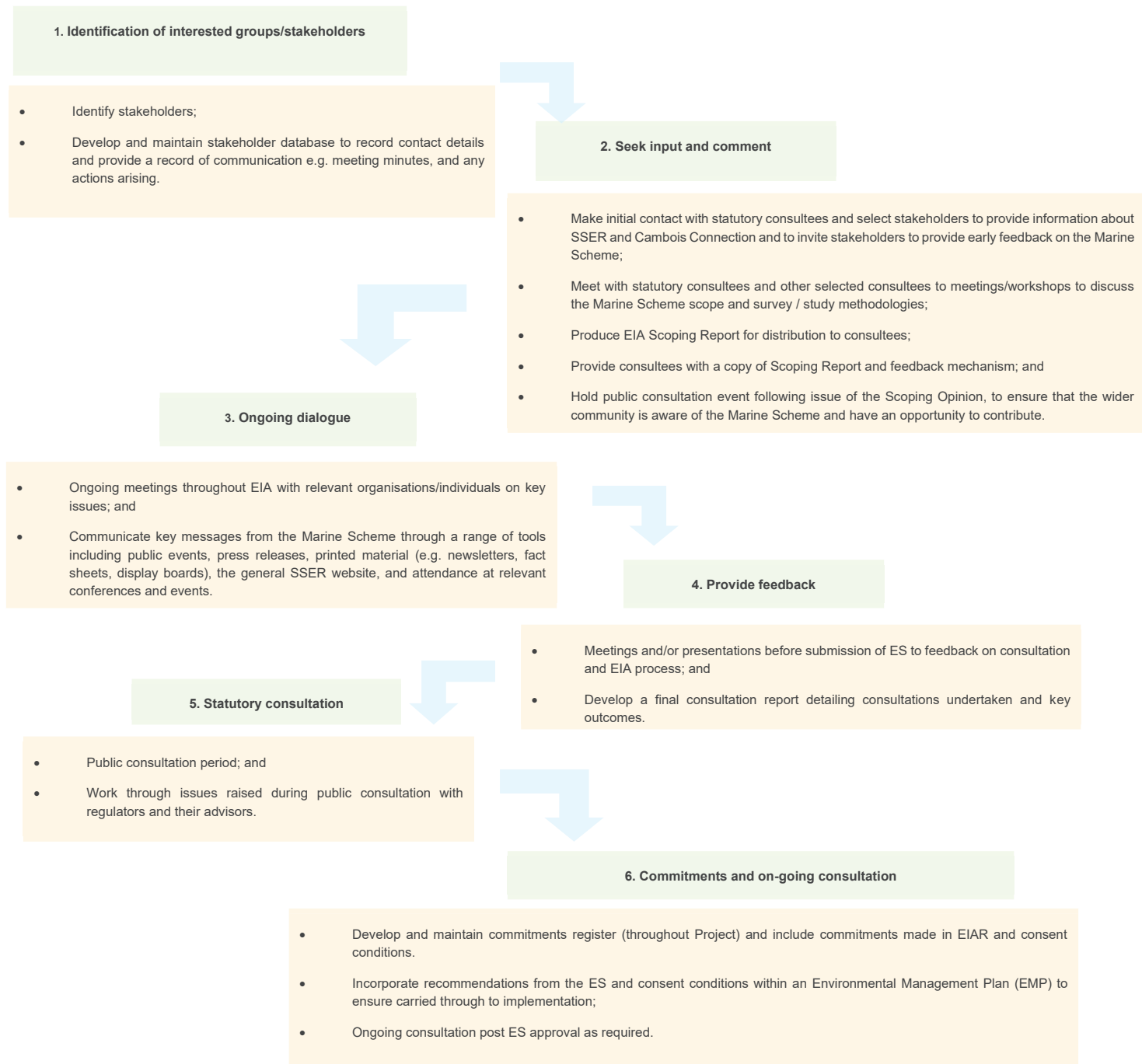


Figure 5-1 Overview of Marine EIA Stakeholder Engagement Strategy

5.3. STATUTORY CONSULTATION

5.3.1. SCOTLAND

In Scottish waters, the Marine Scheme is entirely offshore (beyond the 12 NM limit). The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 ('the PAC Regulations') prescribe the marine licensable activities which are subject to pre-application consultation. In combination with the Marine (Scotland) Act 2010, the PAC Regulations dictate out the nature of the pre-application process. There is no similar provision for PAC within the Marine and Coastal Access Act 2009.

In accordance with the PAC Regulations and associated guidance from MS-LOT (MS-LOT, 2022) these requirements only apply in respect of relevant applications in the Scottish Inshore Region (i.e. from MHWS to the 12 NM limit). On this basis, there is no mandatory requirement for statutory Pre-Application Consultation (PAC).

The ensuing EIA for the Marine Scheme will be subject to Part 5 (Publicity and Procedures on Submission of EIA Reports) under the Marine Works EIA (Scotland) Regulations 2017, namely: Regulation 16 (Publication of EIA Report); Regulation 17 (Publicity of determinations and provision of information); Regulation 18 (Consultation); Regulation 19 (Copies of EIA Report for the Scottish Ministers); and Regulation 20 (Copies of EIA Report for the Public). The Applicant will work with MS-LOT to help ensure full compliance with the relevant EIA consultation requirements.

5.3.2. ENGLAND

There are no requirements comparable to PAC in English offshore and inshore waters. As part of the EIA process, the ensuing EIA for the Marine Scheme will be subject to the range of publicity, consultation and notification requirements under Part 3 of the Marine Works EIA Regulations 2007, namely: Regulation 16 (Publicity); Regulation 17 (Consultation on proposed regulated activity); Regulation 21 (Consideration of representations from the public); Regulation 22 / 23 (EIA Consent Decision and associated notification / publicity); and Regulation 24ZA (Notification and publication of regulatory decisions). The Applicant will adhere to all statutory consultation requirements for consultation for the Onshore Scheme, which is likely to include views from marine-related stakeholders that will relate to the Marine Scheme.

6. OFFSHORE PHYSICAL ENVIRONMENT AND SEABED CONDITIONS

6.1. INTRODUCTION

This section of the Scoping Report outlines the key sensitivities and potential impacts arising from the Marine Scheme on the offshore environmental and seabed conditions throughout construction, operation and maintenance and decommissioning phases. In most cases, marine physical processes are not in themselves receptors but are instead pathways with the potential to indirectly impact other environmental receptors. Consequently, information that may be considered relevant to this chapter is also presented in coming sections on water and sediment quality (section 7), benthic subtidal and intertidal ecology (section 8), and fish and shellfish ecology (section 9).

Aspects of the marine physical environment and seabed which are considered within this section include:

- Geological and geomorphological:
 - Bathymetry;
 - Bedrock geology;
 - Quaternary geology;
 - Sediment regime; and
 - Designated sites.
- Metocean:
 - Waves; and
 - Tides.

Receptors which are considered within the marine physical environment and seabed section are as follows:

- Designated sites; and
- Bedforms.

6.2. LEGISLATION, POLICY AND GUIDANCE

The offshore physical environment and seabed conditions impact assessment will be undertaken in line with the methodology set out in section 4. The specific legislation and guidance documents listed below will also be considered in relation to the offshore physical environment and seabed conditions impact assessment. In addition, any upcoming guidance being developed will be utilised where appropriate.

6.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of physical environment and seabed conditions receptors across the Marine Scheme:

- European Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy – commonly referred to as the Water Framework Directive (European Commission, 2000); and
- European Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of environmental policy (MSFD)

6.2.2. NATIONAL LEGISLATION

The following national legislations are considered relevant to the assessment of physical environment and seabed conditions receptors across the Marine Scheme:

6.2.2.1. UK (England and Scotland)

- Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009).

6.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- Water Environment and water Services (Scotland) Act 2003 (HMSO, 2003);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Scottish Statutory Instrument 2011 No. 209 (HMSO, 2009), as amended;
- The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019; and
- The Environment (EU Exit) (Miscellaneous Amendments) (Scotland) Regulations 2019.

6.2.2.3. England

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended); and
- The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019.

6.2.3. NATIONAL POLICY

The following national policies are considered relevant to the assessment of physical environment and seabed conditions receptor across the Marine Scheme:

6.2.3.1. UK (England and Scotland)

- UK Marine Policy Statement (MPS) (HM Government, 2011).

6.2.3.2. Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015).

6.2.3.3. England

- North East Inshore and North East Offshore Marine Plan (HM Government, 2021); and
- East Inshore and East Offshore Marine Plan (HM Government, 2021).

6.2.4. GUIDANCE

In addition to the legislation and policies outlined above, the following guidance documents are also considered applicable to the assessment of physical environment and seabed conditions receptors within UK waters:

- Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland (SNH, 2018);
- Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide (ABPmer and HR Wallingford, 2009);
- Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RenewableUK, 2013);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012);
- Environmental Impact Assessment for offshore renewable energy projects (British Standards Institute (BSI), 2015);
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2011);
- Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2001);
- Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects. (NRW, 2018);
- Offshore wind farms: guidance note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2 (Cefas, 2004);
- Offshore wind, wave, and tidal energy applications: consenting and licensing manual (Scottish Government, 2018);
- Nature Conservation Guidance on Offshore Wind Farm Development (Defra, 2005);
- Marine Licensing: Sediment Analysis and Sample Plans. Marine Management Organisation. (2014);
- Marine Renewable Energy and the Natural Heritage: An Overview and Policy Statement' (SNH, 2003); and
- Marine Scotland Licensing and Consents Manual covering marine renewables and offshore wind energy development. Report commissioned for Marine Scotland (ABPmer, 2012).

6.3. STUDY AREA

For the purpose of this Scoping Report, the study area for the offshore physical environment and seabed conditions baseline is defined based on the tidal excursion extent. The tidal excursion extent in the vicinity of the Marine Scheme is approximately 4 km (based on a spring tide). In order to ensure extreme metocean conditions are captured and form part of the baseline considerations, this has been rounded up to 10 km. The study area for the offshore physical environment and seabed conditions is therefore the Scoping Boundary plus a 10 km buffer.

6.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the offshore physical environment and seabed conditions baseline include, but are not limited to, the following:

- ABPmer (2019) Atlas of UK Marine Renewable Energy – modelled data on wind, waves and tides;
- ABPmer (2018) Seastates Metocean Data and Statistics Interactive Map;
- British Geological Survey (BGS) (2001; 2021) Geological data;
- British Oceanographic Data Centre (BODC) (2022) National Oceanography Centre (NOC) metocean data;
- Cefas (2022). WaveNet telemetry data from the Newbiggin Waverider buoy;
- DTI (2007) Offshore Oil and Gas Strategic Environment Assessment (SEA) 3 and 5 Overall Report and associated specialist reports;
- European Centre for Medium-Range Weather Forecasts (ECMWF) (2022) Meteorological data;
- EMODnet (2021) Bathymetry data;
- Fugro GEOS (2011) Firth of Forth Zone Development: Metocean survey;
- Interek Metoc (2012) Summary of Seagreen Firth of Forth Metocean Surveys to Date;
- Metoc (2010) UK Round 3 Offshore Wind Farm Zone 2 Firth of Forth: Wave Height Spells for Survey Operability;
- National Network of Regional Coastal Monitoring Programmes (2022) Metocean data for the Northeast of England;
- Environment Agency Shoreline Management Plan (SMP) for the coastline between the Scottish Border and The Tyne, and associated reports;
- UK Hydrographic Office (UKHO) (2022) Admiralty Total Tide (ATT) tidal prediction software; and
- UK Met Office (2022) Modelled wave and wind data.

In addition to the above, third party impact assessments of surrounding developments will also be utilised to help inform the baseline understanding of the study area including, but not limited to, the environmental appraisals for the Neart Na Gaoithe, Inch Cape, Seagreen Alpha and Bravo, SEGL1, Eastern Green Link 2, and the BBWF Scoping Report (and the BBWF EIA Report once available, specifically information from the geophysical surveys which have been undertaken across the BBWF array area). Finally, site-specific surveys of the offshore export cable corridor are currently being undertaken. The geophysical surveys are ongoing and will include the following:

- Uncrewed Surface Vessel: Multibeam Echosounder (providing backscatter and side scan data) and Sub-bottom profiler;
- Unmanned Aerial Vehicle: Topographic and very shallow bathymetric mapping;

- Taking grab samples for Particle Size Analysis (PSA) as well as macrofauna and contaminant analysis; and
- Acquiring seabed imagery using Drop-Down Video (DDV).

Additionally, metocean buoys and Acoustic Doppler Current Profiler (ADCP) devices have been deployed by the Applicant between October 2021 and April 2022 within the north of the Scoping Boundary to record metocean data within the BBWF array area. These devices will be demobilised between October 2022 and November 2022, and the data collected will inform the offshore physical environment and seabed conditions baseline.

This output will contribute to the baseline understanding of the offshore physical environment and seabed conditions, as appropriate. It is however expected that wider baseline information which is available outside of the study area will be used to help inform the EIA (best-practice and professional judgment will be used to inform the relevance of such data).

6.5. BASELINE ENVIRONMENT

An initial desk-based review of literature and available data sources has been undertaken to describe the offshore physical environment and seabed conditions within the Marine Scheme area to inform the Scoping process.

6.5.1. GEOLOGICAL AND GEOMORPHOLOGICAL

6.5.1.1. Bathymetry

The water depths across the offshore physical environment and seabed conditions study area range from less than 30 m below Lowest Astronomical Tide (LAT) at the proposed landfall location to approximately 100 m below LAT at isolated points within the offshore export cable corridor just beyond the 12 NM limit (Figure 6-1) (EMODnet, 2021). Geophysical data within the BBWF array area indicates the water depth varies between 39 m and 68 m relative to LAT (BBWF, 2021). The average depth within the BBWF array area was generally recorded as being between 50 m and 60 m below LAT (BBWF, 2021). This is slightly shallower than along the export cable corridor for the Marine Scheme which experiences depths of 70 m to 80 m below LAT (EMODnet, 2021).

6.5.1.2. Bedrock Geology

The basic structural framework of bedrock geology within the North Sea is primarily a result of Upper Jurassic/ Lower Cretaceous rifting, with partial control from older structural elements (Norwegian Petroleum Directorate, 2020). The overall modern topography of the Central North Sea (CNS) has originated from the patterns of basin subsidence, uplift, and climate on sediment input to the seabed (BGS, 2001).

Two bedrock lithologies characterise the offshore physical environment and seabed conditions study area, Palaeozoic sedimentary (extending 6.5 km east of the proposed landfall area) and Mesozoic interbedded (extending a further 67 km east). Two unnamed igneous (magmatic) intrusions (Carboniferous to Permian) extend approximately 1.4 km and 5.6 km east and South East respectively from the shoreline. Two easterly trending fault lines are also present extending approximately 3.4 km and 7.9 km from the shoreline (BGS, 2020).

6.5.1.3. Quaternary Geology

The offshore physical environment and seabed conditions study area is typically made up of diamict (meaning poorly sorted substrate of terrestrial origin) Quaternary deposits (i.e. glacial till), punctuated with regions of firm to hard mud, sand and gravel and undifferentiated deposits. These deposits range in thickness from <5 m to between 30 m and 50 m approximately 20 km off the coast of the proposed landfall area. The structural geology of the offshore physical environment and seabed conditions study area is characterised by Permian rocks (mudstone and gypsum-stone), interspersed with areas of Triassic rocks (rock, siliciclastic, argillaceous and sandstone). Geological succession near the shore is characterised by an area of Coal Measures Group (rock, siliciclastic, argillaceous and sandstone) extending approximately 6.5 km east from the shoreline (BGS, 2020).

6.5.1.4. Seabed Sediment

The sediment regime varies throughout the offshore physical environment and seabed conditions study area. Regions of sand and slightly gravelly sand characterise the northern region of the offshore physical environment and seabed conditions study area. The gravelly sand substrate is interspersed with smaller patches of sandy gravel. Sediment succession to the near shore and coastal area comprises muddy sand, slightly gravelly muddy sand and gravelly muddy sand. These Holocene deposits form the uppermost, and geologically most recent, layer of sediments across the UKCS (Figure 6-2)

An area of rock and hard substrate (defined as rock or clasts >64 mm within 0.5 m of the seabed) extends approximately 8.7 km east of the proposed landfall site.

The majority of the seabed in the BBWF array area is 'featureless', however the southern and north-western extent of the array area are dominated by megaripples, sandwaves, ribbons and bars (BBWF, 2021).

6.5.1.5. Designated Sites

There are three designated sites that directly interact with the offshore physical environment and seabed conditions study area, that are designated for the conservation of the offshore physical environment. These are the:

- Firth of Forth Banks Complex Scottish Nature Conservation Marine Protected Area (NCMPA): designated for the conservation of offshore subtidal sands and gravels, shelf banks and mounds and moraines;
- The Coquet to St Mary's MCZ: designated for a number of intertidal rock and sediment features and communities, and subtidal sediments, amongst others; and
- Farnes East MCZ: designated for the conservation of moderate energy circalittoral rock, sea-pen and burrowing megafauna communities, subtidal coarse sediment, subtidal mixed sediments, subtidal mud and subtidal sand.

Designated sites in the vicinity of the Marine Scheme are shown in Figure 6-3.

The degree of direct interaction between the Marine Scheme and these designated sites will be subject to the finalisation of the offshore export cable route by the Applicant. Any interaction between a designated site and the Marine Scheme will be addressed fully through an MCZ / MPA assessment, as appropriate, as described in section 2.

Geological Conservation Review (GCR) sites have been identified as sites of national and international importance to British geology conservation. The majority of these GCR sites represent features of interest which underpin a number of SSSIs. There are 35 GCR sites within the Northumberland local authority area, however only two have the potential to be impacted by the Marine Scheme. The Creswell and Newbiggin Shores site (GCR code 2938) and Sandy Bay (GCR code 2025) both underpin the Creswell and Newbiggin Shores SSSI (JNCC, 2019). The export cable corridor will intersect with this SSSI. GCR sites are found throughout the UK, however they are exclusively onshore and coastal. Therefore no sites within Scotland are relevant to the Marine Scheme which is located outwith 12 NM in Scottish waters.

6.5.2. SEDIMENT TRANSPORT REGIME

Generally, sediment transport along the North East coast of England is in a southward direction. Sediment transport is described within the context of coastal cells and sub-cells. These cells are defined by common patterns in local coastal processes. Cable landfall will be located within Cell 1 in the St Abb's Head to the Tyne sub-cell. The section of coast at which cable landfall will occur is presently experiencing erosion; at Blyth the beach and cliff are eroding, and beach despoliation occurs at Cambois where historically deposited colliery waste is being eroded (Crosby, 1995; Scarborough Borough Council, 2017).

Net drift at Cambois and Blyth is to the south, with an estimated 994 – 1,684 m³/year of sediment being transported in a southward direction, dependent on tidal conditions. This is considered relatively low and is in-keeping with net drift conditions along much of the Northumberland coast.

6.5.3. METOCEAN

As stated in section 6.4, metocean buoys ADCP devices have been deployed within the north of the Scoping Boundary to record metocean data within the BBWF array area. The data collected from these devices will inform the offshore physical environment and seabed conditions baseline.

6.5.3.1. Waves

The mean annual wave height within the offshore physical environment and seabed conditions study area ranges from approximately 1.17 m at the proposed landfall location to approximately 1.59 m within the offshore extent of the offshore export cable corridor. There is a seasonal variation in the mean annual wave height, with spring and winter mean annual wave heights ranging from 0.85 – 1.05 m and 1.43 – 2.07 m respectively (Figure 6-4) (ABPmer, 2019).

As part of the Cefas WaveNet network of buoys across the UKCS, one was installed at Newbiggin from 2013 until present, approximately 3.5 km north of the proposed landfall location. Since commissioning, the significant wave height (i.e. the mean wave height of the highest third of all waves) reached a maximum of 6.3 m in the early months of 2018, associated with a storm event (Cefas, 2022). Wave heights vary throughout the year. In 2021, the significant wave height was greatest in February, reaching 1.88 m, and lowest in July, with a maximum of 0.55 m (National Network of Regional Coastal Monitoring Programmes, 2021). No buoy has been installed in the vicinity of the offshore physical environment and seabed conditions study area.

6.5.3.2. Tides and Currents

The tidal range varies across the offshore physical environment and seabed conditions study area. Water levels according to the UKHO ATT service are provided in Table 6-1 for the proposed landfall location and for a point further offshore, close to the offshore physical environment and seabed conditions study area. At the proposed landfall area, the mean spring range is approximately 4.2 m, and the mean neap range is 2.2 m (UKHO, 2019). This aligns with the tidal predictions presented in ABPmer's Atlas of UK Marine Renewable Energy (2019) which show the mean spring range to be 4.14 m, and the neap range to be approximately 2.11 m.

A mean spring range of approximately 3.37 m is likely along the majority of the offshore physical environment and seabed conditions study area. The mean neap range is expected to be approximately 1.62 m (ABPmer, 2019).

Table 6-1 Tidal Ranges for the Marine Scheme

	Water level (m) from LAT	
	Landfall	Offshore
Highest Astronomical Tide (HAT)	5.6	4.4
MHWS	5.0	
Mean High Water Neap (MHWN)	3.9	
Mean Sea Level (MSL)	2.89	2.18
Mean Low Water Neap (MLWN)	1.7	
MLWS	0.8	
LAT	0	-0.1

Across the offshore physical environment and seabed conditions study area, the average annual spring peak flow is approximately 0.59 m/s: ranging from approximately 0.57 m/s at the landfall area to 0.60 m/s throughout much of the offshore physical environment and seabed conditions study area (ABPmer, 2019). The average annual mean neap peak flow across the offshore physical environment and seabed conditions study area is approximately 0.28 m/s. Mean neap flows at the landfall area reach approximately 0.24 m/s and within the offshore physical environment and seabed conditions study area approximately 0.30 m/s (ABPmer, 2019).

These current speeds are considerably faster than reported by ATT. According to ATT spring current speeds at the landfall location reach a maximum of 0.36 m/s on the ebb tide (which occurs after high water) and reach 0.15 m/s on a neap tide. Offshore, current speeds are predicted to also reach 0.36 m/s on a spring tide and 0.15 m/s on a neap tide (UKHO, 2019).

6.5.3.3. Wind

Across the offshore physical environment and seabed conditions study area, the mean wind speed ranges from approximately 5.46 – 9.73 m/s, with evidence of seasonal variations. Throughout the summer months, the mean wind speed ranges from 5.28 – 7.22 m/s, with mean wind speed throughout the winter months ranging from 6.42 – 11.51 m/s (ABPmer, 2019).

6.5.3.4. Climate Change

Into the future, climate change will likely alter metocean conditions across the UKCS. The nature of these changes is likely to be variable and is highly uncertain. For instance, the Marine Climate Change Impacts Partnership (MCCIP) in their most recent annual report on future storm and wave conditions across the UKCS suggest that, under the UK Climate Projections 2018 (UKCP18) high emissions scenario (referred to as Representative Concentration Pathway (RCP) 8.5), there may be a reduced frequency in storms and a change in storm tracks, although there is considerable uncertainty in these predictions. It is also predicted that there will be an overall reduction in significant wave height, combined with an increase in the mean annual maximum wave height by 0.5 m (i.e. larger waves less frequently) and that wave heights to the north of the UK will increase as a result of a retreating Arctic sea ice (Wolf *et al.*, 2020). Changes in future wind and wave conditions are provided in Environment Agency (2016), 'Flood Risk Assessments: Climate Change Allowances (Environment Agency, 2022).

With regards to the influence of climate change on coastal environments, trends in coastal erosion/accretion may also be altered as a result of sea level rise and changes to local sediment transport processes. The rate of sea level rise varies by location, in accordance with local conditions. At present, climate change is expected to attribute to 1 – 2 mm increase in the sea level rise per year in the UK (Horsburgh *et al.*, 2020).

6.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- The use of rock protection will be minimised as far as possible, and only used where required (i.e., where target burial using installation tools cannot be achieved, at crossings and the landfall, for example). This will be informed by outputs from Cable Burial Risk Assessment activity completed prior to the commencement of installation;
- Placement of scour protection will also be minimised as far as possible, however a level of protection may be required at certain locations;
- A Construction Environmental Management Plan (CEMP) will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan; and
- Suitable implementation and monitoring of cable protection through the Development and adherence to a Cable Plan (CaP).

A full suite of designed in measures will be provided as part of the EIA.

6.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 6.4) and the understanding of the local physical environment and seabed conditions.

The scope of potential cumulative and transboundary impacts on offshore physical environment and seabed conditions receptors is discussed in section 6.8 and is summarised in Table 16-1.

Table 6-2 Scoping of potential impacts for offshore physical environment and seabed conditions receptors

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
Construction and Decommissioning				
Change to seabed levels and sediment properties due to installation of export cables	Scoped-In	There is the potential for localised changes to the seabed as a result of pre-installation activities (including seabed preparation) and cable installation. This has the potential to result in pathways for impacts on other environmental, biological and human receptors.	Available data and information on surface and sub-surface geology, bathymetry and background suspended sediment concentrations throughout the offshore physical environment and seabed conditions study area will be assessed. This regional data will be augmented with site-specific geophysical survey data and metocean data obtained from public sources and from the BBWF array area.	The assessment method will entail a desk-based assessment, based upon the maximum design scenario. Consistent with the approach taken by other comparable subsea transmission projects, no numerical modelling is proposed due to the strong existing understanding of the environmental interactions associated with cables and the limited scale of proposed activities. Modelling undertaken by other developments in the area (for example as part of the Neart na Gaoithe OWF) will contribute to the assessment of impacts associated with the installation of the Cambois Connection.
Increases to suspended sediment	Scoped-In	There is the potential for sediment changes related to the	Data and information described above, including results from the	The principal method to be employed will be careful examination of the findings of the project

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
concentrations (SSC) due to installation of export cables, and redeposition of the suspended sediment		<p>installation of the export cables including potential sediment disturbance and an increase in suspended sediments to have impacts on other receptors (for example, Water and Sediment Quality, Benthic Subtidal and Intertidal Ecology, and Fish and Shellfish Ecology).</p> <p>Increased sedimentation associated with installation and decommissioning works may lead to smothering of slow moving or sessile species (e.g. Ocean Quahog). Localised changes in sediment type which may also potentially impact seabed dependent species (e.g. Herring spawn). Any potential impacts associated with increased SSC and redeposition are anticipated to be highly localised and temporary.</p> <p>For the above reasons it is considered that there is a potential pathway with significant impacts on other receptors (for example, Water and Sediment Quality, Benthic Subtidal and Intertidal Ecology, and Fish and Shellfish Ecology) during installation and decommissioning of the offshore export cables and this impact is therefore scoped in.</p>	<p>baseline geophysical surveys and benthic surveys (further detail in section 8.4).</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area were undertaken in 2021. The assessment of increased suspended sediment concentrations and associated deposition will be informed by the survey data relevant to the BBWF array area.</p>	<p>specific geophysical surveys and benthic surveys (further detail in section 8.4), as well as those undertaken for the BBWF array area. This will provide site specific information on seabed sediment characteristics. The findings of the study will be used alongside a desk-based study utilising BGS mapping, borehole logs and regional reports and other relevant data as detailed in section 6.4.</p>
Impact on designated features within the designated sites due to installation of offshore export cables	Scoped-In	<p>The Farnes East MCZ, Firth of Forth Banks Complex MPA and the Coquet to St. Mary's MCZ are all designated for a number of offshore physical features including subtidal and intertidal habitats. There is the potential for activities relating to the pre-installation, construction and decommissioning phases of the Project to impact these designated sites through direct and indirect pathways. These pathways include: direct seabed disturbance and loss; reduced water clarity (due to increased SSC) and potential smothering due to sediment deposition; changes to sediment transport changes to wave, tidal and sediment transport regimes.</p>	<p>The bathymetry, representative tidal and wave properties of the offshore physical environment and seabed conditions study area will be augmented with site-specific geophysical data and metocean data obtained from public sources and from the BBWF array area.</p>	<p>A desk-based assessment will be undertaken on a maximum-design scenario, informed by a combination of analytical spreadsheet-based tools to determine the potential extent of direct and indirect disturbance. An MCZ assessment (which will also include the MPA) will be undertaken to assess the impact associated with cable installation. The MCZ assessment process is described in section 2.</p>
Change to coastal landfall morphology	Scoped-In	<p>Cable installation in coastal environments has the potential to disrupt coastal morphology with varying degrees of impact depending on cable installation and protection methods, with the worst-case scenario here involving the installation of a cofferdam at the landfall. The</p>	<p>Assessment of coastal properties will be augmented by site-specific geophysical data and metocean data obtained from public sources.</p>	<p>A desk-based landfall assessment will be undertaken based on a maximum-design scenario, supported by outputs from regional numerical modelling scenarios and modelling outputs produced by third party developments, as outlined above.</p>

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
		presence of a cofferdam can hinder sediment transport process along the coast resulting in localised changes to morphology at the landfall location (see section 3 in which potential installation methods are outlined).		
Operation and Maintenance				
Potential changes to the tidal, wave and sediment transport regimes as a result of blockage effects from scour protection measures	Scoped-In	Impacts associated with operation and maintenance activities along the cable are likely to be limited to remediation activities. Though, rock placement as a source of protection at the cable landfall might not be required during installation. Rock placement will directly impact a limited area of seabed however the presence of rock may affect wider large-scale marine physical process pathways such that a change to local tidal, wave and sediment transport regimes is caused. This could result in delayed impacts on morphology and coastal receptors. However, volumes and frequency of any additional deposits during the O&M phase are expected to be negligible and are adequately considered through the construction phase.	Study area bathymetry, representative tidal (water level and current speeds) and wave properties and seabed sediments. The regional information will be augmented by site-specific geophysical, geotechnical and metocean survey data.	A desk-based landfall assessment will be undertaken based on a maximum-design scenario, supported by outputs from regional numerical modelling scenarios and modelling outputs produced by third party developments, as outlined above.
Introduction of scour	Scoped-Out	The intention is to bury the cable upon installation with scour protection to be used as and when required. Scour would typically develop in the wake of installation activities so is considered here in the context of operations and maintenance. In line with the mitigation measures above, and the limited potential for introduction of scour, given the use of preventative measures, this has been scoped out.	N/A	N/A

6.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on offshore physical environment and seabed conditions receptors. There is the potential for cumulative offshore physical environment and seabed condition impacts to occur during the installation phase of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

The offshore physical environment and seabed conditions study area does not extend beyond UK waters. There is no potential for transboundary impacts upon physical processes receptors due to construction, operation, maintenance and decommissioning of the Marine Scheme. The potential impacts discussed above do not extend beyond UK limits and therefore transboundary impacts are proposed to be scoped out of the EIA for offshore physical environment and seabed conditions.

Section 16 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to offshore physical environment and seabed conditions.

6.9. PROPOSED EIA METHODOLOGY

The assessment of the impacts of the Marine Scheme on the offshore physical environment and seabed conditions will take a qualitative, evidence-based approach. The assessment will utilise Project-specific and publicly available data and will be augmented by consultation during the EIA phase.

The assessment will be based on the maximum design scenario of the Marine Scheme. Potential near-field and far-field effects will be considered within this impact magnitude and an investigation into changes to offshore physical environment and seabed conditions pathways as a result of the Marine Scheme will be assessed.

The assessment of impacts for offshore physical environment and seabed conditions will be conducted in line with the process identified in section 4.

6.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the offshore physical environment and seabed conditions assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

7. WATER AND SEDIMENT QUALITY

7.1. INTRODUCTION

This section of the Scoping Report outlines the key sensitivities and potential impacts arising from the Marine Scheme on water and sediment quality throughout construction, operation and maintenance and decommissioning phases. The water and sediment quality receptors which are considered within this section include:

- Designated sites:
 - Shellfish waters;
 - Designated waterbodies; and
 - Bathing waters.

7.2. LEGISLATION, POLICY AND GUIDANCE

The water and sediment quality impact assessment will be undertaken in line with the methodology set out in section 4. In addition to the legislation, policy and guidance documents outlined in section 6.2, the following legislation, policy and guidance documents are considered specific to the assessment of water and sediment quality across the Marine Scheme:

7.2.1. NATIONAL LEGISLATION

7.2.1.1. UK (Scotland and England)

- The Water Framework Directive (WFD) is a mechanism used for assessing and managing water environments throughout the European Union. This legislation is implemented in the UK under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and in Scotland is covered under the Water Environment and Water Services (Scotland) Act 2003. Under these acts, any projects that display a potential to interact with surface waters must consider the WFD in their proposal to ensure that the project will not hinder the ability of a water environment to maintain 'Good Ecological Status' and that there will be no deterioration of water quality status throughout the duration of the project;
- Shellfish Waters Directive 2006; and
- Bathing Waters Directive 2006.

7.2.2. GUIDANCE

In addition to the legislation outlined above, the following guidance documents are also considered applicable to the assessment of water and sediment quality receptors within UK waters:

- High Level Review of Current UK Action Level Guidance: MMO Project No. 1053 (MMO, 2015);
- ME5226 C7590: Review of Action Levels used for assessing Dredging and Disposal Marine Licences (Cefas, 2018); and
- Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 1999).

Any additional guidance will be utilised where appropriate.

7.3. ANY ADDITIONAL GUIDANCE WILL BE UTILISED WHERE APPROPRIATE. STUDY AREA

For the purpose of this Scoping Report, the study area for the sediment and water quality baseline is the same as is proposed for the offshore physical environment and seabed conditions; the study area defined based on the tidal excursion extent. The study area for the sediment and water quality baseline is therefore the Scoping Boundary plus a 10 km buffer.

7.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the offshore water and sediment quality baseline include, but are not limited to, the following:

- Cefas (2016). Suspended sediment climatologies around the UK;
- Cefas (2022). Action Level Tool for sediment contaminants;
- DEFRA (2019). Bathing water quality;
- Environment Agency (2017). WFD water body status; and
- OSPAR (2017). Intermediate Assessment 2017 – Contaminant Assessment.

In addition to the above, third party impact assessments of surrounding developments will also be utilised to help inform the baseline understanding of the study area including, but not limited to, the environmental appraisals for the Neart na Gaoithe, Inch Cape, Seagreen Alpha and Bravo, SEGL1, Eastern Green Link 2, and the BBWF Scoping Report (and the BBWF EIA Report once available).

Furthermore, site specific benthic and geophysical surveys for the offshore export cable corridor are being undertaken throughout 2022. As part of the benthic survey scope, sediment samples will be taken in order to assess sediment contaminant levels. The proposed contaminant sampling stations are all located in areas of finer sediments. The placement of these sediment sampling stations is focused on sections of the potential cable routes closer to shore where elevated levels of contaminants are more likely to be found. Samples will be retained for subsequent analysis for Arsenic, Mercury, Cadmium, Chromium, Copper, Nickel, Lead and Zinc. Analysis will take place at an MMO approved and ISO accredited laboratory. The approach to the contaminant sampling was agreed with stakeholders, including Cefas, Natural England and NatureScot as discussed in section 5.

This information will contribute to the baseline understanding of the water and sediment quality in the water and sediment quality study area, as appropriate.

7.5. BASELINE ENVIRONMENT

An initial desk-based review of literature and available data sources has been undertaken to describe the water and sediment quality within the water and sediment quality study area and to inform the Scoping process.

7.5.1. WATER QUALITY

The chemical composition of water throughout the water and sediment quality study area is expected to be similar to that of recorded unpolluted coastal and offshore North Sea waters.

Sampling conducted within the Seagreen OWF in March and June 2011, found the total suspended solids (TSS) in the water column to be low. The samples collected illustrated a TSS of < 5 mg/l with a maximum reading of 10 mg/l during March 2011 (Fugro, 2012). The Cefas Climatology Report 2016 (Cefas, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UKCS; generally, the levels of SPM in the central North Sea (CNS), and in the Marine Scheme area, are between 0 and 1 mg/l.

A study, commissioned by the Port of Blyth and undertaken by Newcastle University, set out to investigate the extent of disposed sediment dispersal associated with routine dredging activity; riverine sediment is obtained by suction dredge in order to maintain the navigability of the port channel. Once disposed within the Blyth A and B disposal site (which intersects with the sediment and water quality study area), the sediment remained within 230-760 m of the location of release (Port of Blyth, 2017).

The water quality baseline for the water and sediment quality study area has been defined through an evaluation of designated waters including designated waterbodies, designated bathing waters and designated shellfish waters which are addressed in the following sections. Under the WFD, five classifications are used to define the ecological status of a water environment: 'High' (near natural), 'Good', 'Moderate', 'Poor', and 'Bad'. Each of these classifications is accorded a degree of confidence (high, medium and low) in an overall quality assessment.

7.5.1.1. Designated Waterbodies

The water and sediment quality study area does not intersect any coastal waterbodies designated under the WFD. The following is presented for context on the wider region.

A total of 14 designated waterbodies are located within Northumberland. The Blyth (N) estuarine water body (ID: GB510302203200) and the Wansbeck estuarine water body (ID: GB510302210100) are the closest designated waterbodies to the offshore physical environment and seabed conditions study area. These sites are located approximately 2 km to the south and 1.3 km to the north of the proposed landfall area respectively. Table 7-1 summarises the status of the Blyth (N) and Wansbeck designated waterbodies.

Table 7-1 Summary of designated waterbodies

Site	Overall water body status	Ecological status	Chemical status	Target water body status
Blyth (N)	Moderate	Moderate	Good	Moderate
Wansbeck	Moderate	Moderate	Good	Good

7.5.1.2. Designated Bathing Waters

Water quality standards for designated bathing waters are based on World Health Organisation (WHO) research into the impacts on human health as a result of bacteria present within bathing waters. Bathing waters are categorised as 'Excellent', 'Good', 'Sufficient' or 'Poor' based on the bacteria levels within the bathing water.

Bathing waters in the UK are covered by the Bathing Water Regulations 2013. 13 of these designated bathing waters are located within Northumberland County (DEFRA, 2022). However, the Marine Scheme does not directly interact with any designated Bathing Waters. As designated bathing waters are located within coastal waters, only the proposed landfall location comes close to any such areas. The closest bathing waters to the proposed landfall location are the Blyth South Beach and the Newbiggin bathing waters, located approximately 2.3 km to the south and 3.5 km to the north respectively. Both of these designated water bodies are categorised as 'Excellent'.

A risk assessment was conducted along the coastline of Cell 1 as part of the SMP which investigated areas of coastline where the current management plan was of No Active Intervention (NAI). The risk assessment was based on local coastal erosional risk in combination with an area of known contamination, which gave an overall risk ranking on the possibility of contaminant release. Two locations to the south of the proposed landfall location (at Newbiggin) were considered to represent a high risk of coastal contamination. These locations are associated with historic contaminant deposition (Scarborough Borough Council, 2017). However, considering the designated waterbodies in the area are of good chemical status, it suggests that contamination due to the erosion of the coastline is not currently at a level of concern.

7.5.1.3. Designated Shellfish Waters

Shellfish waters are protected under the WFD. The WFD sets physical, chemical and microbiological water quality requirement that shellfish waters must comply with or endeavour to meet in order to support shellfish growth and life (DEFRA, 2011; DEFRA, 2022).

The water and sediment quality study area does not directly interact with any designated shellfish waters. The closest designated shellfish waters can be found at Holy Island, approximately 60 km to the north of the cable landfall.

As designated shellfish are located within coastal waters, the portion of the Marine Scheme located within Scottish waters does not directly interact within any designated shellfish as the Marine Scheme is located outside the 12 NM Scottish Territorial Limits.

7.5.2. SEDIMENT QUALITY

Within English Territorial Waters, DEFRA and Cefas carry out analysis of sediment quality in order to help provide a high level characterisation surrounding the nature and degree of chemical contamination present within the marine environment. In 2019, Marine Scotland produced an assessment of Clean Seas Environmental Monitoring Programme (CSEMP) which describes the status and trends in sediment contamination concentrations across the UK between 2013-2018. There are a number of CSEMP sites which record sediment contaminants along the east coast of the UK, including sample sites within the Forth, at the Tees Estuary, and further offshore.

The Cefas OneBenthic tool shows the level of contamination in sediments around the UK, according to data obtained from surveys and in relation to data provided in support of marine consent applications. Sampling effort is typically concentrated in and around port and harbour areas, including the Port of Blyth. Sediments on the seaward side of the Blyth harbour wall typically exhibit levels of contamination which fall below Cefas Action Level 1 (Cefas, 2022). Cefas Action Level limits for contaminants, such as trace elements and PCBs, apply to the suitability of dredged material for possible disposal to sea. The Action Levels are not statutory limits but are used and are indicative of the contamination level of sediments. Generally, contamination below Action Level 1 is of no concern. Material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal. Particularly highly contaminated sediments within Blyth Harbour are not dredged and disposed in the designated offshore disposal areas; therefore, sediment which is disposed of should not be contaminated.

Based on the available strategic data there are no known sediment quality issues within the water and sediment quality study area. Notwithstanding, as the EIA evolves, the Applicant will carry out a review of further available data which will inform the consideration of sediment quality and contamination in further detail. This is expected to include outputs from the ongoing benthic surveys, as well as sediment analysis data carried out for third party consent applications within the offshore physical environment and seabed conditions study area, as detailed within section 1.

7.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- In the event that any activity considered as 'dredging and disposal' is required, a sample plan and suite of analysis will be agreed with MS-LOT / the MMO;
- The use of rock protection will be minimised as far as possible, and only used where required (i.e., where target burial using installation tools cannot be achieved, at crossings and the landfall, for example). This will be informed by outputs from the Cable Burial Risk Assessment completed prior to the commencement of installation;
- Placement of scour protection will also be minimised as far as possible, however a level of protection may be required at certain locations;
- A CEMP will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan;
- An OEMP will be developed and employed; and
- Suitable implementation and monitoring of cable protection through the Development and adherence to a Cable Plan (CaP).

A full suite of designed in measures will be provided as part of the EIA.

7.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 7.4)

The scope of potential cumulative and transboundary impacts on water and sediment quality receptors is discussed in section 7.8 and is summarised in Table 16-1.

Table 7-2 Scoping of potential impacts for water and sediment quality receptors

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
Construction and Decommissioning				
Potential impacts to shellfish waters as a result of increased suspended sediment concentration and potential release of contaminants	Scoped-Out	Any potential impacts associated with increased suspended sediment concentrations and the potential release of contaminants as a result of construction or decommissioning works are anticipated to be highly localised and temporary. The large distance between the Marine Scheme and designated shellfish waters means that there is no potential pathway for impact. Furthermore, the reported condition of the local	N/A	N/A

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
		shellfish waters indicates that there is no evidence of existing contamination in the area.		
Potential impacts to designated waterbodies as a result of increased suspended sediment concentration and potential release of contaminants	Scoped-Out	The closest designated water bodies, as stated in above, do not coincide directly with the Marine Scheme. Any potential impacts associated with increased suspended sediment concentrations and the potential release of contaminants as a result of construction or decommissioning works are anticipated to be highly localised and temporary. Standard best practice and industry guidance will be applied during construction and decommissioning. Only substances approved for use in the marine environment will be used at the proposed landfall location. Bentonite, should it be required as part of construction activities at landfall, is a PLONOR substance ¹⁰ . Furthermore, a Marine Pollution Contingency and Control Plan will be part of the CEMP. The large distance between the Marine Scheme and designated waterbodies means that there is no potential pathway for impact. Furthermore, the reported condition of the local designated waterbodies indicates that there is no evidence of existing contamination in the area.	N/A	N/A
Operation and Maintenance				
Potential impacts to shellfish waters as a result of increased suspended sediment concentration and potential release of contaminants	Scoped-Out	Any potential impacts associated with increased suspended sediment concentrations and the potential release of contaminants as a result of operation and maintenance works are anticipated to be highly localised and temporary. The intervening distance between the Marine Scheme and designated shellfish waters means that there is no potential pathway for impact. Furthermore, the reported condition of the local shellfish waters indicates that there is no evidence of existing contamination in the area.	N/A	N/A
Potential impacts to designated waterbodies as a result of increased suspended sediment concentration and potential release of contaminants	Scoped-Out	Any potential impacts associated with increased suspended sediment concentrations and the potential release of contaminants as a result of operation and maintenance works are anticipated to be highly localised and temporary. The intervening distance between the Marine Scheme and designated waterbodies means that there is no potential pathway for impact. Furthermore, the reported condition of the local designated waterbodies indicates that there is no evidence of existing contamination in the area.	N/A	N/A

7.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on water and sediment quality receptors. There is the potential for cumulative offshore water and sediment quality impacts to occur during the installation phase of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

The water and sediment quality study area does not extend beyond UK waters. There is no potential for transboundary impacts upon water and sediment quality due to construction, operation, maintenance and decommissioning of the Marine Scheme, and therefore transboundary impacts are proposed to be scoped out of the EIA for water and sediment quality.

The scope of cumulative and transboundary impacts with regard to water and sediment quality is summarised in Table 16-1.

¹⁰ PLONOR chemicals are those which pose little or no risk to the environment according to OSPAR, i.e. the mechanism by which 15 Governments and the EU cooperate to protect the marine environment of the North-East Atlantic.

7.9. PROPOSED EIA METHODOLOGY

No impacts are anticipated on water and sediment quality as a result of the Marine Scheme, as demonstrated above. In the event stakeholder feedback results in the request for further assessment, this shall be undertaken in line with the high level principles of the methodology described in section 4.

7.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the water and sediment quality assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping out of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

8. BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY

8.1. INTRODUCTION

This section of the Scoping Report outlines the key sensitivities and potential impacts arising from the Marine Scheme on the benthic subtidal and intertidal ecology throughout construction, operation and maintenance and decommissioning phases. The benthic subtidal and intertidal ecology receptors, including epifauna and infauna, that are considered within this section include:

- Annex I habitats;
- Designated sites and associated species;
- Priority Marine Features (PMFs);
- Habitats supporting blue carbon storage; and
- Intertidal ecology.

This section of the Scoping Report should be read alongside section 6 offshore physical environment and seabed conditions, 7 water and sediment quality and section 9 fish and shellfish ecology.

8.2. LEGISLATION, POLICY AND GUIDANCE

This section outlines the relevant legislation, policy and guidance for the appraisal of the potential impacts of the Marine Scheme on benthic subtidal and intertidal ecology receptors associated with the construction, operation and maintenance and decommissioning phases of the development. For further information on legislative context, refer to section 2.

8.2.1. INTERNATIONAL LEGISLATION

The following international legislation is considered relevant to the assessment of benthic subtidal and intertidal ecology receptors across the Marine Scheme:

- European Union Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna.

8.2.2. NATIONAL LEGISLATION

The following national legislation is considered relevant to the assessment of benthic subtidal and intertidal ecology receptors across the Marine Scheme within UK waters:

8.2.2.1. UK (England and Scotland)

- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- Marine and Coastal Access Act (MCAA) 2009;
- Wildlife and Countryside Act 1981;
- The Marine Strategy Regulations 2010; and
- The Conservation of Offshore Marine Habitats and Species regulations 2017.

8.2.2.2. Scotland

- Marine (Scotland) Act 2010;
- The Water and Environment (Controlled Activities) (Scotland) Regulations 2011;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendments) Regulations 2019;
- Nature Conservation (Scotland) Act 2004;
- Water Environment and Water Services Act 2003; and
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended).

8.2.2.3. England

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended); and
- Natural Environment and Rural Communities Act 2006.

8.2.3. INTERNATIONAL POLICY

The following international policies are considered relevant to the assessment of benthic subtidal and intertidal ecology receptors across the Marine Scheme within UK waters:

- Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') adopted in 1998 and amended in 2007.

8.2.4. NATIONAL POLICY

The following national policies are considered relevant to the assessment of benthic subtidal and intertidal ecology receptors across the Marine Scheme within UK waters:

8.2.4.1. UK (Scotland and England)

- UK Marine Policy Statement (MPS) (HM Government, 2011); and
- UK Post-2010 Biodiversity Framework, revised 2012-2019

8.2.4.2. Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015); and
- Scottish Planning Policy.

8.2.4.3. England

- North East Inshore and North East Offshore Marine Plan (HM Government, 2021);
- East Inshore and East Offshore Marine Plan (HM Government, 2021);
- National Policy Statements (NPS) (National Policy Statements, 2011);
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services; and
- The revised National Planning Policy Framework (HM Government, 2021).

8.2.5. GUIDANCE

In addition to the legislation and policies outlined above, the following guidance documents are also considered applicable to the assessment of benthic subtidal and intertidal ecology receptors within UK waters:

- Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and marine (CIEEM, updated April 2022);
- Priority Marine Features (PMF) 2014 (Scottish waters only);
- Refining the criteria for defining areas with a 'low resemblance' to Annex I stony reef (Golding, Albrecht, & McBreen, 2020);
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (JNCC and Natural England, 2019);
- Nature Conservation Considerations and Environmental Best Practice for subsea cable for English Inshore and UK Offshore Waters (Natural England and JNCC, 2022);
- Defining and managing *Sabellaria spinulosa* reefs (Gubbay, 2007); and
- The identification of the main characteristics of Annex I stony reef habitats under the Habitats Directive (Irving, 2009).

In the absence of *in situ* Environmental Quality Standards for UK sediments, the following guidance documents have been used to inform a 'Weight of Evidence' (WoE) approach to the assessment of the potential impacts of the Marine Scheme on benthic subtidal and intertidal ecology receptors:

- Centre for Environment, Fisheries and Aquaculture Science (Cefas) Chemical Action Levels (MMO, 2014) (Reviewed 2020);
- Data from the 'Clean Seas Environmental Monitoring Programme' at Tyne Tees (CSEMP, 2019) and a station from the Firth of Forth (Marine Scotland, 2020);
- OSPAR background concentration and background assessment concentrations and effect range low (ERL) and effect range median (ERM) concentrations for contaminants (OSPAR, 2009); and
- Canadian Sediment Quality Guidelines (Canadian Council of Ministers of the Environment, 2001) (applied to contaminants where no other regional threshold value is available) and the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life.

8.3. STUDY AREA

For the purpose of this Scoping Report, the study area for the benthic subtidal and intertidal ecology baseline is defined as the Scoping Boundary presented in Figure 8-1 where the Marine Scheme directly interacts with the seabed. Where appropriate, a larger impact area will be considered, for example when considering the potential introduction of non-native marine species and this will be clearly stated.

8.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the benthic subtidal and intertidal ecology baseline include:

- EMODnet (2019) Broad-scale Seabed habitat map for Europe (EUSeaMap);
- Scottish Government (2020) Sectoral Marine Plan: Regional Local Guidance;
- OSPAR (2008) List of threatened and/or declining species and habitats;
- Tyler-Walters *et al* (2016) Scottish priority marine features;
- JNCC (2018) UK protected area datasets for download;
- JNCC (2016) UK SeaMap 2016 – predictive mapping of seabed habitats;
- JNCC (2021a) Annex I reefs in UK offshore waters (public);
- JNCC (2021b) Habitat's List.
- JNCC (2016) Annex I submarine structures made by leaking gas;
- SEGL1 (2021) Eastern Link 1 Marine Scheme Scoping Report;
- National Grid NSN Link Limited (2014) Norway-UK Interconnector UK Marine Environmental Statement;
- Blyth Offshore Demonstration Wind Farm (MMO, 2021);

- Seagreen Wind Energy Limited (2020). SeaGreen Alpha and Bravo EIA;
- BBWF Offshore Scoping Report (SSE, 2021) (and the BBWF EIA Report once available, in particular the survey results from the benthic surveys of the BBWF array area);
- Neart na Gaoithe Offshore Wind (2019) Offshore Windfarm Section 36 Consent Variation – Environmental Report;
- DEFRA (2022) Magic Maps – CEFAS MCZ monitoring data (2014);
- Project specific intertidal walkover (to be completed this year / next year); and
- EEA (2021) EUNIS classification system / data.

In addition to the key data sources listed above, third party impact assessments of surrounding developments will be utilised to help inform the benthic subtidal and intertidal ecology baseline for the Marine Scheme, including benthic surveys for the offshore export cable corridor are being undertaken throughout 2022.

The benthic survey was undertaken in September/October 2022 and followed two possible cable route options within the Scoping Boundary. The broad scope for the benthic survey includes:

- Grab samples for Particle Size analysis (PSA) as well as macrofauna and contaminant analysis;
- Acquiring seabed imagery using Drop-Down Video (DDV) and/or a towed camera.

The geophysical survey includes multibeam echosounder (providing backscatter and side scan data) and sub-bottom profiler, as well as nearshore and shallow bathymetric mapping. Intertidal walkover surveys will be undertaken in November 2022. The inputs from site-specific surveys will contribute to the baseline understanding for benthic and subtidal ecology, as appropriate.

The survey design plan for September 2022 has been agreed with key stakeholders prior to the commencement of any works, including Natural England, NatureScot, MS-LOT, Cefas and the MMO. Section 5 provides a comprehensive list of all stakeholder engagement to date.

8.5. BASELINE ENVIRONMENT

8.5.1. ANNEX I HABITATS

Throughout the UK, there are three Annex I marine habitats that occur regularly (EU Commission, 2013). These are:

- Reefs (defined as hard substrate on the sea floor which can be formed in several different ways);
- Sandbanks (with a degree of seawater cover at all times); and
- Submarine structures made by leaking gases (e.g. pockmarks).

There is the potential for the Marine Scheme to directly interact with the Annex I habitats sandbanks and reefs, which may be present within the benthic subtidal and intertidal ecology study area (Figure 8-1).

8.5.2. DESIGNATED SITES AND ASSOCIATED SPECIES

There are three sites which directly interact with the benthic subtidal and intertidal ecology study area, that are designated for the conservation of geological features (Figure 8-1). These are the:

- Firth of Forth Banks Complex NCMPA. This site is designated for the conservation of ocean quahog aggregations, edible crab, brittlestars, subtidal sands and shelf banks and mounds. These species and habitats are noted for their potential sensitivity to works associated with the construction of offshore export cables and have been assessed further as part of section 8.7);
- Farnes East MCZ. This site is designated for the conservation of Ocean quahog and marine habitats such as sea-pen and burrowing megafauna, subtidal mud and subtidal sand. These marine habitats are noted for their potential sensitivity to works associated with the construction of offshore export cable and have been assessed further as part of section 8.7); and
- Coquet to St Mary's MCZ. This designated for the conservation of marine habitats such as intertidal mud, high energy infralittoral rock and intertidal mixed sediments. These marine habitats are noted for their potential sensitivity to works associated with the construction of offshore export cables and have been assessed further as part of section 8.7).

Ocean Quahog are noted as a feature of conservation importance within these designated sites however, there is insufficient data available to assess the potential impacts of the Marine Scheme on these aggregations.

The offshore export cables have the potential to impact protected subtidal habitats within the Firth of Forth Banks Complex NCMPA, the Coquet to St Mary's MCZ and the Farnes East MCZ through dredging activities, cable burial and the increased risk of suspended sediment relating to construction and decommissioning activities resulting in habitat smothering.

8.5.3. PRIORITY MARINE FEATURES

In July 2014, the Scottish Government identified a list of 81 priority marine features (PMFs) that were considered to be characteristic of the Scottish marine environment (NatureScot, 2020). While most of these PMFs are protected under existing MPA designations, 11 PMFs have been identified as the most vulnerable within Scottish inshore waters. These are:

- Blue mussel (*Mytilus edulis*) beds;
- Cold water coral reefs (*Lophelia pertusa*);
- Fan mussel (*Atrina fragilis*) aggregations;
- Flame shell (*Limaria lians*) beds;
- Horse mussel (*Modiolus modiolus*) beds;

- Maerl beds (*Phymatolithon calcareum*);
- Maerl or coarse shell gravel with burrowing sea cucumbers (*Neopentadactyla mixta*);
- Native oysters (*Ostrea edulis*);
- Northern sea fan (*Swiftia pallida*) and sponge communities;
- Seagrass beds; and
- Serpulid aggregations.

The portion of the Marine Scheme within Scottish territorial waters will directly interact with the Firth of Forth Banks Complex MPA. This MPA is not designated for any PMFs protected under existing MPA designations. The benthic subtidal and intertidal study area will not directly interact with any PMFs within Scottish territorial waters.

8.5.4. HABITATS SUPPORTING BLUE CARBON STORAGE

Blue carbon refers to a marine or coastal environment and its potential to capture and store carbon dioxide (CO₂). Plants and calcifying organisms have the potential to capture and store carbon in both the long and short term. The principal threats to the long-term storage of carbon within a marine or coastal environment result from any process or activity that disturbs the top layers of sediment (such as the placement of subsea export cables and pipelines). The key habitats that support blue carbon storage and sequestration include:

- Kelp forest (*Macrocystis pyrifera*);
- Intertidal macroalgae;
- Subcanopy algae;
- Maerl beds;
- Seagrass beds;
- Horse mussels (*Modiolus modiolus*);
- Flame shell (*Limaria hians*);
- Lophelia pertusa beds;
- Tubeworm (*Serpula vermicularis*) reef;
- Brittlestar (*Ophiuroidea*) beds;
- Blue mussel (*Mytilus edulis*); and
- Burrowed mud.

Along the Northumberland, Scottish Borders and East Lothian coastlines there are small to moderate sized, isolated patches of seagrass cover. These areas are restricted to inshore areas of Scottish and English Territorial Waters within which the Marine Scheme does not enter. There are no other sediments or habitats which have been identified as being present within the benthic subtidal and intertidal ecology study area which support blue carbon storage or sequestration.

Activities associated with the installation of subsea export cables has the potential to disturb the long-term storage of carbon in rocks and sediments throughout the Marine Scheme. An assessment of blue carbon storage and the potential impacts of the Marine Scheme on associated habitats considers the following:

- Uncertainty surrounding the levels of carbon storage across the Marine Scheme and a lack of information relating to the levels of blue carbon storages within sediments associated with the Marine Scheme;
- The relatively small footprint of the Marine Scheme and the local scale of any potential impacts associated with the Marine Scheme which will result in limited potential for the release of carbon stored in sediments;
- Uncertainty at this stage of the development of the detailed design of the Marine Scheme including the location of the offshore export cables and installation methods which may result in disturbance to carbon storage in benthic and subtidal habitats during the construction of the Marine Scheme; and
- The non-significant effects of suspended sediment concentrations (SSC) and associated deposition will not extend outside the defined benthic subtidal and intertidal ecology study area (as assessed in section 6 Offshore Physical Environment and Seabed Conditions).

Based on the above assessment of blue carbon storage and the indication that there are no benthic subtidal and intertidal sediments across the Marine Scheme which are of particular importance for blue carbon storage and, given the relatively small footprint of the Marine Scheme, the potential for significant impacts to blue carbon storage have been scoped out for further assessment.

8.5.5. INTERTIDAL ECOLOGY

The predicted EUNIS habitat classification within the intertidal section of the benthic subtidal and intertidal ecology study area are dominated by A3.1 Atlantic and Mediterranean high energy infralittoral rock, with smaller patches of A5: Sublittoral and A3.2 Atlantic and Mediterranean moderate energy infralittoral rock (Figure 8-2). The intertidal area also overlaps with the Coquet to St Mary's MCZ, designated for the conservation of marine habitats such as intertidal mud, high energy infralittoral rock and intertidal mixed sediments.

8.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- Placement of scour protection will be minimised as far as possible, however a level of protection may be required at certain locations;
- An Ecological Clerk of Works (ECOW) will be employed during landfall works;
- A Construction Environmental Management Plan (CEMP) will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan and an Invasive Non-Native Species (INNS) management plan; and

- Micro-routing within the offshore export cable route for the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints.

A full suite of designed in measures will be provided as part of the EIA.

8.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 8.4) and the understanding of the local benthic subtidal and intertidal conditions.

The potential impacts for benthic subtidal and intertidal ecology receptors are summarised in Table 8-1 below.

The scope of potential cumulative and transboundary impacts to benthic subtidal and intertidal ecology receptors is discussed in in section 8.8 and is summarised in Table 16-1.

Table 8-1 Scoping of potential impacts for benthic subtidal & intertidal ecology receptors

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
Construction and Decommissioning				
Temporary benthic habitat / species loss or disturbance	Scoped-In	There is the potential for the temporary loss or disturbance to benthic subtidal and intertidal Annex I habitats as a result of activities during the construction and decommissioning phases of the Project.	<p>Benthic subtidal and intertidal ecology surveys will be undertaken to collect site-specific data and to identify the location and/or extent of Annex I habitats present within the benthic subtidal and intertidal ecology study area.</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area were undertaken in 2021. The assessment of increased suspended sediment concentrations and associated deposition will be informed by the survey data relevant to the BBWF array area.</p>	No specific modelling is required, instead the area of impact will be assessed through the seabed footprint associated with the maximum design scenario. CIEEM (2022) guidance for ecological impact assessments will be followed.
Temporary increase in underwater noise on benthic species	Scoped-Out	<p>There will be a temporary increase in underwater noise during the installation of the cable and associated construction activities. There has been very little research into the impact of underwater sound on marine invertebrates 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 bivalve <i>Ruditapes philippinarum</i>, 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 <i>Amphiura filiformis</i>). As the nature of the cable installation process has a much-reduced noise level in comparison to other construction techniques.</p> <p>For these reasons, it is considered that there is no potential pathway for significant impacts resulting from the construction of the offshore</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
		export cables and disturbance will not generate significant impacts to benthic subtidal and intertidal ecology receptors.		
Increased SSC and associated deposition (including mobilisation of potential contaminants)	Scoped-In	Sediment disturbance as a result of construction and decommissioning activities may result in indirect impacts on benthic ecology as a result of increases in suspended sediment concentrations through pathways including reduced water clarity (due to increased SSC) and potential smothering due to sediment deposition.	<p>Benthic subtidal and intertidal ecology surveys will be undertaken to collect site-specific data and to identify the location and/or extent of benthic habitats present within the benthic subtidal and intertidal ecology study area</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area were undertaken in 2021. The assessment of increased suspended sediment concentrations and associated deposition will be informed by the survey data relevant to the BBWF array area.</p>	<p>The primary productivity and the corresponding effects of the potential impact will be considered and habitat maps will be produced as part of the benthic subtidal and intertidal ecology technical report. The assessment of increased suspended sediment concentrations and associated deposition will be conducted in line with Cefas Action Level guidelines.</p> <p>No numerical modelling is proposed for the assessment.</p>
Increased risk of introduction of Invasive Non-Native Species (INNS)	Scoped-Out	<p>The movement of vessels during the construction and decommissioning phases of the Marine Scheme have the potential to result in the introduction of INNS. A CEMP (such as an INNS Management Plan) and adherence to relevant legislation and guidance will ensure that all required mitigation measures are in place so that the potential for the introduction of INNS are minimised. Through these measures the discharges of ballast waters and biofouling of vessels will be controlled.</p> <p>For these reasons, it is considered that there is no potential pathway for significant impacts resulting from the construction of the offshore export cables and disturbance will not generate significant impacts to benthic subtidal and intertidal ecology receptors.</p>	N/A	N/A
Accidental release of pollutants	Scoped-Out	<p>The accidental release of pollutants is limited to oil and fluid emissions associated with any Project vessels. The potential release of contaminants as a result of operation and maintenance works are anticipated to be highly localised and temporary. Designed in measures, such as Environmental Management Plans including Marine Pollution Contingency Plans and adherence to MARPOL guidance, will ensure that measures are adopted to ensure that the potential for accidental release of contaminants is minimised.</p> <p>The potential for impacts resulting from the accidental release of pollutants is covered by non-EIA legislation which mitigates against any potential impacts to benthic subtidal and intertidal ecology receptors. For this reason, any potential pathways resulting from the construction of the offshore export cables will not generate significant impacts to benthic subtidal and intertidal ecology receptors.</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
Operation and Maintenance				
Permanent benthic habitat / species loss or disturbance, and permanent change/alteration to substrata and habitats.	Scoped-In	<p>There is the potential for the permanent loss or disturbance to habitats as a result of operation or maintenance activities.</p> <p>Rock protection and the introduction of hard substrate (rock) has the potential to change / alter the seabed and supporting habitats. This could subsequently impact the structure, function and extent of a feature.</p>	<p>Benthic subtidal and intertidal ecology surveys will be undertaken to collect site-specific data and to identify the location and/or extent of benthic habitats present within the benthic subtidal and intertidal ecology study area.</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area are not proposed. The assessment of permanent benthic habitat / species loss or disturbance will be informed by survey data relevant to the BBWF array area.</p>	No specific modelling is required, instead a qualitative assessment will be undertaken and presented within the ES.
Increases suspended sediment concentrations and associated deposition	Scoped-In	<p>Sediment disturbance arising from operation and maintenance activities has the potential to result in direct and/or indirect impacts on benthic habitats and communities as a result of increased sediment disturbance and associated deposition. This would occur where there is maintenance required on the cable to fix a fault or damage, or where the cable has become exposed and requires re-burial. These are not considered to be regular / routine activities and would be undertaken only as and when required in the event of damage.</p>	<p>Benthic subtidal and intertidal ecology surveys will be undertaken to collect site-specific data and to identify the location and/or extent of benthic habitats present within the Benthic subtidal and intertidal ecology study area.</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area are not proposed. The assessment of permanent benthic habitat / species loss or disturbance will be informed by survey data relevant to the BBWF array area.</p>	<p>The primary productivity and the corresponding effects of the potential impact will be considered, and habitat maps will be produced as part of the benthic subtidal and intertidal ecology technical report. The assessment of increased suspended sediment concentrations and associated deposition will be conducted in line with Cefas Action Level guidelines.</p> <p>No numerical modelling is proposed for the assessment.</p>
Colonisation of hard structures	Scoped-In	<p>Cable protection placed on the seabed is expected to be colonised by a variety of marine organisms which has the potential to lead to localised changes in biodiversity.</p>	<p>Benthic subtidal and intertidal ecology surveys will be undertaken to collect site-specific data and to identify the location and/or extent of benthic habitats present within the Benthic subtidal and intertidal ecology study area.</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area are not proposed. The assessment of permanent benthic habitat / species loss or disturbance will be informed by survey data relevant to the BBWF array area.</p>	No specific modelling is required, instead a qualitative assessment will be undertaken and presented within the ES.

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
Changes in physical processes from cable protection measures	Scoped-In	The presence of cable protection has the potential to induce localised changes to tidal flow and wave climate, resulting in potential changes to sediment transport regime and associated effects on benthic habitats and communities (section 8).	<p>Benthic subtidal and intertidal ecology surveys will be undertaken to collect site-specific data and to identify the location and/or extent of benthic habitats present within the Benthic subtidal and intertidal ecology study area.</p> <p>Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area are not proposed. The assessment of permanent benthic habitat / species loss or disturbance will be informed by survey data relevant to the BBWF array area.</p>	<p>The primary productivity and the corresponding effects of the potential impact will be considered, and habitat maps will be produced as part of the benthic subtidal and intertidal ecology technical report.</p> <p>No numerical modelling is proposed for the assessment.</p>
Impacts to benthic communities as a result of thermal load of electromagnetic field (EMF) arising from the cable during operation	Scoped-Out	<p>Subsea cables emit EMFs along their lengths, with high-voltage AC or DC export cables emitting the greatest EMFs. There is the potential for thermal load and/or EMF released by the cable during operation to impact benthic species. These potential impacts are not well understood and the level of exposure to EMF or thermal load will be dependent on the type of cable burial and protection measures adopted. Studies indicate that invertebrates do not have a notable sensitivity to EMF. For example, there was no impact observed on crustaceans (<i>Crangon crangon</i>), the round crab (<i>Rhithropanopeus harrisi</i>), the isopod (<i>Saduria entomon</i>), and edible mussel (<i>Mytilus edulis</i>) 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 Marine Scheme and benthic invertebrates or communities.</p> <p>For these reasons, any potential pathways resulting from the operation or maintenance of the offshore export cables will not generate significant impacts to benthic subtidal and intertidal ecology receptors.</p>	N/A	N/A
Accidental release of pollutants	Scoped-Out	<p>The accidental release of pollutants is largely limited to oil and fluid emissions associated with any vessels. The potential release of contaminants as a result of operation and maintenance works are anticipated to be highly localised and temporary. Designed in measures, such as Environmental Management Plans including Marine Pollution Contingency Plans and adherence to MARPOL guidance, will ensure that measures are adopted to ensure that the potential for accidental release of contaminants is minimised.</p> <p>For these reasons, it is considered that there is no potential pathway for significant impacts resulting from the operations of the offshore export cables this disturbance will not</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information Required to Inform the Assessment	Assessment Method
		generate significant impacts to benthic subtidal and intertidal ecology receptors.		
Introduction and spread of INNS	and Scoped-Out	<p>The movement of vessels during the operation and maintenance phases of the Marine Scheme have the potential to result in the introduction of INNS. A CEMP (such as an INNS Management Plan) and adherence to relevant legislation and guidance will ensure that all required mitigation measures are in place so that the potential for the introduction of INNS are minimised. Through these measures the discharges of ballast waters and biofouling of Project vessels will be controlled.</p> <p>For these reasons, it is considered that there is no potential pathway for significant impacts resulting from the operations of the offshore export cables this disturbance will not generate significant impacts to benthic subtidal and intertidal ecology receptors.</p>	N/A	N/A

8.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on benthic subtidal and intertidal ecology receptors. There is the potential for cumulative offshore benthic subtidal and intertidal ecology impacts to occur during the installation phase of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is no potential for transboundary impacts on benthic subtidal and intertidal ecology receptors to arise as a result of construction, operation and maintenance or decommissioning activities associated with the Marine Scheme. Any potential impacts associated with the Marine Scheme will be highly localised. Potential transboundary impacts on benthic subtidal and intertidal ecology receptors are therefore proposed to be scoped out of the EIA and will not be assessed further within the ES.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to benthic subtidal and intertidal ecology.

8.9. PROPOSED EIA METHODOLOGY

A desk-based study will be undertaken to review and summarise the potential impacts of the marine scheme on offshore subtidal and intertidal ecology receptors. This assessment will include an overview of the key environmental receptors associated with the marine scheme and will outline the appropriate mitigation measures that will be adopted where potential impacts to sensitive receptors are predicted to be significant. Consultation with key stakeholders will be undertaken prior to the submission of the ES. The following benthic subtidal and intertidal ecology will be considered for the marine scheme:

- Marine Scotland;
- NatureScot;
- Scottish Wildlife Trust;
- JNCC;
- Marine Conservation Society;
- MMO; and
- Natural England

As described in section 8.4, benthic subtidal and intertidal ecology surveys have been undertaken to collect site-specific data for environmental baseline characterisation. Data gathered during the surveys will provide a detailed description of the benthic and intertidal environment and biotope classification and will identify the presence or absence of species or habitats of conservation importance.

The characterisation of the marine scheme baseline within the BBWF array area will be informed by survey work undertaken to inform the EIA as part of the Marine Scheme as outlined in section 8.4.

The assessment of potential impacts of the Project on benthic subtidal and intertidal ecology will be consistent with the approach recommended by CIEEM (2022). Any potential direct and indirect impacts of the Marine Scheme will be assessed, and the sensitivity, vulnerability and recoverability of benthic subtidal and intertidal ecology receptors will be assessed using the Scottish Government's Feature Activity Sensitivity Tool (FEAST) and the Marine Life Information network (MarLIN, 2022). The assessment of impacts for offshore benthic subtidal and intertidal ecology will be conducted in line with the process identified in section 4, in line with standard industry guidance and the relevant legislation outlined in section 2.

The MCZ assessment will be undertaken in line with published MMO guidance (2013) and other relevant documents (as outlined in section 2). The MMO guidelines recommend a staged approach to assessment, involving three sequential stages: screening, stage 1 assessment and stage 2 assessment. 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. See section 2 for further information.

As outlined in Section 5, the Applicant held a meeting with Natural England on 21st July 2022 to discuss the scope of and approach to a suite of surveys planned for 2022 and to agree the scope of the benthic survey design, including the scope of offshore geophysical and benthic surveys, and the assessment process. Natural England agreed with the assessment approach. EIA methodology for the assessment of benthic subtidal and intertidal ecology will be conducted in line with the processes outlined in section 4 and the relevant legislation identified in section 2.

8.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the benthic subtidal and intertidal ecology assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

9. FISH AND SHELLFISH ECOLOGY

9.1. INTRODUCTION

This section of the Scoping Report identifies the fish and shellfish ecology receptors of relevance to the offshore aspects of the Marine Scheme and considers the potential impacts from the construction, operation and maintenance and decommissioning phases of the proposed Marine Scheme. The fish and shellfish ecology baseline will include details of the relevant:

- Species of conservation or commercial importance;
- Key prey species;
- Migratory routes of diadromous species; and
- Fish and shellfish species with:
 - sensitivity to the impacts of EMFs;
 - sensitivity to the impacts of underwater noise; and
 - seabed dependence during any life stage, including spawning and/or nursery stages.

It should be noted that whilst classified as a fish, basking shark (*Cetorhinus maximus*) have not been included in this section and instead have been discussed in section 11 Marine Mammals and Other Megafauna. SACs which have been designated due to the presence of fish and shellfish species have been discussed briefly but details will be provided in the supporting HRA (which will be submitted alongside and in support of the ES).

This section of the Scoping Report should be read alongside section 6 Offshore Physical Environment and Seabed Conditions, section 8 Benthic Subtidal and Intertidal Ecology, and section 12 Commercial Fisheries.

9.2. LEGISLATION, POLICY AND GUIDANCE

This section outlines the relevant legislation, policy and guidance for the appraisal of the potential impacts of the Marine Scheme on fish and shellfish ecology receptors associated with the construction, operation and maintenance and decommissioning phases of the development. For further information on legislative context, refer to section 2.

9.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

- European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora adopted in 1992.

9.2.2. NATIONAL LEGISLATION

The following national legislations are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

9.2.2.1. UK (England and Scotland)

- Wildlife and Countryside Act 1981 (HM Government, 1981);
- The Conservation of Habitats and Species Regulations 2017 (HM Government, 2017) (as amended);
- The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2017 (HM Government, 2017); and
- The Fisheries Act 2020.

9.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Scottish Statutory Instrument 2011 No. 209 (HMSO, 2009), as amended;
- The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (Scottish Government, 1994) (as amended); and
- Nature Conservation (Scotland) Act 2004 (Scottish Government, 2004).

9.2.2.3. England

- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended); and
- Natural Environment and Rural Communities Act (HM Government, 2006).

9.2.3. INTERNATIONAL POLICY

The following international policies are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

- Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') adopted in 1998 and amended in 2007.

9.2.4. NATIONAL POLICY

The following national policies are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

9.2.4.1. UK (Scotland and England)

- UK Marine Policy Statement (MPS) (HM Government, 2011); and
- UK Post 2010 Biodiversity Framework (HM Government, 2010)

9.2.4.2. Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015); and
- Scottish Planning Policy (Scottish Government, 2020).

9.2.4.3. England

- Biodiversity 2020 (HM Government, 2011);
- National Policy Statement (NPS) (HM Government, 2014); and
- North East Inshore and North East Offshore Marine Plan (HM Government, 2021); and
- East Inshore and East Offshore Marine Plan (HM Government, 2021).

9.2.5. GUIDANCE

The following guidance documents are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

- Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2, updated April 2022);
- Priority Marine Features (PMF) 2014 (Scottish waters only);
- Best practice guidance for fishing industry financial and economic impact assessments (UKFEN, 2012);
- Fishing and Submarine Cables – Working Together (ICPC, 2009);
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (JNCC and Natural England, 2019);
- Nature Conservation Considerations and Environmental Best Practice for subsea cable for English Inshore and UK Offshore Waters (Natural England and JNCC, 2022);
- Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014); and
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendation for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015).

9.3. STUDY AREA

The fish and shellfish ecology study area is defined by a 10 km radius around the Marine Scheme and the ICES Rectangles within which the Marine Scheme is located. These include ICES rectangles 41E8, 40E8, 40E9 and 39E8. ICES rectangles 39E9, 41E9, and 42E8 have also been considered as part of this fish and shellfish ecology study area given their close proximity to the Marine Scheme.

To ensure that a wider regional context is also considered, and to consider the mobile nature of fish and shellfish species, a 50 km buffer has been applied to the Marine Scheme to consider the possibility that migratory fish will directly interact with the Marine Scheme. This will help to account for migratory species, the availability of fish spawning and nursery grounds as well as other fish and shellfish species which may not directly be commercially important.

9.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the fish and shellfish ecology baseline include:

- Ellis *et al* (2012), Mapping the spawning and nursery grounds of selected fish for spatial spawning;
- Coull *et al* (1998), Fishery sensitivity maps in British waters;
- Aires *et al* (2014), Updating fisheries sensitivities maps in British waters;
- UK Government (2021), North East inshore and North East offshore marine plan;
- MMO (2016-2020), Landings data (value and weight) by species;
- The Marine Life Information Network (2022);
- National Biodiversity Network (NBN) Atlas (2015);
- Survey data / reports available through ICES, including International Herring Larvae Survey (IHLS) and the International Bottom Trawl Survey (IBTS) (North Sea);
- Marine Scotland (2018). Salmon Smolt Surveying on the Sunbeam;
- JNCC (2021), UK protected sites;
- International Union for Conservation of Nature (IUCN) (2021). The IUCN Red List of Threatened Species;
- Seagreen Wind Energy Limited (2020). SeaGreen Alpha and Bravo EIA;
- BBWF Offshore Scoping Report (SSE, 2021) (and the BBWF EIA Report once available);
- CIEEM (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal, and Marine;

- Langton *et al* (2021) A verified distribution model for the lesser sandeel (*Ammodytes marinus*);
- Burt *et al* (2006) A summary of demersal fish tagging data maintained and published by Cefas;
- MarLIN (2020). The Marine Life Information Network; and
- Fishbase (2022) FishBase with special emphasis on the fish of Europe.

The datasets and information sources as outlined above, with large-scale coverage are relevant for characterising the fish and shellfish ecology baseline. Fisheries landings datasets provide sufficient information, detail and coverage to characterise and describe the fish and shellfish baseline within the fish and shellfish ecology study area. Any previous monitoring from existing projects may also add to this information. Benthic surveys are being undertaken and the information provided from these will provide a further understanding of the habitat classifications within the study area.

Given that fish are highly mobile, both temporally and spatially, a site-specific survey only provides coverage of the species present in a particular area at a particular time. This has the potential to skew the baseline. Given the volume of existing data and the low value of site-specific data collection site-specific survey will not be undertaken for the Marine Scheme. Where appropriate, the conclusions drawn from the benthic subtidal and intertidal ecology habitat mapping (as outlined in section 8) will be used to inform the assessment of fish and shellfish ecology associated with the Marine Scheme.

9.5. BASELINE ENVIRONMENT

9.5.1. FISH AND SHELLFISH ASSEMBLAGE

Fish receptors relevant to the Marine Scheme within the fish and shellfish ecology study area include marine fish (pelagic and demersal), diadromous fish and elasmobranchs (skates and rays). Relevant shellfish receptors include crustaceans and molluscs. Commercial landings data have been used to describe the fish and shellfish assemblage. However, it is acknowledged that the extent of commercial landings is limited with regards to species composition, as landings will be influenced by the fishing methods used, seasonality, quotas and Total Allowable Catch (TAC) limits. To account for these limitations, ICES and CEFAS trawl survey data will also be reviewed for the EIA.

Table 9-1 below displays the average value (£) (2016 – 2020) of the top 15 commercially exploited species from the ICES rectangles that are relevant to the Marine Scheme (MMO, 2021a and 2021b). The most frequently caught fish in the fish and shellfish ecology study area include Norway Lobster (*Nephrops norvegicus*), Lobsters (*Homarus gammarus*), Crabs (*Cancer pagurus*), Scallops (*Pecten maximus*), Herring (*Clupea harengus*), Crabs – Velvet (*Necora puber*), Whiting (*Merlangius merlangus*), Halibut (*Hippoglossus hippoglossus*), Monk or Angler fish (*Lophius americanus*), Squid (*Teuthida*), Turbot (*Scophthalmus maximus*), Cod (*Gadus morhua*), Sandeels (*Ammodytes marinus*) (Only caught in ICES rectangle 40E9), Mackerel (*Scomber scombrus*), and Haddock (*Melanogrammus aeglefinus*).

Shellfish are protected under The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 Regulation 9, The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013, and The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc.) (Scotland) Regulations 2013. These shellfish waters are considered to be an important area, primarily these areas occur on the west coast of Scotland and England as well as the south of England. There is only one designated shellfish waters site which occurs within the fish and shellfish ecology study area, Holy Island (DEFRA 2022a; 2022b)

Table 9-1 Average Value (£) (2016-2020) of top 15 species from ICES rectangles within the fish and shellfish ecology study area

Species	39E8	39E9	40E8	40E9	41E8	41E9	42E8	Total
<i>Nephrops</i> (Norway Lobster)	4002202.4	1095834.99	508371.906	130402.2	30843.37	18679.61	13736.026	5800071
Lobsters	1596980.99	13315.448	2178208.12	203.694	424900.166	22950.15	125403.938	4361963
Scallops	79919.658	27339.148	259823.458	6335.302	449952.814	8959.786	1370627.132	2202957
Brown Crabs	603248.666	24719.944	883410.582	274.424	260795.618	10094.73	47685.406	1830229
Herring	383.344	45.564	2.3	207773.08	0	0	76.4	208280.7
Crabs – Velvet (Swim)	23299.306	46.036	79467.1384	395.702	13490	1472.16	9987.698	128158
Whiting	93221.9709	25998.686	4322.348	2163.594	168.338	1310.456	812.822	127998.2
Halibut	53348.5646	45257.706	4063.89171	1633.656	256.546	513.04	155.512	105228.9
Monks or Anglers	52429.2855	22255.3008	4546.082	1796.454	361.992	1224.642	1709.574	84323.33
Squid	42450.6326	9668.44828	3337.11585	1409.01	998.448	852.78	22405.568	81122

Species	39E8	39E9	40E8	40E9	41E8	41E9	42E8	Total
Haddock	8535.3209	52427.9391	1685.09859	4228.058	102.86	4517.98	1998.836	73496.09
Turbot	36138.5928	5236.09787	869.98	334.948	132.052	56.246	76.032	42843.95
Cod	28423.0254	5757.42	5548.68822	263.132	57.78	40.812	230.058	40320.92
Sandeels	0	0	0	22003.6	0	0	0	22003.6
Mackerel	14790.914	443.79	1709.476	132.288	141.246	53.91	4437.32	21708.94

9.5.2. DIADROMOUS SPECIES

There is the potential for diadromous fish species to migrate to and from Scottish and English rivers in the vicinity of the Marine Scheme and, therefore, they may migrate through the fish and shellfish ecology study area during certain periods of the year (SNH, 2017a and NBN Atlas, 2019).

The fish and shellfish ecology assessment for the Seagreen Alpha/Bravo OWF (this project lies within the fish and shellfish ecology Study Area) noted five migratory species considered to be present and of relevance: Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), and European eel (*Anguilla Anguilla*). The project noted that none of these species were recorded within the marine ecological surveys undertaken however due to the presence in the surrounding rivers and coastline it would be likely for these migratory species to be present within the surrounding area (Seagreen, 2018, 2020). Therefore, these species have also been considered within the fish and shellfish ecology study area for the Marine Scheme. Due to the potential impacts on the River Teith brook lamprey (*Lampetra planeri*) have also been included.

River SACs are assigned to protect salmon smolt migrations, there are four river SACs which are relevant to the Marine Scheme which include the River Tweed, River Teith, River Tay, and River South Esk. These relevant river SACs are detail in **Table 9-2** and Figure 9-1 below. Potential impacts from the cable installation activities and operation and maintenance will result in the River Tweed SAC being considered further within the ES and supporting HRA.

The fish and shellfish ecology study area considers a 50 km buffer area for migratory species to interact with the Marine Scheme. The River Teith, River Tay, and River South Esk fall further than 50 km however these have been included as the Marine Scheme falls within 50 km of the channel/firth which the species must travel through to reach the SAC. It is also worth noting that this will occur from species migrating from the south and south-east, species migrating from the north may avoid the study area overlap. Therefore, these river SAC's have been considered due to likely nature that the species will cross the Marine Scheme.

Table 9-2 Special protected river sites

Site Name	Distance from Study Area (km)	Primary Designation	Qualifying Features	Comments
River Tweed SAC	34	Atlantic Salmon	River lamprey, sea lamprey, and brook lamprey	The River Tweed is also a designated Special Site of Scientific Interest (SSSI), (JNCC 2017; SNH,2017).
River Teith SAC	100	River lamprey, sea lamprey, and brook lamprey	Atlantic salmon	The River Teith has been considered due to the Firth of Forth being used by migratory species, and it is likely that the species will cross over the fish and shellfish ecology study area.
River Tay SAC	90	Atlantic salmon	River lamprey, sea lamprey, and brook lamprey	The River Tay has been considered due to the Firth of Tay being used by migratory species, and it is likely that the species will cross over the fish and shellfish ecology study area.
River South Esk SAC	62	Atlantic salmon and freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	N/A	The River South Esk has been considered due to the channel to the river mouth being used by migratory species, and it is likely that the species will cross over the fish and shellfish ecology study area.

Atlantic salmon, European eel, lamprey Sp. And sea trout are species of conservation concern that are likely to be present in the fish and shellfish ecology study area at certain times of the year (Malcolm *et al.*, 2010). European eels typically undergo migration in autumn and will be more likely to be present in the study area then but may migrate at any point in the year. Sea trout will move to the open sea between late June to July and return in August and September and will likely be present in the study area between these times. Atlantic salmon migration routes will likely have the species pass through the study area between September to November. European eel, a critically endangered species on the IUCN Red List, spend most of their lives in freshwater, migrating to the sea to spawn. Sea trout (IUCN Red list

least concern) predominately are found in shallow coastal waters of the oceans and estuaries, except for when they have reached maturity when they migrate upstream to spawn (Malcolm *et al.*, 2010).

Migratory movements of Atlantic salmon in the Firth of Forth and North Sea are still not yet well known. The drivers of Atlantic salmon smolt migration are also still relatively unknown. Tagging studies indicate that migrations are primarily east-to-west and that homing salmon either travel in a direct migration to target rivers or via a more convoluted route, with some entering multiple rivers before selecting a final river to spawn (Malcolm *et al.*, 2015; Godfrey *et al.*, 2015;). Further tagging studies indicate that migrations are not solely driven by tidal currents, as was previously believed to be the case (Newton *et al.*, 2017).

No site-specific surveys are proposed to inform the impact assessment on migratory fish species. For the purposes of the impact assessment, it will be assumed that the aforementioned species are likely to be present within the fish and shellfish ecology study area, during key migration periods (e.g., adult migration to spawning rivers and smolt migration from natal rivers in the vicinity of the fish and shellfish ecology study area). To ensure that all the potential impacts are captured a worst-case scenario will be used. The assumed numbers will be derived from the relevant surrounding projects and most recent papers. With respect to the Seagreen Alpha and Bravo EIA the Marine Scheme being in a similar location will have similar migratory timings. Looking at the downstream migration for the five species of relevance the key migratory periods noted were April to May (Salmon), Spring (Sea Trout), late Spring (Eel), July to September (Sea and River Lamprey). The timings noted for upstream migration are all year with peaks late summer/early autumn (Salmon), April to June (Sea Trout), January to June (Eel), April to May (River Lamprey), and winter and spring (sea temperature lower than 10°C) (River Lamprey) (Seagreen, 2018, 2020).

With respect to migratory fish species, the aim of the impact assessment will be to determine whether construction, operation and maintenance or decommissioning activities have the potential to lead to disruption to migration, e.g., construction noise potentially creating an effective barrier to fish migration. The timing of fish migration will therefore be an important element of the baseline characterisation. The sources for an indication of migratory times for the relevant species include previous projects (Seagreen EIA), recent papers (e.g. Newton *et al.*, 2017; Gardiner *et al.*, 2018, Godfrey *et al.*, 2015; Malcolm *et al.*, 2010; Malcolm *et al.*, 2015), desktop data sources (rod catch data from rivers on the coast of Scotland and England [e.g. Tweed, Forth, Tay, Esk and Dee]) and Marine Scotland smolt survey data from the east coast of Scotland (Marine Scotland, 2018).

9.5.3. ELASMOBRANCHS

Elasmobranchs utilise EMF to help navigate and forage for food.. There is potential for several elasmobranch species to be present along the fish and shellfish ecology study area. These include common blue skate (*Dipturus batis*), spotted ray (*Raja montagui*), spurdog (*Squalus acanthias*), and tope shark (*Galeorhinus galeus*) (Ellis *et al.*, 2012, MarLIN, 2020). Some of these species are of conservation concern, the common skate is listed as Critically Endangered whilst the spurdog is listed as vulnerable on the IUCN Red List.

9.5.4. SPAWNING AND NURSERY GROUNDS

There are 17 species of fish that are of commercial and conservation importance that depend on the seabed either throughout, or at key stages, in their life-cycle: anglerfish, blue whiting (*Micromesistius poutassou*), cod, European hake (*Merluccius merluccius*), haddock, herring, lemon sole (*Microstomus kitt*), ling (*Molva molva*), mackerel, *Nephrops*, plaice (*Pleuronectes platessa*), sandeel, spotted ray, sprat (*Sprattus sprattus*), spurdog, tope shark, and whiting. These species all occur within the fish and shellfish ecology study area for at least one of the following key life cycles, spawning, or nursing (Aires *et al.* 2014; Ellis *et al.*, 2012). Furthermore, important shellfish species that are present within the fish and shellfish ecology study area include lobster (*Nephrops*) and Ocean Quahog (*Arctica islandica*). *Nephrops* inhabit burrows where their pre-larval offspring are incubated. The Ocean Quahog is a slow growing species and is a feature of conservation importance for Farnes East MCZ and Firth of Forth MPA both of which overlap with fish and shellfish ecology study area. These sites are discussed further in section 2.7 and displayed in Figure 6-3 and are important for spawning and nursing as Ocean Quahog is slow moving and slow growing (Marine Scotland, 2015; JNCC, 2021b).

Data from Coull *et al.*, (1998) and Ellis *et al.*, (2012) indicate that low intensity spawning grounds for cod, plaice, and whiting although overlap with the fish and shellfish ecology study area, as well as high and low intensity spawning grounds for Sandeel (Figure 9-2). It is also noted that part of the Marine Scheme overlaps with an area where sandeel and sea bass fishing is restricted shown in Figure 9-6. Coull *et al.*, (1998) indicate that there is potential for herring, sprat and *Nephrops* to undertake spawning in the vicinity of the Marine Scheme; however, the intensity of such spawning is currently undetermined.

The fish and shellfish ecology study area overlaps with the nursery grounds of anglerfish, blue whiting, European hake, ling, mackerel, plaice, sandeel, spotted ray, spurdog, and tope shark (Figure 9-3 and Figure 9-4).

Figure 9-5 shows the potential for aggregations of juvenile fish which are less than one year old (Aires *et al.*, 2014). Haddock have the highest potential for aggregation within the fish and shellfish ecology study area (probability values of 0.6 – 0.8) while sprat, whiting, cod, herring, and Norway pout all show probability values of between 0.2 – 0.4 for presence within the fish and shellfish ecology study area. Anglerfish, Hake, mackerel, sole, and plaice all show probability values of 0.05 – 0.2 within the fish and shellfish ecology study area. Blue whiting has the lowest probability of aggregates of juvenile fish below one year (probability values of 0.000001 – 0.05) within the fish and shellfish ecology study area.

9.5.5. DESIGNATED SITES AND PROTECTED SPECIES

The fish and shellfish ecology study area will directly interact with two designated sites for which fish and/or shellfish are a designated feature, these are the Farnes East MCZ and the Firth of Forth Banks Complex NCM. Further information on these two sites can be found within section 8.5.2. Fish and shellfish are also a qualifying feature of the North East of Farnes Deep MCZ, however given the intervening distance between the Marine Scheme and this designated site (approximately 13.7 km to the east) this site has been scoped out for further assessment (see section 2.7).

There is potential that diadromous species which utilise the River Tweed SAC, River Teith SAC, River Tay SAC, and River South Esk SAC, may cross the fish and shellfish ecology study area and may therefore be impacted by cable installation activities. These sites will therefore require further consideration within the ES and supporting HRA.

9.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- Placement of scour protection will be minimised as far as possible, however a level of protection may be required at certain locations;
- A CEMP will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan and an INNS management plan; and
- An Operational Environmental Management Plan (OEMP) will be developed and employed.

A full suite of designed in measures will be provided as part of the EIA.

9.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 9.4) and known fish and shellfish ecology sensitivities.

The scope of potential cumulative and transboundary impacts on fish and shellfish ecology receptors is discussed in section 9.8 and is summarised in Table 16-1.

Table 9-3 Scoping of potential impacts for fish and shellfish ecology receptors

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Temporary habitat and species disturbance or loss	Scoped-In	Seabed disturbance associated with construction and decommissioning works may negatively impact fish and shellfish species dependent on the seabed for some or all of their life cycle. Potential impacts on any spawning grounds associated with direct seabed disturbance during cable installation will be limited to the working corridor. Given the limited potential for significant fish spawning grounds along the offshore export cable route and the localised nature and small scale of direct seabed disturbance the potential for significant impacts to occur is unlikely.	Available desktop information to describe the baseline environment. Habitat maps and PSA results from the benthic habitat surveys to understand the potential suitability of the seabed within the fish and shellfish ecology study area and cod, whiting, and sandeel spawning	The area of impact will be calculated based on the extent of seabed footprint associated with the maximum design scenario. An assessment of potential cumulative and transboundary impacts on fish and shellfish ecology will be completed as part of the ES, in line with the process outlined in Section 4.
Temporary increases in suspended sediment concentrations (SSC) and associated sediment deposition and potential release of contaminants	Scoped-In	Increased sedimentation associated with construction and decommissioning works may lead to smothering of slow moving or sessile species (e.g. Ocean Quahog). Localised changes in sediment type which may also potentially impact seabed dependent species (e.g. herring spawn). While any potential impacts associated with increased SSC and the potential release of contaminants as a result of construction or decommissioning works are anticipated to be highly localised and temporary, it is considered that there are potential pathways with significant impacts on fish and shellfish receptors during construction and decommissioning of the offshore export cables and this impact is therefore scoped in.	Results from the baseline geophysical surveys (further detail in section 6.4) and benthic surveys (further detail in section 8.4). Benthic subtidal surveys within the area where the Marine Scheme overlaps with the BBWF array area were undertaken in 2021. The assessment of increased suspended sediment concentrations and associated deposition will be informed by the survey data relevant to the BBWF array area.	The principal method to be employed will be careful examination of the findings of the project specific geophysical surveys and benthic surveys (further detail in sections 6.4 and 8.4), as well as those undertaken for the BBWF array area. This will provide site specific information on seabed sediment characteristics and seabed dependent species.
Underwater noise	Scoped-Out	Fish species may exhibit behavioural responses when exposed to sound (Popper et	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		<p>al, 2019). Impacts from noise emitting activities typically impact species with swim bladders or other air sac alternatives making these species more susceptible to impacts. Additionally, whilst species may exhibit behavioural responses of avoidance eggs and larvae will be unable to perform this action (Popper et al, 2009). Whilst impacts may occur, they will be localised and temporary and unlikely to result in long-term impacts.</p> <p>Noise arising from vessels has the potential to result in behavioural responses. This has been seen from moving research vessels noting avoidance responses (De Robertis, and Handegard, 2013). Further studies were undertaken to determine the impacts from vessel noise, there is potential for anatomy injuries including damage to ears or swim bladders. There is also potential for physiology/stress injuries which can result in health and reproductive issues (Weilgart, 2018)</p> <p>Disturbance to fish populations caused by underwater noise generated during construction may negatively impact diadromous fish and fish spawning behaviour, particularly for sensitive species including cod, whiting, and sandeel (Popper et al, 2014) which all potentially spawn in the study area. However, given the limited number of vessels expected to be involved in any seabed preparation and cable installation activities and the short duration and localised nature of cable installation activities, the potential for significant impacts on fish is considered to be minimal.</p> <p>For the abovementioned reasons, it is considered that there is no potential pathway with significant impacts on fish and shellfish receptors during construction and decommissioning of the offshore export cables and this impact is therefore scoped out.</p>		
Accidental release of pollutants	Scoped-Out	<p>Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and can potentially have detrimental effects on fish and shellfish. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of the CEMP, including measures for compliance with international requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) convention, as well as best practice for works in the marine environment (e.g. preparation of Shipboard Oil Pollution Emergency Plans (SOPEP)). In this manner, accidental release of potential contaminants from construction vessels will be</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		strictly controlled and procedures will be in place to minimise the potential impact of any accidental release if it occurs, and hence the impact has been scoped out of the EIA.		
Pre-installation surveys including - Geophysical/ Geotechnical/ Archaeological surveys	Scoped-Out	<p>Fish species may exhibit behavioural responses when exposed to sound (Popper et al, 2019). Impacts from noise emitting activities typically impact species with swim bladders or other air sac alternatives making these species more susceptible to impacts. A source of noise relevant to the Marine Scheme which contributes to the potential injuries is noise produced from vessels as described in the underwater noise potential impact (De Robertis, and Handegard, 2013). Whilst species may exhibit behavioural responses of avoidance, eggs and larvae will be unable to perform this action (Popper et al, 2009). Whilst impacts may occur they will be localised and temporary and unlikely to result in long term impacts.</p> <p>For the abovementioned reasons, it is considered that there is no potential pathway with significant impacts on fish and shellfish receptors during construction and decommissioning of the offshore export cables and this impact is therefore scoped out of the EIA for the Marine Scheme.</p>	N/A	N/A
Operation and Maintenance				
EMF effects	Scoped-In	Subsea cables emit EMFs along their lengths, with high-voltage AC or DC export cables emitting the greatest EMFs EMF may impact sensitive species, including elasmobranchs, teleost fish (i.e. flat fish, salmonids and gadoids) and crustaceans by altering foraging or migratory behaviour (Hutchison et al., 2020). The magnitude of this impact will depend in part on the project design and the burial and cable protection measures which are utilised.	Available desktop information to describe the baseline environment.	<p>The assessment will consider the EMF emissions based on the maximum design scenario. It is acknowledged that there is limited, but emerging research on EMF impacts on fish and shellfish. The impact assessment will draw on the latest relevant available literature on this impact.</p> <p>An assessment of potential cumulative and transboundary impacts on fish and shellfish ecology will be completed as part of the ES, in line with the process outlined in section 4.</p>
Long-term habitat loss and disturbance	Scoped-In	Long-term habitat loss may occur as a result of the presence of cable protection as this may lead to a change in the seabed type, potentially altering spawning, nursery and feeding habitat. Species that are seabed dependent for some or all of their life cycle (e.g. sandeel and herring) are most sensitive to this impact.	<p>Available desktop information to describe the baseline environment.</p> <p>Habitat maps and PSA results from the benthic habitat surveys will be used to understand the potential suitability of the seabed at the site for cod, whiting, and sandeel spawning</p>	<p>The area of impact will be calculated based on the seabed footprint associated with the maximum design scenario.</p> <p>An assessment of potential cumulative and transboundary impacts on fish and shellfish ecology will be completed as</p>

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
part of the ES, in line with the process outlined in section 4.				
Thermal emissions from operational cables	Scoped-Out	Thermal emissions from cables increase the temperature of the surrounding sediments Taormina et al (2018) showed a maximum increase of 2.5°C 50 cm directly below the cable. Due to the project impacts from thermal emissions being highly localised and the offshore export cables being buried or protected, this impact has been scoped out for further consideration.	N/A	N/A
Accidental release of pollutants	Scoped-Out	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on fish and shellfish. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of the OEMP, including measures for compliance with international requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) convention, as well as best practice for works in the marine environment (e.g., preparation of Shipboard Oil Pollution Emergency Plans (SOPEP)). In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimise the potential impact of any accidental release if it occurs, and hence the impact has been scoped out of the EIA.	N/A	N/A

9.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on fish and shellfish ecology receptors. There is the potential for cumulative offshore fish and shellfish ecology impacts to occur during all phases of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is no potential for transboundary impacts on fish and shellfish ecology receptors to arise as a result of construction, operation and maintenance or decommissioning activities associated with the Marine Scheme. Any potential impacts associated with the Marine Scheme will be highly localised. Potential transboundary impacts will not be assessed further within the ES and are therefore proposed to be scoped out of the EIA for the Marine Scheme.

Table 16-1 summarised where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to fish and shellfish ecology.

9.9. PROPOSED EIA METHODOLOGY

The assessment of impacts for fish and shellfish ecology will be conducted in line with the process identified in Section 4, in line with standard industry guidance and the relevant legislation outlined in section 2. The available data to inform the fish and shellfish ecology baseline from a desk-based study is extensive and therefore there will be no requirement to obtain any further data via site-specific fish and shellfish ecology surveys. The fish and shellfish EIA will also adhere to guidance from CIEEM "Guidelines for ECIA in the UK and Ireland Terrestrial, Freshwater, Coastal, and Marine" (CIEEM, 2022).

Engagement with consultees will be an important source of information for the Marine Scheme. Engagement with local fishermen will continue (details on engagement undertaken so far is outlined in section 5) throughout the lifespan of the Marine Scheme (as outlined in section 12 Commercial Fisheries).

9.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the fish and shellfish ecology assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

10. OFFSHORE AND INTERTIDAL ORNITHOLOGY

10.1. INTRODUCTION

This section of the Scoping Report outlines the key sensitivities and potential impacts arising from the Marine Scheme on offshore and intertidal ornithology receptors and considers the potential impacts arising during construction, operation and maintenance and decommissioning phases. The offshore and intertidal ornithology receptors that are considered within this section include:

- Sites within the National Site Network which are of relevance to ornithology, including but not limited to;
 - Outer Firth of Forth and St Andrews Bay Complex SPA;
 - St Abb's Head to Fast Castle SPA;
 - Lindisfarne SPA;
 - Farne Islands SPA;
 - Northumbria Coast SPA;
 - Coquet Island SPA; and
 - Northumberland Marine SPA
- Key seabird species; and
- Terrestrial migratory birds.

The UK is internationally important for breeding seabird populations and wintering waterfowl and wader populations. Species of birds in the UK have protection under national and international legislation, including through the Wildlife and Countryside Act (1981) and the European Union Wild Birds Directive (Directive 2009/147/EC).

This section of the Scoping Report should be read alongside section 8 Benthic Subtidal and Intertidal Ecology and section 9 Fish and Shellfish Ecology, and section 6 Terrestrial Ecology and section 7 Ornithology of the Onshore Scheme Scoping Report.

10.2. LEGISLATION, POLICY AND GUIDANCE

This section outlines legislation, policy, and guidance relevant to the appraisal of the potential effects on offshore and intertidal ornithological receptors associated with installation, operation and maintenance, and decommissioning phases of the Marine Scheme.

10.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of ornithological receptors across the Marine Scheme:

- The Council Directive 92/43/EEC (the Habitats Directive); and
- The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive).

10.2.2. NATIONAL LEGISLATION

The national international legislations are considered relevant to the assessment of ornithological receptors across the Marine Scheme:

10.2.2.1. UK (England and Scotland)

- Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009);
- Wildlife and Countryside Act 1981 (HM Government, 1981);
- The Marine Strategy Regulations 2010 (HM Government, 2010);
- The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2017 (HM Government, 2017);

10.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Scottish Statutory Instrument 2011 No. 209 (HMSO, 2009), as amended;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (Scottish Government, 1994) (as amended);
- The Conservation of Habitats and Species (EU Exit) (Scotland) (Amendment) Regulations 2019; and
- Nature Conservation (Scotland) Act 2004 (Scottish Government, 2004).

10.2.2.3. England

- The Conservation of Habitats and Species Regulations 2017 (HM Government, 2017) (as amended);
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- The Natural Environment and Rural Communities Act (HM Government, 2006); and
- The Countryside and Rights of Way (CROW) Act 2000 (HM Government, 2000) (as amended).

10.2.3. NATIONAL POLICY

The following national and devolved policies concerning the preservation of ornithological receptors during the planning and execution of projects such as offshore cable development in UK waters:

10.2.3.1. UK (England and Scotland)

- UK Marine Policy Statement (MPS) (HM Government, 2011); and
- UK Post 2010 Biodiversity Framework (HM Government, 2010).

10.2.3.2. Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015); and
- Scottish Planning Policy (Scottish Government, 2020).

10.2.3.3. England

- Biodiversity 2020 (HM Government, 2011);
- National Planning Framework 2 (HM Government, 2012);
- National Policy Statements (NPS) (HM Government, 2014);
- North East Inshore and North East Offshore Marine Plan (HM Government, 2021); and
- East Inshore and East Offshore Marine Plan (HM Government, 2021).

10.2.4. GUIDANCE

Best practice guidelines regarding offshore projects' impact on the maritime ornithological receptors. Although no specific guidance has been developed for offshore cables, the following existing guidance should be noted:

- Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2, updated April 2022); and
- Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020).

Noting that the Marine Scheme does not relate to any generation assets, aspects of the following guidance will be considered where appropriate:

- Developing guidance on ornithological cumulative impact assessment for offshore wind farm developers (King et al, 2009);
- Vulnerability of Seabirds to offshore wind farms (Furness et al, 2013; Wade et al, 2016);
- Vulnerability of Seabirds to offshore wind farms (Bradbury et al, 2014); and
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (JNCC and Natural England, 2019);
- Nature Conservation Considerations and Environmental Best Practice for subsea cable for English Inshore and UK Offshore Waters (Natural England and JNCC, 2022); and
- Highly Pathogenic Avian Influenza (HPAI) outbreak in seabirds and Natural England advice on impact assessment (specifically relating to offshore wind) (Natural England, 2022).

10.3. STUDY AREA

For the purpose of this Scoping Report, the study area considers a number of spatial elements, including:

- In recognition of the highly mobile and wide-ranging nature of seabirds, and to consider the potential impacts of activities associated with the Marine Scheme on wider seabird populations, the study area for the assessment of offshore and intertidal ornithology is the scoping area plus a 10 km buffer. A 10 km buffer is considered appropriate to the size and nature of the Marine Scheme, based on professional judgement and experience of similar developments.
- Selected consideration is given to designated sites and species outside of this study area in recognition of the often extensive foraging ranges (for example) of some seabird species to be considered as part of the offshore and intertidal ornithology assessment include, but are not limited to, the:
 - Outer Firth of Forth and St Andrews Bay Complex SPA;
 - St Abb's Head to Fast Castle SPA;
 - Lindisfarne SPA;
 - Farne Islands SPA;
 - Northumbria Coast SPA;
 - Coquet Island SPA; and
 - Northumberland Marine SPA.

A 100 km search area has been used for this search of designated sites. While it is acknowledged that some species may forage beyond 100 km and therefore there is potential for connectivity with sites beyond 100 km, potential impacts from the Marine Scheme are unlikely to be significant at this range and therefore a 100 km search area is considered proportionate.

The offshore and intertidal ornithology study area encompasses the offshore marine, inshore marine and intertidal areas and will be considered as part of the EIA and HRA. The offshore ornithology study area also considers the concept of functional linkage (this relates to the role or function which land or watercourses located outside of the boundaries of a National Site Network site fulfil in terms of supporting the particular species for which the site was designated). In practical terms for the Cambois Connection, this means that the areas adjacent to the Marine Scheme will require consideration as part of the EIA and supporting HRA. This is also adequately captured within the ornithology study area, which considers land adjacent to the landfall which (for example) may support populations of birds in the area.

10.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the ornithology baseline include:

- BirdLife International. (2014) 2006-2014. BirdLife International Seabird Tracking Database;
- NatureScot (2022). SiteLink;
- Natural England (2022). Designated Sites View;
- British Trust for Ornithology (BTO) (2022). Seabird Monitoring Programme;

- Furness (2015). Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, Number 164;
- Woodward *et al.* (2019). Desk-based revision of seabird foraging ranges used for HRA screening;
- Cleasby *et al.* (2018). Combining habitat modelling and hotspot analysis to reveal the location of high-density seabird areas across the UK;
- Kober *et al.* (2012). The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1 – 1.4 of the SPA selection guidelines;
- Kober *et al.* (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs;
- Dean *et al.* (2003). Aerial surveys of UK inshore areas for wintering seaduck, divers and grebes: 2000/01 and 2001/02;
- Frost *et al.* (2018). Waterbirds in the UK 2016/17: The Wetland Bird Survey;
- Söhle *et al.* (2006). Surveillance of wintering seaducks, divers and grebes in UK inshore areas: Aerial surveys and shore based counts 2005/06;
- Stone *et al.* (1995). An atlas of seabird distribution in north-west European waters;
- JNCC (2022). SPAs with marine components;
- RSPB. (2015). Future of the Atlantic Marine Environment (FAME) & Seabird Tracking and Research (STAR) seabird (kittiwakes, guillemots, razorbills and shags) tracking projects; and
- Berwick Bank DAS baseline bird surveys (2021). Completed between 2020-2021. Covers a small section of the cable corridor at the northern end, and will help with characterisation of the sites;
- National WeBS Database, 2015-2020;
- Seagreen Alpha and Bravo Offshore Wind Farms Environmental Statement Addendum and associated technical reports;
- Wernham *et al.* (2002). The migration Atlas Movements of the Birds of Britain and Ireland;
- Mitchell *et al.* (2004). Seabird 2000 National Seabird Census Project;
- UK – Norway Electricity Interconnector (NSN Link) Winter and Breeding Bird Survey 2012 to 2014;
- SKM Enviro (2011) Blyth–Cambois Wader Study – Final Report July 2011; and
- Baseline non-breeding (overwintering) coastal bird survey which the Applicant has commissioned for 2022/2023 winter.

The Applicant is in the process of undertaking overwintering surveys. They shall be focused on the Cambois coastline, and adjacent landmass / nearshore-sightings, as agreed with Natural England (see Table 5-1 in section 5). The findings of the site specific overwintering bird surveys, supplements with the findings of the BBWF EIA will inform the Marine Scheme EIA.

10.5. BASELINE ENVIRONMENT

Bird species are highly mobile and wide-ranging throughout the marine environments of the UK and Europe.

10.5.1. SPECIES OF POTENTIAL INTEREST

For the purposes of summarising the baseline ornithological interests, the offshore and intertidal ornithology study areas is considered in three sections: (1) a large truly offshore section beyond the 12 NM limit across both Scottish and English waters; (2) a relatively small section at the southern end where the route traverses inshore waters as it approaches the Cambois coastline; and (3) a very small nearshore and intertidal section at the proposed landfall location. The baseline ornithological characteristics of each of these sections is summarised below. The account below is based on information drawn from multiple sources, in particular the following publications: Wernham *et al.*, 2002; Kober *et al.*, 2010; Balmer *et al.*, 2013; and Mitchell *et al.*, 2004.

10.5.1.1. Offshore waters (beyond 12 NM)

The northernmost extent of the offshore and intertidal ornithology study area (approximately 100 km in length) lies between 20 and 50 km off the coast of Northumberland and has seabed depths in excess of 40 m. From an ornithological perspective, this part of the offshore and intertidal ornithology study area is truly offshore in character. This area is only likely to be used by seabird species that forage in offshore waters. In the breeding season these offshore seabirds will mainly comprise the species which breed in the region (namely fulmar (*Fulmarus glacialis*), gannet (*Morus bassanus*), kittiwake (*Rissa tridactyla*), common guillemot (*Uria aalge*), razorbill (*Alca torda*) and puffin (*Fratercula arctica*)). These species all have large foraging distances, commonly travelling up to at least 100 km from colonies to offshore foraging grounds. Smaller numbers of herring gull, lesser black-backed gull and great black-backed gull may also occur across the offshore and intertidal ornithology study area, but these three species mostly forage closer to the coast (generally <40 km from the colony (BirdLife, 2022)). The individuals of all the species using the offshore section of the offshore and intertidal ornithology study area in the breeding season may be associated with colonies along the coast of north-east England and south east Scotland, in particular the large seabird colonies located on islands in the Firth of Forth (e.g., Isle of May and Bass Rock), the colonies at St. Abb's Head to East Castle. All of these colonies are designated as SPAs for their breeding seabird interests.

Outside the breeding season the offshore section of the offshore and intertidal ornithology study area will be used by the same species as in the summer, however many of the individuals are likely to originate from colonies further afield, including further north in Scotland and Scandinavia. A number of other offshore seabird species that do not breed in the region (or do so only rarely and in very small numbers) are likely to use the offshore section of the Marine Scheme during migration times. For example, little gull (*Hydrocoloeus minutus*), Manx shearwater (*Puffinus puffinus*), storm petrel (*Hydrobates pelagicus*) and great skua (*Stercorarius skua*). Small numbers of little auks (*Alle alle*), a visitor from Arctic breeding grounds, are likely use the offshore section of the Marine Scheme in winter.

Importantly, the offshore section of the offshore and intertidal ornithology study area lies too far from the coast and is too deep to provide suitable foraging habitat for inshore marine birds such as tern species, shag (*Gulosus aristotelis*), cormorant (*Phalacrocorax carbo*), seaduck species and diver species. The offshore section of the Marine Scheme will be overflown by large numbers of a very wide range of migrating terrestrial birds including passerines, waders and wildfowl species.

10.5.1.2. Inshore waters section

The section of the offshore and intertidal ornithology study area lies within approximately 20 km of the Northumbrian coastline and is relatively shallow (mostly it has a seabed depth of between approximately 10 and 30 m). This section will be used by all the same seabird species that use the offshore section discussed above, and in addition by a range of species that specialise in using coastal waters. In the breeding season these additional species potentially include the five tern species that

breed along the coasts and islands of Northumberland and south-east Scotland (Arctic (*Sterna paradisaea*), common (*Sterna hirundo*), little (*Sternula albifrons*), Sandwich (*Sterna sandvicensis*) and roseate (*Sterna dougallii*)) mostly at designated sites, in particular Coquet Island. These tern species are all summer visitors and will therefore not be present outside the breeding season. The inshore section of the cable route, especially within approximately 3 km of the coast, is likely to be used by small numbers of common eider (a species of seaduck), shag and cormorant throughout the year and by small numbers of other seaduck species and diver species in the winter months. The common eider, which is likely to be present within the inshore part of the offshore ornithology study area, will have connectivity with Berwick to St Mary's MCZ.

10.5.1.3. Intertidal section

The proposed cable landfall location and its nearby vicinity is a beach habitat comprising a mixture of intertidal sands, shingle and rocks. These habitats are used by a variety of non-breeding (wintering and passage migrant) wader species for feeding and roosting. These include visitors from Arctic and sub-Arctic breeding grounds such as turnstone, dunlin, sanderling, [Redacted] and bar-tailed godwit, and birds from UK breeding grounds such as ringed plover, oystercatcher and curlew. Ringed plover and oystercatcher have the potential to breed on beach habitat locally in small numbers. The beach habitats at the proposed landfall location are also likely to be used by several non-breeding gull species for feeding and roosting, including herring gull, common gull and black-headed gull.

The turnstone and [Redacted] that overwinter along this stretch of coast are a feature of qualifying interest of the Northumbria Coast SPA.

10.5.2. DESIGNATED SITES

The offshore ornithology and intertidal study area overlaps four sites designated for the conservation and protection of seabirds, inshore wintering waterbirds and waders. In addition, a number of designated sites have been identified as having potential connectivity to the offshore ornithology study area. All designated sites are presented within Table 10-1. As detailed in section 10.3 above, a 100 km search area has been used.

The coastal foraging areas of species associated with the Lindisfarne SPA, Farne Islands SPA and Coquet Island SPA are protected by the Northumberland Coast SPA.

The Outer Firth of Forth and St Andrews Bay Complex SPA is, to a larger extent, designated to protect the feeding grounds of the various species nesting on Forth Islands SPA and St Abb's Head to Fast Castle SPA.

Table 10-1 Theoretical potential connectivity for seabird and waterfowl qualifying species between the Marine Scheme and designated sites within 100 km

Designated Site	Closest proximity to Marine Scheme Scoping Boundary	Qualifying Features
Outer Firth of Forth and St Andrews Bay Complex (Scotland)	Approximately 2 km	<p>Non-breeding waterfowl</p> <ul style="list-style-type: none"> Red-throated diver <i>Gavia stellata</i> (5% of the GB population) Slavonian grebe <i>Podiceps auratus</i> (2.7% of the GB population) Common eider <i>Somateria mollissima</i> (35.9% of the GB population) Long-tailed duck <i>Clangula hyemalis</i> (17.7% of the GB population) Common scoter <i>Melanitta nigra</i> (4.7% of the GB population) Velvet scoter <i>Melanitta fusca</i> (23.2% of the GB population) Common goldeneye <i>Bucephala clangula</i> (2.9% of the GB population) Red-breasted merganser <i>Mergus serrator</i> (5.1% of the GB population) Waterfowl assemblage of more than 20,000 seabirds in any season (Article 4.2) <p>Breeding and Non-breeding seabirds</p> <ul style="list-style-type: none"> Common tern <i>Sterna hirundo</i> (8.8% of the GB population; breeding) Arctic tern <i>Sterna paradisaea</i> (1% of the GB population; breeding) European shag <i>Phalacrocorax aristotelis</i> (4.6% / 2.2% of the GB population; breeding / non-breeding) Northern gannet <i>Morus bassanus</i> (2.5% of the GB population; breeding) Atlantic puffin <i>Fratercula arctica</i> (5.3% of the GB population; breeding) Black-legged kittiwake <i>Rissa tridactyla</i> (1.6% of the GB population; breeding / non-breeding) Manx shearwater <i>Puffinus puffinus</i> (present during breeding season, but not breeding) Common guillemot <i>Uria aalge</i> (NA) Razorbill <i>Alca torda</i> (NA) Herring gull <i>Larus argentatus</i> (1.7% of the GB population) Little gull <i>Larus minutus</i> (NA) Black-headed gull <i>Chroicocephalus ridibundus</i> (1.2% of the GB population) Common gull <i>Larus canus</i> (2.1% of the GB population) Seabird assemblage of more than 20,000 seabirds in the breeding season (Article 4.2) Seabird assemblage of more than 20,000 seabirds in the non-breeding season (Article 4.2)

Designated Site	Closest proximity to Marine Scheme Scoping Boundary	Qualifying Features
St Abb's Head to Fast Castle SPA (including marine extension) (Scotland)	Approximately 40 km	<p>Breeding</p> <ul style="list-style-type: none"> Razorbill <i>Alca torda</i> (1% of the GB population) Common guillemot <i>Uria aalge</i> (3% of the GB population) Black-legged kittiwake <i>Rissa tridactyla</i> (4% of the GB population) Herring gull <i>Larus argentatus</i> (0.7% of the GB population) European shag <i>Phalacrocorax aristotelis</i> (1% of the GB population) Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)
Forth Islands SPA (Scotland)	Approximately 38 km	<p>Breeding</p> <ul style="list-style-type: none"> Arctic tern <i>Sterna paradisaea</i> (1.2% of the GB population); [Redacted] Common tern <i>Sterna hirundo</i> (3% of the GB population); Atlantic puffin <i>Fratercula arctica</i>; Common guillemot <i>Uria aalge</i>; Great cormorant <i>Phalacrocorax carbo</i>; Northern gannet <i>Morus bassanus</i>; and Razorbill <i>Alca torda</i>.
Lindisfarne SPA / Ramsar site (England)	Approximately 40 km	<p>Non-breeding</p> <ul style="list-style-type: none"> Bar-tailed godwit <i>Limosa lapponica</i> (12% of the GB population) Common scoter <i>Melanitta nigra</i> (2% of the GB population) Dunlin <i>Calidris alpina alpina</i> (2% of the GB population) Eider <i>Somateria mollissima</i> (5% of the GB population)
Farne Islands SPA (England)	Approximately 28 km (distance between the Marine Scheme and the Knivestone, the closest Island)	<p>Breeding</p> <ul style="list-style-type: none"> Arctic tern <i>Sterna paradisaea</i> (NA) Common tern <i>Sterna hirundo</i> (NA) Guillemot <i>Uria aalge</i> (NA) [Redacted] Sandwich tern <i>Sterna sandvicensis</i> (NA) Herring gull <i>Larus argentatus</i> (NA) Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)
Coquet Island SPA (England)	Approximately 15 km	<p>Breeding</p> <ul style="list-style-type: none"> Arctic tern <i>Sterna paradisaea</i> (NA) Common tern <i>Sterna hirundo</i> (NA) [Redacted] Sandwich tern <i>Strena sandvicensis</i> (NA) Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)
Northumberland Marine SPA (England)	0 km	<p>Breeding</p> <ul style="list-style-type: none"> Arctic tern <i>Sterna paradisaea</i> (9% of the breeding GB population) Common tern <i>Sterna hirundo</i> (12.9% of the GB population) Guillemot <i>Uria aalge</i> (1.7% of the GB population) [Redacted] Atlantic puffin <i>Fratercula arctica</i> (1.1% of the GB population) [Redacted] Sandwich tern <i>Sterna sandvicensis</i> (19.7% of the GB population) Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)
Northumbria Coast SPA / Ramsar site (England)	0 km	<p>Breeding</p> <ul style="list-style-type: none"> Arctic tern <i>Sterna paradisaea</i> (2.9% of the GB population) Little tern <i>Sterna albigrons</i> (1.7% of the GB population) <p>Non-breeding</p> <ul style="list-style-type: none"> [Redacted]

Designated Site	Closest proximity to Marine Scheme Scoping Boundary	Qualifying Features
		<ul style="list-style-type: none"> Turnstone <i>Arenaria interpres</i> (2.6% of the biogeographic population)
Northumberland Shore SSSI	0 km	Shore birds <ul style="list-style-type: none"> [Redacted] Turnstone (regularly over 1300), Sanderling <i>Calidris alba</i> (1.6% of the GB population), Golden plover <i>Pluvialis apricaria</i> (3,500; 1.8% of the GB population), Ringed plover <i>Charadrius hiaticula</i> (37; 1.6% of the GB population); and Redshank <i>Tringa totanus</i> (1.5%).
Berwick to St Mary's MCZ	0 km	Breeding and non-breeding <ul style="list-style-type: none"> Common eider <i>Somateria mollissima</i>

10.6. DESIGNED IN MEASURES

At this scoping stage of the Marine Scheme, full details of topic-specific designed in measures have not been developed. However measures which the Applicant is committed to considering and applying to the Marine Scheme include:

- A CEMP will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan and an INNS management plan;
- An Operational Environmental Management Plan (OEMP) will be developed and employed;
- Vessel Management Plan will confirm the types and numbers of vessels that will be engaged on the Marine Scheme and consider vessel coordination including indicative transit route planning;
- Compliance with MARPOL regulations and best-practise protocols to prevent and manage incidents of accidental release of marine contaminant; and
- An Ecological Clerk of Works (ECOW) will be employed during landfall works.

Full details of designed in measures to safeguard ornithology interests will be described in the marine licence application and EIA.

10.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 10.4), and the understanding of the local offshore and intertidal ornithology sensitivities.

There is an increasing knowledge base of how birds respond to activities in the marine environment. Whilst appreciating that the Marine Scheme does not include generation assets, the main sources of information for assessment the potential impacts on birds are outlined in section 10.4. There are large between-species differences in vulnerability to potential effects.

Based on the published literature and Natural England Advice on Operations the following potential impacts on birds are identified:

- Visual disturbance/displacement from vessel activity and presence of infrastructure associated with the Marine Scheme;
- Disturbance from construction noise and lighting;
- Seabed habitat loss/change and the effects this has on prey species
- Indirect effects on prey species; and
- Accidental release of contaminants.

Additional information is presented on these potential effects in Table 10-2, together with rationale as to whether they will be scoped-in of scoped-out for detailed assessment in the ES.

The potential impacts for offshore and intertidal ornithology receptors are summarised in Table 10-2 below. The scope of potential cumulative and transboundary impacts on offshore and intertidal ornithology receptors is discussed in section 10.8 and is summarised in section 16.

Table 10-2 Scoping of potential impacts for ornithology receptors

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Disturbance and displacement as a result of construction and decommissioning activities	Scoped-In	There is the potential for temporary disturbance to bird species using marine and intertidal habitats during the construction and	The assessment will be informed by the data sources listed in section 10.4, stakeholder responses and	A semi-qualitative, evidence-based assessment will be undertaken to

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		decommissioning phases of the Marine Scheme relating to vessels and associated infrastructure present within the marine environment. Further assessment will be required to conclude the impact of significance.	planned surveys of overwintering birds in the vicinity of the landfall. The Applicant is in the process of developing a suite of overwintering surveys for completion in 2022/2023. They shall be focused on the Cambois coastline, and adjacent landmass / nearshore-sightings, as agreed with Natural England (see Table 5-1 in section 5).	consider impacts and identify any required mitigation. The EIA will assess disturbance and displacement impacts on ornithological receptors following the methodology outlined in section 10.9. Any emerging guidance will be reviewed and applied as appropriate to the assessment. An HRA RIAA will be undertaken to assess the effects on the SPAs, and an MCZ assessment will be undertaken to consider impacts on common eider due to potential connectivity with the Berwick to St Mary's MCZ.
Disturbance to prey species and habitats of prey species, including through SSC / disturbance of contaminant as well as localised deterioration of water quality.	Scoped-In	Disturbance to the distribution of prey species may cause displacement effects up the food chain, resulting in reduced energy intake for prey species affecting productively or survival in the long term. Impacts to prey species will be highly localised and since there is an abundance along the route, no significant impacts are anticipated. Nonetheless, the ES will consider the significance of this impact.	The assessment will be informed by the information outlined in section 8 and the outcomes of the Fish and Shellfish Ecology assessment and the outputs from the contaminant analysis of benthic surveys.	A semi-qualitative, evidence-based assessment will be undertaken to consider impacts and identify any required mitigation. The EIA will assess disturbance and displacement impacts on ornithological receptors following the methodology outlined in section 10.9. Any emerging guidance will be reviewed and applied as appropriate to the assessment. An HRA RIAA will be undertaken to assess the effects on the SPAs, and an MCZ assessment will be undertaken to consider impacts on common eider due to potential connectivity with the Berwick to St Mary's MCZ.
Accidental release of contaminants	Scoped-Out	<p>The accidental release of pollutants is limited to oil and fluid emissions associated with any Project vessels. The potential release of contaminates as a result of construction and decommissioning works are anticipated to be highly localised and temporary. Designed in measures, such as Environmental Management Plans including Marine Pollution Contingency Plans and adherence to MARPOL guidance, will ensure that measures are adopted to ensure that the potential for accidental release of contaminants is minimised.</p> <p>The potential for impacts resulting from the accidental release of pollutants is covered by non-EIA legislation which mitigates against any potential impacts to benthic subtidal and intertidal ecology receptors. For this reason, any potential pathways resulting from the construction of the offshore export cables will not generate significant impacts to offshore and intertidal ornithology receptors.</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Operation and Maintenance				
Disturbance and displacement of seabirds from the Marine Scheme	Scoped-Out	During the operation and maintenance phase of there is no potential risk of displacement of seabirds throughout the Marine Scheme as all structures in place will be subsurface. There are not anticipated to be any potential impacts associated with project specific vessels used during maintenance works, any impact would be temporary and not significant.	N/A	N/A
Accidental release of contaminants	Scoped -out	<p>The accidental release of pollutants is limited to oil and fluid emissions associated with any Project vessels. The potential release of contaminants as a result of maintenance works are anticipated to be highly localised and temporary. Designed in measures, such as Environmental Management Plans including Marine Pollution Contingency Plans and adherence to MARPOL guidance, will ensure that measures are adopted to ensure that the potential for accidental release of contaminants is minimised.</p> <p>The potential for impacts resulting from the accidental release of pollutants is covered by non-EIA legislation which mitigates against any potential impacts to benthic subtidal and intertidal ecology receptors. For this reason, any potential pathways resulting from the construction of the offshore export cables will not generate significant impacts to offshore and intertidal ornithology receptors.</p>	N/A	N/A

10.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on offshore and intertidal ecology receptors. There is the potential for cumulative offshore and intertidal ornithology impacts to occur during the installation phase of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is potential for birds to move across a variety of national and international boundaries for different groups of birds in different seasons. Existing published information on seabird foraging behaviour, based on foraging range (e.g. Woodward *et al.*, 2019) will be used to determine transboundary connectivity in the breeding season. However, as any works associated with the construction, operation and maintenance and decommissioning of the Marine Scheme are anticipated to result in temporary, highly localised potential impacts, the potential for transboundary impacts, are, in turn, anticipated to be temporary and highly localised.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to offshore and intertidal ornithology.

10.9. PROPOSED EIA METHODOLOGY

Within the EIA, key seabird species will be assessed in relation to their seasonal use of the marine environment and their potential connectivity with the ornithology study area. For seabird species, this will be informed by desk-based data sources only. For birds using intertidal habitat and inshore waters the assessment will also use baseline information from the overwintering bird survey currently being undertaken, in line with consultation with Natural England. These surveys will focus on the Marine Scheme landfall area at Cambois, considering an area of 500 m either side along the foreshore, covering a range of times of day and tidal states. To consider the distribution of eider and other waterbirds, a stretch of 1 km from the nearshore will also be assessed. Birds identified along the foreshore and nearshore coastal waters will be counted and assigned to distance bands and plotted on to a field map using standard BTO species codes. The observations of this survey will consider the number and nature of species within an area. As agreed with Natural England, these surveys will not consider the marine portion of the cable route due to the nature of cable installation activities and the associated limited potential for disturbance to offshore and intertidal ornithology features. The assessment of impacts on ornithology receptors will follow best practice methods and guidance (e.g., CIEEM, 2022) and relevant legislation (section 2). The assessment will consider the potential effects scoped-in in Section 4 Scoping of Potential Impacts. A semi-quantitative, evidence-based assessment will be undertaken to consider impacts and identify any required mitigation. An HRA and MCZ assessment (for eider) will be undertaken, in line with the principles set out in section 4 and in consideration of key designated sites, as discussed above.

For each offshore and intertidal bird species requiring further assessment within the EIA, their importance and potential connectivity with the Marine Scheme will be determined by the following factors:

- Features of designated sites;
- National biodiversity lists;
- UK BAP list; and
- Red listed, rare and legally protected species.

The subsequent impact assessment will include:

- Identifying the nature of and characterising impacts and considering their potential effect on seabird populations;
- Incorporating mitigation measures for these potential impacts;
- Assessing the significance of any residual effects after mitigation measures have been put in place;
- Identifying the appropriate mitigation measures for these residual effects; and
- Identifying any potential opportunities for ecological enhancement as a result of activities associated with the Marine Scheme.

The assessment of offshore and intertidal ornithology receptors as part of the EIA will consider the specific legislation, policy and guidance documents outlined in section 10.2.

10.10. SCOPING QUESTIONS FOR CONSULTATION

- Do you agree with the study area defined for the offshore and intertidal ornithology assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping in of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?
- Do you agree with the proposed scope of wintering bird surveys to inform the offshore and intertidal ornithology EIA assessment?

11. MARINE MAMMALS AND OTHER MEGAFUNA

11.1. INTRODUCTION

This section of the Scoping Report identifies marine mammal and other megafauna receptors of relevance to the Marine Scheme and considers the potential impacts from the construction, operation and maintenance and decommissioning phases.

This section of the Scoping Report should be read alongside section 6 Offshore Physical Environment and Seabed Conditions, section 8 Benthic Subtidal & Intertidal Ecology, section 9 Fish and Shellfish Ecology, and section 12 Commercial Fisheries.

The marine mammals and other megafauna considered in this section are highly mobile, and sometimes migratory, species which occupy the coastal and North Sea waters of Scotland and England.

11.2. LEGISLATION, POLICY AND GUIDANCE

This section outlines the relevant legislation, policy and guidance for the appraisal of the potential impacts of the Marine Scheme on marine mammals and other megafauna receptors associated with the construction, operation and maintenance and decommissioning phases of the development. For further information on legislative context, refer to section 2.

11.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of marine mammal and other megafauna ecology receptors across the Marine Scheme:

- The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas 1992 (ASCOBANS) (UNEP, 1992); and
- European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora adopted in 1992

11.2.2. NATIONAL LEGISLATION

The following national legislations are considered relevant to the assessment of marine mammal and other megafauna ecology receptors across the Marine Scheme:

11.2.2.1. UK (England and Scotland)

- Wildlife and Countryside Act 1981 (HM Government, 1981);
- The Conservation of Habitats and Species Regulations 2017 (HM Government, 2017) (as amended); and
- The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2017 (HM Government, 2017).

11.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Amendment Order 2014 (as amended);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Scottish Statutory Instrument 2011 No. 209 (HMSO, 2009), as amended;
- The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (Scottish Government, 1994) (as amended); and
- Nature Conservation (Scotland) Act 2004 (Scottish Government, 2004).

11.2.2.3. England

- The Conservation of Habitats and Species (Amendment) (Eu Exit) Regulations 2019;
- Conservation of Seals (England) Order 1999;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended);
- The Conservation of Seals Act 1970 (UK Government, 1970); and
- Natural Environment and Rural Communities Act (HM Government, 2006).

11.2.3. INTERNATIONAL POLICY

The following international policies are considered relevant to the assessment of marine mammal and other megafauna ecology receptors across the Marine Scheme:

- Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') adopted in 1998 and amended in 2007.

11.2.4. NATIONAL POLICY

The following national policies are considered relevant to the assessment of marine mammal and other megafauna ecology receptors across the Marine Scheme:

11.2.4.1. UK (Scotland and England)

- UK Marine Policy Statement (MPS) (HM Government, 2011); and
- UK Post 2010 Biodiversity Framework (HM Government, 2010).

11.2.4.2. Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015); and
- Scottish Planning Policy (Scottish Government, 2020).

11.2.4.3. England

- Biodiversity 2020 (HM Government, 2011);
- National Policy Statement (NPS) (HM Government, 2014);
- North East Inshore and North East Offshore Marine Plan (HM Government, 2021); and
- East Inshore and East Offshore Marine Plan (HM Government, 2021).

11.2.5. GUIDANCE

The following guidance documents are considered relevant to the assessment of marine mammal and other megafauna ecology receptors across the Marine Scheme:

- Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2, updated April 2022);
- Priority Marine Features (PMF) 2014 (Scottish waters only);
- Joint Nature Conservation Committee (JNCC) guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017);
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (JNCC and Natural England, 2019);
- Nature Conservation Considerations and Environmental Best Practice for subsea cable for English Inshore and UK Offshore Waters (Natural England and JNCC, 2022);
- The Protection of Marine EPS from Injury and Disturbance for the marine Area in Scottish Inshore Waters (Scottish Government and Scottish Natural Heritage (NatureScot, 2020);
- The Scottish Marine Wildlife Watching Code for advice, information and recommendations for watching marine wildlife (NatureScot, The Scottish Marine Wildlife Watching Code – Part 1, 2017a);
- Updated abundance estimates for cetacean Management Units in UK waters (Revised 2022) (JNCC, 2022);
- The Guide to Best Practice for Watching Marine Wildlife to reduce the disturbance of important marine species (NatureScot, 2017b); and
- The Wildlife Safe (WiSe) Scheme (MMO, 2016);
- Berwickshire and North Northumberland Coast SAC conservation objectives (Natural England, 2018);
- Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: Southern North Sea Conservation Objectives and Advice on Operations (JNCC and Natural England, 2019); and
- Guidance Seals (MMO, 2021).

The following guidance documents for marine mammals and other megafauna will be considered in relation to the EIA:

- PMFs, as described in NatureScot Commissioned Report 388 (Howson *et al.*, 2012);
- Scottish Marine Wildlife Watching Code (NatureScot, 2017);
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) (JNCC, 2017);
- Guidance on the Offence of Harassment at Seal Haul-out Sites (Marine Scotland, 2014);
- The Basking Shark Code of Conduct (Shark Trust, n.d.);
- JNCC Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (JNCC, DAERA and Natural England, 2020);
- The Protection of Marine European Protected Species (EPS) From Injury and Disturbance: Draft Guidance for the Marine Area in England and Wales and the UK Offshore Marine Area (JNCC, Natural England and Countryside Council for Wales, 2010); and
- The protection of Marine European Protected Species from injury and disturbance Guidance for Scottish Inshore Waters (July 2020 Version) (Marine Scotland, 2020).

11.3. STUDY AREA

The Study Area for marine mammals and other megafauna encompasses a wide geographic area to include all potential species which might occur within the Marine Scheme.

The marine mammals and other megafauna study area will incorporate the Inter Agency Marine Mammal Working Group (IAMMWG) Management Unit (MU), and SCOS seal management units (SMU) within which the Marine Scheme is located. For cetacean species the relevant MUs to the Marine Scheme include the North Sea MU for harbour porpoise, Greater North Sea MU for bottlenose dolphins, and Celtic and Greater North Seas MU for other cetacean species. The assessment will utilise available data from Block R and O of the SCANS-III survey data to characterise density and abundance of cetaceans in UK and Northern European waters (Hammond *et al.*, 2021).

For pinnipeds the marine mammals and other megafauna Study Area incorporates the East England SMU which the Marine Scheme will overlap with, Fast Castle SMU and the Farne Islands SMU.

11.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the marine mammals (cetaceans and pinnipeds) and other megafauna (e.g. basking sharks (*Cetorhinus maximus*)) baseline include:

- Carter *et al.* (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles;
- Hague *et al.* (2020) Regional baselines for marine mammal density across the North Sea and Atlantic areas of Scottish waters;
- Inter-Agency Marine Mammal Working Group (IAMMWG) (2021) Management Units (MU) for cetaceans in UK waters;

- Marine Scotland (2020) The protection of Marine European Protected Species from injury and disturbance Guidance for Scottish Inshore Waters (July 2020 Version);
- Waggitt *et al* (2020) Distribution maps of cetacean and seabird populations in the North-East Atlantic;
- Hammond *et al* (2021) The Small Cetaceans in the European Atlantic and North Sea (SCANS) I, II and III projects, with a focus on the data presented in the most recent survey report;
- Witt *et al* (2012) Basking sharks in the northeast Atlantic: Spatio-temporal trends from sightings in UK waters;
- Special Committee of Seals (SCOS) (2021) Scientific Advice on Matters Related to the Management of Seal Populations;
- Sea Watch Foundation (2022) National Whale and Dolphin Watch Sightings
- Reid *et al* (2003) An atlas of cetacean distribution on the northwest European Continental Shelf;
- BBWF Offshore Scoping Report (SSE, 2021);
- Berwick Bank Windfarm marine mammal sightings from aerial surveys (available in Q4 2022 following publication the BBWF EIA Report); and
- Project specific benthic surveys being undertaken in 2022.

In addition to the above, third party impact assessments of surrounding developments will also be utilised to help inform the baseline understanding of the study area including, but not limited to, the environmental appraisals for the Near Na Gaoithe, Inch Cape, Seagreen Alpha and Bravo, SEGL1, Eastern Green Link 2, and BBWF Scoping Report (and the BBWF EIA Report once available).

11.5. BASELINE ENVIRONMENT

11.5.1.1. Cetaceans

All cetacean species are protected as EPS under Annex IV of the European Habitats directive. Nine species of cetacean are expected to be present within the Northumberland Coastal region (Hague *et al*, 2020; IAMMWG, 2022; Hammond *et al*, 2021). The following cetacean species are known to frequent or seasonally visit the waters of the east coast of Scotland and England: harbour porpoise (*Phocoena phocoena*); bottlenose dolphin (*Tursiops truncatus*); short-beaked common dolphin (*Delphinus delphis*); white-beaked dolphin (*Lagenorhynchus albirostris*); Atlantic white-sided dolphin (*Lagenorhynchus acutus*); Risso's dolphin (*Grampus griseus*); long-finned pilot whale (*Globicephala melas*); minke whale (*Balaenoptera acutorostrata*) and beaked whale (*Ziphiidae spp.*) (Hammond *et al*, 2021; Hague *et al*, 2020). Of these species, harbour porpoise, bottlenose dolphins, white-beaked dolphin, and minke whale are expected to occur at the highest frequency in the marine mammals and other megafauna study area (Hammond *et al*, 2021). There is one protected site with cetacean qualifying features within 100 km of the Marine Scheme, this is the Southern North Sea SAC which is designated for harbour porpoise (Figure 11-1). The Moray Firth SAC (267 km north of the Marine Scheme) has also been included for assessment due to the range of bottlenose dolphin population present in this SAC.

11.5.1.2. White-beaked dolphin

White-beaked dolphin are common in Northern European continental shelf seas from Iceland and Norway south to Ireland and Southwest England, including the northern and central North Sea. White-beaked dolphin have an estimated density within Block R and O of the SCANS III survey, within which the Marine Scheme resides located, of 0.243 animals/km² (R) and 0.002 animals/km² (O), which is considered high compared to the rest of the United Kingdom Continental Shelf (UKCS) (Figure 11-2) (Hammond *et al*, 2021). However, it is expected that densities within the marine mammals and other megafauna study area Marine Scheme may be lower than this, given the high predicted densities for this species lie towards the north of the Marine Scheme over 100 km from the Marine Scheme and lower densities occur within the sStudy aArea (Hague *et al*, 2020; Waggitt *et al*, 2020; Hammond *et al*, 2021).

11.5.1.3. Harbour Porpoise

Harbour porpoise are the most abundant cetacean species in UK waters and are generally observed in small groups of one to three individuals (Reid *et al*, 2003). The density of harbour porpoise within Block R and O of the SCANS III survey was approximately 0.599 animals/km² (R) and 0.888 animals/km² (O), which is high in the context of the wider UKCS region (Figure 11-2) (Hammond *et al*, 2021). According to density modelling data (SCANS III data and regional baseline data), it is predicted that harbour porpoise densities within the vicinity of the marine mammals and other megafauna study area Marine Scheme may be lower than this, with higher densities occurring in deeper offshore waters to the south and east (Hague *et al*, 2020; Hammond *et al*, 2021).

This species is present in UK waters year-round with peak densities occurring in the summer months (Evans *et al*, 2011). In addition, the peak calving period for harbour porpoises in UK waters is between June and July (JNCC, 2022).

11.5.1.4. Bottlenose dolphin

Bottlenose dolphins are less common in offshore waters than inshore waters. Small resident or semi-resident populations occupy a few scattered locations on the Scottish coastal and territorial waters (Cheney *et al*, 2013; Hague *et al*, 2020). The density of harbour porpoise within Block R and O of the SCANS III survey was approximately 0.030 animals/km² (R) and 0.888 animals/km² (O), which is moderate in the context of the wider UKCS region (Figure 11-2) (Hammond *et al*, 2021). Bottlenose dolphins have been shown to prefer coastal habitats (20 – 50 m depths), with densities highest around bays, estuaries or sandbanks (Evans *et al*, 2011). According to density modelling data and behavioural traits observed in the species, it is predicted that bottlenose dolphins densities within the marine mammals and other megafauna study area Marine Scheme area may be lower than this, with higher densities occurring in coastal inshore waters to the north and west of the Marine Scheme (Cheney *et al*, 2013; Hague *et al*, 2020; Hammond *et al*, 2021; Evans *et al*, 2011). Bottlenose dolphins have been shown to prefer coastal habitats (20 – 50 m depths), with densities highest around bays, estuaries or sandbanks (Evans *et al*, 2011).

This species is present in UK waters year-round, although peak densities are expected to occur between May and September, with a breeding season between May and October (Evans *et al*, 2011).

11.5.1.5. Minke whale

Minke whale are the smallest, most prevalent baleen whales to occur in UK waters (Marine Scotland, 2016). They feed mainly in shallower waters over the continental shelf and regularly appear around shelf banks and mounds, or near fronts where zooplankton and fish are concentrated at the surface (Reid *et al*, 2003). They are also commonly seen in the strong currents around headlands and small islands, where they can come close to land, even entering estuaries, bays and inlets. Minke whale density within Block R and O of the SCANS III survey is considered to be high in comparison to the rest of the UKCS, with an estimated 0.039 animals/km² (R)

and 0.010 animals/km² (O) (Figure 11-2) (Hammond *et al*, 2021). However, density modelling data suggests densities along the east coasts of Scotland and England are lower than this, particularly along the Northumberland coastline, due to higher abundance estimates in deeper water to the east of the marine mammals and other megafauna study area Marine Scheme area (Hammond *et al*, 2021; Hague *et al*, 2020).

This species shows a large seasonal variation with much lower densities in the winter months, likely driven by variations in sea surface temperature and chlorophyll concentrations (Hague *et al*, 2020). Breeding locations of this species are currently unknown.

11.5.1.6. Other cetacean species

Other cetacean species, such as short-beaked common dolphin, Risso's dolphin, Atlantic white-sided dolphin, long-finned pilot whale, killer whale and beaked whale species, are encountered intermittently throughout the year along the east coast of England, with no obvious spatial or temporal patterns in abundance or distribution (Reid *et al*, 2003; Evans *et al*, 2011; Hague *et al*, 2020; Hammond *et al*, 2021).

11.5.1.7. Pinnipeds

Two species of pinniped regularly occur in the Scottish and English offshore and coastal environment: grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*). Both are protected as Annex II species under the Habitats Directive. Scotland provides habitat to approximately 85% of the UK population of grey seals and 80% of the UK population of harbour seals (SCOS, 2021). The Farne Islands is located approximately 28 km from the Marine Scheme and, although it is currently designated for the protection of bird species, it is an important breeding site for grey seals, providing habitat for the third largest grey seal (*Halichoerus grypus*) colony of grey seals on the east coast of England. Grey seals are the primary reason for the selection of the Berwickshire and North Northumberland Coast SAC (13.7 km from Marine Scheme). Fast Castle is a recently established breeding site for grey seals which is continuing to grow at a rate of approximately 16.9% per year (SCOS, 2021). It was noted to hold the largest colony in the North Sea, lies to the north of Farne Islands and 38.8 km from the Marine Scheme (Russell *et al*, 2016). Fast Castle lies within the St Abbs to Fast Castle SAC (39.3 km from Marine Scheme) and whilst seals are not listed as a primary feature for the SAC, Fast Castle is a designated haul out site. Seal haul outs are terrestrial sites designated for the protection of seals within Scotland during vulnerable haul out periods, such as breeding and pupping (Marine Scotland, 2019). The extent of these protections is limited to those seals on shore at the haul-out and the site would only be considered should any potential activities occurring be within 2 km of the site. As the Marine Scheme lies 38.8 km from Fast Castle this site will not be considered any further.

Grey and harbour seals forage in the coastal and shelf waters, with their movement patterns largely dependent upon the seasonal distribution of their prey species. Both species tend to remain concentrated close to shore, particularly during the pupping seasons which occur from May to July for harbour seals and September to December for grey seals (Marine Scotland, 2014). Grey seals have greater maximum foraging ranges than do harbour seals and may travel over 100 km to optimum foraging habitat whilst harbour seals generally remain within 50 km of their selected haul-out sites (SCOS, 2021).

At-sea usage by grey seals in the immediate area surrounding the Marine Scheme is moderate (Figure 11-3) and increases with proximity to the Farne Islands. Telemetry data indicates the density of grey seals and illustrates the importance of the Northumberland coastline for grey seals in the east of England, with this continuous region of elevated habitat use extending southward from the outer Moray Firth (Russell *et al*, 2017; Carter *et al*, 2020).

At sea usage by harbour seals is also negligible (0-5 seals per 25 km² at sea harbour seal usage) in the immediate area surrounding the Marine Scheme (Figure 11-3), with higher usage occurring near the coast to the southeast and east of England and these areas don't support any harbour seal haul-outs of (Russell *et al*, 2017; Carter *et al*, 2020).

11.5.1.8. Basking Sharks

Basking sharks are protected under Schedule 5 of the Wildlife and Countryside Act 1981 and the Nature Conservation Act 2004. Basking sharks occupy cold and temperate waters and feed predominately on plankton and zooplankton (e.g. barnacle larvae, copepods, fish eggs and deep-water oceanic shrimps) by passively filtering large volumes of water through their open mouths. Individuals typically move in a generally direct swimming pattern (Sims *et al*, 2005).

Basking sharks seasonally visit Scottish and English coastlines in the spring and leave in autumn. In the summer, basking sharks spend the majority of time near the surface, where they appear to be basking whilst feeding on plankton. Summer also functions as a potential breeding season for the species, with aggregations of individuals peaking in July and August. They are mainly found around the western isles of Scotland and southwest of England, but at certain times can be found in the North Sea or along the east coast as an occasional visitor (Evans *et al*, 2011; Witt *et al*, 2012). Habitat suitability studies have been undertaken to help identify areas which may support basking sharks. The coastal waters to the north of the marine mammals and other megafauna study area and near to the point which the cable will transition from sea to land (proposed landfall site) area indicated a moderate to high habitat suitability for basking shark populations (Austin *et al*, 2019).

There have only been 23 approximate occurrences of basking sharks within the Marine Scheme and the surrounding inshore area between 1987 -2016. Due to this species rarely frequenting the Marine Scheme this species has been scoped out and won't be considered within the EIA for the Marine Scheme.

11.5.1.9. Sea Turtles

Records of sea turtles are sparse in the UK, with leatherback turtles (*Dermochelys coriacea*) as the most commonly sighted species (NBN Atlas, 2022). Sea turtle sightings in Scotland are mostly limited to the southwest coast, as individuals generally occupy the Irish Sea and Northeast Atlantic Ocean during their long-distance migrations (Baxter *et al*, 2011). Due to the remote likelihood of encountering sea turtles within/surrounding the Marine Scheme, this taxon has not been included as 'other megafauna' and is not considered further within this Scoping Report and is proposed to be scoped out of the EIA for the Marine Scheme.

11.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- Given the potential for injury arising from the installation of the Marine Scheme offshore export cable, including the use of pre-installation survey techniques which have the potential to generate underwater noise, the JNCC guidelines for minimising the risk of injury to marine mammals will be employed; and
- A CEMP will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan and an INNS management plan;

- An OEMP will be developed and employed; and
- A Marine Mammal Mitigation Protocol (MMMP) will be developed for the marine mammal species of particular relevance to the Marine Scheme, if and when required.

A full suite of designed in measures will be provided as part of the EIA.

11.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 11.4) and known marine mammals and other megafauna sensitivities.

The potential impacts for marine mammal and other megafauna receptors are summarised in Table 11-1 below. The scope of potential cumulative and transboundary impacts on marine mammal and other megafauna receptors is discussed in section 11.8 and is summarised in Table 16-1.

Table 11-1 Scoping of potential impacts for marine mammal and other megafauna receptors

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Noise-related impacts associated with construction noise, including physiological impacts, barrier effects and displacement	Scoped-In	The Marine Scheme may use a variety of methods which may generate noise. These may include but are not limited to: pre-lay grapnel, mechanical ploughing; mechanical cutting, and water jetting. The evidence base suggests that mitigation ensures such impacts are generally limited to short term and temporary displacement or disturbance effects. Regardless, impacts related to disturbance of EPS and other protected species, as well as those associated with protected sites, requires further consideration.	Available desktop information to describe the baseline environment and inform assessment of impact. Density maps of cetaceans and pinnipeds. Predicted underwater noise levels for the construction period.	Noise modelling is not proposed for the Marine Scheme. Publicly available data from other projects within the marine area, such as the BBWF Scoping Report / ensuing ES (when available) and the SEGL1 and EGL2 EARs will be used to inform potential sources and anticipated noise levels associated with construction and decommissioning activities of relevance to the Marine Scheme. These – and other potentially relevant appraisals – provide a useful source of information to inform the appraisal of potential noise impacts, particularly when the cable installation process is considered. It is widely acknowledged that this is not a process which will typically generate notable – significant – sources of underwater noise when compared to, for example, impact piling associated with a wind farm. A MMMP will be implemented in line with the anticipated noise related impacts identified from the review of publicly available data and information sources.
Indirect impacts of construction noise on the prey species of marine mammals and other megafauna	Scoped-Out	Disturbance to prey species caused by underwater noise generated during construction may negatively impact diadromous fish and fish spawning behaviour, particularly for sensitive species including cod, whiting, and sandeel which all have spawning grounds in the marine mammals and other megafauna study area, as outlined above. The spawning grounds within the marine mammals and other megafauna study area have a low intensity for the sensitive species.	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		<p>The localised and temporary nature of the cable installation activities and increase in vessel traffic associated with construction of the Marine Scheme is not however expected to significantly impact on prey species.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance to prey species will not generate an adverse significant impact to marine mammals and other megafauna.</p>		
Disturbance to prey species and habitats of prey species through temporary increases in SSC and associated sediment deposition and potential release of contaminants	Scoped-In	<p>Increased sedimentation associated with construction and decommissioning works may lead to restricted visibility in foraging prey species and disturbance to the distribution of prey species, through habitat loss and increases to sediment deposition. Localised changes in sediment type which may also potentially impact seabed dependent prey species (e.g. herring). Potential impacts associated with increased suspended sediment concentrations SSC and the potential release of contaminants as a result of construction or decommissioning works are anticipated to be highly localised and temporary. Marine mammals and other megafauna are highly mobile species, temporary and localised effects have limited potential to impact the species.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance to prey species will not generate an adverse significant impact to marine mammals and other megafauna. Whilst no significant impacts are anticipated, the ES will consider the significance of this impact.</p>	The assessment will be informed by the outcomes of the Offshore Physical Environment and Seabed Conditions assessment, the Fish and Shellfish Ecology assessment, the assessment of increased suspended sediment concentrations and the outputs from the analysis of benthic surveys.	The principal method to be employed will be careful examination of the findings of the project specific geophysical surveys and benthic surveys (further detail in sections 6.4 and 8.4), as well as those undertaken for the BBWF array area. This will provide site specific information on seabed sediment characteristics and seabed dependent species. The assessment will be informed by the result of the increased suspended sediment concentrations assessment undertaken for the Benthic Subtidal and Intertidal Ecology assessment to assess how this might effect prey species.
Disturbance due to the physical presence of vessels	Scoped-Out	<p>The potential for the physical presence of installation vessels to generate a disturbance response in marine mammals and other megafauna is considered negligible given the levels of shipping activity which characterise the existing baseline and the addition of a small number of vessels during the construction phase of the Marine Scheme.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance will not generate an adverse significant impact to marine mammals and other megafauna.</p>	N/A	N/A
Risk of injury resulting from collision of marine mammals and other megafauna with installation vessels	Scoped-Out	<p>Increased localised vessel traffic as a result of construction is not expected to significantly increase collision risk to marine mammals and other megafauna. Vessel activities will fall within standard (e.g. transit) speeds and will follow prescribed routes, thereby reducing the possibility</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		<p>of collision. Additional mitigations will be considered to further reduce any potential collision events, including: maintaining manned bridges, training vessel crew in the Scottish Marine Wildlife Watching Code and following the relevant (i.e. activity-specific) JNCC guidance for minimising the risks of injury to marine mammals and other megafauna during construction, which may include use of a marine mammal observer. Mitigation measures for marine mammal and other megafauna species relevant to the Marine Scheme will be outlined in the supporting MMMP.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance will not generate an adverse significant impact to marine mammals and other megafauna.</p>		
Impacts associated with effects upon marine water quality, particularly due to any disturbed sediments affecting turbidity.	Scoped-Out	<p>Cable laying activities, particularly those associated with the installation of the export cables, comprise the primary pathway which may influence water quality through disturbed sediments. Changes in turbidity due to cable laying are short-lived, with resettlement taking place within hours or days. Marine mammals and other megafauna regularly occupy waters with varying levels of turbidity, including exceptionally murky tidal waters, for extended periods without any important impacts to their biology or behaviour. Marine mammals have adapted to utilise other sense organs as their primary sensory modality in their marine environment, with pinnipeds using tactile information via their vibrissae (whiskers) and cetaceans using sound (including echolocation) to successfully survive in the ocean. For these reasons, highly localised and temporary changes in water quality from sediment disturbance will not generate significant impacts to marine mammals and other megafauna.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance will not generate an adverse significant impact to marine mammals and other megafauna.</p>	N/A	N/A
Accidental release of pollutants	Scoped-Out	<p>Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on marine mammals and other megafauna. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of the Environmental Management Plan, including measures for compliance with international requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) convention, as well as best practice for works in the marine</p>	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		environment (e.g. preparation of Shipboard Oil Pollution Emergency Plans (SOPEP)). In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimise the potential impact of any accidental release if it occurs, and hence the impact has been scoped out of the EIA.		
Pre-installation surveys including – Geophysical/ Geotechnical/ Archaeological surveys	Scoped-In	Marine mammals and other megafauna are sensitive to noise related activities. The pre-installation surveys have the potential to result in behavioural disturbances or/and displacement of marine mammals and other megafauna.	Available desktop information to describe the baseline environment	<p>The area of impact will be calculated based on the worst-case seabed footprint associated with the maximum design scenario.</p> <p>An assessment of potential cumulative and transboundary impacts on marine mammals and other megafauna will be completed as part of the ES in line with the process outlined in section 4.</p>
Operation and Maintenance				
Displacement or barrier effects resulting from the physical presence of devices and infrastructure	Scoped-Out	<p>The addition of infrastructure in the marine environment can deter individuals from occupying those areas, potentially leading to exclusions from important habitats or barrier effects to movement.</p> <p>The Marine Scheme will bury the cable where possible which will not lead to barrier effects. Additionally, any potential substation will be built nearby to the existing structures and will be likely to have a negligible effect. Mid-range (a few hundred metres) avoidance behaviours have been noted from marine mammals in relation to turbines (Sparling <i>et al</i>, 2020). The individuality and small size of the potential substation in addition to marine mammals only showing avoidance behaviours in close proximity and being in close proximity to turbines would likely not result in any barrier effects from the substation.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance will not generate an adverse significant impact to marine mammals and other megafauna.</p>	N/A	N/A
Risk associated with electromagnetic fields (EMFs) associated with subsea cabling	Scoped-Out	Subsea cables emit EMFs along their lengths, with high-voltage AC or DC export cables emitting the greatest EMFs. Research on the potential effects of EMFs on sensitive marine species have focused on behavioural and physiological effects of exposure in field and laboratory settings. However, the mechanism for detection of electric or magnetic fields remains relatively poorly understood in the majority of species. Results have shown that, even for some of the most	N/A	N/A

Potential Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		<p>sensitive species – a group which includes elasmobranchs (e.g. basking sharks) – none of the evidence indicates that crossing EMFs at levels typical of power cables used in marine renewable developments have the potential to cause significant impacts to individuals or populations (Hemery, 2020).</p> <p>Moreover, the location of the offshore export cables and array cables is considered unlikely to lead to potential effects to travel for basking sharks which use electrical fields for navigation. Additionally, they generally occur in the study area in low to very low numbers on occasion.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance will not generate an adverse significant impact to marine mammals and other megafauna.</p>		
Risk of injury resulting from collision of marine mammals and other megafauna with operations and maintenance vessels	Scoped-Out	<p>Vessel activity during the operations and maintenance phase of the Marine Scheme will be highly limited and associated primarily with inspections and limited survey effort. Increased localised vessel traffic as a result of operations and maintenance is not expected to significantly increase collision risk to marine mammals and other megafauna. Vessel activities will fall within standard (e.g. transit) speeds and will follow prescribed routes, thereby reducing the possibility of collision.</p> <p>For these reasons, it is considered that whilst there is a potential pathway for impacts resulting from the construction of the offshore export cables to occur, this disturbance will not generate an adverse significant impact to marine mammals and other megafauna.</p>	N/A	N/A
Long term habitat change, including the potential for change in foraging opportunities	Scoped-In	The impacts occurring from long term habitat changes at the lower trophic levels may result in significant changes to marine mammals and other megafauna. See Fish and Shellfish Ecology, Benthic and Intertidal Ecology, and Commercial Fisheries sections for further details (sections 9, 8 and 12, respectively).	<p>Available desktop information to describe the baseline environment.</p> <p>Habitat maps and PSA results from the benthic habitat surveys will be used to understand the potential suitability of the seabed at the site for cod, whiting, and sandeel spawning.</p>	<p>The area of impact will be calculated based on the worst-case seabed footprint associated with the maximum design scenario.</p> <p>An assessment of potential cumulative and transboundary impacts on marine mammals and other megafauna will be completed as part of the ES, in line with the process outlined in section 4.</p>

11.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on marine mammal and other megafauna receptors. There is the potential for cumulative marine mammal and other megafauna impacts to occur during all phases of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is potential for transboundary impacts on marine mammal and other megafauna receptors to arise as a result of construction, operation and maintenance or decommissioning activities associated with the Marine Scheme. Whilst any potential impacts associated with the Marine Scheme will be highly localised the highly mobile nature of marine mammal and other megafauna receptors may cause potential for transboundary impacts. Therefore, potential transboundary impacts will be assessed further within the ES.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to marine mammals and other megafauna.

11.9. PROPOSED EIA METHODOLOGY

Cetaceans are all EPS and should any potential disturbances occur to the species a licence to disturb will be sought to follow the appropriate legal requirements. The Marine Scheme will include designed in measures including but not limited to the development of:

- A MMMP;
- A vessel management plan;
- A decommissioning plan; and
- A pollution prevention plan.

The designed in measures will develop alongside the Marine Scheme as required. The marine mammal and other megafauna baseline will be informed by the data and information sources identified in section 11.4. The potential impacts of the Marine Scheme on marine mammal and other megafauna receptors will be informed by the input of expert judgement and consultation with relevant stakeholders prior to the submission of the ES. Consultation with key stakeholders will be ongoing throughout the EIA process.

The direct and indirect impacts of the Marine Scheme on marine mammal and other megafauna receptors will be assessed. Direct pathways will include those that relate to a direct interaction between a marine mammal and infrastructure, or operations associated with the Marine Scheme, including exposure to underwater noise. Indirect impacts include those produced as a result of a direct impact pathway, including habitat loss and disturbance. The assessment of direct and indirect impacts on marine mammals and other megafauna receptors will be assessed against the maximum design scenario.

Publicly available data from other projects within the marine area, such as the Berwick Bank OWF Scoping Report (and EIA Report once available) and the SEGL1 Scoping Report/EIA Report will be used to inform potential sources and anticipated noise levels associated with construction and operation and maintenance activities of relevance to the Cambois Connection.

European sites that are designated for the conservation of marine mammal features will be considered within the support HRA which will be completed alongside the ES. The HRA will identify where the potential for LSE on marine mammal qualifying features associated with European sites.

The Assessment of impacts for marine mammals and other megafauna will be conducted in line with the process identified in section 4, in line with standard industry guidance and the relevant legislation outlined in section 2.

11.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the marine mammals and other megafauna assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping in of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

12. COMMERCIAL FISHERIES

12.1. INTRODUCTION

This section of the Scoping Report identifies the commercial fisheries receptors of relevance to the Marine Scheme and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the Marine Scheme.

Commercial fisheries are defined for the purpose of this report as activity by licensed fishing vessels undertaken for legitimate capture and sale of finfish and shellfish in the marine environment. Aquaculture, recreational fishing and fishing activities in rivers are not considered within this section; other sea users are considered in section 15.

AIS is used to track and monitor vessels and the fishing intensity. UK legislation applying to English and Scottish territorial and inshore waters requires fishing vessels of 15 m and over to be fitted with an AIS system meeting the International Maritime Organisation (IMO) standard (SOLAS, 2014). The European Union (EU) requires any fishing vessels exceeding 12 m to transmit their position. This data is required through VMS data and was updated in 2019 (UK Government, 2021). Although there is not a legal requirement for fishing vessels under 15 m to use AIS and fishing vessels under 12 m to use VMS, some of these smaller vessels opt in for the tracking systems. This results in a large data gap currently and will likely only be addressed through consultation with local fishing industry. Legislation, likely to come into force by the end of 2022, will make it a legal requirement for all vessels registered in England and under 12 m in length to have an inshore vessel monitoring system (I-VMS) installed (UK Government, 2022) and consultation is underway to consider this for Scotland.

12.2. LEGISLATION, POLICY AND GUIDANCE

The following relevant legislation, policy and guidance relating to commercial fisheries were consulted in preparing this Scoping Report and will be used to inform the ensuing ES:

12.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

- European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora adopted in 1992.

12.2.2. NATIONAL LEGISLATION

The following national legislations are considered relevant to the assessment of fish and shellfish ecology receptors across the Marine Scheme:

12.2.2.1. UK (England and Scotland)

- Wildlife and Countryside Act 1981 (HM Government, 1981);
- The Conservation of Habitats and Species Regulations 2017 (HM Government, 2017) (as amended);
- The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2017 (HM Government, 2017); and
- The Fisheries Act 2020.

12.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Scottish Statutory Instrument 2011 No. 209 (HMSO, 2009), as amended;
- The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (Scottish Government, 1994) (as amended); and
- Nature Conservation (Scotland) Act 2004 (Scottish Government, 2004).

12.2.2.3. England

- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended); and
- Natural Environment and Rural Communities Act (HM Government, 2006).

12.2.3. POLICY

The following national policies are considered relevant to the assessment of commercial fisheries receptors across the Marine Scheme:

12.2.3.1. Scotland

- Scotland's National Marine Plan (The Scottish Government, 2015).

12.2.3.2. England

- North East Inshore and North East Offshore Marine Plan (DEFRA, 2015); and
- East Inshore and east Offshore Marine Plan (DEFRA, 2014).

12.2.4. GUIDANCE

The following guidance documents are considered relevant to the assessment of commercial fisheries receptors across the Marine Scheme:

- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (Seafish, 2012);
- Options and Opportunities for Marine Fisheries Mitigation associated with windfarms (Blythe-Skyrme, 2010);

- Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) Best Practice Guidance for Offshore Renewable Developments: Recommendations for Fisheries Liaison (FLOWW, 2014);
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015);
- MGN 661 (M+F) Navigation – safe and responsible anchoring and fishing practices (Maritime & Coastguard Agency, 2021);
- The Mariner's Handbook (NP100) (UKHO, 2020) – Section 9.45 Submarine Cables; and
- National Planning Practice Guidance: Environmental Impact Assessment (HM Government, 2020).

12.3. STUDY AREA

The Study Area for commercial fisheries is defined by the ICES Rectangles within which the Marine Scheme is located. These include ICES rectangle 39E8, 40E8, 40E9, 41E8. ICES rectangles 39E9, 41E9, and 42E8 have also been considered as part of the commercial fisheries study area given their close proximity to the Marine Scheme.

Reference may also be made to waters outside of these four ICES rectangles to provide contextual information and relevance for fishing activity on a regional basis.

12.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the commercial fisheries baseline include:

- Fisheries statistics per ICES Rectangle (average 2016-2020). MMO (2020);
- Vessel Monitoring System (VMS) values by fishing method (average 2016-2020) MMO (2020);
- Average intensity (hours) of fishing with bottom trawls 2009-2016 (ICES SR.2017.17);
- Average intensity (hours) of fishing with dredges 2009-2016 (ICES SR.2017.17);
- Average intensity (hours) of fishing for nephrops and crustaceans with bottom trawls 2009-2017 (ICES SR.2018.14);
- Automatic Information System (AIS) data of fishing vessel tracks;
- ScotMap – Inshore Fisheries Mapping Project in Scotland Kafas et al (2014);
- Marine Scotland Salmon and Sea Trout Fishery Statistics and other associated reports – Marine Scotland;
- Creel Fishing Study MSS (2017);
- Vessel monitoring system devices MMO (2021);
- NIFCA Annual Research Plan & Report NIFCA (2021); and
- Information gained from consultation (FLO, RIFG).

In addition to the above, third party impact assessments of surrounding developments will also be utilised to help inform the baseline understanding of the study area including, but not limited to, the environmental appraisals for the Near Na Gaoithe, Inch Cape, Seagreen Alpha and Bravo, SEGL1, Eastern Green Link 2, and BBWF Scoping Report (and the BBWF EIA Report once available).

The above information will contribute to the baseline understanding of commercial fisheries, as appropriate. It is however expected that wider baseline information which is available outside of the study area will be used to help inform the EIA (best-practice and professional judgment will be used to inform the relevance of such data).

12.5. BASELINE ENVIRONMENT

An initial desk-based review of literature and available data sources has been undertaken to describe commercial fisheries in the offshore Marine Scheme environment and to inform the Scoping process.

The following sections provide information on the key spatial differences across the commercial fisheries study area and Marine Scheme for commercial fishing activity.

12.5.1. FISHERIES STATISTICS

Landings values from 2016 to 2020 per ICES rectangle have been used to calculate the annual average by vessel length, fishing method, and species, and this data is presented in Figure 12-1, Figure 12-2, Figure 12-3, and Figure 12-4. In the commercial fisheries study area, landings values are highest in ICES rectangle 39E8 in the west of the commercial fisheries study area and the lowest landings values are recorded in ICES rectangle 41E9 in the North East of the commercial fisheries study area. Please note that various factors can influence fishing practices and activities, such as Covid-19 and Brexit for example. The commercial fisheries impact assessment will analyse five years of data (seven years of data will be requested for scallops) in order to ensure that the understanding of fishing activity in the commercial fisheries study area is as accurate as possible, it should be noted that the 2020 and 2021 data was impacted by Covid-19. Seasonal and inter-annual variation will also be analysed.

Average landings values by vessel length (under and over 10 m in length) show that vessels over 10 m contribute to the majority of landings in the commercial fisheries study area. Proportionally less landings are recorded for vessels 10 m and under in ICES rectangle 40E9, which is located furthest offshore (Figure 12-2 and Figure 12-3).

The fishing methods that contribute to the majority of average landings values from the ICES rectangles in the commercial fisheries study area include otter trawls and pots/traps. Average landings values in the northwest and west of the commercial fisheries study area in ICES rectangles 39E8 and 40E8 are dominated by demersal trawls/seines with proportionally lower landings values recorded for pots/traps compared with ICES rectangles 39E9 and 40E9. Vessels deploying demersal trawls and seines (with the exception of beam trawls) are prohibited from fishing in the Farnes Deep outwith 12 NM, explaining the reduced or no effort by these vessels in this area. Much of the cable corridor lies within this fishing restricted area. Within 12 NM, the prohibition does not apply to vessels with an engine power of 350 kW or less deploying a single-rig demersal trawl or seine (Kingfisher, 2022).

Landings by scallop dredges are also recorded in the commercial fisheries study area, with the highest values recorded in ICES rectangle 41E8 and 40E8. Other fishing methods recorded with comparably lower landings values, include 'other' passive gears, gears using hooks, beam trawls and demersal seines.

The species associated with the highest landings values in the commercial fisheries study area include Norway Lobster (*Nephrops norvegicus*), lobster (*Homarus gammarus*), brown crab (*Cancer pagurus*), scallops (*Pecten maximus*), herring (*Clupea harengus*), whiting (*Merlangius merlangus*), crabs – velvet (swim) (*Necora puber*), Cod (*Gadus morhua*), and halibut (*Hippoglossus hippoglossus*) which is further discussed in section 9. *Nephrops* comprise higher proportionate landings values in ICES rectangles 39E9 and 39E8, associated with the proportionally higher landings values by pots/traps recorded in these ICES rectangles. Lobsters, brown crab and velvet crab (swim) are associated with traps and pots and feature heavily within the 39E8 and 40E8 ICES rectangles, which is also noted in region 4 of the Scottish creel fishing survey (MSS, 2017). Demersal whitefish, mainly whiting and halibut, also contribute to a high proportion of landings values in the commercial fisheries study area, especially in ICES rectangles 39E8 and 39E9, and other notable demersal species recorded in the landings data include monkfish/anglerfish (*Lophius americanus*), haddock (*Melanogrammus aeglefinus*) and squid (*Teuthida*). Pelagic fish, primarily herring are also recorded with proportionally high landings values in the commercial fisheries study area with mackerel (*Scomber scombrus*) being another notable species. Overall, the species which have high values for catch rates reflect the pattern of fishing methods described above.

12.5.2. VESSEL MONITORING SYSTEM (VMS) DATA

Average VMS value from 2016 to 2020 for beam trawls, bottom otter trawls, bottom seine nets, dredges, pelagic trawls and seines, and passive fishing methods (static gear) are presented in Figure 12-1, Figure 12-3 and Figure 12-4. This generally indicates that fishing activity by over 10 m vessels using gears, using hooks, 'other' passive gear, drift and fixed nets and beam trawls is low in the Marine Scheme. Additionally, it indicates that the fishing activity within the commercial fisheries study area is highest within the ICES rectangle 40E8.

The VMS data indicates that demersal trawling activity, for species such as haddock, monkfish/anglerfish, cod and squid is highest in the east of the commercial fisheries study area above the landfall connection in ICES rectangles 39E8 and 39E9, overlapping with the Marine Scheme. Comparably lower average VMS values are present in the commercial fisheries study area in ICES rectangle 41E8 and 41E9.

Scallop dredging occurs throughout the commercial fisheries study area, with effort at moderate to high levels in the north and north west respectively. This is concentrated in ICES rectangle 41E8, including high densities within 40E8 and 39E8, and overlapping with the western extent of the Marine Scheme.

Figure 12-1 shows that fishing activity by passive methods, such as pots and traps (static gear), is high across the commercial fisheries study area. Vessels involved in this type of activity are typically less than 15 m in length (Figure 12-2). These types of fishing method are concentrated towards the north west and west inshore areas in ICES rectangle 39E8 and 40E8 (Figure 12-3). This is consistent with the high landing values recorded for pots and traps recorded in the commercial fisheries study area.

Average VMS values for pelagic fishing methods in the commercial fisheries study area is relatively high, and comparably higher in the west of ICES rectangle 39E8.

The UK Government (2021b) VMS data only covers fishing vessels over 10 m in length, Figure 12-2 and Figure 12-3 indicates the landings values for vessel lengths. UK Government data indicates that fishing by smaller 10 m and under vessels is likely to be low in the commercial fisheries study area, with activity increased towards the Northumberland coastline and Firth of Forth, mostly for pots/traps targeting crabs and lobster (Kafas *et al.*, 2014). However, it should be noted that there is often a large data gap on vessels under 10 m and is typically not included in datasets. It is acknowledged that this data set is potentially outdated, however, further consultation will be undertaken with various fishing representatives and local fishermen, where necessary, as part of the EIA process, to fill any data gaps and finalise the baseline characterisation. This will be in line with relevant guidance (e.g. FLOWW, 2014).

Due to the paucity of quantitative data on the distribution of fishing effort / value for smaller vessels, it is anticipated that consultation will be a key source to understand the fishing activity in this area.

12.5.3. SALMON FISHERIES

Scottish and English salmon fisheries include fixed engine, net & coble (i.e. netting) and rod and line fisheries (Marine Scotland, 2015). Across Scotland, the majority of salmon catch is from rod and line (Marine Scotland 2021a). Data from across England indicated similar values for fixed engine/net and rod/line however on average catches from fixed engine/nets was higher (Cefas, 2019). However, it is understood that several coastal netting sites are present along the Scottish/English border coastline which have had a status assessment for clean and safe, healthy and biologically diverse assessments. The status assessment noted these areas as having many concerns (Scottish Government, 2020; 2021).

Records show that salmon catches across Scotland have declined significantly in recent years, and this is expected to partly have resulted from the implementation of the Conservation of Salmon (Scotland) Regulations 2016 which has prohibited the retention of salmon caught in coastal waters and in specified inland waters (depending on their conservation status) since 2016. Records show that salmon catches across England have declined across the past 15-20 years however 2018 saw the total catches from fixed engine and net increase by 10%, whilst rod catches (which also includes catch and release) showed a decrease of 46% in 2017 (Cefas, 2019). The data looked at salmon which was caught and killed and indicated a decline by approximately 90% since the 1970s. When looking solely at the commercial fishing methods of fixed engine and nets the decrease was 85%. The English salmon report also notes that the majority of salmon caught from net methods occurs within the north east of England (88.9%) and will overlap with the commercial fisheries study area (Cefas, 2019).

Marine Scotland collates salmon catch statistics by district or region on an annual basis. Latest catch statistics for rod and line and net catches within the River Nith, River Annan, the Forth River, and River Tweed reporting areas were recorded between 2016 and 2020 (Marine Scotland, 2021). Catch statistics in England, and particularly the north east, between 1992 and 2018 were considered. The Tyne is the most notable site nearby to the commercial fisheries study area due to the high number of rod catch from the catch statistics and salmon action plan but other rivers within the commercial fisheries study area include the River Aln, River Coquet, River Wear, River Tees, and Yorkshire Esk River, all of which (excluding the River Aln) have salmon action plans (Cefas, 2019). Most rod and line catches are understood to be recreational, so more consideration has been given to fixed engine and net methods.

12.5.4. NON-UK FISHING ACTIVITY

It is understood through data from the UK Government that the commercial fisheries study area is comprised of UK fishing vessels and is supported by the Marine Scheme being within 12 NM. English vessels are responsible for the majority of fishing activity in the commercial fisheries study area (56.8%) carried out by UK vessels. Scottish and Northern Irish vessels are also noted to be present in abundance of 37.2% and 5.9% (MMO, 2020a). Therefore, it is unlikely for any non-UK fishing activity to occur within the commercial fisheries study area.

Following its departure from the EU, the UK can now regulate the access of non-UK fishing vessels to UK waters. Gradual changes to quota shares and Total Allowable Catches (TACs) will also occur between 2021 and 2026, including a gradual reduction of EU quota shares within UK waters and the transfer of 25% of EU's fishing rights in UK waters to UK fleets (European Council, 2021). Thus, in the wake of the UK's departure from the EU, it is possible that there will be changes to the proportion of international vessels present in the commercial fisheries study area.

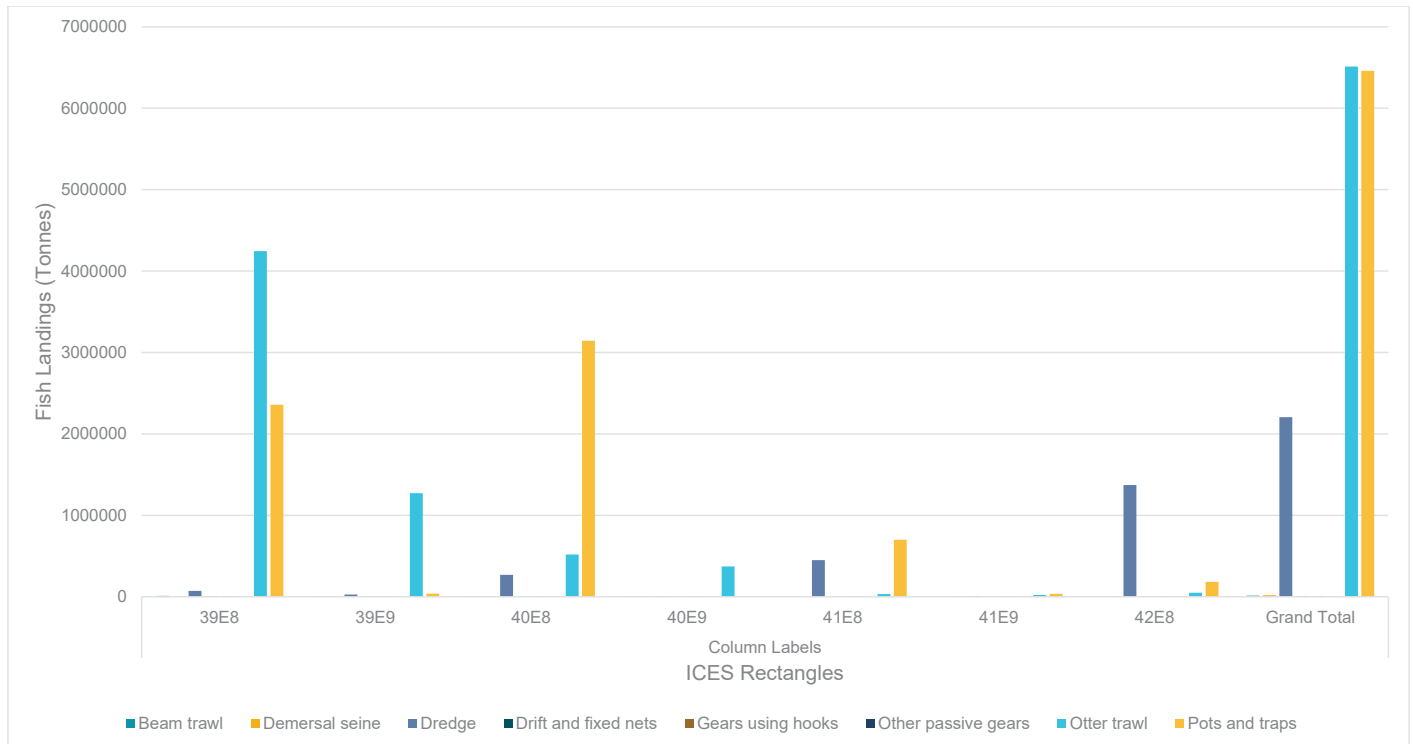


Figure 12-1 Fishing vessel gear use by ICES rectangles in the commercial fisheries study area

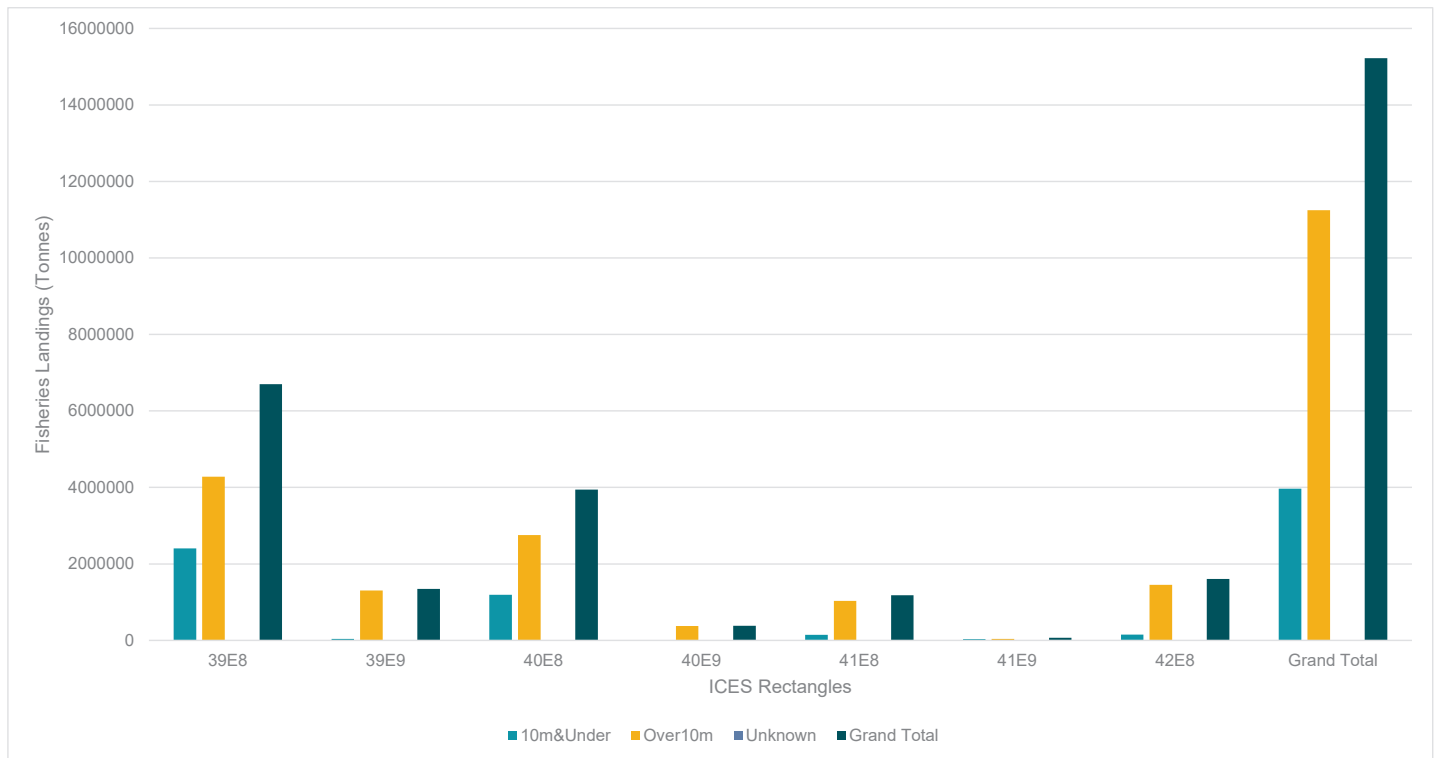


Figure 12-2 Vessel length by ICES rectangle

12.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- The use of rock protection will be minimised as far as possible, and only used where required (i.e., where target burial using installation tools cannot be achieved, at crossings and the proposed landfall location, for example). This will be informed by outputs from the Cable Burial Risk Assessment completed prior to the commencement of installation;
- Placement of scour protection will be minimised as far as possible, however a level of protection may be required at certain locations;
- Cable protection will be designed to be 'fishing-friendly', and to minimise snagging risk (i.e. graded rock and 1:3 berm profile);
- A CEMP will be developed and employed. This is expected to be inclusive of a Marine Pollution Contingency and Control Plan and an INNS management plan;
- An OEMP will be developed and employed;
- Implementation of a Vessel Management Plan and Navigation Safety Plan
- Timely and efficient distribution of NtM, Kingfisher notifications and other navigational warnings of the position and nature of works ahead of commencement of the installation of the Marine Scheme;
- Information related to the areas where cable protection is required will be provided to relevant organisations for inclusion on charts and relevant bulletins;
- Notification to the UK Hydrographic Office of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications;
- A Fisheries Liaison Officer (FLO) is currently employed and will remain in place for the lifetime of the Marine Scheme;
- Micro-routeing within the consented corridor for the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints; and
- Participation in the Forth and Tay Commercial Fisheries Working Group (FTCFWG); and
- Liaison with Fisheries Industry Representatives (FIRs) as appropriate.

A full suite of designed in measures will be provided as part of the EIA.

12.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 12.4) and known commercial fisheries sensitivities. The commercial fisheries EIA topic overlaps with potential impacts from other sections and will refer to these to support the potential impacts.

Potential impacts from shipping and navigation (see section 13), considers impacts from navigational safety issues for fishing vessels during construction and obstruction of regular fishing vessel transit routes due to the presence of vessels and safety zones during construction, fishing vessel and recreational vessel

displacement due to the presence of project infrastructure, and increased risk of vessel-to-vessel collision involving fishing and/or recreational vessels as a result of displacement.

The potential impacts from fish and shellfish ecology in section 9, considers change in the abundance or distribution of target species and resulting impact on fisheries resource due to construction phases, impact to fish from any EMF arising from the offshore export cables during operation, impact to fish from any thermal emissions arising from the offshore export cables during operation, and temporary increases in SSC and associated sediment deposition and potential release of contaminants. These potential impacts will be assessed in the relevant sections and the commercial fisheries section will refer to them.

The potential impacts for commercial fisheries receptors are summarised in Table 12-1 below. The scope of potential cumulative and transboundary impacts on commercial fisheries receptors is discussed in section 12.8 and is summarised in Table 16-1.

Table 12-1 Scoping of potential impacts for commercial fisheries receptors

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Temporary loss, displacement or restricted access to fishing grounds due to presence of vessels and safety zones during route preparation activities	Scoped-In	The route preparation will require pre-installation surveys, and also include pre-installation activities to prepare the seabed for laying of the cable. The installation activities may include, but are not limited to, cable route clearance and pre-sweeping. Disruption and disturbance to fisheries impacts including impacts to static fishing gear operators.	Desktop analysis of available public data sources, including those listed within section above and information gained through consultation to characterise the environmental baseline. Consultation to understand potential nature and extent of the impact.	The assessment will consider route preparation activities based on the maximum design scenario. It is acknowledged that there is potential for a variety of methods to be used. The impact assessment will draw on the latest relevant available literature on this impact.
Temporary loss, displacement or restricted access to fishing grounds due to presence of vessels and safety zones during construction	Scoped-In	The implementation of safety zones around the Marine Scheme during cable installation activities, may result in fishing activity being temporarily displaced due to the temporary loss or restricted access to fishing grounds associated with the safety zones around construction activities or vessels.	Desktop analysis of available public data sources, including those listed within section 12.4 and information gained through consultation to characterise the environmental baseline. Consultation to understand potential nature and extent of the impact.	The worst-case scenario will be temporary exclusion from the Marine Scheme based on the maximum design parameters. The impact will be qualitatively assessed on a fleet-by-fleet basis, considering available data on fishing activity in the area and the potential sensitivity of the receptor to this impact.
Interference with fishing activity as a result of increased vessel traffic, including potential increases to steaming times.	Scoped-In	Increased vessel traffic associated with construction and decommissioning works may lead to interference with fishing activity. This is due to the increased presence of vessels in the area which may require navigation around Marine Scheme installation vessels, potentially restricted access and increased steaming times.	Desktop analysis of available public data sources, including those listed above and information gained through consultation to characterise the environmental baseline. Consultation to understand potential nature and extent of the impact.	The maximum number of vessel transits required during construction / decommissioning will represent the maximum design parameters for this impact assessment. The impact will be qualitatively assessed on a fleet-by-fleet basis, considering available data on fishing activity in the area and the potential sensitivity of the receptor to this impact.

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Operation and Maintenance				
Potential for fishing gear to become entangled with cable (ie. snagging), resulting in damage or loss of fishing gear	Scoped-In	The only infrastructure to be installed as part of the Marine Scheme is the export cable, which will be buried where possible. Snagging risk will be minimised due to the burial of the cable but where this is not possible, there is a risk of in entanglement or snagging impacts to commercial fisheries.	Desktop analysis of available data on fishing activity in the area, including those sources listed above and information gained through consultation to characterise the environmental baseline and to understand use of cable route by commercial fisheries. Consultation to understand potential nature and extent of the impact.	The worst-case scenario will be based on the extent of the export cable which cannot be buried, from the Marine Scheme based on the maximum design parameters, to understand the area of potential impact.
Long-term habitat loss and disturbance	Scoped-In	Long-term habitat loss may occur as a result of the presence of installed cable, rock protection altering the habitat, and clearing of areas to allow for laying of cables as this may lead to a change in the seabed type, potentially altering the habitat for commercially important species. Species that are seabed dependent for some or all of their life cycle (e.g. sandeel and herring) are most sensitive to this impact.	Desktop analysis of available public data sources, including those listed above in section 12.4 and information gained through consultation to characterise the environmental baseline. Consultation to understand potential nature and extent of the impact.	The area of impact will be calculated based on the seabed footprint associated with the maximum design scenario.
Long-term reduced access to key fishing grounds and resultant displacement	Scoped-In	<p>The presence of infrastructure within the cable route may result in a loss or restricted access to fishing grounds during the operation and maintenance phase.</p> <p>Fishing activity may be displaced into other areas as a result of loss of grounds or restricted access to fishing grounds during the operation and maintenance phase. Any displacement of existing fishing activity from the area may result in increased pressure on other existing grounds; affecting those fishing locally and in other areas. This has the potential to impact existing local fishing management practices and relationships between existing sea users.</p>	Desktop analysis of available data on fishing activity in the area, including those sources listed above and information gained through consultation to characterise the environmental baseline and to understand use of cable route by commercial fisheries. Consultation to understand potential nature and extent of the impact.	<p>Section 12.4 outlines the data sources which will provide the baseline. In addition, data which is gathered during consultation with stakeholders will inform the baseline.</p> <p>As assessment will be undertaken in line with the methodology outlined in section 12.9 below and informed, as appropriate, by the conclusions of other sections of the EIA, such as Fish and Shellfish Ecology and Shipping and Navigation.</p>

12.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on commercial fisheries receptors. There is the potential for cumulative offshore commercial fisheries impacts to occur during all phases of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is the potential for transboundary impacts upon commercial fisheries receptors due to construction, operation, maintenance and decommissioning of the Cambois Connection, as it lies partly beyond the 12 NM limit where EU member states have access to fish. Potential transboundary impacts that will be considered may include all of those relevant to non-UK vessels, including the impacts described in Table 12-1. This will be informed by further desktop analysis of non-UK fishing activity (e.g. through EU Data Collection Framework (DCF) datasets (EU DCF, 2020)) to understand the non-UK fishing activity in the offshore study area.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to commercial fisheries.

12.9. PROPOSED EIA METHODOLOGY

The Assessment of impacts for commercial fisheries will be conducted in line with the process identified in section 4, in line with standard industry guidance and the relevant legislation outlined in section 2.

The Applicant will look to engage with different stakeholders regarding commercial fisheries. The Applicant will engage with key stakeholders, including but not limited to the SFF, NFFO, NEIFCA, Cefas, MMO, MS-LOT, the Regional Inshore Fisheries Groups (RIFGs) as well as liaising with Fishing Industry Representatives (FIRs) to obtain fishing data relevant to the Marine Scheme.

The Applicant has also appointed a Fisheries Liaison Officer (FLO) to work with the commercial fisheries groups such as IFCA and RIFG to ensure that the Marine Scheme will minimise the potential impacts on any commercial fishing activities in and surrounding the Marine Scheme. The Marine Scheme will adhere to good practice guidance such as FLOWW (2014; 2015).

12.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the commercial fisheries assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping in of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

13. SHIPPING AND NAVIGATION

13.1. INTRODUCTION

This section of the Scoping Report assesses the shipping and navigation features within the shipping and navigation study area that have potential connectivity to the Marine Scheme and considers the potential impacts and/or risks associated during the construction, operation and maintenance and decommissioning phases of the Marine Scheme on maritime users. This section fulfils the requirements of the Preliminary Hazard Analysis (PHA) as required under Annex 1 of the MCA Marine Guidance Note (MGN) 654.

The shipping and navigation EIA chapter will also be supported by a Navigational Risk Assessment. These additional documents are best practice for shipping and navigation. They will provide information to help understand the scope and potential impacts on shipping and navigation receptors.

This section of the Scoping Report should be read alongside section 12 Commercial Fisheries.

13.2. LEGISLATION, POLICY AND GUIDANCE

Several policies and regulations operate to ensure that shipping and navigation is taken into account during the planning and execution of projects within UK waters. For the Marine Scheme these include the UK Marine Policy Statement (MPS) and the UK Marine Plans, specifically the Scottish National Marine Plan (Scottish Government, 2015), and the North East Inshore and North East Offshore Marine Plan have a number of relevant policies specific to shipping and navigation. They shall be considered further within the EIA.

There are numerous specific legal requirements which will apply to vessels and mariners associated with the development of the Marine Scheme; further details will be supplied within the EIA.

13.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of shipping and navigation receptors across the Marine Scheme:

- International Regulations for Preventing Collisions at Sea (COLREGS) 1972/78 (IMO, 1972/78);
- United Nations Convention for the Law of the Sea (UNCLOS) 1982 (UN, 1982); and
- International Convention for the Safety of Life at Sea (SOLAS) 1974 (IMO, 1974) (as amended).

13.2.2. NATIONAL LEGISLATION

The following national legislations are considered relevant to the assessment of shipping and navigation receptors across the Marine Scheme:

13.2.2.1. UK (Scotland and England)

- Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009); and
- Submarine Telegraph Act 1885 (Hm Government, 1885).

13.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010)

13.2.3. NATIONAL POLICY

The following national policies are considered relevant to the assessment of shipping and navigation receptors across the Marine Scheme:

13.2.3.1. UK (Scotland and England)

- UK Marine Policy Statement (MPS) (HM Government, 2011).

13.2.3.2. Scotland

- Scottish National Marine Plan (2015) (The Scottish Government, 2015).

13.2.3.3. England

- North East Inshore and North East Offshore Marine Plan (HM Government, 2021).

13.2.4. GUIDANCE

The following guidance documents are considered relevant to the assessment of shipping and navigation receptors across the Marine Scheme:

- International Maritime Organisation (IMO) Revised Guidelines for Formal Safety Assessment (FSA) For Use In The IMO Rule-Making Process – MSC-MEPC.2/Cic. 12/Rev2 (09 April 2018) (IMO, 2018);
- Maritime and Coastguard Agency (MCA) MGN 654 (M + F) Offshore Renewable Energy Installations (OREI) safety response (MCA, 2021a);
- International Association of Marine Aids to Navigation (AtoN) and Lighthouse Authorities (IALA) Recommendation O-139 on the Marketing of Man-Made Offshore Structures, Edition Two (IALA, 2013);
- IALA Guideline G1162, Edition 1.0, The Marketing of Offshore Man-Made Structures, Dec 2021 (IALA, 2021); and
- Maritime and Coastguard Agency (MCA) MGN 661 (M + F) Navigation – safe and responsible anchoring and fishing practices (CA, 2021b).

13.3. STUDY AREA

For the purpose of this report, the shipping and navigation study area is defined as a 10 NM buffer surrounding the Marine Scheme from BBWF to the proposed landfill area.

Reference may also be made to waters outside of this shipping and navigation study area in order to provide contextual information and relevance for shipping and navigation activity on a regional basis.

13.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the shipping and navigation baseline include:

- Marine Accident Investigation Branch (MAIB). Incident data provided by the MAIB (data request to be made by the Applicant as required);
- Royal National Lifeboat Institution (RNLI). Incident data provided by the RNLI (data request to be made by the Applicant as required);
- RYA (2019) RYA coastal atlas of recreational boating (RYA, 2021);
- UKHO (2021) UKHO Admiralty Charts 219-0, 1954-0, 2249-0;
- UKHO (2018) UKHO Admiralty sailing directions – NP52;
- VMS data (where available);
- SARH (2022) Incident data;
- Sailing and Pilot books;
- SDIC Red Rock Power Limited (2018) Inch Cape Wind Farm EIA;
- Seagreen Wind Energy Limited (2020). SeaGreen Alpha and Bravo EIA; (when available);
- BBWF Offshore Scoping Report (SSE, 2021) (and the BBWF EIA Report once available, particularly the Navigational Risk Assessment (NRA)); and
- Seagreen Wind Energy Limited (2017) Seagreen Phase 1 Offshore Project Scoping Report Round 3: Firth of Forth.

Due to the nature of shipping and navigation receptor consultation with relevant stakeholders will be used including commercial fisheries to contribute to the scope of the shipping and navigation EIA chapter.

13.5. BASELINE ENVIRONMENT

13.5.1. NAVIGATIONAL FEATURES

The closest navigational features that are considered relevant to the shipping and navigation study area are presented in Figure 13-2 (this should be viewed alongside information provided in section 15, which provides further context related to other sea users which will be a relevant consideration for the assessment of shipping and navigation).

13.5.1.1. RNLI Lifeboat Stations

The closest RNLI lifeboat stations to the shipping and navigation study area are located at Newbiggin-by-the-Sea to the North and Blyth to the South of the proposed landfall location. The Newbiggin Lifeboat Station is the oldest operational lifeboat station in the UK, first opening in 1851. The station operates a single inshore Atlantic 85 lifeboat (RNLI(a), 2022). The Blyth Lifeboat Station, established in 1854, operates two inshore lifeboats: a D class and a B class Atlantic 75 (RNLI(b), 2022).

13.5.1.2. Harbours

There are a number of ports and harbours along the east coast of the UK from which recreational and service craft transit and anchor. There is the potential for interaction with a number of these anchorage sites along the length of the Marine Scheme, including at:

- Grangemouth;
- Victoria Harbour;
- St Abbs;
- Burnmouth Harbour
- Amble;
- Berwick Upon Tweed Blyth St Abbs;
- Eyemouth;
- Holy Island ;
- Newbiggin-by-the-Sea; and
- Tyne Mouth.

Blyth Harbour (or the Port of Blyth) is the closest major harbour to the shipping and navigation area, located approximately 4.5 km to the South of the proposed landfall location. The Port of Blyth is the port operating division of the Blyth Harbour Commission established in 1882. The Port is regarded as one of the leading offshore energy support bases within the UK for offshore wind, renewables and decommissioning works (Port of Blyth, 2022).

The Applicant will seek to work collaboratively with associated harbours and ports throughout all phases of the Marine Scheme to support the operation of these sites and ensure that any potential disruption is minimised.

13.5.1.3. Anchorages

Anchorage at any of the ports and harbours identified above is utilised by several types of vessel, including fishing, recreational, cargo, non-port service craft and unknown. Anchorage of larger vessels, including tankers, cargo vessels and dredging or underwater operations vessels is primarily associated with the ports of Grangemouth, Eyemouth and Blyth.

There will be no direct interaction between the offshore export cables and any of these anchorage sites, however in the wider context of the potential impacts of the Marine Scheme on shipping and navigational receptors, the presence of Project specific vessels within the shipping and navigation study area and using any of these anchorages during the construction, operation and maintenance and decommissioning phases of the Marine Scheme has the potential to result in disruption to existing shipping and navigation anchorages.

13.5.1.4. Aggregate Sites

There are no aggregate extraction points or aggregate extraction areas throughout the shipping and navigation study area or within surrounding waters. The closest aggregate extraction site is an inactive sand extraction area owned by The Netherlands and within the Netherlands EEZ which lies over 200 km from the shipping and navigation study area (EMODnet, 2022).

13.5.1.5. Shipping Lanes

The shipping and navigation study area will directly interact with a number of recreational and commercial shipping lanes through the Scottish EEZ, the English EEZ and English Territorial Waters. The most significant commercial traffic transits north and south along the east coast of the UK. AIS tracking data identifies fishing, passenger, tanker and cargo vessels which transit east from ports along the coast into the North Sea, towards Norway and Europe. There is the potential for direct interaction with shipping lanes across the Marine Scheme through the Scottish and English EEZ and English Territorial Waters.

13.5.1.6. Wrecks

There are a number of non-dangerous wrecks throughout the shipping and navigation study area, with dangerous wrecks located within the intertidal regional of the proposed landfall location. Historic wreck sites within UK territorial waters can be protected under the Protection of Wrecks Act 1973, the Ancient Monuments and Archaeological Areas Act 1979 and the Protection of Military Remains Act 1986 (Historic England, 2022). Further information on protected wrecks within the offshore study area can be found within section 14.

13.5.1.7. Areas to be Avoided (ATBAs)

The IMO Areas to be Avoided (ATBAs) defines maritime limits in which navigation is particularly hazardous or in which it is particularly important to avoid casualties. These areas should be avoided by all ships or certain classes of ships. There are no ATBAs within the shipping and navigation study area (Portodimare, 2022).

The IMO does not identify any Particularly Sensitive Sea Areas (PSSAs) within the shipping and navigation study area that should be considered.

13.5.1.8. Oil and Gas Assets

There is a single, operational, offshore installation located at Newbiggin-by-the-Sea, located approximately 4.5 km to the north of the proposed landfall location. This installation is the Newbiggin-By-The-Sea Waverider Buoy Kfb02/2013 Area3, operated by Scarborough Borough Council.

Oil and gas activities are extensive throughout the North Sea, however, there are no active licences that directly interact with the shipping and navigation study area. In the wider context of the offshore marine environment, a large area of exploration is located to the south-east of the proposed landfall location. There are no borehole operations out with this area of oil and gas exploration, the closest borehole is the abandoned 41/01- 1 borehole, located approximately 100 km to the south-east of the proposed landfall location.

13.5.1.9. AIS Survey Data Analysis

Automatic Identification System (AIS) is an integral part of the EU Vessel Traffic Monitoring and Information Directive (2002/59/EC) and, in accordance with the International Convention for the Safety of Life at Sea (SOLAS) 1974 (Chapter V, Regulation 19, section 2.4.5), AIS is required to be fitted to all ships of 300 gross tonnage and upwards on international voyages, cargo ships of 500 gross tonnage and upwards not engaged in international voyages, passenger ships and fishing vessels. AIS data has been used to identify vessel traffic within the shipping and navigation study area of interest to the Marine Scheme.

13.5.2. VESSEL DENSITY AND MOVEMENT

13.5.2.1. Cargo Vessels

AIS data published under Open Government Guidance identifies cargo vessels throughout the shipping and navigation study area with transit lines concentrated along the east coast within 12 NM territorial limits. Vessels associated with ports within the Firth of Forth and Blyth have the potential to interact with activities relating to the construction, operation and maintenance and decommissioning phase of the Marine Scheme. From these ports vessel transit lines also track east across the North Sea to Europe and the Nordics (Figure 13-2).

13.5.2.2. Tankers

AIS data published under Open Government Guidance identifies a dense area of tanker transit tracks within the 12 NM Territorial limits of Scottish and English waters and transit east through the Scottish and English EEZ out into the North Sea. Tanker tracks associated with ports in the Firth of Forth travel along the east coast north to Aberdeen and south to Middlesbrough. There are nine isolated tanker vessel tracks associated with the Port of Blyth. From the Firth of Forth and Middlesbrough tanker vessel transit lines track east across the North Sea to Europe and the Nordics (Figure 13-2).

13.5.2.3. Fishing Vessels

AIS data on fishing vessels present within the shipping and navigation study area that have the potential for connectivity with the construction, operation and maintenance and decommissioning phases of the Marine Scheme can be found in section 12.

13.5.2.4. Recreational Vessels

AIS data on recreational vessels present within the shipping and navigation study area that have the potential for connectivity with the construction, operation and maintenance and decommissioning phases of the Marine Scheme can be found in section 15.

13.5.2.5. Passenger Vessels

Throughout the shipping and navigation study area there are low to moderate intensity passenger vessel tracks, primarily associated with the ports in the Firth of Forth and Port of Newcastle. Passenger vessel tracks associated with the Port of Newcastle have a dense transit route south to the Netherlands. There are approximately

15 passenger vessel transit tracks from the Port of Newcastle and approximately 16 from the ports in the Firth of Forth which will directly interact with the shipping and navigation study area. An isolated cluster of passenger vessel tracks associated with the Port of Blyth which transit approximately 9 km off the coast before returning back to the port, these transit tracks have the potential to directly interact with the proposed landfall location at Cambois (Figure 13-2).

13.5.2.6. Dredging or Underwater Operations

Throughout the shipping and navigation study area there are low intensity dredging or underwater operations associated with the Port of Blyth, the Port of Newcastle and ports within the Firth of Forth. Dredging or underwater operations works relating to the Blyth Demonstrator Offshore Wind Farm transit from the Port of Blyth out to approximately 8 km offshore before returning to port. Approximately 13 dredging or underwater operations vessels transit through the shipping and navigation study area north to south. Most of the AIS tracks are within the 12 NM English and Scottish Territorial Waters. Two vessel tracks associated with ports in the Firth of Forth directly interact with the shipping and navigation study area (Figure 13-2).

Along the coast of Eyemouth in the Scottish borders there is a moderate intensity cluster of dredging or underwater operations however these operations are local and isolated to the coastal waters, therefore there is no potential for overlap with these activities and the offshore study area.

13.5.2.7. Non-Port Service Craft

AIS data associated with non-port service craft is largely coastal within the 12 NM Scottish and English Territorial Waters. There is an area of high intensity non-port service craft transit lines in nearshore waters along a 24 km stretch of coastline between Blyth and Sutherland. Across the proposed landfall location there are 10 transit tracks that have the potential to interact with the shipping and navigation study area within 12 NM off the coast of Cambois. Extending beyond 12 NM approximately seven non-port craft transit tracks that have the potential to interact with the shipping and navigation study area (Figure 13-2).

13.5.2.8. High Speed Craft

There are dense areas of high-speed craft associated with the Port of Blyth and Newcastle which have the potential for connectivity with the Marine Scheme. With the exception for two transit lines which track south, all high-speed craft transit lines associated with these ports track north across the proposed landfall location at Cambois as far north as Berwick-upon-Tweed before returning south to port. Two high speed craft transit lines associated with the Port of Blyth continue transit north through the shipping and navigation study area to Aberdeen (Figure 13-2).

13.5.3. HISTORICAL INCIDENT DATA

An analysis of the MAIB incident data available between 2010 to 2022 reports that there was only one incident within the shipping and navigation study area. This was flooding, capsizing and sinking of a prawn trawler in 2020. This incident did not result in the loss of life of any crew member onboard, the two crew members abandoned ship to a life raft and were subsequently picked up by a local lifeboat service (MAIB, 2022).

There were six accidents which occurred in waters adjacent to the shipping and navigation study area. These accidents included a collision between a prawn trawler and a general cargo vessel, the capsizing and sinking of a stern trawler, a collision between two rigid inflatable boats, man overboard from a stern trawler, person overboard while climbing aboard a stern trawler and the grounding of a container vessel. Of these accidents one resulted in serious injuries to one passenger and two accidents resulted in the loss of one life.

RNLI data was reviewed for incidents within the shipping and navigation study area. The RNLI record over 100,000 incidents within their online data base between 2008-2020 of these, approximately 162 occurred within the shipping and navigation study area during this time. Over half of these incidents and RNLI callouts were attributed to commercial fisheries activities within the shipping and navigation study area, where the most common incident types include 'Accident to Person', 'Fire, explosion, capsizing or collision' or 'Other reason'. Incidents involving recreation or sailing vessels were the next most common.

Within the Navigational Risk Assessment (NRA) an additional 10 years of historical incident data will be considered to inform the shipping and navigation baseline as a secondary dataset. This data will be considered quantitatively and will take into consideration advancements in technology and changes to relevant legislation that have resulted in improvements to maritime safety over the past 10 and 20 years.

13.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- Placement of scour protection will be minimised as far as possible, however a level of protection may be required at certain locations;
- A CEMP will be developed and employed;
- An OEMP will be developed and employed;
- Notices to Mariners, Kingfisher and other navigational warnings will be completed ahead of commencement of the installation of the Marine Scheme;
- Information related to the areas where cable protection is required will be provided to relevant organisations for inclusion on charts and relevant bulletins; and
- Micro-routing within the consented corridor for the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints;
- An application for 500 m safety zones will be submitted for the duration of the construction, decommissioning and should any major maintenance on the asset be required; and
- The Marine Scheme will include designed in measures to comply with the MGN 654 which will include the completion of a Search and Rescue (SAR) check post-consent and will also include the development of an Emergency Response Cooperation Plan (ERCoP).

A full suite of designed in measures will be provided as part of the EIA.

13.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 13.4) and the understanding of the local shipping and navigational baseline.

The potential impacts for shipping and navigation receptors are summarised in Table 13-1 below. The scope of potential cumulative and transboundary impacts on shipping and navigation receptors is discussed in section 13.8 and is summarised in Table 16-1.

Table 13-1 Scoping of potential impacts for shipping and navigation receptors

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Requirement for vessel transit outside established and identified vessel passage / routes due to construction activities	Scoped-In	There is the potential for vessel displacement from the shipping and navigation study area as a result of construction and/or decommissioning activities. AIS data shows a number of vessels currently use or pass through the shipping and navigation study area.	A desk-based study of available data and information sources will inform the assessment, augmented by stakeholder comments and recommendations.	Potential impacts will be assessed through a desk-based analysis of available data and information sources, informed by consultation with relevant stakeholders. As part of the EIA for the Marine Scheme, an NRA will be completed.
Collision between Project vessels and infrastructure and third party activities and operations (including vessel interaction with subsea cables)	Scoped-Out	<p>The presence of project related vessels during the construction and decommissioning phases of the Marine Scheme has the potential to increase the risk of collision with third party vessels.</p> <p>There is limited potential for the Marine Scheme to impact vessels while they are in transit. This is due to the designed in measures of standard best-practice and notifications, as well as the safety zones proposed it is unlikely for potential impacts to occur</p>	N/A	N/A
Reduced access to local ports due to construction activities	Scoped-In	Local access to ports may be impacted from construction and decommissioning activities and from the presence of Project vessels.	A desk based study of available data and information sources will inform the assessment, augmented by stakeholder comments and recommendations.	Potential impacts will be assessed through a desk based analysis of available data and information sources, informed by consultation with relevant stakeholders.
Operation and Maintenance				
Commercial shipping traffic displacement due to the presence of project infrastructure	Scoped-Out	As the Marine Scheme relates to the installation of subsea export cables, commercial shipping traffic will not be displaced as a result of project infrastructure	N/A	N/A
Fishing vessel and recreational vessel displacement due to the presence of project infrastructure	Scoped-Out	As the Marine Scheme relates to the installation of subsea export cables, recreational vessel traffic will not be displaced as a result of project infrastructure. Interactions with the Marine Scheme and commercial fisheries will be considered within the assessment of commercial fisheries, as described above.	N/A	N/A

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Collision risk between a third party vessel and a project vessel	Scoped-In	There is the potential for collision of a third party vessel with a Marine Scheme vessel during any operation and maintenance works	A desk based study of available data and information sources will inform the assessment, augmented by stakeholder comments and recommendations.	Potential impacts will be assessed through a desk based analysis of available data and information sources, informed by consultation with relevant stakeholders.
Increased risk of third party vessel-to-vessel collision due to displacement	Scoped-Out	Once the Marine Scheme offshore export cables are in place, there will be no displacement of third party vessels from the offshore shipping and navigation area as all Marine Scheme related infrastructure will be subsurface	N/A	N/A
Increased risk of vessel-to-vessel collision involving fishing and/or recreational vessels as a result of displacement	Scoped-Out	Once the Marine Scheme offshore export cables are in place, there will be no displacement of fishing and / or recreational vessels from the offshore shipping and navigation area as all Marine Scheme related infrastructure will be subsurface	N/A	N/A
Increased risk of vessel to structure collision	Scoped-Out	As the Marine Scheme is related to the installation of subsea cables, there will be no potential for collision between a vessel within the shipping and navigation study area and any Marine Scheme related infrastructure	N/A	N/A
Increased risk of fishing vessel in transit collision risk with Project infrastructures	Scoped-Out	As the Marine Scheme is related to the installation of subsea cables, there will be no potential for collision between a fishing vessel in transit within the offshore study area and any Marine Scheme related infrastructure	N/A	N/A
Reduced access to local ports as a result of maintenance activities associated with the Marine Scheme	Scoped-In	Local access to ports may be impacted from the presence of Project related operation and maintenance vessels.	A desk based study of available data and information sources will inform the assessment, augmented by stakeholder comments and recommendations.	Potential impacts will be assessed through a desk based analysis of available data and information sources, informed by consultation with relevant stakeholders. A hazard review workshop will be undertaken which will feed into the assessment of potential impacts as part of the ES.
Reduction in under keel clearance as a result of cable protection methods	Scoped-In	While the preferred method of cable installation is burial, at certain points along the Marine Scheme this may not be possible. Where alternative methods of cable protection are required (i.e., rock placement) water depths may be reduced and therefore under keel clearance for third party vessels may be reduced.	A desk based study of available data and information sources will inform the assessment, augmented by stakeholder comments and recommendations.	Potential impacts will be assessed through a desk based analysis of available data and information sources, informed by consultation with relevant stakeholders.

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Potential interference with marine navigational equipment	Scoped-In	Whilst the majority of vessel traffic utilises gyro compasses or other methods of navigation which are unaffected by EMF, in poor visibility, magnetic methods may be utilised. There is therefore the potential for marine navigational equipment to be affected by the presence of the offshore export cables. The Applicant will complete a compass deviation assessment within the MCA to reduce the potential impacts of the Marine Scheme during the operation and maintenance phase of the Marine Scheme to acceptable levels.	A desk based study of available data and information sources will inform the assessment, augmented by stakeholder comments and recommendations.	Potential impacts will be assessed through a desk based analysis of available data and information sources, informed by consultation with relevant stakeholders.
Potential anchor interactions with subsea cables	Scoped-Out	The preferred method of cable installation is burial, with protection used where this is not achievable and at third party crossings. The Marine Scheme will be designed so as to be protected from anchor strike.	N/A	N/A

13.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on shipping and navigation receptors. There is the potential for cumulative shipping and navigation impacts to occur during all phases of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is no potential for transboundary impacts on shipping and navigation receptors to arise as a result of construction, operation and maintenance or decommissioning activities associated with the Marine Scheme. Any potential impacts associated with the Marine Scheme will be highly localised. Potential transboundary impacts will not be assessed further within the ES.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to shipping and navigation.

13.9. PROPOSED EIA METHODOLOGY

The Assessment of impacts for shipping and navigation will be conducted in line with the process identified in section 4, in line with standard industry guidance and the relevant legislation outlined in section 2. The shipping and Navigation EIA chapter will also build on this methodology for its own specific methodology using a risk rank matrix from the IMO FSA methodology detailed further below. An NRA will also be undertaken and the output of this will inform the shipping and navigation assessment within the EIA.

The IMO's FSA assessment methodology is the internationally recognised approach to assessing the potential impacts of an offshore development on shipping and navigation receptors and this is the approach required under the EIA methodology. The assessment methodology will align with the following best practice guidance:

- IMO Guidelines for Formal Safety Assessment (FSA0 – MSC – MEPC.2/Circ.12/Rev.2 (2018); and
- MCA MGN 543 (M + F) Offshore Renewable Energy Installations Guidance on UK Navigational Practice, Safety and Emergency Response Issues (2016).

The IMO's FSA methodology is categorised into three potential options:

- Broadly Acceptable;
- Tolerable; or
- Unacceptable.

Should there be any impacts determined as “Unacceptable” additional measures will be required to reduce the significance of these potential impacts to “Tolerable” or “Broadly Acceptable”. The risk rank matrix for the shipping and navigation is below in Table 13-2. The significance of the potential impacts will be determined through a variety of factors which includes:

- Information obtained within the NRA;
- The shipping and navigation baseline assessment;
- Previous projects of relevance to the Marine Scheme;
- The potential concern of stakeholders;
- Information obtained through consultation; and
- Expert analysis and opinion.

Table 13-2 Risk rank matrix

Consequence	Frequency					
		Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
	Extremely Unlikely	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Remote	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Reasonably Probable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Frequent	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

The NRA will identify those navigational features and vessel activities within the vicinity of the Marine Scheme that should be considered within the ES assessment. Relevant control and mitigation measures will be identified to reduce the potential impacts of the Marine Scheme on shipping and navigation receptors. This approach to risk assessment is based on an impact in terms of its frequency and significance and the mitigation of the risk to As Low As Reasonably Practicable (ALARP). Any potential impacts determined to be ‘unacceptable’ will require additional assessment and mitigation measures to be considered.

13.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the shipping and navigation assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

14. MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

14.1. INTRODUCTION

This section of the Scoping Report identifies the known and potential marine historic environment receptors of relevance to the Marine Scheme and considers the potential impacts arising from construction, operation and maintenance and decommissioning phases.

14.2. LEGISLATION, POLICY AND GUIDANCE

This section outlines the relevant legislation, policy and guidance for the appraisal of the potential impacts of the Marine Scheme on marine archaeology and cultural heritage receptors associated with the construction, operation and maintenance and decommissioning phases of the development.

14.2.1. INTERNATIONAL LEGISLATION

The following international legislations are considered relevant to the assessment of marine archaeology and cultural heritage receptors across the Marine Scheme:

- The United Nations Convention of the Law of the Sea (UNCLOS);
- The Annex to the United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage 2001; and
- The European Convention on the Protection of the Archaeological Heritage (revised), known as the Valletta Convention.

14.2.2. NATIONAL LEGISLATION

The following national legislations are considered relevant to the assessment of marine archaeology and cultural heritage receptors across the Marine Scheme:

14.2.2.1. UK (England and Scotland)

- Protection of Military Remains Act 1986;
- Ancient Monuments and Areas Act 1979; and
- Merchant Shipping Act 1995.

14.2.2.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010).

14.2.3. NATIONAL POLICY

The following national policies are considered relevant to the assessment of marine archaeology and cultural heritage receptors across the Marine Scheme:

14.2.3.1. UK (Scotland and England)

- UK Marine Policy Statement (MPS) (HM Government, 2011).

14.2.3.2. Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015);
- Planning Advice Note 2/2011: Planning and Archaeology. The Scottish Government (2011); and
- Scottish Planning Policy (SPP). Scottish Government (2014).

14.2.4. GUIDANCE

The following guidance documents are considered relevant to the assessment of marine archaeology and cultural heritage receptors across the Marine Scheme:

- 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 2008);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology 2008);
- 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);
- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (Historic England, 1998);
- Military Aircraft Crash Sites: Guidance on their significance and future management (Historic England, 2002);
- Ships and Boats: Prehistory to Present: Designation Selection Guide (Historic England, 2012);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015);
- Wessex Archaeology (2011) Assessing Boats and Ships (presented in three period reports: 1860 - 1913, 1914 - 1938 and 1939 - 1950); and
- The Nautical Archaeology Society: Underwater Archaeology (2008).

This legislation and guidance will be used to inform the desk-based study for the Marine Archaeology and Cultural Heritage ES chapter.

14.3. STUDY AREA

The marine archaeology and cultural heritage study area is defined as the Marine Scheme with a 500 m buffer in each direction.

14.3.1. SEABED PREHISTORY

The marine archaeology and cultural heritage study area is situated in an area which historically would have been submerged during prehistoric times. Paleogeography shows that the marine historic environment study area would likely have been covered in ice sheets during the Devensian glaciation (Woodcock and Strachen, 2000). During the time of maximum glaciation, the lands would have provided difficulty for habitation. During the Mesolithic era the ice sheets began to melt out and left the coastal lands fertile. This would suggest that the highest abundance of archaeological material would be present in/alongside the coastlines. It is noted that the movement of glacier during pre-historic times has the potential to expose and/or erode archaeological findings (Flemming, 2003).

As there was high glacial movement activity within the marine historic environment study area it is unlikely for survival of any potential archaeological artifacts to be present. This is also supported by the lack of any artifacts being reported within the marine historic environment study area. This is further support by Flemming (2004) which would indicate that whilst archaeological artifacts could occur within the marine historic environment study area there is a very low probability. It has also been noted that peat and other organic sediments can be an indicator of potential paleo-landscapes. The marine historic environment study area however does not have any of peat or organic sediment deposits and is therefore also unlikely to have any paleo-landscapes present (Wessex Archaeology 2009; Flemming, 1998; EMODnet, 2022).

14.3.2. MARITIME ARCHAEOLOGY

Previous scoping reports and archaeological studies have noted that ships from the 19th and 20th century are typically more likely to be found (Seagreen, 2017; Flemming, 1998). This is due to these vessels being comprised of more durable materials such as steel and iron. There is a total of six identified vessels within the marine historic environment study area which are likely to be or have been identified as a certain maritime artifact and one which is within the marine historic environment study area. These maritime artifacts within the marine historic environment study area include Acantha (Possibly), HMSM Unity (Probably), Moulmein (Possibly), Ragnhild (Possibly), Stork (Possibly), and Svava. The maritime artifact within the marine historic environment study area is Oswin (Probably). A review of admiralty charts from Wrecksite EU (2022), and GIS data showed the location and protection status of these vessels. HMSM Unity was the only maritime artifact which fell under the Protection of Military Remains Act 1986.

14.3.3. AVIATION ARCHAEOLOGY

Aviation archaeology is restricted to assets from the 19th century onwards due to their nature. Typically, any artefacts which are younger are more likely to be found due to the material, structure, exposure to sea and size. The marine historic environment study area does not lie in a historically high activity aviation area, the closest airport to the marine archaeology and cultural heritage study area is the Newcastle International Airport approximately 16 km to the northeast. There have additionally been no reported aviation wrecks within the Newcastle International Airport. However, should any aviation wreck be discovered it would automatically be protected under the Protection of Military Remains Act 1986 should it have been lost during active service. Marine historic assets are defined in the Marine (Scotland) Act 2010, section 73, paragraph 5) as vessels, vehicles, aircraft, parts of such, contents of such, buildings and other structures, caves, deposits, artefacts or any other thing or groups of things that evidence previous human activity.

14.4. KEY DATA SOURCES

The key data and information sources that will be used to inform the marine archaeology baseline include:

- Canmore (2019) Historic Environment Scotland's National Record of the Historic Environment (NRHE);
- Historic England (2022) National Marine Heritage Record
- Wreck Site EU (2022);
- National Oceanography Centre (2022) UKHO wreck register & nautical charts;
- Flemming, N. C. (2003) The scope of Strategic Environmental Assessment of Continental Shelf Area SEA 2 and SEA 3 in regard to prehistoric archaeological remains;
- SDIC Red Rock Power Limited (2018) Inch Cape Wind Farm EIA
- Seagreen Wind Energy Limited (2020). SeaGreen Alpha and Bravo EIA;
- SSE (2021) BBWF Offshore Scoping Report. (SSE, 2021);
- Seagreen Wind Energy Limited (2017). Seagreen Phase 1 Offshore Project Scoping Report Round 3: Firth of Forth;
- Geophysical surveys due to be completed January 2023;
- BAAA (2022) Blyth Bureau of Aircraft Accidents archive; and
- Heritage Gateway (2022) Northumberland Historic Environment Records.

The BBWF EIA Report will be used to inform the marine archaeology baseline. Specifically the Written Scheme of Investigation, supporting Technical Report and Protocol for Archaeological Discoveries.

14.5. BASELINE ENVIRONMENT

The marine archaeology and cultural heritage chapter will be an entirely desk-based review of existing data sources alongside any relevant information from the geophysical technical survey report which will be reviewed from an archaeological perspective for the EIAR. This section will focus on the relevant literature, legislation and guidance described above. This will consider all the relevant archaeological points of interest including maritime artifacts, aviation artifacts, seabed history, and historic minefields and ordnance. There is a notable lack of paleo-landscapes and aviation wrecks within the marine historic environment study area, however there are maritime wrecks which have been recorded within and will need to be considered.

An initial desk-based review of literature and available data sources has been undertaken to support this Scoping Report. The findings of this research are presented below in order to aid with an initial baseline understanding as part of the Scoping Process. It has been completed in accordance with the relevant sections of the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for historic environment desk-based assessment (2014, revised January 2020).

A preliminary heritage importance has been attributed to each identified asset in Table 14-1, in order to assess whether to scope marine cultural heritage assets in or out of the EIA. The level of importance assigned was based on a number of factors, including intrinsic, contextual and associative characteristics (HES Designation Policy and Selection Guidance 2019, Annex 5, paragraphs 15-17). In line with good practice, a precautionary level of importance has been assigned until proven otherwise. It should be noted that a site that has not been statutorily designated can still be of high importance.

The key features of the historic environment which are likely to require consideration within the EIA are:

- Known wrecks;
- Known losses with no known location (including vessels, submarines, and aircrafts);
- Known wreckage and debris;
- Wartime defences in Northumberland coastal water;
- Marine paleoenvironmental deposits; and
- Submerged archaeological sites and artefacts.

14.5.1. WRECKS

As a maritime nation with a reliance on marine based trade and exchange, and with the exploitation of marine resources from prehistoric times, there have been countless shipwrecks around UK waters from all periods – many of which remain unreported. Shipwreck inventories and documentary sources are usually biased towards the 18th century and later when more systematic reporting began, and documentary sources became more abundant. Therefore, there are few known historical records of medieval and earlier wrecks, and the potential exists for shipwrecks pre-dating the 18th century to be present along the cable corridor that have not entered the historical record. The Modern period of World War 1 (WW1) and World War 2 (WW2) has the greatest potential for the preservation of wrecks and aircraft sites. This is due to their size, relative age and their metal construction. There are marine cultural heritage statutory designations within the marine historic environment study area and the potential for discovery of vessels that would be designated if found, such as any vessel lost while on military service (automatically protected under the terms of The Protection of Military Remains Act 1986 (PoMRA) and any vessels (e.g. merchant vessels) that were lost during war actions with the death of crew onboard, like SS Tempo, that could be deemed War Graves. Table 14-1 list vessels with verified locations (Figure 14-1 derived from the UKHO and Canmore databases. These, and any others uncovered during the desk-based assessment will be included in the EIA process.

Table 14-1 below notes named charted wrecks within the marine archaeology and cultural heritage study area, the importance of the wrecks has been graded by the Protection of Military Remains Act automatically determining high for a designated war grave. The potential cargo which the vessel may have been transporting, and from details obtained by historical records a medium or low importance was determined (Canmore, 2019; Wreck Site, 2022). In addition to this there are also 21 non-dangerous wrecks these have been identified within the table see Table 14-2 below. Nb. These are unnamed.

Table 14-1 Chartered wrecks located within the marine historic environment study area

Name	UKHO	Canmore	Description	Circumstance of loss	Date lost	LAT	LONG	Importance	Reason
HMSM UNITY (PROBABLY)	004334	322833	Submarine	N/A	N/A	55 232.72 N	-1 328.89 W	Moderate	Potential military remains
FV Stork	003142	322363	Fishing Trawler	Charges/explosives	13/04/1917	55.87.222 N	- 1.19.503 W	Low	Common vessel, fishing
SS RAGNHILD (POSSIBLY)	004335	322834	Transport cargo	Mine	27/04/1917	55 13.815 N	1 19.007 W	Moderate	Common Vessel, cargo of low interest, potentially for PoMRA
SS SVAVA	004341	322840	Transport cargo	Collision	10/03/1944	55 14.582 N	1 18.962 W	Low	Common Vessel, cargo of low interest.
ACANTHA (POSSIBLY)	065637	324105	Fishing trawler	Torpedo	05/04/1915	55 76.675 N	- 1 00.347 W	Moderate	Common Vessel Fishing, potentially for PoMRA
FV MOULMEIN (POSSIBLY)	003143	322364	Fishing trawler	Scuttled	28/03/1917	55 87.150 N	-1 19.528 W	Moderate	Common Vessel Fishing, potentially for PoMRA
FV Kitty	003151	322368	Steam trawler	Charges/explosives	09/05/1917	56.17. 652 N	-1.52.825 W	Low	Common Vessel, cargo of low interest.

Table 14-2 Unnamed non-dangerous wrecks located within the marine historic environment study area

Non-Dangerous Wreck ID	Latitude	Longitude
70469	56 21.467 N	1 54.403 W
70467	56 22.699 N	1 50.863 W
70464	56 20.986 N	1 44.405 W
4370	55 29.107 N	1 4.998 W
58004	55 29.147 N	1 9.585 W
57879	55 21.027 N	1 12.538 W
58047	55 15.372 N	1 17.922 W

Non-Dangerous Wreck ID	Latitude	Longitude
58003	55 26.767 N	1 9.985 W
58017	55 31.027 N	1 7.41 W
58006	55 35.864 N	1 3.218 W
65638	55 58.006 N	1 6.335 W
70456	56 28.051 N	1 31.86 W
63952	56 7.839 N	1 22.822 W
65627	56 7.486 N	1 20.569 W
65633	56 4.777 N	1 28.363 W
65620	56 7.546 N	1 30.881 W
3148	56 4.786 N	1 28.51 W
70439	56 12.995 N	1 25.56 W
71600	56 11.007 N	1 25.491 W
70457	56 13.928 N	1 32.53 W
70460	56 13.958 N	1 33.983 W

14.5.2. AIRCRAFT

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 marine historic environment study area in either Scottish or English waters, there is the potential for the discovery of previously unknown aircraft-related debris on the seafloor within the marine historic environment 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 84 recorded aircraft crash sites have been identified at sea located in the vicinity of the marine historic environment study 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 these locations are only a set of general coordinates, a general distance and bearing from a landmark, the location of the crew's dinghy, or the recovered remains of crew or aircraft. Nonetheless, these highlight the potential for further archaeological material to be present within the marine historic environment study area. One notable aircraft is an Avro 652 Anson model which suffered double engine failures six miles from the Blyth coast from a survey/patrol flight which would be counted as a military wreckage.

There are at least 11 airfields in Northumberland dating to WWII 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. Aircraft did go missing without trace off the east coast of Scotland and England including along the Northumberland coastline. The chances of finding one within the area, although not likely, cannot be discounted.

As aircraft are protected under the PoMRA, and maritime aircraft crash sites can retain a significant amount of material, whilst being an ephemeral target to identify, the potential for burial means that there is a possibility that aircraft material may be present within the marine historic environment study area.

14.5.3. HISTORIC MINEFIELDS AND ORDNANCE

During both WWI and WWII, a large amount of ordnance, both offensive and defensive, was used in the seas around the Northumberland coastline which included WWI German Mining Areas, WWII British Armament Training Areas, and WWII British Mining Areas. Some of these munitions still exist and are regularly found by divers or fishermen. Therefore, there is potential for UXO to be present within the marine historic environment study area, appropriate guidance described in section 14.6 will be followed.

14.5.4. SUBMERGED PALEOLOGICAL DEPOSITS, ARCHAEOLOGICAL SITES AND ARTEFACTS

Hominids and humans have occupied the UK continental shelf (UKCS) at various times for more than 700,000 years but finds showing this are incredibly rare. Although in general terms, the potential for submerged prehistoric archaeology and landscapes across wide areas of the UKCS is high (Wessex Archaeology 2009, 9), the potential for site preservation in areas of the shelf deeper than 80 m is low (Flemming 2003: 16). Submerged landscapes are where human beings and early hominids previously lived or hunted on terrain which was at that time dry land, or where they exploited fish and shellfish on the coast which is now submerged.

The marine historic environment study area is within Zone 2 of the Strategic Environmental Assessment (SEA) of the Continental Shelf (Flemming, 2003). Fleming notes the potential for the survival of submerged landscapes and prehistoric sites in the marine historic environment study area is influenced by various physical factors processes. Prospective submerged paleological deposit sites include depressions large lagoons, channels, palaeo-coastlines, headlands, bays, coastal lagoons, modern coastlines, present intertidal mudflats and wetlands, lee of islands and archipelagos, estuaries, marshes, peat, and caves and cliffs (Flemming, 2003: 13 – 20).

The survival of submerged landscapes and in particular submerged peat deposits and woodland remains that contain organic microfossils (e.g. pollen, diatoms, foraminifera) and macrofossils (e.g. seeds, wood, buds, insects) are important historic resources. They contribute to reconstructing former landscapes, the activities of past human communities and sea level change, (Bates et al., 2013). A historical peat deposit has been recorded on the Northumberland coastline along which the marine historic environment study area passes. This is the Low Hauxley SSSI and is an Eroding Inter-Tidal Peat Bed. The location of this SSSI is unlikely to be significantly impacted by activities from the Marine Scheme due to the nature and distance, and the proposed landfall location is approximately 20km away (Gilliam et al, 2013). Whilst it is unlikely for this site to be impacted there is the possibility, although unlikely, for undiscovered peat deposits which will need to be considered.

Research and modelling indicate that Northumberland had a rich potential of the area to record mid and late Holocene Relative Sea Level (RSL) changes, coastal evolution. The modelling showed changes in RSL along the Northumberland coastline, the highest alteration was recorded within the River Tyne area at Cowen Road with a reduction of around 5.7 m. Whilst a reduction did occur at this site the majority increased within the modelled surrounding River Sites (Shennan et al, 2000). Relative sea level has continued to rise since prehistory.

14.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- A Written Scheme of Investigation will be developed by the Applicant and implemented during the installation phase of the Marine Scheme;
- A Protocol for Archaeological Discovered will be adopted;
- Micro-routing within the consented corridor for the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints; and
- Implementation of archaeological exclusion zones if applicable.

A full suite of designed in measures will be provided as part of the EIA.

14.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 14.4) and the understanding of the marine archaeological and cultural heritage baseline.

The potential impacts for marine archaeology and cultural heritage receptors are summarised in Table 14-3. The scope of potential cumulative and transboundary impacts on marine archaeology and cultural heritage receptors is discussed in section 14.8 and is summarised in Table 16-1.

Table 14-3 Scoping of potential impacts for marine archaeology and cultural heritage receptors

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Direct loss of or damage to known marine and intertidal historic environment assets arising from cable installation.	Scoped-In	<p>Any aspects of the Marine Scheme that impacts the seabed or intertidal zone have the potential to result in the damage/loss of archaeological features lying on the seabed if such assets are shown to be present. The primary aspects which would be likely to cause impacts to any archaeological assets would be from pre-sweep (subsea plough and pre-lay grapple, pre-sweep dredging) etc. Similar effects may be expected from installation, operations and maintenance or decommissioning vessels anchoring systems that impact the seabed.</p> <p>The removal of other objects or structures such as boulders may result in potential damage to archaeological assets. Effects are considered to be permanent.</p>	Desk based assessment of existing data sources alongside any relevant information from the geophysical technical report which will be reviewed from an archaeological perspective.	Desk based assessment considering the maximum design scenario of the Marine Scheme
Indirect loss of or damage to known marine and intertidal historic environment assets arising from cable installation.	Scoped-In	<p>Any aspects of the Marine Scheme that impacts the seabed or intertidal zone have the potential to result in the damage/loss of archaeological features lying on the seabed if such assets are shown to be present. The primary aspects which would be likely to cause impacts to any archaeological assets would be from pre-sweep (subsea plough, pre-lay grapple, pre-sweep dredging). Similar effects may be expected from installation, operations and maintenance or decommissioning vessels anchoring systems that impact the seabed.</p> <p>The removal of other objects or structures such as boulders may result in potential damage to archaeological assets. Effects are considered to be permanent.</p>	Desk based assessment of existing data sources alongside any relevant information from the geophysical technical report which will be reviewed from an archaeological perspective.	Desk based assessment considering the maximum design scenario of the Marine Scheme
Direct loss of or damage to unknown marine and intertidal historic environment assets arising from cable installation.	Scoped-In	<p>Any aspects of the Marine Scheme that impacts the seabed or intertidal zone have the potential to result in the damage/loss of archaeological features which may lie undiscovered on or below the surface of the seabed or in the intertidal zone, if any are present. The primary aspects which would be likely to cause impacts to any archaeological assets would be from pre-sweep (subsea plough, pre-lay grapple, pre-sweep dredging). Similar effects may be expected from installation, operations and maintenance or decommissioning vessels anchoring systems that impact the seabed.</p> <p>The removal of other objects or structures such as boulders may result in potential damage to archaeological assets. Effects are considered to be permanent.</p>	Desk based assessment of existing data sources alongside any relevant information from the geophysical technical report which will be reviewed from an archaeological perspective.	Desk based assessment considering the maximum design scenario of the Marine Scheme
Indirect loss of or damage to unknown marine and intertidal historic environment	Scoped-In	<p>Any aspects of the Marine Scheme that impacts the seabed or intertidal zone have the potential to result in the damage/loss of archaeological features which may lie undiscovered on or below the surface of the seabed or in the</p>	Desk based assessment of existing data sources alongside any relevant information from the geophysical technical report which will be reviewed from an archaeological perspective.	Desk based assessment considering the maximum design scenario of the Marine Scheme

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
assets arising from cable installation.		<p>intertidal zone, if any are present. The primary aspects which would be likely to cause impacts to any archaeological assets would be from pre-sweep (subsea plough, pre-lay grapple, pre-sweep dredging). Similar effects may be expected from installation, operations and maintenance or decommissioning vessels anchoring systems that impact the seabed.</p> <p>The removal of other objects or structures such as boulders may result in potential damage to archaeological assets. Effects are considered to be permanent</p>		
Loss of or damage to submerged prehistoric landscapes arising from cable installation.	Scoped-In	<p>Any aspect of the Marine Scheme that impacts the seabed or intertidal zone have the potential to result in the damage/loss of archaeological features which may lie undiscovered on or below the surface of the seabed or in the intertidal zone, if any are present. The primary aspects which would be likely to cause impacts to any archaeological assets would be from pre-sweep (subsea plough, pre-lay grapple, pre-sweep dredging). Similar effects may be expected from installation, operations and maintenance or decommissioning vessels anchoring systems that impact the seabed.</p> <p>The removal of other objects or structures such as boulders may result in potential damage to archaeological assets. Effects are considered to be permanent</p>	Desk based assessment of existing data sources alongside any relevant information from the geophysical technical report which will be reviewed from an archaeological perspective.	Desk based assessment considering the maximum design scenario of the Marine Scheme
Potential impacts on the setting of heritage assets from the presence of vessels during the installation/decommissioning activities	Scoped-Out	<p>The cable installation/decommissioning activity will be temporary and localised.</p> <p>The temporary and localised nature will be unlikely to alter the historic seascape character and it is likely that the potential impacts to the historic environment assets will not be significant.</p>	N/A	N/A
Operation and Maintenance				
Long-term changes to the setting of historic environment assets arising from cable installation.	Scoped-Out	The cable installation activity will be temporary and localised. Additionally, the cables will be buried, which will make any potential impacts to the setting of the historic environment assets not likely to be significant.	N/A	N/A

14.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on marine archaeology and cultural heritage receptors. There is the potential for cumulative offshore marine archaeology and cultural heritage impacts to occur during the installation phase of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is no potential for transboundary impacts on marine archaeology and cultural heritage receptors to arise as a result of construction, operation and maintenance or decommissioning activities associated with the Marine Scheme. Any potential impacts associated with the Marine Scheme will be highly localised. Potential transboundary impacts will not be assessed further within the ES.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to marine archaeology and cultural heritage.

14.9. PROPOSED EIA METHODOLOGY

The marine archaeology and cultural heritage EIA chapter is proposed to be an entirely desk-based study of existing data sources. The Applicant is committed to undertaking a more detailed geophysical and geotechnical survey and will undergo a pre-construction assessment to investigate any anomalies of potential archaeological interest. The Applicant is also committed to undergo a full archaeological review and assessment of all the relevant geophysical and geotechnical data which is collected pre-construction. Any relevant information from the geophysical technical report will be reviewed from an archaeological perspective alongside the desk-based study of existing data sources.

The Applicant will also produce a Technical Report and Written Scheme of Investigation (WSI) to characterise the baseline environment of the Marine Scheme, proposed to be produced post-consent. A Technical Report and WSI has been completed for the BBWF array area and will be submitted within the EIA. The methodology for the Technical Report and WSI produced for the Marine Scheme will follow the same approach. For the avoidance of doubt, the WSI and Technical Report produced for the Marine Scheme will encompass the area of the Marine Scheme outwith the BBWF array area. The information which will be collected from the desktop review will come from previous projects (such as Inch Cape OWF, Seagreen OWF, Scotland England Green Link 1, Eastern Green Link 2, North Sea Link, Blyth Demonstrator), and from publicly available sources. The primary information which will be gathered will originate from:

- BBWF array area Technical Report and WSI;
- UKHO records on wrecks and obstructions;
- Canmore the National Records of the Historic Environment HES;
- Historic England Records;
- Wreck Site EU;
- Maritime records held by Northumberland Historic Environment Records; and
- Bureau of Aircraft Accidents Achieve.

The baseline data which will be produced from the available records will be used to determine the location and types of known wrecks and other anomalies which are present within the study area and have potential archaeological significance. Consultation with archaeologist will occur prior to any of the previously mentioned pre-construction surveys. There is potential to impact archaeological assets which have not yet been identified; to reduce this impact the Applicant will undergo consultation with archaeologists to analyse the pre-construction surveys.

The assessment of impacts for marine archaeology and cultural heritage will be conducted in line with the process identified in section 4, in line with standard industry guidance and the relevant legislation outlined in section 2. The marine archaeology and cultural heritage will also use the specific legislation and guidance as detailed above. In addition to the relevant guidance the marine archaeology and cultural heritage will also undergo consultation with Historic Environment Scotland and Historic England for further support.

14.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the marine archaeology assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

15. OTHER SEA USERS

15.1. INTRODUCTION

This section outlines the key sensitivities and potential impacts arising from the Marine Scheme on other sea users throughout construction, operation and maintenance and decommissioning phases. The other sea users which are considered within this section include:

- Offshore renewable energy projects;
- Nearshore energy projects;
- Dredging and disposal activities;
- Military and defence activities;
- Aquaculture;
- Oil and gas activities;
- Recreation and tourism; and
- Other third party infrastructure.

A number of other users of the sea are addressed separately (for example commercial fisheries in section 12 and shipping and navigation in section 13) and should be considered alongside this section.

Marine socio-economic considerations will be addressed within this section, and within the ensuing ES. Based on the nature of the Marine Scheme, there is a relatively limited supply chain and a small number of specialist roles anticipated during the installation of offshore export cables (and no regular, permanent roles during the O&M phase). There is some potential for disturbance to other sea users which may have socio-economic implications; the assessment will therefore be informed by other topic-specific assessments (such as those undertaken for commercial fisheries and shipping and navigation).

The assessment will be proportionate to the potential impacts associated with the Marine Scheme and therefore a detailed, dedicated assessment will not be undertaken within a standalone chapter.

15.2. POLICY AND GUIDANCE

The other sea users impact assessment will be undertaken in line with the methodology set out in section 4. The specific legislation and guidance documents below will also be considered in relation to the assessment. In addition, any upcoming guidance being developed will be utilised where appropriate.

15.2.1. NATIONAL POLICY

The following national policies are considered relevant to the assessment of other sea users receptors across the Marine Scheme:

15.2.1.1. UK (England and Scotland)

- UK Marine Policy Statement (MPS) (HM Government, 2011); and
- Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009).

15.2.1.2. Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010); and
- Scottish National Marine Plan (2015) (Scottish Government, 2015).

15.2.1.3. England

- North East Inshore and North East Offshore Marine Plan (HM Government, 2021); and
- East Inshore and East Offshore Marine Plan (HM Government, 2021).

15.2.2. GUIDANCE

The following guidance documents are considered relevant to the assessment of other sea users receptors across the Marine Scheme:

- International Cable Protection Committee (ICPC) Recommendation No.2. Cable Routing and Reporting Criteria (ICPC, 2015);
- International Cable Protection Committee (ICPC) Recommendation No.3. Cable and Oil Pipeline/ Power Cables Crossing Criteria (ICPC, 2014);
- International Cable Protection Committee (ICPC) Recommendation No.13. The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013);
- Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013);
- The European Subsea Cable Association (ESCA) guideline No.6. 'The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters' (ESCA, 2016); and
- Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs), produced by Oxford Brooks and Vattenfall (Glasson et al., 2020).

15.3. KEY DATA SOURCES

The key data and information sources that will be used to inform the other sea users baseline include:

- EMODnet (2022). Human Activities online mapping tool;
- Environment Agency (2022). Bathing waters;
- Finstrokes (2022). UK dive map;
- KIS-ORCA (2022). Offshore Renewables and Cables Awareness online mapping tool;
- Magic Seaweed (2022). Leisure Activities. UK and Ireland Surf Reports and Forecasts;
- MMO (2022). Marine Information System (MIS) online mapping tool;

- National Marine Plan Interactive (NMPi) (2022). Online mapping tool;
- North Sea Transition Authority (NSTA) (2022). Data centre;
- Royal Navy (2017). Exercise Joint Warrior;
- RYA (2019). UK Coastal Atlas of Recreational Boating;
- Scottish Government (2015). Scotland's National Marine Plan;
- TCE (2022). Asset Map;
- TeleGeography (2022). Submarine Cable Map 2022;
- UK Government (2021). North East Inshore and Offshore Marine Plan;
- UK Government (2022). Explore Marine Plans; and
- UKHO (2021). UK Practice and Exercise areas (PEXA) Marine Limits App.

In addition to the above, third party impact assessments of surrounding developments will also be utilised to help inform the baseline understanding of the study area including, but not limited to, the environmental appraisals for the Neart Na Gaoithe, Inch Cape, Seagreen Alpha and Bravo, SEGL1, Eastern Green Link 2, and BBWF Scoping Report (and the BBWF EIA Report once available).

This output will contribute to the baseline understanding of the other sea users in the area, as appropriate. It is however expected that wider baseline information which is available outside of the study area will be used to help inform the EIA (best-practice and professional judgment will be used to inform the relevance of such data).

15.4. STUDY AREA

For the purpose of this report, the study area for the other sea users baseline is defined as the area that will be directly impacted by the introduction of the offshore export cables and associated cable protection as well as a buffer of 10 NM (approximately 18 km). This buffer has been applied around the Scoping Boundary to consider the movement of mobile other sea users, and is consistent with what has been defined for shipping and navigation, as described in section 13.

15.5. BASELINE ENVIRONMENT

An initial desk-based review of literature and available data sources has been undertaken to describe the presence of other sea users in the offshore Marine Scheme environment and to inform the Scoping process. The following sections provide information on the key spatial differences across the other sea users study area.

Figure 15-1 outlines the other sea users associated with the Marine Scheme that have been assessed as part of this section.

15.5.1. OFFSHORE RENEWABLE ENERGY PROJECTS

The far north of the other sea users study area directly overlaps with the BBWF array area and part of the BBWF export cable route to Branxton. As discussed in section 1, BBWF is a separately consented wind farm application, from which the Cambois Connection will support the export of electricity.

The other sea users study area directly overlaps with the Blyth Demo (Phase 2) Wind Farm, an approved development of 10 turbines located approximately 8.5 km off the east coast of Blyth. Based on the most recent consenting data associated with this site (MMO, 2020b), it is understood that an array of five (floating) turbines will be installed instead of the previously consented 10 turbines. The other sea users study area also overlaps with the Blyth Demo (Phase 1) Wind Farm, in operation since 2018, located approximately 2 km off the coast of Blyth (Figure 15-1).

The Blyth Wind Farm, located approximately 1 km off the coast of Blyth, was commissioned in 2000 as a demonstration project. It was decommissioned in 2019.

There is no other direct overlap of the offshore study area with any other offshore renewable energy projects (either wind, wave or tidal projects). There are no current leasing agreements for any other wave, wind, or tidal energy developments within the vicinity of the other sea users study area or along the east coast of Scotland and Northumberland (Crown Estate Scotland, 2020; The Crown Estate, 2022).

15.5.2. RECREATIONAL ACTIVITIES

15.5.2.1. Recreational Boating

AIS data can be used to assess the average vessel density around the UK for all vessel types, including recreational boating. AIS data for recreational boating throughout the UK was defined by the RYA UK Coastal Atlas of Recreational Boating, as issued in September 2019 (RYA, 2019).

Recreational boating occurs in high number within nearshore waters within Scottish Territorial waters from ports at the Dunbar Sailing Club and the Eyemouth Harbour Trust at a low intensity (RYA, 2019). As the portion of the Marine Scheme within the Scottish EEZ does not directly interact with Scottish Territorial Waters it is not anticipated that there will be any potential impacts on recreational boating within Scottish waters.

Along the Northumberland coast there are a number of recreational boating activities, the nearest of which to the proposed landfall location occurs at the Port of Blyth. Recreation boating occurs from a low to moderate intensity along the coast of Northumberland within English Territorial waters, there is no recreational boating activity which occurs between 12 NM to 200 NM within the English EEZ (RYA, 2019). There is the potential for direct interaction with recreational boating at the proposed landfall location and extending approximately 10 km offshore.

Overall, recreational boating activity increases along the length of the other sea users study area from the Berwick Bank Offshore Wind Farm within the Scottish EEZ, through the English EEZ and into English Territorial Waters to the proposed landfall location where the average recreational boating intensity is highest.

An assessment of the potential impacts to shipping and navigation activities can be found in section 6.

15.5.2.2. Recreational Fishing

Sea fishing is a popular recreational activity within UK waters. Sea fishing can occur on many different platforms and on many different scales, including through the use of personal boats, kayaks, charter vessels or from the shore. Recreational sea fishing occurs in UK waters throughout the year with little seasonal variability (MMO, 2020a).

A survey carried out by The Scottish Government in 2009 estimated that within Edinburgh, Fife and the South East region of the country, approximately 250,000 annual sea angler days were spent (The Scottish Government, 2009). The effort expended by recreational fishers within Scottish waters was exclusively within the 12

NM limit of Scottish Territorial Waters. For this reason, it is not anticipated that there will be any interaction between recreational fishing and the other sea users study area, which lies outside 12 NM within the Scottish EEZ.

There is the potential for recreational fishing activities to interact with the portion of the other sea users study area. It is anticipated that there will be a low to moderate intensity level of interaction between recreational fishing and the other sea users within English Territorial Waters (MMO, 2014).

An assessment of the potential impacts to commercial fishing activities can be found within section 12.

15.5.2.3. Other Recreational Activities

Other sporadic recreational activities may occur along the east coast on, however it is expected that these recreational activities will, for the most part occur in nearshore waters and will not directly interact with the other sea users study area. Given the sporadic nature of offshore recreational activities, it is difficult to predict the extent of potential interaction between these receptors and the other sea users study area. As a result, the assessment of other recreational activities and their potential interaction with the Marine Scheme activities is relatively high level and is not intended to be an exhaustive list of receptors.

The Northumberland coastline offers a number of dive sites to explore, including Newton, Beadnell and Seahouses. The Farne Islands is one of the most popular dive locations off the Northumberland coast and boasts close up encounters with the 5,000 strong colony of grey seals which inhabit the islands. There are no dive sites that interact with the other sea users study area within the Scottish EEZ (PADI, 2022). There are no dive sites which interact with the proposed landfall location, or that lie within a 10 km radius of the proposed landfall location (PADI, 2022).

There are no surfing activities identified within the nearshore other sea users study area towards the proposed landfall location. The closest notable surfing area is Seaton to Blyth, approximately 6 km to the south of the proposed landfall location (Magic Seaweed, 2022).

An assessment of designated water bodies that have potential interaction with the other sea users study area can be found in section 6.

15.5.3. SUBSEA CABLES AND UTILITIES

There are several subsea cables within the North Sea which are used for telecommunications and the transfer of power between offshore and onshore infrastructure and between nations (DECC, 2016).

The North Sea Link subsea interconnector cable is located within the other sea users study area. The North Sea Link cable is the world's longest subsea interconnector cable (approximately 720 km long) linking the UK and Norway and making landfall on the Cambois coast. The point of landfall for the North Sea Link cable is within Cambois Bay and within the proposed area of consideration for the landfall location for the Marine Scheme. The North Sea Link cable became operational in 2021 and, as a result, works associated with the construction, operation and maintenance and decommissioning phases of the Marine Scheme have the potential to overlap with works associated with the operation and maintenance and decommissioning phases of the North Sea Link interconnector cable (Figure 15-1).

The other sea users study area also overlaps with the proposed SEGL1 and Eastern Green Link 2 (EGL2) cables. Both are subsea High Voltage Direct Current (HVDC) cables. SEGL1 will be a link between Torness in East Lothian, Scotland, and Hawthorn Pit in County Durham, England. Marine installation activities are currently scheduled to commence in 2025 and finish in 2027. Marine licence applications have been made to both MS-LOT and the MMO.

SEGL2 will be a link between Peterhead in Aberdeenshire, Scotland, and Drax in North Yorkshire, England. Marine installation activities are currently scheduled to commence in 2025 and finish in 2029. The marine licence application for SEGL-2 was submitted to the MMO and MS-LOT in June 2022.

Both SEGL1 and SEGL2 run approximately in parallel with one another off the North East of England. SEGL1 lies within 12 NM of the coast in its entirety and will be crossed by the Cambois Connection cable as it continues down the coast to its landfall at Seaham, County Durham. The SEGL2 cable route is mostly located beyond the 12 NM limit and will come into close proximity with the Marine Scheme other sea users study area further offshore.

The PANGEA Segment 1 cable, approximately 65 km to the south of the proposed landfall location is the closest telecommunication cable to the other sea users study area. The Viking Link is the closest subsea cable to the other sea users study area, approximately 278 km to the south.

15.5.4. MILITARY AND DEFENCE ACTIVITIES

The MoD operates throughout UK territorial waters and adjacent seas where they carry out maritime and aerial training activities and surveillance of any potential threats to national security. Offshore defence activities include the operation of naval vessels, navigational interests, underwater acoustic ranges, maritime exercise areas, amphibious exercises, coastal training ranges and coastal test and evaluation ranges.

The other sea users study area overlaps with:

- D613C, an area of intense aerial activity (or 'AIAA');
- D613D, an AIAA;
- X5641: FORTH OUTER, a military practice area flagged for submarine exercise and practice;
- D513: DRURIDGE BAY, a military practice area flagged for surface danger and firing danger; and
- D513A: DRURIDGE BAY, a linked practice area within D513.

15.5.5. AQUACULTURE

The UK is a global leader in aquaculture, primarily relating to salmon and trout farming and mussel production. Most of the UK aquaculture activities are located on the west coast of Scotland.

The North East Inshore and North East Offshore Marine Spatial Plans recognise that the aquaculture industry is important and that there is the potential for growth of this sector to support increasing demand. The MMO supports sustainable aquaculture production within spatially defined areas. The MMO identifies a number of areas within the North East Inshore Marine Spatial Plan as 'strategic areas of sustainable aquaculture production'. The proposed landfall location overlaps with an area of strategic sustainable aquaculture production.

There are no active finfish or shellfish marine aquaculture sites within the other sea users study area (Figure 15-1).

15.5.6. OIL AND GAS ACTIVITIES

The other sea users study area is located within the Central North Sea (CNS) which is a well-developed area for oil and gas infrastructure and extraction (DECC, 2016). These infrastructures include pipelines, wells and surface and subsurface infrastructure. There is currently no oil and gas infrastructure relating to active licenses or boreholes that overlap with the other sea users study area (Figure 15-1). There are no offshore installations that directly overlap with the other sea users study area, nor any within 50 km of the offshore export cable corridor (EMODnet, 2022).

It is acknowledged that the North Sea Transition Authority has begun a new licensing round in the UK to allow fossil fuel exploration and extraction. The licensing process is due to continue until June 2023 and offers up to 900 locations for exploration. This will be monitored during preparation of the ES baseline to identify any interactions with potential sites.

Given the extensive infrastructure within the CNS, it is expected that the rate of decommissioning works of offshore oil and gas infrastructure within the vicinity of the Marine Scheme will result in the potential overlap of the decommissioning of these structures and operations associated with the Marine Scheme. Despite there being little oil and gas infrastructure within the immediate vicinity of the other sea users study area, there is the potential transit of vessels associated with decommissioning works for oil and gas installations within the wider CNS to directly interact with the other sea users study area during the construction, operation and maintenance and decommissioning phases of the Marine Scheme.

15.5.7. LICENCED SPOIL DISPOSAL SITES

Licensed spoil disposal sites are primarily located within inshore coastal waters. The other sea users study area overlaps with three dredge spoil dumping sites located approximately 8 km off the east coast of Blyth. These dredge spoil dumping sites are:

- TY042 (operational since 2017);
- TY043 (operational since 2017); and
- Tyne Industrial.

The other sea users study area coincides with two active urban wastewater discharge points located within the coastal waters off Cambois. Both urban wastewater treatment discharge points have been active since 2012.

There is no potential overlap with any other licences spoil disposal sites, including waste at ports or dumped munitions.

15.5.8. NUCLEAR INFRASTRUCTURE

There is no nuclear infrastructure within the vicinity of the other sea users study area and therefore nuclear infrastructure will not be considered further within this section.

15.5.9. OTHER INFRASTRUCTURE

St Mary's Island, Tyne and Wear, Blyth East Pier Head and Northumberland Lighthouses are located within the other sea users study area. At present, these at-sea lighthouses are still in place (status defined as 'not removed, relocated or destroyed').

15.6. DESIGNED IN MEASURES

At this early stage in the development of the Marine Scheme, it is not possible to provide an exhaustive list of topic-specific mitigation however measures which the Applicant is committed to considering and applying to the Marine Scheme are detailed below:

- The use of rock protection will be minimised as far as possible, and only used where required (i.e., where target burial using installation tools cannot be achieved, at crossings and the landfall, for example). This will be informed by outputs from the Cable Burial Risk Assessment completed prior to the commencement of installation;
- Placement of scour protection will also be minimised as far as possible, however a level of protection may be required at certain locations;
- A CEMP will be developed and employed;
- An OEMP will be developed and employed;
- Timely and efficient distribution of NtM, Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Marine Scheme ahead of commencement of the installation of the Marine Scheme;
- Information related to the areas where cable protection is required will be provided to relevant organisations for inclusion on charts and relevant bulletins;
- Micro-routing within the consented corridor for the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints; and
- Where crossing of existing or future third party infrastructure is unavoidable, these will be subject to crossing/proximity agreements per the guidance.

A full suite of designed in measures will be provided as part of the EIA.

15.7. SCOPING OF POTENTIAL IMPACTS

Potential impacts have been identified and considered based on professional experience, the Project Design Envelope, relevant third party environmental reports (as summarised in section 15.4) and the understanding of the local other sea users baseline.

The potential impacts for other sea users receptors are summarised in Table 15-1 below. The scope of potential cumulative and transboundary impacts on other sea users receptors is discussed in section 15.8, and is summarised in Table 16-1.

Table 15-1 Scoping of potential impacts for other sea users receptors

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
Construction and Decommissioning				
Temporary obstruction to other offshore renewable energy projects (wind, wave or tidal)	Scoped-In	Pre-installation activities and the construction of the offshore export cables has the potential to interact with other offshore renewable energy infrastructure within the marine environment. Engagement will be carried out with third party asset owners and proponents of future infrastructure. Crossing and / or proximity agreements will be developed and agreed as required.	A desk-based analysis will be undertaken, supported by ongoing stakeholder engagement and consultation	A qualitative assessment will be undertaken based on the maximum design scenario for the Marine Scheme. Further details will be presented within the ES.
Temporary obstruction to marine recreational activities	Scoped-In	Pre-installation activities and the construction and decommissioning of the Marine Scheme has the potential to directly interact with marine recreational activities, particularly with recreational boating activities and recreational fishing activities within English Territorial Waters.	A desk-based analysis will be undertaken, supported by ongoing stakeholder engagement and consultation.	A qualitative assessment will be undertaken based on the maximum design scenario for the Marine Scheme. Further details will be presented within the ES.
Temporary disruption to oil and gas assets	Scoped-out	There is no direct interaction between the Marine Scheme and any oil and gas activities. It is not anticipated that safety distances around construction vessels will obstruct any oil and gas activities.	N/A	N/A
Risk of damage to / interference with other third party assets	Scoped-Out	Pre-installation geophysical and environmental surveys will ensure that an accurate understanding of subsea third party infrastructure is obtained. Should rock placement be required during cable installation, measures will be in place to minimise the area of impact and spread, thereby reducing the potential for damage to other subsea assets. In addition, numerous mitigation measures will be in place to ensure the risk of damage to third party assets is reduced as far as possible. Dropped objects will be subject to industry standard procedures. Additionally, NTMs measures will be in place. Overall, the opportunity for damage to third party assets is limited given the limited presence of such infrastructure close to the export cable corridor. In addition, crossing and / or proximity agreements will be in place where the cables will be adjacent to or required to cross third party	N/A	N/A

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		infrastructure (for example the North Sea Link and SEGL1 cables).		
Temporary disturbance to coastal tourism during installation	Scoped-Out	While the pre-installation, construction (and decommissioning) activities may cause displacement to coastal tourism activities (e.g. recreational fishing), the spatial and temporal extent of this disturbance is highly limited, temporary and reversible; therefore, this impact is scoped out.	N/A	N/A
Temporary obstruction to other infrastructure or activities, including defence	Scoped-In	The other sea users study area overlaps with the North Sea Link, SEGL1 and EGL2 cables, and potential activity associated with St Mary's Island, Tyne and Wear, Blyth East Pier Head, and Northumberland Lighthouses. The installation of the offshore export cable and the implementation of safety distances around construction vessels may result in the temporary obstruction of these other infrastructures, particularly where construction timelines should coincide (eg. SEGL1 and EGL2). The study area interacts with a number of military areas; direct engagement with the MoD will be carried out, as required (alongside the technical consultation associated with this Scoping Report).	A desk-based analysis will be undertaken, supported by ongoing stakeholder engagement and consultation	A qualitative assessment will be undertaken based on the maximum design scenario for the Marine Scheme. Further details will be presented within the ES.
Operation and Maintenance				
Obstruction to other sea users arising from the presence of the Marine Scheme	Scoped-Out	Once installation has concluded, the Marine Scheme will be entirely subsea. Please note, impacts to commercial fisheries are considered in section 12 and will ultimately be assessed in the ES. Overall, the presence of infrastructure and the implementation of safety distances around project maintenance vessels has limited potential to obstruct activities of nearby third party developments.	N/A	N/A
Disturbance to other sea users arising from operation and maintenance activity, including vessel movements	Scoped-Out	The presence of infrastructure and Marine Scheme vessels relating to operation and maintenance works has the potential to obstruct marine recreational activities. However,	N/A	N/A

Impact	Scoping Result	Justification	Information required to inform the Assessment	Assessment Method
		the scope and duration of vessel presence will be highly limited. No infrastructure installation is planned as part of the Marine Scheme during the operation and maintenance phase. Additionally, all vessels will be subject to key mitigation (including NTMs as outlined in the preceding sections). Overall, due to the mitigation measures in place and the spatially and temporally limited presence of vessels, this has been scoped out.		

15.8. POTENTIAL CUMULATIVE AND TRANSBOUNDARY IMPACTS

Although the predicted effects of the Marine Scheme are anticipated to be localised, there is the possibility that certain impacts from the Marine Scheme may interact with other projects, plans and activities, which could result in a cumulative effect on other sea user receptors. There is the potential for cumulative offshore other sea user impacts to occur during all phases of the Marine Scheme. The projects to be considered as part of the Cumulative Impact Assessment are summarised in Table 4-5. The assessment will be made based on information in the public domain, and in line with the methodology outlined in section 4.

There is no potential for transboundary impacts upon other sea user receptors due to construction, operation, maintenance and decommissioning of the Marine Scheme. No other sea users receptors associated with other European Economic Area (EEA) states have been identified and therefore will not be assessed further.

Table 16-1 summarises where cumulative and transboundary impacts have been scoped in or scoped out for specific potential impacts with regards to other sea users.

15.9. PROPOSED EIA METHODOLOGY

Consultation will be undertaken with all relevant developers, operators and marine users within the vicinity of the Marine Scheme to inform the EIA as far as possible. Any areas of concern will be identified and considered within the EIA. The potential direct and indirect impacts of the Marine Scheme on other sea users receptors will be considered both alone and cumulatively with other offshore projects. The sensitivity of each receptor will be considered on a case-by-case basis and the relevant mitigation measures will be made depending on the sensitivity and value of the impacted user or activity. It is likely that any impacts will either be non-significant or able to be fully mitigated after consultation with the relevant stakeholders.

Owing to the potential creation of jobs associated with the Project, albeit limited, marine socio-economic considerations will be considered qualitatively within the ES. Potential socio-economic impacts of the Onshore Scheme, both beneficial and adverse, will however be considered within the scope of the Onshore Scheme EIA. This is discussed further within the separate Scoping Report prepared in support of a request for a formal Scoping Opinion from NCC.

The assessment of impacts for other sea users will be conducted in line with the process identified in section 4, in line with standard industry guidance and the relevant legislation outlined in section 2.

15.10. SCOPING QUESTIONS

- Do you agree with the study area defined for the other sea users ecology assessment?
- Do you agree that all available information and data sources have been identified to inform the baseline? Are there any other information and data sources that should be considered?
- Do you agree with the scoping decisions of potential impacts?
- Do you agree with the scoping in of potential cumulative impacts?
- Do you agree with the scoping out of potential transboundary impacts?
- Do you agree with the proposed approach to EIA methodology? Do you agree with the stakeholder and consultees identified as part of the proposed EIA methodology?

16. SUMMARY OF SCOPING REPORT

16.1. OVERVIEW

Table 16-1 summarises the scoping of potential impacts for all assessed receptors within the Marine Scheme Scoping Report.

Table 16-1 Summary of Scoping of Potential Impacts for the Cambois Connection Marine Scheme

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Offshore Physical Environment and Seabed Conditions					
Change to seabed levels and sediment properties due to installation of export cables	✓	N/A	✓	✓	X
Increases to suspended sediment concentrations (SSC) due to installation of export cables, and redeposition of the suspended sediment	✓	N/A	N/A	✓	X
Impact on designated features within the designated sites from export cable installation	✓	N/A	✓	✓	X
Change to coastal landfall morphology	✓	N/A	✓	✓	X
Potential changes to the tidal, wave and sediment transport regimes as a result of blockage effects from scour protection measures	N/A	✓	N/A	X	X
Introduction of scour	N/A	✓	N/A	X	X
Water and Sediment Quality					

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Potential impacts to shellfish waters as a result of increased suspended sediment concentration and potential release of contaminants	X	X	X	X	X
Potential impacts to designated waterbodies as a result of increased suspended sediment concentrations and potential release of contaminants	X	X	X	X	X
Benthic Subtidal and Intertidal Ecology					
Temporary benthic habitat / species loss or disturbance	✓	N/	✓	✓	X
Permanent benthic habitat / species loss or disturbance, and permanent change/alteration to substrata and habitats.	N/A	✓	N/A	✓	X
Temporary increase in underwater noise on benthic species	X	N/A	X	X	X
Increased SSC and associated deposition (including mobilisation of potential contaminants)	✓	✓	✓	✓	X
Increased risk of introduction of Invasive Non-Native Species (INNS)	X	X	X	X	X
Accidental release of pollutants	X	X	X	X	X
Colonisation of hard substrates	N/A	✓	N/A	✓	X
Changes in physical processes from cable protection measures	N/A	✓	N/A	✓	X

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Impacts on benthic communities as a result of thermal load of EMF arising from the cable during operation	N/A	X	N/A	X	X
Fish and Shellfish Ecology					
Temporary habitat and species loss or disturbance	✓	N/A	✓	✓	X
Temporary increases in suspended sediment concentration (SSC) and associated sediment deposition and potential release of contaminants	✓	N/A	✓	✓	X
Underwater noise	X	N/A	X	X	X
Accidental release of pollutants	X	X	X	X	X
Pre-installation surveys including – geophysical / geotechnical / archaeological surveys	X	N/A	X	X	X
EMF effects	N/A	✓	N/A	✓	X
Long-term habitat loss and disturbance	N/A	✓	N/A	✓	X
Thermal emissions from operational cables	N/A	X	N/A	X	X
Offshore and Intertidal Ornithology					
Disturbance from construction / decommissioning activities	✓	N/A	✓	✓	✓

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Disturbance to prey species and habitat of prey species, including through SSC / disturbance of contaminants as well as localised deterioration of water quality	✓	N/A	✓	✓	✓
Accidental release of contaminants	X	X	X	X	X
Displacement of seabirds from the Marine Scheme	N/A	X	N/A	X	X
Marine Mammals and Other Megafauna					
Noise-related impacts associated with construction noise, including physiological impacts, barrier effects and displacement	✓	N/A	✓	✓	✓
Indirect impacts of construction noise on the prey species of marine mammals and other megafauna	X	N/A	X	X	X
Disturbance to prey species and habitats of prey species through temporary increases in SSC and associated sediment deposition and potential release of contaminants	✓	N/A	✓	✓	X
Disturbance due to the physical presence of vessels	X	N/A	X	X	X
Risk of injury resulting from collision of marine mammals and other megafauna with installation vessels	X	N/A	X	X	X
Impacts associated with effects upon marine water quality, particularly due to any disturbed sediments affecting turbidity	X	N/A	X	X	X

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Accidental release of pollutants	X	N/A	X	X	X
Pre-installation surveys including – geophysical / geotechnical / archaeological surveys	✓	N/	✓	✓	X
Displacement or barrier effects resulting from the physical presence of devices and infrastructure	N/A	X	N/A	X	X
Risk associated with EMFs associated with subsea cabling	N/A	X	N/A	X	X
Risk of injury resulting from collision of marine mammals and other megafauna with operations and maintenance vessels	N/A	X	N/A	X	X
Long term habitat change, including the potential for change in foraging opportunities	N/A	✓	N/A	✓	X
Commercial Fisheries					
Temporary loss, displacement or restricted access to fishing grounds due to the presence of vessels and safety zones during route preparation activities	✓	N/A	✓	✓	✓
Temporary loss, displacement or restricted access to fishing grounds due to presence of vessels and safety zones during construction and decommissioning	✓	N/A	✓	✓	✓
Interference with fishing activity as a result of increased vessel traffic, including potential increases to steaming times	✓	N/A	✓	✓	✓

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Potential for fishing gear to become entangled with subsea structures, resulting in damage or loss of fishing gear	N/A	✓	N/A	✓	✓
Long-term habitat loss and disturbance	N/A	✓	N/A	✓	✓
Long-term reduced access to key fishing grounds and resultant displacement	N/A	✓	N/A	✓	✓
Shipping and Navigation					
Requirement for vessel transit outside established and identified vessel passage / routes due to construction activities	✓	N/A	✓	✓	X
Collision between project vessels and infrastructure and third party activities and operations (including vessel interaction with subsea cables)	X	N/A	X	X	X
Reduced access to local ports due to construction activities	✓	N/A	✓	✓	X
Commercial shipping traffic displacement due to presence of project infrastructure	N/A	X	N/A	X	X
Fishing vessel and recreational vessel displacement due to the presence of project infrastructure	N/A	X	N/A	X	X
Collision risk between third party vessels and project vessels	N/A	X	N/A	X	X

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Increased risk of third party vessel-to-vessel collision due to displacement	N/A	X	N/A	X	X
Increased risk of vessel-to-vessel collision involving fishing and/or recreational vessels as a result of displacement	N/A	X	N/A	X	X
Increased risk of vessel to structure collision	N/A	X	N/A	X	X
Increased risk of fishing vessel in transit collision risk with Project infrastructure	N/A	X	N/A	X	X
Reduced access to local ports as a result of maintenance activities associated with the Marine Scheme	N/A	✓	N/A	✓	X
Reduction in under keel clearance as a result of cable protection methods	N/A	✓	N/A	✓	X
Potential interferences with marine navigational equipment	N/A	✓	N/A	✓	X
Potential anchor interactions with subsea cables	N/A	X	N/A	X	X
Marine Archaeology and Cultural Heritage					
Direct loss of or damage to known marine and intertidal historic environment assets arising from cable installation	✓	N/A	✓	✓	X
Indirect loss of or damage to known marine and intertidal historic environment assets arising from cable installation	✓	N/A	✓	✓	X

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Direct loss of or damage to unknown marine and intertidal historic environment assets arising from cable installation	✓	N/A	✓	✓	X
Indirect loss of or damage to unknown marine and intertidal historic environment assets arising from cable installation	✓	N/A	✓	✓	X
Loss of or damage to submerged prehistoric landscapes arising from cable installation	✓	N/A	✓	✓	X
Potential impacts on the setting of heritage assets from the presence of vessels during the installation/ decommissioning activities	X	N/A	X	X	X
Long-term changes to the setting of historic environment assets arising from cable installation	N/A	X	N/A	X	X
Other Sea Users					
Temporary obstruction to other offshore renewable energy projects (wind, wave or tidal)	✓	N/A	✓	✓	X
Temporary obstruction to marine recreational activities	✓	N/A	✓	✓	X
Temporary disruption to oil and gas assets	X	N/A	X	X	X
Risk of damage to / interference with third party assets	X	N/A	X	X	X
Temporary disturbance to coastal tourism during installation	X	N/A	X	X	X

Potential Impact	Construction Phase	O&M Phase	Decommissioning Phase	Cumulative Impacts	Transboundary Impacts
Temporary obstruction to other infrastructure or activities, including defence	✓	N/A	✓	✓	X
Obstruction to other sea users arising from the presence of the Marine Scheme	N/A	X	N/A	X	X
Disturbance to other sea users arising from operation and maintenance activities, including vessel movements	N/A	✓	N/A	X	X

17. REFERENCES

ABPmer and HR Wallingford (2009). Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide. Available at: https://www.researchgate.net/publication/228784265_Coastal_Process_Modelling_for_Offshore_Wind_Farm_Environmental_Impact_Assessment_Best_Practice_Guide

ABPmer (2012). Marine Scotland Licensing and Consents Manual covering marine renewables and offshore wind energy development. Report commissioned for Marine Scotland. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2020/02/marine-licensing-applications-and-guidance/documents/guidance/guidance-manual-for-offshore-wind-wave-and-tidal-energy-application/guidance-manual-for-offshore-wind-wave-and-tidal-energy-application/govscot%3Adocument/Guidance%2BManual%2Bfor%2BOffshore%2BWind%252C%2BWave%2Band%2BTidal%2BEnergy%2BAplication.pdf>

ABPmer. (2018). Seastates. Available online at: <https://www.seastates.net/explore-data/>

ABPmer. (2019). UK Renewables Atlas. Available online at: <https://www.renewables-atlas.info/explore-the-atlas/>

Aires, C., González-Irusta, J.M. and Watret, R. (2014). Updating fisheries sensitivity maps in British waters. Marine Scotland Science.

Austin, R.A., Hawkes, L.A., Doherty, P.D., Henderson, S.M., Inger, R., Johnson, L., Pikesley, S.K., Solandt, J.L., Speedie, C. and Witt, M.J. (2019). Predicting habitat suitability for basking sharks (*Cetorhinus maximus*) in UK waters using ensemble ecological niche modelling. *Journal of Sea Research*, 153, p.101767.

BAAA (2022). Blyth | Bureau of Aircraft Accidents Archives. Available online at: <https://www.baaa-acro.com/city/blyth>

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J. (2013). *Bird Atlas 2007–11: the breeding and wintering birds of Britain and Ireland*. BTO Books, Thetford.

Bates, M.R., Nayling, N., Bates, R., Dawson, S., Huws, D. and Wickham-Jones, C. (2013). A Multi-Disciplinary Approach to the Archaeological Investigation of a Bedrock-Dominated Shallow-Marine Landscape: an example from the Bay of Firth, Orkney, UK. *The International Journal of Nautical Archaeology* 42:24-43.

Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. (2011) *Scotland's Marine Atlas: Information for the national marine plan*. Marine Scotland, Edinburgh. 191pp.

Benyon Review (2021). Government response to the Highly Protected Marine Areas (HPMAs) review. Available at: <https://www.gov.uk/government/publications/government-response-to-the-highly-protected-marine-areas-hpmas-review/government-response-to-the-highly-protected-marine-areas-hpmas-review>

- BERR. (2008). Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Cabling_Techniques_and_Environmental_Effects.pdf
- BGS. (2001). North Sea Geology. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/197333/TR_SEA2_Geology.pdf
- BGS. (2021). Geoindex Offshore. Available online at: http://mapapps2.bgs.ac.uk/geoindex_offshore/home.html#
- BirdLife International. (2006-2014). BirdLife International Seabird Tracking Database. Available online at: <http://www.seabirdtracking.org/>
- BODC. (2022). Marine data sharing and preservation, managed & operated by the National Oceanography Centre Available online at: <https://www.bodc.ac.uk/>
- Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W.G. and Hume, D. (2014). Mapping Seabird Sensitivity to Offshore Wind Farms. PLOS ONE, 12 (1), pp. 1-17.
- British Trust for Ornithology (BTO). (2022). Wetland Bird Survey Data. Available online at: <https://www.bto.org/our-science/projects/wetland-bird-survey/data>
- Burt, G., Goldsmith, D. and Armstrong, M. (2006). A summary of demersal fish tagging data maintained and published by Cefas. Sci. Ser. Tech Rep., Cefas Lowestoft, 135: 40pp.
- BSI (2015). EIA Guidance for Offshore Renewable Energy Projects – Guidebook. Available at: <https://www.bsigroup.com/en-GB/about-bsi/media-centre/press-releases/2015/april/Offshore-renewable-energy-guide-published/>
- Canmore. (2019). The NRHE of Scotland | Canmore. Available online at: <https://canmore.org.uk/>
- Carter, M.I., Boehme, L., Duck, C.D., Grecian, J., Hastie, G.D., McConnell, B.J., Miller, D.L., Morris, C., Moss, S., Thompson, D. and Thompson, P. (2020). Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles: Report to the Department for Business, Energy and Industrial Strategy (BEIS), OESEA-16-76, OESEA-17-78.
- Cefas (2004). Offshore wind farms: guidance note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2. Available at: <https://www.cefas.co.uk/publications/files/windfarm-guidance.pdf>
- Cefas (2011). Guidelines for Data Acquisition to support Marine Environmental Assessments of Offshore Renewable Energy Projects. Available at: https://tethys.pnnl.gov/sites/default/files/publications/CEFAS_2012_Environmenta_Assessment_Guidance.pdf

Cefas. (2016). Suspended sediment climatologies around the UK. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf

Cefas. (2019). Salmon Stocks and Fisheries in England and Wales in 2018. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/919734/SalmonReport-2018-assessment_final.pdf#:~:text=DESCRIPTION%20OF%20STOCKS%20AND%20FISHERIES%20There%20are%2049,64%20rivers%20have%20been%20designated%20%E2%80%98principal%20salmon%20rivers%E2%80%99.

Cefas. (2022). OneBenthic. Available online at: https://rconnect.cefas.co.uk/action_levels_tool/

Cefas. (2022). WaveNet. Available online at: <https://wavenet.cefas.co.uk/Map>

CIEEM. (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal, and Marine. Available online at: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf>

Cleasby, I.R., Owen, E., Wilson, L. and Bolton, M. (2018). Combining Habitat Modelling and Hotspot Analysis to Reveal the Location of High Density Seabird Areas Across the UK: Technical Report (No. 63). RSPB Research Report.

Coull, K.A., Johnstone, R. and Rogers, S.I. (1998). Fisheries Sensitivity Maps in British Waters. UKOOA Ltd: Aberdeen.

COWRIE. (2008). Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy by Oxford Archaeology & George Lambrick Archaeology and Heritage. Available online at: <http://www.biofund.org.mz/wp-content/uploads/2018/11/F1349.Cowrie-Ciarch-Web.pdf>;

Crosby, A. (1995). Chapter 4.1 Estuaries. In: Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., and Davidson, N.C., eds. 1995. Coasts and seas of the United Kingdom. Region 5 North-east England: Berwick-upon-Tweed to Filey Bay. Peterborough, Joint Nature Conservation Committee. Available online at: <https://data.jncc.gov.uk/data/6473ed35-d1cb-428e-ad69-eb81d6c52045/pubs-csuk-region-05.pdf>

Crown Estate Scotland. (2020). Energy and Infrastructure Spatial Data. Available online at: <https://www.crownestatescotland.com/resources/documents>

De Robertis, A. and Handegard, N.O. (2013). Fish avoidance of research vessels and the efficacy of noise-reduced vessels: a review. ICES Journal of Marine Science, 70(1), pp.34-45.

Dean, B.J., Webb, A., McSorley, C.A. and Reid, J.B. (2003). Aerial surveys of UK inshore areas for wintering seaduck, divers and grebes: 2000/01 and 2001/02. JNCC Report No. 333, JNCC, Peterborough.

DECC. (2016). UK Offshore Energy SEA 3 – Appendix 1h – Other Users and Material Assets. Available online at: <https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-3-oesea3>

DEFRA (2005). Nature Conservation Guidance on Offshore Wind Farm Development. Available at: https://tethys.pnnl.gov/sites/default/files/publications/Nature_Conservation_Guidance_on_Offshore_Windfarm_Development.pdf

DEFRA. (2009). Our seas - a shared resource High level marine objectives. Available online at: <https://tethys.pnnl.gov/sites/default/files/publications/HMGovernment-2009.pdf>

DEFRA. (2011). Shellfish Waters Directive. Available online at: <https://webarchive.nationalarchives.gov.uk/ukgwa/20130123215433/http://www.defra.gov.uk/environment/quality/water/water-quality/shellfish-directive/>

DEFRA. (2011). UK Marine Policy Statement. Available online at: <https://www.gov.uk/government/publications/uk-marine-policy-statement>

DEFRA. (2019). Bathing water quality statistics. Available online at: <https://www.gov.uk/government/statistics/bathing-water-quality-statistics>

DEFRA. (2022). Highly Protected Marine Areas: Consultation on sites proposed for designation as Highly Protected Marine Areas. Available online at: https://consult.defra.gov.uk/hpma/consultation-on-highly-protected-marine-areas/supporting_documents/Highly%20Protected%20Marine%20Areas%20consultation%20document.pdf

DEFRA. (2022). List of Current Bathing Waters (2022 Bathing Season). Available online at: <https://www.gov.uk/government/publications/bathing-waters-list-of-designated-waters-in-england/list-of-current-bathing-waters-2019-bathing-season>

DEFRA. (2022). List of shellfish water protected areas in England. Available online at: <https://www.gov.uk/government/publications/water-framework-directive-shellfish-protected-areas/list-of-shellfish-water-protected-areas-in-england>

DEFRA. (2022). Magic Maps. Available online at: <https://magic.defra.gov.uk/MagicMap.aspx?startTopic=Designations&activelayer=sssiIndex&query=HYPERLINK%3D%272000134%27>

DTI. (2007). Offshore Oil and Gas Strategic Environment Assessments. Available online at: <https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process>

ECMWF. (2022). European Centre for Medium-Range Weather Forecasts. Available online at: <https://www.ecmwf.int/en/forecasts/datasets>

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and Nursery Grounds of Selected Fish Species in UK Waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56 pp.

EMODnet. (2019). Seabed Habitat. Available online at: <https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/>

EMODnet. (2021). Bathymetry. Available online at: <https://www.emodnet-bathymetry.eu/>

EMODnet. (2022). View Data | EMODnet Human Activities. Available online at: <https://www.emodnet-humanactivities.eu/view-data.php>.

Environment Agency. (2017). Water Framework Directive assessment: estuarine and coastal waters. Available online at: <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>

Environment Agency. (2022). Bathing waters. Available online at: <https://www.gov.uk/government/statistics/bathing-water-quality-statistics>

Environment Agency. (2022). Flood risk assessments: climate change allowances. Available online at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Environment Agency. (2022). Shoreline Management Plans (SMP). Available online at: <https://www.gov.uk/government/publications/shoreline-management-plans-smps/shoreline-management-plans-smps>

ESCA. (2016). Guideline No 6, The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK Waters. Available online at: <https://www.thecrownstate.co.uk/media/1783/ei-km-in-pc-cables-082012-proximity-of-offshore-renewable-energy-installations-submarine-cable-infrastructure-in-uk-waters-guideline.pdf>

EU DCF. (2020). Fisheries Dependent Information. Available online at: <https://stecf.jrc.ec.europa.eu/dd/fdi>

European Commission. (2013). Interpretation Manual of European Union Habitats. Available online at: https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

European Council. (2021). Fish Stocks Shared Between the EU and the United Kingdom. Available online at: <https://www.consilium.europa.eu/en/policies/eu-fish-stocks/eu-uk-fishing-quotas/>. Kingfisher (2022). UK Fishing Restrictions. Available online at: <https://kingfisherrestrictions.org/>

European Environment Agency. (2021). EUNIS Classifications. Available online at: <https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification>

Evans, P.G.H., Baines, M.E. & Coppock, J. (2011). Abundance and behaviour of cetaceans and basking sharks in the Pentland Firth and Orkney Waters. Report by Hebog Environmental Ltd & Sea Watch Foundation. Scottish Natural Heritage Commissioned Report No.419

Finstrokes. (2022). Finstrokes. Available online at: <https://www.finstrokes.com/dive-map>

Fishbase. (2022). FishBase with special emphasis on the fishes of Europe Available online at: <https://fishbase.se/search.php?region=europe>

Fugro GEOS. (2011). Firth of Forth Zone Development: Metocean Survey. Available online at: https://marine.gov.scot/sites/default/files/appendix_e2.pdf

Flemming, N. C. (1998). Archaeological evidence for vertical movement on the continental shelf during the Palaeolithic, Neolithic and Bronze Age periods. In: Stewart, I.S. and Vita-Finzi, C. (eds.) Coastal tectonics. Geological Society Special Publication 146, London, 129-146

Flemming, N. C. (2003). The scope of Strategic Environmental Assessment of North Sea areas SEA3 and SEA2 in regard to prehistoric archaeological remains Prepared for the Dept. of Trade & Industry. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/197339/TR_SEA3_Archaeology.pdf

Frost, T.M., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. and Balmer, D.E. (2018). Waterbirds in the UK 2016/17: The Wetland Bird Survey. British Trust for Ornithology.

Furness, J. (2015). Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, Number 164. Available at: <http://publications.naturalengland.org.uk/publication/6427568802627584>

Gillian, E., Waddington, C., Taylor, M. and Hammon, A. (2013). Rescue Recording of an Eroding Inter-Tidal Peat Bed at Low Hauxley, Northumberland (6109). Available online at: <http://www.archaeologicalresearchservices.com/projects/Low%20Hauxley%20Footprints%20&%20Peat%20Deposit.pdf>

Godfrey, J.D., Stewart, D.C., Middlemas, S.J., and Armstrong, J.D. (2015). Depth Use and Migratory Behaviour of Homing Atlantic Salmon (*Salmo salar*) in Scottish Coastal Waters. ICES Journal of Marine Science. Volume 72. p.568– 575. Available online at: <http://icesjms.oxfordjournals.org/content/early/2014/07/16/icesjms.fsu118.full.pdf?keytype=ref&ijkey=y9lmPDRLdC04n7B>.

Hague, E.L., Sinclair, R.R. and Sparling, C.E. (2020). Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters. Scottish Marine and Freshwater Science.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J., Vingada, J. and Øien, N. (2021). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Wageningen Marine Research.

Hemery, L. (2020). Changes in Benthic and Pelagic Habitats Caused by Marine Renewable Energy Devices. OES-environmental 2020 state of the science report: Environmental effects of marine renewable energy development around the world, pp.104-125.

Heritage Gateway. (2022). Northumberland Historic Environment Records. Available online at: https://www.heritagegateway.org.uk/Gateway/Results_Application.aspx?resourceID=110

Highways England (2019). Design Manual for Roads and Bridges. Available at: <https://nationalhighways.co.uk/suppliers/design-standards-and-specifications/design-manual-for-roads-and-bridges-dmrb/>

Historic England. (2002). Military Aircraft Crash Sites Archaeological guidance on their significance and future management. Available online at: <https://historicengland.org.uk/images-books/publications/military-aircraft-crash-sites/milaircsites/>

Historic England. (2008). Conservation Principles, Policies and Guidance. Available online at: <https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/>.

Historic England. (2012). Geoarchaeology Using Earth Sciences to Understand the Archaeological Record. Available online at: <https://historicengland.org.uk/images-books/publications/geoarchaeology-earth-sciences-to-understand-archaeological-record/heag067-geoarchaeology/>.

Historic England. (2012). Ships and Boats: Prehistory to Present Selection Guide. Available online at: <https://historicengland.org.uk/images-books/publications/dsg-ships-boats/heag143-ships-and-boats-prehistory-to-present-sg/>

Historic England. (2022). Protected Wrecks. Available online at: <https://historicengland.org.uk/advice/hpg/has/protectedwrecks/>

Horsburgh, K., Rennie, A., Palmer, M. (2020). Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK. *MCCIP Science Review 2020*, pp. 116-131

Howson, C. M., Steel, L., Carruthers, M. & Gillham, K. (2012). Identification of Priority Marine Features in Scottish territorial waters. Scottish Natural Heritage Commissioned Report No. 388.

Hutchison, Z.L., Gill, A.B., Sigra, P., He, H. and King, J.W. (2020). Anthropogenic electromagnetic fields (EMF) influence the behaviour of bottom-dwelling marine species. *Scientific reports*, 10(1), pp.1-15.

IAMMWG. (2022). Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680 (Revised March 2022), JNCC Peterborough, ISSN 0963- 8091.

ICPC. (2015). International Cable Protection Committee (ICPC) Recommendation No.2. Cable Routing and Reporting Criteria 2015. Available online at: <https://www.isa.org.jm/files/documents/EN/Regs/2017/Other/ICPC.pdf>

ICPC. (2019). ICPC recommendations. Available online at: <https://www.iscpc.org/publications/recommendations/>

IEMA. (2004). Environmental Impact Assessment Guide To: Delivering Quality Development.

IEMA (2011). The Statement of Environmental Impact Assessment Practice in the UK. Available at: [https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN020016/EN020016-000986-BFC_Vol_09.18.16_Special%20Report%20-The%20State%20of%20Environmental%20Impact%20Assessment%20Practice%20in%20the%20UK%20-%20IEMA%20\(2011\).pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN020016/EN020016-000986-BFC_Vol_09.18.16_Special%20Report%20-The%20State%20of%20Environmental%20Impact%20Assessment%20Practice%20in%20the%20UK%20-%20IEMA%20(2011).pdf)

IEMA (2015). Environmental Impact Assessment Guide to Shaping Quality Development

IEMA (2017). Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010056/TR010056-001649-Climate%20Emergency%20Planning%20and%20Policy%20-%20Appendix%20A%20-%20IEMA%20Guide-%20Assessing%20Greenhouse%20Gas%20Emissions%20and%20Evaluating%20their%20Significance,%20Version%202,%20Feb%202022.pdf>

IEMA (2019). Impact Assessment Strategy. Available online at: <https://www.iema.net/resources/watch-again/2020/02/13/iema-impact-assessment-guidance>

IEMA. (2017). Delivering Proportionate EIA. Available online at: <https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia>

IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation. Available online at: <https://www.iema.net/downloading-document/42159>

IEMA. (2022). Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition. Available online at: <https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions>

Interek Metoc. (2012). Summary of Seagreen Firth of Forth Metocean Surveys to Date. Available online at: https://marine.gov.scot/sites/default/files/appendix_e2.pdf

International Cable Protection Committee. (2009). Fishing and Submarine Cables - Working Together. Available online at: <https://www.iscpc.org/publications/>

IUCN (2021). The IUCN Red List of Threatened Species. Available online at: <https://www.iucnredlist.org/>

JNCC and Natural England (2011). General advice on assessing potential impacts of and mitigation for human activities on MCZ features, using existing regulation and legislation. Available at: <https://hub.jncc.gov.uk/assets/6aff8099-10e1-4323-a4d5-b8539b8013b0>

JNCC and Natural England. (2019). Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: Southern North Sea Conservation Objectives and Advice on Operations. Available online at: <https://data.jncc.gov.uk/data/206f2222-5c2b-4312-99ba-d59dfd1dec1d/SouthernNorthSea-conservation-advice.pdf>

JNCC and Natural England. (2019). Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas. Available online at: <https://hub.jncc.gov.uk/assets/3c9f030c-5fa0-4ee4-9868-1debedb4b47f>

JNCC, DAERA, Natural England. (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). Report No. 654, JNCC, Peterborough. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/889842/SACNoiseGuidanceJune2020.pdf

JNCC. (2000-2021). Seabird Monitoring Programme (SMP) database. Available online at: <https://app.bto.org/seabirds/public/data.jsp>

JNCC. (2010). JNCC guidelines for minimising the risk of injury to marine mammals from using explosives. Available online at: <https://data.jncc.gov.uk/data/24cc180d-4030-49dd-8977-a04ebe0d7aca/JNCC-Guidelines-Explosives-Guidelines-201008-Web.pdf>

JNCC. (2015a). St Abb's Head to Fast Castle Available online at: <https://sac.jncc.gov.uk/site/UK0030281>

JNCC. (2015b). Berwickshire and North Northumberland Coast. Available online at: <https://sac.jncc.gov.uk/site/UK0017072>

JNCC. (2016). Annex I submarine structures made by leaking gas. Available online at: <https://hub.jncc.gov.uk/assets/b47ebc16-7b74-4a69-bd4b-7e29c0584d59>

JNCC. (2016). UKSeaMap 2016 – predictive mapping of seabed habitats. Available online at: <https://jncc.gov.uk/our-work/marine-habitat-data-product-ukseamap/>

JNCC. (2017). JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. August 2017. Available online at: <https://hub.jncc.gov.uk/assets/e2a46de5-43d4-43f0-b296-c62134397ce4>

JNCC. (2017). River Tweed SAC: Site Summary Document. Available online at: <https://sac.jncc.gov.uk/site/UK0012691>.

JNCC. (2018). UK Protected Area Datasets for Download. Available online at: <https://jncc.gov.uk/our-work/uk-protected-area-datasets-for-download>

JNCC. (2021a). Annex I Reefs in UK offshore waters (public). Available online at: <https://hub.jncc.gov.uk/assets/992dfef7-3267-43db-b351-5927bf0621d4>

JNCC. (2021a). Firth of Forth MPA: Site Summary Document. Available online at: <https://jncc.gov.uk/our-work/firth-of-forth-banks-complex-mpa/>

JNCC. (2021b). Farnes East MPA: Site Summary Document. Available online at: <https://jncc.gov.uk/our-work/farnes-east-mpa/>.

JNCC. (2021b). Habitat's List. Available online at: <https://sac.jncc.gov.uk/habitat/>

JNCC. (2021c). North East of Farnes Deep MPA: Site Summary Document. Available online at: <https://jncc.gov.uk/our-work/north-east-of-farnes-deep-mpa/>

JNCC. (2022). Harbour porpoise (*Phocoena phocoena*) - Special Areas of Conservation. Available online at: <https://sac.jncc.gov.uk/species/S1351/>.

JNCC. (2022). Special Protection Areas (SPAs) with marine components (all UK waters). Available online at: <https://hub.jncc.gov.uk/assets/07078ed3-496d-432b-974e-1754b47536c7>

- Kafas, A., McLay, A., Chimienti, M., Gubbins, M. (2014). ScotMap Inshore Fisheries Mapping in Scotland: Recording Fishermen's use of the Sea. Scottish Marine and Freshwater Science Volume 5 Number 17. Edinburgh: Scottish Government, 32p. DOI: 10.4789/1554-1.
- King, S., Maclean, I.M.D., Norman, T., and Prior, A. (2009). Developing Guidance on Ornithological Cumulative Impact Assessment for Offshore Wind Farm Developers. COWRIE.
- KIS-ORCA. (2022). Cables – power and telecoms. Available online at: <https://kis-orca.org/subsea-cables/>
- Kober, K. (2012). The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1-1.4 of the SPA selection guidelines. Joint Nature Conservation Committee, JNCC.
- Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S., Wilson, L.J. and Reid, J.B. (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC report, 431.
- Langton R, Boulcott P, Wright PJ (2021). A verified distribution model for the lesser sandeel *Ammodytes marinus*. Mar Ecol Prog Ser 667:145-159. Available at: <https://doi.org/10.3354/meps13693>
- Magic Seaweed. (2022). UK and Ireland Surf Reports and Surf Forecasts. Available online at: <https://magicseaweed.com/UK-Ireland-Surf-Forecast/1/>
- MAIB. (2022). Flooding, capsizing and sinking of prawn trawler Diamond D. Available online at: <https://www.gov.uk/maib-reports/flooding-capsizing-and-sinking-of-prawn-trawler-diamond-d>
- Malcolm, I.A., Millar C.P and Millidine K.J. (2015). Spatio-Temporal Variability in Scottish Smolt Emigration Times and Sizes. Scottish Marine and Freshwater Science. Volume 6 Number 2. Available online at: <http://www.gov.scot/Resource/0047/00472202.pdf>.
- Malcolm, I.A., Godfrey, J and Youngson, A.F. (2010). Review of Migratory Routes and Behaviour of Atlantic Salmon, Sea Trout and European Eel in Scotland's Coastal Environment: Implications for the Development of Marine Renewables. Scottish Marine and Freshwater Science. Vol 1 No 14
- Marine Scotland Science. (2017). Marine Scotland Science Marine Scotland Science Creel Fishing Effort Study. Available online at: <https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2017/08/creel-fishing-effort-study/documents/00523958-pdf/00523958-pdf/govscot%3Adocument/00523958.pdf>
- Marine Scotland. (2014). Guidance on the Offence of Harassment at Seal Haul-Out Sites. Report to The Scottish Government, June 2014. Available online at: <https://www.gov.scot/publications/guidance-harassment-at-seal-haul-out-sites/>
- Marine Scotland. (2015). Protecting the Ocean Quahog. Available online at: <https://blogs.gov.scot/marine-scotland/2015/12/03/protecting-the-ocean-quahog/>
- Marine Scotland. (2016). Minke Whale | Marine Scotland Information. Available online at: <http://marine.gov.scot/information/minke-whale>

Marine Scotland (2018) Consenting and Licensing Guidance: for Offshore Wind, Wave and Tidal Energy Applications.

Marine Scotland. (2018). Salmon Smolt Surveying on the Sunbeam. Available online at: <https://blogs.gov.scot/marine-scotland/2018/05/11/salmon-smolt-surveys-on-the-sunbeam/>. Survey report at: https://www.bodc.ac.uk/resources/inventories/cruise_inventory/programmes/1419h.pdf.

Marine Scotland. (2019). Seal haul-out sites | Marine Scotland Information. Available online at: <https://marine.gov.scot/information/seal-haul-out-sites>.

Marine Scotland. (2020). The protection of Marine European Protected Species from injury and disturbance – Guidance for Scottish Inshore Waters (July 2020 Version). Available online at: [https://www.gov.scot/publications/marine-european-protected-species-protection-from-injury-and-disturbance/#:~:text=Marine%20European%20protected%20species%3A%20protection%20from%20injury%20and%20disturbance,-Published%3A%2029%20Jul&text=This%20guidance%20provides%20advice%20for,European%20protected%20species%20\(EPS\)](https://www.gov.scot/publications/marine-european-protected-species-protection-from-injury-and-disturbance/#:~:text=Marine%20European%20protected%20species%3A%20protection%20from%20injury%20and%20disturbance,-Published%3A%2029%20Jul&text=This%20guidance%20provides%20advice%20for,European%20protected%20species%20(EPS))

Published%3A%2029%20Jul&text=This%20guidance%20provides%20advice%20for,European%20protected%20species%20(EPS)

Marine Scotland. (2020). EIA Report – Technical Chapters – Seagreen Alpha and Bravo Wind Farms. Available online at: <https://marine.gov.scot/data/eia-report-technical-chapters-seagreen-alpha-and-bravo-wind-farms>

Marine Scotland. (2021). Salmon and Sea Trout Fishery Statistics: 1952-2020 Season – reported catch and effort by method. Available online at: <https://data.marine.gov.scot/dataset/salmon-and-sea-trout-fishery-statistics-1952-2020-season-reported-catch-and-effort-method>

Maritime and Coastguard Agency. (2022). Search and Rescue Helicopter Statistics: data tables (SARH). Available online at: <https://www.gov.uk/government/statistical-data-sets/search-and-rescue-helicopter-sarh01>

Marine Scotland. (2022). Marine Scotland - National Marine Plan Interactive. Available online at: <https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=46>

MarLIN. (2022). The Marine Life Information Network. Available online at <https://www.marlin.ac.uk/>;

Metoc. (2011). Firth of Forth OWF Phase 1 – Metocean criteria for conceptual design. Report to Seagreen.

Mitchell, P.I., Newton S.F., Ratcliffe, N. and Dunn, T.E. (2004). Seabird populations of Britain and Ireland. Christopher Helm, London.

MMO. (2013). Marine conservation zones and marine licensing. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/410273/Marine_conservation_zones_and_marine_licensing.pdf.

MMO. (2014). A Strategic Framework for Scoping Cumulative Effects. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/389876/MMO1055_Report_Final.pdf.

MMO. (2014). Modelling marine recreation potential in England. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/317758/modelling.pdf

MMO. (2016). The WiSe Scheme The UK's national training scheme for minimising disturbance to marine wildlife. Available online at: <https://www.wisescheme.org/>

A Coastal Concordat for England (MMO, 2019)

MMO. (2020a). Mapping recreational sea anglers in English waters (MMO1163): Non-technical summary. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/869635/Non_technical_Summary_Mapping_Sea_Angling_MMO1163.pdf

MMO. (2020b). Application Ref: EIA/2020/00026. Blyth 2 Floating Offshore Windfarm.

MMO. (2020). UK Sea Fisheries Statistics 2020. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1020837/UK_Sea_Fisheries_Statistics_2020_-_AC_checked.pdf

MMO. (2021). Blyth Offshore Demonstration Project. Available online at: <https://marinelicensing.marinemangement.org.uk/mmofox5/fox/live/>.

MMO. (2021). Guidance Seals. Available online at: <https://www.gov.uk/government/publications/protected-marine-species/seals>

MMO. (2021). The North East Marine Plans Documents. Available online at: <https://www.gov.uk/government/publications/the-north-east-marine-plans-documents>

MMO. (2021a). Landing values by species, fishing method and vessel length (average 2016-2020).

MMO. (2021b). Vessel Monitoring System (VMS) values by fishing method (average 2016 - 2020).

MMO. (2022). Marine Information System (MIS). Available online at: <https://defra.maps.arcgis.com/apps/webappviewer/index.html?id=3dc94e81a22e41a6ace0bd327af4f346>

MS-LOT. (2022). Marine Scotland: Guidance on Marine Licensable Activities subject to Pre-Application Consultation. Available online at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2020/02/marine-licensing-applications-and-guidance/documents/guidance/guidance-on-activities-subject-to-pre-application-consultation/guidance-on-activities-subject-to-pre-application-consultation/govscot%3Adocument/Guidance%2Bon%2Bactivities%2Bsubject%2Bto%2Bpre-application%2Bconsultation.pdf>

National Grid NSN Link Limited. (2014). Norway-UK Interconnector UK Marine Environmental Statement. Available online at: https://northsealink.com/media/1196/p1568_rn3057-norway-uk-environmental-statement.pdf.

National Network of Regional Coastal Monitoring Programmes of England. (2021). Newbiggin Annual Wave Report 2021. Available online at: <https://coastalmonitoring.org/reports/#northeast>

National Network of Regional Coastal Monitoring Programmes: Metocean data for the Northeast of England. (2022). Available online at: <https://coastalmonitoring.org/northeast/>

Natural England and JNCC. (2022). Nature Conservation Considerations and Environmental Best Practice for subsea cable for English Inshore and UK Offshore Waters. Available by request from neoffshorewindstrategicsolutions@naturalengland.org.uk.

Natural England. (2006). Natural Environment and Rural Communities Act 2006. Available online at:

Natural England. (2022). Designated Sites Viewer. Available online at: <https://designatedsites.naturalengland.org.uk/>

NatureScot. (2017). Scottish Marine Wildlife Watching Code. Available online at: <https://www.nature.scot/sites/default/files/2017-06/Publication%202017%20-%20The%20Scottish%20Marine%20Wildlife%20Watching%20Code%20SMWWC%20-%20Part%201%20-%20April%202017%20%28A2263518%29.pdf>

NatureScot. (2020). Priority marine features in Scotland's seas. Available online at: <https://www.nature.scot/professional-advice/protected-areas-and-species/priority-marine-features-scotlands-seas>

NatureScot. (2022). SiteLink. Available online at: <https://sitelink.nature.scot/home>

NBN Atlas. (2022). Dermochelys coriacea – Leathery Turtle Records. Available online at: https://species.nbnatlas.org/species/NBNSYS0000188646#tab_mapView

Newton, M., Main, R. and Adams, C. (2017). Atlantic Salmon *Salmo salar* Smolt Movements in the Cromarty and Moray Firths, Scotland. LF000005-REP-1854, March 2017

NIFCA. (2021). NIFCA Annual Research Plan & Report. Available online at: <https://nifca.gov.uk/wp-content/uploads/2022/02/Annual-Research-Report-2020-21.pdf>

NMPi. (2022). National Marine Plan Interactive. Available online at: <https://marinescotland.atkinsgeospatial.com/nmpi/>

NNG Offshore Wind. (2019). Neart na Gaoithe Offshore Windfarm Section 36 Consent Variation Report. Available online at: <https://marine.gov.scot/data/neart-na-gaoithe-offshore-windfarm-revised-design-section-36-consent-variation-report>

Norwegian Petroleum Directorate. (2021). Geology of the North Sea. Available online at: <https://www.npd.no/en/facts/publications/co2-atlases/co2-atlas-for-the-norwegian-continental-shelf/4-the-norwegian-north-sea/4.1-geology-of-the-north-sea/#:~:text=The%20basic%20structural%20framework%20of%20the%20North%20Sea,deposition%20of%20reddish%20eolian%20and%20fluvial%20sandstones%20%28Rotliegendes%29.>

Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects. (NRW, 2018);

NSTA. (2022). Interactive maps and tools. Available online at: <https://nstauthority.co.uk/data-centre/interactive-maps-and-tools/>

Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2001);

OSPAR. (2008). List of threatened and/or endangered species and habitats. Available online at: <https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats>

OSPAR. (2009). Assessment of the Environmental Impacts of Cables. Available online at: https://qsr2010.ospar.org/media/assessments/p00437_Cables.pdf

OSPAR. (2017). Intermediate Assessment 2017 – Contaminant Assessment. Available online at: <https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/pressures-human-activities/contaminants/>

PADI. (2022). Diving in Scotland. Available online at: <https://www.padi.com/diving-in/scotland/>

PADI. (2022). Diving Northumberland. Available online at: <https://www.padi.com/diving-in/united-kingdom/northumberland/>

Cumulative Effects Assessment (Planning Inspectorate Advice Note Seventeen) (PINS, 2019)

Popper A N, Hawkins A D, Fay R, Mann D A, Bartol S, Carlson T J, Coombs S, Ellison W T, Gentry R L, Halvorsen M B, Løkkeborg S, Rogers P H, Southall B L, Zeddies D G, Tavalga W N. (2014). Sound Exposure Guidelines for Fishes and Sea Turtles. Springer Briefs in Oceanography, DOI 10. 1007/978-3-319-06659-2.

Popper, A.N. and Hawkins, A.D. (2018). A sound approach to assessing the impact of underwater noise on marine fishes and invertebrates. ICES Journal of Marine Science, 74(3), pp.635-651.

Popper, A.N., Hastings, M.C. (2009). The effects of anthropogenic sources of sound on fishes. Available online at: <https://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.2009.02319.x>

Port of Blyth. (2017). Maintenance Dredge Protocol (Base Line Document).

Port of Blyth. (2022). Port of Blyth. Available online at: <https://portofblyth.co.uk/>

Portodimare. (2022). Metadata: IMO – Traffic regulation zones: areas to be avoided. Available online at: https://www.portodimare.eu/layers/geonode:imo_traffic_regulation_z_jaljb/metadata_detail

Reid, J., Evans, P. & Northridge, S. (2003). An atlas of cetacean distribution on the northwest European Continental Shelf, Joint Nature Conservation Committee: Peterborough.

Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RenewableUK, 2013);

- RNLI. (2022). RNLI Open Data. Available online at: <https://rnli.org/about-us/our-research/rnli-open-data>
- RNLI(a). (2022). Newbiggin Lifeboat Station. Available online at: <https://rnli.org/find-my-nearest/lifeboat-stations/newbiggin-lifeboat-station>
- RNLI(b). (2022). Blyth Lifeboat Station. Available online at: <https://rnli.org/find-my-nearest/lifeboat-stations/blyth-lifeboat-station>
- Royal Navy. (2017). Exercise Joint Warrior. Available online at: <https://www.royalnavy.mod.uk/news-and-latest-activity/operations/united-kingdom/exercise-joint-warrior>
- RSPB. (2015). FAME & STAR seabird (kittiwakes, guillemots, razorbills and shags) tracking projects. Available online at: [https://marine.gov.scot/information/fame-star-seabird-kittiwakes-guillemots-razorbills-and-shags-tracking-projects#:~:text=FAME%20\(Future%20of%20the%20Atlantic,seabirds%20from%20multiple%20colonies%20around](https://marine.gov.scot/information/fame-star-seabird-kittiwakes-guillemots-razorbills-and-shags-tracking-projects#:~:text=FAME%20(Future%20of%20the%20Atlantic,seabirds%20from%20multiple%20colonies%20around)
- Russell, D.J.F. (2016). Movements of grey seal that haul out on the UK coast of the southern North Sea. Report for the Department of Energy and Climate Change (OESEA-14-47).
- Russell, D.J.F., Jones, E.L., and Morris, C.D. (2017). Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals. Scottish Marine and Freshwater Science Report Volume 8, No. 25.
- RYA. (2019). UK Coastal Atlas of Recreational Boating. Available online at: <https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating>
- Scarborough Borough Council. (2017). Technical Note on Contaminated Land Assessment. Prepared by ch2m. Available online at: [http://www.northeastcoastalobservatory.org.uk/data/reports/20_cell_1_monitoring_reports/20_cell_wide_reports/Cell_1_Strategic_Assessment_Environmental_Report_\(2017\)/Cell%201%20Contaminated%20Land%20Assessment.pdf](http://www.northeastcoastalobservatory.org.uk/data/reports/20_cell_1_monitoring_reports/20_cell_wide_reports/Cell_1_Strategic_Assessment_Environmental_Report_(2017)/Cell%201%20Contaminated%20Land%20Assessment.pdf)
- SCOS. (2021). Scientific Advice on Matters Related to the Management of Seal Populations: 2020 Contents. Available at: <http://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf>
- Scotland to England Green Link (SEGL). (2021). Eastern Link 1 Marine Scheme Scoping Report Available online at: https://marine.gov.scot/sites/default/files/seg12_el2_marine_scheme_non-statutory_scoping_report_eastern_link_2_marine_scoping_report_v5.0_finalcombined_ifi_-_issued_for_information_01_1_redacted.pdf
- Scottish Government. (2015). Scotland's National Marine Plan. Available online at: <https://www.gov.scot/publications/scotlands-national-marine-plan/>
- Offshore wind, wave, and tidal energy applications: consenting and licensing manual (Scottish Government, 2018);

Scottish Government. (2020). Productive: Living Resources – Salmon and Sea Trout Fishing. Available online at: https://marine.gov.scot/sma/sites/default/files/sma2020_-_salmon_and_sea_trout_fishing_-_productive.pdf [Accessed 18 Jul. 2022].

Scottish Government. (2020). Sectoral Marine Plan: Regional Local Guidance. Available online at: <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2020/10/sectoral-marine-plan-regional-locational-guidance/documents/offshore-wind-energy-scottish-waters-regional-locational-guidance/offshore-wind-energy-scottish-waters-regional-locational-guidance/govscot%3Adocument/offshore-wind-energy-scottish-waters-regional-locational-guidance.pdf>.

Scottish Government. (2021). Salmon fishery statistics: 2021. Available online at: <https://www.gov.scot/publications/salmon-fishery-statistics-2021/pages/1/>

SDIC Red Rock Power Limited. (2018). Inch Cape Wind Farm EIA Available online at: https://marine.gov.scot/sites/default/files/inch_cape_wind_farm_non_technical_summary_-_reduced.pdf

Seagreen Wind Energy Limited. (2017). Seagreen Phase 1 Offshore Project Scoping Report Round 3: Firth of Forth. Available online at: https://marine.gov.scot/sites/default/files/seagreen_phase_1_scoping_2017.pdf

Sea Watch Foundation. National Whale and Dolphin Watch. Available online at: <https://www.seawatchfoundation.org.uk/nwdw/>

Shennan, I., Horton, B., Innes, J., Gehrels, R., Lloyd, J., McArthur, J. and Rutherford, M. (2000). Late Quaternary sea-level changes, crustal movements and coastal evolution in Northumberland, UK. *Journal of Quaternary Science: Published for the Quaternary Research Association*, 15(3), pp.215-237.

Sims, D.W., Southall, E.J., Tarling, G.A. and Metcalfe, J.D. (2005). Habitat-specific normal and reverse diel vertical migration in the plankton-feeding basking shark. *Journal of Animal Ecology*, pp.755-761.

SKM Enviro. (2011). Blyth–Cambois Wader Study – Final Report July 2011.

Marine Renewable Energy and the Natural Heritage: An Overview and Policy Statement' (SNH, 2003

SNH. (2017). River Tweed Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). Available online at: River Tweed SAC & SSSI guidance (Final draft in template) - 11 December 2017 (A2464025) (nature.scot)

A Handbook on Environmental Impact Assessment: Guidance for Competent Authorities, Consultees and others involved in the EIA Process in Scotland (SNH, 2018);

Söhle, I., Wilson, L.J., Dean, B.J., O'Brien, S.H. (2006). Surveillance of wintering seaducks, divers and grebes in UK inshore areas: Aerial surveys and shore-based counts 2005/06. JNCC.

Solan, M., Hauton, C., Godbold, J. A., Wood, C. L., Leighton, T. G. and White, P. (2016). Anthropogenic sources of underwater sound can modify how sediment-dwelling invertebrates mediate ecosystem properties. *Scientific reports*, 6(1), 1-9.

SOLAS. (2014). SOLAS CHAPTER V SAFETY OF NAVIGATION REGULATION 1 -Application. Available online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/343175/solas_v_on_safety_of_navigation.pdf.

Sparling, C.E., A.C. Seitz, E. Masden, and K. Smith. (2020). Collision Risk for Animals around Turbines. In A.E. Copping and L.G. Hemery (Eds.), OES-Environmental 2020 State of the Science Report: Environmental Effects of Marine Renewable Energy Development Around the World. Report for Ocean Energy Systems (OES). (pp. 29-65).

SSE Renewables. (2022). Berwick Bank Wind Farm Boundary Reduction. Available online at: <https://www.berwickbank.com/news/berwick-bank-thank-local-stakeholders-lf59t-xfy8>

SSE. (2021). Scoping Report - Berwick Bank Offshore Wind Farm. Available online at: <https://marine.gov.scot/data/scoping-report-berwick-bank-offshore-wind-farm>

Stone, C.J., Webb, A., Barton, C., Ratcliffe, N., Reed, T.C., Tasker, M.L., Camphuysen, C.J. & Pienkowski, M.W. (1995). An atlas of seabird distribution in north-west European waters, JNCC, Peterborough, ISBN 1 873701 94 2.

TCE. (2012b). TCE Guidance: Submarine cables and offshore renewable energy installation – Proximity study. Available online at: <https://www.yumpu.com/en/document/read/7826087/submarine-cables-and-offshore-renewable-the-crown-estate/96>

TCE. (2022). Asset Map. Available online at: <https://www.thecrownestate.co.uk/en-gb/what-we-do/asset-map/>

TCE. (2022). Offshore Wind Leasing Round 4. Available online at: <https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/offshore-wind-leasing-round-4/> TeleGeography. 2022. Submarine Cable Map 2022.

The Chartered Institute for Archaeologists. (2020). Standard and guidance: desk-based assessment Standard and guidance for historic environment desk-based assessment Standard and guidance for historic environment desk-based assessment (Revised). Available online at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf.

The Crown Estate and Wessex Archaeology. (2010, draft 2020). The Crown Estate: Model Clauses For Archaeological Written Schemes of Investigation | PDF | Archaeology | Geophysical Survey (Archaeology). Available online at: <https://www.scribd.com/document/47517639/The-Crown-Estate-Model-Clauses-for-Archaeological-Written-Schemes-of-Investigation>

The Crown Estate. (2010). Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects. Available online at: <https://www.thecrownestate.co.uk/media/3917/guide-to-archaeological-requirements-for-offshore-wind.pdf>

The Crown Estate. (2014). Protocol for Archaeological Discoveries: Offshore Renewables Projects, Wessex Archaeology Ltd on behalf of The Crown Estate. Available online at

<https://www.thecrownestate.co.uk/media/1782/ei-protocol-for-archaeological-discoveries-offshore-renewables-projects.pdf>

The Crown Estate (2021) Cable Route Identification and Leasing Guidelines

The Crown Estate. (2022). The Crown Estate. Available online at: <https://www.thecrownestate.co.uk/>

The Joint Nautical Archaeology Policy Committee and The Crown Estate's Maritime Cultural Heritage & Seabed development. (2006). JNAPC Code of Practice for seabed development. Available online at: https://www.jnapc.org.uk/jnapc_brochure_may_2006.pdf;

The Nautical Archaeology Society: Underwater Archaeology. (2008). The NAS Guide to Principles and Practice (2nd edn,). Available online at: <https://www.nauticalarchaeologysociety.org/underwater-archaeology-the-nas-guide>)

Tyler-Walters H, James B, Carruthers M, Wilding C, Durkin O, Lacey C, Philpott E, Adams L, Chaniotis PD, Wilkes PT V, Seeley R, Neilly M, Dargie J, Crawford-Avis OT. (2016). Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406.

UK Government. (1981). Wildlife and Countryside Act 1981 c.(5) Available online at: <https://www.legislation.gov.uk/ukpga/1981/69/contents>

UK Government. (2004). Nature Conservation (Scotland) Act 2004. Available online at: <https://www.legislation.gov.uk/asp/2004/6/contents>

UK Government. (2020). UK sea fisheries annual statistics report 2020. Available online at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020>

UK Government. (2021). North East Inshore and Offshore Marine Plan. Available online at: <https://www.gov.uk/government/publications/the-north-east-marine-plans-documents>

UK Government. (2021a). Vessel monitoring system devices. Available online at: <https://www.gov.uk/government/publications/vessel-monitoring-system-devices>

UK Government (2022). The Energy White Paper – Powering our Net Zero Future. Available at: <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

UK Government. (2022). Explore Marine Plans. Available online at: <https://www.gov.uk/guidance/explore-marine-plans>

UK Government. (2022). Inshore Vessel Monitoring (I-VMS) for under-12m fishing vessels registered in England. Available online at: <https://www.gov.uk/guidance/inshore-vessel-monitoring-i-vms-for-under-12m-fishing-vessels-registered-in-england>

UK Government. (2022). Marine Accident Investigation Branch reports 2010-2022. Available online at: https://www.gov.uk/maib-reports?date_of_occurrence%5Bfrom%5D=2010&date_of_occurrence%5Bto%5D=2022&keywords=north+sea&page=3

UK Met Office. (2022). Modelled wave and wind data. Available online at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/data/met-office-global-wave-model-_low-res_.pdf

UKHO. (2022). Admiralty Charts. Available online at: <https://www.admiralty.co.uk/charts>

UKHO. (2022). Admiralty Sailing Directions. Available online at: <https://www.admiralty.co.uk/publications/publications-and-reference-guides/admiralty-sailing-directions>

UKHO. (2021). Admiralty Marine Data Portal. Available online at: <https://www.gov.uk/guidance/inspire-portal-and-medin-bathymetry-data-archive-centre>

UKHO. (2022). Admiralty Total Tide. Available online at: <https://www.admiralty.co.uk/publications/admiralty-digital-publications/admiralty-totaltide>

Wade, H.M., Masden, E.A., Jackson, A.C. and Furness, R.W. (2016). Incorporating Data Uncertainty when Estimating Potential Vulnerability of Scottish Seabirds to Marine Renewable Energy Developments. *Marine Policy*, 70: 108-113.

Waggitt, J.J., Evans, P.G., Andrade, J., Banks, A.N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C.J., Durinck, J. and Felce, T. (2020). Distribution maps of cetacean and seabird populations in the North-East Atlantic. *Journal of Applied Ecology*, 57(2), pp.253-269.

Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. and Baillie, S.R. (2002). *The Migration Atlas: movements of the birds of Britain and Ireland*. T. & A.D. Poyser, London.

Wessex Archaeology. (2007). *Historic Environment Guidance for the Offshore Renewable Energy Sector*. Cowrie Ltd, January.

Wessex Archaeology. (2011). *Assessing Boats and Ships* (presented in three period reports: 1860 - 1913, 1914 - 1938 and 1939 - 1950). Available online at: <https://www.wessexarch.co.uk/our-work/assessing-boats-and-ships>

Witt, M.J., Hardy, T., Johnson, L., McClellan, C.M., Pikesley, S.K., Ranger, S., Richardson, P.B., Solandt, J.L., Speedie, C., Williams, R. and Godley, B.J. (2012). Basking sharks in the northeast Atlantic: spatio-temporal trends from sightings in UK waters. *Marine Ecology Progress Series*, 459, pp.121-134.

Wolf, Fabian., Bumke, Karl., Wahl, Sebastian., Nevoigt, Frauke., Hect, Ute., Hiebenthak, Class., Pansch, Christian. (2020). High resolution water temperature data between January 1997 and December 2018 at the GEOMAR pier surface.

Woodcock, N.H., AND Strachan, R. (2000). *Geological History of Britain and Ireland*. Blackwell Science Ltd. Oxford. 423pp

Woodward et al. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate (BTO Research Report No.724).

Wrecksite EU. (2022). WRECK WRAK EPAVE WRACK PECIO. Available online at: <https://www.wrecksite.eu/wrecksite.aspx>.