Offshore Wind Power Limited

The West of Orkney Windfarm

Scoping Report

ASSIGNMENT L100632-S02

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XODUS

West of Orkney Windfarm

REVISIONS & APPROVALS

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FOREWORD

Offshore Wind Power Limited (OWPL) is developing the West of Orkney Windfarm ('the Project'). Crown Estate Scotland (CES) awarded OWPL an Option Agreement Area (OAA) in January 2022, for the development of the proposed Project, following the conclusion of the ScotWind leasing round. OWPL are seeking consent for the Project, an offshore wind farm (OWF), located 23 km from the north coast of Caithness and 28 km from the west coast of Orkney. Both the offshore infrastructure and onshore infrastructure are the subject of this Environmental Impact Assessment (EIA) Scoping Report. The purpose of this report is to request formal consultation in the form of Scoping Opinions for the offshore and onshore aspects of the Project.

The Project is progressing a dual offtake strategy, facilitated through a grid connection agreement with National Grid at or near the existing Spittal substation in Caithness, as well as an exclusive partnership to power the proposed Flotta Hydrogen Hub located on Flotta, Orkney. As such, all necessary consents are being sought to connect the Project to both Spittal and Flotta. This will allow OWPL the flexibility to export power to both locations, creating the best opportunity for a highly competitive project to drive forward the Scottish Government's economic, environmental and societal ambitions in both offshore wind and green hydrogen. No overhead lines are planned for the Project.

This Scoping Report is structured in five sections:

Section 1 Introduction and overview provides information on the Project as a whole covering introductions, legislation and policy, project description, assessment methodology and stakeholder consultation.

Section 2 Offshore (including Scapa Flow) relates to the offshore infrastructure and environment. This volume covers the scoping of the offshore EIA. The offshore infrastructure spans across the offshore marine area (west of Orkney), and the Scapa Flow area, a geographically distinct area of water, naturally sheltered by the islands of Orkney. The OAA and separate offshore export cable corridor search areas to Caithness and Orkney are located within the offshore marine area. The Scapa Flow offshore export cable corridor search area is located within Scapa Flow. Due to their geographically and biologically distinct nature, baseline information has been separated out between the offshore marine area and the Scapa Flow area. Colour coded text boxes and headings guide the reader to information relevant to each geographic area.

Section 3 Onshore Caithness relates to the onshore infrastructure and environment relevant to Caithness. This volume covers the scoping of the onshore EIA relevant to Caithness.

Section 4 Onshore Orkney relates to the onshore infrastructure and environment relevant to Orkney. This volume covers the scoping of onshore EIA relevant to Orkney. The onshore infrastructure has the potential to span across the islands of Hoy, Fara and Flotta, as such baseline information has been separated out according to these areas. Colour coded text boxes and headings guide the reader to information relevant to each geographic area.

Section 5 Summary draws together all the findings of each section and outlines the suggested EIA Report structure and next steps.

Key to text box colour codes:

Offshore Scoping Areas	Offshore Marine Area
	Scapa Flow
Onshore Caithness Scoping Area	Onshore Caithness
Onshore Orkney Scoping Areas	North Hoy
	South Hoy and Fara
	Flotta

OWPL invites consultees to respond to this Scoping Report by providing a response to the topic specific questions, which are included in each technical section, and by providing a formal opinion on the information presented.

Below are the ways in which to provide comment and stay informed on the Project.

Email	Scoping@westoforkney.com
Mail	Offshore Wind Power Limited C/O Green Investment Group Atria One Level 7 144 Morrison Street Edinburgh EH3 8EX
Website	Scoping Report available for download at http://www.westoforkney.com

1 INTRODUCTION AND OVERVIEW

1.1 Introduction

1.1.1 Background

The applicant, Offshore Wind Power Limited (OWPL) is proposing the development of the West of Orkney Windfarm ('the Project'), an offshore wind farm (OWF), located at least 23 km from the north coast of Caithness and 28 km from the west coast of Hoy, Orkney. Crown Estate Scotland (CES) awarded OWPL the Option Agreement Area (OAA) in January 2022 for the development of the proposed Project to OWPL following the ScotWind leasing round which began in late 2019.

OWPL's OWF lies wholly within the "N1" Plan Option (PO), which is one of 15 Pos areas around Scotland which the Scottish Government considered suitable for the development of commercial scale OWFs. The Scottish Government published the Sectoral Marine Plan for Offshore Wind Energy in October 2020 following over 2 years of extensive analysis, consideration and engagement with a wide range of stakeholders.

The purpose of this document is to request Scoping Opinions in relation to the scope of the Environmental Impact Assessment (EIA), covering both the offshore and onshore transmission infrastructure. The offshore infrastructure includes the proposed generation infrastructure, comprising wind turbine generators (WTGs) and associated foundations and substructures (floating and fixed-bottom currently under consideration), the Offshore Substation Platforms (OSPs) and associated foundations, the inter-array cables, offshore export cables and landfall. The onshore infrastructure includes the landfall, onshore export cables and onshore substations. The offshore infrastructure is located seaward of Mean High Water Springs (MHWS) and the onshore infrastructure is located landward of Mean Low Water Springs (MLWS). It is anticipated that the Scoping Opinions will be based on responses to this Scoping Report from statutory and non-statutory consultees, and will be used to guide the EIA.

1.1.2 Introduction to Offshore Wind Power Limited (OWPL)

OWPL brings together a unique combination of financial, technical and project development capability, with deep Scottish roots, a commitment to delivery, and a clear vision for the Project.

MACQUARIE / Green Investment Group	Green Investment Group (GIG) – owned by Macquarie, the world's largest infrastructure investor, with ownership of over 40% of UK's operational offshore wind farms.
TotalEnergies	TotalEnergies – one of the largest offshore operators on UK continental shelf, majority owner of Seagreen offshore wind farm and the Shetland Gas Plant. Targeting 35 GW of renewables by 2025 and 100 GW by 2030.
RIDG	Renewable Infrastructure Development Group (RIDG) – Scottish offshore wind project developer with over 40 years experience in the sector, set up to deliver high value projects alongside strategic partners.

Xodus Group Limited (Xodus) has been appointed by OWPL to lead the EIA.

1.1.3 Project Overview

The Project is a proposed offshore wind farm located within the PO area identified as N1 in the Offshore Wind Sectoral Marine Plan, off the west coast of Orkney (Scottish Government, 2020a). The Project has a grid connection agreement with National Grid for a connection to the existing network at Spittal substation. Additionally, OWPL have an exclusive partnership for the Project to power the Flotta Hydrogen Hub through a Power Purchase Agreement (PPA). There is the potential for both of these power export options to be utilised. The Project are currently considering both fixed-bottom foundations and floating substructures for the wind turbine generators.

The EIA scoping boundary, within which the offshore wind farm and associated offshore and onshore transmission infrastructure will be located, is presented in Figure 1-1. The EIA scoping boundary includes:

- The OAA;
- Three offshore export cable corridor search areas;
  - one to the north coast of Caithness with potential landfall options at Melvich, Dounreay, Cling Glang and Crosskirk;
  - one to the west coast of Orkney with potential landfall options at Murra and Rackwick on the Island of Hoy;
  - one across Scapa Flow with potential landfall options on the east coast of Hoy (Greenhead, Rinnigill, Mill Bay; and Rysa), Fara (Fara south, Fall sand, Fara northwest and Fara west) and Flotta (Flotta north and Flotta west).
- Two onshore export cable search corridor areas;
  - one in Caithness
  - one in Orkney across Hoy, Fara and Flotta
- Two onshore substation search areas (one around Spittal, Caithness and one on the island of Flotta, Orkney).

OWPL are responsible for the consenting of the offshore wind farm and transmission infrastructure, with the exception of the construction and operation of the grid infrastructure, for which Scottish Hydrogen Electric Transmission plc (SHET-L) will be responsible, and the development and operation of the Flotta Hydrogen Hub, for which the Flotta Hydrogen Hub partners will be responsible.

The key Project milestones are:

- Commencement of onshore construction – 2027 (duration of 4 years)
- Commencement of offshore construction – 2028 (duration of 4 years)
- First power 2029.

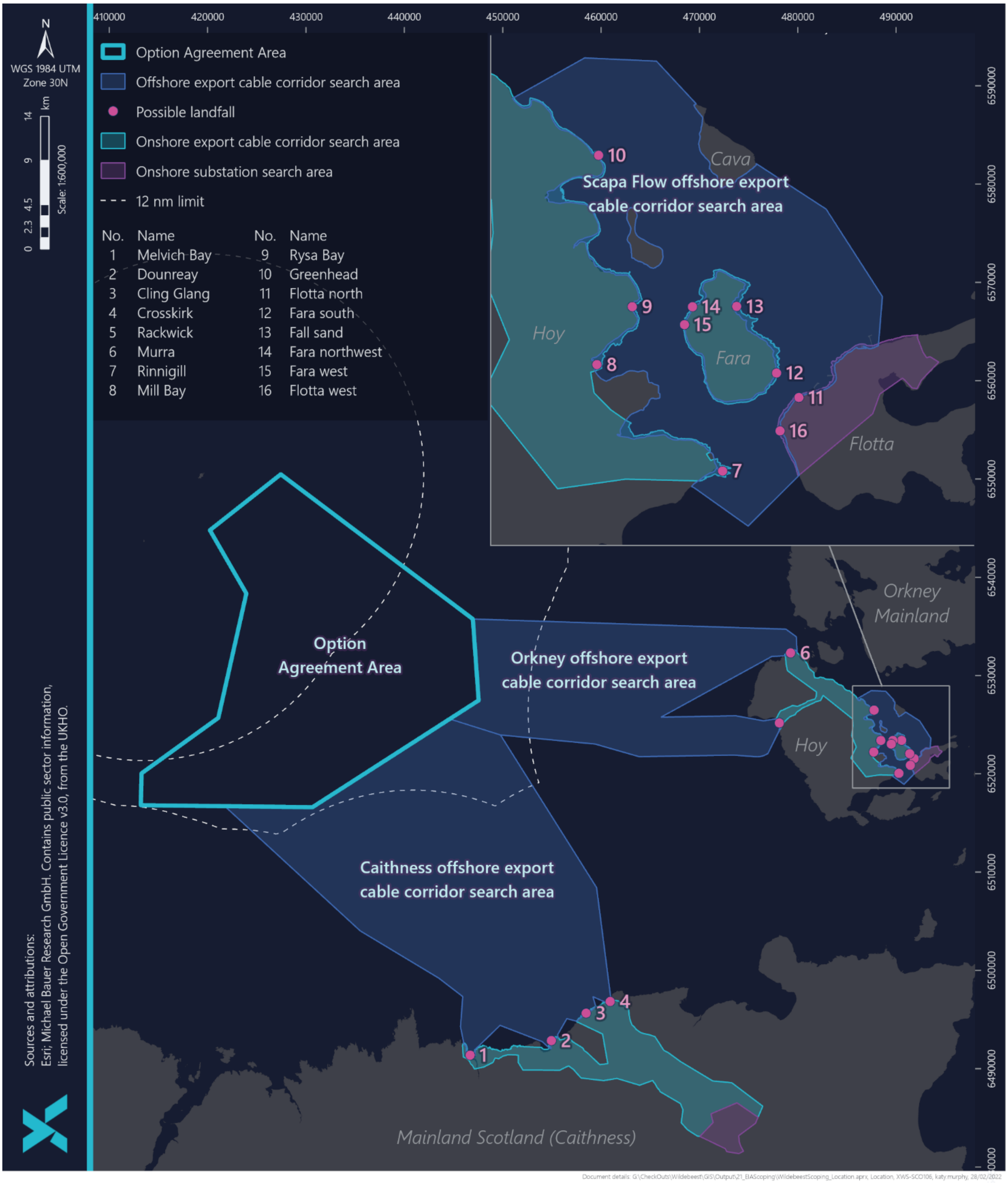

Figure 1-1 Project Overview

1.1.4 Consenting Strategy

The Project offshore infrastructure is located in both the Scottish Territorial Waters and the Scottish Economic Exclusive Zone (EEZ). As such, the Scottish Ministers are the relevant decision maker in respect of the necessary offshore consents and licences required for the construction and operation of the Project. The onshore infrastructure is located within the jurisdiction of The Highland Council (THC) (onshore transmission infrastructure to the Spittal grid connection) and Orkney Islands Council (OIC) (the onshore transmission infrastructure to the Flotta Hydrogen Hub) and as such they are the competent authorities for the relative onshore consents.

The consents, licences and permissions to be sought for the Project include:

- Offshore infrastructure:
  - A Section 36 consent under the Electricity Act 1989;
  - Marine Licences under the Marine and Coastal Access Act (MCAA) 2009 for the OAA and the parts of the export cable routes beyond the 12 NM limit, and under the Marine (Scotland) Act 2010 for the parts of the export cable routes which are within 12 NM of the coast.
- Onshore infrastructure:
  - Either:
    - Two separate applications for full planning permission, in accordance with the Town and Country Planning (Scotland) Act 1997 to THC and OIC; or
    - Deemed planning permission under S57 of the Town and Country Planning (Scotland) Act 1997 (as amended by the Growth and Infrastructure Act 2013) as part of a single application for consent under Section 36 of the Electricity Act 1989.

The onshore consenting strategy is under consideration and discussion with Scottish Ministers, THC and OIC, and as such there are two possible options presented.

It is anticipated that the Project will seek a 50 year consent period.

To allow the Scottish Ministers, THC and OIC to properly consider the development proposals, applicants are required to provide information which demonstrates compliance with the relevant legislation and allows adequate understanding of the material considerations. Where an offshore energy project, such as an offshore wind farm, requires Section 36 Consent and a Marine Licence, the Marine Scotland Licensing and Operations Team (MS-LOT), on behalf of Scottish Ministers, can process both consent applications jointly.

The overall EIA process, as outlined in section 1.4, is delivered through a number of clearly defined stages, namely screening, scoping, environmental assessment, planning and monitoring. The Project qualifies as requiring an EIA under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), The Marine Works (Environmental Impact Assessment) Regulations 2007 and the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended), collectively referred to throughout this report as 'the EIA regulations'. For this reason, there was no need to carry out the screening stage of the EIA process.

This Scoping Report has been structured to be consistent with the relevant jurisdictions for each Scoping Opinion Request from MS-LOT (on behalf of Scottish Ministers), THC and OIC, as detailed in Table 1-1.

Table 1-1 Relevant Sections of the Scoping Report for the Scoping Opinion Requests

SCOPING OPINION REQUEST	RELEVANT SECTIONS
MS-LOT on behalf of Scottish Ministers	• Section 1 – Introduction and Overview; • Section 2 – Offshore EIA Scoping; and • Section 5 – Summary of EIA Scoping.
THC	• Section 1 – Introduction and Overview; • Section 2.14 – Onshore Caithness EIA Scoping; and • Section 5 – Summary of EIA Scoping.
OIC	• Section 1 – Introduction and Overview; • Section 4 – Onshore Orkney EIA Scoping; and • Section 5 – Summary of EIA Scoping.

As the UK is no longer part of the EU, amendments were made to the EIA regulations in Scotland to ensure that they continue to work in the same manner in Scotland's inshore and offshore waters. The amendments made are minor and technical in nature, for example references to European Economic Area (EEA) states are corrected to exclude the UK. The policies and procedures under the EIA Regulations remain unchanged. Amendments were made through The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019, The Town and Country Planning and Electricity Works (Miscellaneous Amendments) (EU Exit) (Scotland) Regulations 2019 and The Environment, Food and Rural Affairs (Environmental Impact Assessment) (Amendment) (EU Exit) Regulations 2019.

1.1.5 Document Structure

Table 1-2 presents the structure of the Scoping Report and an overview of what information is within each section.

Table 1-2 Document Structure

SECTION	SUB-SECTIONS	SECTION TITLE	OVERVIEW
Section 1	1.1	Introduction	Provides an introduction to the developer and the Project, outlines the objective of the Scoping Report and the consenting strategy for the project.
	1.2	Legislation and Policy	Sets out the need for the Project and the relevant policy and legislative context.
	1.3	Project Description	Provides a description of the key components of the Project.

<table>
<tr><th>SECTION</th><th>SUB-SECTIONS</th><th>SECTION TITLE</th><th>OVERVIEW</th></tr>
<tr><td></td><td>1.4</td><td>Approach to Scoping and the EIA</td><td>Outlines the approach taken to scoping and the methodology proposed for the EIA.</td></tr>
<tr><td></td><td>1.5</td><td>Stakeholder Consultation</td><td>Outlines stakeholder consultation conducted to date and the proposed approach to further consultation.</td></tr>
<tr><td>Section 2</td><td>2.1 – 2.14</td><td>Offshore topic- specific EIA Scoping sections</td><td rowspan="3">Topic specific sections cover:
• An outline of the baseline characterisation;
• Scoping of impacts including embedded mitigation;
• Identification of potential cumulative and transboundary effects; and
• An outline of the proposed approach to the EIA.
Geographical areas of the Project have been separated into volumes, according to their relevant Competent Authorities.</td></tr>
<tr><td>Section 3</td><td>3.1 – 3.10</td><td>Onshore Caithness topic-specific EIA Scoping sections</td></tr>
<tr><td>Section 4</td><td>4.1 – 4.10</td><td>Onshore Orkney topic-specific EIA Scoping sections</td></tr>
<tr><td>Section 5</td><td>5.1 – 5.3</td><td>Summary of EIA Scoping</td><td>Summaries the approach taken to scoping and the key findings of the report.</td></tr>
<tr><td></td><td>5.4</td><td>Next Steps</td><td>Outlines the next steps for the Project following the submission of this Scoping Report.</td></tr>
<tr><td></td><td>5.5</td><td>Proposed Structure of the EIA Report</td><td>Outlines the proposed structure of the EIA Report.</td></tr>
</table>

1.2 Legislative Context and Regulatory Requirements

1.2.1 Legislation and Policy Relevant for the Project

Table 1-3 outlines the key relevant legislation and policy for the Project relating to international obligations, the need for the Project (UK and Scottish climate change and renewable energy policy and legislation), planning policy and legislation, and consent requirements.

Table 1-3 Legislation and Policy Relevant to the Project

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
Climate Change and Renewable Energy			
International			
Kyoto Protocol under the United Nations Framework Convention on Climate Change	The Kyoto Protocol 'operationalised' the United Nations Framework Convention on Climate Change by committing state parties to reduce greenhouse gas emissions. The protocol came into effect in 2005 and its commitments were transposed into UK law by the Climate Change Act 2008, which requires the net UK carbon account for the year 2050 to be 80% lower than the 1990 baseline.	✓	✓
Paris Agreement under the United Nations Framework Convention on Climate Change	The international treaty aims to reduce the emission of gases that contribute to global warming by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. The Paris Agreement set out to improve upon the Kyoto Protocol. It entered into force on November 4, 2016 and was ratified by the UK as of November 2019. Under the UN Framework Convention on Climate Change, the annual Conference of Parties (COP) brings governments together to discuss and review how climate change is being managed domestically and internationally. It is the main decision-making body of the United Nations Framework Convention on Climate Change.	✓	✓

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
European			
Brexit	As of 31st January 2020, the UK is no longer a member of the European Union (EU). The UK has committed to implement international environmental obligations in accordance with the EU (Withdrawal) Act 2018 and to maintain environmental commitments and legislation already made following the departure of the UK. On this premise the existing EU renewable energy targets for the UK, including the EU Renewable Energy Directive 2009/28/EC and the recast Renewable Energy Directive 2018/2001/EU will remain applicable. The policies and procedures under the EIA Regulations remain unchanged. As the UK is no longer part of the EU, amendments were made to the EIA regulations in Scotland to ensure that they continue to work in the same manner in Scotland's. The amendments made are minor and technical in nature. Amendments were made through The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019, The Town and Country Planning and Electricity Works (Miscellaneous Amendments) (EU Exit) (Scotland) Regulations 2019 and The Environment, Food and Rural Affairs (Environmental Impact Assessment) (Amendment) (EU Exit) Regulations 2019. The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 and The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, ensure that policy on the protections and standards afforded by the Habitats Regulations remains unchanged, but there have been some changes in terminology and the Scottish Ministers now exercise some functions that were previously carried out at an EU level. Guidance on the implications of Brexit on marine environmental legislation (including EIA) and HRA are available through the Scottish Government website (Scottish Government, 2020b, Scottish Government, 2020c).	✓	✓
European Union Renewable Energy Directive	The UK committed to sourcing 15% of its total energy needs from renewable sources by 2020 under the 2009 Directive on Renewable Energy (2009/28/EC) including electricity, heat and transport and 32% of its total energy needs from renewable sources by 2030 under the recast Renewable Energy Directive 2018/2001/EU. The UK and Scottish Governments have also made legally binding commitments through the Climate Change Act 2008 and the Climate Change (Scotland) Act 2009.	✓	✓

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
National			
Scottish Emissions Targets	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 sets targets for the reduction of greenhouse gases emissions. Scottish Emissions Reductions Targets include a reduction of all greenhouse gases to net-zero by 2045, with interim targets for reductions of at least 75% by 2030 and 90% by 2040.	✓	✓
Scottish Energy Strategy	Scotland's Energy Strategy: The Future of Energy in Scotland (Scottish Government, 2017) sets out a vision for the energy system in Scotland until 2050. The strategy sets a 2030 target for the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied by renewable sources. This has since been supplemented by the Scottish Government Offshore wind policy statement (Scottish Government, 2020d).	✓	✓
Scottish Government Hydrogen Policy Statement	This document sets out Scotland's position on the growth of hydrogen in Scotland, including government targets and commitments. The position statement describes the government's aim to have at least 5 GW of renewable and low-carbon hydrogen developed by 2030 and at least 25 GW by 2045 among other commitments and strategies to reach this goal. Please note that although related to this Project, the Hydrogen Hub will be consented separately (Scottish Government, 2020e).	✓	✓
Draft Scottish Hydrogen Action Plan	The draft Hydrogen Action Plan issued in 2021 sets out what the Scottish Government will do and how they will work with others over the next five years to implement the strategic approach required to support the development of the hydrogen economy in Scotland, to support the aims of reducing greenhouse gas emissions from our energy system, industry, homes and transport, while ensuring a just transition. The document sets out how the Scottish Government aims to achieve the policy positions stated within the Scottish Governments Hydrogen Policy Statement.	✓	✓
Planning Policy			
National Marine Plan	In March 2015, the Scottish Government published 'Scotland's National Marine Plan – a Single Framework for Managing our Seas' (the NMP) (Scottish Government, 2015). The National Marine Plan 2015 sets out strategic policies for the	✓	

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
	sustainable development of Scotland’s marine resources out to 200 NM. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK.		
Sectoral Marine Plan for Offshore Wind Energy	The first Sectoral Marine Plan for Offshore Wind Energy (Blue Seas Green Energy) (Marine Scotland, 2011) (the Sectoral Plan) was adopted in 2011. In November 2017, CES announced their intention to run a further leasing round for commercial scale offshore wind energy projects in Scottish Waters. To inform the spatial development of this leasing round, Marine Scotland, as Planning Authority for Scotland’s Seas, was required to undertake a planning exercise, in accordance with relevant EC, UK and Scottish legislation. The Sectoral Plan was published in October 2020 (Scottish Government, 2020a). The Plan identified sustainable options for the future development of commercial-scale offshore wind energy in Scotland.	✓	
Orkney Islands Regional Marine Plan	Regional marine plans are currently in the process of being prepared within those Scottish Marine Regions where there is an established Regional Marine Planning Partnership. The planning competence of these Regional Marine Planning Partnerships extends out to 12 NM. Regional marine plans are required to be developed in accordance with the National Marine Plan (unless relevant considerations indicate otherwise). The Project falls within the Orkney Islands Region. However, at this time no Regional Marine Plan for this Region has been published. There has been some background work published in November 2020 for the ‘Orkney Islands Marine Region: State of the Environment Assessment’ (Orkney Islands Council, 2020). The Strategic Environmental Assessment (SEA) Scoping Report is expected to be published imminently to prepare for the development of the SEA Environmental Report in 2022 alongside the Orkney Islands Marine Regional Marine Plan. Submission of the Orkney Islands Regional Marine Plan to Scottish Ministers for approval and publishing is expected to take place in 2024 / 2025. Nonetheless, the Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016), developed by Marine Scotland, OIC and THC, sets out an integrated planning policy framework to guide marine development and activities and management decisions, whilst ensuring the quality of the marine environment is protected. As this plan is anticipated to inform the development of the Orkney Islands Regional Marine Plan, the Applicant will refer to this plan, to ensure best practice in delivering its planning policy framework.	✓	

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
National Planning Framework 3	Published in June 2014, National Planning Framework 3 (NPF3) provides a statutory framework for Scotland's long-term spatial development priorities for the next 20 to 30 years. Statutory development plans must have regard to the NPF, and Scottish Ministers expect planning decisions to support its delivery. Orkney, Pentland Firth and North Caithness is identified as an area of coordinated action in NPF3; a location of particular significance to the delivery of the Scottish Government's low carbon strategy. NPF3 states that the area is an internationally renowned historic and natural environment, with significant future prospects for growth and innovation. There are unparalleled opportunities for marine renewable energy development, generating significant new business and employment opportunities for the surrounding coastal and island communities. The Planning (Scotland) Act 2019 came into force on the 25th July 2019 and taking this into account, the draft National Planning Framework 4 (NPF4) was published in November 2021. NPF4 will differ from NPF3 by addressing both thematic and spatial planning policies, by incorporating the Scottish Planning Policy and the NPF into a single document. NPF4 will also be part of the statutory development plan, taking on a stronger role for influencing planning decisions compared with NPF3. It is expected that the final adoption date of NP4 will be in summer 2022.		✓
Scottish Planning Policy	On 23rd June 2014, the Scottish Government published the new Scottish Planning Policy (SPP). The SPP sets out Scottish Government policy on how nationally important land-use matters should be addressed and outlines Governmental priorities for land-use planning. The SPP 2014 sits alongside other key Scottish Government documents including the NPF3 and Circulars. The SPP emphasises the merits of sustainable development and the need to deliver heat and electricity in a low carbon manner through supportive policies in development plans. NPF4 will incorporate updated Scottish Planning Policy.		✓
Highland-wide Local Development Plan (LDP)	The Highland-wide Local Development Plan was adopted in 2012. Review of the Highland-wide Local Development Plan but was halted following the issue of the Scottish Planning Bill in 2017. Following the implementation of NPF4, THC are expected to recommence the review under the new arrangements for LDPs in Spring / Summer 2022. The plan outlines the planning policy for THC area with the exception of the Cairngorms National Park which is covered by the Cairngorms National Park Local Plan. The plan contains general policies for the THC area that planning applications are assessed against.		✓

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
Caithness and Sutherland Local Development Plan	The Caithness and Sutherland Local Development Plan was adopted in 2018 and outlines the spatial planning policy, strategy and vision for the Caithness and Sutherland area which developments should consider for their planning applications (Highland Islands Council, 2018).		✓
Orkney Local Development Plan	The Orkney LDP was adopted in 2017 and the plan period is between 2017 and 2022. This plan sets out the policies and strategy for Orkney which are considered for planning applications (OIC, 2017).		✓
Consenting Requirements			
Section 36 under the Electricity Act 1989	To construct and operate an electricity generating station, such as a wind farm, with a capacity greater than 1 MW in Scottish Territorial Waters and greater than 50 MW in the Scottish Offshore Region, consent is required under Section 36 of the Electricity Act 1989 (as amended). An application for consent under Section 36 in Scottish Territorial Waters is made to the MS-LOT on behalf of the Scottish Ministers. The Application shall be for the construction and operation of a number of fixed or floating WTGs with a generating capacity of > 50 MW, in the Scottish Offshore Region. The application shall be supported by an offshore EIA Report, onshore Caithness EIA Report and onshore Orkney EIA Report, prepared in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, as amended. Section 36 consent will allow for the installation, operation and maintenance of WTGs and inter-array cables associated with the Project.	✓ (generation stations only)	
Marine (Scotland) Act 2010 and Marine and Coastal Access Act 2009	The Marine (Scotland) Act 2010, which applies to Scottish Territorial Waters (between 0 and 12 NM from MHWS) and the Marine and Coastal Access Act 2009, which applies between the 12 and 200 NM limit, states that a Marine Licence is required to construct, alter or improve any works, or deposit any object in or over the sea, or on or under the seabed. As the Project is both within and beyond the 12 NM limit, a Marine Licence under both of these regulations will be required to deposit project components in/on the seabed. As with the Section 36 application above, the Marine Licence application will be made to MS-LOT on behalf of Scottish Ministers. An EIA Report shall also be prepared in accordance with EIA regulations.	✓	

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
The Islands' (Scotland) Act 2018	The Islands' (Scotland) Act 2018 introduced measures to help create the right environment for sustainable growth in and around Scotland's islands, through creation of a licensing scheme in relation to any works in or under the sea in the coastal waters surrounding islands for up to 12 NM. Local authorities apply to the Scottish Ministers for an island licensing area designation to be made. Neither THC or OIC have yet applied for island licensing designation.	✓	
The Orkney County Council Act (1974)	Works within the Orkney Harbour Area, in relation to the export cables in Scapa Flow require a Works Licence under this legislation.	✓ (Scapa Flow only)	
Town and Country Planning Act 1997 (as amended)	The Town and Country Planning (Scotland) Act 1997 is the basis for the Scottish planning system and sets out the roles of the Scottish Ministers and local authorities with regard to development plans, development management and enforcement. Consent for the onshore aspects of the Project will either be sought separately from the Section 36 Consent, via a separate planning permission application made to the THC and/or the OIC, or through 'deemed' planning permission under the Section 36 of the Electricity Act, as permitted by the Growth and Infrastructure Act 2013.		✓
Environmental Impact Assessment (EIA) Legislation			
Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)	The requirements of the EIA Directive are enacted through relevant UK legislation for electricity generation projects requiring consent under Schedule 36 of the Electricity Act 1989 by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.	✓ (generation stations only)	
The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)	These EIA Regulations apply to applications for a marine licence out to the 12 NM limit. An EIA is specifically required under Schedule 2 of the Marine Works EIA 2017 (Scotland) Regulations for installations for the harnessing of wind power for energy production (wind farms) if: • The development involves the installation of more than two WTGs; or • The hub height of any WTG or height of any other structure exceeds 15 m. As this Project exceeds these requirements, an EIA must be undertaken.	✓	

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
The Marine Works (Environmental Impact Assessment) Regulations 2007	The EIA regulations that apply to applications for a marine licence requiring an EIA, relevant to projects from 12 – 200 NM. Schedule A1 and A2 list the types of projects which may require an EIA. Schedule A2 includes "Installations for the harnessing of wind power for energy production". Schedule 1 of these regulations is used to understand whether an EIA is required for a Schedule A2 project by considering whether the project is likely to have significant effects on the environment. Matters requiring consideration include the characteristics (e.g. size, design, waste, pollution, risks etc.) and location (e.g. environmental sensitive areas) of the project as well as the types and characteristics of the potential impact (e.g. magnitude and spatial extent). Given the nature and scale of the Project, it is considered that an EIA must be undertaken.	✓	
Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)	The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) implement the requirements of the EIA Directive for planning permission applications made under the Town and Country Planning Act 1997 (as amended), including for planning permission which is deemed to be granted. The onshore aspects of the Project are considered to require an EIA under these regulations.		✓
Habitats Regulations			
The Conservation (Natural Habitats &c.) Regulations 1994 (as amended), The Conservation of Habitats and Species Regulations 2017 and The Conservation of Offshore Marine Habitats and Species Regulations 2017	The Conservation (Natural Habitats &c.) Regulations 1994 (as amended), The Conservation of Habitats and Species Regulations 2017 and The Conservation of Offshore Marine Habitats and Species Regulations 2017 ('The Habitat Regulations), transpose the requirements of Directive 92/43/EEC (the Habitats Directive) for developments in Scottish Waters. The Habitat Regulations require that where a plan or project that is not directly connected with, or necessary to the management of a European Site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.	✓	✓

LEGISLATION & / OR POLICY	SUMMARY	RELEVANT PROJECT ASPECT	
		OFFSHORE	ONSHORE
Pre-Application Consultation			
The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013	Where activity is planned within the Scottish Territorial Waters, the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 (hereafter referred to as the Pre-Application Consultation (PAC) Regulations) apply.	✓	
The Town and Country Planning (Hierarchy of Developments (Scotland) Regulations 2009	In addition to the above, there are further PAC requirements for 'major' onshore developments. The classes of 'major' development are as defined in The Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009.		✓
The Town and Country Planning (Development Manager Procedure) (Scotland) Regulations 2013 (as amended)	These regulations set out the onshore PAC requirements. Amendments to the PAC requirements came into force in October 2021 through The Town and Country Planning (Pre-Application Consultation) (Scotland) Amendment Regulations 2021. The proposed amendments require two PAC events ahead of submitting a planning application within the 18 months preceding the planning application submission and no earlier.		✓

1.2.2 Other Licencing Requirements

Other Permits and Licencing will be required during Project development for activities not included within the Project consent including, but not limited to:

PRE-CONSTRUCTION	• Pre-construction survey licences: – European protected species (EPS) licence and basking shark derogation licence, as required; – Marine licences or marine licence exemptions for survey data acquisition, as required; – CES works licence; – OIC works licence; and – Protected sites assessment.
CONSTRUCTION	• Onshore construction licences (as required, including Controlled Activities Licence, Construction Site Licence and EPS) • EPS licence and basking shark derogation licence for construction.
OPERATION & MAINTENANCE	• Safety Zone Applications; and • Licences and consents for any unscheduled or major maintenance work that has not been considered within the EIA.
DECOMMISSIONING	• Decommissioning Programme(s); and • Relevant licences as listed for pre-construction and construction.

For each permit or licence, separate applications will be submitted to the regulators, with supporting information as required. Should additional licences be required across the lifecycle of the Project, these will be discussed and agreed with the relevant consenting authority. Therefore, any potential effects of pre-construction surveys or Unexploded Ordnance (UXO) clearance to marine mammals will be fully considered and assessed as part of the European Protected Species Licence and Marine Licence applications required for the surveys and clearance works.

Once the Operations and Maintenance (O&M) strategy is finalised, any construction works required in relation to the O&M base of operations will also be subject to separate consent applications either undertaken by OWPL or the existing facility operator.

1.3 Project Description

1.3.1 Site Selection and Consideration of Alternatives

1.3.1.1 Site Selection Process

The site selection process undertaken to date is outlined below in Figure 1-2. This process is ongoing and further refinements to the Project boundary may occur once further information following offshore and onshore surveys is obtained. The EIA Report will provide a full description of the site selection process.

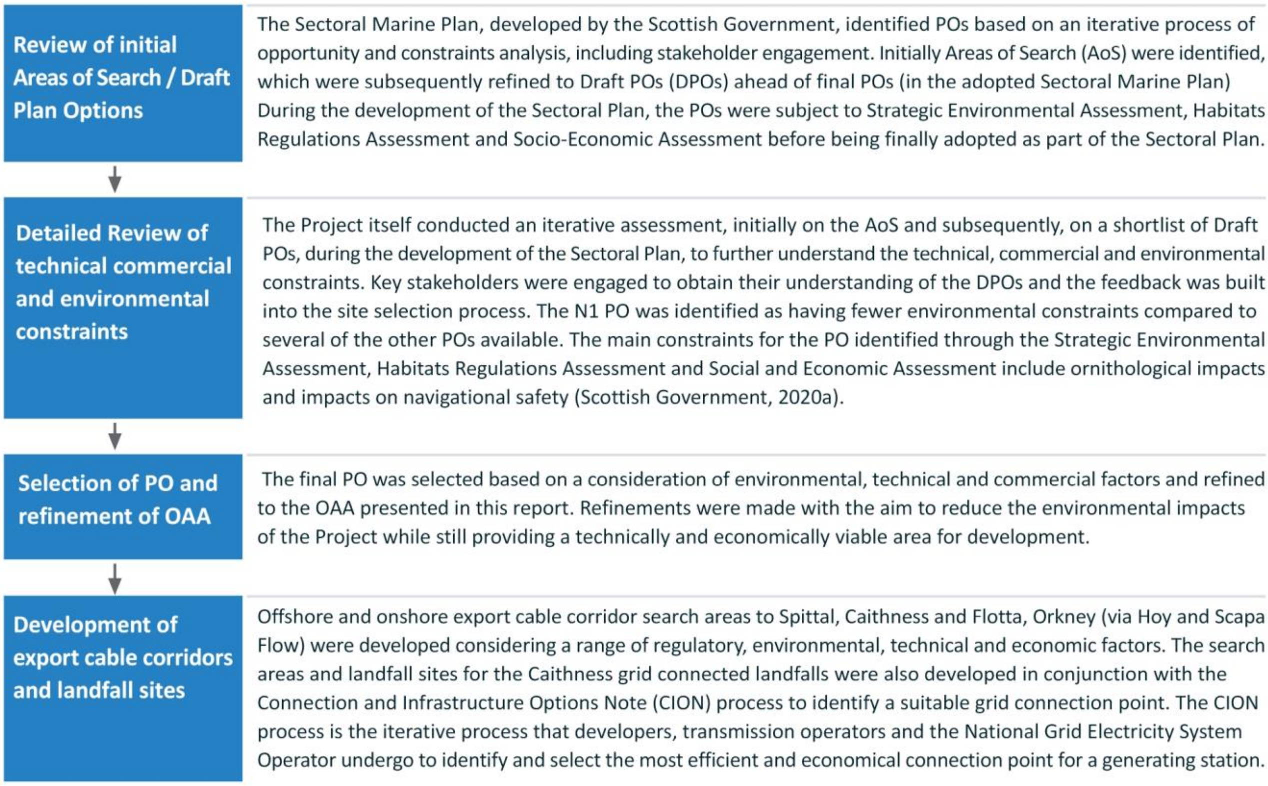

Figure 1-2 Site Selection Process

1.3.1.2 Option Agreement Area

OWPL developed and selected the OAA, within which the array area will be located, in the N1 PO of the Sectoral Plan. The OAA was developed and selected through an iterative constraints mapping exercise to identify the key constraints for avoidance supplemented by extensive consultation with key stakeholders. The OAA has been designed to minimise impacts as far as possible whilst retaining necessary flexibility to accommodate uncertainties.

Key offshore constraints considered include:

- Technical: bathymetry and slope, ground conditions, metocean, windspeed, constructability and installation and maintenance; and
- Environmental: seascape, landscape and visual designations on the Caithness and Orkney coastlines, shipping and navigation routes and the Yankee helicopter main route.

The constraints analysis results in an OAA that both maximises the potential for renewable energy production, while retaining technical flexibility and minimising environmental impacts.

The location of each WTG is yet to be finalised, and are subject to further site investigations. Indicative WTG locations will be used to inform the EIA process

1.3.1.3 Offshore Transmission Infrastructure

The OAA was identified as being relatively unconstrainted for siting the OSPs and inter-array cables. The locations of the OSPs are yet to be finalised, however, it is expected that they will be located within the OAA to optimise costs and reduce cable length. Indicative OSP locations will be used to inform the EIA process.

Offshore export cable corridor search areas have been developed, forming wide corridors between the OAA and the landfall sites, at both Caithness and Orkney, and within Scapa Flow. The offshore export cable corridor search areas are based on significant routing work that has been conducted to date.

Key offshore constraints include:

- Technical: seabed substrate, metocean, existing seabed use (anchorage areas, dredging areas, disposal areas, munitions areas), existing assets, constructability and installation and maintenance access; and
- Environmental: protected sites, marine protected areas (nature and historic), offshore cultural heritage and third party, existing and consented infrastructure.

The routing process resulted in an offshore export cable corridor search area directly from the OAA to the Caithness landfall sites. However, for Orkney, there were significant marine constraints when routing directly to Flotta associated with the strong tidal regime within the Pentland Firth, hard substrate, marine archaeological wrecks and shipping navigation restrictions. As such, the offshore export cable corridor search area involves an onshore section across the island of Hoy (and potentially Fara) before crossing Scapa Flow and landing on the island of Flotta.

The offshore export cable corridor search areas have been developed to allow more defined offshore export cable corridors to be identified once further site investigations have been completed. As the project develops, and as the EIA progresses, the final offshore export cable corridors to Caithness, Orkney and across Scapa Flow will be defined following environmental, technical and commercial studies, surveys and consultation. It is these refined corridors (and landfall options) that will be the subject of the EIA and consent application.

1.3.2 Landfall Identification and Selection

A preliminary cable landfall study has been conducted, informed by initial geophysical surveys, in order to identify the most suitable options for the Project.

A number of potential landfalls are being considered along the Caithness coastline, with four potential landfalls currently under consideration Melvich bay, Dounreay, Cling Glang and Crosskirk.

A number of potential landfalls are being considered along the west coast of Hoy, the east coast of Hoy, Fara and Flotta (Figure 1-1). Currently, the below landfalls are under consideration:

- North/west coast of Hoy:
  - Murra; and
  - Rackwick.
- East coast of Hoy:
  - Greenhead;
  - Rinnigill;
  - Mill Bay; and
  - Rysa Bay.
- East coast of Fara:
  - Fara south; and
  - Fall sand.
- West coast of Fara:
  - Fara northwest; and
  - Fara west.
- Flotta:
  - Flotta north; and
  - Flotta west.

As the project develops, and the EIA progresses, the final landfalls will be defined following environmental, technical, land-use and commercial studies, surveys and consultation. The final selected landfalls will be the subject of the EIA and consent applications.

1.3.2.1 Onshore Export Cables

Onshore export cable corridor search areas have been developed forming broad corridors between the landfall sites and the Caithness grid connection at Spittal and the Flotta Hydrogen Hub, Orkney. The Orkney onshore export cable corridor search area to the Flotta Hydrogen Hub, includes search areas across the islands of Hoy and Fara. The onshore export cable corridor search areas are based on significant routing work, which considered key technical, environmental and land-use constraints.

Key drivers for routing included:

- Technical: roads , utilities, water courses and existing planning consents/infrastructure;
- Environmental: forestry and woodland, protected sites, landscape designations, cultural heritage, tourism and recreation; and
- Land-use.

While the onshore export cable corridor search areas are broad and may still overlap with the key sensitivities highlighted above, this is to allow flexibility in how these sensitivities are managed. Where possible, onshore transmission infrastructure will not directly overlap with any protected sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Geological Conservation Review Sites (GCRs)) to avoid effects on the integrity and condition of the sites and features.

The onshore export cable corridor search areas have been developed to allow more defined corridors to be identified once further site investigations have been completed. As the Project develops, and as the EIA progresses, the final onshore export cable corridors to Spittal and the Flotta Hydrogen Hub will be defined following environmental, technical and commercial studies, surveys and consultation.

1.3.2.2 Onshore Substations

In May 2018, OWPL concluded a detailed grid connection feasibility study for the Project and initiated discussions with SHET-L. Following 12 months of engagement and design optimisation, OWPL then applied for a 2.25GW grid connection in May 2019, in advance of the 2GW capacity limit being set for the N1 DPO in December 2019.

OWPL has subsequently signed a post- CION connection agreement with National Grid for delivery of transmission capacity in two stages: 750MW in October 2029 and 1,500MW in 2031. As a collaborative effort between OWPL , National Grid and SHET-L, the CION process identified the most suitable grid connection location at the existing substation owned by SHET-L near Spittal.

Two onshore substation search areas have been developed, forming broad areas within which the onshore substations will be located.

The Caithness onshore substation search area at Spittal is located near to the existing SHET-L Spittal substation. Similarly, the Orkney onshore substation search area at Flotta is located near to the existing Flotta oil terminal and proposed Flotta Hydrogen Hub. The exact location of the onshore substations are yet to be determined, as several options are still being considered. However, the potential onshore substation locations within the onshore search areas have been designed to avoid key constraints.

Through the EIA process, and in consultation with the public and stakeholders, the locations of the infrastructure will continue to be refined. Further site selection work will be undertaken following the completion of site-specific survey work and additional technical, environmental and commercial discussions and studies.

1.3.3 Design Envelope Approach

In accordance with best practice, the Project will utilise a Design Envelope approach to inform the EIA. The Project's design will continue to evolve from the EIA Scoping stage, through to the post-consent phase, in line with the EIA process and the rapid and frequent advances in the offshore renewable industry. The Design Envelope approach allows a range of parameter values to be presented for each project aspect. The Design Envelope will cover all components, and permanent and temporary works required to generate and transmit electricity from the Project to the existing National Grid network at Spittal substation and/or to the Flotta Hydrogen Hub.

Within this EIA Scoping Report the Design Envelope remains indicative and will be refined following environmental surveys, technical and engineering studies and discussions with stakeholders and the community, as part of the EIA process. The key components for the Project are outlined below, providing the first version of the Design Envelope to be further developed and detailed during the EIA.

Within the EIA, the design parameter values which represent the worst-case scenario for the impact assessments will be determined on a case-by-case basis, depending on the receptor and impact being considered.

1.3.4 Key Project Components

The key offshore components of the Project will include:

- Up to 125 WTGs with the option of fixed and/or floating foundations and associated support structures;
- Up to 5 OSPs;
- Up to 750 km of inter-array cables; and
- Up to 10 export cables across the Project, including up to 5 to a landfall at Caithness, up to 5 to a landfall at Flotta via onshore sections across Hoy and potentially Fara.

The key onshore components of the Project will include:

- Landfalls, either at Caithness and/or Hoy, Fara and Flotta;
- 1 cable transition joint bay at each landfall;
- Up to 10 onshore export cables, including up to 5 at Caithness and up to 5 across Hoy, Fara and Flotta in Orkney;
- Up to 2 new onshore substations, including one at Spittal (Caithness) and/or one at Flotta (Orkney);
- Temporary construction compounds for the onshore substations and onshore export cables; and
- Potential new access tracks for the onshore export cables, landfalls and onshore substations.

The key Project milestones are:

- Commencement of onshore construction – 2027 (duration of 4 years)
- Commencement of offshore construction – 2028 (duration of 4 years)
- First power 2029.

The Flotta Hydrogen Hub is subject to a separate consenting process and is not part of this Project.

1.3.4.1 Array Area

The array area includes the WTGs and associated foundations and supporting structures, inter-array cables and the OSPs. The array area reflects the OAA awarded to OWPL following the ScotWind Leasing Round. The OAA is approximately 28 km from Hoy and 23 km from Caithness.

1.3.4.1.1 WTGs

The WTGs convert wind energy to electricity and consist of rotor blades, towers, gearboxes, transformers, power electronics and control equipment. WTG technology is constantly evolving so the final model of WTG will be selected post-consent. A range of WTG options and associated dimensions are being considered against which the environmental impacts of the Project can be assessed. The final WTG envelope will be subject to reviews conducted throughout the EIA and design processes, and comments from stakeholders will also be considered as part of such reviews. Based on expected individual WTG capacity and the development capacity in the Sectoral Plan, the OAA will support up to 125 WTGs.

The WTGs are anticipated to be horizontal axis turbines. The anticipated maximum Design Envelope for the WTGs is provided in Table 1-4. Due to navigational commitments, the minimum lower blade tip clearance will be at least 22 m above sea level in all tidal states. This does not represent the minimum air gap. It is anticipated that the minimum air gap will be greater than 22m. The minimum air gap will be determined through specific ornithological collision risk modelling.

1.3.4.1.2 Layout

The WTG layout will be determined once the design optimisation process has been completed. This is an iterative process balancing several key development sensitivities including WTG model choice, WTG spacing arrangements and wind direction, geophysical characteristics, metocean conditions, benthic habitats, foundation structure (and associated supporting structures) and navigational safety considerations.

The distance between rows of WTGs in the down and cross wind directions will vary to maximise the efficiency of energy capture whilst minimising cabling costs. Within the array, each individual WTG will be micro-sited to consider any technical constraints and positioning accuracy. The indicative minimum spacing included as a design parameter in the WTG layout is 1 km.

Table 1-4 Anticipated Maximum Design Envelope for Wind Turbine Generators (WTGs)

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
Number of WTGs	Up to 125
Hub height (m, above mean sea level)	Up to 200
Rotor diameter (m)	Up to 330
Maximum rotor tip height (m, above LAT)	Up to 370

1.3.4.1.3 Wind Turbine Foundations and Substructures

The specific technology and makeup of the WTG foundations has not yet been selected. However, the WTGs will be supported either by fixed-bottom foundations or floating substructures. The water depths across the OAA range from 45 to 100 m. There are two shallow bank areas within the OAA, Whiten Head Bank and Stormy Bank, across which the bathymetry is relatively uniform. At present, it is anticipated that water depths under 70 m will be suitable for fixed-bottom foundations and depths of over 55 m are suitable for floating foundations. There is an overlap in the viability of fixed-bottom foundations and floating foundations in relation to water depth. The final technology selection will be driven by a series of environmental, technical and commercial variables. There is the potential for each foundation technology to be used for all the WTGs or a combination of both technologies.

The following design options are being considered for the Project: monopiles, jacket foundations (piled or suction buckets), gravity base substructures (GBS), semi-submersibles, barges and tension leg platforms (TLP). Figure 1-3 presents schematics of the different foundation options and Table 1-5 provides an overview of anticipated the maximum Design Envelope parameters for the different WTG foundation options. The Project is aiming to narrow down the foundation options under consideration so a more refined options are presented within the final EIA.

The maximum hammer energy required for the piling of the monopile or the pin piles for the piled jacket foundation are yet to be determined and subject to further analysis following the receipt of site specific survey data. This will be included within the EIA Report.

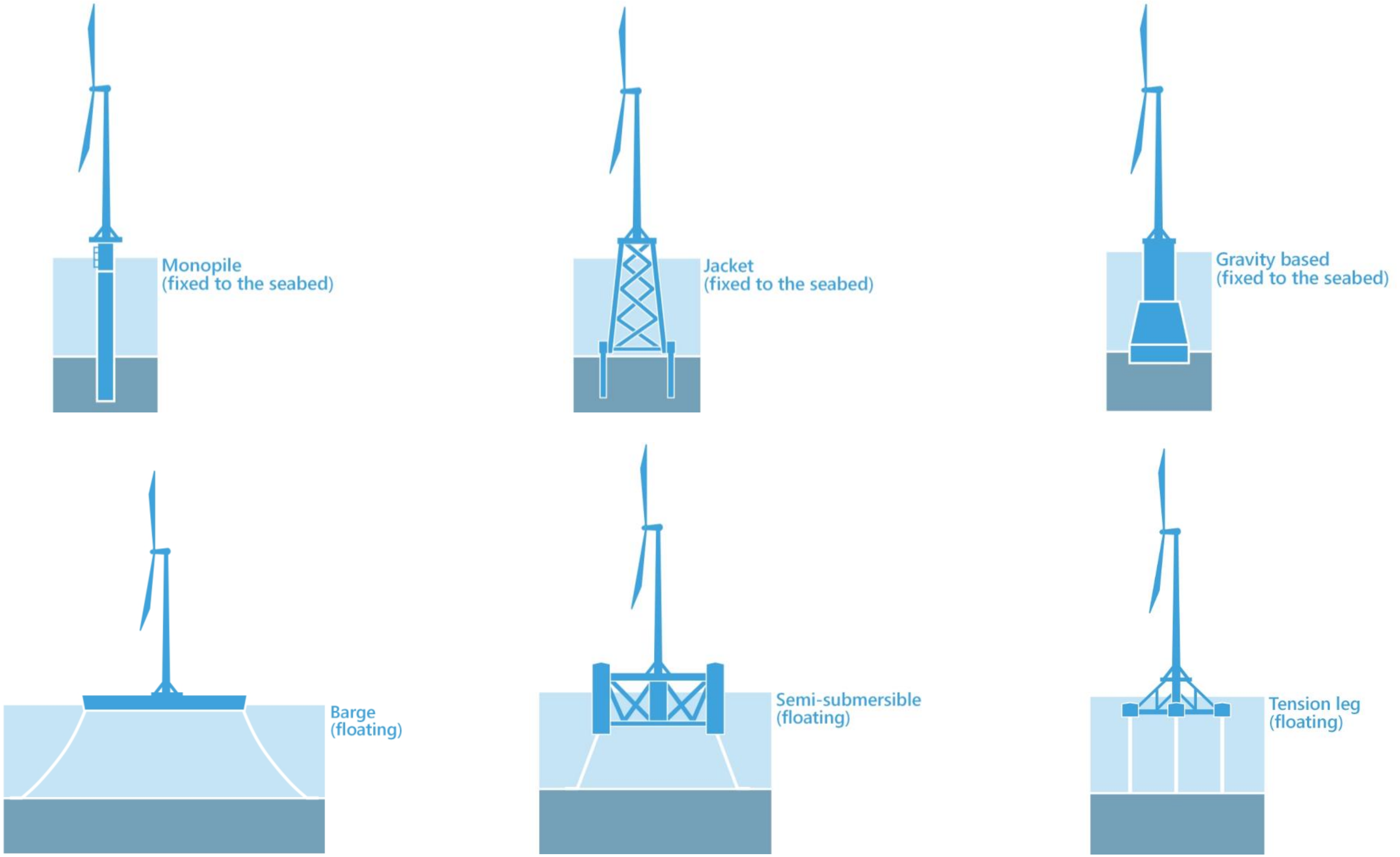

Figure 1-3 Schematic of Different Foundation Options Currently Being Considered

Table 1-5 Anticipated Maximum Design Envelope for Wind Turbine Foundations and Substructures

FOUNDATION DESIGN OPTION	DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
Fixed Bottom		
Monopile	Base diameter (m)	Up to 18
	Diameter of pile (m)	Up to 18
	Maximum hammer energy (kJ)	Unknown at this stage – to be included in EIA Report.
	Additional activity required	Potential for drilling to be required to achieve required burial depth.
Jacket foundations	Base length and width (m)	35 x 35
	Number of legs per foundation	Up to 4
	Leg width (m)	Up to 4
	Piled: Number of piles per foundation	Up to 4
	Piled: Diameter of pile (m)	Up to 4
	Piled: Maximum hammer energy (kJ)	Unknown at this stage – to be included in EIA Report.
	Piled: Additional activity	Potential for drilling to be required to achieve required burial depth.
	Suction bucket: Suction bucket diameter (m)	12
	Suction bucket: Expected penetration depth (m)	15
GBS	Base diameter (m)	Up to 60
	Additional activity required	Seabed preparation to achieve required installation base.
Floating		
Barge	Floating foundation dimensions (m)	Up to 75 x 75

FOUNDATION DESIGN OPTION	DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
	Depth of floating foundation within the water column (m)	Up to 25
	Number of mooring lines	Up to 12
	Mooring line radius (m)	Up to 1,000
	Anchoring method	Conventional anchoring, complex anchoring or rock-socket piling.
Semi-submersible	Floating foundation dimensions (m)	Up to 100 x 100
	Depth of floating foundation in water column (m)	Up to 22
	Number of mooring lines	Up to 15
	Mooring line radius (m)	Up to 1,000
	Anchoring method	Conventional anchoring, complex anchoring or rock-socket piling.
TLP	Floating foundation dimensions (m)	120 x 120
	Depth of floating foundation within the water column (m)	20 – 40
	Number of tension legs	6
	Anchoring method	Dependent on soil conditions (suction piles, driven piles, drilled piles, hybrid Suction and Gravity pile).

Scour protection may be required to prevent structures being undermined by sediment processes and seabed erosion. The requirement for scour protection will be defined during the design process, but may also be identified as part of ongoing maintenance inspections. Typical scour protection solutions include concrete mattress protection, rock placement and artificial fronds.

The volume and likely locations of scour protection are currently unknown and subject to further analysis. This information will be included in the EIA Report.

1.3.4.1.4 Offshore Substation Platforms

A maximum of five OSPs will be required for the Project. The OSPs will collect, transform and export the power generated by the WTGs. The OSPs will be located within the array area, although the exact location for the OSPs has not yet been determined. It is anticipated that each OSP will be supported by piled jacket foundations. Table 1-6 presents the anticipated maximum Design Envelope for the OSPs.

Table 1-6 Maximum Design Envelope for the Offshore Substation

DESIGN PARAMETER		MAXIMUM DESIGN ENVELOPE
Number of OSPs		Up to 5
Height (m, above Mean Sea Level (MSL))		Up to 26
Topsides		
Length x width of topside (m)		45 x 38
Height of topside (m, above MSL)		45
Foundations		
Piled jacket	Base diameter (m)	Up to 35 x 35
	Number of legs	Up to 8
	Leg width (m)	Up to 4
	Number of piles per foundation	Up to 8
	Diameter of pile (m)	Up to 4
	Maximum hammer energy (kJ)	Unknown at this stage – to be included in EIA Report.
	Additional activity	Potential for drilling to be required to achieve required burial depth.

Scour protection may also be required for the OSPs to mitigate against scour around the foundations. Typical scour protection solutions include concrete mattresses, rock placement and artificial fronds. The volume and likely locations of scour protection are currently unknown and subject to further analysis. This information will be included in the EIA Report.

1.3.4.1.5 Inter-array and Interconnector Cables

Inter-array cables collect power from the WTGs and connect to an OSP. In the case of the Project, a network of inter-array cables will be installed, which typically includes cables grouped in strings, which branch out to each OSP. Interconnector cables may also be installed between the OSPs to improve transmission reliability.

Table 1-7 presents the maximum Design Envelope for the inter-array and interconnector cables. The primary method of installation will be to bury the cable under the seabed and this is also the primary approach to protecting the cable itself. A range of potential installation methods are currently being considered for the inter-array and interconnector cables, with the potential for a combination of options to be used. The options being considered include: cable plough, jet trencher, mechanical cutting trencher and mass flow excavator. The inter-array and interconnector cables will be buried wherever possible, with external protection (e.g. rock placement, concrete mattresses and/or grout bags) only being used where adequate burial is not achievable or additional protection is required.

If floating foundations are used, a portion of the inter-array cable will be suspended within the water column.

Table 1-7 Maximum Design Envelope for the Inter-array and Interconnector Cables

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
Inter-array cables	
Voltage (kV)	Up to 132
External cable diameter (mm)	225
Total length of inter-array cables (km)	up to 750
Installation and protection methods	Cable lay and burial protection: cable plough, jet trencher, mechanical cutting trencher, mass flow excavator.
Trench width (m)	2
Width of installation tool (i.e. width of seabed footprint) (m)	Up to 15
Target burial depth (m)	1 – 3
Cable protection material	Concrete mattresses, rock placement, grout bags.
Cable protection width (m)	Up to 20
Cable protection height (m)	Up to 3
Anticipated number of crossings	Up to 10

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
Crossing material	Concrete mattresses, rock placement, grout bags, other measures.
Crossing height, length, width (m)	4 x 500 x 25
Interconnector cables	
Number of cables	Up to 6
Total length of cabling (km)	150

1.3.4.2 Offshore Export Cables

The offshore export cables will export energy from the OSPs to the landfall point(s). Up to 10 offshore export cables will be required across the Project. This includes:

- Up to 5 offshore export cables connecting the array area to the Caithness landfall(s); and
- Up to 5 offshore export cables connecting the array area to the Flotta landfall(s) crossing both the offshore area west of Orkney and Scapa Flow (via onshore routes across Hoy and potentially Fara).

The primary method of installation will be to bury the cable under the seabed and this is also the primary approach to protecting the cable itself. The offshore export cables may be installed using a variety of techniques, including cable plough, jet trencher, mechanical cutting trencher and mass flow excavator. The design parameters for the offshore export cables are provided in Table 1-8.

Table 1-8 Maximum Design Envelope for the Offshore Export Cables

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
Voltage (kV)	Up to 600
External cable diameter (mm)	330
Number of cables	Offshore Caithness: Up to 5; Offshore Orkney and Scapa Flow: Up to 5; Total: Up to 10.
Maximum cable length (km)	Offshore Caithness: Up to 320; Offshore Orkney (Hoy): Up to 340; Scapa Flow: Up to 60.
Installation and protection method	Cable lay and burial protection: cable plough, jet trencher, mechanical cutting trencher and mass flow excavator.

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE
Width of installation tool (i.e. width of seabed footprint) (m)	Up to 15
Trench width (m)	2
Target burial depth (m)	1 – 3
Cable protection and cable crossing material	Concrete mattresses, rock placement, grout bags.
Cable protection width (m)	Up to 20
Cable protection height (m)	Up to 3
Anticipated number of crossings	Up to 10
Crossing height, length, width (m)	4 x 500 x 25

1.3.4.3 Landfall Infrastructure

The landfall is an interface between the offshore and onshore aspects of the offshore wind farm. The construction work will typically involve both offshore and onshore elements. The landfalls under consideration are outlined within section 1.3.2.

There are three techniques being considered for the installation of the offshore export cables at landfalls:

- Option 1: Horizontal Directional Drilling (HDD);
- Option 2: Open-cut trench; and
- Option 3: Rock pinning.

If HDD is required, a temporary onshore HDD compound will be utilised at the landfall site.

At the cable landfall points, a concrete joint transmission bay (JTB) may be required to house the interface joint between the offshore export cables and onshore cables. Two JTBs may be required at the landfalls at Hoy and Fara (one for each end of the land crossing(s)) with one JTB required at Caithness and Flotta. The JTB would be located above MHWS.

The purpose of the JTB is to allow a firm, solid base for cable jointing which can be covered by a tent or container to allow the necessary environmental conditions. Following connection of the cables, the JTB may be backfilled to protect the joint. The area will then be reinstated. A temporary working area will also be required to construct the landfall and JTB infrastructure.

The anticipated maximum Design Envelope for the landfall infrastructure is provided in Table 1-9.

Table 1-9 Table Anticipated Maximum Design Envelope for Landfall Infrastructure

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE	
	CAITHNESS	ORKNEY
Installation method	HDD, open-cut trench or rock-pinned	HDD, open-cut trench or rock-pinned.
Number of ducts installed	5	10 on Hoy, five at each landfall; 10 on Fara, five at each landfall 5 on Flotta.
Number of joint / transition bays	1	2 on Hoy, one on each shore-end; 2 on Fara, one on each shore-end; 1 on Flotta.
JTB dimensions (m^2) (per cable)	200	200
Landfall HDD compound dimensions (m^2 per cable)	1,250	1,250
Temporary working area dimensions (m^2 per cable)	1,250	1,250

1.3.4.4 Onshore Export Cables

Up to five onshore cables will be installed as underground cables in trenches along the cable routes on both Caithness and Orkney (including five cables installed across Hoy, potentially Fara and Flotta), i.e. ten cables in total. No overhead lines are planned for the Project. As no overhead lines will be used as part of the Project, no adverse human health effects from electromagnetic field (EMF) exposure are expected and this is not considered further within the Scoping Report.

It is anticipated that open-cut trenching will be the primary installation method, however this will be reviewed once the onshore cable routes are finalised. HDD may be required, if obstacles are encountered, including sensitive features such as water courses and crossings with railways. The onshore cable trenches will be located within the working corridor, which will also include any access tracks, excavated material and any other equipment/machinery. Certain sections of the working corridor may be wider, if required, for temporary parking, storage and cable pulling equipment. The working corridor will also include Cable Joint Bays (CJBs), which are typically required every 500 – 1,000 m to string together the onshore cable sections depending on the manufacturing specification of the cable supplier. Temporary working areas will also be required along the onshore cable route for the cable installation works.

The anticipated maximum Design Envelope for the onshore export cables is provided in Table 1-10. Several of these dimensions will be subject to ground conditions, landowner requirements and cable characteristics.

Table 1-10 Anticipcated Maximum Design Envelope for the Onshore Export Cables

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE	
	CAITHNESS	ORKNEY
Voltage (kV)	Up to 600	up to 600
Number of cables	Up to 5	Up to 5 (including up to 5 on Hoy, Fara and Flotta).
External cable diameter (mm)	330	330
Maximum length of export cable (km)	Up to 175	Up to 155 across Hoy, Fara and Flotta.
Installation method	Trenching where possible and HDD at pinch points (e.g. river and rail crossings)	Trenching
Trench width (m)	Unknown at this stage – to be included in EIA Report	Unknown at this stage – to be included in EIA Report.
Trench burial depth (m)	1 – 3	1 – 3
Working corridor width (m)	100	100
Temporary working area for crossings (per crossing) (m^2)	1,250	1,250
Cable joint bay dimensions (m^2) (per bay)	200	200

1.3.4.5 Onshore Substations

The Project will require up to two new onshore substations, one at Spittal (Caithness) and / or one at Flotta (Orkney). The onshore substations will include the electrical equipment required to connect the Project to the grid and/or the Flotta Hydrogen Hub. In addition to the area required for the footprint of the onshore substations, temporary working areas will also be required for construction. The maximum Design Envelope for the onshore substations is provided in Table 1-11.

Table 1-11 Anticipated Maximum Design Envelope for the Onshore Substations

DESIGN PARAMETER	MAXIMUM DESIGN ENVELOPE	
	CAITHNESS	ORKNEY
Number	One at Spittal.	One at Flotta.
Footprint (ha)	20	15
Temporary working area dimensions (ha)	15	15

1.3.5 Project Phases

1.3.5.1 Construction

1.3.5.1.1 Offshore

It is anticipated that the construction of the offshore elements of the Project will take approximately 4 years (subject to change) between 2028 to 2031. Construction works would typically be undertaken 24 hours a day, 7 days a week offshore, dependent upon weather conditions. The general series of activities is outlined below Table 1-12.

Table 1-12 Outline of Offshore Construction Activities

ACTIVITY		DESCRIPTION
1.	**Pre-construction surveys and site investigations**	Pre-construction surveys may be undertaken, including geophysical, geotechnical and benthic, surveys, UXO clearance surveys and metocean measurement campaigns. Other surveys, such as ornithological surveys, may also be undertaken.
2.	**Site preparation, foundation and substructure installation**	Seabed preparations may also be required prior to the installation of WTG and OSP foundations and offshore cable infrastructure. This may include boulder clearance and pre-lay grapnel runs.
3.	**OSP installation**	OSP foundation structures are typically pre-installed ahead of the topside structure. The installation technique for the foundation structures will vary depending on the selected design.
4.	**Offshore export cable – landfall and offshore installation**	Following the completion of the necessary onshore works (including the necessary landfall preparations discussed in section 1.3.5.1.2) and the offshore site preparations, the offshore export cables will be installed from the landfall(s) out to the OSPs, with the potential for pre-trenching works to be undertaken ahead of cable installation. The export cables will be buried wherever possible and may be installed using a variety of techniques, as discussed in section 1.3.4.2. Following cable

ACTIVITY	DESCRIPTION
	lay and burial (which may occur simultaneously or sequentially) external cable protection will be installed, as necessary.
5. Foundation or substructure installation	Foundations will be installed ahead of the WTG, typically transported as partially pre-assembled sub-units. WTGs are subsequently installed onto the foundation structures. In the case that floating substructures are used, the substructures will be assembled onshore or in a nearshore location, before being towed to site (see row 7).
6. Inter-array and interconnector cable installation	The inter-array cables will be installed between the WTGs and OSPs, typically as strings connecting multiple WTGs to a single OSP. The interconnector cables will be installed between the OSPs. The installation techniques for the inter-array and interconnector cables will be similar to that of the offshore export cables.
7. WTG installation/commissioning	The WTGs will be fabricated onshore and transported to the array area for installation. For WTGs with floating substructures, the turbine and substructure assemblies are typically towed to site where they are hooked to pre-installed mooring systems. There may be a requirement for the assembled WTGs to be held at a nearshore wet storage location before being towed to site. Following installation of the WTG and connection to the inter-array cabling, a process of testing and commissioning will be undertaken.

Specific details on installation will vary depending on the technologies adopted and may change due to improvements in both the technology and supply chain.

It is anticipated that a range of vessels will be used in the construction phase, including jack-ups, semi-submersible crane vessels, transportation barges, heavy lift vessels, cable laying vessels, service operated vessels (SOVs), diving support vessels, construction support vessels (CSVs), remote operated vehicle support vessels (ROVSVs), rock placement vessels and guard vessels. During construction activities, appropriate safety zones will be required to be in place around WTGs, construction vessels and work areas. The Project intends to apply for standard safety zones of 500 m during construction and major maintenance activities. Both statutory and advisory operational safety zones are being considered as part of the Project development process and the Navigational Risk Assessment (see section Shipping and Navigation). The requirement for these safety zones will be discussed further with consultees during the EIA process.

1.3.5.1.2 Onshore

It is anticipated that the construction of the onshore elements of the Project will take approximately 4 years (subject to change) between 2027 to 2030. Construction works would typically be undertaken 24 hours a day, 7 days a week onshore. The general series of activities is outlined below Table 1-13.

Table 1-13 Outline of Onshore Construction Activities

ACTIVITY	DESCRIPTION
1. **Pre-construction surveys and site investigations**	Pre-construction surveys and site investigations may be undertaken, including intrusive archaeological investigations, ecology surveys, hydrology surveys, geotechnical and geophysical surveys and contaminated land investigations. The requirement for these surveys will be determined once the pre-consent surveys have been completed and following the EIA and engineering processes.
2. **Landfall works**	The landfall works will involve the following activities: • Setting up of a temporary construction site and potential HDD compound for the landfall works; • Excavation or HDD for landfall installation; • Possible laying of ducts for later installation of cables; • Construction of JTB; • Installation of onshore and offshore cables to JTB; and • Reinstatement, where necessary.
3. **Cable enabling works**	The cable enabling works will be carried out ahead of cable installation and may involve site preparation, including site clearance, topsoil stripping and fencing off of construction areas, setting up of temporary work areas and construction of access roads.
4. **Cable route installation**	Following the enabling works, the cable will be installed. The primary installation method is expected to be open-cut trenching which will involve the excavation of trenches along the cable route and the construction of CJBs. The onshore cable would then be drawn through buried ducts and laid in the trenches at the CJBs. HDD will be used to avoid disturbance to sensitive surface features.
5. **Onshore substation enabling works**	The substation enabling works will involve the following stages: • Site preparation, including site clearance, fencing off of the construction areas, provision of services to the site and creation of temporary works areas; and • Construction of temporary and permanent access roads.
6. **Onshore substation civil and electrical works**	Following the enabling works, the substation civil and electrical works will commence, which will comprise the following stages: • Civil works to prepare the site for the heavy-duty equipment required for the installation of the foundations and buildings. This will comprise earthworks to create a firm and level platform across the site; • Foundation works for the main electrical components and buildings which may comprise piled and/or shallow foundations; • Provision of the main utilities to services the site including electrics, water and telecommunications; • Construction of the main buildings; • Installation and testing of electrical equipment;

ACTIVITY	DESCRIPTION
	• Landscaping works including earthworks and vegetation planting; and • Commissioning activities.

1.3.5.2 Operations and Maintenance

1.3.5.2.1 Offshore

The overall O&M strategy will be finalised once the onshore base location and technical specifications are known. Options for the O&M base are currently being considered and work has already been undertaken to assess Scottish port capabilities to understand the viability of options available to meet the Project requirements. It is anticipated that the Project will be managed from a local onshore facility for the lifecycle of the Project.

During the operations period, the following classifications of maintenance may be required:

- Routine maintenance: activities that are carried out on a regular basis based on the original equipment manufacturer (OEM) recommendations and good industry practice, for example inspections, testing investigation of minor faults;
- Unscheduled maintenance: activities that may be required to carry out repairs or remedial works to return the asset to serviceable condition; and
- Major component replacement/repair: Faults that could trigger emergency repairs requiring large component replacements and extensive remedial works.

All offshore infrastructure, including WTGs, foundations, cables and offshore substation platforms will be included in monitoring and maintenance programmes. The EIA will assess the potential impacts of routine maintenance activities based on experience and best practice, however further consents or licences will be applied for if required. O&M activities may be required at any time during the lifecycle of the Project.

It is anticipated that routine maintenance will be serviced through SOVs, Crew Transfer Vessels (CTVs), daughter craft, ROVSVs and helicopters. Any major exchanges may require the use of jack-up barges or semi-submersible crane vessels.

1.3.5.2.2 Onshore

Following commissioning, it is assumed that the onshore substation(s) will operate continuously (24 hours a day, 7 days a week) except during planned shutdowns for maintenance. The onshore substation(s) will be designed to remain *in situ* during the lifetime of the Project.

There will be a limited amount of traffic to and from the substation(s) for general O&M purposes. Beside this, there will be no day-to-day personnel on site in normal operation. Unexpected faults may lead to increasing traffic volumes depending on the type of fault. It should be noted that for the Flotta substation option, traffic to and from the substation will most likely involve a ferry and / or CTV from Orkney mainland.

Activities on the underground cable system during the operational phase will include:

- Regular and ad-hoc visits: including activities for inspection/maintenance purposes; and
- Non-routine activities: including activities to repair of damage to cable or replacement of failed cable joint.

1.3.5.3 Decommissioning

1.3.5.3.1 Offshore

The Energy Act 2004 and the Scotland Act 2016 contain statutory requirements in relation to the decommissioning of offshore renewable energy installations (OREI) and require the Project to provide a Decommissioning Programme, supported by appropriate financial security, prior to construction. The Decommissioning Programme will follow the guidance found in the Guidance Notes on Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004 from the UK Department of Energy and Climate Change (DECC) (Department for Business Energy and Industrial Strategy, 2019) and the Draft Guidance Note for the Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in the Scottish Part of the Renewable Energy Zone under the Energy Act 2004 published by Marine Scotland (Marine Scotland, 2019). Decommissioning activities will comply with all relevant legislation at that time.

Throughout the Project lifespan, the Decommissioning Programme will be reviewed and updated every 5 years. Consultee bodies listed in the S105 Notices, and any additional consultees identified by MS-LOT or the Applicant, will be provided with the opportunity to comment on the final decommissioning strategy prior to it being finalised. It is anticipated that the final revision process will commence two years prior to the initiation of decommissioning activities.

Best practice will be followed when developing a Decommissioning Programme. It is expected that WTGs and OSPs will be removed in a reverse order of their installation, with surface infrastructure likely to be fully removed. The decommissioning options for the cables will be discussed with stakeholders and regulators, however, sections of the cable may be left *in situ* to avoid unnecessarily disturbing the seabed.

1.3.5.3.2 Onshore

A Decommissioning Plan will be required as a planning condition to be approved by the regulator, prior to the onshore decommissioning works. Decommissioning best practice and legislation will be applied at that time. It is expected that decommissioning will follow a reverse order of the installation activities with some infrastructure potentially left *in situ*.

1.4 Approach to Scoping and the EIA

1.4.1 Scoping Overview

The objective of this Scoping Report is to engage with the Scottish Ministers, statutory and non-statutory consultees in the EIA process, inviting them to provide relevant information and to comment on the proposed approach to the EIA, to ensure that a robust and proportionate EIA Report is submitted in support of the applications for consents. In order to engage in an informed manner, the Scoping Report provides information on:

- The proposed Project;
- The topics to be scoped into the offshore and onshore EIAs, where potentially significant impacts may result from the Project on the physical, biological and human environment;
- The topics to be scoped out of the offshore and onshore EIAs, where significant impacts are not anticipated with consideration of embedded and industry best practice mitigation; and
- The proposed outline approach to understanding further the baseline conditions and addressing the potential environmental impacts through the EIA process.

In order to produce a succinct and informative EIA Report, a proportionate approach is used whereby, as far as possible, the report will seek to scope out those issues which are increasingly shown (from repeated assessment in offshore wind EIA) to be non-significant. The Scoping Report is key in distilling the potential environmental effects and identifies those that are proposed to be scoped in or scoped out of the EIA process.

The final list of topics to be considered in the EIA process for the Project will be confirmed following receipt of the Scoping Opinions and through further discussions with relevant stakeholders, including MS-LOT (on behalf of Scottish Ministers), OIC and THC, their statutory advisors and other relevant stakeholders. The Scoping Report will also aim to confirm the scope of the cumulative effects assessment (CEA) and identified relevant transboundary impacts. The Applicant welcomes the opportunity for engagement with stakeholders and feedback on the Project and the scope of the EIA Report.

1.4.2 EIA Methodology

EIA is the process of systematically identifying the potential impacts that the Project could have on the environment. The process involves developing a detailed understanding of both the Project e.g. proposed installation, operation and decommissioning activities, and the environment within which the Project will be located. The potential impacts of the Project are then evaluated to determine how the Project would affect the environment and the significance of those impacts.

Where potential impacts are likely to be significant, specific measures will need to be taken to reduce or remove such impacts (mitigation measures). Mitigation measures can either take the form of management measures required by legislation of industry practices (tertiary mitigation), changes to the design of the project (primary mitigation), or implementation of additional measures (secondary mitigation). The EIA process also requires the identification of measures to monitor the predicted impacts of the Project in the long term.

1.4.2.1 Baseline Characterisation

The characterisation of the existing environment will be undertaken in order to determine the baseline conditions in the area covered by the offshore and onshore components of the Project, including relevant surrounding study areas for those issues scoped into the EIA Report. This will involve the following steps:

- Study areas defined for each receptor based on the relevant characteristics of the receptor (e.g. mobility/range);
- Review available information;
- Review likely or potential impacts that might be expected to arise from the Project;
- Determine if there is sufficient data to make the EIA judgements with sufficient confidence;

- If further data is required, ensure data gathered is targeted and directed at answering the key question and filling key data gaps; and
- Review information gathered to ensure the environmental baseline can be sufficiently characterised in appropriate detail.

1.4.2.2 Assessment of Potential Impacts

This Scoping Report sets out the potential environmental impacts associated with the Project and identifies those to be scoped into or out of the EIA process. It builds on the assessments already completed during the preparation of the Sectoral Marine Plan for Offshore Wind energy, including the SEA, Habitats Regulations Appraisal (HRA) (including Appropriate Assessment), Island Communities Impact Assessment and Social and Economic Impact Assessment. The EIA scoping assessment considers embedded mitigation, measures that are built into the project concept either through design (primary mitigation) or implementation of industry best practice (tertiary mitigation).

For those potential impacts scoped into the EIA, the EIA Report will describe the significance of effect expected to result from the Project using a standard EIA methodology. The assessment process will consider the potential magnitude of the change to the baseline conditions arising from the Project and the sensitivity of the particular receptor under consideration, as well as any embedded mitigation measures (see Figure 1-4).

There is the potential for the Project to result in both adverse and positive impacts on the environment. The impact identification will consider whether a potential impact is considered to be adverse or positive. The assessment process will then consider the significance of the resulting effect on the environment, either positive or negative, using the process outlined below.

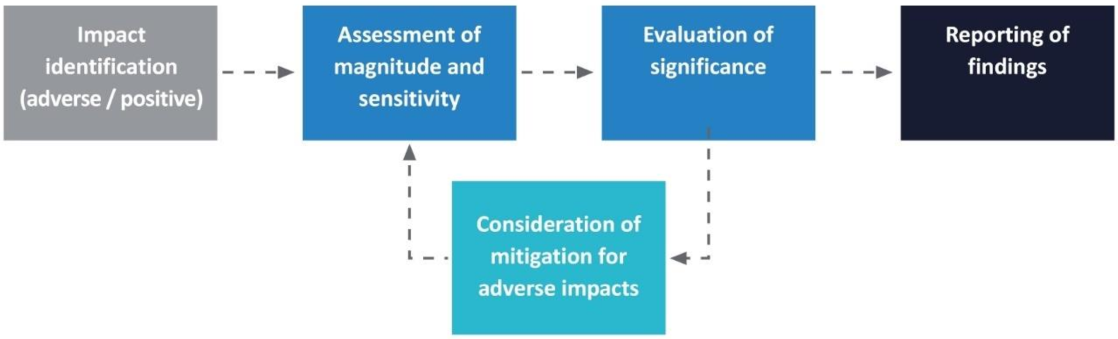

Figure 1-4 Assessment of Effects Process

Magnitude:	The categorisation of magnitude of impact will vary for specific pathways / receptors / technical assessments but will broadly follow: • High: total change or major alteration to key elements / features of the baseline conditions; • Medium: Partial change or alteration to one or more key elements / features of the baseline conditions;

- Low: Minor shift away from the baseline conditions; and
- Negligible: Very slight change from baseline conditions.

For topics where there is the potential for adverse and positive impacts, magnitude definitions will be defined for both positive and adverse impacts.

Sensitivity: The specific scale of sensitivity for a receptor is dependent on the EIA topic / receptor in question, but in general it may be defined in terms of quality, value, rarity or importance of the receptor being assessed. The ability of a receptor to adapt to change, tolerate, and / or recover from potential impacts will be key in assessing its sensitivity to the impact under consideration. The scale of sensitivity will be classed as 'negligible, low, medium or high'. In carrying out topic specific assessments, a more specific scale of increasing sensitivity will be defined where this is appropriate. Guidance will also be taken from the value attributed to elements through designation or protection under law. Expert judgement is particularly important when determining the sensitivity of receptors.

Note: where specific guidance exists for impact assessment criteria e.g. for Navigational Risk Assessment (NRA), archaeological impact assessment and seascape, landscape and visual impact assessment, these will be followed.

1.4.2.3 Evaluation of Significance

The consideration of magnitude of a potential impact and sensitivity of the receptor will determine an expression, which may be quantitative or qualitative and often informed by expert judgement, for the significance of the positive and negative impacts. Table 1-14 sets out how the magnitude of impact and the sensitivity of the receptor are combined to provide an assessment of effect significance.

Table 1-14 Significance of Effect

SIGNIFICANCE OF EFFECT		SENSITIVITY OF RESOURCE RECEPTORS			
		NEGLIGIBLE	LOW	MEDIUM	HIGH
MAGNITUDE OF EFFECT	NEGLIGIBLE	Negligible	Negligible	Negligible	Negligible
	LOW	Negligible	Negligible	Minor	Minor
	MEDIUM	Negligible	Minor	Moderate	Moderate
	HIGH	Negligible	Minor	Moderate	Major

The categories provide a threshold to determine whether or not significant effects may result from the Project, with Moderate and Major effects being defined as 'significant' in EIA terms, as highlighted in amber. A typical categorisation is shown below (Table 1-15), noting that effects can be both beneficial or adverse.

Table 1-15 Definitions of Effect Significance

CATEGORY	DEFINITION
NEGLIGIBLE	No detectable change to the environment or receptor resulting in no significant effect.
MINOR	A detectable but non-material change to the environment or receptor resulting in no significant effect or small-scale temporary changes.
MODERATE	A material but non-fundamental change to the environment or receptor, resulting in a possible significant effect.
MAJOR	A fundamental change to the environment or receptor, resulting in a significant effect.

The EIA will provide topic specific definitions of magnitude, sensitivity and significance as required. The topic specific definitions will consider guidance and specialist knowledge specific to the topic in question.

Where the impact assessment identifies that an aspect of the Project is likely to give rise to significant environmental effects, mitigation measures, above and beyond any embedded mitigation, or design changes will be incorporated into the assessment process to avoid impacts or reduce them to acceptable levels. At this point the impact will be reassessed, considering the additional mitigation to determine the residual effect.

1.4.2.4 Ecosystem Approach

In addition to impacts on individual receptors being assessed, a more holistic approach will be taken to consider any potential impacts that may occur at an ecosystem scale and particularly across trophic levels (e.g. impacts on prey species affecting their availability for predators). This has been considered as relevant in the scoping of impacts for each topic presented within this Scoping Report.

1.4.3 Cumulative Effects Assessment Approach

As well as considering impacts from the Project alone, the EIA regulations require a consideration of potential impacts that could occur cumulatively with other relevant projects or plans, resulting in a cumulative effect. Each technical section of the EIA will provide a CEA.

The EIA will consider projects that are 'reasonably foreseeable' such as:

- Existing developments either built or in construction;
- Approved developments, awaiting implementation; and
- Proposals awaiting determination within the planning process with design information in the public domain (including other ScotWind OWFs).

The most up-to date publicly available information in relation to the relevant project parameters will be used to inform the CEA. The assessment will consider the temporal and spatial extent of impacts associated with each phase of the Project to present an understanding of how these overlap with other relevant projects and plans.

When completing the CEA, it is important to consider that some proposed projects may not be taken forward and built out as currently described, and therefore, there is a level of uncertainty with respect to the potential impacts which may arise. The 'phase' of a project, in relation to the certainty or uncertainty over whether the project will be brought forward as described, will be considered when drawing conclusions on cumulative effects.

The potential in-combination effects on European designated sites will be considered through the HRA process and will be assessed using the same approach as the CEA.

1.4.4 Inter-related Effects and Transboundary Effects

The EIA will consider inter-related effects, the potential effects of multiple impacts from the construction, operation and decommissioning of the Project, effecting one receptor. Inter-related effects are assessed through consideration of all effects on a receptor, considering both spatial and temporal overlaps, by the Project. This will ensure that the Project as a whole is appropriately considered within the EIA.

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, which has been transposed into Scottish law through Domestic legislation prior to the UK's withdrawal from the EU, 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.

1.4.5 Proportionate Approach to EIA

The Scoping Report forms a key step to ensuring a proportionate EIA. The importance of proportionate and accessible EIAs is something that is recognised by regulators, stakeholders and practitioners. The aim of ensuring a proportionate EIA has been considered from the offset of project planning and our approach includes:

- A robust EIA Scoping process: Scoping based on significant industry experience of what the key impacts are likely be; and
- Consideration of embedded and industry best practice mitigation from the offset: mitigation measures that are built into the project concept rather than in response to a significant effect identified as part of the EIA process. A range of mitigation measures have been applied to the project concept and therefore considered within this EIA Scoping Report.

Sections 2 to 4 present the results of scoping on a receptor-by-receptor basis for each of the distinct geographical regions of the project, i.e.:

- Section 2 Offshore, including Scapa Flow;
- Section 3 Onshore Orkney; and
- Section 4 Onshore Caithness.

An overall summary of the Scoping Process is provided in section 5.

1.4.6 Additional EIA Matters

1.4.6.1 Consideration of Human Health

Under the EIA regulations the EIA must identify, describe and assess, the direct and indirect significant effects of a proposed development (including any operational effects if appropriate) on a number of factors which now includes human health.

Following best practice, health impacts assessment typically take the World Health Organization's (WHO) definition, which states that health is:

- "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*" (World Health Organization, (1948), Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946).

In this context, the main determinants of human health are made up of:

- environment (noise, air quality, visual);
- employment and income;
- education;
- housing;
- lifestyle;
- physical activity;
- access to services, amenities and social networks;
- community severance or cohesion;
- transport;
- social networks and connectivity;
- community identity; and
- access and accessibility.

The Project will interact with human health in relation to noise, air quality, visual, transport and socioeconomics. As all onshore cables for the Project will be buried underground, no adverse human health effects in relation to exposure to EMF are expected.

Impacts to human health have been considered within this Scoping Report within sections 2.11, 2.12, 2.13, 3.7, 3.8, 3.9, 3.10, 4.7, 4.8, 4.9 and 4.10, and will be considered within the EIA in the associated sections. Where an impact relating to human health has been scoped out within this Scoping Report, no adverse effects on human health are anticipated. Any positive impacts on human health in relation to employment and economic benefits will be considered within the socioeconomics assessment. A stand-alone EIA section for the effects on human health is not proposed.

The EIA regulations also states that any risks to human health, for example, due to accidents or disasters, must be considered. The approach for the consideration of major accidents or disasters is provided in section 1.4.6.2.

1.4.6.2 Consideration of Major Accidents or Disasters

The EIA regulations requires the EIA to consider any "*expected effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development*".

The EIA regulations go on further to state that the EIA Report should include "*A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU law such as any law that implemented Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or UK environmental assessments may be used for this purpose provided that the requirements of any law that implemented this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies*."

The Project is designed to operate within its marine and terrestrial environment. Relevant extreme environmental conditions (e.g. flooding, storm events) are taken into account when designing the Project. The Project will not include any large inventories of hazardous material that could be released in the event of a natural disaster affecting the project.

Relevant aspects of the EIA will consider the risk of environmental disasters to the Project and the associated risks to the environment and society, for example within relevant topic sections, such as geology and hydrology in relation to flood risk (section 3.1 and 4.1). Associated control measures to prevent or mitigate any major accidents or events will also be included where relevant in the EIA Report. A standalone section on the topic of major accidents and/or disasters is not proposed. This will consider relevant appropriate guidance on this topic, including the Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in EIA: A Primer (IEMA, 2020).

The main areas of vulnerability for the Project stem from its marine operating conditions (but for which it will be designed in the first place), coastal erosion at the landfall and flood risk (lowest level) at the substation. However, the likelihood of a natural disaster for any these components leading to consequential significant environmental effects is negligible.

1.4.6.3 Consideration of Climate

Similar to the consideration of human health, the EIA regulations also require that any direct or indirect significant effects relating to the climate (e.g. greenhouse gas emissions) are identified, described and assessed in an appropriate manner. Further to this, the EIA regulations specify that the EIA report must consider any significant effects on the environment relating to the impact of the Project on climate, as well as the vulnerability of the project to climate change.

The Scottish Government's carbon reduction targets were set out in the Climate Change (Scotland) Act of 2008 (as amended), and renewables developments, such as the Project will help meet these targets. Furthermore, as mentioned in section 1.4.6.2, the Project has been designed to operate within the marine and terrestrial environment to reduce any potential vulnerability to climate change.

A stand-alone climate change assessment will be developed and presented as a standalone report that will be appended to the EIA Report. The section will consider both:

- The impact of the Project on the Climate – in the form of a greenhouse gas (GHG) assessment, with emissions presented in the context of the reduction in GHG emissions from the production of zero carbon electricity instead of electricity produced from fossil fuels. This will consider the GHG emissions from the lifecycle of the Project in the context of any reduced GHG emissions as a result of energy produced by the Project (as a % of carbon budgets for Scottish and UK governments). This assessment will utilise guidance nots as appropriate, such as IEMA's Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significant ("IEMA GHG Guidance") (IEMA, n.d.); and

- The impacts of climate change on the Project – consideration of the resilience of the Project to climate change, how vulnerable it is to the impacts of climate change and what measures are taken to reduce this vulnerability. This will consider the current and future expected climate conditions at the Project with an evaluation of the potential vulnerability of the Project to climate change.

1.4.7 Habitat Regulations Appraisal

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, known as the Habitats Directive, provides for the conservation of natural habitats and of wild flora and fauna including in offshore areas. The Council Directive 2009/147/EC on the Conservation of Wild Birds, known as the Birds Directive, applies to the conservation of all species of naturally occurring wild birds including in offshore areas. In the UK, sites designated as SACs and SPAs, collectively referred to as European sites, form part of the UK site network, delivering the requirements of the Directives. The Directives were transposed into Scottish Law by various regulations, collectively referred to as the Habitats regulations, those of relevance to the Project include:

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

As the UK is no longer part of the EU, the UK has no direct obligations under the Habitats Directive or the Birds Directive. However, The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 and The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 ensure that Scotland continues to maintain the standards required by the EU Habitats and Wild Birds Directives. The Habitats Regulations remain in force, including the general provisions for the protection of European sites and the procedural requirements to undertake HRA to assess the implications of plans or projects for European sites. The changes made were only those necessary to ensure that they remain operable now that the UK has left the EU. The terms "European site", "European marine site", and "European offshore marine site", have been retained, as have "Special Area of Conservation" (SAC) and "Special Protection Area" (SPA). European sites, European marine sites and European offshore marine sites in the UK are no longer part of the European Union's Natura 2000 network. Instead, they form a UK-wide network of protected sites and retain the same protections. As such, the Habitats and Birds Directive continue to provide the framework for the conservation and management of rare and vulnerable habitats and species and wild birds within Europe and the UK.

The Habitat Regulations require that where a project is likely to have a significant effect on a designated site, either alone or in-combination with other plans or projects, it shall be subject to an Appropriate Assessment of its implications for the site in view of the site's conservation objectives by the competent authority.

HRA is a process, which first determines whether a Project is likely to have significant effects (LSE) on the conservation objectives of the sites in the absence of mitigation measures. This information is presented by the applicant in an HRA Screening report for the competent authority to provide a response to. If it is concluded, by the competent authority, that there is the potential for a LSE, then the HRA proceeds to assesses adverse impacts on the integrity of a site. This assessment is provided within an HRA report and forms the basis for the competent authority's Appropriate Assessment. If at this point an adverse effect on the integrity of a site is identified then there are additional stages, which examine alternative solutions, and provides justification of Imperative Reasons of Overriding Public Interest (IROPI).

1.5 Stakeholder Consultation

1.5.1 Consultation Strategy

Engagement with stakeholders is an important part of the development of any project; early and ongoing consultation throughout the lifecycle of the project is highly important in allowing integration of public and stakeholder concerns, opinions and data into the Project decision-making and design processes and for the developer to communicate Project progress. The Project has therefore made a commitment to work with organisations, communities and individuals who have an interest in the development of the Project throughout its lifetime. The Project will adhere to all statutory consultation requirements for consultation, including PAC.

Engagement with stakeholders during the EIA process is expected to be focused on the following key stages:

- Engagement with regulators and other stakeholders in relation to licences and permits associated with pre-development surveys (e.g. geophysical, benthic, metocean). This has already commenced;
- Formal submission and publication of this Scoping Report and request for Scoping Opinions;
- Follow-up to scoping, to confirm the EIA approach with key stakeholders, in order to agree the detailed scopes of surveys and refine the scope of EIA studies being undertaken, based on the EIA Scoping Opinions received;
- Provision of key technical reports and data, used to inform the assessments, to relevant stakeholders for information and feedback throughout the EIA;
- Completion of statutory PAC;
- Formal submission and publication of consent applications and the accompanying EIA Report to seek views on the proposal; and
- Additional public / stakeholder-specific engagement events that will take place at intervals during the consenting process, together with the issue of newsletters and updates to the Project website.

1.5.2 Engagement to Date

OWPL has conducted a significant volume of engagement prior to the submission of this Scoping Report and will continue to work pro-actively with all key stakeholders and the public, including local communities, throughout the Project lifecycle. The following organisations have been consulted to date:

- MS-LOT;
- Herriot-Watt University, Orkney;
- Marine Scotland Science (MSS);
- THC (via Pre-Planning Advice service / request);
- Maritime and Coastguard Agency (MCA);
- OIC;
- Orkney Fisheries Association (OFA);
- UK Chamber of Shipping;
- Defence Infrastructure Organisation (MoD) (via The Wind Farm Pre-Application Consultation service);
- Royal Yachting Association (RYA) Scotland;
- Scottish Fishermen's Federation (SFF);
- Highlands and Islands Enterprise (HIE);

- NatureScot;
- Orkney Harbour Authority;
- Royal Society for the Protection of Birds (RSPB);
- Scrabster Harbour Trust;
- Highlands & Islands Airports Ltd (HIAL);
- Northern Lighthouse Board (NLB);
- Historic Environment Scotland (HES);
- Space Hub Sutherland;
- Scottish Whitefish Producers Association (SWFPA);
- Sutherland & Caithness Regeneration Partnership;
- Orkney Fisheries Association;
- CES;
- Northern Highland College (University of the Highlands and Islands (UHI));
- European Marine Energy Centre (EMEC); and
- Orkney College (UHI).

A significant number of other stakeholders have been identified and will be consulted either through the formal processes or engaged directly.

1.5.3 Technical Working Groups & Receptor Specific Consultation

To facilitate engagement throughout the EIA process, OWPL is in the process of establishing technical working groups (TWGs) to discuss survey methods, interim results, assessment methods and EIA outputs. TWGs will be set up for the following topic areas:

- Commercial fisheries;
- Marine ecology;
- Shipping and navigation;
- Seascape and landscape; and
- Socioeconomics and tourism.

Each working group will meet approximately three times per year during the EIA process and potentially more frequently where required.

Other engagement, either on different environmental topics or specific issues, will be organised as required in consultation with the relevant stakeholders.

1.5.4 Community Panels

OWPL are also in the process of establishing three community panels with the aim to provide a long-term and consistent process for community engagement. Community councils will be invited to scrutinise the engagement process and provide feedback on the approaches being used. The Applicant has identified 14 community councils in the Highlands and 12 community councils in Orkney relevant to the Project. Representatives from these community councils will be invited to attend community panels for Caithness, Sutherland and Orkney.

1.5.5 Public Consultation

The applicant intends to hold three rounds of public consultation prior to the submission of the EIA and associated consents application(s). Two of these meetings will represent the formal PAC events required to meet the requirements of the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 and The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 (as amended).

Current anticipated timeline for public consultation is outlined below and includes pre-application consultation ahead of application submission:

- Round 1 – March 2022 - OWPL will hold virtual public information events following site award to present the Project, the partners and explain how people can engage with the Project team and planning process.
- Round 2 - late 2022 / early 2023 – Formal PAC event, where the public will be invited, via notices advertised in the local press and the Edinburgh Gazette for two consecutive weeks, and indicative results from the analysis and EIA work will be presented.
- Round 3 - 2023 – Formal PAC event, where the public shall be invited, via notices advertised in the local press and the Edinburgh Gazette for two consecutive weeks, to comment on the proposals prior to formal application.

Once the application is accepted by MS-LOT (on behalf of Scottish Ministers), the public shall have a further 28 days to respond, in writing, to Scottish Ministers.

1.5.6 Post Application Consultation

Consultation will continue beyond the submission of the application(s) in order to address any comments raised during the application determination and during the discharge of consent conditions ahead of construction (assuming successful project consent).

Further public events and consultation will also be undertaken as the Project progresses, during which it may be appropriate to consider alternative means of broader public consultation including press releases, printed material (e.g. newsletters, fact sheets, display boards) and through the Project website.

1.6 References

Orkney Islands Council (2020). Orkney Islands Marine Region: State of the Environment Assessment (2020). Available from: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf [Accessed 26/01/2022].

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Scottish Government (2020a). Sectoral Marine Plan for Offshore Wind Energy. Available from: https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy/documents/ [Accessed 02/11/2021].

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Scottish Government (2020d). Offshore wind policy statement. Available from: https://www.gov.scot/publications/offshore-wind-policy-statement/ [Accessed 03/11/2021].

Scottish Government (2020e). Scottish Government Hydrogen Policy Statement. Available from: https://www.gov.scot/publications/scottish-government-hydrogen-policy-statement/ [Accessed 03/11/2021].

Scottish Government (2015). Scotland's National Marine Plan A Single Framework for Managing Our Seas. Marine Scotland. Available at: https://tethys.pnnl.gov/sites/default/files/publications/Marine-Scotland-2015.pdf [Accessed 03/11/2021].

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The Highland Council (2018). Caithness and Sutherland Local Development Plan. Available from: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan [Accessed 03/11/2021].

IEMA (2020). Major Accidents and Disasters in EIA: A Primer. Available from: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer [Accessed 16/02/2022].

IEMA (n.d.) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available from: https://www.iema.net/preview-document/assessing-greenhouse-gas-emissions-and-evaluating-their-significance [Accessed 16/02/2022].

Orkney Islands Council (2017). Orkney Local Development Plan. Available from: https://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm [Accessed 03/11/2021].

2 OFFSHORE EIA SCOPING

The offshore area covers a large region, with varying physical characteristics, and therefore has been split into two areas: the offshore marine area; and Scapa Flow. The offshore marine area is located to the north of the Caithness coast and to the west of the Orkney coast and is detailed in Figure 2-1). The offshore marine area includes the OAA, the Caithness offshore export cable corridor search area and the Orkney offshore export cable corridor search area. Scapa Flow (detailed in Figure 2-1) is located on the south-east of Hoy, borders the south and west of Cava, and the north coast of Flotta. The island of Fara is located within the study area. The Scapa Flow offshore export cable corridor search area is located within this area. The Offshore EIA Scoping section of this report identifies the potential receptors of relevance, which have a potential to be impacted as a result of this Project. The baseline environment has been detailed for each receptor, which when considered alongside the embedded mitigation has been used to inform potential impacts and scope of the EIA.

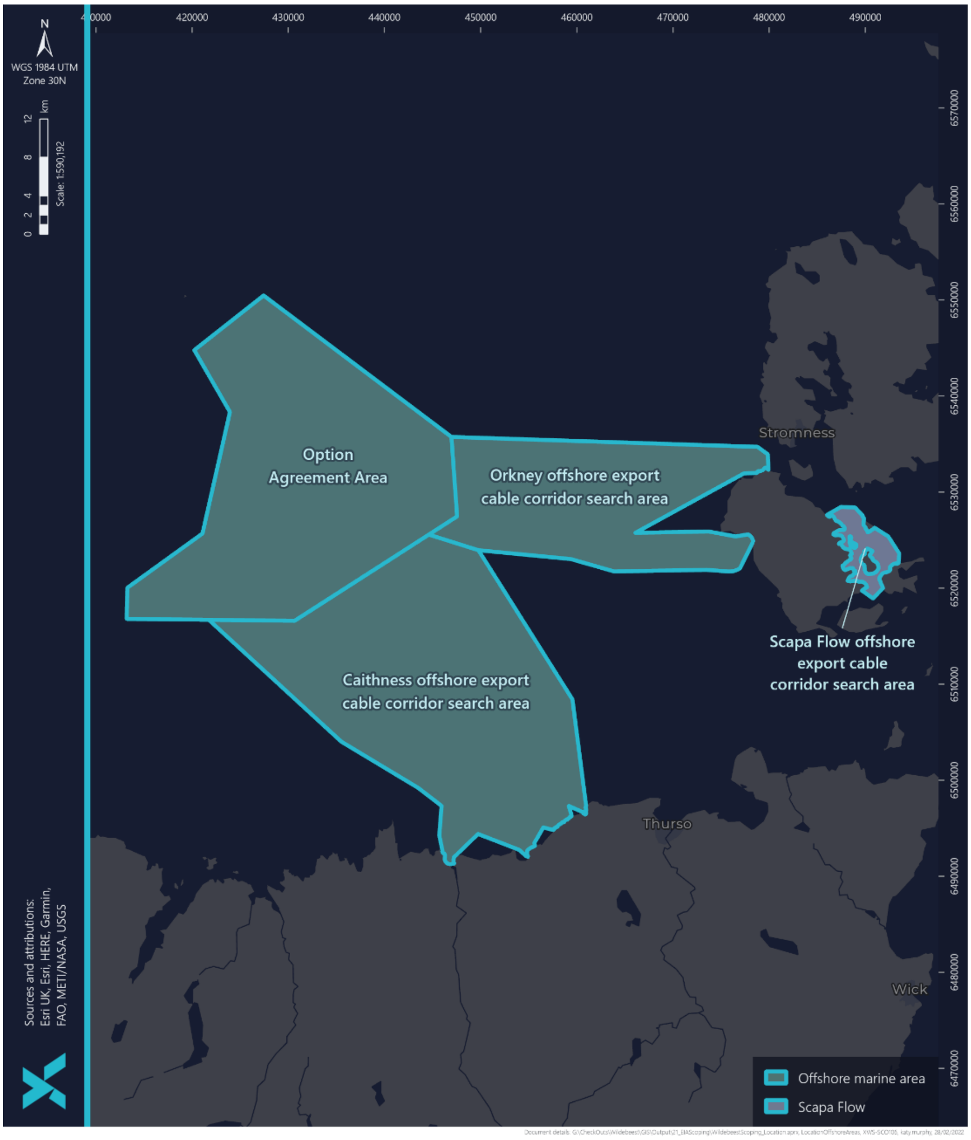

Figure 2-1 Offshore EIA Scoping Boundary

2.1 Physical and Coastal Processes

2.1.1 Introduction

This section of the Scoping Report identifies the physical processes of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project up to MHWS.

Information that may be considered relevant to this section is also presented within the below sections:

- Water and sediment quality, section 2.2; and
- Benthic subtidal and intertidal ecology, section 2.3.

This section of the Scoping Report has been prepared by Xodus Group.

2.1.2 Study Area

The physical processes study area is defined by the OAA, the Caithness and Orkney offshore export cable corridor search areas, which extend to the north coast of Caithness and west coast of Orkney, and the Scapa Flow offshore export cable corridor search area. The coastal region to the north coast of Caithness extends from Portskerra in the east to Crosskirk in the west. The coastal region to the west coast of Orkney extends around Hoy from Rackwick in the west to Murra in the east.

2.1.3 Data Sources to Inform the EIA Baseline Characterisation

2.1.3.1 Publicly Available Data

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-1.

Table 2-1 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
General Information			
Pilot Pentland Firth and Orkney Water Marine Spatial Plan	https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/	2016	Scottish Government
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf	2020	OIC

TITLE	SOURCE	YEAR	AUTHOR
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Protected sites	https://gateway.snh.gov.uk/natural-spaces/inspire_download.atom.xml	2021	NatureScot
Bathymetry, Geology and Seabed Sediment			
United Kingdom Hydrographic Office (UKHO) Admiralty Chart data & UKHO INSPIRE bathymetric data	https://datahub.admiralty.co.uk/portal/apps/webappviewer/index.html	2017	UKHO
British Geological Survey (BGS) Offshore GeoIndex Map	http://mapapps2.bgs.ac.uk/geoindex_offshore/home.html	2020	BGS
BGS Geology of Britain Viewer	http://mapapps.bgs.ac.uk/geologyofbritain/home.html?	2015	BGS
Department of Trade and Industry (DTI) Technical Report: Sandbanks, sand transport and offshore wind farms	https://tethys.pnnl.gov/sites/default/files/publications/Keny-et-al-2005.pdf	2005	Kenyon, H; Cooper, B.
Hydrodynamics and Waves			
National Tidal and Sea Level Facility (NTSLF)- Observational Water Level Records	https://www.ntslf.org/	2020	NTSLF
UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3). Appendix 1D - Water Environment (Regional Sea 6 &7)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504541/OESEA3_A1d_Water_environment.pdf	2016	DECC
Admiralty Total Tide (ATT) tidal prediction software	UK Hydrodynamic Office (UKHO) Admiralty Maritime Data Solutions	2020	UKHO
UKHO Admiralty Tide Tables	https://www.admiralty.co.uk/publications/publications-and-reference-guides/admiralty-tide-tables	2017	UKHO
Atlas of UK Marine Renewable Energy, Interactive Map	https://www.renewables-atlas.info/explore-the-atlas/	2017	ABPmer

TITLE	SOURCE	YEAR	AUTHOR
SEASTATES Metocean Data and Statistics Interactive Map	https://www.seastates.net/explore-data/	2018	ABPmer
EMEC Metocean Data	Sourced exclusively from European Marine Energy Centre.	2021	EMEC
Water Column Properties			
Cefas Suspended Sediment Climatologies around the UK	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf	2016	Cefas
Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters	http://data.cefas.co.uk/#/View/18133	2016	Cefas
Climatology of Surface and Near-bed Temperature and Salinity on the North-West European Continental Shelf for 1971–2000 (2009)	https://marinescotland.atkinsgeospatial.com/nmpi/	2009	Berx, B, Hughes, S.
British Oceanographic Data Centre (BODC) Observational Conductivity Temperature Depth (CTD) Records	https://www.bodc.ac.uk/data/bodc_database/ctd/search/	2019	BODC
Coastal Characteristics			
Scottish Government Dynamic Coast: Scotland's National Coastal Change Assessment Map	https://snh.maps.arcgis.com/apps/webappviewer/index.html	2017	NatureScot

2.1.3.2 Project Site-Specific Surveys

To date, a nearshore geophysical survey has been undertaken across the different export cable landfall options. During this survey a multi-beam echosounder (MBES), sub-bottom profiler (SBP) and sound velocity profiler (SVP) were used to collect geophysical information.

Additional geophysical and metocean site specific surveys are planned in 2022 and beyond (as appropriate) to inform the EIA, as outlined below:

- Geophysical survey: MBES, side scan sonar (SSS), a magnetometer (MAG), a SBP, an ultra-high resolution seismic (UHRS) and a gradiometer (GRAD). Grab and water samples will also be taken; and
- Metocean: wind, other meteorological and oceanographic measurements..

2.1.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-1) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The key features of marine physical processes which will inform this Scoping Report and subsequent EIA are as follows:

- Geology;
- Bathymetry and morphology;
- Seabed sediment and sediment transport regime;
- Hydrodynamic regime;
- Wave regime;
- Frontal zones;
- Wind regime;
- Coastal characteristics;
- Designated sites; and
- Frontal zones.

The following sections provide information on the key spatial differences across the study area for the marine physical and coastal processes and environment:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area (section 2.1.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.1.4.2).

2.1.4.1 OFFSHORE MARINE AREA

2.1.4.1.1 Geology

The seabed across the study area is dominated by a succession of Quaternary sandy deposits overlying glacial till, in turn overlying sandstone and mudstone (BGS, 2015; BGS, 2020a;b). The Quaternary sediment thickness is predicted to be highly variable, with a significant portion of the study area being over 50 m thick, particularly to the south and east. The thickness level of Quaternary geology decreases to the west to between 5 and 20 m thick. The presence of glacial till beneath the seabed sediments means that there will be local variability of the geology properties. Various sampling points found that in some instances all the sediment above the deeper underlying rock stratum was sand, whereas in other cases sand was only present for shallow depths near the seabed surface. There is no exposed bedrock in the study area. Boulders are expected to be present in the study area, most likely on the seabed surface and at depth.

2.1.4.1.2 Bathymetry and Morphology

The bathymetry of the OAA has a water depth range between 45 m and 100 m (NMPi, 2021). Depths across the OAA are relatively uniform, but with some steeper slopes (greater than 5°) to the south of the OAA (Figure 2-2). Sand wave and sediment wave fields are present to the east of the OAA. Two shallow banks are also present within the OAA, Whiten Head Bank and Stormy Bank.

Water depths within the offshore export cable corridor search areas reach up to 120 m. Isolated sections of the export cable corridor search areas contain steeper slope sections of up to 10° (West of Orkney Windfarm, 2021).

2.1.4.1.3 Seabed Sediment and Sediment Transport Regime

The majority of the study area contains sand, slightly gravelly sand and sandy gravel. Within the OAA, sand is present throughout, but particularly in western side, whereas sandy gravel is more prevalent in the east and north of the OAA. Slightly graveling sand is present in patches throughout the OAA.

Regionally, evidence from TotalEnergies' assets to the West of Shetland suggest that across the southern and central West Shetland Shelf, sediments are being transported eastwards to the North Sea, driven by water circulation around the north and northwest of Scotland (West of Orkney Windfarm personal communication, 2021). This suggests there may be some sediment mobility in the OAA and both offshore export cable corridor search areas.

The suspended sediment concentrations in the study area are 0 to 1 mg/l throughout all months of the year (Cefas, 2016).

2.1.4.1.4 Hydrodynamic Regime

The tidal range regime of the area was assessed using Coordinate Ocean Model (HYCOM), covering a period from January 2004 to April 2018. The outputs from the model were validated against a range of datasets.

The study area lies west of Orkney, with characteristics asymmetric tides, with highly energetic tidal flows coming from the southwest, and marginally less energetic tidal flows from the north and east (Marine Scotland, 2016). The tidal range in the OAA is approximately 3.2 m (spring tide) across the OAA (Marine Scotland, 2016; ABPmer, 2017). The offshore export cable corridor search areas have a similar tidal range, ranging between 2 to 4 m (spring tide). Tidal flows across the study area range from 1.25 m/s in the Orkney offshore export cable corridor search area to 0.26 m/s in the Caithness offshore export cable corridor search area and in the OAA (spring flow). The southeast of the study area is near the Pentland Firth and tidal flows in this region are highly energetic area along the north coast of Scotland (Figure 2-3).

The Pentland Firth channel separates the Orkney Islands from the Scottish mainland. This channel connects the Atlantic Ocean with the North Sea. The Pentland Firth is characterised by strong tidal currents with widespread and highly energetic tidal races, eddies, overfalls and areas of general turbulence. Peak spring tidal currents in the Outer Sound between Swona and the Island of Stroma are about 4.5 m/s on both the flood and ebb tides

(Marine Scotland, 2016). These flows cause an almost continuous tidal race north of the Island of Stroma, referred to as The Swilkie (Scottish Government, 2016).

Across the study area, extreme non-tidal current speeds with respect to surge events are around 1.5 m/s at the surface and 0.8 m/s at the seabed based on a 5-year return period event. For a 100-year return period event, speeds of up to 2.2 m/s occur at the surface and 1.2 m/s near the seabed (West of Orkney Windfarm personal communication, 2021).

2.1.4.1.5 Wave Regime

The wave climate in the area is dominated by the passage of low-pressure systems from west to east across the North Atlantic. In general terms the highest waves approach from westerly directions (Figure 2-4). To the west of the OAA, it is open to the fetch of the North Atlantic (OIC, 2020). Wave periods of 4 seconds are typical of the Pentland Firth. This wave period gets longer as waves move away from the Pentland Firth, with the longest wave periods occurring in the OAA. On the northern coast of Scotland, modelled significant wave heights (Hs) throughout the year are typically within the range of 1.75 – 2 m (Scottish Government, 2009; Marine Scotland, 2016; ABPmer, 2017).

The wave regime in the OAA was further assessed using an independent high-resolution model to create a hindcast dataset spanning 1979 to 2015, which was calibrated for UK waters and providing greater resolution around coastal features (MetOceanWorks, 2018; 2020). The annual mean Hs within the OAA was modelled to be higher, ranging between 2.3 m and 2.8 m, with maximum wave heights ranging between 10.8 m and 12.2 m. In extreme conditions, the Hs is 13.6 m and 14.0 m for the 50- and 100-year return periods (West of Orkney Windfarm personal communication, 2021).

2.1.4.1.6 Frontal Zones

Fronts or frontal zones mark boundaries between water masses, including tidally mixed and stratified areas, and are numerous on the European continental shelf. Within the north coast of Scotland seasonal water mass and water column structure are characterised as well mixed shelf waters through all seasons except summer, where weakly stratified shelf waters are recorded, with the dominant stratification category defined as intermittently stratified (DECC, 2016). The entire study area has an annual mean surface temperature of 10°C and an annual mean seabed temperature of 9.5°C (NMPi, 2021). The study area has an annual average surface and seabed salinity of between 34.75 to 35 ppt (NMPi, 2021). The Orkney offshore export cable corridor search area is within a region marked by persistent offshore fronts and transitional areas, which develop between vertically mixed and stratified waters around the Orkney Islands (JNCC, 1997).

2.1.4.1.7 Wind Regime

Average annual wind speeds at 100 m elevation are greatest at distances furthest offshore and are highest in the north-western half of the OAA (ABPmer, 2017). Wind speeds at these locations reach 11.1 – 11.5 m/s. Nearer to the shore and towards the south-eastern area of the OAA, wind speeds get slower, reaching lows of 7.6 – 8.0 m/s.

2.1.4.1.8 Coastal Characteristics

The Caithness offshore export cable search area lands on the north coast of Caithness, extending from Portskerra in the west to Crosskirk in the east. Around 12% of the Scottish coastline is recognised as in a state of erosion (Marine Scotland, 2016), with climate change posing the main risk to increased rates for erosion and flooding. Local authority plans have identified actions to alleviate flooding, including preparation of Flood Risk Management Plans.

The coastal type is characterised as hard and mixed substrate, with cliffs along much of the coastline (NatureScot, 2020). There are several areas of north-facing sandy beach in-between the hard substrate, including at landfall sites at Melvich Bay, Dounreay, Cling Gang and Crosskirk. The Orkney offshore export cable corridor search area extends around the west of Hoy to the east side of the island, which is characterised by hard substrate with several areas of sand and east-facing sandy beaches along the coast from Chalmers Hope to Crockness. The offshore cable landing search area coastline on west coast of Hoy at Rackwick to Murra has hard substrate cliffs surrounding with one sandy beach location at Rackwick.

2.1.4.1.9 Designated Sites

In regard to designated sites that may be affected by physical and coastal processes, there is only one marine designation in the immediate vicinity of the Project that is designated for physical marine characteristics (e.g. geology, geomorphology, dunes etc.) (Figure 2-6). This site is the North-West Orkney Nature Conservation Marine Protected Area (NCMPA), which borders the Orkney offshore export cable corridor search area (very slight overlap of 0.02 km^2 representing 0.0005% of the NCMPA). This site is within a shallow area lying to the north and west of Orkney on the Scottish continental shelf. The designated interest features for the NCMPA are sandbanks, sand wave fields and sediment wave fields representative of the Fair Isle Strait Marine Process Bedforms Key Geodiversity Area. These geomorphological features are active and are maintained under a specific range of tidal current conditions. There are coastal SSSIs that are designated for physical features near the landfall areas of the Project (Figure 2-6). There are also four GCR sites in the north of Hoy (located within the Hoy SSSI). These include the West coast of Orkney, Old man of Hoy Coast and North Hoy (Ward Hill, Enegars Corrie and Dwarfie Hamars).

Table 2-2 Relevant SSSIs and GCRs and Associated Physical Notified Natural Features

SSSI NAME	RELEVANT PHYSICAL NOTIFIED NATURAL FEATURES	DISTANCE TO OFFSHORE MARINE AREA (M)
Caithness coast		
Red Point Coast	Quaternary of Scotland Maritime Cliffs	68
Strathy Coast	Machair Maritime Cliffs Sand Dunes	0
Sandside Bay	Sand Dunes	0
Ushat Head	Maritime Cliffs	25

SSSI NAME	RELEVANT PHYSICAL NOTIFIED NATURAL FEATURES	DISTANCE TO OFFSHORE MARINE AREA (M)
Orkney coast		
Hoy (within which the West coast of Orkney, Old man of Hoy Coast and North Hoy GCRs are located)	Coastal Geomorphology of Scotland Old Red Sandstone Igneous Quaternary of Scotland	0
Muckle Head and Selwick SSSI	Quaternary of Scotland	0

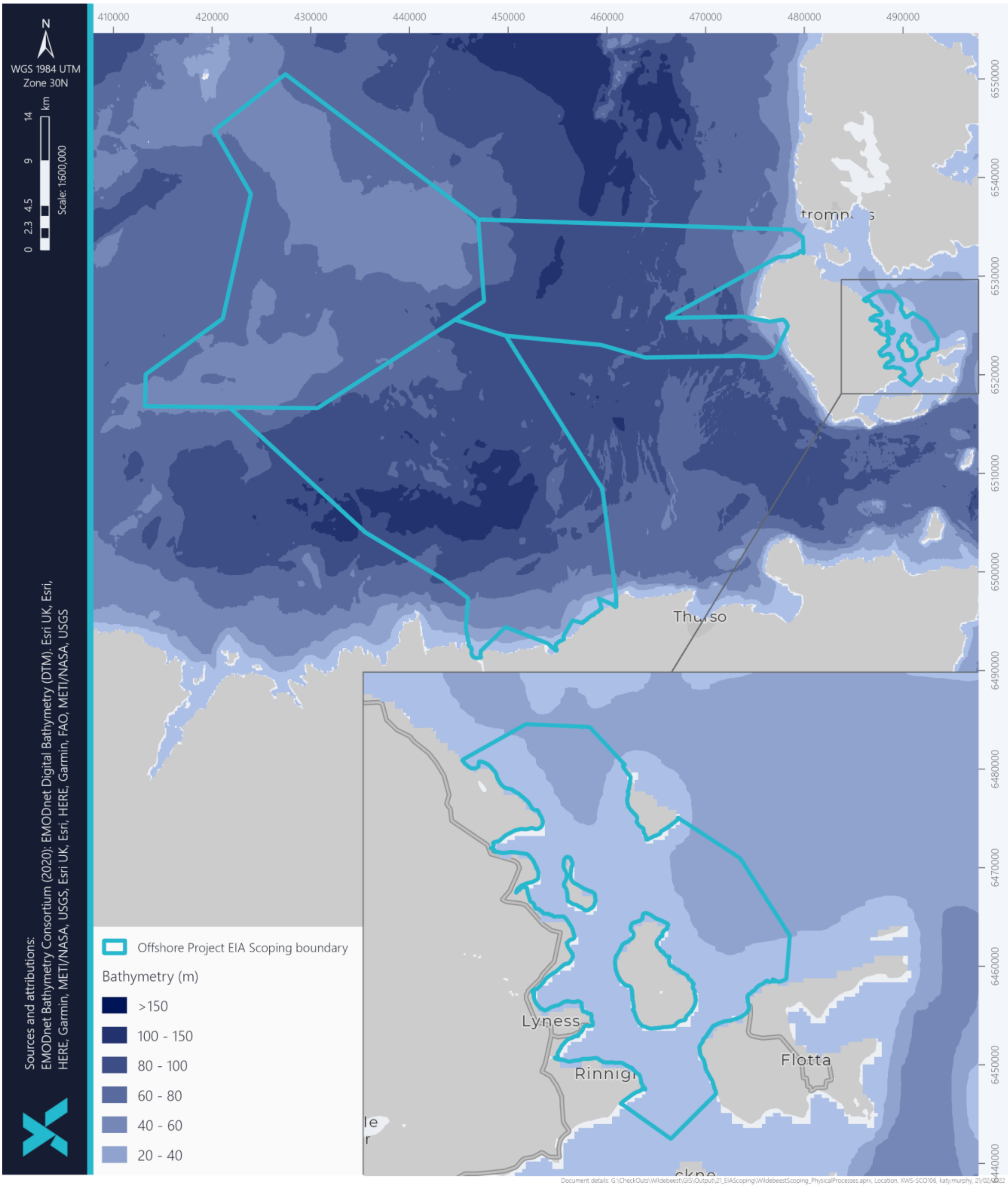

Figure 2-2 Bathymetry of the Study Area

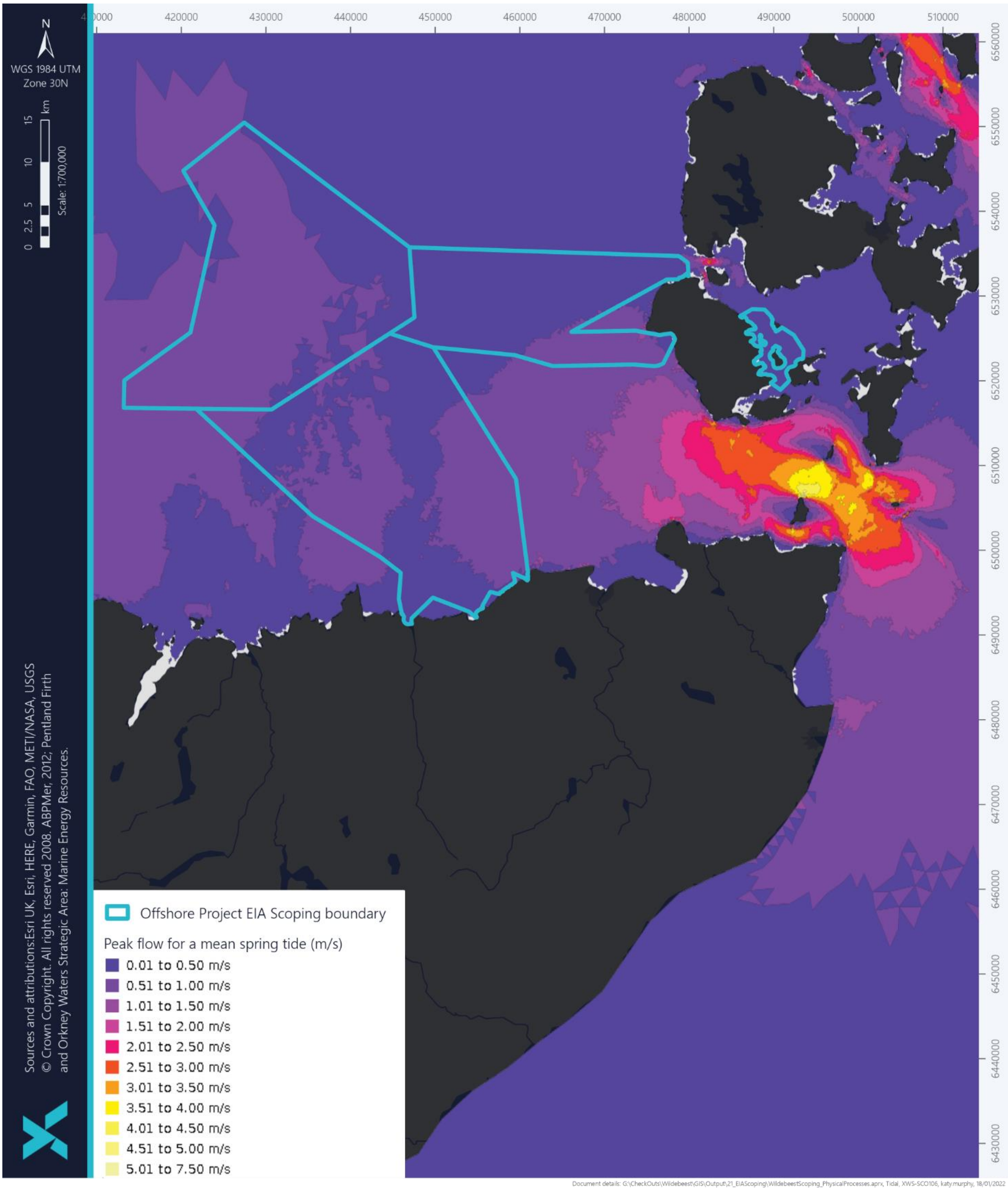

Figure 2-3 Tidal Regime

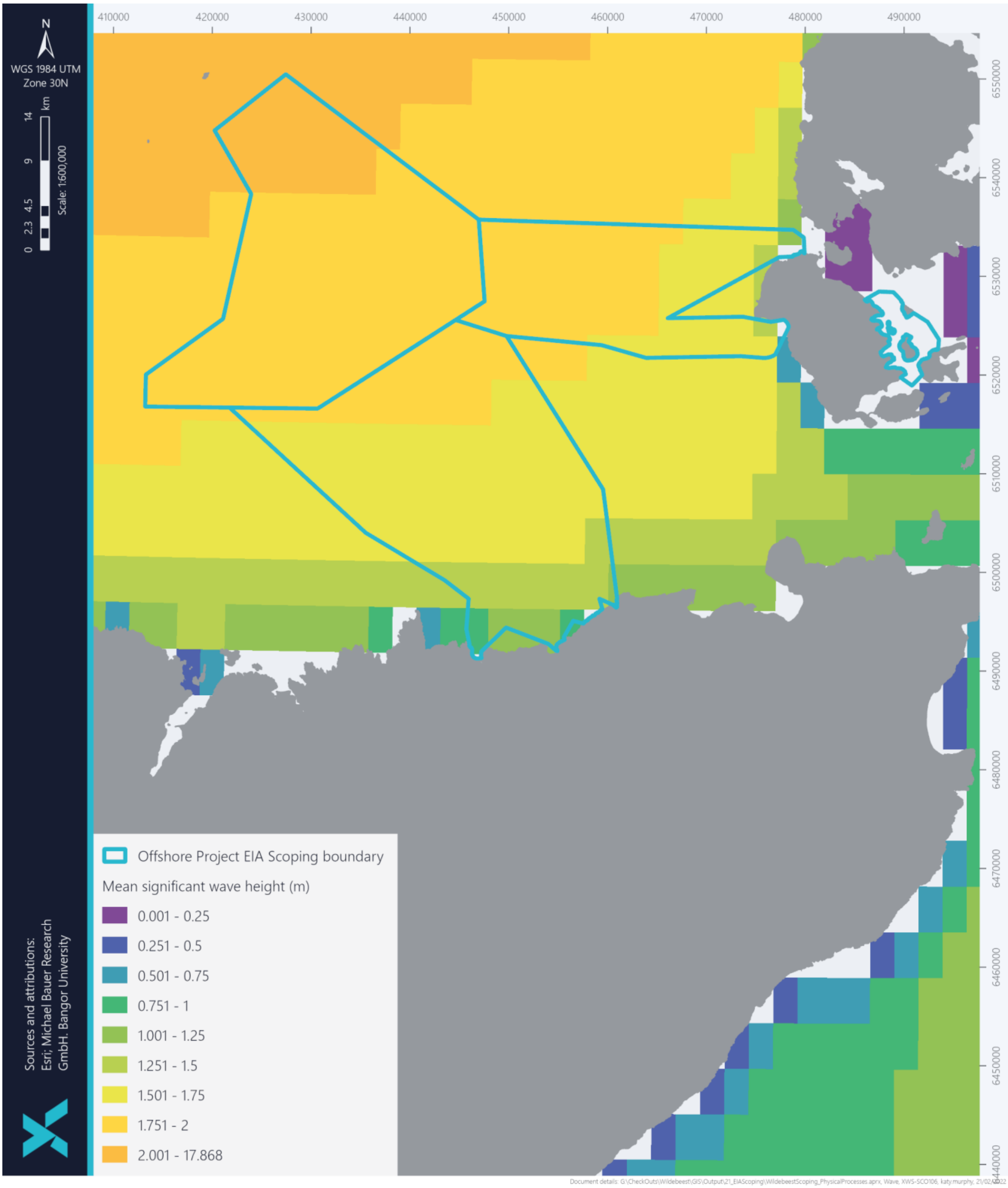

Figure 2-4 Wave Regime

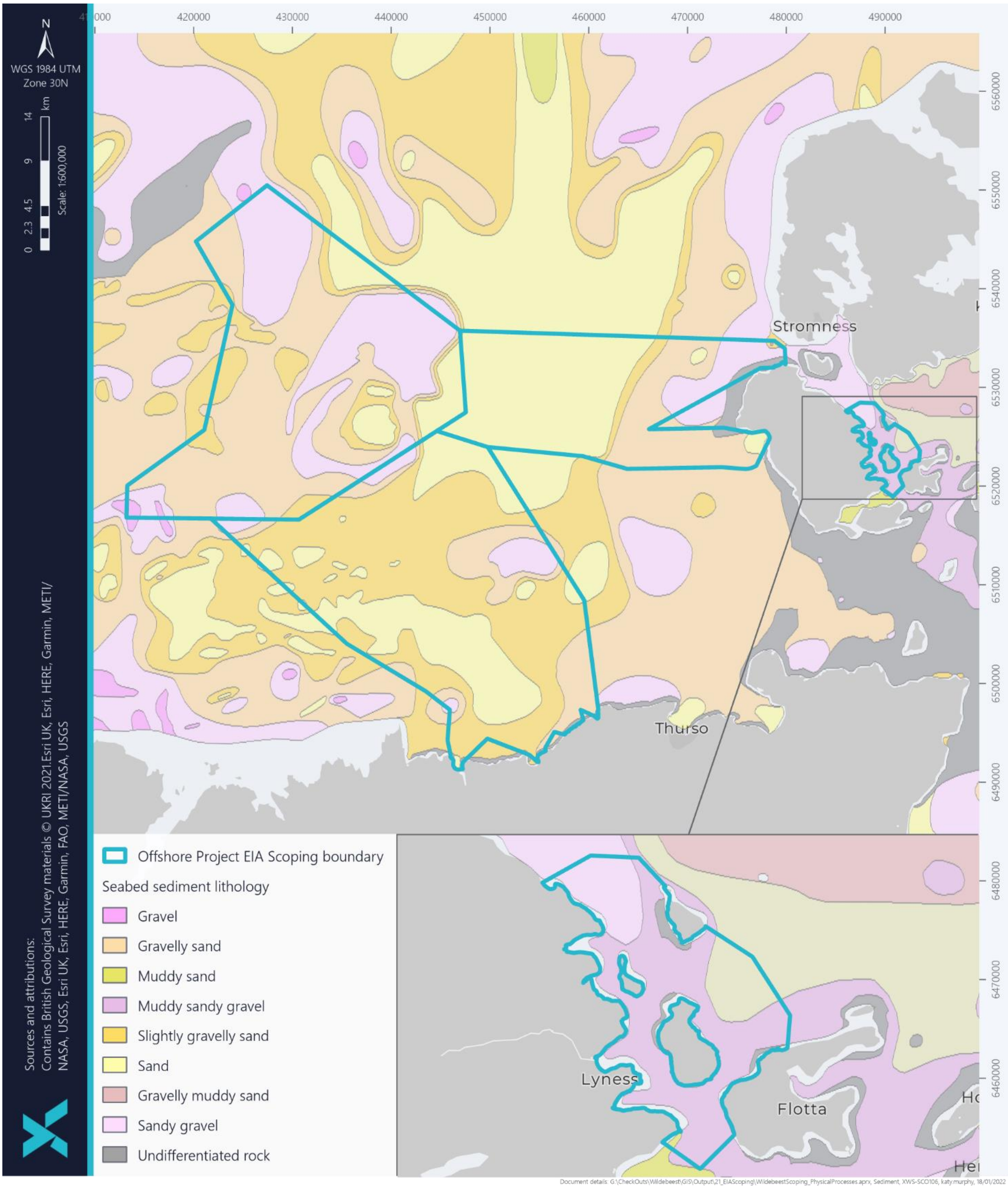

Figure 2-5 Seabed Sediments Across the Study Area

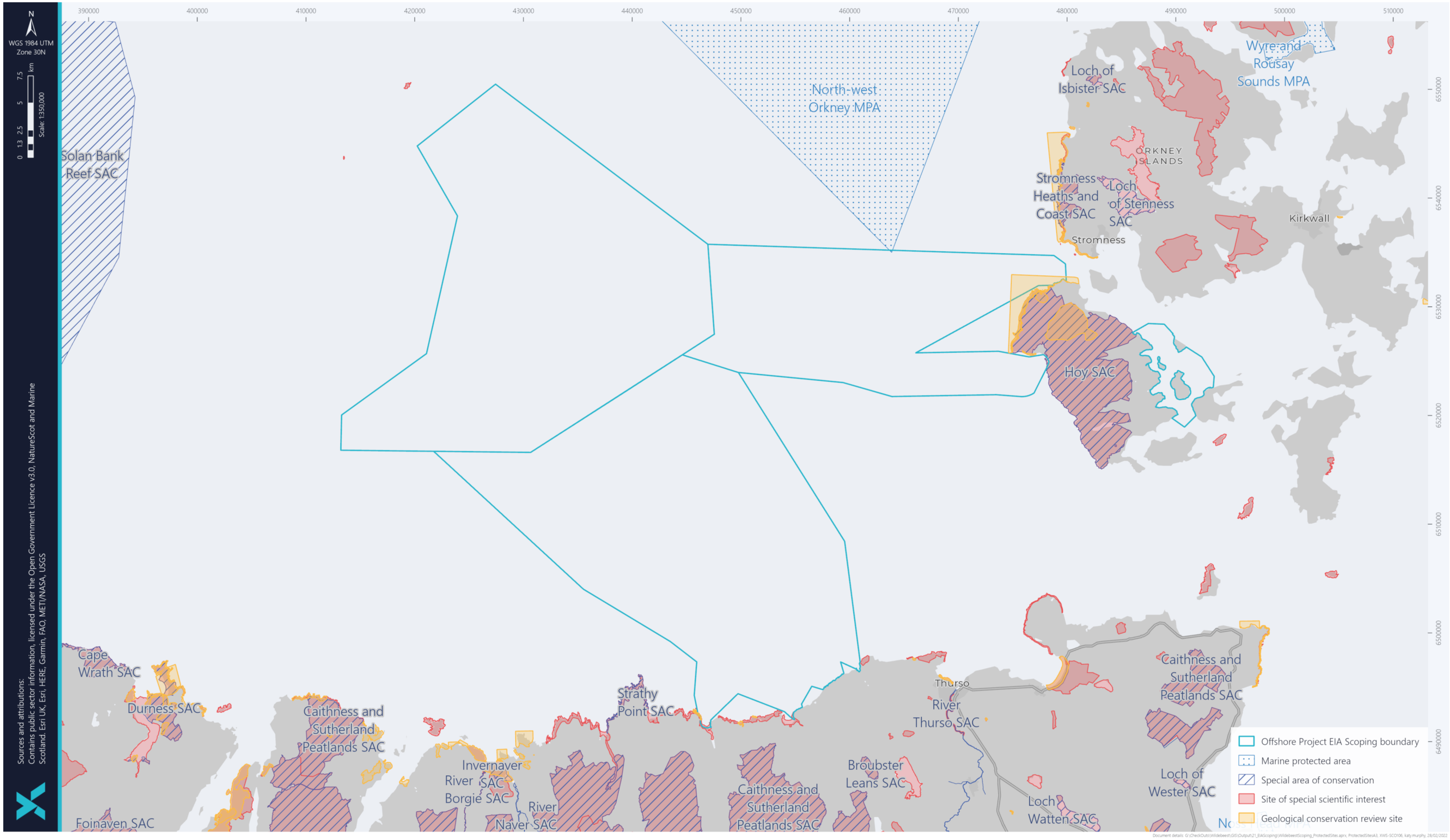

Figure 2-6 Designated Sites of relevance to Physical Processes In the Vicinity of the Study Area

2.1.4.2 SCAPA FLOW

2.1.4.2.1 Geology

The floor of Scapa Flow is covered by a variety of sediments from mud to rock debris. In regard to Pleistocene geology, till-like deposits, commonly less than 5 m thick, occur around the Orkney Islands and within Scapa Flow. The Orkney Islands and inshore waters are underlain by the Shetland platform, which is composed largely of Middle Devonian rocks. These rocks consist of sandstones, flagstones (fissile micaceous sandstones), conglomerates and shales that are comparable to rock sequences found onshore (JNCC, 1997; OIC, 2020).

2.1.4.2.2 Bathymetry and Morphology

At the deepest point in Hoy Mouth, the water depth is 49 m and 34 m within Scapa Flow (NMPi, 2021). Depth across the area varies in accordance with coastline, with several islands within Scapa Flow having shallower regions around their coastline.

2.1.4.2.3 Seabed Sediment and Sediment Transport Regime

The seabed sediment in Scapa Flow is made up of coarse sediment in the offshore export cable corridor search area, with mixed sediment further east in Scapa Flow. There is also one area of sand and muddy sand off the east coast of Hoy (NMPi, 2021). The suspended sediment concentrations in the study area are 0 to 1 mg/l throughout all months of the year (Cefas, 2016).

2.1.4.2.4 Hydrodynamic Regime

The mean spring tidal range in Scapa Flow is 1.51 to 2.00 m. The majority of the mean spring tidal current speeds in Scapa Flow is 0.01 to 0.50 m/s, with a small point to the North of Hoy and South of Stromness reaching up to 3.5 m/s (Marine Scotland, 2016). Mean spring tidal power ranges between 0.01 kW/m^2 to 2.00 kW/m^2.

2.1.4.2.5 Wave Regime

The annual mean significant wave height in Scapa Flow ranges from 0.01 to 0.50 m, with waves of up to 0.75 m occurring to the south of the region. Waves in the region have an annual mean wave power of 0.01 to 5.00 kW/m. The fetch within the sheltered waters within Scapa Flow is more limited when compared to the west of Orkney (OIC, 2020).

2.1.4.2.6 Frontal Zones

Although the wider area is marked by persistent offshore fronts and transitional areas, which develop between vertically mixed and stratified waters around the Orkney Islands (JNCC, 1997), it is considered unlikely that such fronts occur within the Scapa Flow area due to its localised context.

2.1.4.2.7 Wind Regime

Average annual wind speeds at 100 m elevation are greatest at the southeast of Scapa Flow furthest with wind speeds at these locations reaching 8.6 – 9.0 m/s. Towards the north area of Scapa Flow, wind speeds get slower, reaching lows of less than 7.1 m/s.

2.1.4.2.8 Coastal Characteristics

The Scapa Flow offshore export cable corridor search area extends around the east of Hoy, which is characterised by hard substrate with several areas of sand and east facing sandy beaches along the coast from Chalmers Hope to Crockness.

2.1.4.2.9 Designated Sites

There are no protected sites designated for physical marine characteristics within Scapa Flow or along the coast of Fata and northwest Flotta (**Figure 2-6**). However, the Hoy coastal SSSI extends to the Scapa Flow coastline and is designated for "Coastal Geomorphology of Scotland". This SSSI is proximal to the most northerly point of the Scapa Flow offshore export cable corridor search area.

2.1.4.3 Summary and Key Issues

Table 2-3 Summary and Key Issues for Physical and Coastal Processes

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• The Orkney offshore export cable corridor search area borders the North-West Orkney NCMPA and designated features, including sand wave and sediment wave features extend beyond the boundary of the NCMPA; and • Potential landfalls overlapping with or in proximity to a number of coastal designated sites with physical features.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Potential landfalls overlapping with or in proximity to a number of coastal designated sites with physical features.

2.1.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-4.

Table 2-4 Table Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Scour protection.	Primary	Scour assessment will be conducted for the different design scenarios. Requirements outlined within the Construction Method Statement which is required under Section 36 and/or Marine Licence consent conditions.
2	Implementation of suitable cable protection.	Primary	Cable burial risk assessment to determine and minimise volume and spatial extent of required cable protection. Final cable design will be outlined within the Cable Plan, a condition of the Section 36 / Marine Licence consent.
3	Landfall methodology will minimise the impact on the coastline, where possible.	Primary	Landfall assessments will be conducted for the different design scenarios. Requirements outlined within the Construction Method Statement which is required under Section 36 and/or Marine Licence consent conditions.
4	Pre-construction cable route survey to identify the presence of morphological features and the requirement for micro-siting around these or completion of seabed preparation works	Tertiary	Requirement for pre-construction cable route survey secured under Section 36 and/or Marine Licence consent conditions. Final cable design will be outlined within the Cable Plan.

There is a commitment for the project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on physical processes receptors and will be consulted upon with consultees throughout the EIA process.

2.1.6 Scoping of Impacts

A number of potential impacts on physical processes receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

Physical and coastal processes are primarily considered as pathways rather than receptors themselves. However, whilst the processes are largely pathways, there are nonetheless some features that can be considered as physical and coastal receptors and in relation to the Project (section 1.3) these include:

- The coast and coastal designated sites with geomorphological features; and
- Morphological features associated with North-West Orkney NCMPA and associated features beyond the extent of the NCMPA.

With respect the physical and coastal processes topic, none of the potential impacts are proposed to be scoped out of the assessment at this stage, as it is considered that all impacts have the potential to be significant and therefore require assessment. These impacts are outlined, together with a justification for their scoping decision in Table 2-5.

As pathways, physical and coastal processes have the potential to lead to changes with onward impacts to receptors associated with other EIA topics, including but not limited to:

- Water and sediment quality;
- Benthic ecology;
- Fish and shellfish ecology;
- Commercial fisheries;
- Shipping and navigation; and
- Other sea users.

The scoping of impacts associated with changes to physical and coastal process pathways on other environmental receptors will be assessed within the relevant EIA topic sections.

Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

Table 2-5 EIA Scoping Assessment for Physical Processes

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Change to seabed levels, sediment properties and suspended sediment concentrations	N/A	Scoped In	Localised alteration of the physical characteristics of the seabed due to installation of infrastructure. This includes morphological features that occur within the study area. Increased suspended sediment concentrations associated with the construction and installation works, with pathways for impacts on other environmental, biological and human environment receptors.	Available data and information on the surface and sub-surface geology across the study area. As well as bathymetry and background suspended sediment concentrations across the study area. The regional information will be augmented with site-specific geophysical and metocean survey data.	The assessment method will entail a desk-based assessment, based upon the maximum design scenario, of potential spoil volumes and sedimentological properties informed by spreadsheet analytical tools. Numerical modelling using a regional model to characterise the environmental baseline and assess the potential extent of sediment plumes.
Impact on designated features within the designated sites due to export cable construction	4	Scoped In	The North-West Orkney NCMPA, SSSI and GCR sites within the physical processes study area has designated features that may be affected directly though seabed preparation works and indirectly by changes to physical process pathways.	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 and metocean survey data.	Desk based assessment, based upon the maximum design scenario, informed by the combination of analytical spreadsheet tools and regional numerical modelling outputs to determine the potential extent of direct disturbance and indirect effects.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Change to coastal landfall morphology	3	Scoped In	Cable installation in coastal environments, may disrupt the coastal morphology to varying degrees depending on the method applied.	Coastal properties (including metocean, and littoral transport properties), augmented by site-specific geophysical and metocean survey data.	Desktop landfall assessment, based upon the maximum design scenario, and outputs of regional numerical modelling scenarios.
Operations and Maintenance					
Change to the tidal, wave and sediment transport regimes resulting in impacts on morphology and coast receptors	N/A	Scoped In	This impact is scoped in order to analyse and inform changes to the marine physical process pathways and the potential for any changes with onward impacts to designated morphological features and the coast.	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 and metocean survey data.	Numerical modelling using a regional model to characterise the environmental baseline and model the potential extent and duration of changes to the tidal, wave and sediment transport regimes (including the potential for changes to suspended sediment concentrations).
Introduction of scour	1, 2	Scoped In	There is the potential for localised alteration of the physical characteristics of the seabed as a result of seabed scour around Project infrastructure.	Desktop study and site-specific geophysical and metocean survey data.	Desktop assessment, based upon the maximum design scenario.
Seabed abrasion associated with Project infrastructure (e.g.	1, 2	Scoped In	Similar to the introduction of scour, there is the potential for the introduction of localised seabed abrasion, associated with Project infrastructure that moves, such as	Desktop study and site-specific geophysical and metocean survey data.	Desktop assessment of the potential range of movement that could occur, based upon the maximum design scenario.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
anchor chains if a floating structure is progressed)			anchor or mooring chains. Any movement that could occur will be within engineered bounds associated with the infrastructure (e.g. applied tension) design, which will be considered and assessed within the EIA.		

2.1.7 Potential Cumulative Effects

Although the predicted effects of the Project are anticipated to be localised within the footprint of the Project, there is the possibility that certain impacts interacting with other projects, plans and activity, resulting in a cumulative effect on physical processes receptors. There is potential for cumulative effects during the construction periods of the Project with other offshore infrastructure in the area e.g. the Pentland Floating Offshore Wind Farm and the SHET-L Caithness to Orkney interconnector. These would result in cumulative effects of the impacts discussed in Table 2-5.

The physical processes CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

2.1.8 Potential Transboundary Impacts

The study area does not extend beyond the Scottish or UK limits. There is no potential for transboundary impacts upon physical processes receptors due to construction, operation, maintenance and decommissioning of the Project. The potential impacts are discussed in Table 2-5 and do not extend beyond the Scottish or UK limits and therefore transboundary impacts are scoped out of the EIA.

2.1.9 Approach to Analysis and Assessment

2.1.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on physical process will utilise site specific and publicly available data (see section Table 2-1) and will be augmented by consultation during the EIA phase. Consultation will be undertaken with but not limited to:

- Marine Scotland;
- NatureScot;
- THC;
- OIC
- Joint Nature Conservation Committee (JNCC); and
- Scottish Environment Protection Agency (SEPA).

The Project has already undertaken some initial consultation with Marine Scotland and MSS with regards to the seabed survey strategy for the Project, which will include sampling for suspended sediments.

A combination of analytical spreadsheet-based tools and outputs of regional numerical modelling are proposed in order to assess the nature and magnitude of any impacts. Analytical spreadsheet tools will be developed and used to inform potential changes to seabed levels and suspended sediment concentrations as a result of construction activities. Further tools will be developed to inform desk-based studies to:

- Characterise wave transport regime;
- Identify potential changes to seabed properties associated with drilling works; and
- Investigate the potential equilibrium scour associated with different foundation options.

Due to the available Project information and proximity to the coast and protected areas, regional numerical modelling is proposed to inform the potential for and magnitude of any impacts and extent. To enable this a regional model in an appropriate software package will be set up, calibrated and validated to present the baseline environmental conditions and against which modelling scenarios will be completed to investigate the potential impacts associated with different design and development scenarios. Potential impacts that would be investigated using the numerical modelling includes:

- Changes to the tidal and wave regime associated with operation activities; and
- Changes to the suspended sediment concentrations and the extent and duration of any potential plumes.

Modelled results of the tidal and wave regime will be assessed in relation to outputs of sediment transport potential from analytical methods in order to determine the potential changes to sediment transport regime.

Direct impacts to physical and coastal processes receptors will be assessed, based on the maximum design scenario of the Project. Both near field and far field effects will be considered within the impact magnitude. As introduced above, physical and coastal processes are mainly pathways. Therefore, the physical and coastal processes EIA will investigate the changes to the pathways in order to inform and enable assessment of other environmental receptors within their respective EIA topic section (indirect impacts for other environmental topics).

2.1.9.2 EIA Methodology

The physical processes EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-6 will be considered in relation to the physical and coastal processes EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-6 Legislation and Guidance for Physical Processes

LEGISLATION / GUIDANCE	SUMMARY
OSPAR Assessment of the Environmental Impacts of Cables (OSPAR, 2009)	Assesses the environmental impact of subsea cables throughout the five OSPAR regions.
Department of Business Enterprise and Regulatory Reform (BERR) – Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry (BERR, 2008)	This report is intended to provide technical details on subsea cable installation techniques and associated potential environmental effects, particularly relating to the offshore wind farm industry. It aims to inform wind farm developers (and their consultants), stakeholders and regulators during the EIA stage and consents process.
CIRCA C584 Coastal and Marine Environmental Site Guide (CIRCA, 2003)	The CIRCA C584 Coastal and marine environmental site guide provides practical advice for front-line supervisors, managers and engineers working in coastal and marine environments on how to control impacts arising from construction works.

LEGISLATION / GUIDANCE	SUMMARY
COWRIE Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guidance (COWRIE, 2009)	This report provides guidance on the application and use of numerical models to predict the potential impacts from offshore wind farms on coastal processes.
Land Use Planning System SEPA Guidance Note 17: Marine development and marine aquaculture planning guidance, Version 6 (SEPA, 2014)	The purpose of this note is to provide guidance on the approach that we should take when dealing with consultations relating to the marine environment and aquaculture developments.
Cefas 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)	The purpose of this document is to assist the offshore wind farm industry and their consultants; the primary aim being to provide scientific guidance to those involved with the gathering, interpretation and presentation of data within an EIA as part of the consents application process in England and Wales.
Dynamics of scour pits and scour protection – Synthesis report and recommendations. (Sed02)' (HR Wallingford *et al.*, 2007)	This document provides a synthesis of the work undertaken by HR Wallingford in conjunction with ABPmer and Cefas for the RAG research project SED02: Dynamics of scour pits and scour protection.
Potential effects of offshore wind developments on coastal processes (ABPmer and METOC, 2002)	This document aims to identify, review and assess the potential effects on coastal processes related to the development of offshore wind farms around the UK coast.
Review of environmental data associated with post-consent monitoring of licence conditions of offshore wind farms. MMO Project No: 1031. (Fugro-Emu, 2014)	This report examines outcomes and conclusions from monitoring regimes undertaken as a result of statutory requirements imposed on developers of OWFs in UK waters through consent conditions.
Pentland Firth and Orkney Waters Marine Spatial Plan (MSP) (Scottish Government, 2016)	This plan sets out an integrated planning policy framework to guide marine development, activities and management decisions, whilst ensuring the quality of the marine environment is protected.
Orkney Islands Regional Marine Plan	The Orkney Islands' Regional Marine Plan aims to ensure that waters are clean, healthy, safe and productive; the marine and coastal environment is rich in biodiversity and managed sustainably to support thriving and resilient local community. The report is currently being drafted.

2.1.10 Scoping Questions

- Do you agree with the study areas defined for physical and coastal processes?
- Do you agree with the data sources which are suggested for the assessment of physical and coastal processes?
- Are there any additional data sources or guidance documents that should be considered?

- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for physical processes?
- Do you agree with scoping out transboundary impacts?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Do you agree with the proposed assessment approach?

2.1.11 References

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Berx B. and Hughes S. (2009) Climatology of Surface and Near-bed Temperature and Salinity on the North-West European Continental Shelf for 1971–2000, Available at: https://marinescotland.atkinsgeospatial.com/nmpi/.

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United Kingdom Hydrographic Office (UKHO) (2021) Admiralty Chart data & UKHO INSPIRE bathymetric data. Available at: https://datahub.admiralty.co.uk/portal/apps/webappviewer/index.html.

United Kingdom Hydrographic Office (UKHO) (2017) Admiralty Tide Tables.

2.2 Water and Sediment Quality

2.2.1 Introduction

This section of the Scoping Report identifies the water and sediment quality receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project.

Information that may be considered relevant to this section is presented within the below sections:

- Physical and coastal processes, section 2.1.

This section of the Scoping Report has been prepared by Xodus Group.

2.2.2 Study Area

The water and sediment quality study area is defined by the OAA, the Caithness and Orkney offshore export cable corridor search areas, which extend to the north coast of Caithness and west coast of Orkney and a 2 km buffer, and the Scapa flow offshore export cable corridor search area. The coastal region of the north coast of Caithness extends from the western edge of Portskerra to Dounreay. The coastal region to the west coast of Orkney extends around Hoy from Rackwick and Murra.

2.2.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-7.

Table 2-7 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Bathing water profiles from Environment Scotland	https://www.environment.gov.scot/data/data-analysis/bathing-waters/	2019	SEPA
Clean Seas Environmental Monitoring Programme	https://www.bodc.ac.uk/projects/data_management/uk/merman/assessments_and_data_access/csemp	2018	BODC
Coastal Water Body Classifications 2007-2017 (as per WFD (2000/60/EC)	https://map.environment.gov.scot/sewebmap/?layers=coastalClass	2017	SEPA
Hazardous Substances Marine Environment Monitoring and Assessment National Database (MERMAN)	http://marine.gov.scot/node/12618	2017	MERMAN

TITLE	SOURCE	YEAR	AUTHOR
Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters	http://data.cefas.co.uk/#/View/18133	2016	Cefas
OSPAR Intermediate Assessment 2017 – Contaminant assessments	https://oap.ospar.org/en/osparassessments/intermediate-assessment-2017/pressures-human-activities/contaminants	2017	OSPAR
Pilot Pentland Firth and Orkney Water Marine Spatial Plan	https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/	2016	Scottish Government
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf	2020	OIC
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Radioactivity in Food and the Environment (RIFE) 2018 Report	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/843281/Radioactivity_in_food_and_the_environment_2018_RIFE_24.pdf	2019	Environment Agency *et al.*
Regional Assessment of Hazardous Substances in Coastal and Offshore Marine Environments: 1999-2009	https://www2.gov.scot/Resource/Doc/295194/0104805.pdf	2014	Marine Scotland
Scotland's water environment 2019: A summary and progress report	https://www.sepa.org.uk/media/490771/191219_scotlands-water-environment-final.pdf	2019	SEPA
Shellfish Biotoxin Risk Water Profiles from Environment Scotland	https://www.environment.gov.scot/data/data-analysis/biotoxin-risk-management/	2020	Food Standards Scotland (FSS)
Suspended Sediment Climatologies around the UK	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf	2016	Cefas
Water Framework Directive (WFD) River Basin Management Plan (RBMP) Waterbody status	https://www.sepa.org.uk/data-visualisation/water-environment-hub/	2019	SEPA

TITLE	SOURCE	YEAR	AUTHOR
Urban Waste Water Treatment Directive Sensitive Areas 2019	https://www.gov.scot/binaries/content/documents/govscot/publications/map/2016/01/urban-waste-water-treatment-sensitive-areas-map/documents/urban-waste-water-treatment-sensitive-areas-map-2019/urban-waste-water-treatment-sensitive-areas-map-2019/govscot%3Adocument/UWWTD%2Bdesignations%2B2019.pdf	2020	SEPA

2.2.3.1 Project Site-Specific Surveys

A full environmental baseline survey is to be completed in association with the benthic ecology EIA topic (see section 2.3), including Shipek Grabs for contaminants analysis. Results from the contaminant analyses, along with the sediment particle analyses will be incorporated in the EIA for this topic. Water samples will also be collected and analysed for suspended sediments.

2.2.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-7) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The following sections provide information on these key spatial differences across the study area for the water and sediment quality properties:

1. Offshore Marine Area, which covers the OAA, the Orkney offshore export cable corridor search area to and the Caithness offshore export cable corridor search area (section 2.2.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.2.4.2).

2.2.4.1 OFFSHORE MARINE AREA

2.2.4.1.1 Water Quality

The chemical composition of the water present in the study area would be expected to be similar to that recorded for typical unpolluted coastal/offshore Atlantic waters. All surface waters are classified under a river basin management plan (RBMP) under the Water Environment and Water Services (Scotland) Act, 2003. Any Project with the potential for interaction with surface water must have regard to the requirements of the Water Framework Directive to ensure that all surface water bodies achieve 'Good Ecological Status (GES)' and that there is no deterioration in status. Five classifications of water quality status are defined: High (near natural), Good, Moderate, Poor and Bad; and each classification is accorded a degree of confidence (high, medium or low) in the overall quality assessment.

Water quality within the study area has been determined through evaluation of designated waters under SEPA's RBMP including designated waterbodies, designated bathing waters and designated shellfish waters as detailed in the following paragraphs.

2.2.4.1.2 Designated Waterbodies

The offshore export cable corridor search areas intersect four coastal water bodies as follows (see Figure 2-7):

- The Caithness offshore export cable corridor search area to the north coast of Caithness and the associated buffer intersects:
  - Strathy Point to Dunnet Head (ID: 200224) is 275.1 km^2 in area; and
  - Cape Wrath to Strathy Point (ID: 200223) is 439.1 km^2 in area.
- The Orkney offshore export cable corridor search area and the associated buffer intersects:
  - Tor Ness to Breck Ness (ID: 200231) is 178.6 km^2 in area; and
  - Breck Ness to Noup Head (ID: 200237) is 324.7 439.1 km^2 in area.

For the Strathy Point to Dunnet and Cape Wrath to Strathy Point coastal waterbodies, SEPA analysis identified no significant pressures on either of these water bodies, with both having an overall status of Good with High confidence (Table 2-8) (SEPA, 2019). For both the water bodies, Water Quality status is classified as Good, whereas Physical Condition and Freedom from Invasive Species are both classified as Excellent. Projected conditions for these water bodies are anticipated to retain their current status within the years 2021 and 2027.

For the Tor Ness to Breck Ness and Breck Ness to Noup Head coastal water bodies, SEPA analysis identified no significant pressures on either of these water bodies, with both having an overall status of Excellent with High confidence (Table 2-8) (SEPA, 2019). For both water bodies, Water Quality status, Physical Condition and Freedom from Invasive Species are all classified as Excellent. Projected conditions for this water body are anticipated to retain their current status within the years 2021 and 2027.

Table 2-8. Summary of Designated Waterbodies

SITE	CONDITION	PREVIOUS STATUS IN 2014	CURRENT STATUS	PREDICTED STATUS FOR 2021	PREDICTED STATUS FOR 2027
Strathy Point to Dunnet Head	Overall	Good	Good	Good	Good
	Physical condition	Excellent	Excellent	Excellent	Excellent
	Freedom from invasive species	Excellent	Excellent	Excellent	Excellent
	Water quality	Good	Good	Good	Good
	Overall	Good	Good	Good	Good

SITE	CONDITION	PREVIOUS STATUS IN 2014	CURRENT STATUS	PREDICTED STATUS FOR 2021	PREDICTED STATUS FOR 2027
Cape Wrath to Strathy Point	Physical condition	Excellent	Excellent	Excellent	Excellent
	Freedom from invasive species	Excellent	Excellent	Excellent	Excellent
	Water quality	Good	Good	Good	Good
Tor Ness to Breck Ness	Overall	Excellent	Excellent	Excellent	Excellent
	Physical condition	Excellent	Excellent	Excellent	Excellent
	Freedom from invasive species	Excellent	Excellent	Excellent	Excellent
	Water quality	Excellent	Excellent	Excellent	Excellent
Breck Ness to Noup Head	Overall	Excellent	Excellent	Excellent	Excellent
	Physical condition	Excellent	Excellent	Excellent	Excellent
	Freedom from invasive species	Excellent	Excellent	Excellent	Excellent
	Water quality	Excellent	Excellent	Excellent	Excellent

2.2.4.1.3 Designated Bathing Water

There are no designated bathing waters which intersect with the study area, and there are no designated bathing waters located in Orkney (OIC, 2020). The closest designated bathing waters are at Thurso and Dunnet Bay, which are approximately 10 km – 20 km east of the Caithness offshore export cable corridor search area. Due to the intervening distance between the study area and these designated bathing waters, it is unlikely that any localised impacts on water quality from the Project activities, would negatively impact upon the water quality of these designated bathing waters.

2.2.4.1.4 Designated Shellfish Waters and Shellfish Water Protected Areas

There are no designated shellfish waters which intersect with study area. The nearest shellfish water is the Kyle of Tongue, which is harvested for Pacific oysters, and Loch Eriboll, which is harvested for blue mussel and Pacific oysters, which are approximately 25 km and 40 km west along the coast from the landfall area at Portskerra.

Due to the intervening distance between the study area and these designated shellfish waters, it is unlikely that any localised impacts on water quality from the Project activities, would negatively impact upon the water quality of these designated shellfish waters.

The statuses of fish and shellfisheries of commercial importance are discussed in section 9.2: Commercial Fisheries.

2.2.4.1.5 Urban Wastewater Treatment Sensitive Areas

Urban wastewater treatment sensitive areas in Scotland as of 2019, include particular lochs, rivers, estuaries, bathing waters and shellfish water protected area (SEPA, 2020). No urban wastewater treatment sensitive areas intersect the study area. The closest are as described for bathing waters and shellfish water protected areas in the previous sections. Others are the River Thurso and Loch of Sternness and Loch of Harray in the Orkney Islands, which are all several kilometres away from the offshore export cable corridor search areas.

2.2.4.1.6 Sediment Quality

There are no known sediment quality issues associated within the study area.

The Marine Scotland 2019 assessment of Clean Seas Environmental Monitoring Programme (CSEMP) data describes the status and trends of contaminant concentrations in biota and sediment at monitoring stations around the UK between 2013 – 2018. There are no fixed CSEMP sites or strata recording sediment contaminants for the North Scotland Coast region.

The closest monitoring stations to the Project which provide robust sediment quality datasets are the North Minch Station and the Outer Moray Firth Station both located greater than 80 km away. These sites are situated too far from the Project to supplement any assumptions related to sediment quality in the area. In the absence of more localised up to date sediment quality data, a 2011 review of the status of the marine environment of the northern coastal area of Scotland identified no significant concerns relating to hazardous substances, eutrophication, oil/chemical spills, algal toxins and microbiology of bathing and shellfish waters (Baxter *et al.*, 2011).

Both the Caithness and Orkney offshore export cable corridor search areas overlap with a number of open and closed/disused dredge spoil deposit sites, some of which may contain historic deposits of contaminated sediments. The Caithness offshore export cable corridor search area directly overlaps the closed Dounreay microsite (FI002) spoil deposit site, while the Orkney export corridor search area directly overlaps the open Stromness C (FI045) spoil deposit site and is adjacent to open Stromness A (FI040) spoil deposit site. Routeing directly through or in close proximity to the spoil deposit sites has the potential to disturb such sediment. Information on the sediment quality within the Project will be informed by the sediment contaminant analyses being completed during planned benthic surveys.

2.2.4.1.7 Historic Radioactive Contamination

Fragments of irradiated nuclear fuel were discharged to sea as a result of reprocessing nuclear fuels at the Dounreay Nuclear Facility during the 1960s and 70s (DSRL, 2014). Studies have shown that the most hazardous particles clustered on the seabed in a radioactive plume running parallel to the coast from southwest to northeast, within the immediate vicinity of the historic liquid effluent diffuser system (LEDS) located to the north of the facility approximately 1 km to the northeast of the Caithness offshore export cable corridor search area.

The Particle Retrievals Advisory Group (PRAG) estimated some several hundred thousand particles may have been discharged from the historic LEDS. The presence of the larger radioactive particles near the historic LEDS is believed to be the source of smaller, less hazardous particles detected in the wider area – most notably in the Sandside Bay area (PRAG, 2012).

An extensive programme of remediation activity has been undertaken by Dounreay Site Restoration Limited (DSRL) between 2008 – 2012 to detect and retrieve hazardous particles from areas of seabed near the outfall using remotely operated vehicles (ROVs), clean-up vehicles and divers. In the period up to summer 2012, when the last retrieval activities were conducted, a total of 2,184 particles were removed from the seabed. Of these 411 were deemed significant (particles with activities greater than 1 million becquerels (Bq) and likely to pose a risk to human health) and were removed from the seabed (DSRL, 2014).

To date, between November 1983 – April 2020, a total of 341 radioactive particles have been found in the Dounreay foreshore area, with the highest Caesium -137 activity recorded at 2.0E+08 Bq (26 November 1991) (DSRL, 2020a). Additionally, 287 radioactive particles have been found at Sandside Bay between April 1984 – August 2020, with the highest Caesium -137 activity recorded at 5.0E+05 Bq (15 February 2007) (DSRL, 2020b).

Furthermore, routine marine monitoring includes sampling of seafood (including crabs, mussels and winkles, seawater, sediment and seaweed) around the Dounreay historic LEDS, and other materials further afield from the outfall, as well as the measurement of beta and gamma dose rates. Seafood samples are collected from within the offshore zone covered by a Food and Environment Protection Act 1985 ('FEPA') Order which prohibits the harvesting of seafood within a 2 km radius of the historic LEDS due to the radioactive particle plume. Sediment samples collected in 2018 recorded a maximum gamma dose rate of 0.14 µGy h-1 at 1 m over substrate at Oigin's Geo, immediately east of the Dounreay Nuclear Site. Seawater samples collected in 2018 from Brims Ness and Sandside bay did not result in detects for radioactive contaminants above laboratory Limits of Detection (LoD) (Environment Agency *et al.*, 2019).

Based on the results of the reported survey results and extensive remediation it is unlikely that any significant particles would be encountered within the study area during construction, operation, maintenance, or decommissioning Project phases.

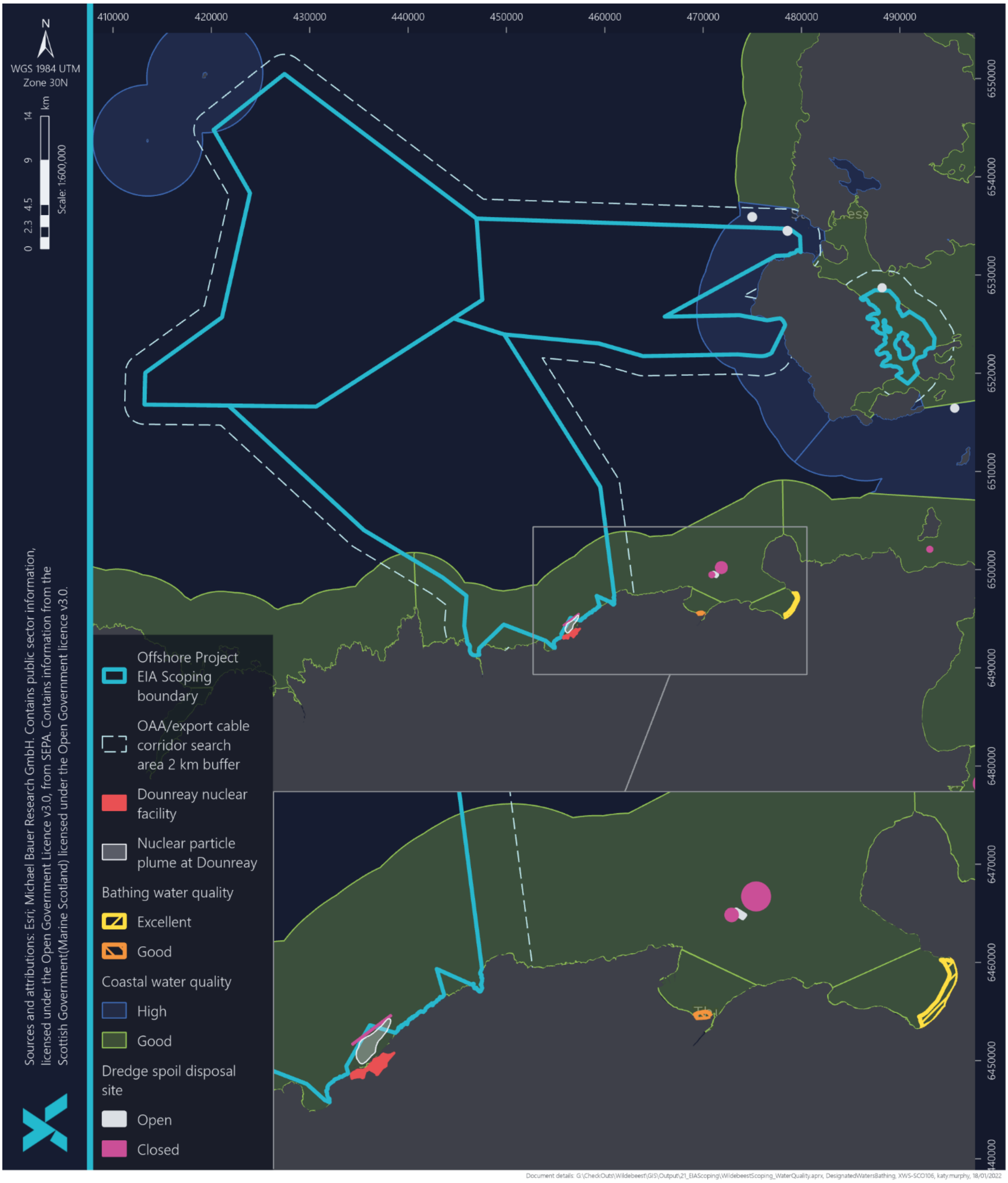

Figure 2-7 Water and Sediment Quality Features

2.2.4.2 SCAPA FLOW

2.2.4.2.1 Water Quality

The chemical composition of the water present within Scapa Flow would be expected to be similar to that recorded for typical unpolluted coastal/offshore Atlantic waters. An assessment on the dissolved nutrients released from operational aquaculture sites, watercourses and sewage treatment plants in Scapa Flow indicated that the releases complied with the WFD standards (OIC, 2020).

2.2.4.2.2 Designated Waterbodies

The Scapa Flow offshore export cable corridor search area intersects with the designated coastal water body Scapa Flow (ID: 200474), measuring 263.3 km^2 in area.

For the Scapa Flow coastal water body, SEPA analysis identified no significant pressures on the water body, with it having an overall status of Good with High confidence (Table 2-9) (SEPA, 2019). For this water body, Water Quality status is classified as Good, while Physical Condition and Freedom from Invasive Species are classified as Excellent. Projected conditions for this water body are anticipated to retain their current status within the years 2021 and 2027.

Table 2-9. Summary of Designated Waterbodies

SITE	CONDITION	PREVIOUS STATUS IN 2014	CURRENT STATUS	PREDICTED STATUS FOR 2021	PREDICTED STATUS FOR 2027
Scapa Flow	Overall	Good	Good	Good	Good
	Physical condition	Excellent	Excellent	Excellent	Excellent
	Freedom from invasive species	Excellent	Excellent	Excellent	Excellent
	Water quality	Good	Good	Good	Good

2.2.4.2.3 Designated Bathing Water

There are no designated bathing waters which intersect with the Scapa Flow. The closest designated bathing waters are at Dunnet Bay and Thurso, which are approximately 25 km and 30 km south of Scapa Flow respectively. Due to the intervening distance between Scapa Flow and these designated bathing waters, as well as the distinct geographic nature of Scapa Flow, it is unlikely that any localised impacts on water quality from the Project activities, would negatively impact upon the water quality of these designated bathing waters.

2.2.4.2.4 Designated Shellfish Waters and Shellfish Water Protected Area

There are no designated shellfish waters which intersect Scapa Flow. The nearest shellfish water is the Kyle of Tongue which is harvested for the Pacific oysters and Loch Eriboll which are approximately 75 km and 90 km away, west of Scapa Flow. Due to the intervening distance between the Scapa Flow and these designated shellfish waters, it is unlikely that any localised impacts on water quality from the Project activities, would negatively impact upon the water quality of these designated shellfish waters. The statuses of fish and shellfisheries of commercial importance are discussed in section 2.7: Commercial fisheries.

2.2.4.2.5 Urban Wastewater Treatment Sensitive Areas

No urban wastewater treatment sensitive areas intersect the study area in Scapa Flow. The closest are as described within section 2.2.4.1 above.

2.2.4.2.6 Sediment Quality

There are no other known sediment quality issues associated with Scapa Flow. Similar to the study area, the CSEMP sites are situated too far from Scapa Flow to supplement any assumptions related to sediment quality in the area. Instead sediment quality properties will be informed by any sediment contaminant sampling and analyses completed within Scapa Flow. It is acknowledged that war-time debris is located within Scapa Flow (see section 2.9), which may result in sediment quality issues.

The Scapa Flow study area overlaps with the active Stromness B dredge spoil deposit site (FI050), which may contain historic deposits of contaminated sediments. Routeing directly through the site has the potential to disturb such sediment. Therefore, information on the sediment quality within the Project will be informed by the sediment contaminant analyses being completed during planned benthic surveys.

2.2.4.3 Summary and Key Issues

Table 2-10 Summary and Key Issues for Water and Sediment Quality

	PROJECT COMPONENT
SUMMARY AND KEY ISSUES	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE SEARCH AREA
	• The offshore export cable corridor search areas and associated buffers intersect a number of coastal water bodies, with potential impacts on the water and sediment quality; and • The offshore export cable corridor search areas overlap with open and closed/disused spoil deposit sites, which could contain historic deposits of contaminated sediment that could be disturbed, resulting on impacts on water and sediment quality.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE SEARCH AREA
	• Scapa Flow offshore cable corridor search area intersects one designated coastal water body with potential impacts on the water and sediment quality; • War-time debris is located within Scapa Flow (see section 2.9), which may result in sediment quality issues; and • The Scapa Flow offshore export cable corridor search area overlaps with an open spoil deposit site, which could contain historic deposits of contaminated sediment that could be disturbed, resulting on impacts on water and sediment quality.

2.2.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-11.

Table 2-11 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Environmental Management Plan, covering pollution prevention, biosecurity assessment and waste management.	Tertiary	Required under Section 36 and/or Marine Licence consent conditions.
2	Marine pollution prevention under the MARPOL convention requirements	Tertiary	Secured through the production of a Marine Pollution Prevention Plan, a condition of the Section 36 consent and/or Marine Licence.

There is a commitment for the project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on water and sediment quality receptors and will be consulted upon with consultees throughout the EIA process.

2.2.6 Scoping of Impacts

A number of potential impacts on water and sediment quality receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the Offshore Renewable Energy (ORE) Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

A number of impacts are proposed to be scoped out of the assessment for water and sediment quality receptors. These impacts are outlined in Table 2-12 together with a justification for scoping them out.

Impacts to water quality may indirectly affect other receptors. Other EIA topics for which impacts to water quality may affect are listed below. The indirect effect from impacts to water quality are address within these sections.

- Benthic ecology;
- Fish and shellfish ecology;
- Marine mammals;
- Offshore ornithology; and
- Commercial fisheries.

Table 2-12 EIA Scoping Assessment for Water and Sediment Quality

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Impacts on water quality status of designated waterbodies due to increased suspended sediment and potential release of contaminants or radioactive particles	1, 2	Scoped In	Changes to suspended sediment concentrations due to construction activities will be temporary and transient and will not ultimately lead to a reduction in the waterbody status (currently Good or Excellent). This impact is scoped in only with respect to the potential release of sediment contaminants, with an onward impact on the chemical status of the water body.	Results of sediment contaminant analyses completed for sediment samples.	Desk-based assessment of the potential for release of sediment contaminants trapped in sediment, based on the maximum design scenarios for the Project.
Changes in water and sediment quality from accidental discharges from vessels during construction	1, 2	Scoped Out	Construction activities may potentially result in reduced water and sediment quality in the vicinity due to accidental discharges from vessels. The impacts are likely to be short lived and localised. The risk will be adequately managed through the embedded mitigation measures, which will reduce the risk of accidental discharges.	N/A	N/A
Disturbance and release of contaminated sediments or radioactive particles	1, 2	Scoped In	Trapped contaminated sediments may be disturbed, released and dispersed more widely into the environment with impacts on the sediment quality during construction and/or decommissioning activities. Further assessment is required to assess	Results of sediment contaminant analyses completed for sediment samples.	Desk-based assessment of the potential for release of sediment contaminants trapped in sediment, based

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			the impact this will have on the sediment quality of the area.		on the maximum design scenarios for the Project.
Operations and Maintenance					
Changes in water and sediment quality due to pollution from accidental discharges from vessels during operation and maintenance	1, 2	Scoped Out	Routine maintenance activities may potentially result in reduced water and sediment quality in the vicinity due to pollution accidental discharges from vessels. The impacts are likely to be short lived and localised. The risk will be adequately managed through the embedded mitigation measures, which will reduce the risk of accidental discharges.	N/A	N/A
Impacts on water quality status of designated waterbodies due to increased suspended sediment and potential release of contaminants or radioactive particles	1, 2	Scoped Out	Routine maintenance activities may potentially result in changes to suspended sediment concentrations in designated water bodies. The impacts are likely to be short lived and localised. The risk will be adequately managed through the embedded mitigation measures, through environmental management plans, and will not ultimately lead to a reduction in the waterbody status (currently Good or Excellent).	N/A	N/A
Changes in water and sediment quality associated with	1	Scoped Out	Routine maintenance activities including cleaning biofouling of Project infrastructure may potentially result in reduced water and sediment quality in the immediate vicinity of the Project infrastructure. Such operational cleaning may also release paints used on	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
operational cleaning of Project infrastructure			the Project infrastructure. Any impacts are likely to be short lived and localised. Risks will also be adequately managed through the embedded mitigation measures, including using anti biofouling paints suitable for the marine environment and fauna.		

2.2.7 Potential Cumulative Effects

Although the predicted effects of the Project are anticipated to be localised within the footprint of the Project, there is the possibility that certain impacts interacting with other projects, plans and activity, resulting in a cumulative effect on water and sediment quality receptors. There is potential for cumulative effects during the construction period of the Project with other offshore infrastructure in the area e.g. the cumulative effect to the water quality status of designated waterbodies due to construction activities associated with the Project and the Pentland Floating Offshore Wind Farm, the SHET-L Caithness to Orkney interconnector or active disposal sites.

The water and sediment quality CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

2.2.8 Potential Transboundary Impacts

There is no potential for transboundary impacts upon water and sediment quality receptors due to construction, operation, maintenance and decommissioning of the Project. The potential impacts are largely localised around the Project and will not extend beyond the Scottish or UK limits and therefore do not need to be considered further.

2.2.9 Approach to Analysis and Assessment

2.2.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on water and sediment quality will utilise Project-specific contaminant analyses results and publicly available data (see section Table 2-7) to characterise the baseline and will be augmented by consultation during the EIA phase. Results of the sediment contaminant analysis will be used to assess for the potential for disturbance of any contaminated sediment in the impact assessment. The outputs from the physical processes section will also be used to understand the changes to Suspended Sediment Concentrations (SSC) such as dispersion distances. Guidance from legislation, including the WFD, will be considered and adhered to.

Consultation will be undertaken during the process with key stakeholders relevant to water and sediment quality, including:

- Marine Scotland;
- NatureScot;
- THC;
- OIC
- JNCC; and
- SEPA.

The Project has already undertaken some initial consultation with Marine Scotland and MSS with regards to the seabed survey strategy for the Project, which will include sampling for suspended sediments.

The water and sediment quality EIA will assess the direct impact to water and sediment quality receptors as described in Table 2-12. This will include consideration of the extent and duration of any impacts in determining the magnitude of any potential impact along with the sensitivity of the receptor to the impact. The magnitude of impact will be derived from the maximum design scenarios for the Project. Indirect effects from impacts to water quality, on other receptors (e.g. fish and shellfish ecology) will be assessed within the appropriate sections.

2.2.9.2 EIA Methodology

The water and sediment quality EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-13 will be considered in relation to the water and sediment quality EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-13 Legislation and Guidance for Water and Sediment Quality

LEGISLATION / GUIDANCE	SUMMARY
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)	Regulations to ensure that a controlled activity authorised under these Regulations take all reasonable steps to secure efficient and sustainable water use.
Water Environment and Water Services (Scotland) Act 2003	The purpose of this Act is to protect the water environment by preventing furth deterioration and promoting sustainable water use. The Water Framework Directive has been transposed into this Act to provide a mechanism for obtaining authorisation to carry out certain activities which may affect Scotland's water environment.
The Bathing Waters (Scotland) Regulations 2008	Regulations to ensure that all designated bathing waters are classified as "Sufficient", "Good" or "Excellent" and to take measures to improve this status where possible.
The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013	This Order designates 84 areas of coastal water or transitional water within the Scottish River Basin District as "shellfish water protected areas".
Marine Strategy Regulations 2010	The Regulations transposes the Marine Strategy Framework Directive (MSFD), which requires the UK to put in place measures to achieve or maintain GES in the marine environment by 2020. The Scottish Government and statutory bodies continue to work towards GES targets.
Urban Waste Water Treatment (Scotland) Regulations 1994	Aims to reduce water pollution from urban wastewater sources, to prevent the build-up of nitrogen, nitrates and nitrites in the surface waters. Sensitive areas under the Directive are water bodies affected by eutrophication or elevated nitrate concentrations, whereby further action is required to prevent further pollution caused by nutrients.

LEGISLATION / GUIDANCE	SUMMARY
Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 2008	Similar to the Urban Waste Water Treatment (Scotland) Regulations 1994, the Regulation specifically aims to control the pollution of controlled waters by excess use of fertilisers on agricultural land, thereby reducing pollution from such sources. Sensitive areas are the same as those of the Urban Waste Water Treatment Regulations.
Cefas 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)	The purpose of this document is to assist the offshore wind farm industry and their consultants; the primary aim being to provide scientific guidance to those involved with the gathering, interpretation and presentation of data within an EIA as part of the consents application process in England and Wales.
CIRCA C584 Coastal and marine environmental site guide (CIRCA, 2003)	This guide, which is intended to be applicable to all levels of construction experience, provides practical and accessible information on appreciating, avoiding and mitigating the effects of poor environmental practice within the coastal and marine environment once a project has reached the construction stage.
Environmental Authorisations (Scotland) Regulations 2018	The general aims of this document are the prevent or minimise environmental harm and to use resources in a sustainable way.
Food and Environment Protection Act 1985	An Act to authorise the making in an emergency of orders specifying activities which are to be prohibited as a precaution against the consumption of food rendered unsuitable for human consumption in consequence of an escape of substances.
Highland-wide Local Development Plan (2012) Planning Policies, Policy 63: Water Environment.	The Highland Council will support proposals for development that do not compromise the objectives of the Water Framework Directive, aimed at the protection and improvement of Scotland's water environment.
Land Use Planning System SEPA Guidance Note 17: Marine development and marine aquaculture planning guidance, Version 6 (SEPA, 2014)	The purpose of this note is to provide guidance on the approach that we should take when dealing with consultations relating to the marine environment and aquaculture developments.
Pentland Firth and Orkney Waters Marine Spatial Plan (MSP) (Scottish Government, 2016)	This MSP is a pilot process undertaken by a working group consisting of Marine Scotland, Orkney Islands Council and Highland Council in advance of statutory regional marine planning.

LEGISLATION / GUIDANCE	SUMMARY
Orkney Islands Regional Marine Plan	The Orkney Islands' Regional Marine Plan aims to ensure that waters are clean, healthy, safe and productive; the marine and coastal environment is rich in biodiversity and managed sustainably to support thriving and resilient local community. The report is currently being drafted.
SEPAs Guidance for Pollution Prevention (GPPs)	GPPs provide environmental good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales only.
Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters (SEPA, 2020)	The purpose of this guidance is to provide information on, and access to, the environmental and discharge standards for surface waters.
The Pollution Prevention and Control (Scotland) Regulations 2012	Regulations that ensure pollution prevention techniques are in place for a project.

2.2.10 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the data sources which are suggested for the assessment of water and sediment quality?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for water and sediment quality?
- Do you agree that the impacts suggested can be scoped out of the water and sediment quality EIA section?
- Do you agree with scoping out transboundary impacts?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Do you agree with the proposed approach assessment?

2.2.11 References

Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F., (Editors) (2011) Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. 191pp.

Clean Seas Environmental Monitoring Programme (CSEMP), Available at: http://marine.gov.scot/information/clean-seas-environment-monitoring-programme-csemp [Accessed 06/12/2021].

SEPA (2019) Scotland's water environment 2019: A summary and progress report, Available at: https://www.sepa.org.uk/media/490771/191219_scotlands-water-environment-final.pdf.

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SEPA (2020) Urban Waste Water Treatment Directive Sensitive Areas 2019. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/map/2016/01/urban-waste-water-treatment-sensitive-areas-map/documents/urban-waste-water-treatment-sensitive-areas-map-2019/urban-waste-water-treatment-sensitive-areas-map-2019/govscot%3Adocument/UWWTD%2Bdesignations%2B2019.pdf [Accessed 17/12/2021].

2.3 Benthic Subtidal and Intertidal Ecology

2.3.1 Introduction

This section of the Scoping Report identifies the benthic subtidal and intertidal ecology receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project.

Information that may be considered relevant to this section is presented within the below sections:

- Physical and coastal processes, section 2.1; and
- Water and sediment quality, section 2.2.

This section of the Scoping Report has been prepared by Xodus Group.

2.3.2 Study Area

The study area is defined as the area that will be directly impacted by the offshore infrastructure (including WTGs and associated foundations and substructures, the OSPs and associated foundations, the inter-array cables, offshore export cables) and the adjacent areas that may be affected by indirect impacts, such as sediment suspension and resettlement., which will not extend beyond 1 km. Where appropriate, a larger impact area has been considered, for example, in relation to the potential introduction of non-native marine species.

2.3.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-20.

Table 2-14 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
The Marine Scotland National Marine Plan Interactive (NMPi) maps	Marine Scotland – National Marine Plan Interactive (atkinsgeospatial.com)	2021	Marine Scotland
EMODnet Broad-scale Seabed habitat map for Europe (EUSeaMap)	EMODnet Seabed Habitats – EUSeaMap broad-scale maps (emodnet-seabedhabitats.eu)	2014	EUSeaMap
Pilot Pentland Firth and Orkney Water Marine Spatial Plan	https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/	2016	Scottish Government

TITLE	SOURCE	YEAR	AUTHOR
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf	2020	OIC
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Descriptions of Scottish Priority Marine Features (PMFs)	Priority marine features in Scotland's seas | NatureScot	2016	SNH (now NatureScot)
Sitelink NatureScot	SiteLink (nature.scot)	2020	NatureScot
Coasts and Seas of the United Kingdom: Region 2 Orkney	Coasts and seas of the United Kingdom. Region 2: Orkney (jncc.gov.uk)	1997	JNCC
Synthesis of Information on Benthos of Area SEA 5	Strategic Environmental Assessment 5: supporting documents – GOV.UK (www.gov.uk)	2004	Department of Energy & Climate Change (now BEIS)
UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3)	UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3) – GOV.UK (www.gov.uk)	2016	Department for Business, Energy & Industrial Strategy (BEIS)
Habitats and Species Surveys in the Pentland Firth and Orkney Waters	habitats+species+pentland+firth.pdf (www.gov.scot)	2016	Marine Scotland
The Benthic Environment of the North and West of Scotland and Northern and Western Isles: Sources of information and overview	The benthic environment of the North and West of Scotland and the Northern and Western Isles: sources of information and overview (pnnl.gov)	2005	SAMS Research Services Limited
North-West Orkney NCMPA	North-West Orkney MPA | JNCC – Adviser to Government on Nature Conservation	2017	JNCC
Seagrass (*Zostera*) beds in Orkney	SNH Commissioned Report 765: Seagrass (Zostera) beds in Orkney (nls.uk)	2014	SNH (now NatureScot)
Protected sites	https://gateway.snh.gov.uk/natural-spaces/inspire_download.atom.xml	2021	NatureScot

2.3.3.1 Project Site-Specific Surveys

An environmental baseline survey will be completed in 2022 in the OAA and along the offshore export cable corridor search areas. This will include geophysical survey (MBES, SSS, SBP and UHRS) and environmental sampling (e.g. 0.1 m^2 Hamon grabs for faunal analysis, Shipek Grabs for contaminants analysis, and drop-down camera records). The survey results will be incorporated in the EIA. Intertidal surveys will also be conducted at the cable landfalls.

2.3.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-14) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The key features of benthic ecology which are likely to require consideration within the EIA are:

- Sediment type;
- Annex I habitats;
- PMFs;
- Protected species;
- Protected prey species.

Protected areas will be taken into consideration to assess impact on benthic receptors.

The following sections provide information on the key spatial differences across the study area for the benthic subtidal and intertidal biotopes:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area (section 2.3.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.3.4.2).

2.3.4.1 OFFSHORE MARINE AREA

The Project covers a total area of 1,684 km^2 (including the OAA and the Caithness and Orkney export cable corridor search areas) with areas of shallow water (<60 m) and areas of deeper water (>60 m) (Scottish Government, 2020). The OAA comprises of two distinct areas of shallow water, Stormy Bank and Whitten Head Bank. Sandbanks and wave fields are present geomorphological features in the OAA. The site consists of seabed sloped with gradients equal to or under 3.5 degrees, although several areas have gradients more than 3.5 degrees. The seabed sediment at the site is mostly uniform, varying from gravel to sand. Most of the bedrock is deeper than 30 metres, 40% of the site has bedrock deeper than 50 m. Water depths within the offshore export cable corridor search areas reach up to 120 m.

The predicted habitats mentioned below come from the European Nature Information System (EUNIS) 2019 classification.

2.3.4.1.1 Subtidal Sediments

The predicted EUNIS habitat classification within the OAA is dominated by MD52: Atlantic offshore deep circalittoral sand, MD32 circalittoral coarse sediment or MC32: circalittoral coarse sediment. The three main type of seabed sediment in the vicinity of the study area are classified as gravelly sand, slightly gravelly sand, sandy gravel, and sand (NMPi, 2021). Within the OAA, sand is present throughout, but particularly in western side, whereas sandy gravel is more prevalent in the east and north of the OAA. Slightly gravelly sand is present in patches throughout the OAA.

The predicted EUNIS classification for the Caithness offshore export cable corridor search area is predominantly MD52: circalittoral sand or circalittoral coarse sediment with areas of MC32: Atlantic circalittoral coarse sediment and MB32: Atlantic moderate energy infralittoral rock as it approaches the Caithness coastline (EUSeaMap, 2019). The predicted habitat classification of the potential Caithness landfall sites is MB52: Atlantic infralittoral sand with substrate varying between sand and rock or other hard substrata. The nature of the seabed at the Murra potential landfall in Orkney is high energy MB12: Atlantic infralittoral rock and is characterised by small boulders and cobbles on sand (Marine Scotland, 2016)**.** The predicted EUNIS habitat classification near the Rackwick landfall is high energy MC52: Atlantic circalittoral sand with sand as the prominent substrate.

2.3.4.1.2 Subtidal Benthic Communities

The predicted habitat in the OAA, described in section 2.3.4.1.1, covers much of the region to the north-west Orkney, including the North-West Orkney NCMPA, therefore, similar benthic communities are expected. This area is characterised by areas of rough substrate within areas of sediment, which makes it an ideal habitat for sandeels. Newly hatched sandeel larvae from this region are exported to sandeel grounds around Shetland and south of the Moray Firth (JNCC, 2017). There are also benthic species that are important to commercial fisheries (Refer to section 2.7), such as brown crab, common lobster, scallops, and *Nephrops*.

The seabed in the nearshore waters off the north coast of Caithness is dominated by rippled fine sand with a sparse epifauna. Empty shells of the PMF *Arctica islandica* appear to be common in deeper water (>70 m). Sand waves of coarser materials are widely distributed; rocky reef habitats of boulders and cobbles are predominantly in shallower depth of water (<45 m) (BEIS, 2016). Hard substrata (boulder and bedrock) continue into the sublittoral zone with steep cliffs, caves, and overhangs. A kelp forest of *Laminaria hyperborean* grows on the hard substrate at depths of approximately 20 m. On steep cliffs, sponges (*Pachymatisma johnstoni* and *Clathrina coriacea*), soft coral (*Alcyonium digitatum*), and the colonial ascidian (*Botryllus schlosseri*) are all present. Where the current is faster, at sites such as Rora Head (near Rackwick) on the west of Hoy, the densities of attached species increase, with denser populations of bryozoan (*Flustra foliacea*) and the soft coral (*A. digitatum*) at depths of 39 m. There are a few sites on the west coast of Hoy that have similar sublittoral habitats (JNCC, 1997). To the south of Rora Head, there is a small number of sandeels inhabiting the sandy seabed (Marine Scotland, 2016).

2.3.4.1.3 Intertidal Areas

The Caithness shoreline is predominantly rocky with small bays of sediment beaches. The beaches along the northern coast of Caithness are generally formed of offshore glacial deposits and alluvial material. Boulder, pebble and shingle beaches are predominant in the more exposed areas of the coast, while narrow inlets and small bays have mixed sediments, such as sand and mud, in more sheltered areas (BEIS, 2004). There is a diverse range of brown algae and common encrusting forms with the addition of blue-green algae and many Lusitanian species, such as red alga (*Porphyra umbilicalis*), the limpet (*Patella ulyssiponensis siculosus*), and brown algae (*Fucus vesiculosus*, *F. linearis* and *Himanthalia elongate*) that colonise the exposed rocky shores of Caithness. The barnacle *Chthamalus montagui*, the gastropod *Littorina neritoides* and the top-shell *Gibbula umbilicalis* are also characteristic of the area (SAMS, 2005).

The littoral habitats of the west coast of Orkney experience extreme wave action and are typically inhabited by encrusting species, such as *Mytilus edulis*, limpet *Patella spp*., barnacles (*Chthamalus*, and *Semibalanus balanoides*), some lichens, brown algae and red seaweeds (BEIS, 2004). The west shores of Hoy are predominately exposed bedrock and/or large boulders, characterised by barnacles with brown alga (*Fucus distichus*) and red alga (*Palmaria palmata*) present (JNCC, 1997). The lower shores on the west of Hoy are dominated by *Corallina officinalis*, coralline algae, dabberlocks, and mussels.

2.3.4.1.4 Protected Sites and Habitats/ Species

PMFs have been identified within the OAA and offshore export cable corridor search areas. There is one existing record of the PMF species, ocean quahog (*Artica islandica*), present within the OAA and 16 existing records within the Caithness offshore export cable corridor search area. *Parazoanthus anguicomus* is present within the Orkney offshore export cable corridor search area, close to the north-west shore of Hoy, and a habitat with *Atrina fragilis* has been identified less than 3 km to the north of the Orkney offshore export cable corridor search area. Table 2-15 shows all PMFs present in the OAA and offshore export cable corridor search areas.

The nearest marine protected area is the North-West Orkney NCMPA which borders the Orkney offshore export cable corridor search area, with a slight overlap of 0.02 km^2 (0.0005% of the NCMPA). The NCMPA is designated for its importance to biodiversity (sandeels) and geodiversity (marine geomorphology of the Scottish Shelf Seabed including sandbanks and sand and sediment wave fields) (JNCC, 2018). Sandeels spend the majority of their life in the sandy substrate of the seabed on which they depend, except when feeding and spawning, and are therefore vulnerable to disturbance and habitat loss. They are a key food source for a range of marine wildlife, including many types of larger fish and seabirds along with being commercially important to the UK and EU nations (e.g. Denmark). The NCMPA also includes protection for geomorphological features, such as sediment wave fields, sand waves, and sandbanks, that are maintained under a specific range of tidal current conditions (JNCC, 2017).

There are SSSIs located on the Hoy and the north Caithness coasts, which overlap with the potential landfalls. Strathy Coast, Red Point Coast, Sandside Bay and Ushat Head lie across the Caithness landfall sites on the north Caithness coast. Muckle Head and Selwick are situated at Murra on the north coast of Hoy, which overlap with the offshore export cable corridor search area. The Hoy SSSI is an area of 9,499.7 ha covering a majority of Hoy including all the west coast (NMPi, 2021). Hoy SSSI is also a designated SAC and SPA (NatureScot, 2021).

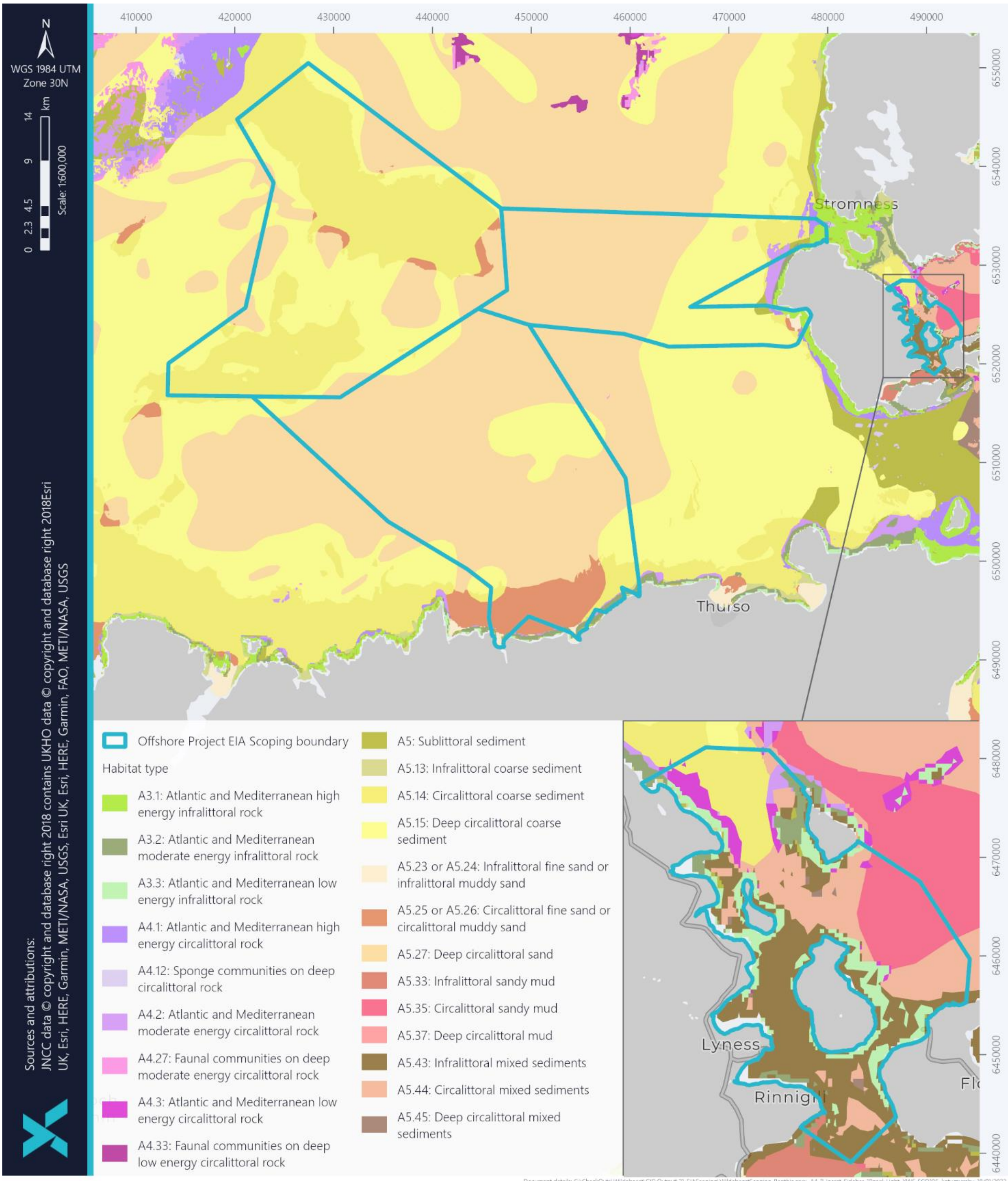

Figure 2-8 Predicted EUNIS Habitats from the EUSeaMap

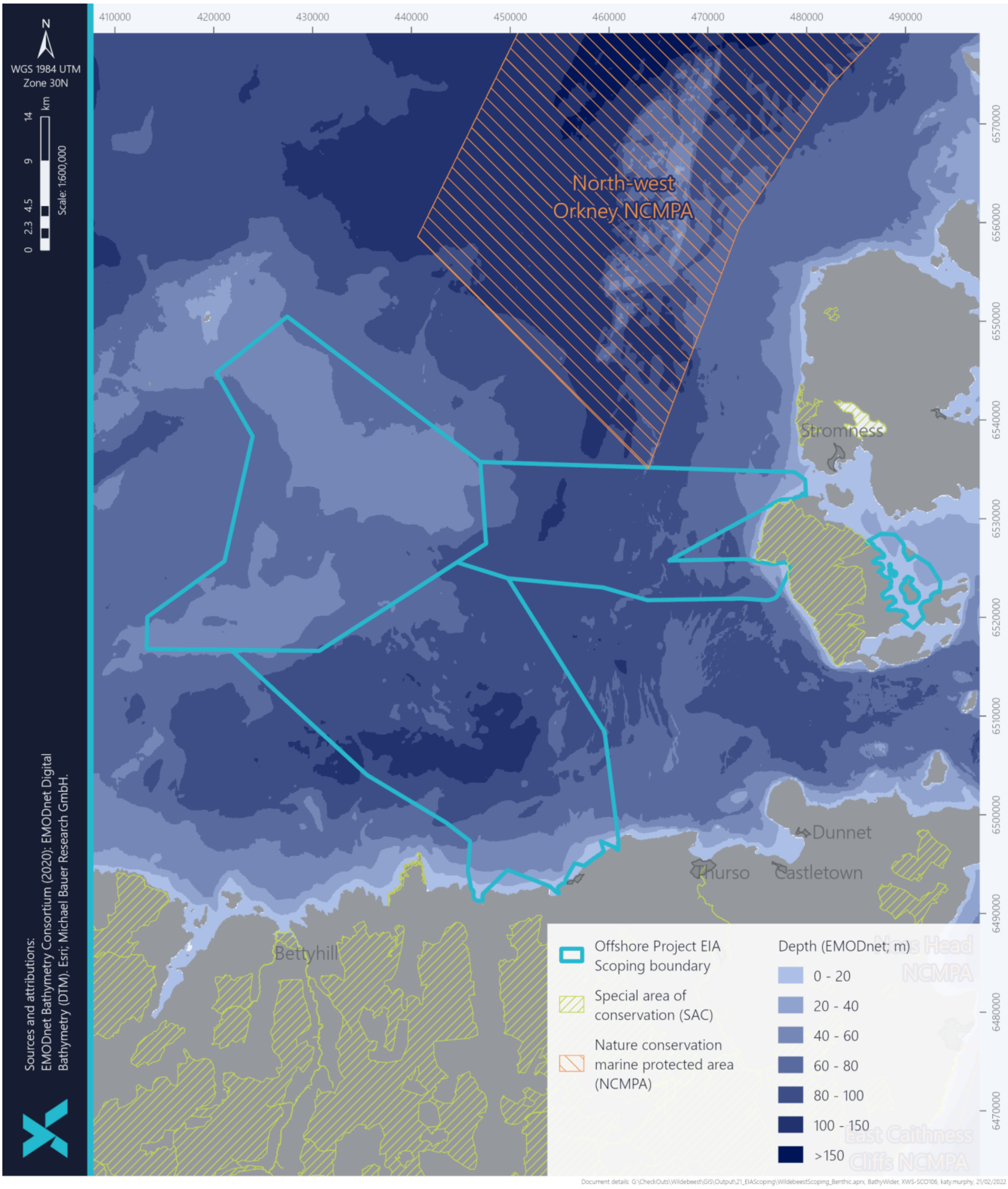

Figure 2-9 NCMPAs and SACs

Table 2-15 PMFs Present within the Study Area

PRIORITY MARINE FEATURE	COMPONENT BIOTOPES/ SPECIES	OFFSHORE MARINE AREA	SCAPA FLOW
Arctica islandica	N/A	✓	✓
Parazoanthus anguicomus	N/A	✓	
Artina fragilis	N/A		✓
Kelp beds	*Laminaria hyperborean* park and foltose red seaweeds on moderately exposed lower infralittoral rock	✓	
	L. cottish forest with a faunal cushion (sponges and polyclinids) and foliose red seaweeds on very exposed upper infralittoral rock	✓	✓
	L. hyperborean with dense foliose red seaweeds on exposed infralittoral rock	✓	
	Grazed *L. hyperborean* park with coraline crusts on lower infralittoral rock	✓	
Flame shell beds	*Limaria hians* beds in tide-swept sublittoral muddy mixed sediment		✓
Horse mussel beds	*Modiolus* beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata		✓
	M. modiolus beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata		✓
Maerl beds	Maerl beds		✓

2.3.4.2 SCAPA FLOW

The Scapa Flow offshore export cable search area runs between the east coast of Hoy to Flotta in Scapa Flow, covering an area of 30 km^2. Scapa Flow is a sheltered marine water body surrounded by the islands of Hoy in the west, Orkney mainland to the north and the south isles of Burray and South Ronaldsay in the east. Depths generally range 20-40 m, with much deeper water in Bring Deeps in the centre of the Flow (OIC, 2020).

2.3.4.2.1 Subtidal Sediment

The predicted EUNIS habitat classification in Scapa Flow is predominately MB12: Atlantic infralittoral rock, MC62: Atlantic circalittoral mud, MB2221: Atlantic infralittoral muddy mixed sediment, MC42: Atlantic circalittoral mixed sediment, and MB42: Atlantic infralittoral mixed sediment. The main types of seabed sediment in Scapa Flow are sandy gravel, muddy sandy gravel, slightly gravelly muddy sand, and gravelly muddy sand. In the more sheltered intertidal regions of Scapa Flow, boulder slopes give way to plains of finer sediment such as muddy sand (JNCC, 1997). The seabed off north-east Hoy is semi-exposed with a gentle slope of hard substrata, such as boulders and bedrock, as well as muddy sand and clean sand.

2.3.4.2.2 Subtidal Benthic Communities

The variation of benthic sediments in Scapa Flow results in an uneven distribution of species, with reduced species diversity and abundance on sediment shores compared with the beaches on Hoy (JNCC, 1997). Areas where the sediment is coarser, in the east of Scapa Flow in Scapa Bay, have the greatest diversity dominated by polychaete worms. At Waulkmill Bay, further west, the mid-shore is polychaete- dominated but the lower shore is dominated by amphipods *Bathyporeia* spp. Off the coast of Orphir, there is a high number of species occurrence, however the population densities are lower with the most dominant species being polychaete worms in the mid-shore, and amphipods *Bathyporeia* spp. And *Ampelisca* spp. In the lower shore (JNCC, 1997). In the shallow areas where there is hard substrata, such as boulders, the kelp plants are generally smaller and less dense than the west coasts of Orkney. There is also a great abundance of sea urchins that live in the Kelp forests of Scapa Flow (JNCC, 1997). Within Scapa Flow, there are horse mussel beds, which attract faunal communities made up from barnacles, small hydroids, keel worms *Pomatoceros triqueter* and the ascidians (*Ciona intestinalis*, *Dendrodoa grossularia*, *Corella parallelogramma*, *Botrylloides leachi* and *B. schlosseri*). Common whelks (*Buccinum undatum*) and red whelk (*Neptunea antiqua*) are common on the seabed, which is dominated by fine muddy sand. There are dense beds of maerl carpets present at Hoy Sound, Bay of Sandside, Clestrain Sound, and Isle of Graemsay located on the west of Scapa Flow. The Bay of Creekland, on the north-east shore of Hoy, is dominated by polychaetes. Large kelp *Sacchoriza polyschides* grow on the boulders and is abundant on the north to east shores of Hoy. Whereas the boulders on the north shore of Flotta are dominated by algae, such as *Codium fragile* and *Chorda filum*. The echiuran worm (*Amalosoma eddystonense*) lives in the muddy sand on the east of Hoy, at a depth of around 16 m. The sea pen (*Virgularia mirabilis*), spoon worm (*A. eddystonense*), and tube worm (*Chaetopterus variopedaus*) are prominent at depths of 20 m. In areas of increased current flow, hydroids and bryozoans are present with dense growths of soft coral *A. digitatum*. The coarse sand in Scapa Flow is characterised by burrowing sea cucumber (*Neopentadactyla mixta*) and the brittlestar (*Ophiocomina nigra*). There is a large seagrass bed located in Widewall Bay, composed of *Zostera marina* and *Zostera angustifolia*. Seagrass beds have also been recorded at the causeway between Burray and South Ronaldsay, and in the north shore of Graemsay (NMPi, 2021). Seagrass (*Zostera* spp.) beds develop on sand and muds in the intertidal and shallow subtidal areas that are sheltered from extreme wave action. Seagrass beds support a high biodiversity are important in the resilience and stability of marine ecosystems (SNH, 2014).

2.3.4.2.3 Intertidal Areas

The shallow rocky sublittoral and other exposed hard substrata are characterised by the alga *L. hyperborean*, along with brown algae, such as *Alaria esculenta*, *M. edulis* and several species of red algae. In the wave-surged south coast of Orkney, there are dense growths of encrusting sponges (*Dendrodea/Clathrina*), ascidians, bryozoans and hydroids. In the shallow sublittoral mixed sediments, *Laminaria saccharina* and filamentous red seaweeds dominated while the bivalves *Venerupis senegalensis* and *Mya cottish* inhabited the muddy gravel in these areas. Modiolus beds are also present on these substrata. The shallow muddy sand communities are characterised by the sand urchin *Echinocardium cordatum* and spionid polychaetes. In very sheltered areas, there are tube-building amphipods, polychaetes and synaptid holothurians (DBEIS, 2004).

2.3.4.2.4 Protected Sites and Habitats/ Species

There are no SACs or potential Annex I located in Scapa Flow, however, many marine habitats and species in Orkney are identified as PMFs of conservation importance (OIC, 2020). Kelp beds are widespread throughout Scapa Flow colonising hard substrate, providing shelter to other organisms. Maerl beds provide ideal conditions for the diversification of benthic communities by providing oxygen and shelter. Biogenic reefs characterised by horse mussel beds, and less common flameshell beds, and blue mussel beds which are unique to Scapa Flow (OIC, 2020). Dense seagrass meadows congregate in shallow water in more sheltered areas creating surfaces for attachment species, such as algae and diatoms, and shelter for crabs and fish species. Sheltered bays along Orkney’s coastline give rise to intertidal mudflats that are rich in organic material and support a wide diversity of burrowing species, such as bivalve molluscs, worms, and crustaceans. Overall, there are twelve broad habitats in the waters surrounding Orkney, including kelp beds, horse mussel beds, seagrass beds and maerl beds, and only three benthic species: northern feather star, fan mussel, and ocean quahog (OIC, 2020). Table 2-15 refers to the PMFs that are present within the Scapa Flow offshore export cable corridor search area.

2.3.4.3 Summary and Key Issues

Table 2-16 Summary and Key Issues for Benthic Subtidal and Intertidal Ecology

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE SEARCH AREA
	• The Orkney offshore export cable corridor search area borders the North-West Orkney NCMPA (designated for sandeel); • Overlap with spawning and nursery grounds for sandeel which are potentially sensitive to seabed disturbance and/or noise; and • Potential overlap with geomorphological features, such as sediment wave fields, sand waves, and sandbanks.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE SEARCH AREA
	• Overlap with spawning and nursery grounds for sandeel which are potentially sensitive to seabed disturbance and/or noise; and • Potential interaction with PMFs such as maerl beds, kelp beds, seagrass and horse mussel beds.

2.3.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-17.

Table 2-17 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	The development of, and adherence to, an appropriate Code of Construction Practise (CoCP).	Tertiary	Section 36 and/or Marine Licence consent conditions
2	The development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan and Invasive Non-Native Species (INNS) Management Plan.	Tertiary	Section 36 and/or Marine Licence consent conditions
3	The development of, and adherence to, a Decommissioning Plan.	Tertiary	Section 36 and/or Marine Licence consent conditions

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
4	Micrositing of wind turbines and associated offshore infrastructure including cable routes	Primary	Final Project layout will be presented within the Cable Plan and Design Specification and Layout Plan, conditions of the Section 36 and/or Marine Licence consent

There is a commitment for the project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on benthic ecology receptors and will be consulted upon with consultees throughout the EIA process.

2.3.6 Scoping of Impacts

A number of potential impacts on benthic ecology receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

A number of impacts are proposed to be scoped out of the assessment for benthic ecology receptors. These impacts are outlined, together with a justification for scoping them out (Table 2-18).

Table 2-18 EIA Scoping Assessment for Benthic Subtidal and Intertidal Ecology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Temporary habitat loss/ disturbance	1	Scoped In	There is a potential for temporary/ substrate, habitat and species loss and damages resulting from construction and decommissioning activities.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment. The area of impact will be calculated based on the worst-case seabed footprint associated with the maximum design scenario.
Long-term loss or damage to benthic habitats and species	1	Scoped In	There is a potential for long-term substrate, habitat and species loss and damages resulting from construction and decommissioning activities. If a floating project is progressed, long-term habitat disturbance may also result from abrasion by anchor chains / mooring lines on the seabed.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment. The area of impact will be calculated based on the worst-case seabed footprint associated with the maximum design scenario.
Increased suspended sediment concentrations and associated deposition	1	Scoped In	Sediment disturbance arising from construction and decommissioning activities may result in indirect impacts on benthic communities due to temporary increases in	Benthic subtidal and intertidal surveys have will be undertaken to collect site-specific data to allow	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			SSCs and associated sediment deposition (i.e. smothering effects). Changes in SSCs can impact benthic receptors through changes in water clarity and reduced feeding due to increases in suspended solids and smothering and siltation rate changes.	for characterisation of the benthic subtidal and intertidal ecology study area.	assessment. The proposed modelling approach is presented within Section 2.1.9.1 primary productivity and the corresponding effects on benthic receptors will be considered.
Increased risk of introduction and spread of INNS	2	Scoped In	Vessel movements during construction and decommissioning can result in the spread of invasive and non-native species. The Environmental Management Plan will include a specific INNS plan, which will demonstrate and ensure that all required measures are implemented so that the potential for introduction of INNS are minimised (e.g. adherence to relevant legislation and guidance). Through these measures the discharges of ballast waters and the biofouling of project vessels will be strictly controlled.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.
Removal of hard substrate during decommissioning	3	Scoped In	The removal of foundations and any scour/ cable protection during decommissioning has the potential to lead to loss of species/ habitat, which has been colonised.	Benthic subtidal and intertidal surveys have been undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
				intertidal ecology study area.	
Release of sediment bound contaminants	1, 2, 3	Scoped In	Seabed disturbance associated with construction and decommissioning activities could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. The Dounreay nuclear site is located on the border of the Caithness offshore export cable corridor search area and it is known that there are small numbers of radioactive particles present in the offshore and intertidal sediments as a result of activity at Dounreay Nuclear Facility, which may be released into the environment as a result of installation activities. The presence of war-time debris (see section 2.9) may also be a source of contaminants.	Site-specific sediment chemistry sampling will be undertaken across the study area.	No specific modelling is required to inform this impact assessment. Sediment analysis will be conducted on sediment samples to inform the impact assessment.
Accidental release of pollutants	1, 2, 3	Scoped Out	Accidental release of pollutants are limited to accidental oil and fluid emissions from any associated Project vessels. Embedded mitigation measures will be adopted to ensure that the potential for release of contaminants is minimised. In this manner, accidental release of potential contaminants from construction	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs. Hence the impact has been scoped out of the EIA.		
Operations and Maintenance					
Temporary habitat loss/ disturbance	1	Scoped In	There is potential for temporary, direct habitat loss and disturbance due to maintenance activities, resulting in potential effects on benthic ecology.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.
Increased suspended sediment concentrations and associated deposition	1	Scoped In	Sediment disturbance arising from maintenance activities may result in indirect impacts on benthic communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects).	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact assessment. Further details of this modelling are presented within 2.1.9.1.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Colonisation of hard structures	2	Scoped In	Artificial structures placed on the seabed (i.e. foundations and scour / cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised changes in biodiversity.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.
Changes in physical processes	1, 3	Scoped In	The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	Outputs of numerical modelling (as per 2.1.9.1) undertaken for the physical processes assessment will inform this impact assessment, however the assessment of impact will be presented within the Benthic Subtidal and Intertidal Ecology section of the EIA.
Impacts from the release of sediment bound contaminants	1, 3	Scoped In	Seabed disturbance associated with operation and maintenance activities could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities.	Site-specific sediment sampling will be undertaken across the Project.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Impact to benthic communities from any thermal load or EMF arising from the cable during operation	1, 3	Scoped In	The potential impacts on benthic species from thermal changes and EMF from export cables is not well understood at present and the level of EMF exposure will be dependent on cable burial and protection methods.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.
Accidental release of pollutants	1, 2, 3	Scoped Out	Accidental release of pollutants are limited to oils and fluids contained within the WTGs or emissions from any associated Project vessels. The only reasonably predictable scenario for release of pollutants from offshore infrastructure would be a slow leak of fluids, however the volume would be undetectable, would be rapidly dispersed and remedied immediately. Embedded mitigation measures will be adopted to ensure that the potential for release of contaminants is minimised. In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs.	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Introduction and spread of INNS	2	Scoped In	Vessel movements during operation and maintenance can result in the spread of invasive and non-native species. The Environmental Management Plan will include a specific INNS plan, which will demonstrate and ensure that all required measures are implemented so that the potential for introduction of INNS are minimised (e.g. adherence to relevant legislation and guidance). Through these measures the discharges of ballast waters and the biofouling of project vessels will be strictly controlled.	Benthic subtidal and intertidal surveys will be undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report.

2.3.7 Potential Cumulative Effects

There is the potential for cumulative impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on benthic subtidal and intertidal ecological receptors. The majority of the potential cumulative impacts on the benthic ecology are likely to be considered localised, and will be most likely where there other projects / plans overlap or are in close proximity to the Project for example the Pentland Floating Offshore Wind Farm and the consented SHET-L Caithness to Orkney interconnector. The benthic ecology CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

2.3.8 Potential Transboundary Impacts

There is no potential for transboundary impacts upon benthic subtidal and intertidal ecological receptors due to construction, operation, maintenance and decommissioning of the Project. Impacts will be largely focused within the footprint or near vicinity of the Project. The potential impacts are described in Table 2-18 and do not need to be considered further from a transboundary perspective.

2.3.9 Approach to Analysis and Assessment

2.3.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the construction, operational and maintenance and decommissioning phases of the Project on benthic subtidal and intertidal ecology will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. Consultation will be undertaken during the process with key stakeholders relevant to benthic subtidal and intertidal ecology, including:

- Marine Scotland;
- NatureScot;
- Scottish Wildlife Trust;
- THC and OIC (in relation to intertidal areas)
- JNCC; and
- Marine Conservation Society.

In order to facilitate resource effective stakeholder consultation through the development phase of the Project, a marine ecology working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs. The Project has already undertaken some initial consultation with Marine Scotland and Marine Scotland Science with regards to the seabed survey strategy for the Project.

The data gathered during the seabed surveys (geophysical, benthic and intertidal) will allow for a detailed description of the biotope classification in the subtidal and intertidal area within the Project area and the likely presence or absence of benthic habitats or species of conservation importance. The conservation status of the habitats and species will be specified, including whether these are Annex I or II species of the EC Habitats Directive, PMFs, OSPAR threatened/declining species, or UK Biodiversity Action Plan (BAP) priority habitat and species.

The assessment criteria will be consistent with the approach recommended by CIEEM (2019). Both direct and indirect impacts will be assessed. Direct impacts include those generated by direct interaction of the project activities with the seabed environment, such as physical disturbance of the seabed within the project footprint. Indirect impacts are those produced as a result of an impact pathway, for example the resettlement of disturbed sediments outside the footprint of the project. The seabed area affected by both direct and indirect impacts will be quantified, informed by the maximum design scenario for the Project. The magnitude of the impact will be derived from the maximum design scenarios for the Project in the context of the wider environment. The sensitivity, vulnerability and recoverability of benthic habitats and species of conservation importance identified in the Project area will be assessed in relation to the type, extent and duration of disturbance using the Scottish Government's Feature Activity Sensitivity Tool (FEAST) and the Marine Life Information Network (MarLIN, 2020).

The presence of Annex I habitats and PMFs will be identified in the baseline characterisation and the significance of the potential impacts on these features of conservation importance will be assessed based on a range of criteria as defined above and in section 1.4.2.

European sites with respect to benthic ecology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with benthic ecology features and assess the adverse impact on the integrity of the European site.

2.3.9.2 EIA Methodology

The benthic subtidal and intertidal ecology EIA will be undertaken in line with the methodology set out in 1.4.2. The specific legislation and guidance documents outlined below in Table 2-19 will also be considered in relation to the benthic ecology EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-19 Guidance for Benthic Subtidal and Intertidal Ecology

GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019)	These guidelines promote good practice in Ecological Impact Assessment (EcIA) relating to terrestrial, freshwater, coastal and marine environments in the UK and Ireland.
Assessment of the Environmental Impact of Offshore Wind-Farms (OSPAR, 2008)	This assessment explores the status of offshore wind-farm development within the OSPAR area, and the environmental effects of this. Its conclusions relate to the effects that all offshore wind-farm developments under construction and operational (at the time) within the OSPAR area have and how these affect the quality status of the OSPAR maritime area.
OSPAR Assessment of the Environmental Impacts of Cables (OSPAR, 2009)	Assesses the environmental impact of subsea cables throughout the five OSPAR regions.

GUIDANCE	SUMMARY
Background document on *Sabellaria spinulosa* reefs (OSPAR, 2013)	Provides a compilation of the reviews and assessments that have been prepared concerning this habitat since the agreement to include it in the OSPAR List of Threatened and/or Declining Species & Habitats.
Defining and Managing *Sabellaria spinulosa* Reefs (Gubbay, 2007)	Aims to establish a definition of *S. spinulosa* reefs, exchange information on current research relating to *S. spinulosa* reefs and the requirements for their conservation under the Habitats Directive, and to discuss issues relevant to the management of *S. spinulosa* reefs.
Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009)	Focuses on clarifying the definition of 'stony reef' under the Habitats Directive and help with recognising areas of the seabed that can be classified as 'stony reef' and those that fall outside the definition.
SNH (now NatureScot) guidance: Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland – Volume 5: Benthic Habitats (SNH, 2011)	The purpose of this guidance is to aid and inform developers, consultants, and regulators regarding the planning and execution of survey and monitoring key natural heritage receptors.
Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012)	The guidelines will assist developers, environmental consultants, regulators, decision-makers and consultees in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments. They provide a synthesis of the body of guidance that exists for such data acquisition activities and have been designed to point the reader to where more detailed guidance can be found.
Scotland's Biodiversity: a route map to 2020 (Scottish Government, 2015)	This route map sets out the priority work needed to meet the international Aichi Targets for biodiversity and improve the state of nature in Scotland.
Pilot Pentland Firth & Orkney Waters Marine Spatial Plan, July 2016 (Scottish Government, 2016)	The Plan will be used by the MS-LOT as a material consideration in the determination of marine licensing and section 36 consent applications within the Pentland Firth and Orkney Waters area.
Orkney Islands Regional Marine Plan	The Orkney Islands' Regional Marine Plan aims to ensure that waters are clean, healthy, safe and productive; the marine and coastal environment is rich in biodiversity and managed sustainably to support thriving and resilient local community. The report is currently being drafted.

2.3.10 Scoping Questions

- Do you agree with the study areas defined for benthic subtidal and intertidal ecology?
- Do you agree with the data sources which are suggested for the assessment of benthic subtidal and intertidal ecology?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for benthic subtidal and intertidal ecology?
- Do you agree that the impacts suggested can be scoped out of the benthic subtidal and intertidal ecology EIA section?
- Do you agree with scoping out transboundary impacts?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Do you agree with the proposed assessment approach?

2.3.11 References

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2.4 Fish and Shellfish Ecology

2.4.1 Introduction

This section of the Scoping Report identifies the fish and shellfish ecology receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project. Basking sharks are not included within the fish and shellfish ecology section and are instead considered within section 2.6 (marine mammals and megafauna).

Information that may be considered relevant to this section is also presented within the below sections:

- Physical and coastal processes, section 2.1;
- Water and sediment quality, section 2.2;
- Benthic subtidal and intertidal ecology, section 2.3; and
- Freshwater ecology, sections 3.2 and 4.2.

This section of the Scoping Report has been prepared by Xodus Group.

2.4.2 Study Area

The fish and shellfish ecology study area is defined by the International Council for Exploration of the Sea (ICES) Rectangles within which the Project resides, including 46E5, 46E6 and 47E5. ICES rectangle 47E6 has also been considered within the study area due to its close proximity to the OAA and the Orkney offshore export cable corridor search area. Each ICES rectangle boundary extends over 1 degree longitude by 30’ latitude.

Given Scapa Flow’s geographically distinct location, it is acknowledged that ICES rectangle 46E6 may not be representative of this area, as this ICES rectangle also covers the offshore waters west of Hoy. Therefore, any data discussed at an ICES rectangle scale in reference to the Scapa Flow offshore export cable corridor search area has been considered in the context of data sources at a smaller spatial scale, in order to verify the validity of the data for this area.

A wider regional context is also considered where this is ecologically relevant, for instance in relation to migratory fish species and the availability of fish spawning and nursery grounds.

2.4.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-20. Additional data sources will also be used where appropriate.

Table 2-20 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Pilot Pentland Firth and Orkney Waters Marine Spatial Plan – gov.scot (www.gov.scot)	2016	Scottish Government
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf	2020	OIC
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Landings data (value and weight) by species	https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020	2015 – 2019	Marine Management Organisation (MMO)
Fisheries sensitivity maps in British waters	https://www.cefas.co.uk/media/o0fgfobd/sensi_maps.pdf	1998	Coull *et al.*
Spawning and nursery grounds of selected fish species in UK waters	https://www.cefas.co.uk/publications/techrep/TechRep147.pdf.	2012	Ellis *et al.*
Updating Fisheries Sensitivity Maps in British Waters	https://data.marine.gov.scot/dataset/updating-fisheries-sensitivity-maps-british-waters	2014	Aires *et al.*
The Marine Life Information Network	https://www.marlin.ac.uk/	2021	MarLIN
National Biodiversity Network (NBN) Atlas	https://nbn.org.uk/content-block/nbn-gateway/	2015	NBN
Fish tagging and genetic studies and reviews on migratory fish published by Marine Scotland	https://www.gov.scot/publications/scottish-marine-and-freshwater-science-reports/	Various	Various, including Malcom *et al.*, 2010, Godfrey *et al.*, 2014, Cauwelier *et al.*, 2015, Downie *et al.*, 2018 and Armstrong *et al.*, 2018
Publications available through the Caithness District Salmon Fishery Board (DSFB)	https://caithness.dsfb.org.uk/publications/	Various	Various

TITLE	SOURCE	YEAR	AUTHOR
Survey data / reports available through ICES, including International Herring Larvae Survey (IHLS) and the International Bottom Trawl Survey (IBTS) (North Sea)	https://www.ices.dk/data/data-portals/Pages/default.aspx	Various	ICES
Protected sites	https://gateway.snh.gov.uk/natural-spaces/inspire_download.atom.xml	2021	NatureScot

2.4.3.1 Project Site-Specific Surveys

Based on the results of this scoping exercise, and the species identified as being present within the study area, the following site-specific surveys are proposed to inform the EIA:

- Cod maturity surveys, as the OAA and the Caithness and Orkney offshore export cable corridor search areas overlap with cod nursery grounds;
- Herring larval surveys, as the OAA and the Caithness and Orkney offshore export cable corridor search areas overlap with herring spawning grounds; and
- Sandeel surveys, as the OAA and the Caithness and Orkney offshore export cable corridor search areas overlap with sandeel spawning grounds.

The results of the benthic ecology surveys e.g. habitat maps and particle size analysis (PSA) will be used to understand the suitability of the seabed habitat at the Project area for sandeel and herring spawning.

2.4.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-20) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The key fish and shellfish receptors which are likely to require consideration within the EIA are:

- Protected species;
- Key prey species;
- Commercially important species;
- Diadromous fish species which have migratory routes which pass through or close to the study area; and
- Fish and shellfish species with the following features:
  - Seabed dependence during any life stage, including spawning and/or nursery stages;
  - Sensitivity to underwater noise; and
  - Sensitivity to EMFs.

The following sections provide information on the key spatial differences across the study area for the fish and shellfish assemblages:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area (section 2.4.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.4.4.2).

2.4.4.1 OFFSHORE MARINE AREA

2.4.4.1.1 Fish and Shellfish Assemblage

Fish receptors relevant to the Project within the study area include marine fish (pelagic and demersal), diadromous fish and elasmobranchs (skates and rays). Relevant shellfish receptors include crustaceans and molluscs. In the absence of site-specific survey data, commercial landings data have been used to describe the fish and shellfish assemblage. However, it is acknowledged that commercial landings do not provide an accurate representation of 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 trawl survey data will also be reviewed for the EIA. Table 2-21 displays the average landings weights (2015 – 2019) of the top 15 commercially exploited species from the ICES rectangles that overlap with the Project (MMO, 2020). The most frequently caught fish in the study area include herring (*Clupea harengus*), mackerel (*Scomber scombrus*) and haddock (*Melanogrammus aeglefinus*) and the most frequently caught shellfish include brown crab (*Cancer pagurus*), scallops (*Pectinidae* spp) and velvet crab (*Necora puber*). Notably, the Orkney Brown Crab Tagging Project found that crabs displayed both localised and long-distance movement patterns (up to 258 km) across the Pentland Firth, with migrations that pass through the study area (Coleman and Rodrigues, 2017).

Table 2-21 Average Landings Weights (tonnes, 2015 – 2019) of Commercially Exploited Fish and Shellfish from the ICES Rectangles in the Study Area

SPECIES	46E5	46E6	47E5	47E6	TOTAL
Herring	2109.4	0.1	268.2	1110.7	3488.4
Mackerel	176.1	10.9	2251.8	344.6	2783.4
Brown crab	562.9	681.1	294.0	618.3	2156.3
Haddock	196.1	586.3	502.2	321.8	1606.4
Cod	12.0	225.6	37.5	337.3	612.5
Monks or anglers	3.2	113.6	56.4	279.5	452.8
Scallops	142.4	129.7	16.3	34.7	323.1
Saithe	12.9	8.8	197.8	26.6	246.2
Whiting	5.7	79.6	24.2	105.6	215.2

SPECIES	46E5	46E6	47E5	47E6	TOTAL
Velvet crab	7.5	72.9	0.0	76.9	157.3
Megrim	0.9	15.6	22.5	69.4	108.5

2.4.4.1.2 Diadromous Species

Migratory movements of Atlantic salmon around the North of Scotland are still not yet well known. However, 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 (Malcom *et al.*, 2010; Godfrey *et al.*, 2015; Youngson, 2017; Armstrong *et al.*, 2018). Available data from genetic and tracking studies also indicate that returning salmon caught at coastal sites in Caithness are not always from local river stocks, but also from rivers potentially hundreds of kilometres away, suggesting there is spatial mixing amongst salmon populations (Downie *et al.*, 2018; Armstrong *et al.*, 2018).

The drivers of Atlantic salmon smolt migration are also still relatively unknown. Tagging studies from the Moray Firth and Cromarty Firth indicate that migrations are not solely driven by tidal currents, as was previously believed to be the case (Newton *et al.*, 2017). However, recent tagging studies near Wick in Caithness indicated that smolt migration followed predicted tidal currents and patterns and it is suggested that once smolts are in the marine environment, they may avoid strong tidal conditions in the Pentland Firth and Orkney waters, or potentially utilise these currents as a low-energy migration route (Mcilvenny *et al.*, 2021).

In addition to Atlantic salmon, European eel (*Anguilla Anguilla*) and sea trout (*Salmo trutta*) are other species of conservation concern that are likely to be present in the study area at certain times of the year. European eel, a critically endangered species on the IUCN Red List, spend most of their lives in freshwater, migrating to the sea to spawn. A proportion of the total European eel population, at the adult (silver eel) migratory stage, may pass through Scottish coastal waters. Waters bordering the northern coast of mainland Scotland, Orkney, Shetland and the Outer Hebrides are most likely to contain migratory eels from northern continental Europe as well as the UK (Malcom *et al.*, 2010). 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).

Further consideration of diadromous fish is provided in section 3.2 and 4.2.

2.4.4.1.3 Elasmobranchs

Elasmobranchs are also recorded in the Pentland Firth waters. Some species of skate and ray are species of conservation concern, with the common skate (*Dipturus batis*) being listed as Critically Endangered on the IUCN Red List. Both skates and rays are likely to be found on sandy substrates in and around the study area. Within the study area, the Project overlaps with predicted thornback ray (*Rajidae cottis*), spurdog (*Squalus acanthias*), spotted ray (*Raja montagui*), tope shark (*Galeorhinus galeus*) and common skate nursery grounds. Flapper skate (*Dipturus intermedius*) are also known to be present around the Orkney waters, with a preference for sandy and muddy sediments (OIC, 2020). The Orkney State Trust[1] are currently developing a sightings database for flapper skate in Orkney waters.

2.4.4.1.4 Spawning and Nursery Grounds

The potential areas for fish spawning and nursery grounds within the study area are shown in Figure 2-10 to Figure 2-12. The Project overlaps with spawning and nursery grounds for several species, including spawning grounds for sandeel, whiting (*Merlangius merlangus*) and sprat (*Sprattus sprattus*) and nursery grounds for sandeel, cod (*Gadus morhua*) and herring – all of which are sensitive to impacts caused by the installation, operation or decommissioning of offshore wind farms due to these species being seabed dependent for some or all of its life cycle (sandeel, herring) or noise sensitive (herring, sprat, whiting, and cod). It should be noted that the spawning and nursery grounds identified by Coull *et al.*, (1998) and Ellis *et al.*, (2012) are based on predictions, and therefore, may be spatially and temporally viable.

Figure 2-13 displays the potential for 0-group aggregation fish (representing juvenile fish less than 1 year old). There is considered to be a moderate to high probability of haddock, Norway pout (*Trisopterus esmarkii*) and whiting 0-group aggregations and a low to moderate probability of 0-group aggregations for anglerfish (*Lophius piscatorius)*, blue whiting (*Micromesistius poutassou*), cod, European hake (*Merluccius merluccius*), herring, horse mackerel (*Trachurus trachurus*), mackerel, plaice (*Pleuronectes platessa*), sole (*Solea solea*) and sprat (Aires *et al.*, 2014).

2.4.4.1.5 Designated Sites and Protected Species

The southern extent of the North-West Orkney NCMPA borders the Orkney offshore export cable corridor search area, overlapping slightly with 0.02 km^2 of the NCMPA (0.0005%) (Figure 2-14). This NCMPA also lies approximately 11 km northeast of the OAA and 17 km northeast of the Caithness offshore export cable corridor search area. The North-West Orkney NCMPA is designated for sandeels (*Ammodytes marinus*), which spend the majority of their life in burrows located in the sandy substrate on which the depend, except when feeding and spawning, and are therefore vulnerable to disturbance and habitat loss (Holland *et al.*, 2005). Sandeels are also a key prey species for a range of marine wildlife, including many types of larger fish and seabirds, and are commercially important, especially to EU nations (e.g. Denmark).

There are several rivers on the north coast of Caithness designated for Atlantic salmon (*Salmo salar*), including at Thurso, Naver and Borgie (Figure 2-14). The Caithness offshore export cable corridor search area lies approximately 9 km northwest of the River Thurso SAC, designated for Atlantic salmon and approximately 20 km northeast of the River Borgie and River Naver SACs, designated for Atlantic salmon and freshwater pearl mussel (*Margaritifera margaritifera*). Atlantic salmon may use the north coast of Caithness, Pentland Firth, and the waters between Orkney islands as migratory routes prior to maturation and spawning (Malcolm *et al.*, 2010; Youngson, 2017). Atlantic salmon are also host species for freshwater pearl mussel (*Margaritifera margaritifera*) which is a feature of the River Naver SAC and River Borgie SAC.

Several species identified as being potentially present in the study area are PMFs, including:

- European eel,
- Atlantic salmon,
- Sea trout,
- Horse mackerel,
- European hake,
- Norway pout,

[1] *https://www.orkneyskatetrust.co.uk/*

- Herring,
- Mackerel,
- Cod,
- Anglerfish,
- Saithe,
- Whiting,
- Sandeel,
- Blue whiting,
- Common skate,
- Ling, and
- Spurdog.

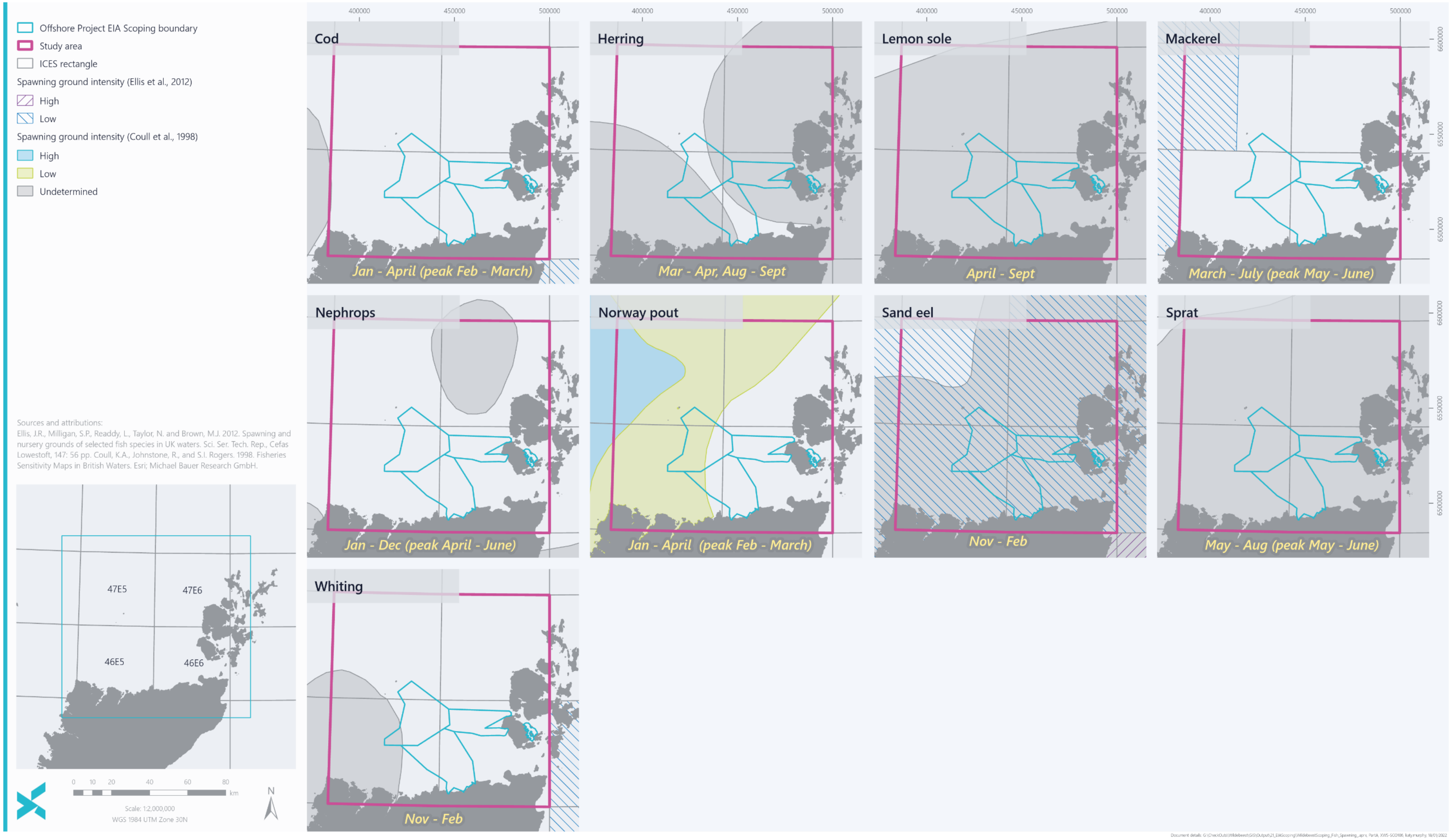

Figure 2-10 Spawning Grounds (Ellis et al., 2012 and Coull et al., 1998) (Note: Spawning Period for Each Species is Inclusive of the Months Listed)

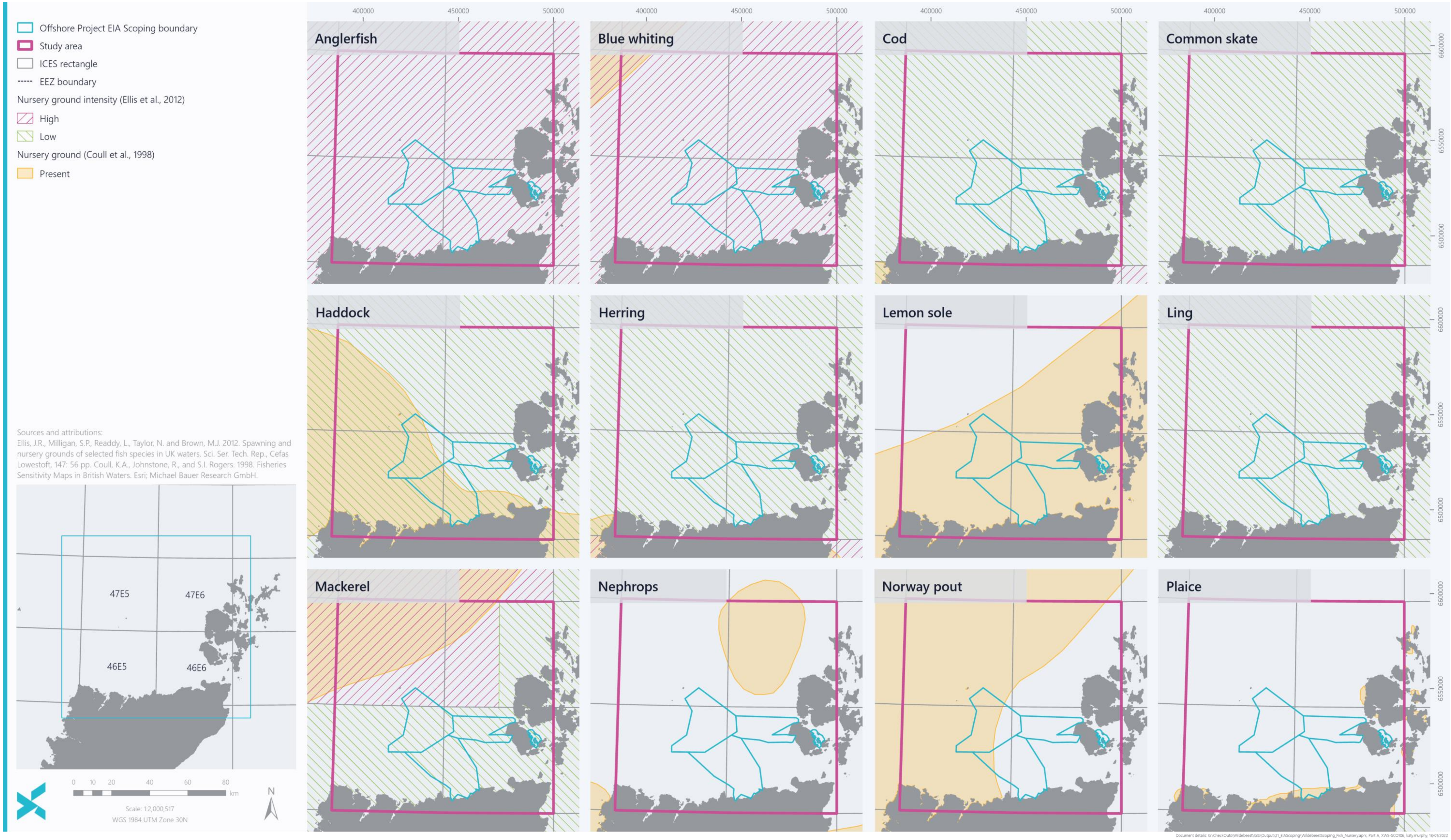

Figure 2-11 Nursery Grounds (Ellis et al., 2012 and Coull et al., 1998) (1 of 2)

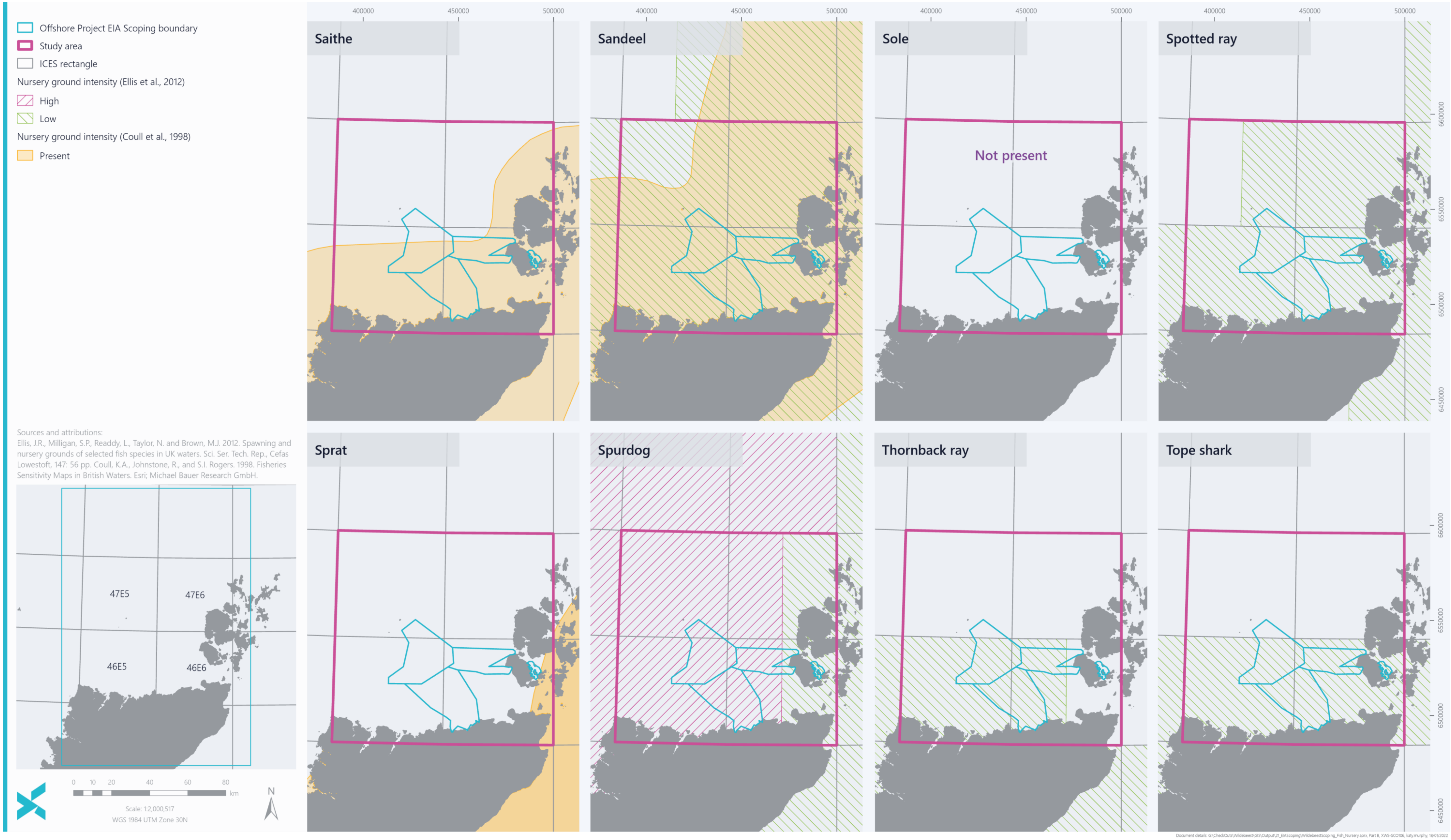

Figure 2-12 Nursery Grounds ((Ellis et al., 2012 and Coull et al., 1998) (2 of 2)

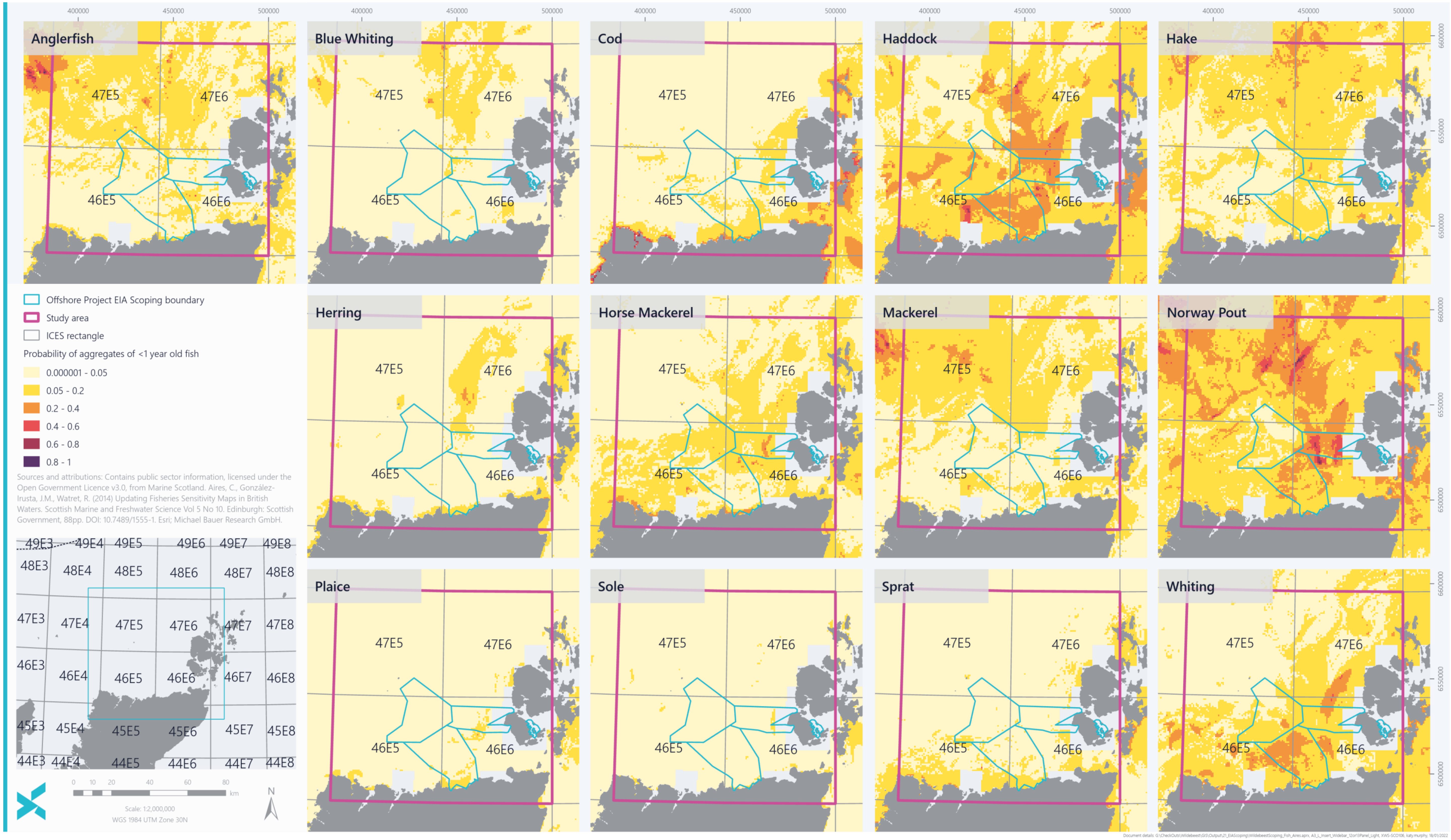

Figure 2-13 Probability of 0-Group Fish Aggregation (Aires et al., 2014)

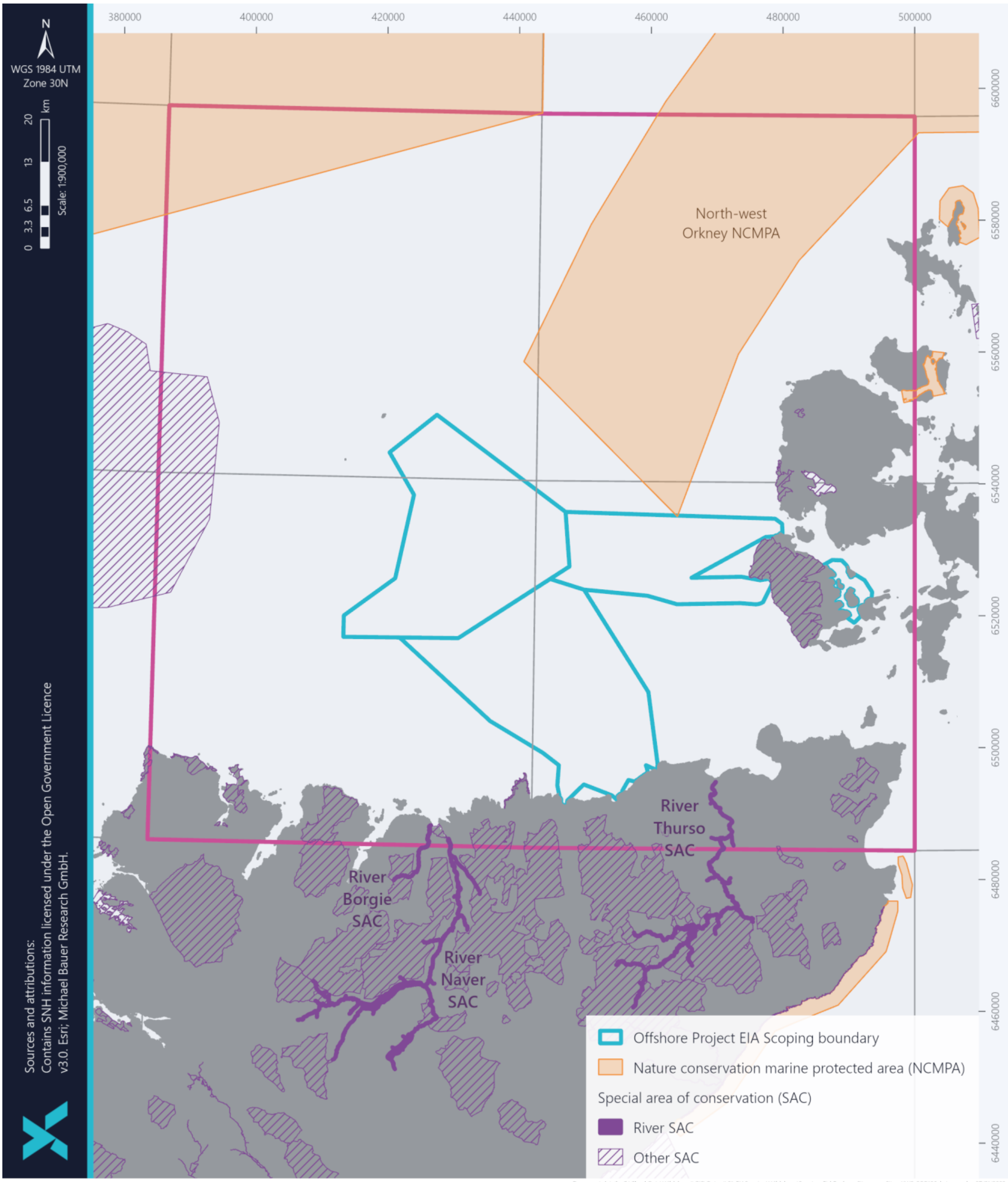

Figure 2-14 Nearby Designated Sites with Fish and Shellfish Qualifying Features

2.4.4.2 SCAPA FLOW

2.4.4.2.1 Fish and Shellfish Assemblage

The most frequently caught fish species in ICES rectangle 46E6, within which the Scapa Flow offshore export cable corridor search area resides, are haddock, cod and monkfish / anglerfish (*Lophius* spp) and the most frequently caught shellfish species include brown crab, scallops and velvet crabs (Table 2-21) (MMO, 2020). As mentioned, ICES rectangle 46E6 also covers the offshore waters west of Hoy, and given Scapa Flow's geographically distinct location, the fish and shellfish assemblage may differ between these two areas. The North Atlantic Fisheries College (NAFC) Marine Centre's report on fisheries in the North East and East Coast Regional Inshore Fisheries Group (NECRIFG) identifies that commercial fishing activity for haddock, cod, plaice and other flatfish species in ICES rectangle 46E6 is absent from Scapa Flow and mostly concentrated in the offshore waters west of Hoy (Shelmerdine & Mouat, 2021). Furthermore, the NAFC report also identifies that scallop dredge activity is low in Scapa Flow, although scallop diving may occur (Shelmerdine & Mouat, 2021; Kafas *et al*., 2014). These data can be used as an interpretation of species presence. In contrast, the NAFC report does identify the main fish species targeted in Scapa Flow as crabs and lobsters (Shelmerdine & Mouat, 2021). Additionally, data from the Orkney Brown Crab Tagging Project indicates that inshore movements from brown crab occur within Orkney waters, meaning this species are likely to be present in Scapa Flow (Coleman and Rodrigues, 2017).

2.4.4.2.2 Diadromous Species

Atlantic salmon, European eels and sea trout may migrate through Orkney waters. However, there is limited information available on migratory movements within Scapa Flow. Notably, there are no salmon rivers present on Orkney and available data indicates that salmon mainly utilise the southern reaches of the Pentland Firth, and to a more limited extent the waters between the north Orkney islands, but generally avoid Scapa Flow (Malcom *et al*., 2010; Youngson, 2017). However, the extent of this southern bias is unclear and Atlantic salmon migrations to the Orkney coast have been recorded (Godfrey *et al*., 2015).

Although no rivers are present in Orkney, the burns present on the Orkney islands are utilised by sea trout for spawning. Sea trout are known to be present along the shallow coastal waters on the east coast of Hoy, with a preference for sand and single beaches (Orkney Trout Fishing Association, 2021).

2.4.4.2.3 Elasmobranchs

Elasmobranchs may be present within Scapa Flow and the Scapa Flow offshore export cable corridor search area overlaps with spurdog, spotted ray, tope shark and common skate nursery grounds. Flapper skate are also known to be present in Scapa Flow (OIC, 2020).

2.4.4.2.4 Spawning and Nursery Grounds

The Scapa Flow offshore export cable corridor search area overlaps with spawning grounds for sandeel and sprat and nursery grounds for sandeel, herring and cod which may be sensitive to seabed disturbance and/or underwater noise. Spawning grounds of other commercially important species which would be considered during the EIA production are provided in Figure 2-10.

Data on 0-group fish aggregations is not available for Scapa Flow.

2.4.4.2.5 Designated Sites and Protected Species

There are no designated sites for fish and shellfish ecology receptors in the vicinity of the Scapa Flow offshore export cable corridor search area, with the closest being the North-West Orkney NCMPA, approximately 25 km north west of the export cable corridor search area. There are no designated sites for migratory fish species on Hoy or Orkney (Figure 2-14).

The PMFs listed for the Offshore Marine Area are also relevant to Scapa Flow.

2.4.4.3 Summary and Key Issues

Table 2-22 Summary and Key Issues for Fish and Shellfish Ecology

	PROJECT COMPONENT
SUMMARY AND KEY ISSUES	OFFSHORE MARINE AREA – OAA, CAITHNESS EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Offshore export cable corridor search area to Orkney borders the North-West Orkney NCMPA (designated for sandeel). The OAA and Caithness offshore export cable corridor search area lie 11 and 17 km northeast of this NCMPA, respectively. • Potential interaction with species which are sensitive to noise impacts and EMF effects, including: – diadromous fish migrating through the waters to the north of Scotland, such as Atlantic salmon designated in the River Thurso, River Naver and River Borgie SACs as well as European eel and sea trout, potentially sensitive to underwater noise and EMF; – elasmobranchs, including common skate, spotted ray and thornback ray, which are potentially sensitive to EMF; – crustaceans, including brown crab, that are sensitive to EMF effects; and • Overlap with spawning grounds and/or nursery grounds for sandeel, herring, whiting, sprat and cod – which are potentially sensitive to seabed disturbance and/or noise.
	SCAPA FLOW – SCAPA FLOW EXPORT CABLE CORRIDOR SEARCH AREA
	• No designated sites for migratory fish in Scapa Flow, although some migratory fish may be present in or pass through the area, including sea trout, European eel and Atlantic salmon; • Sea trout spawning burns are known to be present on the east coast of Hoy; • Potential interaction with elasmobranchs, including common skate which are potentially sensitive to EMF; • Crustaceans, including brown crab, that are sensitive to EMF effects; and • Overlap with spawning grounds for sandeel and nursery grounds for sandeel, herring, sprat and cod, which are potentially sensitive to seabed disturbance and/or noise.

2.4.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-23.

Table 2-23 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Cables will be buried as the first choice of protection. External cable protection will be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a cable burial risk assessment (CBRA) and implemented through Cable Plans (CaPs).	Primary	Section 36 and/or Marine Licence consent conditions.
2	Development and adherence to a Piling Strategy which delineates the noise mitigation measures will be implemented during piling activities (e.g. soft-start and ramp-up procedures) to reduce potential underwater noise effects during construction.	Tertiary	Section 36 and/or Marine Licence consent conditions.
3	The development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan and INNS Management Plan.	Tertiary	Section 36 and/or Marine Licence consent conditions.
4	The development of, and adherence to, an appropriate CoCP.	Tertiary	Section 36 and/or Marine Licence consent conditions.
5	The development of, and adherence to, a Decommissioning Programme.	Tertiary	Section 36 and/or Marine Licence consent conditions.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on fish and shellfish ecology receptors and will be consulted upon with consultees throughout the EIA process.

2.4.6 Scoping of Impacts

A number of potential impacts on fish and shellfish ecology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

A number of impacts are proposed to be scoped out of the assessment for fish and shellfish ecology receptors. These impacts are outlined, together with a justification for scoping them out.

Table 2-24 EIA Scoping Assessment for Fish and Shellfish Ecology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Temporary habitat disturbance or loss	1, 5	Scoped In	Seabed disturbance associated with construction and decommissioning works may negatively impact species that are dependent on the seabed for some or all of their life cycle. Sandeel and herring require specific habitat conditions for spawning. Sandeel also require specific habitat conditions for the burrows they inhabit for the majority of their life cycle.	• 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 at the site for sandeel burrows and herring spawning; and • Fish ecology surveys.	The area of impact will be calculated based on the worst-case seabed footprint associated with the maximum design scenario.
Temporary increases in suspended sediment concentrations (SSC) and associated sediment deposition	1, 5	Scoped Out	Increased sedimentation associated with installation (e.g. jet trenching) and decommissioning works may lead to smothering of slow moving or sessile species and also localised changes in sediment type which may potentially impact seabed dependent species (e.g. sandeel and herring). However, increases in SSC will be temporary and localised to the installation works, and sediments are expected to be rapidly dispersed by the strong tidal currents present	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			in the Pentland Firth and Scapa Flow. Fish and shellfish are expected to tolerant to temporary increases in SSC as a result of the strong currents in the region. Hence the impact has been scoped out of the EIA.		
Underwater noise	2, 3	Scoped In	Disturbance to fish populations caused by underwater noise generated during construction (e.g. from pile driving) may negatively impact diadromous fish and fish spawning behaviour, particularly for sensitive species including sprat, herring, cod and whiting which all potentially spawn in the offshore study area.	Available desktop information to describe the baseline environment.	Underwater noise modelling will be undertaken based on the maximum design scenario associated with the Project Design Envelope. The noise emissions will be combined with the potential noise exposure guidelines for fish to understand potential impacts.
Accidental release of pollutants	3, 4	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 Environmental Management Plan, including measures for compliance with international requirements of the International Convention for the Prevention of Pollution from Ships	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			(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 minimum the impact of any accidental release if it occurs, and hence the impact has been scoped out of the EIA.		
Operations and Maintenance					
Long-term habitat loss and disturbance	1, 4	Scoped In	Long-term habitat loss may occur as a result of the presence of installed infrastructure (e.g. anchors, foundations, scour protection and external cable protection), as this may lead to a change in the seabed type, potentially altering spawning, nursery and feeing 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. For floating foundations abrasion from the mooring lines / anchor chains may also result in long-term habitat disturbance and will be considered.	• Available desktop information to describe the baseline environment; • 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 sandeel burrows and herring spawning; and • Fish ecology surveys.	The area of impact will be calculated based on the worst-case seabed footprint associated with the maximum design scenario.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Introduction of new hard substrate and potential for fish aggregation	1, 3	Scoped In	Installed infrastructure may introduce new hard substrate for colonisation by encrusting marine organisms, including by marine fauna that are not currently found in the existing environment. The Environmental Management Plan will include measures to reduce the spread of invasive species. Offshore infrastructure may act as a fish aggregation device (FAD), providing refuge for some species and also habitat for some shellfish and benthic species, whilst also potentially attracting larger predators which could indirectly increase entanglement or collision risk for both fish and marine mammal species.	Available desktop information to describe the baseline environment.	The assessment will consider the worst-case scenario for the footprint of new hard substate based on the Design Envelope parameters.
EMF effects	1	Scoped In	EMF may impact sensitive species, including elasmobranchs, teleost fish (i.e. flat fish, salmonids and gadoids) and crustaceans (e.g. brown crab (Scott *et al.*, 2018; Scott *et al.*, 2021)) 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. For floating foundations, EMF effects will be	Available desktop information to describe the baseline environment.	The assessment will consider the worst-case scenario for 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, especially for dynamic cables. The impact assessment will draw on the latest relevant

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			considered for suspended cables in the water column.		available literature on this impact.
Ghost fishing due to lost fishing gear becoming entangled in installed infrastructure	N/A	Scoped In	There is the potential for lost gear to become entangled within mooring lines and suspended cables associated with floating substructures, if this technology is utilised, leading to ghost fishing which may negatively impact fish and shellfish.	• Available desktop information to describe the baseline environment; and • Information on fishing activity in the vicinity of the offshore study area from the commercial fisheries section of the EIA.	The assessment will consider the worst-case scenario for the spread of mooring lines and suspended cables in combination with the fishing effort that occurs in the vicinity of the offshore study area. This will link to the commercial fisheries impact assessment for potential gear entanglement (see section 2.7).
Underwater noise	N/A	Scoped Out	The evidence base suggests that the level of operational noise is significantly less than construction noise and detectable only at short ranges from each WTG. Given an individual would need to approach the WTG to experience operational noise, this is not considered a pathway for injury or significant disturbance impacts, including displacement or barrier effects, due to underwater noise. Therefore, noise impacts during operation are expected to be negligible, and hence the impact has been scoped out of the EIA.	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Accidental release of pollutants	3, 4	Scoped Out	As per construction phase. Accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs.	N/A	N/A
Barrier effects to migratory fish from the presence of fixed foundations or floating platforms and associated infrastructure	N/A	Scoped Out	There is currently limited evidence indicating that this the presence of fixed or floating wind turbines presents a significant barrier effect to migratory fish. The offshore location of the development, enabling passage either side, is unlikely to present a significant barrier to movement for migratory fish.	N/A	N/A

2.4.7 Potential Cumulative Effects

There is the potential for the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on fish and shellfish receptors. Most impacts relating to seabed disturbance or EMF are expected to be localised to the Project footprint. However, it is acknowledged that underwater noise impacts can extend beyond the immediate vicinity of the Project. This could act cumulatively with nearby projects / plans such as the Pentland Floating Offshore Wind Farm, the SHET-L Caithness to Orkney interconnector and other ScotWind OWF lease areas located off the northern coast of Scotland. Therefore, underwater noise will form the focus of the Cumulative Effects Assessment for fish and shellfish ecology.

The fish and shellfish ecology CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

2.4.8 Potential Transboundary Impacts

Fish, particularly diadromous fish, are mobile species and may extend beyond Scottish or UK waters. There is the potential for transboundary impacts upon fish and shellfish ecology receptors due to construction, operation, maintenance and decommissioning of the Project. Potential transboundary impacts that will be considered include those to diadromous species protected under Annex II of the Council Directive 92/43/EEC (the Habitats Directive) and to commercial fish and shellfish. Underwater noise impacts are expected to potentially result in disturbance and/or injury to noise-sensitive species. Any other impacts are considered to be temporary and / or highly localised and therefore do not need to be considered further from a transboundary perspective.

2.4.9 Approach to Analysis and Assessment

2.4.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on fish and shellfish ecology will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. Key consultees to inform the fish and shellfish ecology impact assessment include:

- MSS;
- NatureScot;
- Fisheries Management Scotland;
- SFF;
- Orkney Trout Fishermen's Association;
- Caithness DSFB;
- Northern DSFB;
- The Orkney Fisheries Society; and
- OFA.

In order to facilitate resource effective stakeholder consultation through the development phase of the Project, a marine ecology working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs.

As mentioned in section 2.4.3, ICES trawl survey data / reports will be reviewed to aid in characterising the fish and shellfish assemblage in the vicinity of Project and to understand the potential presence of sensitive species.

Site specific cod maturity surveys, herring larval surveys and sandeel surveys are also planned to inform the EIA baseline and the potential for herring and sandeel spawning habitat will be further informed by PSA of sediments collected during the benthic surveys in order to understand the suitability of the sediment type present in the offshore study area for the habitat preferences of these species. The Project has already undertaken some initial consultation with Marine Scotland and Marine Scotland Science with regards to the marine ecology survey strategy for the Project.

Both direct and indirect impacts will be assessed. Direct impacts include those generated by direct interaction of the Project activities with the fish and shellfish receptors (e.g. underwater noise). Indirect pathways are those that are produced as a result of an impact pathway, for example, habitat loss and disturbance that may impact fish spawning or foraging activities. Assessments will be based on maximum design scenarios to understand the magnitude of impact. The potential for ghost fishing will also be informed by understanding the fishing activity in the vicinity of the Project. The sensitivity, vulnerability and recoverability of fish and shellfish receptors identified in the study area will be assessed in relation to the type, extent and duration of disturbance using the latest data and evidence.

Most assessments will not require modelling studies to be undertaken. However, noise modelling will be undertaken to assess the impact of activities, such as piling, during construction on fish and shellfish receptors. The assessment will focus on noise-sensitive species, including sprat, herring, gadoids (e.g. whiting and cod) and diadromous fish, and will consider the potential for underwater noise to act as a barrier to diadromous fish migration. Available literature on piling impacts on fish and shellfish (e.g. Boyle and New, 2018) will be reviewed.

The fish and shellfish ecology EIA section will be used to inform the impact assessments on key prey species (e.g. herring, sandeels and sprat) in relevant sections and impacts on commercially important species will inform the commercial fisheries impact assessment.

European sites with respect to fish and shellfish ecology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with fish and shellfish features and assess the adverse impact on the integrity of the European site.

2.4.9.2 EIA Methodology

The fish and shellfish ecology EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-25 will also be considered in relation to the fish and shellfish ecology EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-25 Guidance for Fish and Shellfish Ecology

GUIDANCE	SUMMARY
Impacts from Piling on Fish at Offshore Wind Sites: Collating Population Information, Gap Analysis and Appraisal of Mitigation Options (Boyle and New, 2018)	This report presents a review of the impacts of piling during the construction of offshore wind farms on herring (*Clupea harengus*) spawning and provides recommendations in determining this impact.

GUIDANCE	SUMMARY
Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008)	This document outlines best practice for assessing, mitigating and managing offshore wind impacts on the marine environment, including minimising effects on fish and shellfish ecology receptors.
Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019)	This guidance outlines best practice for conducting an EcIA. This guidance focusses on the impact assessment process.
Offshore Wind Farms. Guidance note for EIA in respect of FEPA and CPA requirements (Cefas *et al.*, 2004)	This guidance note provides scientific guidance for those undertaking an EIA for offshore wind farms. This includes guidance for assessing impacts on natural fish and shellfish resource.

2.4.10 Scoping Questions

- Do you agree with the study area for the fish and shellfish ecology EIA?
- Do you agree with the data sources listed to be used to inform the EIA baseline?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for fish and shellfish?
- Do you agree that the impacts suggested can be scoped out of the fish and shellfish EIA section?
- Do you agree with the approach for the cumulative effects assessment and for transboundary effects?
- Do you agree with the approach to the analysis and assessment that will inform the EIA?

2.4.11 References

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Shelmerdine R.L. and Mouat B. (2021). Mapping fisheries and habitats in the North and East Coast RIFG area. NAFC Marine Centre UHI report.

Youngson, A. Fishermen's Knowledge: Salmon in the Pentland Firth. Available from: https://caithness.dsfb.org.uk/files/2017/06/FCRTThe-Fishmongers-Company-reportfinal-version.pdf [Accessed 23/11/2021].

2.5 Offshore Ornithology

2.5.1 Introduction

This section of the Scoping Report identifies the offshore ornithology receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the Project.

Many species of birds in the UK have various levels of protection, including through the Wildlife and Countryside Act (1981) and as qualifying features of SPAs through the European Union Wild Birds Directive (Directive 2009/147/EC). In particular, the UK, and Scotland especially, is internationally important for its breeding seabird populations and wintering waterfowl populations.

Populations of protected bird species are recognised as potentially vulnerable to impacts from offshore wind farms (e.g. Furness *et al.*, 2013). It is therefore necessary to assess the potential environmental impacts to birds from offshore wind farm construction, operation and maintenance, and decommissioning. This section of the Offshore Scoping Report sets out the proposed scope of the impact assessment in order to inform stakeholders of the approaches that will be taken, and why, to determine whether impacts are acceptably low, and if not whether mitigations can be successfully applied to reduce impacts to acceptable levels.

Information that may be considered relevant to this section is also presented within the below sections:

- Benthic subtidal and intertidal ecology, section 2.3; and
- Fish and shellfish ecology, section 2.4.

This section of the Scoping Report has been prepared by MacArthur Green.

2.5.2 Study Area

The offshore ornithology study area is comprised of a variety of spatial elements, these include:

- Project footprint plus a suitable buffer around this footprint; this area is used to establish the context of the environment within the Project and to ensure that impacts are captured at a biologically meaningful scale. This is referred to as the survey area;
- Zone of Influence of the potential impacts from the Project; the extent of this area is larger than the survey area and is species-specific, as vulnerability to impacts and potential connectivity with the Project varies with species' behaviour; and
- Region containing reference bird populations; this area is larger than the survey area and the Zone of Influence and is also influenced by the spatial scale of the cumulative and/or in-combination impact assessment.

The extent of the study area may also vary with season, as connectivity and reference population will vary with changes in the ranging behaviour and migration of birds.

2.5.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-26.

Table 2-26 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Key seabird species data sources			
Dounreay Trì Floating Wind Demonstration Project Environmental Statement	http://marine.gov.scot/data/environmental-statement-dounreay-tri-floating-wind-demonstration-project	2016	Dounreay Trì Limited
Dounreay Trì Floating Wind Demonstration Project Scoping Report	https://marine.gov.scot/ml/dounreay-tri-floating-wind-demonstration-project	2015	Dounreay Trì Limited
Pentland Floating Offshore Wind Farm Scoping Report	https://marine.gov.scot/ml/pentland-floating-offshore-wind-farm	2020	Highland Wind Limited
BirdLife International Seabird Tracking Database	http://www.seabirdtracking.org/	2006-2014	Coordinated by BirdLife International
Tracking the elusive Leach's storm petrel on St Kilda	https://community.rspb.org.uk/ourwork/b/science/posts/tracking-the-elusive-leach-s-storm-petrel-on-st-kilda	2021	Marine Scotland, coordinated by RSPB
Seabird Monitoring Programme (SMP) database	https://app.bto.org/seabirds/public/data.jsp	2000 – 2021	Coordinated by JNCC
Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species.	Ecological Applications, 27(7), pp.2074-2091. https://esajournals.onlinelibrary.wiley.com/doi/10.1002/eap.1591	2017	Wakefield *et al.*
Combining habitat modelling and hotspot analysis to reveal the location of high density seabird areas across the UK.	Technical Report. RSPB Research Report no. 63. https://www.rspb.org.uk/globalassets/downloads/documents/conservation-science/cleasby_owen_wilson_bolton_2018.pdf	2018	Cleasby *et al.*
The identification of possible marine SPAs for seabirds in the	JNCC Report No 461	2012	Kober *et al.*

TITLE	SOURCE	YEAR	AUTHOR
UK: The application of Stage 1.1 – 1.4 of the SPA selection guidelines.	https://hub.jncc.gov.uk/assets/6882ac8a-0f00-4abe-bc4b-88fc96dbc789		
An Atlas of Seabird Distribution in North-West European Waters.	Joint Nature Conservation Committee, Peterborough, UK. https://hub.jncc.gov.uk/assets/c132752f-827c-41fc-b617-e681db21eaf5	1995	Stone *et al.*
Key terrestrial migratory species data sources			
Strategic assessment of collision risk of Scottish offshore wind farms to migrating birds.	Scottish Marine and Freshwater Science. Vol 5 No 12. https://www.gov.scot/publications/scottish-marine-freshwater-science-volume-5-number-12-strategic-assessment/documents/	2014	Wildfowl & Wetlands Trust (Consulting) Ltd
The migration of Whooper Swans in relation to offshore wind farms.	WWT Final Report to COWRIE Ltd., Wildfowl & Wetlands Trust, Slimbridge, Gloucester. https://tethys.pnnl.gov/sites/default/files/publications/Griffin_et_al_Wooper_Swan_Migration.pdf	2010	Griffin *et al.*
Migration routes of Whooper Swans and geese in relation to wind farm footprints.	Final report to DECC. WWT, Slimbridge. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/198201/OESEA2_Migration_Routes_WhooperSwans_Geese_Relation_to_Windfarms_v3.pdf	2011	Griffin *et al.*

2.5.3.1 Project Site-Specific Surveys

Digital aerial survey data will be the primary data collection method used to determine the baseline conditions for the Project.

There are a number of additional sources of data currently available that will be used to support the primary digital aerial survey data collected for the baseline (refer to section 2.5.4.1). Principal additional data sources that will be used to determine baseline conditions include:

- GPS tracking of seabirds; and
- Counts of seabird colonies.

Additionally, pre-scoping consultation has taken place with MS-LOT, MSS and NatureScot in order to discuss the proposed approach to Scoping, planned site specific ornithological surveying and the approach to the Offshore EIA. Ongoing consultation with MS LOT, MSS and NatureScot is proposed throughout the whole Offshore EIA process and discussion regarding survey findings and reporting and impact assessment outcomes will be encouraged to assist with refinement of turbine siting, offshore export cable routeing and landfall selection.

2.5.3.1.1 Digital Aerial Surveys

Digital aerial surveys will collect images across the Project plus a 4 km buffer; these surveys commenced in July 2020. Digital video techniques will be used, using the methods employed by HiDef. Parallel transects will be flown across the study area with video footage collected (HiDef). This footage will be processed to identify all the birds observed and the location, date, time, age, sex, and behaviour (on the water or in flight). Not all individuals can be aged or sexed through examination of digital aerial images as this depends on the species imaged and/or the time of year the images were captured. These data will be used to estimate the population size of each species within the entire study area. Different analytical methods will be used depending on the number of individuals observed and the importance of the species to the impact assessment. It is likely that Density Surface Modelling (DSM) will be used for key species where sample sizes are sufficient to parameterize the model. For species occurring in smaller numbers, the abundance will be estimated by extrapolating the density within the imaged area to the whole site. For species that dive underwater a correction for availability bias will be applied to correct for birds likely to be present but not imaged as they were underwater at the time the image was captured. This method varies with species, is dependent on suitable information being available on time spent underwater when diving and on the digital aerial technique applied. Where individual birds that have been imaged cannot be identified to species (e.g. guillemot and razorbill) the unidentified birds will be assigned to one or other species based on the proportion of positively identified birds within each monthly sample. The first year of aerial survey data will be analysed in Q1 2022 following the award of the OAA.

2.5.3.1.2 Global Positioning System (GPS) Tracking of Seabirds

Tracking studies are available for some of the key seabird species identified in Table 2-32. Tracking studies may be valuable in determining the baseline use of the Project and which colonies, including designated sites, that individuals may originate from. A list of available tracking data available in the Birdlife International seabird tracking database is presented in Table 2-28, should additional tracking data become available from other studies, then this will be included as part of the Project baseline data.

2.5.3.1.3 Counts of Seabird Colonies

The vast majority of seabird colonies in the UK and Ireland are counted every 20 years. The last complete count was in 2000 (Mitchell et al. 2004), with a new count having started in 2015. The completion of this count was delayed due to the COVID-19 pandemic and was completed at the end of the 2021 breeding season. These counts should provide up to date information on most of the breeding seabird colonies relevant to the Project. Should important gaps occur within the zone of influence of the Project, these may be filled by contracting surveyors to complete these using the standardised Seabird Monitoring Handbook (Walsh *et al.*, 1995).

2.5.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-26) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

Information on seabirds used to inform the baseline environment is presented in the following order:

- Dounreay Trì Floating Wind Demonstration Project/ Pentland Floating Offshore Wind Farm baseline;
- Tracking data including BirdLife international tracking database and Marine Scotland leach's storm petrel tracking study on St Kilda;
- Colony data from the Seabird Monitoring Programme database;
- Regional distribution of seabirds presented in Wakefield *et al.* (2017);
- Density hotspot distribution of seabirds presented in Cleasby *et al.* (2018);
- Identification of possible marine SPAs for seabirds in the UK; and
- Atlas of seabird distribution.

Aerial survey data collected over the Pentland Firth and Orkney Waters area between November 2010 to August 2011 (APEM, 2012) and March 2012 to January 2013 (APEM, 2013) will not be used as part of the baseline assessment for the Offshore Marine Area due to the differences in survey timing and methodology used during the surveys.

The key features of offshore ornithology which are likely to require consideration within the EIA are:

- Kittiwake;
- Guillemot;
- Razorbill;
- Puffin; and
- Gannet

Other seabird species that may use the Project and potentially may be included in the assessment include:

- Great black-backed gull;
- Arctic tern;
- Great skua;
- Arctic skua;
- Storm petrel;
- Leach's petrel; and
- Fulmar.

The following sections provide information on these key spatial differences for the offshore ornithology assemblage which is understood to use the waters relevant for the following areas:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor (section 2.5.4.1); and

2. The export cable corridor search area through Scapa Flow (section 2.5.4.2).

2.5.4.1 OFFSHORE MARINE AREA

The OAA covers a total area of 657 km² and is comprised of two distinct areas of shallow water, Stormy Bank and Whitten Head Bank. The OAA is well within the foraging depth of most surface diving seabirds likely to be in the region (e.g. Auks). Sandbanks and wave fields are present geomorphological features in the OAA; the main benthic habitats within the OAA includes sand which is present throughout, but particularly in western side, and sandy gravel which is more prevalent in the east and north of the array area. Slightly gravelly sand is present in patches throughout the OAA. These habitats are likely to support important forage fish species for seabirds.

The location is potentially of importance to migratory birds, particularly terrestrial waterbirds such as geese and swans, as it lies along a known migration route for several species of high conservation value.

An overview of existing data for the baseline environment of the offshore marine area is provided in sections 2.5.4.1.1.1 to 2.5.4.1.2.2.

2.5.4.1.1 Key Seabird Species

2.5.4.1.1.1 Dounreay Trì Floating Wind Demonstration Project/ Pentland Floating Offshore Wind Farm Baseline

Dounreay Trì limited carried out aerial surveys of a site and a 2 km buffer approximately 6 km off Dounreay over a 12-month period between January to December 2015; these surveys recorded a total of 4,960 birds of 14 species over 13 surveys (two surveys in June 2015). A second 12-month survey commissioned by Highlands and Islands Enterprise was completed for a proposed floating offshore wind testing/demonstration site and a 3 km buffer immediately west of the Dounreay Trì survey area between May 2015- April 2016.

Due to the relative proximity between the Dounreay Trì survey area and the current project, a similar suite of seabird species and seasonal patterns of occurrence may reasonably be expected to be recorded in both locations. The key seabird species recorded during the Dounreay Trì 2015 surveys that will also be considered key species for the Project included:

- Kittiwake;
- Great skua;
- Guillemot;
- Razorbill;
- Puffin; and
- Gannet;

There was considerable variation in the number of birds recorded in the Dounreay Trì survey area between January to December 2015 (Figure 2-15), a summary description of key seabird densities recorded is presented in Table 2-27. The additional aerial surveys carried out over the proposed floating offshore wind testing/ demonstration site for Highlands and Islands Enterprise during May 2015 to April 2016, recorded a total of 3,779 birds of 13 species which closely resembled the results of the Dounreay Trì 2015 survey.

Table 2-27 Summary Description of Key Seabird Densities Recorded within the Dounreay Trì Floating Wind Demonstration Project between January to December 2015

KEY SPECIES	SUMMARY OF SEASONAL DENSITIES
Kittiwake	Kittiwakes were one of the most frequently recorded species during these surveys and reached moderate density in June.
Gannet	Low densities of gannets were present, and these increased in numbers in late June and again in August, although most of these were in the buffer area around the project site.
Guillemot	Guillemots were the most frequent species recorded and high densities were found to occur in the two June surveys, then again at the end of the survey period in November and December.
Razorbill	Razorbills were only present at low density in the study area and were also found to be more abundant in the breeding season.
Puffin	The density of puffins was generally found to be low to moderate, but one of the June surveys found very high density of this species which was not present in a follow-up survey less than three weeks later, suggesting that this concentration was ephemeral and highly likely to be an exploitation of a temporary food source.
Great skua	Small numbers of great skuas were recorded from May to August.

Figure 2-15 Monthly Number of Observations of Birds from the Dounreay Trì Floating Wind Demonstration Project

2.5.4.1.1.2 Seabird Tracking Data

A number of relevant tracking studies have supplied their raw data to the Birdlife International seabird tracking database. Tracking data that is currently available is presented in Table 2-28 and the raw tracks from these studies are shown in Figure 2-16 for the following key species:

- Kittiwake from Sule skerry, Copinsay, Cape Wrath and Muckle Skerry;
- Gannet from Sule Skerry;
- Guillemot from Copinsay;
- Razorbill from Swona and Copinsay;
- Puffin from Isle of May; and
- Great skua (points) from Foula.

Marine Scotland tasked the RSPB to track leach's storm petrels on the island of St Kilda in 2021; this study provides the first tracking data on Leach's petrel. A total of 14 breeding Leach's storm petrels were successfully tracked; one of the 14 tracks is currently available and is presented in Figure 2-16.

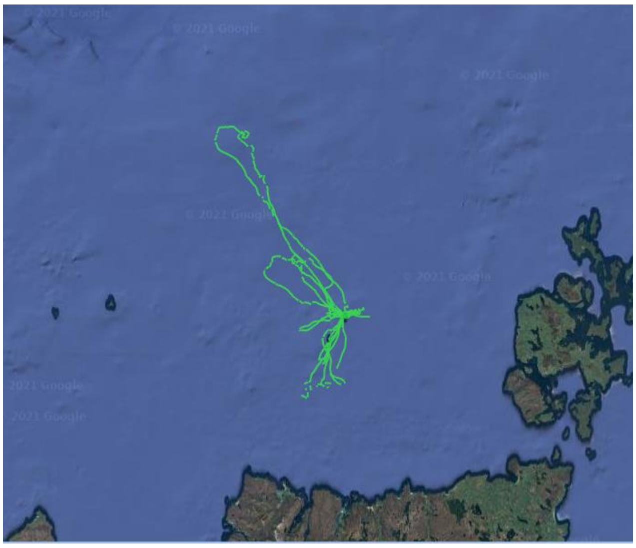
An indication of where further tracking data would be useful to inform the Project is also provided in Table 2-28, if additional tracking data becomes available, then this will be included as part of the Project baseline.

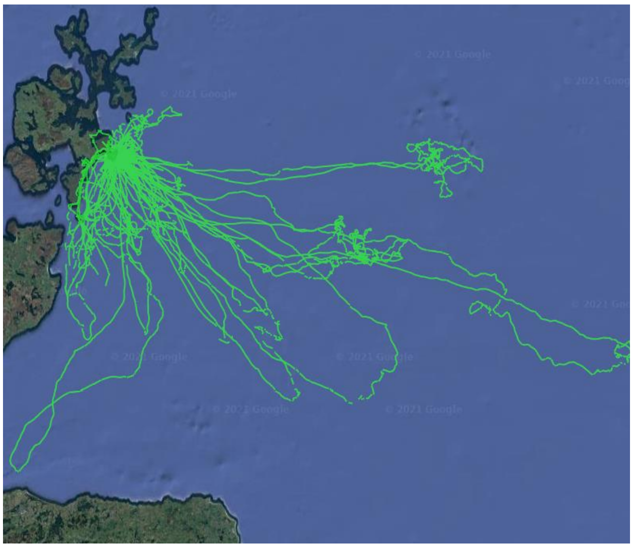
Figure 2-16 clearly shows the use of the Offshore Marine Area by gannets from Sule Skerry, puffins from the Isle of May and great skuas from Foula. However, guillemots and razorbills from Copinsay and Swona appear to remain close to the east coast of Scotland, with no use of the Offshore Marine Area. Tracks of breeding kittiwakes from Sule Skerry do not appear to travel as far east of the Offshore Marine Area and kittiwake tracks from Copinsay, Cape Wrath and Muckle Skerry do not pass through the Offshore Marine Area.

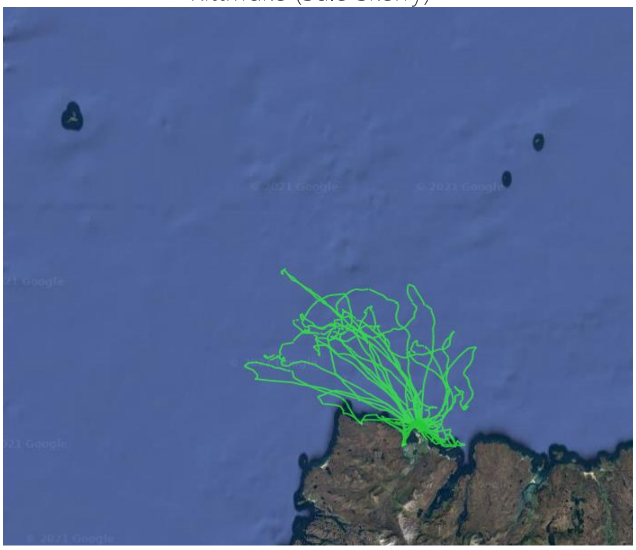
Table 2-28 Summary of Tracking Data Available in the Birdlife International Seabird Tracking Database for Key Seabird Species As Well As Those That May Use the Project and Potentially may be Included in the Assessment

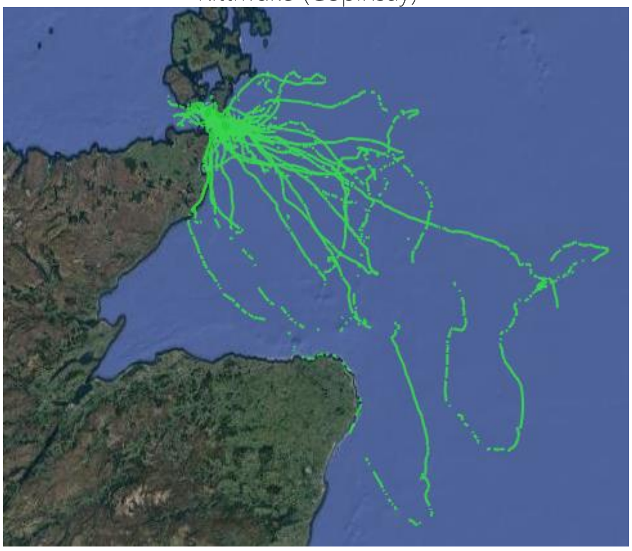
KEY SPECIES	SUMMARY OF TRACKING DATA
Kittiwake	On the western side of Orkney, a total of 4 kittiwakes have been tracked from the seabird colonies on Sule Skerry in 2011 and 5 birds from Cape Wrath in 2014. On the eastern side of Orkney, a total of 54 birds have been tracked from the island of Muckle Skerry and 32 birds from the island of Copinsay between 2010 and 2014. The sample size from Copinsay and the Pentland Firth islands on the eastern side of Orkney appears to be sufficient to understand where these birds are foraging and for apportioning impact to these colonies. However, further tracking from Sule Skerry, Cape Wrath and the north coast of Caithness may be valuable
Gannet	A total of 15 gannets have been tracked from Sule Skerry in 2011. Due to the close proximity of Sule Skerry to the OAA, gannets from Sule Skerry are likely to be the main source of birds using the Project. Wakefield *et al.* (2013) showed that there was space partitioning between gannet colonies, which strongly indicated that all birds within the Project during the breeding season are likely to be from Sule Skerry. Further tracking is therefore not likely to be useful.

KEY SPECIES	SUMMARY OF TRACKING DATA
Guillemot	A total of 9 birds were tracked from the colonies on the island of Copinsay between 2012 and 2014 by the RSPB. However, there has been no tracking of guillemots from Sule Skerry and Sule Stack, Cape Wrath, west coast of Orkney and the north Caithness coast which are likely to be key colonies with potential connectivity to the Project. It is likely, therefore, that tracking of a sample of guillemots from these sites could be valuable.
Razorbill	The RSPB has tracked a total of 29 razorbills from the island of Swona and 14 birds from Copinsay between 2010 and 2014. Key razorbill colonies with potential connectivity to the Project include those from Cape Wrath and along the north coast of Caithness and it is likely that tracking of a sample of razorbills from these locations could be valuable.
Puffin	While there is a clear gap in tracking information for puffins in northern Scotland, it appears that the value of attaching GPS archival tags to puffins is either disputed or not recommended (F. Daunt, pers comm.). At present, given the uncertainty in the value of using GPS archival tags on puffin, there are no plans to undertake any studies.
Great skua	A total of 4 great skuas have been tracked from the island of Foula, west of Shetland, by the Universities of Iceland and Glasgow as well as the Icelandic Institute of Natural History between 2008 and 2009 which show an overlap with Project. There has been no tracking of great skuas from Hoy which has a breeding population of great skua and contains the highest numbers of great skua in the region. It is, therefore, likely that tracking of a sample of great skua from Hoy will be valuable.
Arctic skua	There are no published tracking studies of Arctic skuas in the region of the Project. Key Arctic tern colonies with potential connectivity to the Project are those on Hoy, Cape Wrath and the north coast of Caithness; tracking of a sample of Arctic skuas from these sites could be valuable.
Leach's petrel	The first Leach's petrels were tracked during the breeding season in 2021 on the island of St Kilda by the RSPB. As indicated by the St Kilda track, leach's petrel is a pelagic foraging species. The tracking data indicate that leach's petrels breeding on Sule Skerry and Sule Stack are more likely head west to forage in pelagic waters rather than head east towards Orkney to forage. The current Marine Scotland project tracking Leach's petrels from a variety of locations around Scotland will be used to inform the assessment when results are available.

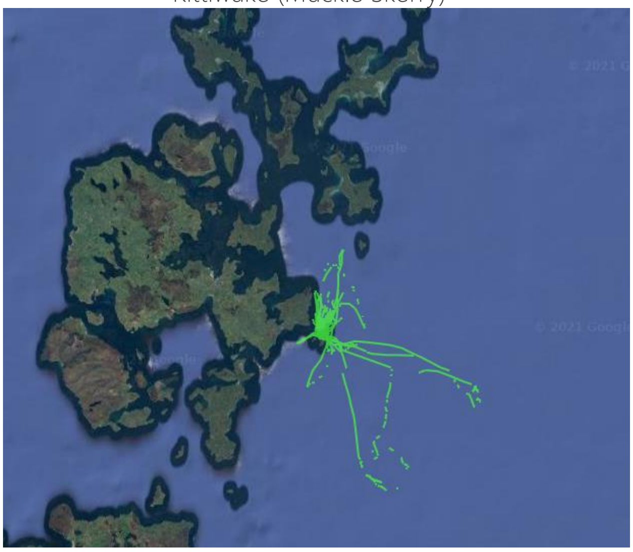

Kittiwake (Sule Skerry)

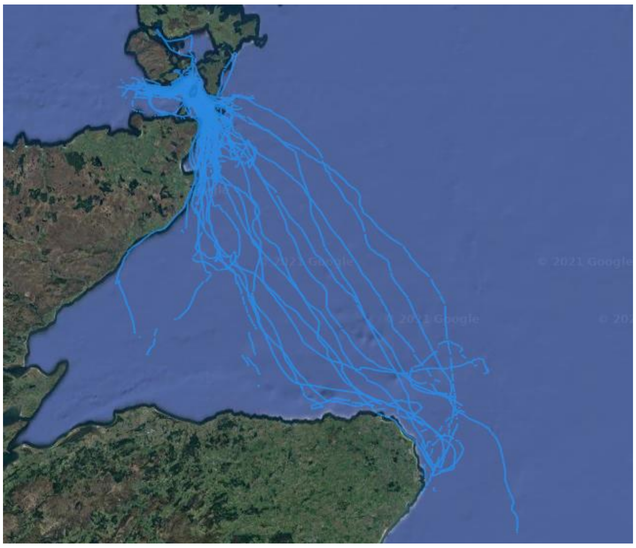

Kittiwake (Copinsay)


Kittiwake (Cape Wrath)

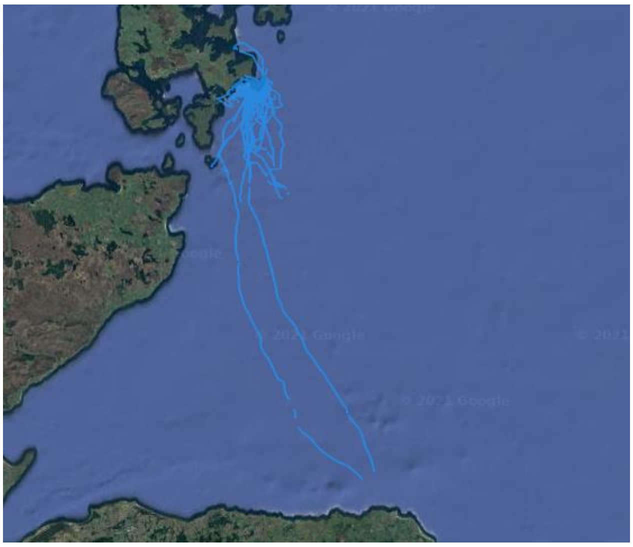

Kittiwake (Muckle Skerry)


Gannet (Sule Skerry)


Guillemot (Copinsay)

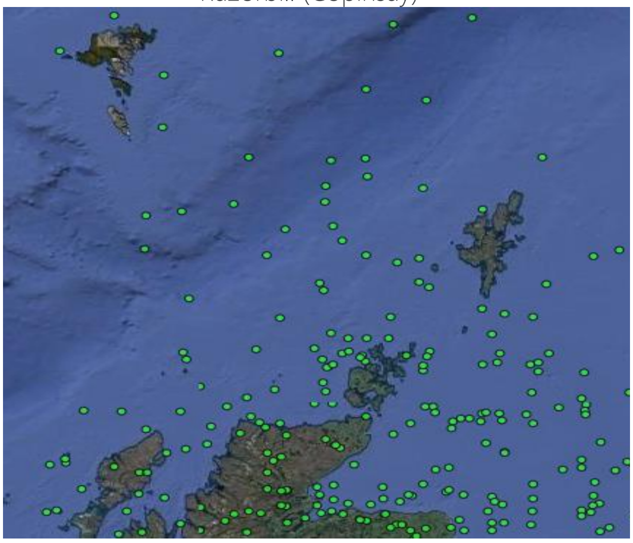


Razorbill (Swona)

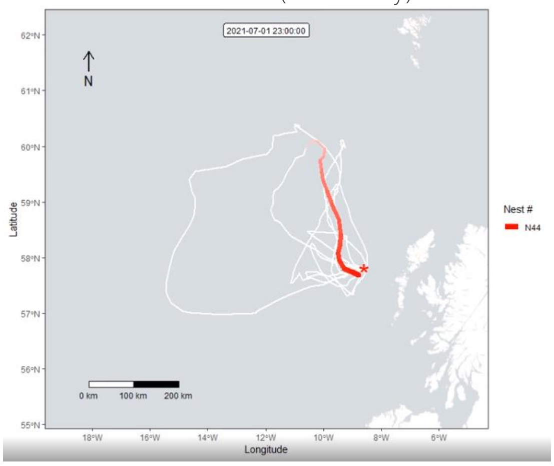


Razorbill (Copinsay)

Puffin (Isle of May)



Great skua (Foula)



Leach's petrel (St Kilda)

Figure 2-16 Raw Tracks for Key Seabird Species. Tracking Data for Kittiwake, Gannet, Guillemot, Razorbill, Puffin and Great Skua is Available in the Birdlife International Seabird Tracking Database; the Track for Leach's Petrel is Available from Marine Scotland

2.5.4.1.1.3 Seabird Monitoring Programme Database

The SMP database shows many key seabird species colonies in the vicinity of the Project. A summary of SMP colony data available for key seabird species as well as species which may use the Project and potentially may be included in the assessment is presented in Table 2-29 and Figure 2-17.

Table 2-29 Summary of Colony Data Available in the Seabird Monitoring Programme Database for Key Seabird Species As Well As Those that May Use the Project and Potentially May be Included in the Assessment.

SPECIES	SUMMARY OF COLONY DATA AVALIABLE
Kittiwake	There are many kittiwake colonies along the coasts of Orkney and north Scotland including those on Sule Skerry, North Rona and Sula Sgeir. The largest colonies (over 2000 Apparently Occupied Nests, AON) are on Orkney, north coast of Scotland and islands including Handa and Sula Sgeir.
Gannet	There are four main gannet colonies within foraging range to the Project, the largest is on Sula Sgeir with 11,230 AOS. There are *c*.4,500 AOS each on Sule Stack and Sule Skerry.
Guillemot	There are many common guillemot colonies along the coasts of Orkney and north Scotland including those on Sule Skerry, North Rona and Sula Sgeir. The largest colonies (over 14,000 individuals) are on Orkney (Westray, Copinsay, Marwick Head), north coast of Scotland and Stroma.
Razorbill	There are many razorbill colonies along the coasts of Orkney and north Scotland including those on Sule Skerry and North Rona. The largest colonies (over 1000 individuals) are at Marwick Head in Orkney and north coast of Scotland.
Puffin	There are a number of puffin colonies along the coasts of Orkney and north Scotland including those on Sule Skerry, North Rona and Sula Sgeir. The largest colony within foraging range of the Offshore Marine Area is on Sule Skerry (47,742 Apparently Occupied Burrows).
Great skua	There are many great skua colonies particularly in Orkney, but also north-west Scotland, Sule Skerry and North Rona. The largest colony closest to the Offshore Marine Area is on Hoy in Orkney.
Arctic skua	There are a number of Arctic skua colonies particularly in Orkney, the largest colonies closest to the Offshore Marine Area are on Orkney Mainland and the island of Rousay.
Storm petrel	There are a number of European storm petrel colonies close to the Offshore Marine Area, the largest (over 300 AOS) are on Auskerry in Orkney, Sula Skerry and North Rona.
Leach's petrel	The SMP database does not contain any colony location or breeding data for Leach's petrel. However, Leach's petrel nest on Sule Skerry and Sule Stack (5 pairs) and North Rona and Sula Sgeir (>1% of the GB population), both within potential foraging range of the Offshore Marine Area.

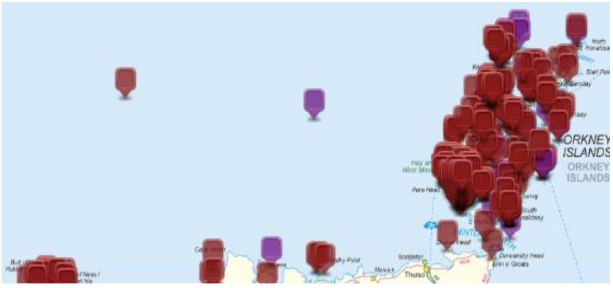

Kittiwake colonies near the Offshore Marine Area

Gannet colonies near the Offshore Marine Area


Guillemot colonies near the Offshore Marine Area


Razorbill colonies near the Offshore Marine Area


Puffin colonies near the Offshore Marine Area


Great skua colonies near the Offshore Marine Area

European storm-petrel colonies near the Offshore Marine Area

Figure 2-17 Seabird Colonies of the Key Species and Those That May Use the Project and Potentially May be Included in the Assessment in the Vicinity of the Offshore Marine Area (Extracted from the Seabird Monitoring Programme Database)

2.5.4.1.1.4 Regional Distribution of Four Seabird Species

Wakefield *et al*. (2017) modelled the distribution of four breeding seabird species around the British Isles: shag, kittiwake, guillemot and razorbill. Due to the distance from the coast, and the water depth, shag is extremely unlikely to be a key species within the Offshore Marine Area. The utilisation distributions of the three species of interest (Figure 2-18) suggest that kittiwake and common guillemot (murre) are more likely to occur in larger densities in the breeding season than razorbill. However, the spatial scale of the maps from Wakefield *et al.* (2017) is sufficiently large that resolving the space use within the Offshore Marine Area is not possible. There is little to suggest that these results would predict relatively high densities of any of these species in the Offshore Marine Area (Figure 2-18).

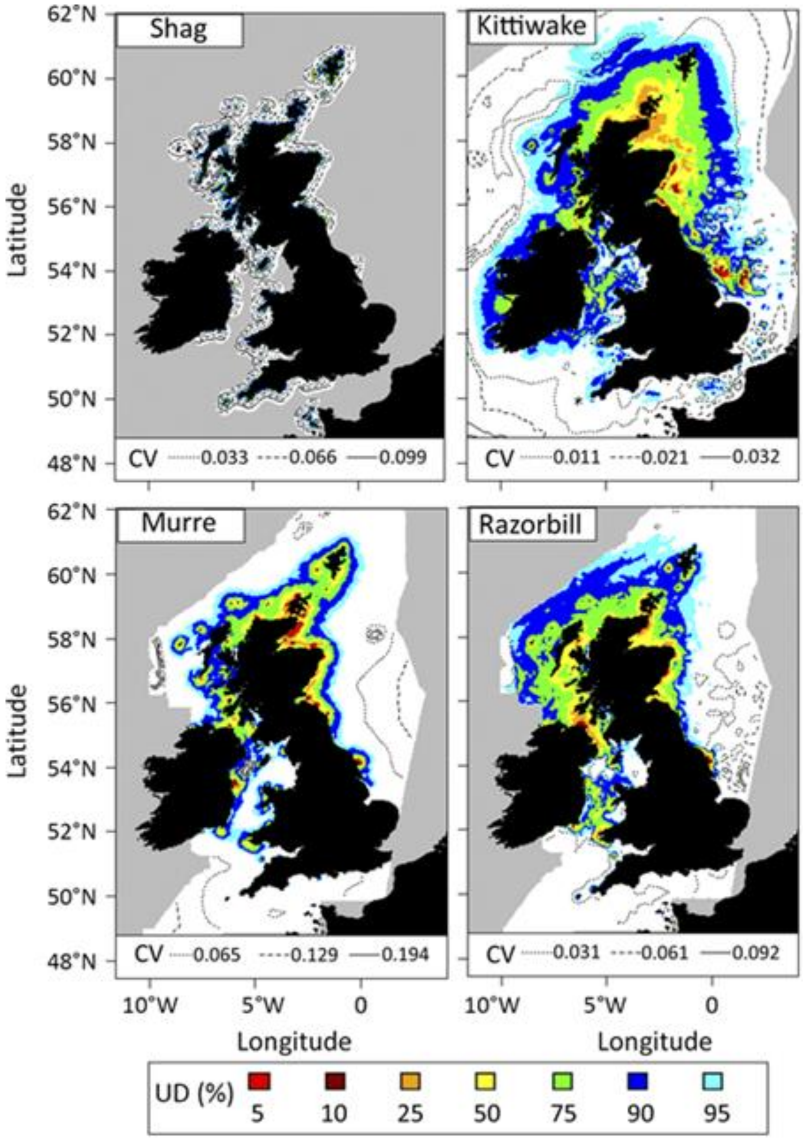


Figure 2-18: Percentage At-Sea Utilization Distribution (UD) of Seabirds Breeding within Britain and Ireland During Late Incubation/early Chick-rearing Estimated as Functions of Colony Distance, Coast Geometry, Intra-specific Competition, and Habitat (from Wakefield et al. 2017). N.B. Murre = guillemot

2.5.4.1.1.5 Location of High-Density Seabird Areas Across the UK

Cleasby *et al*. (2018) predicted the hotspots of distribution around the UK from the utilisation distributions produced by Wakefield *et al.* (2017). The results from this study found hotspots for both kittiwake and guillemot from Orkney and Caithness colonies, but these were to the south and east of the Offshore Marine Area. It appears there was no predicted hotspot within the Offshore Marine Area for razorbill (

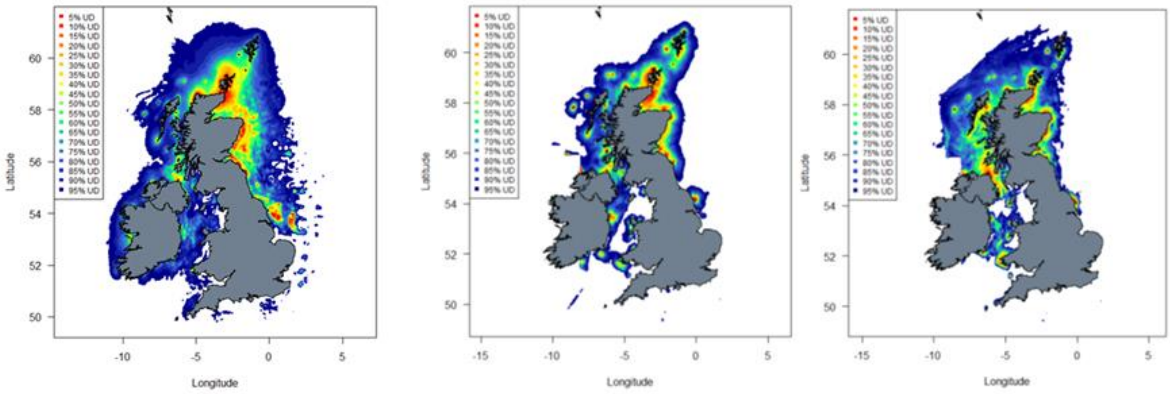


Figure 2-19).

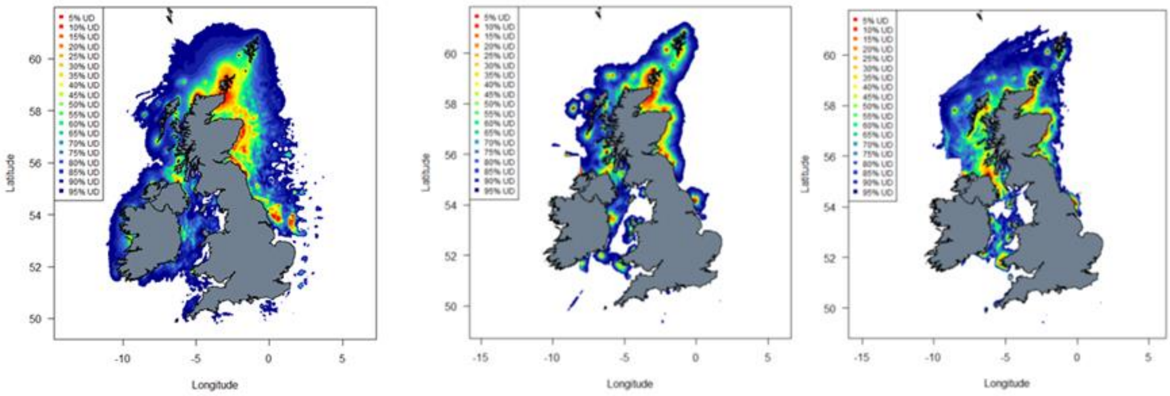


Figure 2-19 Map Displaying Utilisation Distribution for Birds Originating from the UK and the Republic of Ireland from Cleasby et al., 2018

2.5.4.1.1.6 Identification of Possible Marine SPAs for Seabirds in the UK

JNCC undertook analysis of European Seabirds at Sea (ESAS) data to predict where persistent hotspots of seabird distribution in UK waters may be, in order to identify possible SPAs in the marine environment (Kober *et al*. 2012). This identified a hotspot to the south of Orkney for breeding guillemot and a separate hotspot to the south-west of Shetland for breeding great skuas (Figure 2-20), both hotspot locations met the requirements to become a marine SPA although both hotspots are located outside of the Offshore Marine Area. Three other hotspots including one located east of Caithness for wintering guillemots, one south of Shetland for breeding puffin and another around Stroma in the Pentland Firth for breeding Arctic tern had the potential to be a marine SPA, though these areas did not reach qualifying levels for a SPA, so were not progressed to be designated. No other hotspots were found by JNCC in the vicinity of the Offshore Marine Area.

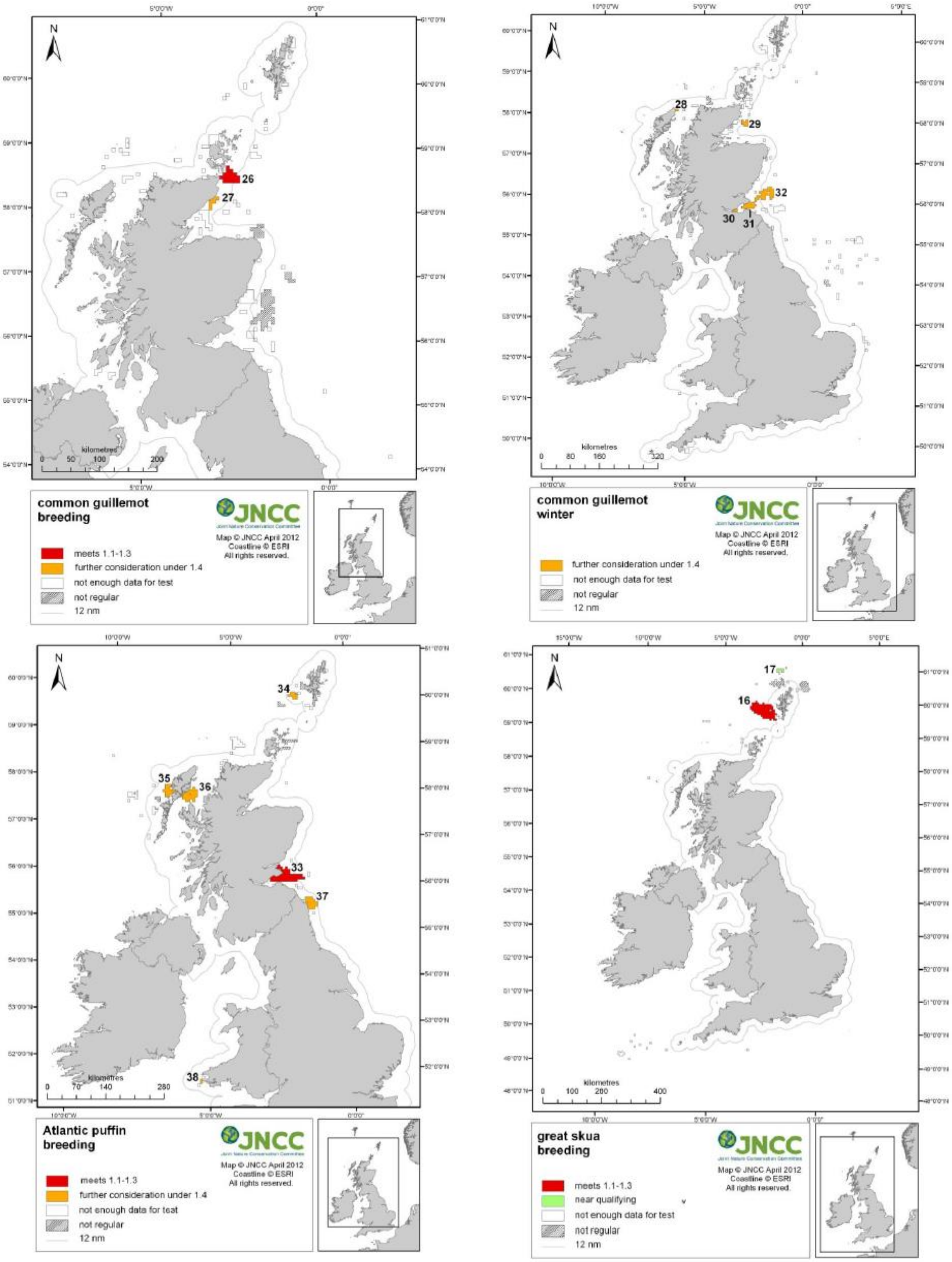


Figure 2-20 Important Areas Identified for Common Guillemot (Breeding and Wintering), Atlantic puffin, Arctic Tern and Great Skua (Breeding Only): Hotspots Meeting Stages 1.1-1.3 (red), Hotspots for Possible Further Consideration Under Stage 1.4 (orange), Hotspots with Insufficient Data for the Test for Regularity (Clear), and Hotspots Tested but Not Meeting the Criterion of Regularity (Hatched) (data from Kober et al. 2012)

2.5.4.1.1.7 Atlas of Seabird Distribution in North-West European Waters

Stone *et al.* (1995) used ESAS data to predict the spatial density of birds around the UK and Ireland. While the spatial scale of the density maps produced is fairly course, the survey coverage in the region around the Offshore Marine Area is fairly high and these data can help predict the likely level and seasonal changes in the likely key species in the vicinity of the Offshore Marine Area.

Summary density descriptions for key seabirds as well as those species that may use the Project and potentially may be included in the assessment are presented in Table 2-30. Overall, these data indicate that the western region of the Offshore Marine Area may have much lower densities of key species than the eastern, north and south regions.

Table 2-30 Summary of ESAS Seabird Densities of Key Species and Those That May Use the Project and Potentially May be Included in the Assessment (Stone et al., 1995).

KEY SPECIES	SUMMARY OF SEASONAL DENSITIES
Kittiwake	Kittiwake densities were relatively high but somewhat patchy between April to October in the area around the Offshore Marine Area, densities were particularly patchy during the spring between April to May. Generally lower and patchy densities occurred through the winter (November to March).
Gannet	Gannet densities were moderately low throughout the year, with the occasional higher density patches in the area around the Offshore Marine Area in spring (March to April) and autumn (September to October). In the summer (May to August), densities were low around the Offshore Marine Area, but high density hotspots around Sula Sgeir to the west were recorded. Generally low densities occurred through the winter (November to March) except around Sula Sgeir.
Guillemot	At the start of the breeding season guillemot densities were moderately high around the Offshore Marine Area and high density patches were recorded on the west coast of Orkney and north coast of Sutherland. As the breeding season progressed through May to June, guillemot density around the Offshore Marine Area increased and by July, density around the Offshore Marine Area was at its highest in the year. In late summer and autumn between August to October, guillemot density around the Offshore Marine Area decreased, guillemots moved eastwards and high densities were recorded along the east coast of north Scotland and Orkney. During the winter, guillemot density was patchily distributed, but generally fairly low around the Offshore Marine Area.
Razorbill	Razorbill densities were much lower around the Offshore Marine Area in the breeding season than guillemot densities. In spring and early summer between April to June, relatively low densities were recorded around the Offshore Marine Area, a high density patch was recorded close to the north Sutherland coast. As the breeding season progressed, razorbill density within the Offshore Marine Area decreased throughout August to September as razorbills moved eastwards. Razorbill density around the Offshore Marine Area was very low or negligible between October to January and remained low in February.
Puffin	In the first half of the breeding season (April and May) puffin densities were generally low and patchy around the Offshore Marine Area. Through June and July density around the Offshore

KEY SPECIES	SUMMARY OF SEASONAL DENSITIES
	Marine Area increased, but was still very patchy; by August and September puffin density was uniformly relatively low around the Offshore Marine Area. Through the remainder of the autumn and winter densities were generally very low.
Great skua	Great skua density was patchy between April to June around the Offshore Marine Area, a high density hotspot was recorded close to land around Hoy. Density became more uniform but remained low around the Offshore Marine Area between July to September; by the second half of the summer, great skua density decreased around Hoy. During the winter between November to March, great skua density was negligible around the Offshore Marine Area.
Arctic skua	Arctic skua density was either very low or negligible around the Offshore Marine Area between April to June. Density remained relatively low around the Offshore Marine Area in July although a density hotspot was recorded close to land in north Orkney; between August to October, density around Orkney decreased. During the winter between November to March, Arctic skua density was negligible around Orkney and the Offshore Marine Area.
Storm petrel	Densities of storm petrel were very low in May and June with the only higher densities of birds in Scotland occurring in the region of North Rona and west of the Western Isles. Through July and August birds occurred more often in area around the Offshore Marine Area, but densities were generally low. By the autumn (September to November) birds were largely absent from the area. Birds were absent through the winter.
Leach's petrel	Leach's petrel was absent all year around the Offshore Marine Area. The only higher densities of birds in Scotland occurred in the region of North Rona and west of the Western Isles between May to August. A low density of birds was recorded around North Rona through the winter.

2.5.4.1.2 Key Terrestrial Migratory Species

2.5.4.1.2.1 Strategic Assessment of Collision Risk of Scottish Offshore Wind Farms to Migrating Birds

Marine Scotland commissioned a collision risk modelling analysis of the cumulative impacts to seabird and non-seabird species at Scottish windfarms in 2014 (WWT 2014). Collision risk modelling was completed for 38 species that were not seabirds. This analysis concluded that, "Overall, birds on migration through Scottish waters are not considered to be at risk of significant levels of additional mortality, due to collisions with Scottish offshore wind farms". From maps of migration pathways the following species were identified that have the potential to interact with a wind farm in the Project:

- Whooper swan, *Cygnus*;
- Pink-footed goose, *cotti brachyrhynchus*;
- Greenland white-fronted goose, *cotti albifrons*;
- Icelandic greylag goose, *cotti cotti*;
- Greenland barnacle goose, *Branta leucopsis*;
- Canadian light-bellied brent goose, *Branta bernicla hrota*;
- Svalbard light-bellied brent goose, *Branta bernicla hrota*;
- Wigeon, *Anas cottish*;
- Corncrake, *Crex*;
- Oystercatcher, *Haematopus ostralegus*;
- Dotterel, *Charadrius morinellus*;
- Golden plover, *Pluvialis apricaria*;
- Grey plover, *Pluvialis squatarola*;
- Sanderling, *Calidris alba*;
- Dunlin, *Calidris alpina schinzii* and *Calidris alpina arctica*;
- Snipe, *Gallinago gallinago*;
- Woodcock, *Scolopax rusticola*;

- Teal, *Anas crecca*;
- Pintail, *Anas acuta*;
- Pochard, *Aythya farina*;
- Tufted duck, *Aythya fuligula*;
- Scaup, *Aythya marila*;
- Long-tailed duck, *Clangula hyemalis*;
- Common scoter, *Melanitta nigra*;
- Velvet scoter, *Melanitta fusca*;
- Hen harrier, *Circus cyaneus*;
- Kestrel, *Falco tinnunculus*;
- Black-tailed godwit, *Limosa limosa islandica*;
- Bar-tailed godwit, *Limosa lapponica*;
- Whimbrel, *Numenius phaeopus*;
- Curlew, *Numenius arquata*;
- Greenshank, *Tringa nebularia*;
- Redshank, *Tringa cottis robusta* and *T. cottis*;
- Turnstone, *Arenaria interpres*; and
- Red-necked phalarope, *Phalaropus lobatus*.

While other species of migratory terrestrial birds (e.g. passerines) are likely to interact with the Array Area these are not likely to be at a risk from a significant negative impact on their populations.

2.5.4.1.2.2 Migration of Whooper Swans in Relation to Offshore Wind Farms

Additional tracking data of relevance to the Project is available for Whooper swans and light bellied brent geese. Griffin *et al*. (2010) reviewed the available data from satellite tracking of Whooper swans in 2009. These data showed that tracked birds from Welney migrated to the west of Orkney close to the OAA (Figure 2-21).

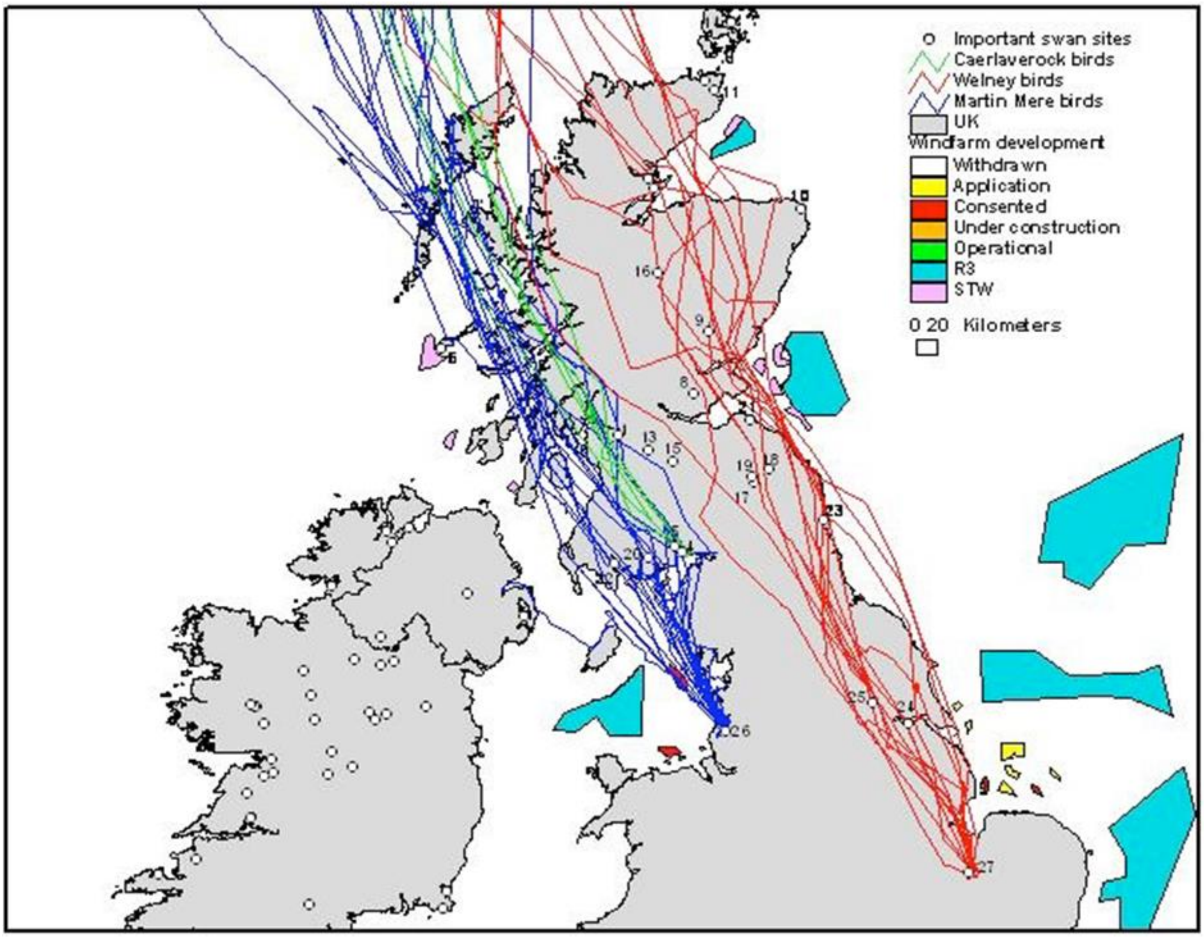


Figure 2-21 Migration Routes in Spring 2009 of Whooper Swans Fitted with Satellite Transmitters

Further tracking of whooper swans and tracking of geese was reviewed by Griffin *et al*. (2011) in relation to wind farm footprints for the Scottish Territorial Waters (STW) and Round Three leasing rounds.

Tracking of more whooper swans during spring migration in 2010 included one bird from Martin Mere migrating further east than the birds tracked in 2009, but not over the Offshore Marine Area (Figure 2-22). This work also showed that migratory light bellied brent geese may occasionally overfly the Offshore Marine Area (Figure 2-23).

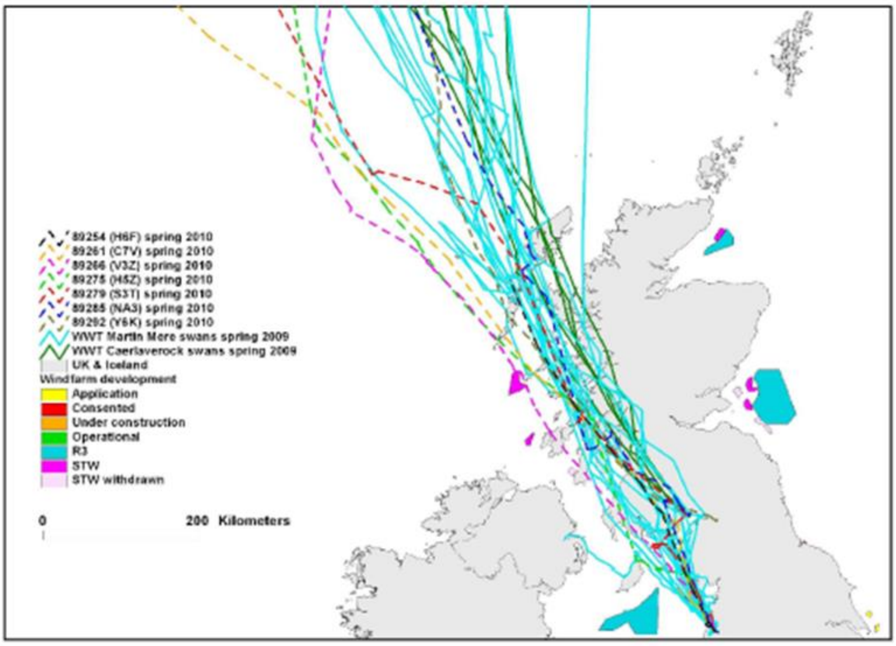


Figure 2-22 The Migratory Routes of Seven Adult Male Whooper Swans Tracked in Spring 2010

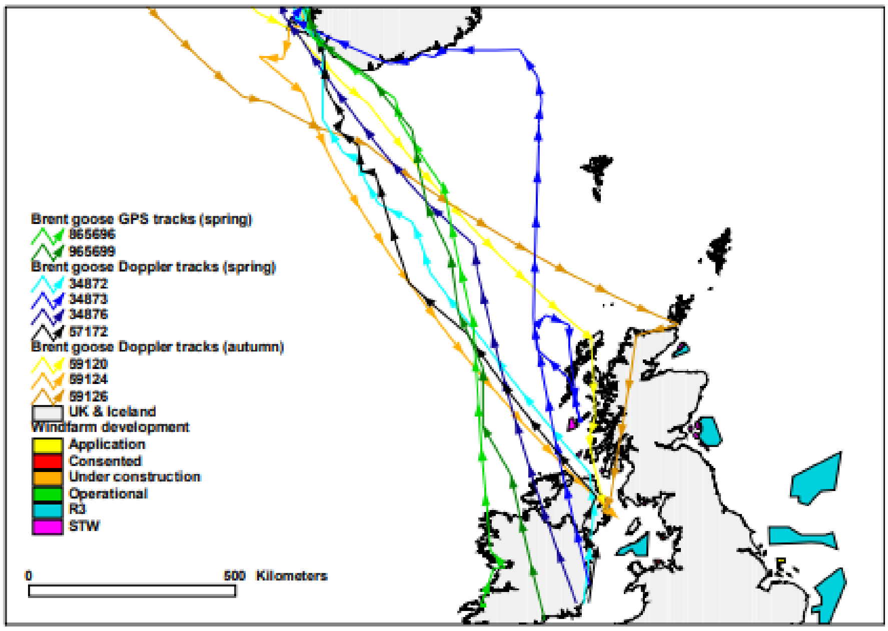


Figure 2-23 Migration Routes within the UK of Light-Bellied Brent Geese Fitted with Conventional Doppler Fix Satellite Transmitters in 2005 and Solar GPS Transmitters in 2006

2.5.4.2 SCAPA FLOW

The Scapa Flow offshore export cable corridor search area runs between the east coast of Hoy to Flotta in Scapa Flow. Scapa Flow is a sheltered marine water body surrounded by the islands of Orkney. Depths range 20-40 m, the main part of Scapa Flow is typically around 30 m deep with much deeper water in bring deeps in the centre of the flow (OIC, 2020). The offshore export cable corridor search area in Scapa Flow is well within the foraging depth of most surface diving seabirds likely to be in the region (e.g. auks) and is likely to support important forage fish species for seabirds.

The surveys and analysis to support the designation of the Scapa Flow SPA identified the following key species:

- Slavonian grebe, *Podiceps auratus;*
- Red-throated diver, *Gavia stellata*;
- Black-throated diver, *Gavia arctica*; and
- Great northern diver, G*avia immer*.
- Common eider, *Somateria mollissima*;
- Long-tailed duck, *Clangula hyemalis*;
- Common goldeneye, *Bucephala clangula*;
- Red-breasted merganser, *Mergus serrator*; and
- European shag, *Phalacrocorax aristotelis*.

Temporary disturbance to the waterbird species listed above may occur from the installation of project infrastructure during the construction and decommissioning phases, but any impacts associated with the installation of the offshore export cable in Scapa Flow on these species are likely to be short term, temporary and reversible.

Due to the proximity of the offshore export cable in Scapa Flow to the rest of the project area, the same bird species present in the offshore marine area (section 2.5.4.1) are likely to be impacted in the Scapa Flow area.

The same sources of ornithology baseline data used to assess the Offshore Marine Area will also be used to assess the Scapa Flow area. Existing colony data focussed on the Scapa Flow area is presented below.

2.5.4.2.1 Seabird Monitoring Programme Database

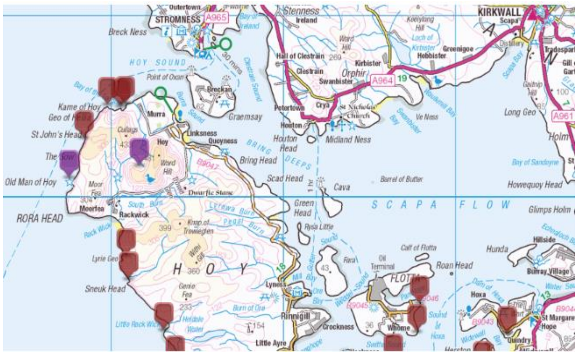
The SMP database shows some key seabird species colonies in the vicinity of Scapa Flow. A summary of SMP colony data available for key seabird species as well as species which may use the project and potentially may be included in the assessment is presented in Table 2-31 and Figure 2-24.

Table 2-31 Summary of Colony Data Available in the Seabird Monitoring Programme Database for Key Seabird Species As Well As Those That May Use the Scapa Flow Offshore Export Cable Corridor Search Area and Potentially may be Included in the Assessment.

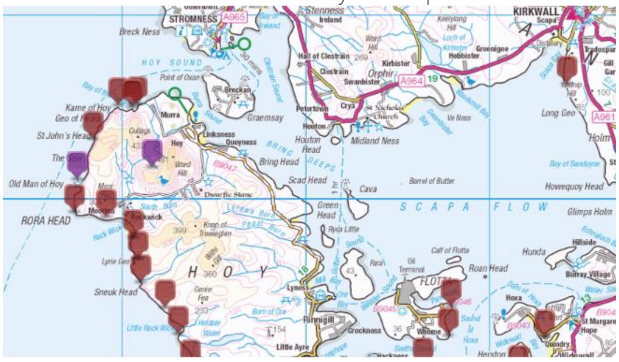
SPECIES	SUMMARY OF COLONY DATA AVALIABLE
Kittiwake	There are some kittiwake colonies of small to moderate size (less than 250 Apparently Occupied Nests, AON) along the west coast of Hoy, although there are no colonies surrounding the Scapa Flow export cable search area.

SPECIES	SUMMARY OF COLONY DATA AVALIABLE
Gannet	There are no gannet colonies surrounding the Scapa Flow export cable search area.
Guillemot	There are very few common guillemot colonies surrounding Bring Deeps and Scapa Flow; there are a couple of colonies on Flotta containing up to 62 individuals.
Razorbill	There are very few razorbill colonies surrounding Bring Deeps and Scapa Flow; there are a couple of colonies on Flotta containing up to 240 individuals.
Puffin	There are a small number of puffin colonies surrounding Bring Deeps and Scapa Flow. Colonies surrounding the Scapa Flow export cable search area include those on the islands of Flotta and Cava as well on the eastern coast of Hoy; colony size in this region is small, ranging from 2 to 4 individuals.
Great skua	There are many great skua colonies on Hoy along Bring Deeps and Scapa Flow; Hoy contains the largest colonies (over 1000 Apparently Occupied Territories, AOT) for this species in the region. Colonies surrounding the Scapa Flow export cable search area include those on the islands of Flotta, Fara and Cava; colony size in this region ranges from 3 to 29 AOT.
Arctic skua	There are some Arctic Skua colonies surrounding Bring Deeps and Scapa Flow. Colonies surrounding the Scapa Flow export cable search area include those on the islands of Flotta, Fara, Rysa Little and Cava; colony size in this region ranges from 1 to 66 AOT, the largest colonies are on Flotta.
Storm petrel	There are no European storm petrel colonies or Manx shearwater colonies surrounding the Scapa Flow export cable search area.
Leach's petrel	The SMP database does not contain any colony location or breeding data for Leach's petrel. Leach's petrel is designated under the Sule Skerry and Sule Stack SPA and the North Rona and Sula Sgeir SPA, both within potential foraging range of the Scapa Flow export cable search area.

Kittiwake colonies in the vicinity of Scapa Flow

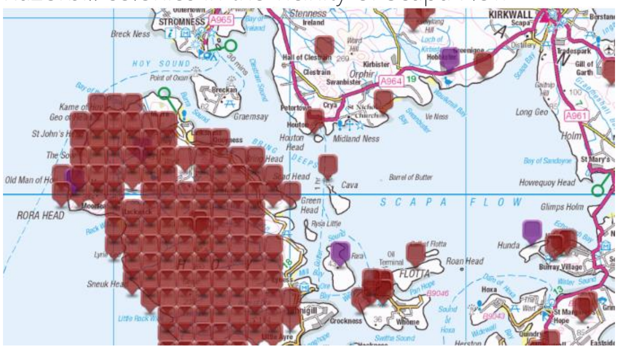


Guillemot colonies in the vicinity of Scapa Flow

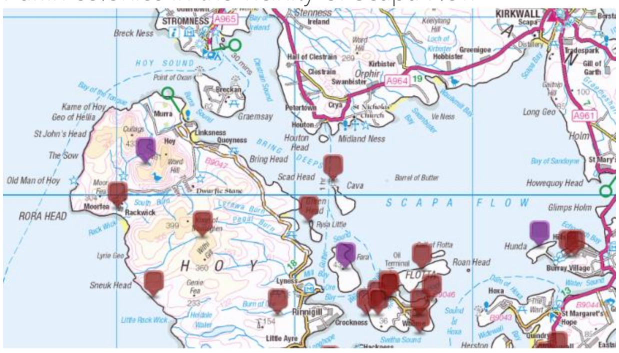


Razorbill colonies in the vicinity of Scapa Flow

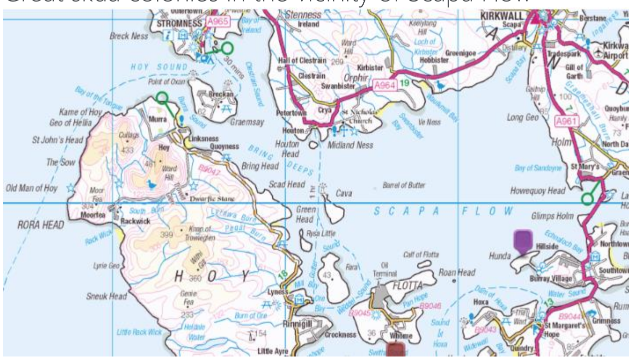
Puffin colonies in the vicinity of Scapa Flow



Great skua colonies in the vicinity of Scapa Flow



Arctic skua colonies in the vicinity of Scapa Flow



European storm-petrel colonies in the vicinity of Scapa Flow

Figure 2-24 Seabird Colonies of the Key Species in the Vicinity of Scapa Flow (Extracted from the Seabird Monitoring Programme Database

2.5.4.3 Summary and Key Issues

Table 2-32 Summary and Key Issues for Offshore Ornithology

SUMMARY AND KEY ISSUES

PROJECT COMPONENT

OFFSHORE MARINE AREA – ARRAY AREA, OFFSHORE EXPORT CABLE SEARCH AREA TO CAITHNESS AND OFFSHORE EXPORT CABLE SEARCH AREA TO ORKNEY (HOY)

From the available information, prior to completing site-based surveys, the key seabirds species using the Project, and taken forward to assessment are likely to be:

- Kittiwake;
- Guillemot;
- Razorbill;
- Puffin; and
- Gannet.

Other seabird species that may use the Project and potentially may be included in the assessment include:

- Great black-backed gull;
- Great skua;
- Arctic skua;
- Arctic tern;
- Storm petrel;
- Leach's petrel; and
- Fulmar.

Other seabirds will occur, and these will be assessed in the Offshore EIA Report, should they meet the requisite criteria for determining potential significant effects. The key species will form the main focus of the Offshore EIA Report unless site-based surveys find other species occurring in important numbers relative to their regional population size.

From the available information the key terrestrial migrant species crossing the Project are likely to be:

- Canadian light-bellied brent goose;
- Greenland barnacle goose;
- Icelandic greylag goose;
- Pink-footed goose;
- Greenland white-fronted goose; and
- Whooper swan.

SCAPA FLOW – OFFSHORE EXPORT CABLE SEARCH AREA THROUGH SCAPA FLOW

Key species using Scapa Flow and are likely to be taken forward to assessment include those designated under the Scapa Flow SPA as follows:

- Common eider;
- Long-tailed duck;
- Common goldeneye;
- Red-breasted merganser;
- Slavonian grebe;
- Red-throated diver;
- Black-throated diver;
- Great northern diver; and
- European shag.

In addition, the same offshore bird species considered and taken forward for the Offshore Marine Area are also likely to be taken forward for assessment in Scapa Flow.

2.5.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined in Table 2-33.

Table 2-33 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Development of and adherence to a Project Environmental Monitoring Programme (PEMP), which will set out commitments to environmental monitoring in pre-, during and post-construction Project phases.	Primary	Required under Section 36 and Marine Licence consent conditions.
2	Development of and adherence to a Vessel Management Plan (VMP). The VMP will confirm the types and numbers of vessels that will be engaged on the Project and consider vessel coordination including indicative transit route planning.	Primary	Required by Section 36 and Marine Licence consent conditions.
3	Development of and adherence to a Lighting and Marking Plan (LMP). The LMP will confirm compliance with legal requirements with regards to shipping, navigation and aviation marking and lighting.	Primary	Required by Section 36 and Marine Licence consent conditions

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on Offshore Ornithology receptors and will be consulted upon with consultees throughout the EIA process.

2.5.6 Scoping of Impacts

A number of potential impacts on birds have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. A number of impacts are proposed to be scoped into the assessment for ornithology. These impacts are outlined in Table 2-34. None of the potential impacts are proposed to be scoped out of the assessment, as it is considered that all impacts have the potential to be significant and therefore that they require assessment. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating

Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

Table 2-34 EIA Scoping Assessment for Offshore Ornithology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Disturbance from construction/ decommissioning activities	1, 2	Scoped In	Temporary disturbance to seabirds may occur from the installation of Project infrastructure during the construction and decommissioning phase. Further assessment required to conclude impact significance.	Three primary survey data collection methods will be used to inform the assessment: • Digital aerial surveys; • GPS tracking of seabirds; and • Counts of seabird colonies Input demographic parameters for population modelling will use the values summarised in Horswill & Robinson (2015).	DSMs will be used to predict the spatial abundance of birds in flight and birds on the water using MRSea (Scott-Hayward et al. 2013). Outputs will include the maps of the predicted abundance and key model diagnostic plots. Population modelling will be used to determine the consequences of impacts on seabird populations. These will either be bespoke Leslie matrix models, following the guidance from Marine Scotland (Searle et al. 2020), or the Natural England Population Viability Analysis (PVA) App (Searle *et al.* 2019).
Operations and Maintenance					
Collision risk	1	Scoped In	The operation of wind turbines has the potential to result in mortality through collisions to birds in flight.	Offshore ornithology digital aerial surveys will be undertaken to collect site-specific densities of birds in flight. Standardised information on bird biometrics, flight speed, nocturnal activity and avoidance behaviour	Collision risk modelling (CRM) of breeding and non-breeding seabirds will use the stochastic CRM (McGregor *et al.* 2018). Input parameters derived from the Project will include the mean aerial densities of birds by month (± one

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
				will likely follow the agreed approach in the Cumulative Effects Framework unless more recent empirical evidence is available. It is likely that birds speed data and bird avoidance rates will follow Bowgen & Cook (2018) for kittiwake and large gulls. Avoidance rates for other species will use those recommended by NatureScot. Bird flight heights for both the basic and extended models will use Johnston *et al*. (2014).	standard deviation) and wind farm information (number of turbines, turbine dimensions, etc.).
Displacement of seabirds from the Array Area	1,2,3	Scoped In	The presence of turbines has the potential to displace birds from within the footprint of the Array Area. This displacement has the potential to cause direct, or indirect, mortality to birds that are predicted to be displaced.	Three primary survey data collection methods will be used to inform the assessment: • Digital aerial surveys; • GPS tracking of seabirds; and • Counts of seabird colonies Input demographic parameters for population modelling will use the values summarised in Horswill & Robinson (2015).	The displacement assessment will use the matrix method of estimating bird mortality. This will be estimated using the mean of the peak values in each of two seasons (breeding season and non-breeding season) as the primary input values. If possible, the assessment of displacement will also include the use of SeabORD (Searle *et al*. 2018). Existing and additional tracking data are unlikely to prove suitable for running this model, but methods being developed as part of the Cumulative Effects Framework may allow this model to be used with other seabird abundance predictions (e.g. Waggitt *et al.* 2020).

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
					Population modelling will be used to determine the consequences of impacts on seabird populations. These will either be bespoke Leslie matrix models, following the guidance from Marine Scotland (Searle et al. 2020), or the Natural England PVA App (Searle et al. 2019)
Barrier effects	1	Scoped In	The presence of turbines has the potential to cause birds to fly around the OAA, rather than through the OAA. This barrier to flight results in a longer flight path so greater energy expenditure. This may cause impacts on survival or productivity of breeding birds.	Three primary survey data collection methods will be used to inform the assessment: • Digital aerial surveys; • GPS tracking of seabirds; and • Counts of seabird colonies	DSMs will be used to predict the spatial abundance of birds in flight and birds on the water using MRSea (Scott-Hayward *et al*. 2013). Outputs will include the maps of the predicted abundance and key model diagnostic plots.
Indirect effects	1,2,3	Scoped In	The presence of the OAA may affect the availability of key prey species to foraging seabirds. Note that this effect will be assessed as part of the	Three primary survey data collection methods will be used to inform the assessment: • Digital aerial surveys; • GPS tracking of seabirds; and • Counts of seabird colonies	DSMs will be used to predict the spatial abundance of birds in flight and birds on the water using MRSea (Scott-Hayward et al. 2013). Outputs will include the maps of the predicted abundance and key model diagnostic plots.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			displacement effect, as no post-construction monitoring is or has tried to separate the causes of displacement of seabirds from wind farms. Subsequently, this impact is effectively incorporated into the displacement assessment.	Benthic data and fish population data collected for the other EIA sections will also be used to inform the assessment.	Approaches to habitat preference modelling developed by Matthiopoulos *et al*. (2011) will also be explored to effectively include previous datasets in the spatial prediction of key species.

2.5.7 Potential Cumulative Effects

There is potential for the impacts from the Project to interact with those from other projects, plans and activities, resulting in a cumulative effect on offshore ornithology receptors (e.g. Pentland Floating Offshore Wind Farm, SHET-L Caithness to Orkney interconnector and other ScotWind OWF lease areas located off the northern coast of Scotland).

The offshore ornithology CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2. For both seabirds and terrestrial migrant birds Marine Scotland have ongoing projects to create tools to complete these assessments and it is likely that these will both be used to inform the cumulative impact assessment.

For seabirds, cumulative impacts will be assessed using the Cumulative Effects Framework (CEF) tool, currently being developed for Marine Scotland (https://www.ceh.ac.uk/our-science/projects/cumulative-effects-framework). Much of the approach for cumulative impact on ornithology receptors will be guided by the outcomes of that project. Overall, cumulative impact assessments on seabirds will likely evolve during this Project. The CEF Project Steering Group includes the key stakeholders who will be involved with the Projects workshops and technical working groups. Thus, guidance is likely to evolve with the Project, so it would be premature to summarise these here.

In general, cumulative assessment on seabirds will be separated between the breeding and non-breeding seasons, following guidance on the species-specific timings recommended by NatureScot in recent assessments.

Marine Scotland are currently developing a stochastic collision risk model for terrestrial migrant birds. This will include a strategic level assessment of cumulative impact on these species for all Scottish offshore wind farms. It is expected that approach to assessment will be to review this study and determine the impacts from the Project cumulatively with all other offshore wind farms in Scotland.

2.5.8 Potential Transboundary Impacts

The study area extends beyond the limits of Scottish and UK limits and there is potential for birds to move across a variety of political boundaries for different groups of birds in different seasons.

There is the potential for transboundary impacts upon Offshore Ornithology receptors due to construction, operation and maintenance, and decommissioning of the Project. Potential transboundary impacts that will be considered include: breeding season connectivity between the Project and breeding seabird colonies in Scotland, Northern Ireland and the Republic of Ireland, and migration connectivity for seabirds from Scotland, Northern Ireland, the Republic of Ireland, Wales and England at least. Hypothetical connectivity for some species could be from a wide variety of countries with coastlines in the north-east Atlantic and Arctic Oceans. Migratory terrestrial birds could have connectivity between the Project and countries to the north (Iceland, Greenland, Canada) and south (Northern Ireland, Republic of Ireland, Wales, and England).

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.

A wide variety of published material will be used to determine transboundary connectivity for migratory species, including: Birds of the Western Palearctic, Furness (2015) and species-specific tracking information (see Key terrestrial migratory species data sources).

2.5.9 Approach to Analysis and Assessment

2.5.9.1 Analysis and Assessment Approaches

2.5.9.1.1 Baseline Characterisation

The assessment of impacts arising from the Project on offshore ornithology will utilise Project-specific and publicly available data (see section 2.5.4) and will be augmented by consultation during the EIA phase. The Project has already undertaken some initial consultation with Marine Scotland, NatureScot and the RSPB with regards to the ornithology issues, surveys and assessment for the Project. In order to facilitate resource effective stakeholder consultation though the development phase of the Project, a marine ecology working group will be established which will be used to consult on surveys methods, interim results, assessment methods and outputs.

The baseline will determine the conditions that exist in the absence of the Project. These will be the conditions against which predicted impacts are assessed. The baseline conditions will need to take account of potential future changes in the use of the site by birds due to changes that include population trends, habitat changes, ecological processes and physical processes. It will be informed by desk-based and field-based data and will be clearly and objectively described in the EIA Report.

2.5.9.1.2 Baseline Data Analysis

Results from digital aerial surveys of the site and an appropriate buffer will be analysed to provide the density and abundance of birds in flight and on the water within the surveyed area. For key species, DSM will be used to predict the spatial abundance of birds in flight and birds on the water using MRSea (Scott-Hayward *et al.* 2013). Outputs will include the maps of the predicted abundance and key model diagnostic plots. These maps will be used to predict the density and abundance with confidence intervals by month of key species.

For species that are observed in too few numbers to allow DSMs the abundance will be calculated based on the density within the surveyed area extrapolated to the whole study area. Where there are fewer than ten observation of a species the abundance will not be calculated, only the number observed will be reported.

Approaches to habitat preference modelling developed by Matthiopoulos *et al.* (2011) will also be explored to effectively include previous datasets in the spatial prediction of key species. These approaches are likely to reduce the uncertainty in the predicted spatial abundance of key species compared with other DSM techniques. These methods will be developed further before more detailed consultation with key stakeholders.

GPS tracking data that is available for some species will be used to assesses potential connectivity between birds recorded in the study area during aerial surveys and their breeding grounds. This can help characterise the use of the Project from breeding colonies, and also explain why some species may be occurring in the Project in some seasons but not others.

2.5.9.1.3 Impact Assessment: Seabirds

CRM of breeding and non-breeding seabirds will use the stochastic CRM (McGregor *et al*. 2018). Input parameters derived from the Project will include the mean aerial densities of birds by month (± one standard deviation) and wind farm information (number of turbines, turbine dimensions, etc.). Where possible the relationship between turbine rotor speed and wind speed and turbine rotor speed and blade pitch will be used to provide a more realistic assessment of potential collisions than using probability distributions of rotor speed and blade pitch. Results from both methods will be provided in an Annex. Standardised information on bird biometrics, flight speed, nocturnal activity and avoidance behaviour will likely follow the agreed approach in the CEF unless more recent empirical evidence is available. Where empirical evidence differs from the recommended values, result using both approaches will be provided. It is likely that birds speed data and bird avoidance rates will follow Bowgen & Cook (2018) for kittiwake and large gulls. Avoidance rates for other species will use those recommended by NatureScot. Bird flight heights for both the basic and extended models will use Johnston *et al.* (2014). It is not intended to provide results using site-based flight height estimates at present, due to high levels of uncertainty in the accuracy and precision of estimates derived from digital images.

At present it is expected that the displacement assessment will use the matrix method of estimating bird mortality. This will be estimated using the mean of the peak values in each of two seasons (breeding season and non-breeding season) as the primary input values. The expected (and proposed) displacement and mortality values for each species are shown in Table 2-35.

Table 2-35 Proposed Displacement and Mortality Rates for Key Species

SPECIES	SPECIES DISPLACEMENT RATE	MORTALITY RATE
Kittiwake	30%	2%
Guillemot	50-60%	1%
Razorbill	40-60%	1%
Puffin	10-30%	1%
Fulmar	10-30%	1%
Gannet	60 – 80%	<1%

If possible, the assessment of displacement will also include the use of SeabORD (Searle *et al.*, 2018). Existing and additional tracking data are unlikely to prove suitable for running this model, but methods being developed as part of the CEF may allow this model to be used with other seabird abundance predictions (e.g. Waggitt *et al.*, 2020).

Population modelling will be used to determine the consequences of impacts on seabird populations. These will either be bespoke Leslie matrix models, for gannet, following the guidance from Marine Scotland (Searle *et al.*, 2020), or the Natural England PVA App (Searle *et al.*, 2019), for other species. Input demographic parameters will use the values summarised in Horswill & Robinson (2015). Metrics will follow the recommendations of Cook & Robinson (2016) with Counterfactuals of Population Size (CPS) and Counterfactuals of Population Growth rate (CPG) being the primary methods. Predicted growth rates of models will be compared with empirical data from key colonies in the region, where data allow. This is a simple form of validation that will show whether the baseline (without additional impact) model predictions are reasonable. Where these are not considered sufficiently similar to provide useful inference model tuning will be used to change the predicted growth rate to one more similar to the empirical information. Model tuning will change the input parameters to values more likely to be representative of the demographics of the seabird populations within the region using the best available scientific evidence available at the time. Where model predictions are considered to closely match the known population change the value of counterfactual metrics may be less important, and so more meaningful probabilistic metrics may also be reported. Note that counterfactual metrics are not genuine counterfactuals as the comparison is made between two model predictions (i.e. since neither prediction is a fact, one prediction is not a counter to factual information). They are mainly used as they are less sensitive to model misspecification compared with probabilistic metrics (Jitlal *et al*., 2017, Cook & Robinson 2016).

Lighting has the potential to cause attraction for a limited number of seabirds (storm petrels and shearwaters) under specific environmental conditions. These will be discussed and mitigation measures will be described. Impacts from the effects of lighting will only be assessed qualitatively.

2.5.9.1.4 Impact Assessment: Terrestrial Migrants

It is expected that the recent tender from Marine Scotland to develop and apply a stochastic CRM for migratory birds will be the primary method for determining whether the impacts from existing and planned wind farms cumulatively, including the proposal in the Project, are likely to be significant. In the unlikely event that these methods prove to be insufficient the approach taken by WWT (2014) will be applied to the Project alone and to the other projects in the zone of influence of the Project.

2.5.9.1.5 Assessment Approach

The EIA Report ornithology section will consider the potential impacts of the Project on the ornithological features present within the study area. It will summarise the methods used to establish the baseline conditions, and the process used to determine the sensitivity of the species' populations present. The ways in which species might be affected (directly or indirectly) by the construction, operation and decommissioning of the Project will be assessed prior to and after any mitigation measures are considered. In addition, any cumulative effects will be considered, taking together impacts of other offshore wind farm projects, whether operational, consented or at application stage, along with the significance of any predicted effects associated with the Project.

European sites with respect to offshore ornithology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with offshore ornithology features and assess the adverse impact on the integrity of the European site.

2.5.9.2 EIA Methodology

The offshore ornithology EIA will be undertaken in line with the broad methodology set out in section 1.4.2. The CIEEM guidelines for ecological impact assessment (CIEEM, 2019) will be used as a framework for the EIA.

For each bird species requiring assessment in the EIA their importance 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 impact assessment will involve:

- Identifying and characterising impacts and their effects on populations;
- Incorporating measures to avoid and mitigate negative impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

After the application of relevant mitigation measures the significance will be assessed on the residual impact. The determination of significance will be specific to the nature of the predicted impact and the potential for population level effects at an appropriate scale. These will be assessed using PVA, where necessary. For instance, where a species is predicted to be vulnerable collisions and the predicted impact would result in greater than a 1%-point change in adult survival a PVA would be used to assess the significance using recommended metrics.

Cumulative effects will be assessed using the CEF currently being developed for Marine Scotland. It is expected that this tool will be delivered in early 2022.

The specific legislation and guidance documents outlined below in Table 2-36 will also be considered in relation to the offshore ornithology EIA:

Table 2-36 Legislation and Guidance for Offshore Ornithology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019)	These guidelines promote good practice in EcIA relating to terrestrial, freshwater, coastal and marine environments in the UK and Ireland.
A handbook on environmental impact assessment: Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment process in Scotland (NatureScot, 2018a)	This document provides NatureScot general guidance on EIA.
Recommendations for the presentation and content of interim marine bird, mammal and basking shark survey reports for marine renewable energy developments (NatureScot, 2014)	This document provides NatureScot recommendations on how to collect, analyse and present data for site characterisation survey reports for proposed wave, tidal and offshore wind renewable energy developments.

LEGISLATION / GUIDANCE	SUMMARY
Reports and presentations from the NatureScot "Bird impact assessment guidance workshop for offshore wind"	The marine bird impact assessment guidance workshop was held on 20 February 2020; the aim was to discuss current bird guidance and tools for the impact assessment of marine renewable energy projects and to identify any issues and possible solutions. These documents provide the workshop presentations, action summary and the workshop report which summarises feedback from the workshop, together with an action plan. These documents inform NatureScot guidance that is provided to developers in connection with the ScotWind leasing round.
Seasonal Definitions for Birds in the Scottish Marine Environment (NatureScot, 2020)	This document provides NatureScot guidance for suggested seasonal definitions for birds in the Scottish Marine Environment.
Joint Statutory Nature Conservation Bodies (SNCB) Interim Displacement Advice Note (SNCB, 2017)	This document provides SNCB advice and positioning on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm developments.
SNCB Position Note on avoidance rates for use in collision risk modelling (SNCB, 2014)	This document provides SNCB recommendations on how the OWF industry can appropriately apply findings from the Marine Scotland Science Avoidance Rate Review (Cook *et al*., 2014). This includes providing a summary of SNCB recommendations on best practise impact assessment using CRM.
Gull foraging offshore and onshore: developing apportioning approaches to casework (Quinn, 2019)	This document summarises and makes recommendations on the current scientific understanding of gull foraging behaviour and how it can be used to inform the development of a robust, evidence-based approach for combining onshore and offshore wind farm impact assessments.

In addition to these guidance notes the results from past, current and ongoing research projects from ScotMer[2], Offshore Wind Strategic Monitoring and Research Forum (OWSMRF)[3], and Offshore Renewables Joint Industry Programme (ORJIP)[4] will be utilised where appropriate.

[2] *https://www.gov.scot/policies/marine-renewable-energy/science-and-research/*

[3] *https://jncc.gov.uk/our-work/owsmrf/*

[4] *http://www.orjip.org.uk/*

2.5.10 Scoping Questions

The following questions are posed to consultees to frame and focus responses to the offshore ornithology scoping exercise, which will in turn inform the Scoping Opinions:

- Do you agree that the data sources identified are sufficient to characterise the offshore ornithology baseline in the Offshore EIA?
- Do you agree that all potential impacts have been identified for offshore ornithology receptors?
- Do you agree that relevant species have been scoped in?
- For those impacts scoped in, do you agree that the methods described are sufficient to inform a robust impact assessment?

Collision risk modelling inputs:

- Since no flight height data will be available from digital aerial surveys, is Option 2 and Option 3 using Johnston et al. (2014) only data an acceptable approach?
- Are the flight speed data in Bowgen & Cook (2018) suitable to use for kittiwake and large gulls?
- Are the avoidance rates in Bowgen & Cook (2018) suitable to use for kittiwake and large gulls?

Displacement and mortality rates:

- Are the proposed displacement and mortality rates acceptable for the EIA (Table 2-35)?
- What displacement and mortality rates should be used to assess impacts for gannet and Arctic tern?

Monitoring results:

- Ornithology monitoring results from offshore wind farms in Scottish Waters have been completed (Vallejo et al. 2017), are underway or will be reposting results during the assessment period for this Project. How can the results of these monitoring studies be applied to the assessment of this Project?
- Several sites have reported that gannet macro avoidance rates are almost 100% (e.g. Skov *et al.*, 2018, MFRAG-O meeting minutes 9th July 2020, Rehfisch *et al.*, 2014). Given that these results appear to be universal to date, the assessment of gannets being at risk from collision but not displacement appears to be incorrect. Should the impact assessment for gannet now be to consider displacement as the primary impact source?
- If so, what buffer should be used in the assessment?
- Since the evidence suggests that Gannet macro-avoidance is nearly 100%, what displacement rate and mortality rate should be used in the impact assessment?

Population Viability Analysis:

- Counterfactual metrics are recommended where there is mis-specification of demographic parameters. If parameters are not mis-specified should other metrics be used?
- Is a comparison of empirical and predicted growth rates sufficient for model validation?
- Is model tuning an acceptable approach to population modelling where models do not validate well?

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2.6 Marine Mammals and Megafauna

2.6.1 Introduction

The following section identifies marine mammals (cetaceans and pinnipeds) and other megafauna (e.g. basking sharks, *Cetorhinus maximus*) that may be impacted by the construction, operation and maintenance and decommissioning of the Project. As described in section 1.2.2, any potential effects of pre-construction surveys or UXO clearance to marine mammals will be fully considered and assessed as part of the European Protected Species Licence application and marine licence application required for the surveys and clearance works.

The species of interest are highly mobile, some migratory, and widespread or patchily distributed. Distribution and abundance of many species in the vicinity of the Project differs seasonally.

Species which are likely to occur most frequently within the OAA and associated offshore export cable search areas to Caithness, Orkney and within Scapa Flow, will be considered within this section to provide a baseline of the environment.

Information that may be considered relevant to this section is also presented within the below sections:

- Water and sediment quality, section 2.2;
- Benthic subtidal and intertidal ecology, section 2.3; and
- Fish and shellfish ecology, section 2.4.

This section of the Scoping Report has been prepared by Sea Mammal Research Unit (SMRU) Consulting.

2.6.2 Study Area

The marine mammal and megafauna study area encompasses the OAA and associated offshore export cable search areas to Caithness, Orkney and within Scapa Flow as shown in Figure 2-1. The marine mammal and megafauna information is presented separately for the Offshore Marine Area and Scapa Flow.

Evans *et al*. (2011) provides a review of cetacean and basking shark abundance and distribution in the Pentland Firth and Orkney waters based on data available from 1980 – 2010 and provides particularly relevant context for this EIA Scoping report. It is worth noting however, that the area considered in Evans *et al*. (2011) is larger than the Offshore Marine Area and Scapa Flow, extending from the north Caithness coast from Cape Wrath to Duncansby Head, south to Helmsdale and 15 miles offshore into the North Sea. More recent information, although not specific to Orkney waters, is also considered. Information on the abundance and distribution of marine mammals and megafauna in the study area is available from the Small Cetaceans in European Atlantic waters and the North Sea (SCANS) surveys with the study area falling inside blocks J (SCANS-I and SCANS-II; Hammond *et al*., 2002, 2013) and S (SCANS-III; Hammond *et al*., 2021). Modelled mean density and distribution of cetaceans using a collation of datasets is also available throughout UK waters and includes coverage of the study area (1980 – 2018 in Waggitt *et al*., 2020; 1994 – 2010 in Paxton *et al*., 2016). For pinnipeds, at sea distribution has been modelled based on telemetry, aerial survey and colony count data throughout the British Isles (Carter *et al*., 2020); information relevant to the North Coast and Northern Isles (i.e. Orkney and Shetland) has been summarised here.

2.6.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-37.

Table 2-37 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Pilot Pentland Firth and Orkney Waters Marine Spatial Plan – gov.scot (www.gov.scot)	2016	Scottish Government
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf	2020	OIC
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Digital video aerial surveys of seabirds and marine mammals at the Hexicon Dounreay Tri Project: Final Report	Hexicon AB	2015	HiDef Aerial Surveying
Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters	https://besjournals.onlinelibrary.wiley.com/doi/full/10.1046/j.1365-2664.2002.00713.x	2002	Hammond *et al.*
Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management	https://www.sciencedirect.com/science/article/pii/S0006320713001055	2013	Hammond *et al.*
Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys	https://synergy.st-andrews.ac.uk/scans3/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf	2021	Hammond *et al.*
Abundance and behaviour of cetaceans and basking sharks in the Pentland Firth and Orkney Waters	https://tethys.pnnl.gov/sites/default/files/publications/SNH_Report_419.pdf	2011	Evans *et al.*
Distribution maps of cetacean and seabird populations in the North-East Atlantic	https://besjournals.onlinelibrary.wiley.com/doi/abs/10.1111/1365-2664.13525	2020	Waggitt *et al.*

TITLE	SOURCE	YEAR	AUTHOR
Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources	https://data.jncc.gov.uk/data/01adfabd-e75f-48ba-9643-2d594983201e/JNCC-Report-517-FINAL-WEB.pdf	2016	Paxton *et al.*
Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and basking shark	https://www.nature.scot/doc/naturescot-commissioned-report-594-statistical-approaches-aid-identification-marine-protected-areas	2014	Paxton *et al.*
Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters	https://data.marine.gov.scot/sites/default/files//Scottish%20Marine%20and%20Freshwater%20Science%20%28SMFS%29%20Vol%2011%20No%2012%20Regional%20baselines%20for%20marine%20mammal%20knowledge%20across%20the%20North%20Sea%20and%20Atlantic%20areas%20of%20Scottish%20waters.pdf	2020	Hague *et al.*
Updated abundance estimates for cetacean Management Units in UK waters	https://data.jncc.gov.uk/data/3a401204-aa46-43c8-85b8-5ae42cdd7ff3/JNCC-Report-680-FINAL-WEB.pdf	2021	IAMMWG
Atlas of Cetacean distribution in north-west European waters	https://data.jncc.gov.uk/data/a5a51895-50a1-4cd8-8f9d-8e2512345adf/atlas-cetacean-distribution-web.pdf	2003	Reid *et al.*
Estimated at-sea Distribution of Grey and Harbour Seals	https://data.marine.gov.scot/sites/default/files/SMFS%200825.pdf	2017	Russell *et al.*
Surveys of harbour (common) seals in Orkney in August 2010	https://digital.nls.uk/pubs/e-monographs/2020/216548277.23.pdf	2011	Duck and Morris
Surveys of harbour (common) and grey seals in Orkney, the north coast of Scotland, the Moray Firth and the Firth of Tay in August 2012	https://digital.nls.uk/pubs/e-monographs/2013/572.pdf	2013	Duck and Morris
Aerial survey of harbour (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) in Scotland in 2016: Orkney and the North Coast, the Moray Firth, and part of East Scotland	https://www.nature.scot/sites/default/files/2019-09/Publication%202019%20-%20SNH%20Research%20Report%201005%20-%20Aerial%20survey%20of%20harbo	2019	Duck and Morris

TITLE	SOURCE	YEAR	AUTHOR
	ur%20and%20grey%20seals%20in%20Scotland%20in%202016.pdf		
Fine-scale harbour seal at-sea usage mapping around Orkney and the North coast of Scotland	https://data.marine.gov.scot/sites/default/files//SMFS%200727_0.pdf	2016	Jones *et al.*
Habitat-based predictions of at sea distribution for grey and harbour seals in the British Isles	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf	2020	Carter *et al.*
Scientific Advice on Matters Related to the Management of Seal Populations: 2020	http://www.smru.st-andrews.ac.uk/files/2021/06/SCOS-2020.pdf	2021	Special Committee on Seals (SCOS)
Sighting Atlas 2020	Orkney Marine Mammal Research Institute (OMMRI)	2020	OMMRI
Protected sites	https://gateway.snh.gov.uk/natural-spaces/inspire_download.atom.xml	2021	NatureScot

2.6.3.1 Site-Specific Surveys

Site-specific digital aerial surveys have been commissioned over the OAA plus a 4 km buffer; surveys commenced inJuly 2020 to collect baseline characterisation data on seabirds and marine mammals. Surveys are expected to occur on a roughly monthly basis with 17 surveys in total commissioned and completed to date. The survey design consists of 21 strip transects spaced at 2 km intervals orientated roughly north to south.

Surveys are undertaken using an aircraft equipped with four HiDef Gen II cameras with sensors set to a resolution of 2 cm Ground Sample Distance (GSD). Each camera samples a strip of 125 m width, separated from the next camera by ~25 m, to provide a combined sampled width of 500 m within a 575 m overall strip.

The survey programme, data are not yet available for this Scoping Report.

2.6.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-37) has been undertaken to support this Scoping Report. The results are presented below to provide an understanding of the offshore Project environment and inform the Scoping process.

The key features of marine mammals and other megafauna which are likely to require consideration within the EIA are:

- Protected species;
- Marine protected areas designated for the species;
- Haul-out dependence during breeding and moulting (pinnipeds);
- Sensitivity to underwater noise; and
- Cetacean species which have migratory routes which pass through or close to the study area.

The following sections provide information on the key spatial differences for the marine mammal and megafauna assemblage which is understood to use the waters relevant for the following areas:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor (section 2.6.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.6.4.2).

2.6.4.1 OFFSHORE MARINE AREA

2.6.4.1.1 Cetaceans

Evans *et al*. (2011) document nineteen species of cetacean recorded in the Pentland Firth and Orkney waters since 1980. Of these, two species were only recorded as stranded animals. The more abundant cetacean species are the harbour porpoise *(Phocoena phocoena*), white-beaked dolphin (*Lagenorhynchus albirostris*) and minke whale (*Balaenoptera acutorostrata*) (Evans *et al*., 2011; Waggitt *et al*., 2020; Hammond *et al*., 2021). From the summer SCANS-III survey, the density of harbour porpoise in Block S[5] was estimated to be 0.15 animals/km^2 (CV = 0.28); white-beaked dolphins, by comparison, were less abundant with a density of 0.021 animals/km^2 (CV = 0.69) (Hammond *et al*., 2021). The density of minke whales from SCANS-III was estimated to be 0.009 animals/km^2 (CV = 0.75) (Hammond *et al*., 2021). Harbour porpoise occur year-round including waters off west Hoy, west Mainland of Orkney and south in the Pentland Firth including Thurso Bay. Sightings of minke whale and white beaked dolphin tend to be more seasonal, with peaks during summer months (Evans *et al*., 2011). Evans *et al*. (2011) reports that sightings of killer whales (*Orcinus orca*) were as common as those for white-beaked dolphins, although their distinctiveness likely contributes to sightings being reported rather than reflect true abundance of the species. Other delphinid species (the taxonomic family of cetaceans containing marine dolphins) occurring less regularly in the area include Atlantic white sided dolphin (*Lagenorhynchus acutus*), common dolphin (*Delphinus delphis*) and long-finned pilot whale (*Globicephala melas)*. Densities of both Atlantic white-sided and common dolphin are likely to be higher in the summer than winter, as they are distributed further offshore (Waggitt *et al*., 2020) as evident in the predominance of sightings on the west coast of Hoy and mainland Orkney (Evans *et al*., 2011).

All cetaceans are European protected species and are afforded strict protection under UK law. The nearest protected area to the offshore marine area is the North-East Lewis Marine Protected Area, located approximately 110 km from the OAA, designated for Risso's dolphin (*Grampus griseus*). The abundance and distribution of this

[5] *The SCANS-III survey area is separated into survey blocks.*

species in continental shelf waters is relatively patchy and none were sighted in Block S of the SCANS-III survey (Hammond *et al*., 2021). Sightings were recorded in Block J (0.192 animals/km^2, CV = 0.80) and to a lesser extent Block K (0.013 animals/km^2, CV = 0.76) to the west and north of Lewis (Hammond *et al*., 2021). Collated data from Evans *et al.*, (2011) indicates the species is one of the six cetacean species likely to occur regularly within the study area, with approximately 1,569 individuals observed between 1980 and 2010. It's likely that the species forages within the study area, although the presence of calves in some groups suggests the area may also be used during breeding, which usually occurs between March and July (Baines and Evans, 2009; Evans, *et al.*, 2011).

The EIA baseline characterisation will consider the available information on harbour porpoise, white- beaked dolphin, Risso's dolphin and minke whale.

Cetaceans are sensitive to noise, particularly that associated with the construction phase of offshore wind farms, such as those employing pile driving (Brandt *et al.*, 2011; Marmo *et al.*, 2013; Thompson *et al.*, 2020). Exposure to pulsed, intensive sounds can cause either temporary or permanent shifts in hearing thresholds of marine mammals, with potential implications for their ability to communicate, forage and socialise (for review see Clark 1991). Noise propagated from operational wind turbines may also impact marine mammals, especially those adapted to low frequency sounds, (Southall *et al*., 2019) such as minke whales (Marmo *et al*., 2013). However, impacts on marine mammals during construction are likely to be more pronounced than during operation, due to the high source levels and broad bandwidth of sound associated with activities such as pile driving (Richardson *et al*., 1995). Whilst the potential for auditory injury is more likely at closer distances to pile driving activities (depending on the hammer energy, bathymetry etc), the potential for behavioural disturbance can occur over 10's of kilometres (Bailey *et al*., 2010). Species may also be disturbed by increased vessel activity and traffic and associated pollution risk related to site exploration, construction, maintenance and decommissioning (Dolman and Simmonds, 2010).

2.6.4.1.2 Pinnipeds

Harbour (common) seals (*Phoca vitulina*) and Atlantic grey seals (*Halichoerus grypus*; hereafter 'grey seals') occur within the study area and wider Scotland. Protected by national and international legislation, such as the Conservation of Seals Act 1970 and Marine (Scotland) Act 2010, they are also Annex II species of the EU Habitats Directive. Although generally high numbers of both species are present across the UK, many localised populations have fluctuated over recent decades, with some regions experiencing rapid growth compared to substantial declines in others (SCOS, 2021). The study area is located within the North Coast and Orkney seal management area, designed to assist with the regulation of seal licences and monitoring.

The UK is estimated to support approximately 36% of the worlds grey seal breeding population, 81% of which is distributed at colonies in Scotland, primarily concentrated in the Outer Hebrides and Orkney (Baxter, 2011; SCOS, 2021). In north and west Scotland, pupping occurs between September and late November. The most recent pup count of grey seal for the North Coast and Orkney seal management area for 2016-2019 was 8,599 (SCOS, 2021). Pup production at Orkney colonies increased from 1985 but has plateaued since 2010 (SCOS, 2021). At-sea relative densities of grey seals, based on region-specific habitat models of telemetry, aerial survey and ground count data since 2005, are shown in Figure 2-25. Localised regions of higher density are generally concentrated closer to haul-out sites (Carter *et al.*, 2020) but grey seals frequently forage over 100 km from their haul-outs and occur throughout the Offshore Marine Area (Figure 2-25). Carter *et al*. (2020) reports a maximum distance travelled by grey seals from the haul-out as 448 km.

The UK harbour seal population is also primarily concentrated in Scotland, supporting about 85% of the total UK population (SCOS, 2021). Orkney was one of the strongholds for the species until the late 1990s, when colonies began rapid decline. Since 1997, the Orkney harbour seal population has declined by 85% (Morris *et al.*, 2021).

Within the Orkney and North Coast Management Area, a 33.5% reduction in population size was estimated, equating to annual declines of 13% (Duck and Morris, 2019). The most recent pup counts for the North Coast and Orkney seal management area based on counts between 2016 -2019 was 1,405 (SCOS, 2021). Carter *et al.* (2020) estimated relative mean at-sea densities of harbour seals based on region specific habitat models of telemetry, aerial survey and count data (Figure 2-26). Harbour seals typically forage within 30-50 km from the coastline, although longer travel distances do occur (e.g. Carter *et al.*, 2020 gives a maximum distance from a haul-out as 273km). There is some overlap with the OAA (Figure 2-26) but usage tends to be higher closer to land and out with the Offshore Marine Area (but high in Scapa Flow – see section 2.1.4.2). Telemetry tracks of tagged harbour seals between 2001 and 2018 indicate occasional use of the OAA during foraging (Hague *et al.*, 2020). Evidence suggests that the prey composition of the diet differs between grey and harbour seals, which could suggest disparities in habitat preference between the two species (Wilson and Hammond, 2019).

SACs designated for the protection of both species are in the vicinity of the OAA, with Faray and Holm of Faray and North Rona SACs (located 82 km and 97 km from the centre of the OAA) designated for grey seals and Sanday SAC (located 106 km from the centre of the OAA) for harbour seals. Proximity to other known seal colonies and haul-out sites should also be considered, with Selwick haul-out site overlapping with the eastern edge of the Orkney offshore export cable corridor search area and Sule Skerry grey seal breeding colony located 5 km from the western boundary of the OAA (Figure 2-27).

Pinnipeds are also sensitive to disturbance and potential injury from noisy activities. Hastie *et al*. (2015) reported the potential for auditory damage in harbour seals monitored from tag devices throughout pile driving activities at a site off south-east England. Displacement of harbour seals during offshore wind farm construction has been reported, but changes in use of the area were temporary and associated only with pile driving (Russell *et al.*, 2016). Aarts *et al.*, (2018) reported diverse behavioural responses of grey seals to pile driving up to 36 km away, although larger and more frequent changes occurred closer to the pile driving activity. Noise from operational windfarms appears to have little impact on pinnipeds, and both grey and harbour seals may utilise offshore infrastructure for foraging (Russell *et al.*, 2014).

2.6.4.1.3 Other Marine Megafauna

Other marine megafauna not detailed, such as turtles, may occasionally use the area, but likely in such low abundances that it would be difficult to assess potential impacts of the Project. There are occasional sightings of live leatherback turtles (*Demochelys coriacea*) in Orkney waters (OESEA3, 2016).

Protected under the Wildlife and Countryside Act (1981) and in Scotland by the Nature Conservation Act (2004), basking sharks are seasonally abundant within the UK, primarily concentrated in three hotspots: west Scotland, Isle of Man and southwest England (Southall *et al.*, 2005; Witt *et al.*, 2012). Aggregations of the species are usually recorded between spring and autumn in relatively shallow continental shelf environments, likely related to seasonal tidal fronts and associated feeding opportunities and reproduction (Southall *et al.*, 2005; Duck *et al.*, 2006). Distribution of copepods, the species primary food source, is likely to affect these distributions, with zooplankton typically moving to offshore, deeper water over winter (Beaugrand *et al.*, 2001). Historically distributed in the west of Scotland, increased abundance has been noted around Shetland and Orkney, perhaps linked to higher sea surface temperatures (Evans *et al.*, 2011). Evans *et al.* (2011) recorded 345 basking sharks between 1980 and 2011, peaking between July and September; there were some sightings within the Offshore Marine Area. Paxton *et al*. (2014) also noted increased presence of basking shark in Scottish waters during July and September. There are no agreed management units for basking sharks in UK waters.

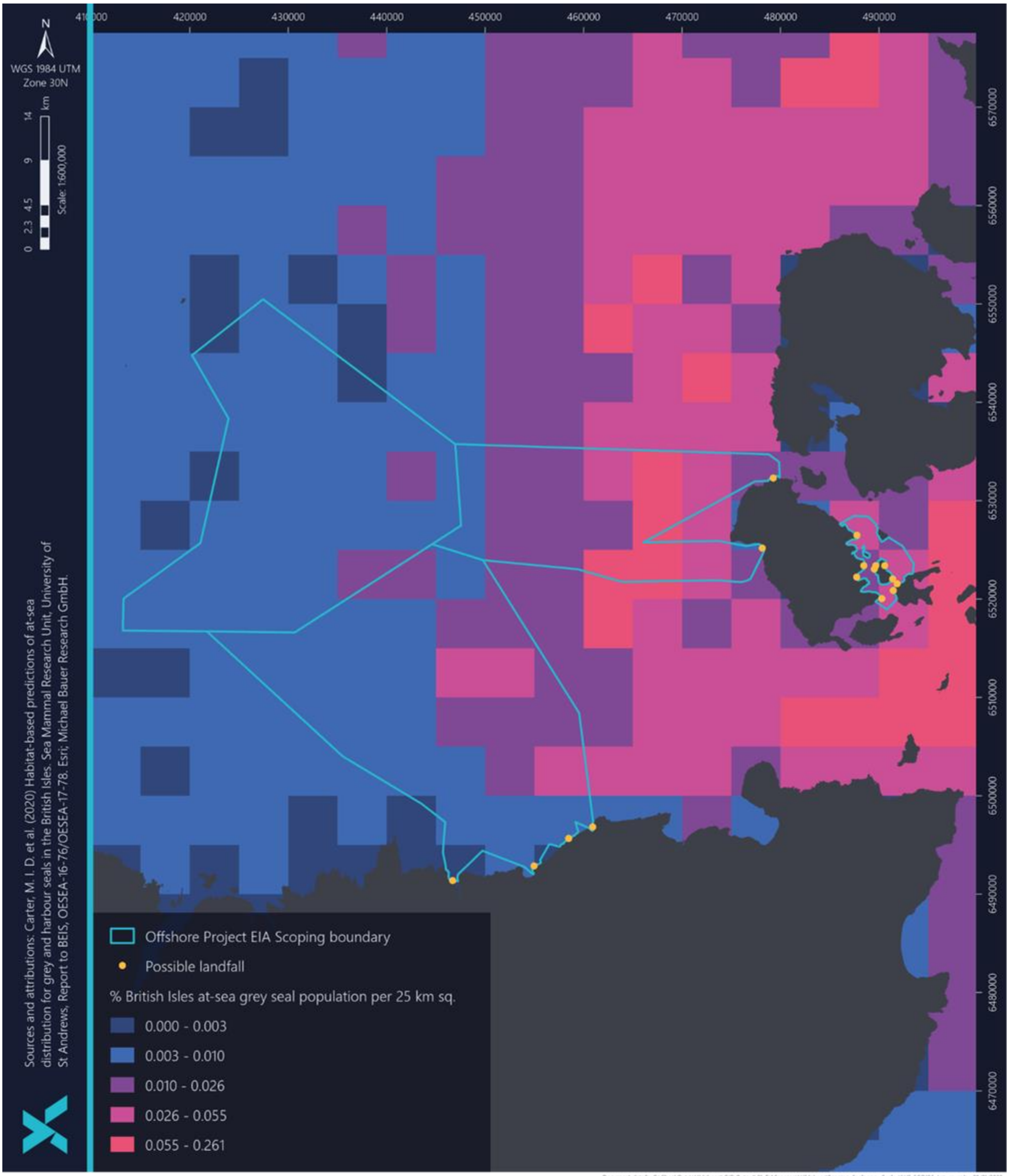

Figure 2-25 Predicted At-sea Relative Mean Density for Grey Seal from Carter et al. 2020

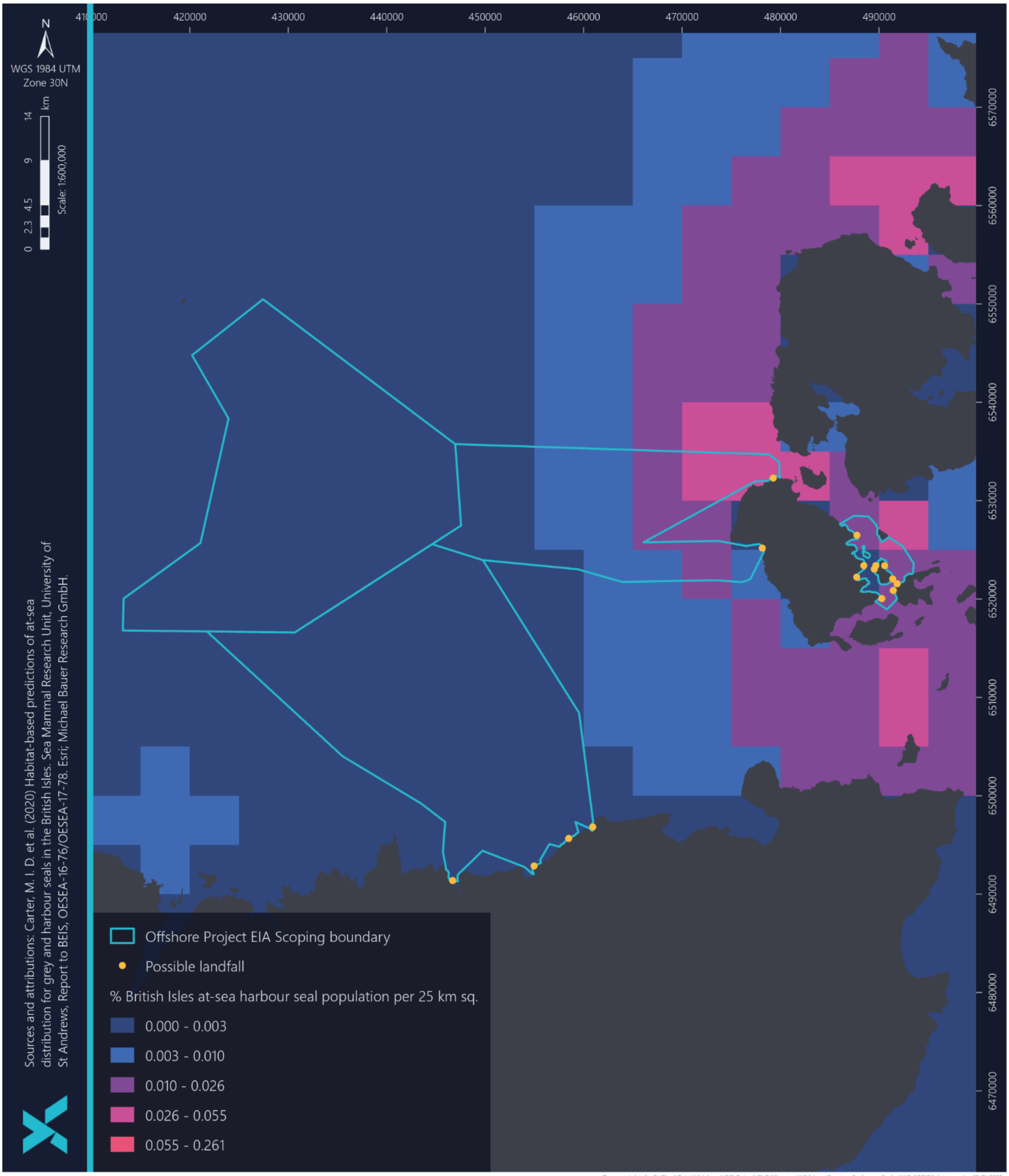

Figure 2-26 Predicted At-sea Relative Mean Density for Harbour Seal from Carter et al. 2020

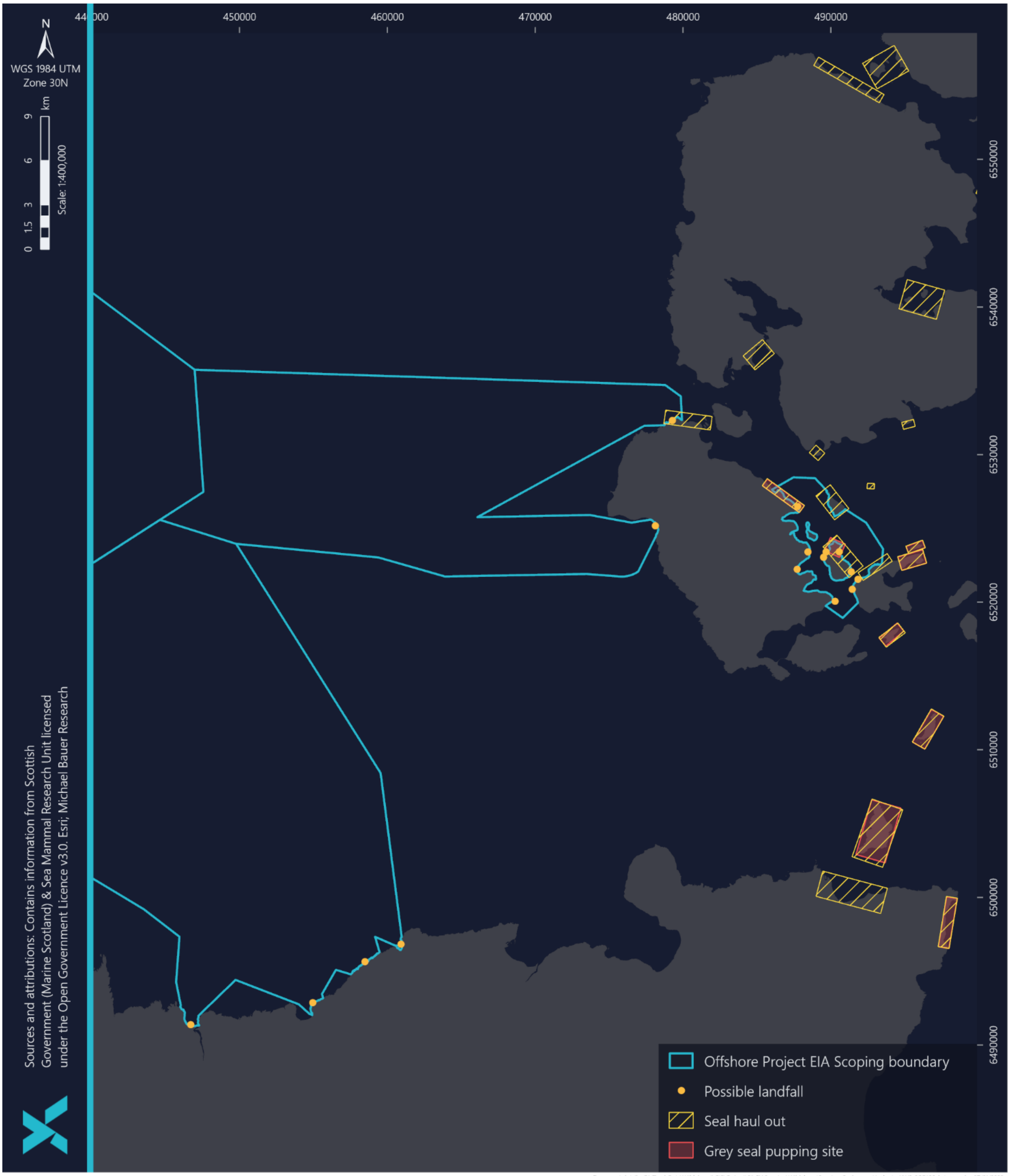

Figure 2-27 Seal Haul-outs and Pupping Sites in the Vicinity of the Study Area

2.6.4.2 SCAPA FLOW

2.6.4.2.1 Cetaceans

Enclosed and shallow, Scapa Flow is predominantly characterised by a sand and gravel substrate, with areas of high tidal power and fast tidal currents directly to the south in the Pentland Firth and to the west in the Hoy Sound (Jones *et al.*, 2016). The presence of several islands makes the area more enclosed, leading to it being less likely to be frequented by the wide range of cetacean species which are present to the west, such as white-sided dolphin and long-finned pilot whale. As in the Offshore Marine Area, several cetacean species are likely to be present, with harbour porpoise, white-beaked dolphin and minke whale likely to be the most numerous (Evans *et al.*, 2011; Waggitt *et al.*, 2020). Harbour porpoises commonly occur in relatively high densities within Scapa Flow, but also other species, such as common dolphin have also been recorded in large groups ranging between 10 and 50 individuals (Evans *et al.*, 2011). Cetacean densities within the Scapa Flow are likely comparable to the wider Offshore Marine Area, and apparent relatively higher densities of some species, including killer whales and common dolphin, in the Scapa Flow reported in Evans *et al*. (2011) may be a consequence of bias in observation effort.

There are no SACs or other protected areas designated for cetaceans within Scapa Flow, with those in proximity to the Offshore Marine Area outlined in the previous section. Effects of noisy activities on cetaceans, such as those associated with construction, operation and decommissioning of wind turbines, can be found in section 2.6.4.1.1.

2.6.4.2.2 Pinnipeds

The Scapa Flow area includes several designated haul-out sites (Section 117 Marine (Scotland) Act 2010) for harbour and grey seals, which are terrestrial locations used during rest, moult and breeding. Relevant designations are those at Cava, North and East Fara and Flotta Oil Terminal; breeding colony haul-out is located at northeast Hoy, Calf of Flotta and North Flotta. Intentional or reckless harassment of seals at these haul-outs is an offence.

In line with the rest of the Orkney and Pentland Firth seal populations, harbour seal populations within Scapa Flow are also declining (Duck and Morris, 2011). Telemetry data of harbour seals around Orkney (Jones *et al.*, 2016) indicate Scapa Flow is likely to be used regularly by the species with usage maps created for the region indicating higher mean densities in the northwest and east, close to Stromness and Burray. Since the species utilises a central-place foraging strategy, in which regular foraging trips are conducted from a haul-out site, it is expected that haul-out sites broadly link to at-sea distributions. Scapa Flow is characterised in some areas by high tidal power and fast currents, with harbour seal densities generally higher in areas with lower tidal power. Data suggested use of localised regions differed seasonally, with telemetry data indicating seal movement was primarily located outside of the Scapa Flow region in summer with increased movement within the Pentland Firth, compared to winter where seals were also concentrated within Scapa Flow (Jones *et al.*, 2016). It is likely that many individuals use the area during foraging, breeding and as 'commuting corridors'.

Several grey seal haul-out sites are present within Scapa Flow, with that located at Flotta likely to be one of the closest to the Scapa Flow offshore export cable corridor search area (and search areas associated with the onshore infrastructure). As central-place foragers, grey seals at Flotta will likely forage within the Scapa Flow area during the breeding season.

Sensitivity of pinnipeds to underwater noise, in particular that associated with the construction, operation and decommissioning of wind turbines, can be found in section 2.6.4.1.2.

2.6.4.2.3 Other Marine Megafauna

Basking sharks are likely to be present intermittently within Scapa Flow, with Evans *et al.* (2011) recording multiple observations. Distributions are likely to be predominantly driven by seasonal tidal fronts and associated prey assemblages (Southall *et al.*, 2005; Duck *et al.*, 2006). Paxton *et al*. (2014) predicted highest densities of basking sharks west of Tiree, west of Islay (supported by effort and observation) and west of the Outer Hebrides; densities were relatively low even in summer in Orkney waters. Observations reported in Evans *et al*. (2011) suggest a higher occurrence of basking sharks in the Scapa Flow compared to the Offshore Marine Area (Figure 2-28).

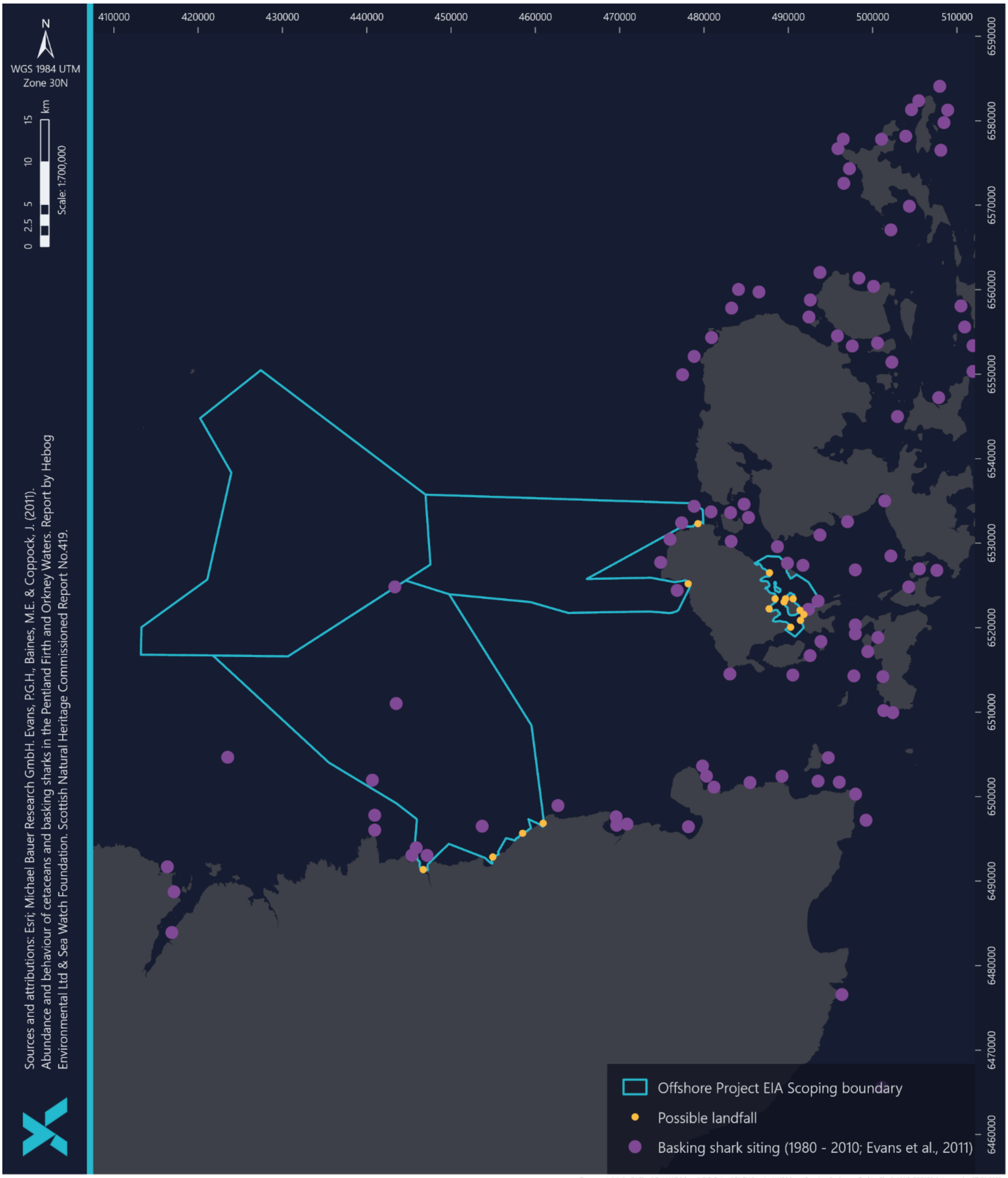

Figure 2-28 Distribution of Basking Shark Sightings 1980 – 2010 Taken from Evans et al. (2011)

2.6.4.3 Summary and Key Issues

Table 2-38 Summary and Key Issues for Marine Mammals and Megafauna

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE SEARCH AREA AND ORKENY OFFSHORE EXPORT CABLE SEARCH AREA
	• No designated sites for the protection of cetaceans within 100 km of the OAA or offshore export cable corridors; • Potential interactions with species sensitive to noise associated with construction primarily, but also operation and decommissioning: – Harbour porpoise and delphinids, minke whale, grey seal and harbour seal susceptible to potential damage to hearing and hearing loss from construction activities; and – Minke whale may also be sensitive to low frequency band sounds emitted during wind farm operation.; • Overlap between vessel traffic associated with site exploration, construction, maintenance and decommissioning with regularly occurring species including harbour porpoise, white-beaked dolphin, harbour seal and grey seal; • Potential interaction with grey seals at haul-out sites located at Selwick and Sule Skerry, located within the Orkney offshore export cable corridor and 5 km from the western edge of the OAA respectively; • Potential interaction with grey seals at haul-out sites at Faray and Holm of Faray and North Rona SACs (82 km and 97 km from the centre of the OAA respectively); • Potential interaction with harbour seals associated with haul-out sites at Sanday SAC (106 km from the centre of the OAA); and • Potential interaction between basking sharks (which are sensitive to EMF effects) and offshore cables.
	SCAPA FLOW – OFFSHORE EXPORT CABLE SEARCH AREA THROUGH SCAPA FLOW
	• Potential interaction with vessels associated with construction and operation and species present in relatively high densities, such as harbour porpoise, white-beaked dolphin and seals; • Potential interaction between harbour and grey seals from haul-out sites at Cava, North and East Fara and Flotta; and • Potential interaction between basking sharks (which are sensitive to EMF effects) and offshore cables.

2.6.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-23.

Table 2-39 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Cables will be buried as the first choice of protection. External cable protection will be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a CBRA and implemented through CaPs.	Primary	Established within the design principles of the Project and presented within CaP a condition of Section 36 and / or Marine Licence consent.
2	Development and adherence to a Piling Strategy which delineates the noise mitigation measures will be implemented during piling activities (e.g. soft-start and ramp-up procedures) to reduce potential underwater noise effects during construction.	Tertiary	Piling Strategy will be a condition of Section 36 and / or Marine Licence consent.
3	The development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan and INNS Management Plan.	Tertiary	EMP will be a condition of Section 36 and / or Marine Licence consent.
4	The development of, and adherence to, an appropriate CoCP.	Tertiary	CoCP will be condition of Section 36 and / or Marine Licence consent.
5	The development of, and adherence to, a Decommissioning Programme.	Tertiary	Decommissioning Programme will be a condition of Section 36 and / or Marine Licence consent.
6	Development of and adherence to a VMP.	Tertiary	Vessel Management Plan will be a condition of Section 36 and / or Marine Licence consent.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on marine mammals and megafauna receptors and will be consulted upon with consultees throughout the EIA process.

2.6.6 Scoping of Impacts

Several potential impacts on marine mammal and megafauna receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project, in addition to multiple impacts on marine mammals and megafauna receptors which are proposed to be scoped out of the assessment. These impacts are outlined, together with justification.

Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

Table 2-40 EIA Scoping Assessment for Marine Mammals and Megafauna

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Noise related impacts associated with construction, including physiological impacts, barrier effects and displacement	2, 3, 4	Scoped In	Impact piling during construction can cause injury and/or behavioural disturbance of marine mammals and megafauna. Piling noise can have significant effects on the distribution and habitat use of marine mammals, but mitigation measures ensure impacts are generally temporary. Evidence suggests that negative disturbance effects associated with piling are not likely to be long-lasting, with displaced animals returning to the site once piling has ceased. However, disturbance to protected species or those associated with protected sites will require further consideration. Other non-piling construction activities should also be considered. If floating WTGs are decided upon, then noise disturbance associated with the installation of anchors will need to be considered for potential impacts on marine mammals.	• Site-specific density and abundance estimates to describe the baseline; • Habitat models of species distribution and use; • Predicted underwater noise levels for the construction period; and • Available desk-top information to inform assessment of impact.	Underwater noise modelling will be undertaken based on the maximum design scenario associated with the Project Design Envelope. Noise outputs will be used to understand impacts on marine mammals, with reference to noise exposure guidelines.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Indirect effects of construction noise on marine mammal prey species	2,3, 4	Scoped In	Changes in prey availability and distribution associated with increased noise may negatively affect foraging efficiency and prey availability of marine mammals and marine megafauna. Several fish species that are sensitive to noise disturbance are prey for marine mammals, and include sprat, herring, cod and whiting; these prey species all potentially spawn in the offshore study area.	• Site-specific density and abundance estimates to describe the baseline; • Habitat models of species distribution and use; and • Available desk-top information to inform baseline and assessment of impact.	Underwater noise modelling will be undertaken based on the maximum design scenario in the Project Design Envelope. The noise emissions will be combined with the potential noise exposure guidelines in relation to prey species for marine mammals and megafauna. Indirect effects inferred from these outputs.
Vessel disturbance	3, 4, 6	Scoped In	Vessel traffic (passenger, cargo and other vessel activities) within the areas form part of the existing baseline. Increased vessel traffic during construction and decommissioning may increase the risk of disturbance to marine mammals and megafauna	• Site-specific density and abundance estimates to describe the baseline; and • Available desk-top information to inform assessment of impact.	Assessment will be conducted based on the worst-case scenario in the Design Envelope.
Risk of injury of marine mammals and	3, 4, 6	Scoped Out	Increased localised vessel traffic associated with construction is not	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
megafauna from collision with installation vessels			expected to significantly increase the risk of collision to marine mammals and basking sharks. Management of vessel movements for other sea users will contribute to minimising negative effects to marine fauna. Transit speeds and routes will be pre-determined and vessel size will be small relative to others already utilising the area (e.g. cargo ships). Further measures to ensure risks of collision is minimised, including maintaining manned bridges and providing awareness training of vessel crew. The appropriate guidance to minimise risk of injury to marine mammals will be adhered to.		
Associated impacts with decreasing marine water quality including increasing turbidity	1, 3	Scoped Out	Increased turbidity associated with installation (e.g. jet trenching) and decommissioning activities are unlikely to be prolonged, with settlement out of the water column expected to occur within hours or days. Marine mammals and other megafauna regularly utilise highly turbid waters during foraging with no known negative impacts to overall health. Species may also use additional sense organs such as vibrissae (whiskers),	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			echolocation and electro-sensory organs (basking sharks) to navigate in such conditions.		
Injury and disturbance from decommissioning activities generating noise	2, 3 and 5	Scoped In	Like construction activities, underwater noise generated during decommissioning may result in temporary or permanent hearing damage or temporary displacement.	• Site-specific density and abundance estimates to describe the baseline; • Habitat models of species distribution and use; and • Available published reports and peer-reviewed literature to provide baseline information.	Assessment will be conducted based on the worst-case scenario in the Design Envelope.
Habitat change, including foraging opportunities, with decommissioning	3, 5	Scoped In	Possibility for changes in prey abundance and distribution resulting from decommissioning which may affect foraging efficiency.	• Site-specific density and abundance estimates to describe the baseline; • Habitat models of species distribution and use; and • Desk-top review to inform the baseline.	Assessment will be conducted based on the worst-case scenario in the Design Envelope.
Other temporary effects associated with decommissioning	3, 5, 6	Scoped In	Potential impacts are likely to be similar to those experienced during construction, such as displacement or barrier effects	• Available published reports and peer-reviewed literature to	Assessment will be conducted based on the worst-case

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			from physical presence of vessels and infrastructure, risk of injury or decreasing water quality although these are expected to be temporary, with no permanent negative effects.	provide baseline information. • Digital aerial survey programme to gain site-specific density and abundance estimates.	scenario in the Design Envelope.
Accidental release of pollutants	3 ,4 ,5	Scoped Out	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment. Any release is likely to facilitate high dispersal and there will be limited interaction with marine mammals and megafauna. 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 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	n/a	n/a

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			controlled and procedures will be in place to minimum the impact of any accidental release if it occurs, and hence the impact has been scoped out of the EIA.		
Operations and Maintenance					
Disturbance from vessel traffic	3, 4, 6	Scoped Out	Increased vessel traffic associated with the operation and maintenance of the Project may disturb populations, although this is likely to be at a much lower level than during commission and decommission. Disturbance is likely to be intermittent.	N/A	N/A
Noise related impacts during operation	3, 4	Scoped Out	Evidence suggests operational noise is substantially lower than that produced during construction and extends short distances from WTGs. No disturbance impacts (including displacement and barrier effects) are considered to act on marine mammal or megafauna. Impacts associated with floating infrastructure, e.g. mooring lines, are not expected to negatively impact marine mammals and megafauna.	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Increased vessel activity and associated collision risk	3, 4, 6	Scoped Out	Localised increased traffic associated with operation and maintenance will increase the risk of collision, but it is not expected to be significant against the current baseline. Embedded mitigation will reduce the risk of collision. As per construction.	N/A	N/A
Habitat change, including foraging opportunities	3, 4	Scoped In	Changes in prey abundance and distribution resulting from operation and maintenance activities may impact foraging success. Infrastructure may deter marine mammals and basking sharks from using the area; however, some evidence supports higher use of areas with infrastructure due to "reef effects"	• See section 2.4 on Fish and Shellfish for more detail; • Available published reports and peer-reviewed literature to provide baseline information; • Site-specific density and abundance estimates to describe the baseline; • Habitat models of species distribution and use.	Assessment will be conducted based on the worst-case scenario in the Design Envelope.
Displacement or barrier effects associated with physical presence of	3, 4	Scoped In	New infrastructure in the marine environment has the potential to deter individuals from areas through barrier effects to movement. This impact pathway	• Evidence from currently operational offshore wind farms;	Assessment will be conducted based on the worst-case

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
devices and infrastructure			is not fully understood for floating renewable energy projects in which mooring lines and cables could inhibit movement.	• Site-specific density and abundance estimates to describe the baseline; and • Habitat models of species distribution and use.	scenario in the Design Envelope.
Entanglement with moorings (floating WTG)	3, 4	Scoped In	Although entanglement in moorings is unlikely to pose a major threat to marine megafauna, cetaceans and basking sharks are legally protected and should therefore be considered. Derelict/lost fishing gear has the opportunity to entangle in moorings, which could increase the chance of marine mammal entanglement. The likelihood of this is not well understood. Risk posed by the project array will vary depending on device spacing, mooring design and array layout.	• Available published reports and peer-reviewed literature to provide baseline information; • Site-specific density and abundance estimates to describe the baseline; and • Habitat models of species distribution and use.	Assessment will be conducted based on the worst-case scenario in the Design Envelope.
Risk associated with electromagnetic fields (EMFs) associated with subsea and midwater cabling	1, 3	Scoped Out	Cables will emit EMFs, the highest of which will be associated with high-voltage export cables (AC or DC). Behavioural and physiological effects are not well understood outside of laboratory conditions; elasmobranchs (including basking sharks) are sensitive to EMF but	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			most effects are expected only in close proximity to cables and would be minor and temporary and unlikely to affect survival or reproduction. It is not expected that basking sharks would be negatively affected on an individual or population basis (Copping and Hemery, 2020). Considering the potential for basking sharks to be present in low numbers in the vicinity of the Project, barrier effects from EMF are not considered to occur.		
Accidental release of pollutants	3, 4	Scoped Out	Oils and fluids contained within WTGs may be accidentally released intermittently throughout the lifetime of a WTG. Most of these substances are organic, composed of water and nitrogen with approximately 13% consisting of non-organic oils and grease. The reduced density of these non-organic components and likely slow release of such components in a high tidal environment like the one surrounding the Project is likely to facilitate high dispersal and there will be limited interaction with marine mammals and megafauna.	N/A	N/A

2.6.7 Potential Cumulative Effects

There is potential for the impacts from the Project to interact with those from other projects, plans and activities, resulting in a cumulative effect on marine mammal and megafauna receptors (e.g. Pentland Floating Offshore Wind Farm, SHET-L Caithness to Orkney interconnector and other ScotWind OWF lease areas located off the northern coast of Scotland). The cumulative impacts of noise will need to be considered because of the potential for impacts over wide areas. The main sources of noise associated with the Project to effect marine mammals and other megafauna will occur primarily occur during construction, due to pile driving. The timing of construction at the Project will need to be considered in the context of any other developments occurring within the region and for marine mammals, the relevant management units. Other activities may contribute to the cumulative assessment of noise including vessel traffic from surrounding projects and other marine users such as seismic surveys, commercial shipping and passenger vessels.

The marine mammal and megafauna CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

2.6.8 Potential Transboundary Impacts

There is the potential for transboundary impacts upon marine mammals and other megafauna to occur during the construction, operation, maintenance and decommissioning of the Project. The study area does not extend beyond the limits of Scottish or UK waters and it is not expected there will be direct impacts on any other European countries. However, due to the highly mobile nature, large foraging ranges and large management units (IAMMWG, 2021) associated with many marine mammal and megafauna species there is potential for some receptors to move outside these limits and impacts on populations whose ranges extend beyond UK waters may occur. Therefore, transboundary impacts on marine mammals will be considered.

2.6.9 Approach to Analysis and Assessment

2.6.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on marine mammals and megafauna will utilise Project-specific and publicly available data (see section 2.6.3) and will be augmented by consultation during the EIA phase. In order to facilitate resource effective stakeholder consultation through the development phase of the Project, a marine ecology working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs.

Key consultees to inform the marine mammals and megafauna impact assessment include:

- Marine Scotland Science;
- NatureScot;
- Whale and Dolphin Conservation Society; and
- Orkney Marine Mammal Research Initiative.

The Project has already undertaken some initial consultation with Marine Scotland and NatureScot with regards to the marine mammal and megafauna issues associated with the Project.

Site-specific digital aerial survey data will inform the baseline at-sea distribution and abundance data for marine mammals and other megafauna, augmented by any existing datasets from telemetry studies of seals and modelled datasets in Orkney and wider Scottish waters. Modelling, where appropriate, can be used to fit density surfaces and provide information on drivers of marine mammal distribution; this may include incorporation of local information on prey collected during fish surveys to be undertaken by the Project. This approach will form an important baseline for EIA.

Both direct and indirect impacts will be assessed. Direct impacts include those generated by direct interaction of the project activities with marine mammals (e.g. underwater noise) and other megafauna (e.g. EMF). Indirect pathways are those that are produced as a result of an impact pathway, for example, habitat loss and disturbance that may impact foraging opportunities for marine mammals. Assessments will be based on maximum design scenarios to understand the magnitude of impact.

Noise impacts are a key concern for marine mammals and Project specific noise propagation models will be developed to predict the extent and magnitude of noise levels at the development site. Noise sources will include pile driving and potentially vessel traffic. These will be coupled with agreed noise exposure criteria for marine mammals to determine where thresholds for permanent auditory injury and behavioural disturbance are exceeded. The risk of injury will be based on both dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (peak SPL). To assess the SEL_{cum} criterion, the predictions of received sound level over 24 hours are frequency weighted, to reflect the hearing sensitivity of each functional hearing group. The peak SPL criterion is for unweighted received sound level. Outputs from noise propagation models will also be contoured and overlain with marine mammal density surfaces to quantify the number of marine mammals that will likely be disturbed. For the Cumulative Impact Assessment of disturbance due to noise is to be undertaken, then approaches such as that available in iPCOD[6], will be considered and discussed with consultees.

European sites with respect to marine mammal features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with marine mammal features and assess the adverse impact on the integrity of the European site.

2.6.9.2 EIA Methodology

The marine mammal and megafauna EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-41 will also be considered in relation to the marine mammal and megafauna ecology EIA:

Table 2-41 Legislation and Guidance for Marine Mammals and Megafauna

LEGISLATION / GUIDANCE	SUMMARY
Wildlife & Countryside Act 1981 (WCA)	Protection to all cetaceans found within UK territorial waters (listed in Schedule 5 and 6 of the Act). Section 9

[6] *https://marine.gov.scot/data/interim-population-consequences-disturbance-ipcod-code-update-version-52*

LEGISLATION / GUIDANCE	SUMMARY
	states it is an offence to intentionally kill, injure or take cetaceans. It is also an offence to cause damage or destruction to areas used by cetaceans for shelter or protection or to intentionally disturb animals in these areas.
Nature Conservation (Scotland) Act 2004	Builds upon the Wildlife and Countryside Act 1981. Further improves protection of cetaceans from intentional disturbance by including protection from reckless disturbance.
PMFs, as described in NatureScot Commissioned Report 388; Strategy	The report contains a list of 56 PMFs, which covers 82 individual features of 36 habitats and 46 species. These are further subdivided into 11 individual habitats and 37 species. Cetacean species regularly distributed in inshore Scottish waters were included, such as harbour porpoise, killer whale, minke whale, Risso's dolphin and white-beaked dolphin.
The UK Post-2010 Biodiversity Framework and the Scottish Biodiversity Strategy: Revised Implementation Plan (2018-2020) (JNCC, 2018)	Produced by JNCC and Defra following the Strategic Plan for Biodiversity 2011-2020, Aichi Targets (2010) and EU Biodiversity Strategy (2011). Allow the UK to deliver on international climate strategies and goals and share best practice techniques and standards.
Scottish Marine Wildlife Watching Code (SNH, 2017)	Guidelines and advice for leisure and commercial activities associated with wildlife watching. Includes information detailing activities likely to disturb wildlife, how to safely approach and how to view with minimum disturbance.
The protection of Marine European Protected Species from injury and disturbance: Guidance for Inshore Waters (July 2020 Version) (Marine Scotland, 2020)	Advice and guidance relating to regulations prohibiting the deliberate and reckless capture, injury, killing and disturbance of marine European Protected Species (EPS) in Scottish Waters. Advice is tailored towards cetaceans however it may be applied to marine turtles and Atlantic sturgeon. Guidance may additionally be used by a range of users including regulators, nature conservation agencies, enforcement authorities and competent authorities.
JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) (JNCC, 2017)	Set of mitigation measures to reduce risk of injury to marine EPS during the use of geophysical technologies (e.g. seismic surveys). If followed, risk of injury is likely to be negligible. Guidelines are split by survey planning, mitigation and reporting to increase ease of use.

LEGISLATION / GUIDANCE	SUMMARY
JNCC guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives (JNCC, 2021)	Guidelines outline measures to minimise potential injury from the use of explosives from activities such as harbour construction, well-head or platform decommissioning and unexploded ordinance clearance.
Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010)	Outlines 'best practice' recommendations and guidance to mitigate underwater noise impacts from pile driving during offshore wind farm construction (and any other industries using pile driving).
Guidance on the Offence of Harassment at Seal Haul-out Sites (Marine Scotland, 2014)	Section 117 of Marine Scotland Act 2010 makes it an offence to intentionally harass seals at haul-out sites. The document provides guidance as to what this may entail and advises on what appropriate actions should be taken if harassment is reported.
The Basking Shark Code of Conduct (Shark Trust, n.d.)	Guidelines designed to reduce risk of injury and harassment to basking sharks by different groups (e.g. swimmers, boat-users).

2.6.10 Scoping Questions

- Do you agree with the study area for marine mammals and other megafauna?
- Do you agree that data sources identified (Table 2-37) are sufficient to inform the marine mammal and
- megafauna baseline section?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree all potential impacts have been identified for marine mammal and megafauna receptors?
- For the impacts which are scoped in, do you agree the methods described are sufficient to inform a robust impact assessment?
- Do you agree with the reasoning behind scoping out impacts highlighted as such in Table 2-40?
- Do you agree with the approach for the cumulative effects assessment and for transboundary effects?

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2.7 Commercial Fisheries

2.7.1 Introduction

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

Commercial fisheries is 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. It is recognised that aquaculture is an important industry for Orkney, especially in Scapa Flow, and impacts to aquaculture operators is discussed in the other sea users section in section 2.12.

Information that may be considered relevant to this section is also presented within the below sections:

- Fish and shellfish ecology, section 2.4;
- Shipping and navigation, section 2.8; and
- Socio-economics, section 2.12.

This section of the Scoping Report has been prepared by Xodus Group.

2.7.2 Study Area

The commercial fisheries study area is defined by the ICES rectangles within which the Project resides, including 46E5, 46E6 and 47E5 (Figure 2-29). ICES rectangle 47E6 is also considered as part of the study area due to its close proximity to the OAA and the Orkney offshore export cable corridor search area. Each ICES rectangle boundary extends over 1 degree longitude by 30′ latitude.

Reference is also made to waters outside of these four ICES rectangles where appropriate in order to provide contextual information and relevance for fishing activity on a regional basis.

Given Scapa Flow's geographically distinct location, it is acknowledged that ICES rectangle 46E6 may not be representative of this area, as this ICES rectangle also covers the offshore waters west of Hoy. Therefore, any data discussed at an ICES rectangle scale in reference to the Scapa Flow offshore export cable corridor search area has been considered in the context of data sources at a smaller spatial scale, in order to verify the validity of the data for this area.

2.7.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-42.

Table 2-42 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Surveillance sightings	MMO	2015 – 2019	MMO
Landings data (value) by fishing method, vessel length and species[7]	MMO	2015 – 2019	MMO
Vessel Monitoring System (VMS) values by fishing method (average 2016 – 2019)	MMO	2016 – 2019[8]	MMO
Automatic Information System (AIS) data of fishing vessel tracks	MMO	2017	MMO
ScotMap – Inshore Fisheries Mapping Project in Scotland	https://marine.gov.scot/information/scotmap-inshore-fisheries-mapping-project-scotland	2007 – 2011	Kafas *et al.*, 2014
VMS Amalgamated Fishing Intensity Layers (2009-2013)	http://marine.gov.scot/node/12882	2009 – 2013	Marine Scotland
Data on fishing grounds gathered during consultation meetings, where possible	Various	N/A	Various
Spatial data on fisheries (e.g. areas where fishing is restricted or prohibited)	https://marinescotland.atkinsgeospatial.com/nmpi/ and https://kingfisherrestrictions.org/fishing-restriction-map	2021	NMPi and Kingfisher Information Service
Mapping fisheries and habitats in the North and East Coast RIFG area	https://rifg.scot/news/nafc-marine-centre-report	2021	Shelmerdine and Mouat (2021)
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Pilot Pentland Firth and Orkney Waters Marine Spatial Plan – gov.scot (www.gov.scot)	2016	Scottish Government

[7] *2016-2020 landings data was published in 2021. This data will be utilised in the EIA. It is noted that this data may be skewed by the effects of COVID-19, and as such the appropriateness of this data will be discussed with consultees.*

[8] *The format of the VMS data available through the MMO changed after 2015. For this reason, the most recent four years of data have been analysed.*

TITLE	SOURCE	YEAR	AUTHOR
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/20210107-OIC-Report-V9-screen%20v2.pdf	2020	OIC
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Marine Scotland Salmon and Sea Trout Fishery Statistics and other associated reports	https://data.marine.gov.scot/dataset/salmon-and-sea-trout-fishery-statistics-1952-2020-season-reported-catch-and-effort-method	1952 – 2020	Marine Scotland

2.7.3.1 Project Site-Specific Surveys

No site-specific surveys are planned for commercial fisheries. However, the Project has already had early consultation with some relevant fisheries interests, including the SFF and SWFPA ahead of their bid submission for the ScotWind offshore wind leasing round and consulted the fishing industry ahead of the inshore geophysical surveys around the cable landfalls that have taken place in 2021 and further geophysical surveys in 2022. 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).

Benthic surveys (e.g. geophysical surveys, drop down video and grab sampling) and fish ecology surveys will be used to inform the potential suitability of the seabed habitat for the spawning of commercially important fish species and also to understand the potential for cable burial along the offshore export cable corridor search areas.

2.7.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-42) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The following sections provide information on the key spatial differences across the study area for commercial fishing activity:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area (section 2.7.4.1); and

2. The Scapa Flow offshore export cable corridor search area (section 2.7.4.2).

2.7.4.1 OFFSHORE MARINE AREA

2.7.4.1.1 Restricted Areas

The Dounreay closed area shown on Figure 2-29 is closed to all fishing year-round due to potential hazards to human health from any fish or shellfish which are caught in that area (Marine Scotland, 2019). The presence of the closed area, which directly overlaps with the Caithness offshore export cable corridor search area at the Dounreay landfall, reduces the fishing activity in this particular area. There are also seasonal restrictions (from 1st May to 30th September) on the use of mobile or active gear (encompassing dredges and trawls) along sections of the western coastline of Orkney at (The Berry to Costa Head restricted area) which overlaps with the Orkney offshore export cable corridor search area, and a permanent restriction for these gear types at Thurso and Dunnet Bay, which lies east of the Caithness offshore export cable corridor search area (Kingfisher Information Service, 2021).

2.7.4.1.2 Fisheries Statistics

Landings values from 2015 to 2019 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 2-30. In the study area, landings values are highest in ICES rectangle 47E6 in the northeast of the study area and the lowest landings values are recorded in ICES rectangle 46E5 in the southwest of the study area.

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 study area. Proportionally less landings are recorded for vessels 10 m and under in ICES rectangle 47E5, which is located furthest offshore.

The fishing methods that contribute to the majority of average landings values from the ICES rectangles in the study area include demersal trawls/seines and pots/traps. Average landings values in the north of the study area in ICES rectangles 47E5 and 47E6 are dominated by demersal trawls/seines with proportionally lower landings values recorded for pots/traps compared with ICES rectangles 46E6 and 46E5. Landings by scallop dredges are also recorded in the study area, with the highest values recorded in ICES rectangle 46E5 and 46E6. Other fishing methods recorded with comparably lower landings values, include 'other' passive and mobile gears, gears using hooks, and drift and fixed nets. It should be noted that the variation in seabed features and water depths across the OAA including the Stormy Bank and Whitten Head Bank (discussed in section 2.1), may influence fisheries characteristics.

The species associated with the highest landings values in the study area include brown crab (*Cancer pagurus*), haddock (*Melanogrammus aeglefinus*), mackerel (*Scomber scombrus*), cod (*Gadus morhua*), monkfish/anglerfish (*Lophius spp*), herring (*Clupea harengus*), lobster (*Homarus cottish*) and scallops (*Pecten maximus*). Brown crab comprise higher proportionate landings values in ICES rectangles 46E5 and 45E5, associated with the proportionally higher landings values by pots/traps recorded in these ICES rectangles. Demersal whitefish, mainly haddock and cod, also contribute to a high proportion of landings values in the study area, especially in ICES rectangles 46E6 and 47E6, and other notable demersal species recorded in the landings data include monkfish/anglerfish and squid. Pelagic fish, including herring and mackerel are also recorded with proportionally high landings values in the study area. Overall, these species generally reflect the pattern of landings values by fishing methods described above.

2.7.4.1.3 Vessel Monitoring System (VMS) Data

Average VMS value from 2016 to 2019 for pelagic, demersal, dredge and passive fishing methods are presented in Figure 2-31 to Figure 2-34. This generally indicates that fishing activity by over 15 m vessels is lower in the OAA than in the remainder of the study area and this is consistent with the lower landings values recorded in ICES rectangles 46E5 and 47E5.

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 study area in ICES rectangles 46E6 and 47E6, overlapping with the Caithness and Orkney offshore export cable corridor search areas. Comparably lower average VMS values are present in the OAA in ICES rectangle 46E5 (Figure 2-31).

Figure 2-32 indicates that moderate to high levels of scallop dredging occur in the west of the study area, concentrated in ICES rectangle 46E5 and overlapping with the eastern extent of the OAA and in the Caithness offshore export cable corridor search area. Scallop dredge activity appears to be low in the Orkney offshore export cable corridor search area.

Figure 2-33 shows that fishing activity by passive methods, such as pots and traps, is moderate to high across the study area, concentrated in ICES rectangle 46E5 and 46E6. This is consistent with the high landing values recorded for pots and traps recorded in the study area.

Average VMS values for pelagic fishing methods, displayed in Figure 2-34 indicate that fishing by this method is relatively patchy and low in the area. Pelagic fishing activity in OAA and the Caithness and Orkney offshore export cable corridor search areas is low, and comparably higher in the south of ICES rectangle 46E5.

Amalgamated VMS data from 2009 – 2013 generally corroborates the more recent VMS data, indicating that the key methods operated in the offshore marine area include static fishing methods targeting crab and to a lesser extent lobster, demersal fishing methods and scallop dredges, as well as pelagic fishing for herring and mackerel (Kafas *et al.*, 2013).

VMS data only covers fishing vessels over 15 m in length. ScotMap data indicates that fishing by smaller 10 m and under vessels is likely to be low in the OAA, with activity increased towards the Caithness and Hoy coastlines, mostly for pots / traps targeting crabs and lobster (Kafas *et al.*, 2014). It is acknowledged that this data set is potentially outdated, however, further consultation will be conducted to understand the fishing activity by 10 m and under vessels during the EIA process to confirm or otherwise the fishing activities in Scapa Flow.

2.7.4.1.4 Salmon Fisheries

Scottish salmon fisheries include fixed engine, net & coble (i.e. netting) and rod and line fisheries (Marine Scotland, 2015). Across Scotland, the majority of salmon and sea trout catch is from rod and line (Marine Scotland 2021a). However, it is understood that several coastal netting sites are present along the Caithness coastline and that salmon netting is historically important for this area (Youngson, 2017; Scottish Government, 2020).

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[9] which has prohibited the retention of salmon caught in coastal waters and in specified inland waters[10] (depending on their conservation status) since 2016.

Each fishery is required to provide the number and total weight of salmon and grilse and sea trout caught and retained each month of the fishing season. Marine Scotland collates salmon and sea trout catch statistics by district or region on an annual basis. Latest catch statistics for the North region indicate that there were no catches from nets in the districts along the north coast of Caithness between 2016 and 2020 (Marine Scotland, 2021b). Rod and line catches within the Thurso, Forss and Halladale and Strathy and Naver reporting areas, adjacent to the Caithness export cable corridor search area, were recorded between 2016 and 2020 (Marine Scotland, 2021b). However, most rod and line catches are understood to be recreational.

There are no salmon fisheries in Orkney (due to the lack of salmon rivers).

2.7.4.1.5 Non-UK Fishing Activity

It is understood through consultation that the majority of fishing activity in the study area is carried out by UK vessels. However, some non-UK vessels are operational in the area, including Dutch and French pelagic trawlers, concentrated in the north of the OAA.

[9] *https://www.legislation.gov.uk/ssi/2016/115/contents/made*

[10] *Inland waters include all rivers above estuary limits, including tributary limits and streams. Coastal waters include all waters seaward of those classified as inland waters.*

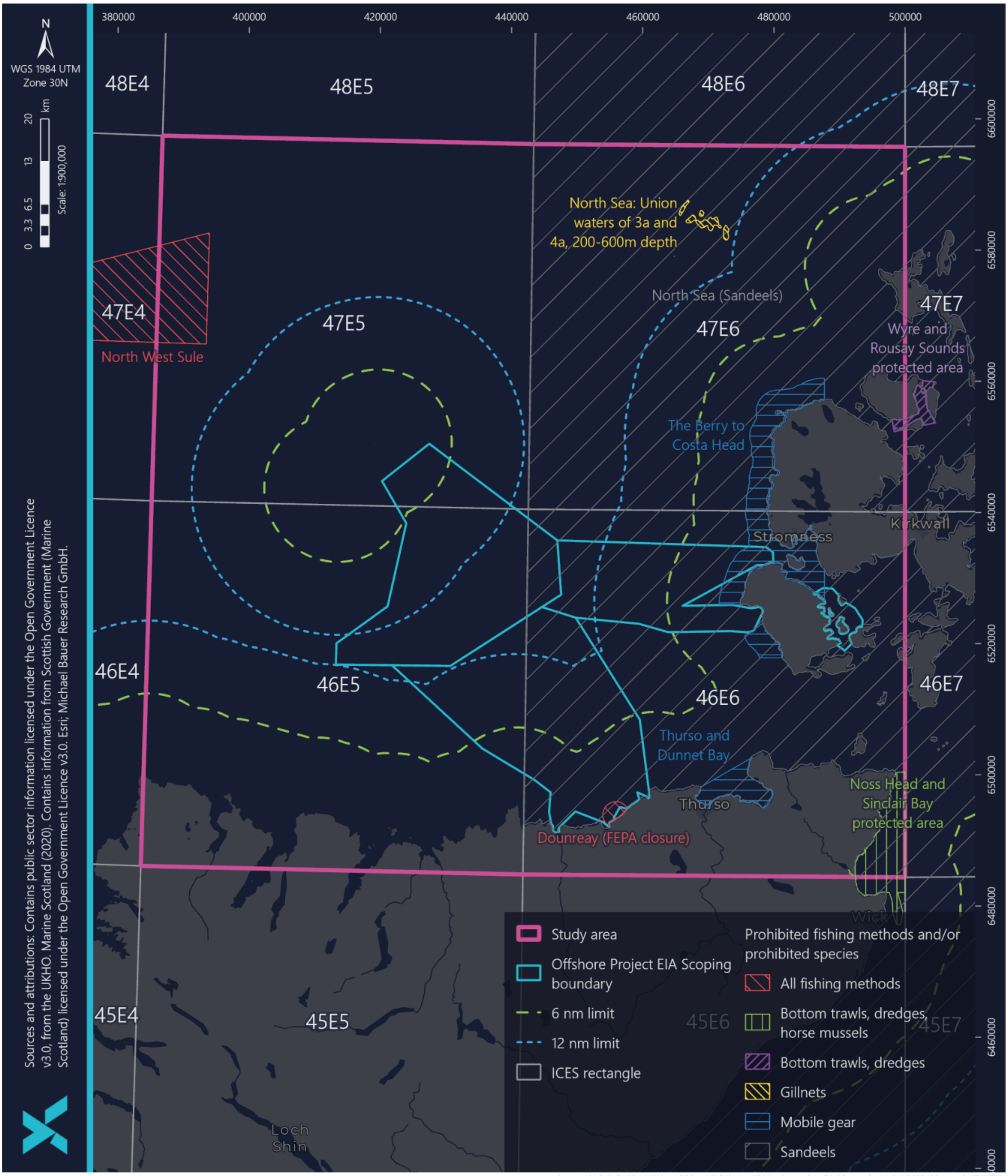

Figure 2-29 Commercial Fisheries Restrictions within the Study Area

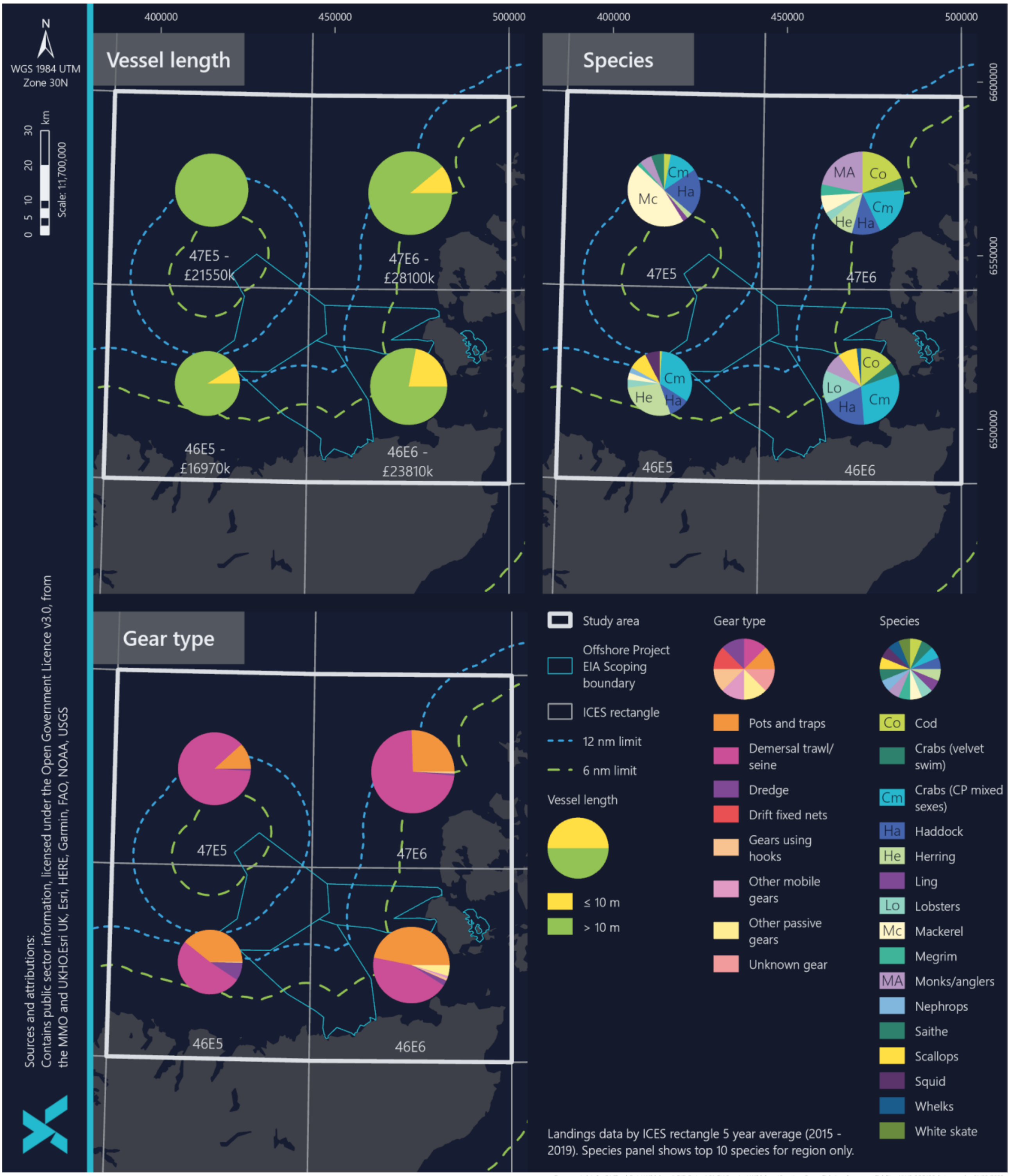

Figure 2-30 Average Landings Values per ICES rectangle by Vessel Length, Fishing Method and Species (2015 – 2019; MMO, 2020)

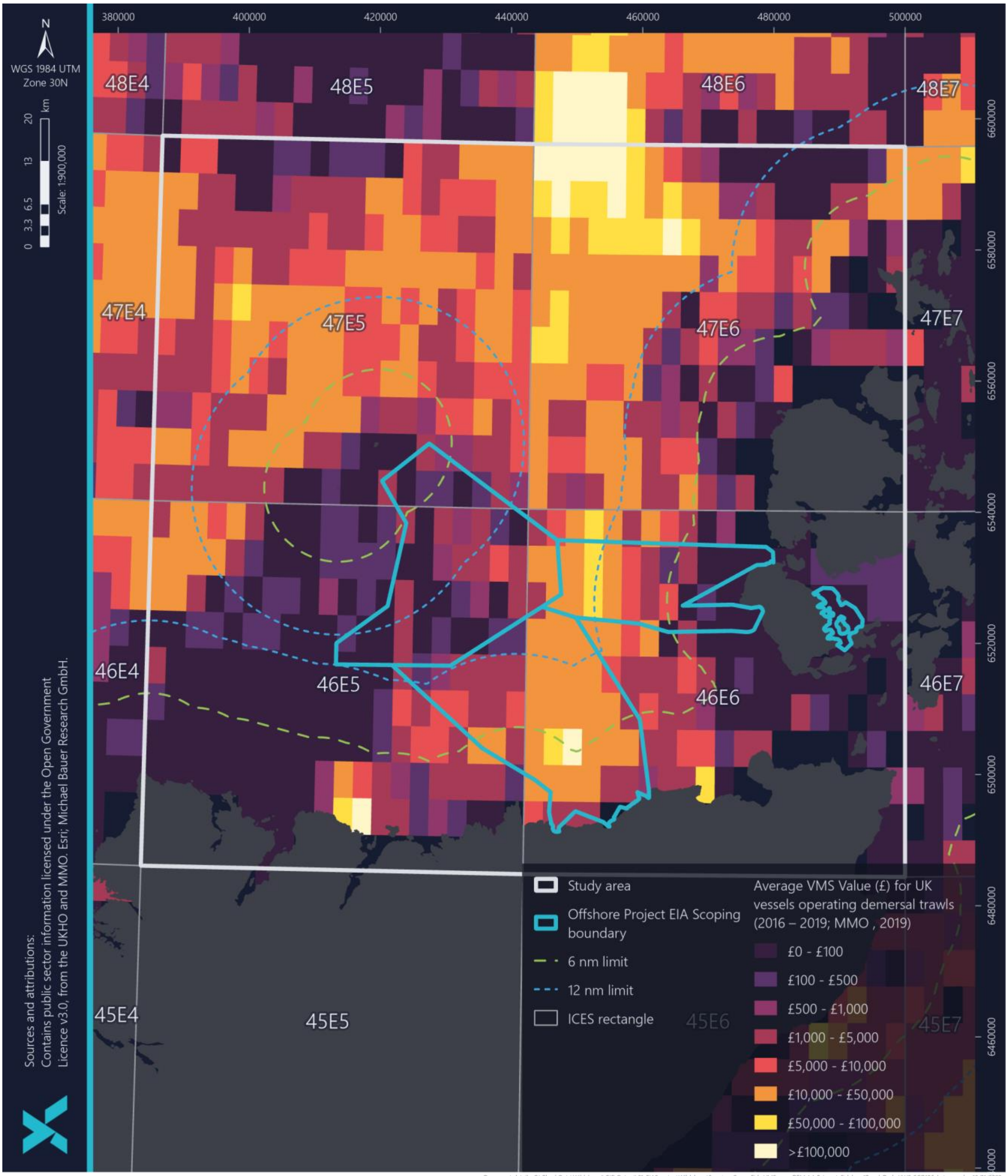

Figure 2-31 Average VMS Value for Demersal Trawling (2016 – 2019) (MMO, 2021)

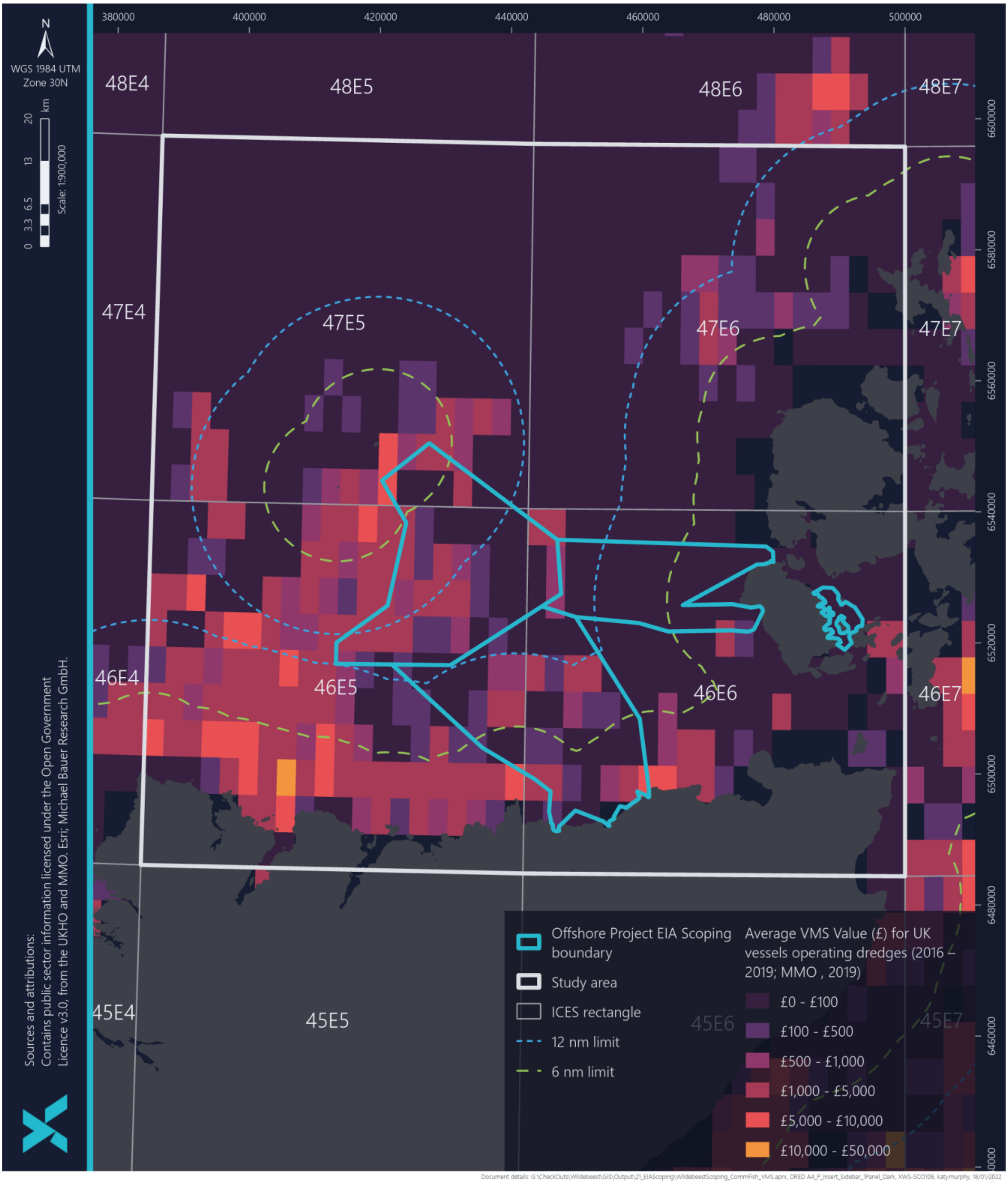

Figure 2-32 Average VMS Value for Dredges (2016 – 2019) (MMO, 2021)

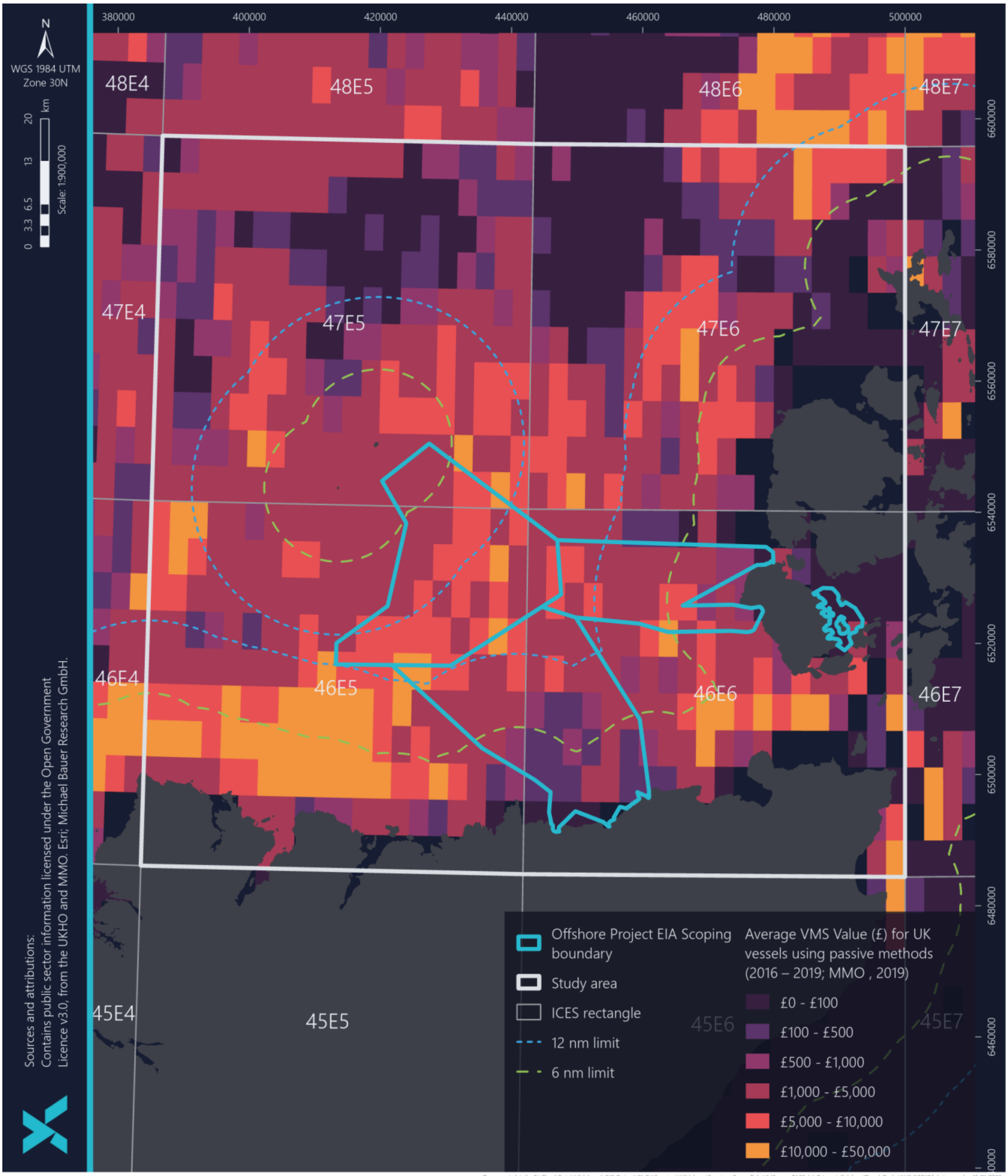

Figure 2-33 Average VMS Value for Passive Fishing Methods (2016 – 2019) (MMO, 2021)

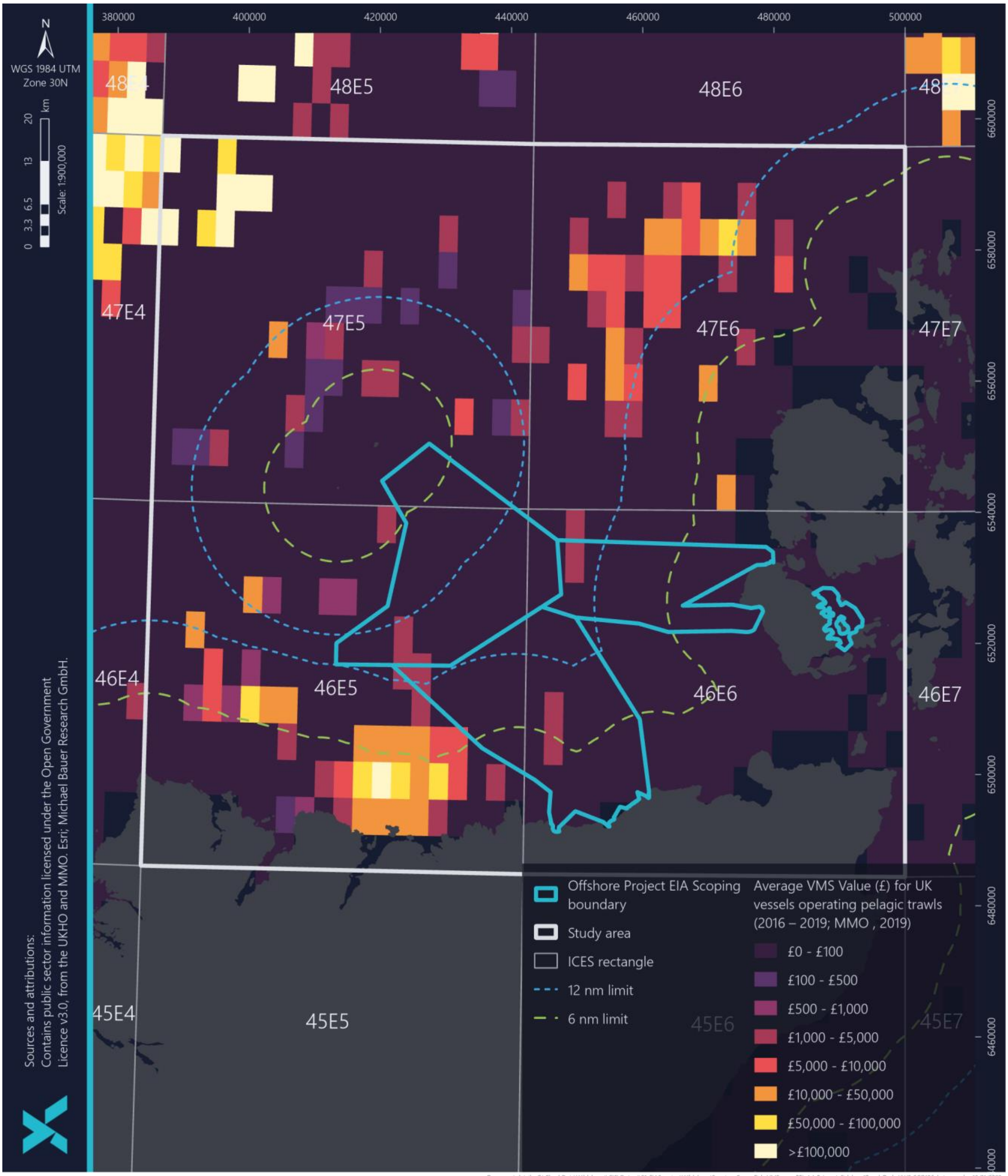

Figure 2-34 Average VMS Value for Pelagic Fishing Methods (2016 – 2019) (MMO, 2021)

2.7.4.2 SCAPA FLOW

2.7.4.2.1 Fisheries Statistics

The Scapa Flow offshore export cable corridor search area is located in the east of ICES rectangle 46E6. According to landing values from 2015 to 2019, over 10 m vessels comprise the majority of landing values for this ICES rectangle, although landings from under 10 m vessels are also recorded (Figure 2-30). The fishing methods with the highest landing values in this ICES rectangle include pots/traps and demersal trawls/seines, with lower landing values recorded for 'other' passive gears and scallop dredges. The species dominant in terms of landing values include brown crab, targeted by pots and traps, haddock and cod, targeted by demersal trawls/seines, lobster and scallops.

It should be noted that due to the large scale of ICES rectangle 46E6, the fisheries in Scapa Flow may differ slightly to the offshore areas of this ICES rectangle that will have distinct fisheries to those in Scapa Flow (Figure 2-30). Therefore, VMS data and other data sources at a smaller spatial scale have been used to further describe the primary fishing methods and key commercial species relevant to the Scapa Flow offshore export cable corridor search area. For example, the available data indicates that demersal trawling for species such as haddock and cod is unlikely to occur within Scapa Flow.

2.7.4.2.2 Vessel Monitoring System (VMS) Data

The VMS data between 2016 and 2019 indicates that fishing activity within the Scapa Flow offshore export cable corridor search area is low, although there is evidence of dredge and passive fishing activity to the southeast of the search area (see Figure 2-32 to Figure 2-34). VMS data between 2013 and 2017 generally corroborates the more recent VMS data, indicating that fishing activity by vessels over 15 m in Scapa Flow is low (Kafas *et al.*, 2013).

The isolated location of Scapa Flow means that vessels over 15 m in length (that are included in the VMS data) are less likely to fish here. Therefore, it is anticipated that the majority of vessels active in the area are under 15 m in length. ScotMap data indicates that fishing by smaller 10 m and under vessels is likely to be high within Scapa Flow, predominantly by pots / traps targeting crabs and lobster (Kafas *et al.*, 2014).

To further understand the fishing activity and key commercial species present in the Scapa Flow offshore export cable corridor search area, the NAFC Marine Centre's report on fisheries in the NECRIFG was reviewed. The NAFC report combines data from AIS fishing tracks, VMS, ScotMap (Kafas *et al.*, 2014) and the Creel Fishing Effort study (Marine Scotland, 2017) to map fishing activity and species group likelihood / occurrence. This report indicates that Scapa Flow is mainly targeted by creels, trawls and handlines, with a low likelihood / occurrence expected (Shelmerdine & Mouat, 2021). In terms of commercial species groups, those recorded with the highest likelihood of occurrence include crabs and lobsters and Norway lobster. Demersal species, such as cod and haddock, which are reported with high landings values for ICES rectangle 46E6, are not recorded as being present within Scapa Flow, indicating that these species are unlikely to be of commercial importance in Scapa Flow.

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

2.7.4.3 Summary and Key Issues

Table 2-43 Summary and Key Issues for Commercial Fisheries

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Landing and VMS data indicate that vessels over and under 10 m are active in the study area. Vessels under 10 m in length will be more active closer to shore in the cable route corridors, rather than the OAA; and • The key fleets operational in the study area include: – Creels (pots and traps) operating across the study area, but mainly in ICES rectangles 46E6 and 46E5, targeting brown crab and to a lesser extent, lobster and velvet crab; – Demersal trawls targeting haddock and cod, and to a lesser extent monkfish / anglerfish and squid, mainly concentrated in the east of the study area, relevant to the Caithness and Orkney offshore export cable corridor search areas; – Scallop dredges operating mainly in ICES rectangles 46E5 and 46E6, relevant to the OAA and the Caithness offshore export cable corridor search area; and – Non-UK fishing activity is expected to occur in the area, mostly Dutch and French pelagic vessels.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• There is a low presence of over 15 m vessels in Scapa Flow due to its geographically distinct location; • The key fleets operational in ICES rectangle 46E6 within which the Scapa Flow offshore cable corridor search area resides are considered to be: – Creels (pots and traps) targeting brown crab, lobster and velvet crab; – Demersal trawls targeting haddock, cod and monkfish / anglerfish (although fishing activity targeting these species is expected to be low within Scapa Flow itself); and – Scallop dredges (although available data indicates this fishing method is mainly operated out with the Scapa Flow offshore export cable corridor search area); and • Due to the paucity of data on the distribution of fishing effort for under 15 m vessels, consultation during the EIA will be a key source to inform a detailed fisheries baseline for Scapa Flow.

2.7.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-44.

Table 2-44 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	The cable will be buried as the first choice of protection. The fishing industry will be consulted as early as possible on the proposed cable corridors. External cable protection will only be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a CBRA and implemented through CaPs.	Primary	Section 36 and/or Marine Licence consent conditions for CaPs.
2	Development and adherence to a VMP and Navigational Safety Plan (NSP).	Tertiary	Section 36 and/or Marine Licence consent conditions for VMP and NSP.
3	All vessels will comply with the provisions of the International Regulations for the Prevention of Collision at Sea (COLREGs) and the International Regulations for the Safety of Life at Sea (SOLAS), including the display of appropriate lights and shapes such as when vessels are restricted in their ability to manoeuvre.	Tertiary	Section 36 and/or Marine Licence consent conditions for VMP and NSP.
4	Development and adherence to a Fisheries Management and Mitigation Strategy (FMMS).	Tertiary	Section 36 and/or Marine Licence consent conditions for FMMS.
5	The project has already engaged a Fisheries Liaison Officer (FLO) to engage in proactive consultation with the fishing industry with adherence to best practice guidance with support from a Fisheries Industry Representative (FIR) (e.g. FLOWW, 2014; 2015 or equivalent at the time of the EIA Report). Use of a FLO will continue throughout the Project.	Tertiary	Section 36 and/or Marine Licence consent conditions for the appointment of a FLO.
6	Procedures for dropped objects and claim processes for loss/damage to fishing gear/vessels.	Tertiary	Section 36 and/or Marine Licence consent conditions for FMMS and Environmental Management Plan.
7	Timely and efficient distribution of Notice to Mariners (NtMs), Kingfisher notifications and other navigational warning on the location, duration and nature of works.	Tertiary	Section 36 and/or Marine Licence consent conditions for VMP, NSP and FMMS.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
8	Notification to the UK Hydrographic Office (UKHO)/Kingfisher of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical /admiralty charts and publications.	Tertiary	Section 36 and/or Marine Licence consent conditions for VMP, NSP and FMMS.
9	The use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs), where required. Where possible these will be sourced locally and as a minimum will be Scottish vessels.	Tertiary	Section 36 and/or Marine Licence consent conditions for FMMS.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on commercial fisheries receptors and will be consulted upon with consultees throughout the EIA process.

2.7.6 Scoping of Impacts

A number of potential impacts on commercial fisheries receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

It should be noted that the below impacts that have relevance to commercial fisheries will be considered in other sections:

- Obstruction of regular fishing vessel transit routes due to the presence of vessels and safety zones during construction or due to the presence of physical infrastructure during operation and maintenance (section 2.8: shipping and navigation);
- Navigational safety issues for fishing vessels during construction and operation and maintenance phases (section 2.8: shipping and navigation); and
- Change in the abundance or distribution of target species and resulting impact on fisheries resource due to construction and operation and maintenance phases (section 2.4: fish and shellfish ecology).

As the salmon and sea trout fishing activity is primarily in-river, there will be no direct impacts and indirect impacts to the fisheries are considered to be most relevant. Therefore, the impact assessment on salmon, sea trout and other migratory species, will be considered in the fish and shellfish ecology section.

None of the impacts presented in Table 2-45 are proposed to be scoped out of the assessment as it is considered that all impacts have the potential to be significant, and therefore require assessment.

Table 2-45 EIA Scoping Assessment for Commercial Fisheries

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Temporary loss or restricted access to fishing grounds	4, 5, 6, 8	Scoped In	The implementation of safety zones around construction activities, including wet storage of mooring lines, for example, if a floating project is progressed, may result in a temporary loss or restricted access to fishing grounds adjacent to the Project.	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and • Consultation to understand potential nature and extent of the impact.	The worst-case scenario will be temporary exclusion from the Design Envelope parameters which represent the maximum duration and spatial extent during the construction / decommissioning works. 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.
Displacement of fishing effort	4, 5, 6, 8	Scoped In	Fishing activity may be temporarily displaced due to the temporary loss or restricted access to fishing grounds associated with safety zones around construction activities, including wet storage of mooring lines, or vessels. This may lead to increased fishing pressure and gear conflict in adjacent fishing grounds and the potential for	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and	The same worst-case scenario as temporary loss of access to fishing grounds will be considered, as this represents the greatest potential for displacement of fishing effort. 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. The impact of

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			further temporary displacement (i.e. secondary displacement).	• Consultation to understand potential nature and extent of the impact.	gear conflict and increased fishing pressure in fishing grounds where vessels will be displaced to will be considered.
Interference with fishing activity as a result of increased vessel traffic	2, 3, 4, 5, 7, 8, 9	Scoped In	Increased vessel traffic associated with construction and decommissioning works may lead to interference with fishing activity (e.g. fouling of static gear markers).	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and • Consultation to understand potential nature and extent of the impact.	The maximum number of vessel transits required during construction / decommissioning will represent the worst-case scenario 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.
Increased steaming times	2, 4 ,5 ,7 ,8, 9	Scoped In	Temporary loss or restricted access to fishing grounds, displacement of fishing effort and increased vessel traffic may result in a requirement for vessels to alter transit routes to fishing grounds and potentially increase steaming times.	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and • Consultation to understand potential nature and extent of the impact.	The same worst-case scenario as temporary loss of access to fishing grounds as this represents the greatest potential increase in steaming times. 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	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Safety issues for fishing vessels	2, 3, 7, 9	Scoped In	Safety issues may arise during construction and decommissioning works as a result of partially installed infrastructure (e.g. cables awaiting burial or pre-installed mooring systems (if a floating project is progressed)), dropped objects or partially decommissioned infrastructure. This may present a snagging risk for fishing vessels with the potential for damage or loss of fishing gear. The implementation of temporary safety zones, the effective communication of project works and adherence to the VMP and NSP is expected to reduce potential safety risks. The risk of collision with construction or decommissioning vessels are addressed in section 2.8 and will be considered further within the Navigational Risk Assessment (NRA).	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; • Navigation Risk Assessment (NRA); and • Consultation to understand potential nature and extent of the impact.	The worst-case scenario will represent the maximum footprint of infrastructure based on the Design Envelope Parameters that could potentially result in a snagging risk for fishing vessels. The impact assessment will consider the results of the NRA. 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.
Operations and Maintenance					
Loss of access to fishing grounds	4, 5, 7, 8	Scoped In	The presence of infrastructure within the study area may result in a loss or	• Desktop analysis of available public data	The worst-case scenario will be the Design Envelope parameters that

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			restricted access to fishing grounds during the operation and maintenance phase. The severity of this impact will depend on the Project design (e.g. fixed-bottom vs floating project). Additionally, the implementation of safety zones around major maintenance activities may also result in temporary localised loss or restricted access to grounds.	sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and • Consultation to understand potential nature and extent of the impact.	represent the maximum spatial extent for loss of access to fishing grounds. 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. The potential for fishing to resume within the windfarm once operational will also be considered, informed by the minimum spacing between turbines, operational requirements for fishing gear operated in the area and vessel manoeuvrability.
Displacement of fishing effort	4, 5, 7, 8	Scoped In	Fishing activity may be displaced due to the loss or restricted access to fishing grounds associated with the presence of physical infrastructure, including any mooring lines or dynamic cables if floating substructures are used. This may lead to increased fishing pressure and gear conflict in adjacent fishing grounds and the potential for further temporary displacement (i.e. secondary displacement). Temporary	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and • Consultation to understand potential nature and extent of the impact.	The same worst-case scenario as temporary loss of access to fishing grounds as this represents the greatest potential displacement of fishing effort. 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. The potential for fishing to resume within the windfarm once operational will also be considered, informed by the minimum

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			displacement may result from the implementation of safety zones around major maintenance activities.		spacing between turbines, operational requirements for fishing gear operated in the area and vessel manoeuvrability. The impacts in fishing grounds where vessels will be displaced to will also be considered.
Increased steaming times	2, 4, 5, 7, 8, 9	Scoped In	The Project may result in changes to local navigation and transit routes for fishing vessels, potentially increasing steaming times to fishing grounds.	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and • Consultation to understand potential nature and extent of the impact.	The same worst-case scenario as temporary loss of access to fishing grounds as this represents the greatest potential increase in steaming times. 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	2, 3, 4, 5, 7, 8, 9	Scoped In	Increased vessel traffic associated with operation and maintenance works may lead to interference with fishing activity (e.g. fouling of static gear markers). It is anticipated that the number of vessel transits required during operation and maintenance will be considerably less than during construction and decommissioning.	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; and	The maximum number of vessel transits required during the operation and maintenance phase will represent the worst-case scenario for this impact assessment. The impact will be qualitatively assessed on a fleet-by-fleet basis, considering available data on fishing activity in the

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
				• Consultation to understand potential nature and extent of the impact.	area and the potential sensitivity of the receptor to this impact.
Safety issues for fishing vessels	1, 2, 3, 6, 7, 8, 9	Scoped In	In the specific case of the vessels engaged in fishing, there may be additional risks such as the potential for snagging with Project infrastructure and the presence of objects/obstacles on the seabed. This may include snagging in areas where the export cable cannot be buried to the optimal burial depth. If floating substructures are used safety risks may also include fishing gear becoming entangled in areas where the export cable is suspended (the dynamic part of the export cable). The risk of collision and allision is addressed in section 2.8 and will be considered further within the Navigational Risk Assessment (NRA).	• Desktop analysis of available public data sources, including those listed in Table 2-42 and information gained through consultation to characterise the baseline; • NRA; and • Consultation to understand potential nature and extent of the impact.	The worst-case scenario will represent the maximum footprint of infrastructure based on the Design Envelope Parameters that could potentially result in a snagging risk for fishing vessels. The impact assessment will consider the results of the NRA. 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 receptors to this impact.

2.7.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on commercial fisheries receptors. This will also consider fishing restrictions associated with restricted areas, as well as other projects, plans and activities which could act cumulatively with the Project. The majority of potential cumulative impacts on commercial fisheries are likely to be considered localised and will be most likely only occur where other projects / plans are located in areas used by the same fisheries as the Project for example the consented SHET-L Caithness to Orkney interconnector, the Pentland Floating Offshore Wind Farm and other ScotWind OWF lease areas. The Cumulative Effects Assessment will focus on the potential for other projects, plans and activities to act cumulatively with the Project to reduce the availability of fishing grounds.

The commercial fisheries CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

2.7.8 Potential Transboundary Impacts

There is the potential for transboundary impacts upon commercial fisheries receptors due to construction, operation, maintenance and decommissioning of the Project, as the Project lies 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 2-45. 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)) further to understand the non-UK fishing activity in the offshore study area.

2.7.9 Approach to Analysis and Assessment

2.7.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on commercial fisheries will utilise publicly available data (see section 2.7.3) and will be augmented by consultation during the EIA phase with fisheries organisations and vessel operators / owners as required. Key consultees within the fishing include but not limited to:

- MSS;
- NatureScot;
- Fisheries Management Scotland;
- NECRIFG;
- Scottish Creel Fishermen's Associated
- Scottish Fishermen's Organisation;
- SFF;
- Orkney Trout Fishermen's Association;
- SWFPA;
- Communities Inshore Fisheries Association (CIFA),
- Seafish Industry Authority;
- Cooke Aquaculture;
- Caithness DSFB;
- Northern DSFB;
- The Orkney Fisheries Society;
- OFA; and
- Orkney Inshore Fisheries Group (IFG).

The Project has already undertaken some initial consultation with fisheries industry organisations ahead of the ScotWind bid application and the nearshore geophysical surveys completed in 2021. In order to facilitate resource effective stakeholder consultation through the development phase of the Project, a commercial fisheries working group will be established, which will be used to consult on fisheries issues, assessment methods and outputs.

It should be noted that due to the varying limitations of each dataset listed in Table 2-42, a single data source alone cannot be used to characterise commercial fishing activity. Instead, a number of datasets will be reviewed for the EIA and the limitations of each will be considered. Any vessels not represented by these groups could be consulted through other appropriate means, e.g. through the fishery officer or direct one-to-one consultation.

Both direct and indirect impacts will be assessed. Direct impacts include those generated by direct interaction of the project activities with commercial fisheries receptors (e.g. safety issues) and indirect impacts are those produced as a result of an impact pathway, for example displacement impacts that occur outwith the Project area. The magnitude of impact will be derived from the maximum design scenarios for the Project. Assessments will be qualitative and undertaken on a fleet-by-fleet basis. Each fleet will be described through a detailed review of publicly available datasets and consultation, and the sensitivity to each impact will be categorised based on expert judgement, as per EIA methodology described in section 1.4.2. The impact assessment will be informed by the NRA and the shipping and navigation chapter, as described in section 2.8. As described in Table 2-45, it is proposed that vessel collision and allision risks are addressed within the NRA and the shipping and navigation section of the EIA Report, with snagging risk and potential entanglement of fishing gear being addressed within the commercial fisheries chapter.

2.7.9.2 EIA Methodology

The commercial fisheries EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-46 will also be considered in relation to the fish and shellfish ecology EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-46 Legislation and Guidance for Commercial Fisheries

LEGISLATION / GUIDANCE	SUMMARY
Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014)	This guidance document was produced collaboratively by the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) committee to promote co-existence between the marine renewable energy industry and the fishing industry. Key topics include fisheries liaison, recommended approaches for maximizing engagement and guidance on evidence-based mitigation measures.
Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015)	This guidance sets out guiding principles for marine renewable energy developers to address any residual impacts to the fishing sector which remain following the application of other mitigation measures and fisheries liaison.
Best practice guidance for fishing industry financial and economic impact assessments (UK Fisheries Economics Network (UKFEN), 2012)	This document provides best practice guidance for conducting commercial fisheries impact assessments for proposals that close or restrict fishing. It specifically considers how to analyse the cost implications of closing or restricting fishing.

LEGISLATION / GUIDANCE	SUMMARY
Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010)	This guidance document was produced to identify mitigation options for impacts of offshore wind farms on commercial fisheries. The document presents an overview of the interactions between the fishing industry and offshore wind developments and appraises different mitigation options available to developers.
Fishing and Submarine Cables – Working Together (International Cable Protection Committee (ICPC), 2009)	This document describes how fishing vessels should avoid snagging cables and what to do if this does occur. It also provides details on how different fishing methods may interact with cables, the dangers of snagging cables and potential preventative and reactive measures to reduce snagging impacts.

In addition, any upcoming guidance being developed as part of the ScotMER initiative will be utilised where appropriate, such as Marine Scotland's fisheries displacement impact assessment guidance.

2.7.10 Scoping Questions

- Do you agree with the study area for the commercial fisheries EIA?
- Do you agree with the data sources listed to be used to inform the EIA baseline?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for commercial fisheries?
- Do you agree with the approach for the cumulative effects assessment and for transboundary effects?
- Do you agree with the approach to the analysis and assessment that will inform the EIA?
- Are there any additional commercial fisheries organisations that you would recommend be consulted?

2.7.11 References

Blyth-Skyrme, R.E. (2010). Options and Opportunities for Marine Fisheries Mitigation Associated with Wind Farms. Final report for Collaborative Offshore Wind Research into the Environment contract FISHMITIG09. COWRIE Ltd, London. Available from: https://tethys.pnnl.gov/sites/default/files/publications/Blyth-Skyrme-2010.pdf [Accessed 29/11/2021].

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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.

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MMO (2021). Vessel Monitoring System (VMS) values by fishing method (average 2016 – 2019).

MMO (2020). Landing values by species, fishing method and vessel length (average 2015-2019).

Scottish Government (2020). Productive: Living Resources – Salmon and Sea Trout Fishing. Available from: https://marine.gov.scot/sma/sites/default/files/sma2020_-_salmon_and_sea_trout_fishing_-_productive.pdf [Accessed 10/12/2021].

Shelmerdine R.L. and Mouat B. (2021). Mapping fisheries and habitats in the North and East Coast RIFG area. NAFC Marine Centre UHI report.

UKFEN. (2012). Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments. Prepared for UK Fisheries Economic Network (UKFEN), Poseidon Aquatic Resource Management Ltd. 47pp.

Youngson, A. Fishermen's Knowledge: Salmon in the Pentland Firth. Available from: https://caithness.dsfb.org.uk/files/2017/06/FCRTThe-Fishmongers-Company-reportfinal-version.pdf [Accessed 23/11/2021].

2.8 Shipping and Navigation

2.8.1 Introduction

This section of the Scoping Report identifies the shipping and navigation maritime users of relevance to the offshore aspects of the Project and considers the potential impacts / risks from the construction, operation and maintenance, and decommissioning of the Project on maritime users. This fulfils the requirement of the Preliminary Hazard Analysis (PHA), as required by Annex 1 of the MCA Marine Guidance Note (MGN) 654. The planned approach to assessing the impacts / risks to the Project within an NRA is also outlined.

Information that may be considered relevant to this section is also presented within the below sections:

- Commercial fisheries, section 2.7; and
- Other sea users, section2.12.

This section of the Scoping Report has been prepared by Anatec.

2.8.2 Study Area

The shipping and navigation study area has been defined as 10 NM around the OAA, joining with the two offshore export cable corridor search areas (Caithness and Orkney) to land (including the small area between the two landfall options on the west coast of Hoy). The study area also includes the Scapa Flow offshore export cable corridor search area. The study area is shown in Figure 2-35.

2.8.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage of the Project which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-47.

Table 2-47 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Automatic Identification System (AIS) data – Winter 14 Days	Anatec	2021	Anatec
AIS data – Summer 14 Days	Anatec	2021	Anatec
Incident data provided by the Marine Accident Investigation Branch (MAIB)	MAIB	2010-2019	MAIB

TITLE	SOURCE	YEAR	AUTHOR
Incident data provided by the Royal National Lifeboat Institution (RNLI)	RNLI	2010-2019	RNLI
RYA Coastal Atlas of Recreational Boating (RYA, 2021)	RYA	2019	RYA
UKHO Admiralty Charts 219-0, 1954-0, 2249-0	UKHO	2021	UKHO
UKHO Admiralty Sailing Directions – NP52	UKHO	2018	UKHO
Clyde Cruising Club (CCC) Sailing Directions and Anchorages – Orkney and Shetland	CCC	2020	CCC

2.8.3.1 Project Site-Specific Surveys

In line with MGN 654 (MCA, 2021a), it will be necessary to undertake a vessel traffic survey covering both AIS and non-AIS vessels within the OAA and surrounding area within AIS, radar and visual range. A requirement of MGN 654 is for a minimum of 28 days of seasonally varied data which is usually collected during two, 14-day surveys, in summer and winter. Appropriate dates for the surveys will be scheduled based on the timing of the application submission to ensure it is within 24 months, as required by the MCA.

In addition to the vessel traffic surveys, stakeholder consultation will be conducted to inform the baseline environment assessment. This will include in-depth consultation with both national and local stakeholders throughout the NRA / EIA process, and the completion of a Hazard Review Workshop to gather feedback from a representative cross-section of maritime users of the area. Further details of the planned consultation are included in section 2.8.9.1.

2.8.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-47) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The following sections provide information on the key spatial differences across the study area for shipping and navigation:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area to and the Caithness offshore export cable corridor search area (section 2.8.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.8.4.2).

2.8.4.1 OFFSHORE MARINE AREA

2.8.4.1.1 Navigational Features

The navigational features considered relevant to the Project are presented in Figure 2-35. The OAA encompasses an area of approximately 192 NM^2 and lies approximately 14 NM off the north coast of Caithness, and approximately 15 NM west of Orkney. The island of Sule Skerry lies approximately 2.5 NM from the northern edge of the OAA. The Caithness offshore export cable corridor search area encloses an area of approximately 205 NM^2 and connects the OAA to the northern Caithness coastline. The Orkney offshore export cable corridor search area encloses an area of approximately 114 NM^2 and connects the OAA to the island of Hoy (Orkney). The Caithness and Orkney export cable corridor search areas lie mostly within the 12 NM territorial limits, with around half of the OAA lying outside of these limits.

The closest major harbours to the site are Scrabster and Stromness. Scrabster lies approximately 20 NM southeast of the OAA on the Scottish mainland, while Stromness is located approximately 20 NM east of the OAA on the Orkney mainland. Other harbours include smaller facilities at Sandside Bay and Thurso Harbour.

The only International Maritime Organisation (IMO)-adopted routeing measure in the area is the Area To Be Avoided (ATBA) around Orkney, which is to be avoided by any vessels over 5,000 Gross Tonnes (GT) carrying oil or hazardous cargoes in bulk. The area extends 15 NM from the west coast of Orkney, and encompasses most of the Orkney cable corridor. Pentland Firth, Scapa Flow and approaches are outside of the ATBA.

There is an Oceanographic Data Acquisition System (ODAS) buoy located approximately 5 NM off the Caithness coast within the Caithness offshore export cable corridor search area. This is associated with the Pentland Floating Offshore Wind Farm project.

There are five existing subsea cables intersecting the Orkney offshore export cable corridor search area. Three are interconnectors between Caithness and Hoy, while the Northern Lights communications cable runs from Caithness to the Orkney mainland. FARICE-1 is a communications cable linking Caithness to the Faroe Islands, passing through the Orkney offshore export cable corridor search area and 1.5 NM west of the OAA.

The Orkney offshore export cable corridor search area is 0.5 NM south of the limits of the EMEC Billia Croo test site, which is used for trialling various renewable energy technologies. The test site is marked by buoys and has five cables connecting to mainland Orkney.

There are several charted wrecks located within the study area, with one of these inside the OAA, close to the southern edge. There is one charted wreck on the southern edge of the Orkney offshore export cable corridor search area, with four within the Caithness offshore export cable corridor search area. A spoil ground is also located within 0.5 NM of the northern edge of the Orkney offshore export cable corridor search area, approximately 2 NM from the west coast of Orkney.

The west coast of Hoy is a Marine Environment High Risk Area (MEHRA) which reflects its environmental sensitivity and exposure to shipping pollution risk. The majority of the study area lies within Royal Air Force (RAF) military exercise areas, while submarine exercises are noted to take place regularly in the area.

2.8.4.1.2 AIS Survey Data Analysis

AIS data has been used within this Scoping study to identify vessel traffic in the areas of interest. AIS is required to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 GT and upwards not engaged on international voyages, passenger ships irrespective of size built on or after 1st July 2002, and fishing vessels of 15 m length and greater. AIS carriage is not compulsory for fishing vessels below 15 m length or for recreational or military vessels. Whilst a growing proportion of smaller vessels carry AIS voluntarily, such vessels will be under-represented within the vessel traffic data presented within this Scoping Report.

The AIS tracks recorded in winter 2021 (1st – 14th January 2021) are shown in Figure 2-36. Following this, the tracks recorded in summer 2021 (1st – 14th July 2021) are shown in Figure 2-37.

There were an average of 24 unique vessels per day recorded within the study area during the winter 2021 survey, and an average of 29 unique vessels per day during the summer 2021 survey. Within the OAA, an average of 3 to 4 vessels were recorded per day during winter, with 5 to 6 per day during summer. During winter, approximately 5 vessels per day were recorded within the Orkney offshore export cable corridor search area, with between 8 and 9 in summer. The Caithness offshore export cable corridor search area was intersected by 13 vessels per day in winter, with 18 in summer.

Vessel lengths ranged from small recreational and fishing vessels of 10 m and below, to larger cargo vessels and tankers of 300 m and above. The largest vessel recorded was a 333 m tanker recorded during the winter survey period.

The main vessel types in the study area during winter were cargo vessels (46%), fishing vessels (31%) and tankers (12%). No recreational vessels were recorded during the winter 2021 study period. The most common types during the summer fortnight were cargo vessels (47%), fishing vessels (16%), recreational vessels (7%) and tankers (7%). A significant portion (13%) of the summer 2021 traffic was also made up of vessels classified as "other", which included lifeboats, survey vessels and fish-carrying vessels.

Within the OAA, the most common vessel type was cargo (42% in winter and 45% in summer) followed by fishing (25% in winter and 18% in summer). A significant number of "other" vessels were recorded in the OAA, with 23% in winter and 26% in summer.

The most common vessel type during the winter 2021 survey period in the Caithness offshore export cable corridor was cargo (67%), followed by tanker (13%) and fishing (12%). In summer 2021, cargo vessels (56%) remained the most common, followed by tankers (9%) and fishing vessels (8%), while "other" vessels made up (15%) of the traffic.

In the Orkney offshore export cable corridor search area, the most common vessel type in winter was fishing (62%) followed by cargo (28%). The most common types in summer 2021 was also fishing vessels (34%) followed by cargo vessels (33%).

The most significant area of commercial traffic was a route headed E-W, the bulk of which passes to the south of the OAA, used by commercial vessels passing through the Pentland Firth. This is used largely by cargo vessels and tankers on international voyages. Vessels heading to or from Norway were also recorded passing NE-SW through the study area. The ferry Hamnavoe, which passes between Scrabster and Stromness was also seen frequently passing through the Orkney offshore export cable corridor search area. Cruise ships are known to dock at Stromness harbour.

2.8.4.1.3 Historical Incident Data

Marine Accident Investigation Branch (MAIB) data was reviewed for 2010-2019. Nineteen incidents were recorded within the study area, with the most common incident type being "Machinery Failure" (42%) followed by "Accident to Person" (37%). Fishing vessels were involved in 10 of the incidents, with other types including cargo vessels, recreational vessels and passenger vessels.

Three incidents occurred within the OAA, three within the Caithness offshore export cable corridor search area, and four within the Orkney offshore export cable corridor search area. It is noted that none of the incidents resulted in fatalities, although injuries were reported.

RNLI data was also reviewed for 2010-2019. A total of 28 incidents were recorded within the study area during this time, with the most common incident type being machinery failures (36%) followed by person in danger (18%) and flooding/foundering (14%). The most common vessel types involved in incidents were fishing vessels (36%) and recreational vessels (32%). Four incidents were recorded involving commercial vessels, two including cargo vessels and two including passenger vessels.

The only RNLI callout within the OAA was to assist a fishing vessel with a fouled propeller. Six incidents were recorded within the Caithness offshore export cable corridor search area, and eight within the Orkney offshore export cable corridor search area.

Four different RNLI lifeboat stations responded to incidents within the study area, with 12 incidents being responded by each of Stromness and Thurso. Longhope responded to three incidents, with Lochinver responding to one.

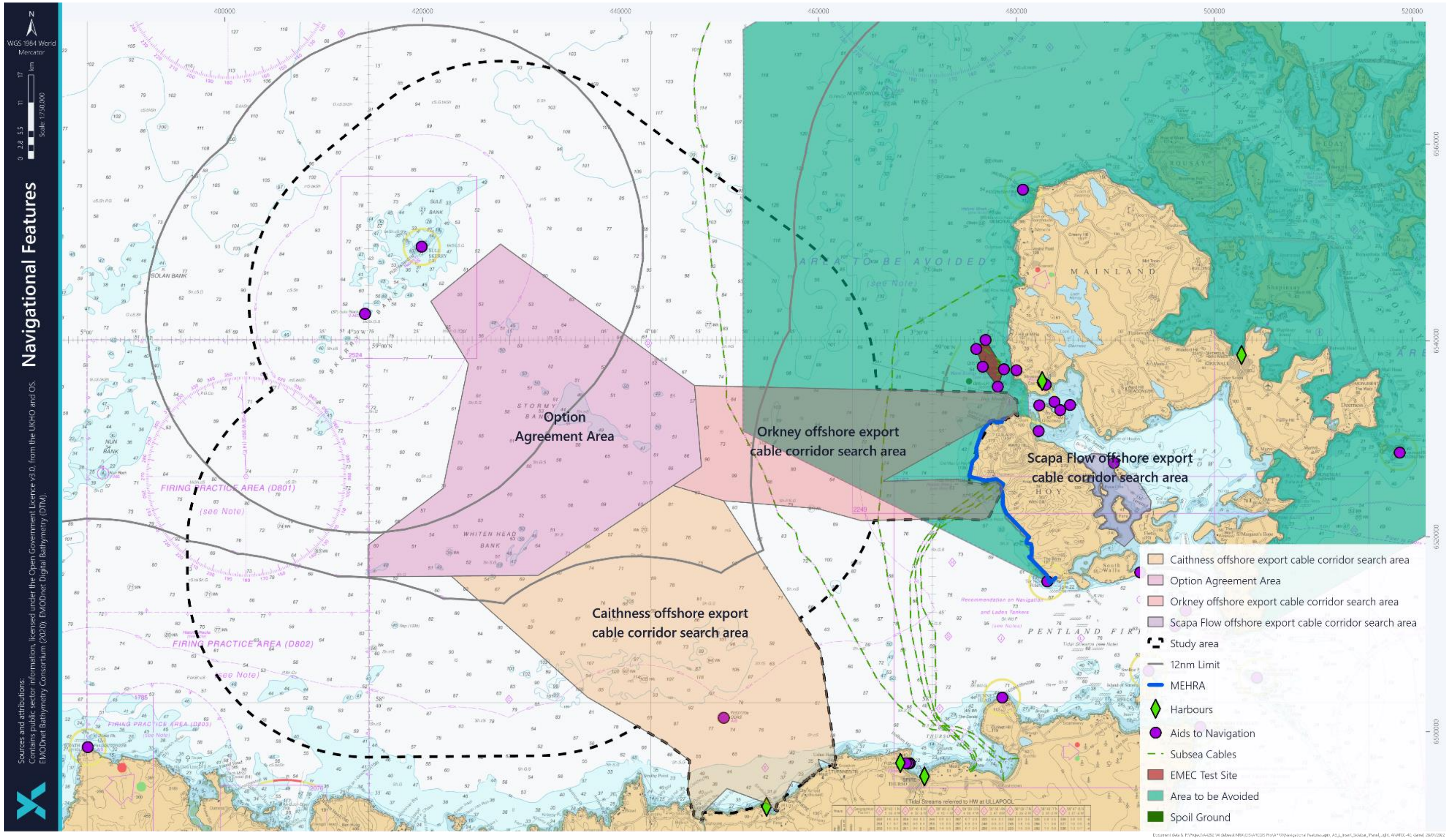

Figure 2-35 Navigational Features

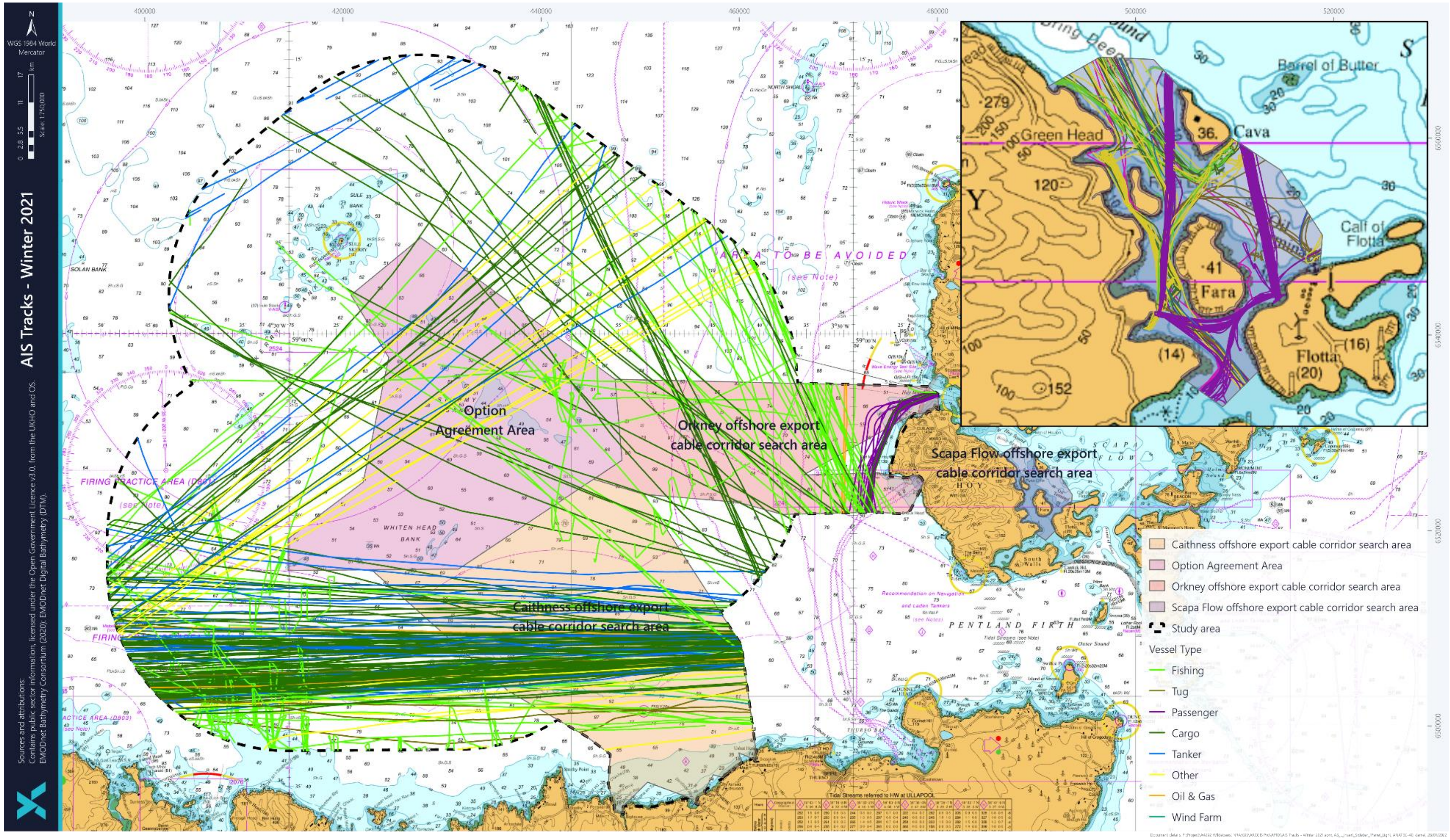

Figure 2-36 AIS Tracks – Winter 2021

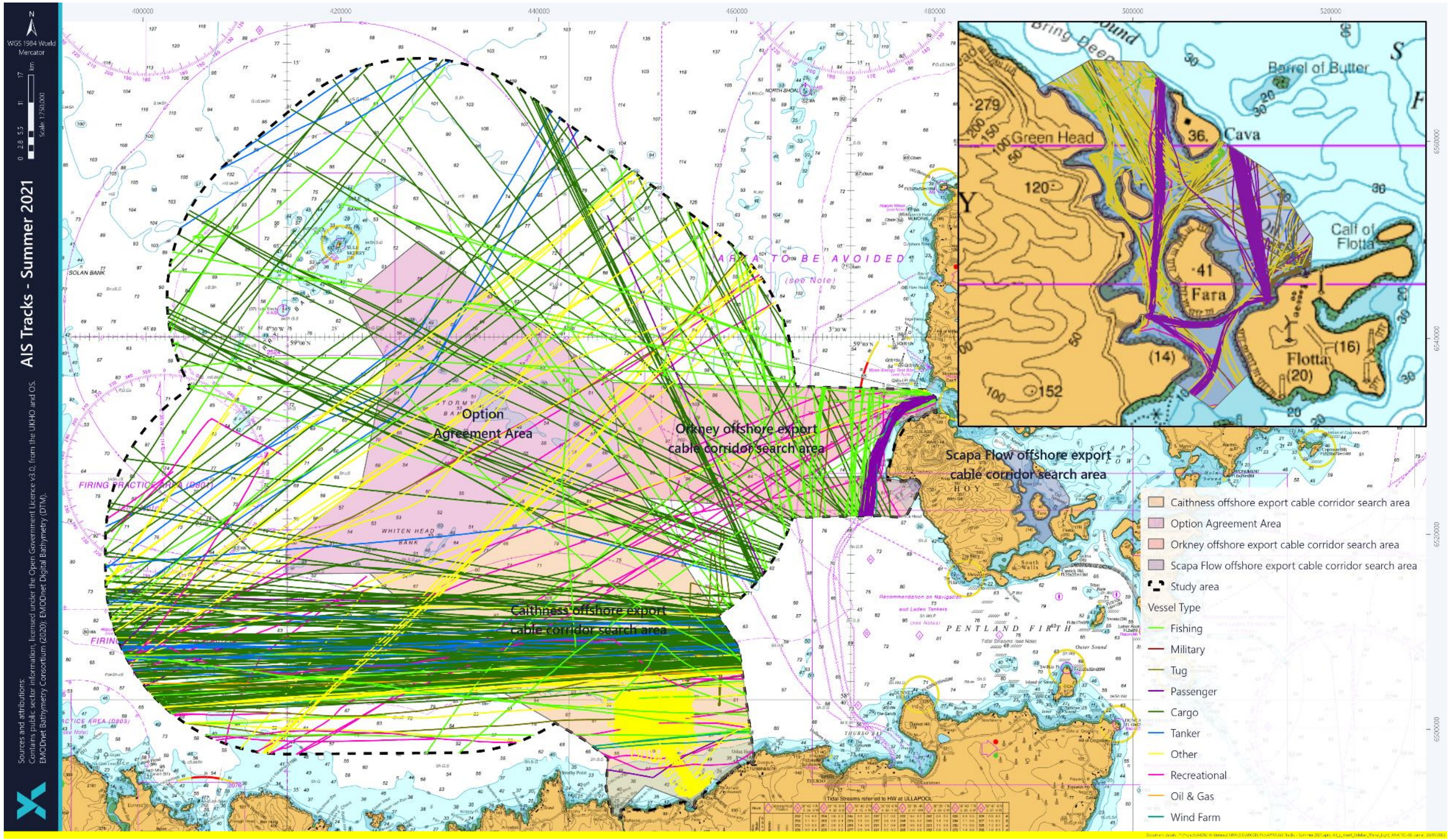

Figure 2-37 AIS Tracks – Summer 2021

2.8.4.2 SCAPA FLOW

2.8.4.2.1 Navigational Features

The Scapa Flow offshore export cable corridor search area is located to the east of Hoy, covering the area between Hoy and Flotta, enveloping the islands of Fara and Rysa Little. South Walls is located within 0.5 NM of the southern edge of the area.

The Flotta Oil Terminal is located in the southeast of the area, with pipelines also connecting this to offshore single point moorings (SPMs) (currently mothballed). Anchoring is prohibited around these pipelines, while entry to the area within 450 m of the SPMs and the terminal is prohibited for vessels not berthing there.

A number of charted historic wrecks are located to the north of the Scapa Flow offshore export cable corridor search area, which are protected from unauthorised interference.

2.8.4.2.2 AIS Survey Data Analysis

Within the Scapa Flow offshore export cable corridor search area, an average of 7 unique vessels per day were recorded during the winter 2021 study period, with 11 vessels per day during the summer 2021 period. A large proportion of the vessels recorded were classified as “other” (31% in winter and 43% in summer), with this including a significant number of dive vessels, pilot vessels and fish carriers associated with the fish farms in the area. Orkney Ferries operating regular services between the Orkney islands were also recorded frequently within the area. The ferry Hamnavoe, between Stromness and Scrabster was also recorded occasionally passing through Scapa Flow when adverse weather routeing in the winter period.

Tankers were frequently recorded anchoring within Scapa Flow, east of the offshore export cable corridor search area, where there are several anchoring berths.

2.8.4.2.3 Historical Incident Data

Between 2010 and 2019, there were four incidents recorded by the MAIB within the Scapa Flow offshore export cable corridor search area. These were a grounding, loss of control, a machinery failure and an accident to person. The incidents involved a fishing vessel, a passenger vessel, a recreational vessel and a service ship.

In the same timeframe, there were 10 incidents responded to by the RNLI. Four of these involved recreational vessels, three involved fishing vessels, while a further three did not involve vessels. Two of the incidents were machinery failures, with one incident involving a collision with a submerged object. Three incidents involved persons in danger, including one person being reported missing and two illnesses onboard vessels. The incident type was not reported for the remaining four incidents.

2.8.4.3 Summary and Key Issues

Table 2-48 Summary and Key Issues for Shipping and Navigation

	PROJECT COMPONENT
SUMMARY AND KEY ISSUES	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Key navigational features include: – Scrabster and Stromness harbours, both 20 NM from the OAA; – The IMO routeing measure around Orkney (Pentland Firth is outside the limits of this routeing measure); – Existing infrastructure – including: ODAS buoy associated with the Pentland Floating Offshore Wind Farm, subsea cables, and the EMEC Billia Croo test site; – Wrecks, within and in the vicinity of the OAA and the offshore export cable corridor search areas; – Spoil ground, approximately 0.5 NM north of the Orkney offshore export cable corridor search area; and – MEHRA off the west coast of Hoy. • AIS survey data in two 14-day periods in January and July indicates that cargo vessels and fishing vessels are the most common vessel types that intersect the study area. Cargo vessels were less common in the Orkney offshore export cable corridor compared with the OAA and the Caithness offshore export cable corridor. • Vessel traffic was concentrated to the south of the OAA (in a route headed E-W), mostly used by cargo and tanker vessels on international voyages. A NE – SW route though the study area was also recorded. There is a ferry route running between Stromness and Scrabster which crosses the Orkney export cable corridor search area. • The most common marine incidents (no reported fatalities) within the study area between 2010 and 2019 are machinery failure and accident to person, mainly involving fishing vessels.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Key navigational features include: – Flotta Oil Terminal and associated with pipelines and SPMs with restricted anchoring and vessel access; and – Wrecks located to the north of the Scapa Flow offshore export cable corridor search area. • AIS survey data indicates that most vessels intersecting the study area are classed as 'other', including dive vessels, pilot vessels and fish carriers (associated with nearby aquaculture sites). Tankers were recorded as anchoring to the east of the Scapa Flow offshore export cable corridor search area. • Marine incidents within the Scapa Flow offshore export cable corridor search area between 2010 and 2019 include grounding, loss of control, machinery failure and accident to person – associated with various vessel types.

2.8.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts on shipping and navigation. These measures will follow best practice and are outlined within Table 2-23.

Table 2-49 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Compliance with MGN 654 and its annexes (particularly Search and Rescue (SAR) annex 5 (MCA, 2021c) and completion of a SAR checklist).	Tertiary	Secured through standard Section 36 and/or Marine Licence consent conditions.
2	Appropriate depiction on UKHO Admiralty Charts.	Tertiary	Secured through standard Section 36 and/or Marine Licence consent conditions.
3	Promulgation of information for vessel routes, timings and locations, safety zones and advisory passing distances as required via Notices to Mariners and Kingfisher bulletins. These will be distributed appropriately (e.g. on Project website, through Kingfisher and in nearby marinas and harbours) to adequately notify vessels users passing through the area.	Tertiary	Secured through standard Section 36 and/or Marine Licence consent conditions.
4	Construction buoyage in agreement with NLB.	Primary	Secured through standard Section 36 and/or Marine Licence consent conditions.
5	Application for safety zones of up to 500 m during construction and periods of major maintenance, and either statutory or advisory safety zones during operation (subject to further consultation).	Tertiary	Application for safety zones to be made post consent under The Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control of Access) Regulations 2007 (SI No 2007/1948).
6	Marine coordination and communication to manage project vessel movements.	Tertiary	Secured through standard Section 36 and/or Marine Licence consent conditions.
7	Suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible).	Primary	Secured through standard Section 36 and/or Marine Licence consent conditions.
8	Marking and lighting of the site in agreement with NLB and in line with International Association of Lighthouse Authorities (IALA) Recommendation O-139 (IALA, 2013).	Primary	Secured through standard Section 36 and/or Marine Licence consent conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
9	Compliance of all Project vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).	Tertiary	Secured through standard Section 36 and/or Marine Licence consent conditions.
10	Production of a Marine Pollution Contingency Plan.	Tertiary	Secured through standard Section 36 and/or Marine Licence consent conditions.
11	Blade clearance of at least 22 m above MHWS.	Primary	Adopted MGN 654 requirement.
12	Guard vessel(s) as required by risk assessment.	Tertiary	Adopted MGN 654 requirement.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the risk to maritime users and will be consulted upon during the NRA / EIA process.

2.8.6 Scoping of Impacts

A number of potential impacts / risks to maritime users have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. These impacts are outlined in Table 2-50. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

None of the potential impacts are proposed to be scoped out of the assessment at this stage, as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 2-50 EIA Scoping Assessment for Shipping and Navigation

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Vessel displacement due to construction activities	1, 2, 3, 4, 6, 8.	Scoped In	Vessels may be displaced from their existing routes due to construction activities associated with the Project. AIS data shows a number of routes currently passing through the Project.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Vessel to vessel collision between a 3rd-party vessel and a project vessel	1, 3, 4, 5, 6, 9, 10, 12.	Scoped In	The presence of project vessels during construction may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Increased vessel to vessel collision risk between third party vessels due to vessel displacement	1, 2, 3, 4, 8.	Scoped In	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters and collision risk between third party vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; • Hazard Review Workshop; and • COLLRISK model.
Vessel to structure allision risk	1, 2, 3, 4, 5, 8, 10, 11, 12.	Scoped In	Partially complete and completed structures within the Array Area could create an allision risk (powered or drifting) to passing traffic.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; • Hazard Review Workshop; and

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
					• COLLRISK model.
Reduced access to local ports due to construction activities associated with the Project	1, 2, 3, 4, 6, 9, 11.	Scoped In	Access to local ports may be impacted due to construction activities associated with the Project. The extent of the impact will depend on the final landfall chosen for the export cable.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study • Stakeholder Consultation • Hazard Review Workshop
Vessel interaction with subsea cables and mooring lines associated with the Project	1, 2, 3, 4, 5, 8, 12.	Scoped In	Subsea cables and mooring lines during wet storage on site will not affect transiting vessels but could interact with any vessels anchoring or fishing within the area.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Operations and Maintenance					
Commercial traffic displacement due to the presence of the Project	1, 2, 3, 8.	Scoped In	Commercial vessels may be displaced from their existing routes due to the presence of the Project.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Fishing vessel and recreational vessel displacement due to the presence of the Project	1, 2, 3, 8.	Scoped In	Fishing vessels and recreational vessel activity may be displaced due to the presence of the Project.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Vessel to vessel collision risk between a 3rd-party vessel and a project vessel	1, 3, 6, 9, 10, 11.	Scoped In	The presence of project vessels during maintenance may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Increased vessel to vessel collision risk between 3rd-party vessels (route-based) due to the displacement	1, 2, 3, 8.	Scoped In	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in collision risk between 3rd party commercial vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; • Hazard Review Workshop; and • COLLRISK model.
Increased vessel to vessel collision risk involving fishing vessels and/or recreational vessels due to displacement	1, 2, 3, 7, 8, 11.	Scoped In	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters / collisions, especially if smaller vessels are displaced towards commercial shipping routes.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; • Hazard Review Workshop; and • COLLRISK model.
Vessel to structure allision risk for commercial shipping due to the presence of Project structures	1, 2, 3, 5, 6, 8, 10, 12.	Scoped In	Structures within the Array Area will pose a potential allision risk (powered or drifting) to passing commercial vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; • Hazard Review Workshop; and • COLLRISK model.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Vessel to structure allision risk for fishing vessels in transit due to the presence of Project structures	1, 2, 3, 4, 5, 6, 8, 10, 12.	Scoped In	Structures within the Array Area will pose a potential allision risk (powered or drifting) to passing fishing vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; • Hazard Review Workshop; and • COLLRISK model
Vessel to structure allision risk for recreational vessels due to the presence of Project structures	1, 2, 3, 4, 5, 6, 10, 11, 12.	Scoped In	Structures within the Array Area will pose a potential allision risk to recreational vessels. This includes the risk of yacht mast interaction with rotor blades.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Reduced access to local ports due to maintenance activities with the Project	1, 2, 3, 6, 9, 11.	Scoped In	Access to local ports may be impacted due to maintenance activities associated with the Project	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Reduction in under keel clearance due to the presence of cable protection	1, 2, 3, 7.	Scoped In	The implementation of cable protection may reduce existing water depths and available under keel clearance available to 3rd party vessels.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Vessel interaction with subsea cables and mooring lines associated with the Project	1, 2, 3, 7, 8.	Scoped In	The presence of subsea cables and mooring lines associated with the Project may increase the likelihood of anchor or fishing gear interaction for third-party vessels, or	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			affect surface navigation if located close enough to sea level.		• Hazard Review Workshop.
Loss of station	1, 3, 8 and 10.	Scoped In	A mooring system failure could cause a floating structure to lose station and create a hazard to navigation away from the Array Area.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Interference with marine navigation equipment	1, 2, 7 and 8.	Scoped In	Marine navigation equipment such as Radar may be affected by the presence of structures within the Array Area, or Offshore Export Cable Corridor.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.
Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders	1, 2, 3, 6, 8 and 10.	Scoped In	The presence of the Project may result in an increased number of incidents requiring emergency response associated with work vessels or 3rd-party vessels. Also, the presence of the structures may reduce access for SAR responders, such as helicopters.	Desktop study of publicly available data, vessel traffic data and stakeholder consultation.	• Desk Study; • Stakeholder Consultation; and • Hazard Review Workshop.

2.8.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on maritime users. Notable projects will be considered as part of the Cumulative Effects Assessment including the plans for the Pentland Floating Offshore Wind Farm and the SHET-L Caithness to Orkney interconnector.

The shipping and navigation Cumulative Effects Assessment will consider the maximum adverse design scenario for each project, plan or activity in question in line with the MCA methodology.

2.8.8 Potential Transboundary Impacts

There is the potential for transboundary impacts upon maritime users due to construction, operation, maintenance and decommissioning of the Project. A proportion of vessels recorded in the AIS survey data were on international voyages with destinations including North America and mainland Europe. Potential transboundary effects on these vessels will be considered further in the NRA / EIA.

2.8.9 Approach to Analysis and Assessment

2.8.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on shipping and navigation will utilise vessel traffic survey data, historical incident data and sources such as those outlined in Table 2-47, and will be augmented by consultation during the NRA / EIA phase.

Consultation with various stakeholders will also be used to verify the baseline environment to be considered in the assessment, and to identify additional data sources and impacts to be considered in the NRA. The Project has already undertaken some initial consultation with a number of organisations with shipping and navigation interests in the Project area, including Maritime and Coastguard Agency (MCA), Royal Yachting Association (RYA), UK Chamber of Shipping and the Northern Lighthouse Board (NLB). In-depth consultation will be undertaken during the NRA / EIA process with key stakeholders relevant to shipping and navigation, including:

- MCA;
- NLB;
- RYA Scotland;
- UK Chamber of Shipping;
- MoD;
- RNLI;
- Cruising Association;
- Local ports and harbours, e.g., Scrabster and Orkney Harbours;
- Regular vessel operators, e.g., NorthLink Ferries and Orkney Ferries; and
- Local marinas and yacht clubs, including CCC.

In order to facilitate resource effective stakeholder consultation through the development phase of the Project, a shipping and navigation working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs.

AIS data over 2 x 14 days have been used to inform the baseline for this Scoping study. AIS data can be limited in terms of tracking small vessels, particularly fishing and recreational vessels. This will be supplemented by conducting site-specific surveys for the EIA to collect additional AIS, radar and visual observation data. Stakeholder consultation will also be undertaken to verify the baseline environment.

The most recent RYA Coastal Atlas will be reviewed to further identify recreational vessel activity in the area, along with sailing directions and almanacs such as those published by the CCC. MAIB and RNLI historical incident data will be updated based on the latest available data at the time of the NRA and assessed in detail to inform the risk. Other data sources will include Admiralty Charts and Sailing Directions for the area, as well as statistics from nearby ports, harbours and marinas, where available.

Quantitative modelling, including collision and allision risk modelling will be undertaken to assess the risk of the Project to vessels transiting the area. This will include modelling to assess the impacts as discussed in Table 2-50. Modelling will account for the maximum design scenario to establish the worst-case impact on shipping and navigation, to allow for design changes within the design envelope to be taken at a later date. Each impact will be assessed in terms of both frequency and consequence in order to determine whether its significance is 'broadly acceptable', 'tolerable', or 'unacceptable'.

2.8.9.2 EIA Methodology

The shipping and navigation NRA / EIA will be undertaken using the methodology outlined below and in reference to the guidance outlined within Table 2-51. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-51 Legislation and Guidance for Shipping and Navigation

LEGISLATION / GUIDANCE	SUMMARY
MCA (2021). MGN 654 Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response and its annexes	Outlines issues to be considered when assessing the potential effect on navigational safety from OREIs in UK waters. Includes several annexes including the methodology to be followed when preparing NRAs.
MCA (2021). Annex 1 to MGN 654, Methodology for Assessing Marine Navigational Safety & Emergency Response Risks of OREI	Outlines the methodology that must be followed when preparing an NRA.
MCA (2021). Annex 5 to MGN 654, Offshore Renewable Energy Installations: Requirements Guidance and Operational Considerations for SAR and Emergency Response	Describes the requirements and guidance to be followed to assist and enable SAR and emergency response in proximity to OREIs.
MCA & HSE (2017). Regulatory Expectations on Moorings for Floating Wind and Marine Devices	Outlines the requirements for mooring systems of floating OREIs to ensure safety and sustainability.

LEGISLATION / GUIDANCE	SUMMARY
IMO (2018). Revised Guidelines for Formal Safety Assessment (FSA)	Provides a structured and systematic methodology based on risk analysis and Cost Benefit Analysis (CBA) to reduce risks to As Low As Reasonably Practicable (ALARP).
IMO (1972/77). Convention on the International Regulation for Preventing Collision at Sea (COLREGs) – Annex 3	Rules and regulations that help regulate vessel traffic movements throughout the world. It is important that the Project does not prevent a vessel from being able to comply with the regulations.
IMO (1974). International Convention for the Safety of Life at Sea (SOLAS)	International treaty detailing the minimum safety standards required to be followed by vessels.
IALA (2013). O-139 the Marking of Man-Made Offshore Structures	Outlines the lighting and marking requirements for offshore structures, including OREIs.
RYA (2019). The RYA's Position on Offshore Renewable Energy Developments: Paper 1 – Wind Energy	Details the RYA's recommendations on what should be considered when assessing the impact on recreational boating due to OREIs.

The assessment methodology will deviate from the methodology set out in section 1.4.2, in order to ensure it complies with the International Maritime Organization's (IMO) Formal Safety Assessment (IMO, 2018), as set out in MCA guidance (Annex 1 to MGN 654 (MCA, 2021b)).

The methodology centres on risk control and will assess each impact in terms of both frequency and consequence in order to determine whether its significance is 'broadly acceptable', 'tolerable', or 'unacceptable'. Impacts assessed as 'unacceptable' will require additional mitigation measures beyond the embedded mitigations discussed in section 2.8.5, in order to bring the impact within the 'tolerable' or 'broadly acceptable' parameters. This is the ALARP approach.

Impact significance will be determined using a risk-ranking matrix assessing frequency and consequence. The frequency and consequence, as part of the NRA process, will be related to the parameters required by the IMO Formal Safety Assessment (FSA) and will be agreed with stakeholders at the Hazard Review Workshop. The risk-ranking matrix is presented in Table 2-52.

The frequency and consequence rankings per impact will be determined using a number of inputs, including:

- Quantitative modelling undertaken in the NRA (Anatec's COLLRISK software);
- Hazard Review Workshop feedback from a cross-section of maritime users;
- Other stakeholder consultation feedback;
- Output of the baseline characterisation, including the vessel traffic surveys;
- Consideration of embedded mitigation measures;
- Lessons learnt from other offshore developments; and
- Expert opinion.

Table 2-52 Risk-Ranking Matrix

CONSEQUENCE						
	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
		FREQUENCY				

Mitigation measures (beyond those already embedded and listed in Table 2-49) will be developed where necessary to reduce the risks to shipping and navigation.

2.8.10 Scoping Questions

- Do you agree with the proposed study area (incorporating a 10 NM buffer around the array area)?
- Do you agree with the proposed approach to survey data collection?
- Do you agree the embedded mitigation is appropriate, or are there other measures that should be included?
- Do you agree with the list of scoped impacts?
- Are there any additional shipping and navigation organisations that you would recommend be consulted?
- Do you agree with the proposed assessment approach?

2.8.11 References

IALA (2013). O-139 the Marking of Man-Made Offshore Structures. Edition 2. Saint Germaine en Laye, France: IALA.

IMO (1972/77). Convention on the International Regulation for Preventing Collision at Sea (COLREGs) – Annex 3. London: IMO.

IMO (1974). International Convention for the Safety of Life at Sea (SOLAS). London: IMO.

IMO (2018). Revised Guidelines for Formal Safety Assessment. London: IMO.

MCA & HSE (2017). Regulatory Expectations on Moorings for Floating Wind and Marine Devices.

MCA (2021a). MGN 654 (Merchant and Fishing) Safety of Navigation OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response. Southampton: MCA.

MCA (2021b). MGN 654 Annex 1: Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms, Southampton: MCA.

MCA (2021c). Annex 5 to MGN 654. Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for SAR and Emergency Response. Southampton: MCA.

RYA (2019). UK Coastal Atlas of Recreational Boating 2.1. Southampton: RYA.

2.9 Marine Archaeology and Cultural Heritage

2.9.1 Introduction

This section of the Scoping Report identifies the known and potential marine historic environment receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project.

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.

Information that may be considered relevant to this section is also presented within the below sections:

- Physical and coastal processes, section 2.4;
- Seascape, landscape and visual, section 2.8;
- Caithness terrestrial archaeology and cultural heritage, section 3.6; and
- Orkney terrestrial archaeology and cultural heritage, section 4.6.

This section of the Scoping Report has been prepared by the Orkney Research Centre for Archaeology (ORCA).

2.9.2 Study Area

The marine historic environment study area is defined as the area that will be directly impacted by the offshore infrastructure (including WTGs and associated foundations and substructures, the OSPs and associated foundations, the inter-array cables, offshore export cables and landfalls), as shown on Figure 2-39.

There will be a separate study area for identifying potential impacts on the setting of historic environment assets. This has yet to be defined but will include assets up to 60 km from the offshore turbine deployment area. As indicative Zones of Theoretical Visibility (ZTVs) are developed, consultation will be undertaken with statutory stakeholders (Historic Environment Scotland, The Highlands Council and Orkney Islands Council) to ensure a suitable study area is agreed.

2.9.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which will inform the baseline characterisation for the EIA are outlined in Table 2-53. The Canmore and UKHO entries in the table, statutory lists, registers and designated areas, including Lists of Scheduled Monuments, Designated Wrecks and Historic Marine Protected Areas, and paleoenvironmental information from Dr Scott Timpany of the UHI Institute of Archaeology have been used to inform this Scoping Report. Any other data sources used are referenced in the text.

Table 2-53 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
The National Record of the Historic Environment (NRHE) of Scotland	Canmore (https://canmore.org.uk/) and Pastmap database (http://pastmap.org.uk/)	Ongoing	HES
UKHO wreck register & nautical charts	https://www.admiralty.co.uk/digital-services/data-solutions/admiralty-marine-data-portal United Kingdom Hydrographic Office	Ongoing	UKHO
Statutory lists, registers and designated areas, including Lists of Scheduled Monuments, Designated Wrecks and Historic Marine Protected Areas	The Historic Environment Scotland Data Portal https://portal.historicenvironment.scot/	Ongoing	HES
Off Scotland: a comprehensive record of maritime and aviation losses in Scottish waters	Edinburgh: C-Anne Publishing	1998	Whittaker I.G.
The Ship Wreck Index of Great Britain & Ireland Vol.4 Scotland	London: Lloyd's Register of Shipping	1998	Larn, R & Larn, B.
Shipwrecks of North Scotland	Edinburgh: Birlinn Ltd	2003	Baird, R.N.
Dive Scotland, Vol 2	London: Underwater World Publications	1985	Ridley, G.
Dive Scotland, Vol 3	London: Underwater World Publications	1992	Ridley, G.
Shipwrecks of Hoy Sound	Stromness: D. Ferguson	1987	Ferguson, D.
Shipwrecks of Orkney & Shetland	Newton Abbot: David & Charles	1988	Ferguson, D.
Ferguson/Heath Collection	Private collection, continuing to update Ferguson's database	ongoing	Ferguson, D. & Heath, K.
Wreck Site EU	www.wrecksite.eu	Ongoing	N/A
The British Newspaper Archives	Home | Search the archive | British Newspaper Archive	Ongoing	N/A
Lloyds Shipping Register	http://www.lrfoundation.org.uk/public_education/reference-library/register-of-ships-online/	Ongoing	Lloyds of London
Bi-Monthly Minesweeping Reports	National Archives, Kew	N/A	N/A

TITLE	SOURCE	YEAR	AUTHOR
Lost In Waters Deep	LOSTINWATERSDEEP.CO.UK – lostinwatersdeep/homepage	Ongoing	Heath, K. & Sadler, W.
Aviation Research Group Orkney & Shetland	CRASHSITEORKNEY – Home	Ongoing	A.R.G.O.S.
Jutland to Junkyard	Edinburgh: Birlinn Ltd	2003	George, S.
Dive Scapa Flow	Caithness: Whittles Publishing	2017	MacDonald, R.
Scapa Flow	Southend-On-Sea: AquaPress	2008	Wood, L.
Scapa Flow: The Definitive Guide to Scapa Flow	Southend-On-Sea: AquaPress	2018	Wood, L.
The Naval Wrecks of Scapa Flow	Kirkwall: The Orkney Press	1989	Smith, P.
The Wrecks of Scapa Flow	Stromness: Stromness Museum	1985	Ferguson, D.
Orkney at War: Defending Scapa Flow, Vol 1	Kirkwall: The Orcadian (Kirkwall Press)	2010	Stell, G.
Scapa flow Legacy: Orkney and the German High Seas Fleet	Kirkwall: The Orcadian (Kirkwall Press)	2021	Edmonds, E. & Park, J. (eds)
High Seas Salvage Sites Report	Projects : Scapa Flow Wrecks	2018	Henry, S., Heath, K. & Littlewood, M
Scapa Flow Underwater Salvage Sites Survey: Phase 2 Report	Projects : Scapa Flow Wrecks	2019	Heath, K. & Thomson, M.
Scapa Flow 2013 Marine Archaeology Survey Final Report	Projects : Scapa Flow Wrecks	2014	Christie, A., Heath, K. & Littlewood, M
The scope of Strategic Environmental Assessment of Continental Shelf Area SEA 4 in regard to prehistoric archaeological remains	https://assets.publishing.service.gov.uk/government	2003	Flemming, N.C.
Submerged Landscapes of the European Continental Shelf	Chichester: John Wiley & Sons Ltd	2017	Flemming, N.C *et al.* (editors)

2.9.3.1 Project Site-Specific Surveys

Marine geophysical surveys, comprising MBES, SSS, MAG and possibly SBP will be undertaken as part of the EIA project, and will be reviewed for historic environment assets.

2.9.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-20) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform 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 2-54, Table 2-55, Table 2-56 and Table 2-57, 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 aircraft);
- Known wreckage and debris, especially from the salvaging of the German High Seas Fleet in Scapa Flow;
- Wartime defences in Scapa Flow;
- Marine paleoenvironmental deposits; and
- Submerged archaeological sites and artefacts.

The following sections provide information on the key spatial differences across the study area for the marine historic environment:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area (section 2.9.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.9.4.2).

Baseline information on terrestrial archaeology and cultural heritage, which is relevant to the consideration of the impact of the offshore array on the setting of onshore historic environment assets can be found in sections 3.6 and 4.6. This includes the Heart of Neolithic Orkney World Heritage Site sensitive area, which has been shown on Figure 2-40 for reference.

2.9.4.1 OFFSHORE MARINE AREA

2.9.4.1.1 Vessels

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 within the study area 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. Not only is this due to their size, relative age and their metal construction but the reality that the area around northern Scotland, Orkney and Shetland was an active battlefield where the blockade of Germany during WW1 and WW2 was maintained and prosecuted by major elements of the Royal Navy using the base at Scapa, Orkney and squadrons based in Shetland. This blockade in turn was contested by Germany using surface raiders, U-Boats and mines.

There are marine cultural heritage statutory designations within the Project, and the potential for discovery of vessels and aircraft that would be designated if found (see Table 2-54 and Table 2-55), such as any aircraft lost while on military service (automatically protected under the terms of The Protection of Military Remains Act 1986 (PoMRA) and any vessels (including merchant vessels) that were lost during war actions with the death of crew onboard, like HMT Orsino, that could be deemed War Graves. HMS Pheasant, located in the Orkney export cable corridor search area, is protected under The Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2017 (see Figure 2-39). The battleship HMS King Edward VII was lost after hitting a mine in the Whitten Head mine field. No crew were lost, and the vessel is not a designated asset, but is of historic interest and has a known position.

Table 2-54 and Table 2-55 list vessels and aircraft with verified locations (shown on Figure 2-39) and known losses that have no known location, but could be within the Project, derived from the UKHO and Canmore databases. These, and any others found by further research or marine geophysical survey, will be included in the EIA process.

2.9.4.1.2 Aircraft

A number of aircraft did go missing without trace off the north coast of Scotland and off the west coast of Orkney in both World Wars, especially World War II. The chances of finding one within the area, although not likely, cannot be discounted (see Table 2-55). Any aircraft lost on military service are automatically protected by PoMRA.

2.9.4.1.3 Historic Minefields and Ordnance

During both World Wars a large amount of ordnance, both offensive and defensive, was used in the seas around the Orkney Islands and the Pentland Firth. Some of these munitions still exist and are regularly found by divers or fishermen. These finds are taken very seriously by the MoD who immediately deploy a bomb disposal team to assess and deal with the items located. They are usually detonated where they are found as it is considered too dangerous to move them.

One of the largest German minefields was laid to the north of mainland Scotland by surface raider SMS Möwe in January 1916. This was known to the British as the Whitten Head Field and had over 250 mines (Figure 2-38). By the end of April 1916, the Royal Navy had accounted for 70 of these mines and considered the field cleared. Parts of the Whitten Head minefield are in or very close to the Project and there is a possibility that live mines from the Whitten Head minefield could have drifted into the Project area either as a result of minesweeping operations or mines having broken free of their moorings., and that some of the mines sunk during sweeping operations are still on the seabed in the area. Mines associated with the Whitten Head Field have been found ashore on Orkney and in the Pentland Firth.

The only reported U-Boat mine-laying activity in off the west coast of Orkney is off the Old Man of Hoy, with four mines laid by U-80 21st January 1917. The report in U-80's Kriegstagebücher (KTB – 'War Day Book') states the four mines were laid on high water slack 0.9 miles from land. On 1st March 1917, HMS Pheasant, an M class destroyer on patrol, struck one of these mines one mile off the Old Man of Hoy and sank with the loss of the entire crew of 89 men. The Bi Monthly minesweeping reports show that the area was subsequently swept for mines 9th April 1917 and a further 4 mines in groups of two were found, indicating that there had been some further mine-laying. Two were a mile NW of the Old Man of Hoy and the other two were 1.5 miles west of Old Man of Hoy (ADM 116-1516 Bi-monthly minesweeping reports). No further mines were reported after this.

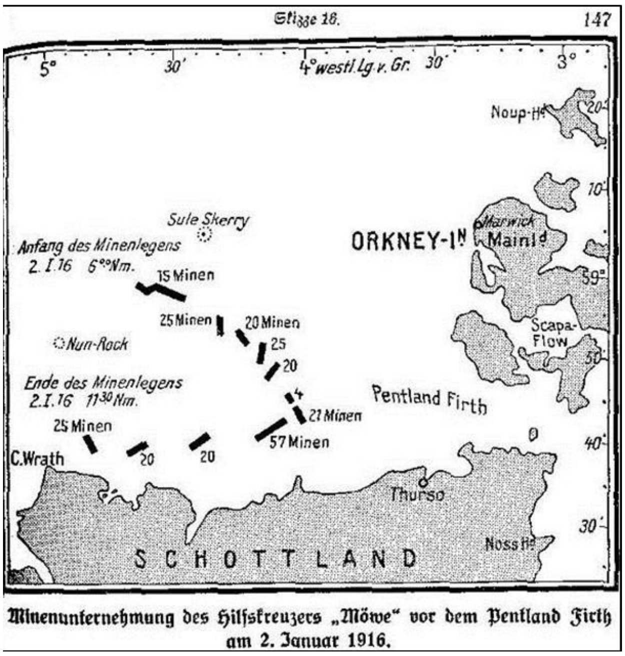

Figure 2-38 The Whitten Head Minefield, from Spindler 1932

An initial screening of UXO hazards within the OAA has been undertaken (Ordtek, 2020). This information will be utilised within the EIA.

2.9.4.1.4 Submerged Paleolandscape 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 Project is within Zone 4 of the SEA of the Continental Shelf (Flemming, 2003). Flemming notes the potential for the survival of submerged landscapes and prehistoric sites in the study area is influenced by various physical factors, processes and topography with sheltered areas with lower seabed water movements, deep sediment deposits in rocky gullies and depressions and sea caves often providing conditions suitable for good site preservation (Flemming, 2003: 15 – 21).

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, shown most recently in Orkney Waters and the Pentland Firth by the ongoing research by the Rising Tide Project and the UHI Institute of Archaeology (Bates *et al.*, 2013; Timpany *et al.*, 2017).

Recent research and modelling indicate that Relative Sea Level (RSL) was perhaps 20 m lower 10,000 years ago, before rising comparatively quickly up to 7,000 years ago, and then slowing. By roughly 5,000 years ago, the coastlines of Orkney and Caithness are, with some later localised transgressions and variation, roughly as we see them now (Bates *et al.*, 2013; Dawson and Smith, 1997; Dawson & Wickham-Jones, 2007; McIllvenny *et al.*, 2013; Wickham-Jones & Bates, 2016). Relative sea level has continued to rise since prehistory.

A sediment deposit that is also of interest from this area of northern Scotland is a layer of silty sand and marine shell that was laid down around 8,200 BP and is evidence of the Storegga tsunami extreme event that has been recorded in sediment sequences from northern Shetland to north-east England (Smith *et al.*, 2004). This layer has been recorded in sediments below the intertidal peat at Dunnet Bay (McIllvenny *et al.*, 2013) and at Strath Halladale / Melvich (Dawson, 1999).

The peat sequences from Dunnet Bay (MacIlvenny *et al.*, 2013) highlight that there is at least moderate potential for submerged peat deposits and associated archaeological sites to be present in sheltered intertidal (and littoral onshore) zones within the Caithness offshore export cable corridor search areas, such as Melvich Bay and Sandside Bay near Dounreay, with negligible to low potential on exposed rocky shorelines. No submerged organic sediments have yet been recorded at Rackwick, Hoy.

There is little information in regard to the presence of offshore organic sediment (silt, peat) sequences that may contain materials of cultural and/or paleoenvironmental significance in the Project area (Bicket and Tizzard, 2015).

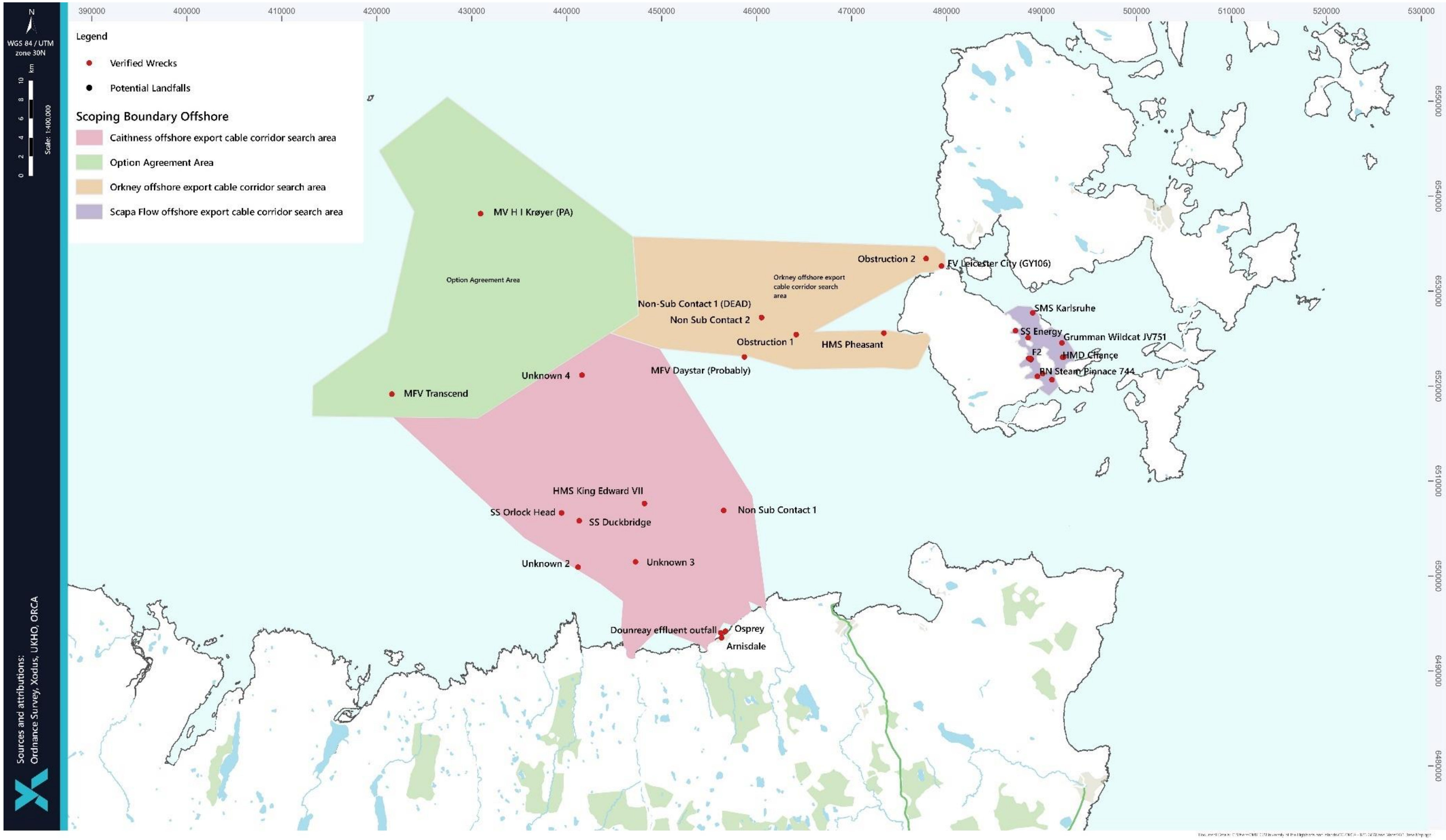

Figure 2-39 Verified Sites within the Project Relevant to the Study Area

Table 2-54 Known Vessel Losses within the Offshore Marine Area

NAME	UKHO	CANMORE	DESCRIPTION	CIRCUMSTANCE OF LOSS	DATE LOST	LAT	LONG	IMPORTANCE	REASON
OAA									
MFV Transcend	64149	323994	21 m fishing vessel. British.	Caught fire. Crew rescued.	14/02/2004	58 48,31'N	04 21,432'W	Negligible	Modern Fishing Vessel .
MV H I Krøyer	886 (DEAD)	230338 & 321465	Motor vessel, Danish. Oslo to Weston Point with a cargo of feldspar and talc.	Caught fire after an explosion and sank. One crewman lost	09/03/1968	58 58,64'N	04 12,086'W	Low	Common Vessel, cargo of low interest.
SS Valur	-	296826	Steamship of Hull. Iron. 326 tons. Baltasound, Shetland; to load chromate ore for Garston on the Mersey.	Foundered in heavy weather south of Sule Skerry. Two crew lost but bodies recovered.	18/02/1923	Unknown	Unknown	Low	Common Vessel, cargo of low interest.
Caithness offshore export cable corridor search area									
Briton	-	288537	Full rigged ship of Scarborough. 450 tons. Cargo of timber.	Wrecked at Dounreay .	07/11/1780	Unknown	Unknown	High	Pre 1913, International Trade.
Smyrna	-	221156	Snow. Cargo iron and tallow. Capt Redpath.	Wrecked at Dounreay.	10/10/1800	Unknown	Unknown	High	Pre 1913, International Trade.
Dauntless	-	221959	Iron Steam Trawler 30 ton. 7 men. Master C.W. Ballard. Owner W. OstenJr, N. Shields. Aberdeen to fishing. Ballast. 6 dead. Wind NNE12. Dounreay, near Sandside, Caithness. Built 1883	Wrecked at Dounreay.	18/11/1893	Unknown	Unknown	Medium	Pre 1913, Regional trade.
Unknown 1	-	325248	-	Vessel on fire 6 miles W of Thurso. Crew landed in own boats.	23/08/1940	Unknown	Unknown	Medium	Pre 1913, Regional trade.
Arnisdale	1152	288543	Motor fishing vessel.	Went aground and broke up.	13/4/1994	58 34.776N	003 45.088W	Negligible	No other record of type of vessel.
Dounreay effluent outfall	1122	101986	Obstruction.	Outfall end marked on chart as obstruction. Buoyed.	-	58 35.060N	003 45.167W	Negligible	Modern Feature.
Osprey	1152	321537	Wave device.	Device broke up in heavy weather.	-	58 35.151N	003 44.655W	Negligible	Modern Feature.
Non Sub Contact 1	945	-	Now listed as dead. Recorded in 29/4/1945 at position 584200N. 034500W. Later position of 584200N, 034500W accurate within 200 yards. Survey on 11/1/1985 found nothing.	-	-	58 42.000N	003 45.000W	Uncertain	Not identified.
Non Sub Contact 2	939	-	Now listed as dead. Recorded in 29/4/1945 at position 584100N. 034630W accurate within 200 yards. Survey on 11/1/1985 found peak of a gravel wave with least e/s depth of 69 m in 84 m.	-	-	58 52.974N	003 41.090W	Uncertain	Not located or identified.
Unknown 2	876	-	Wreck reported by trawler.	-	-	58 38,675'N	04 00,787'W	Unknown	Unknown

NAME	UKHO	CANMORE	DESCRIPTION	CIRCUMSTANCE OF LOSS	DATE LOST	LAT	LONG	IMPORTANCE	REASON
Unknown 3	1151	-	Wreck reported by fisherman.	-	-	58 39,026'N	03 54,538'W	Unknown	Unknown
HMT Orsino	-	214438	Built by Mackie & Thomson Ltd, Govan in 1906. 172 tons. Armament 1 x 3pdr. Fishing registration number H864. Registration: hull. Length: 33m. Beam: 6m. Requisitioned by Royal Navy as an armed trawler.	Sunk by U-boat U55. This vessel was sunk by submarine between Loch Eriboll and Stromness. Six men were killed.	28/09/1916	u/k	u/k	High	War Grave.
SS Polarstjernen	-	222028	Wooden steamship, 194grt, 14 men. Master A. Andersen. Owner C. Christensen, Sandfjord, Norway. Built 1885.. Length: 33 m. Beam: 7 m.	Copenhagen to Greenland. General (including gunpowder). Blew up after catching fire. Wind S2. 6 miles NW of Thurso.	28/08/1897	u/k	u/k	High	Pre 1913, International Trade, transition between sail and steam.
SS Orlock Head	880	101965	British Steamship.1563 tons.	Bombed by German aircraft and sank. 6 lives lost.	28/07/1940	58 41,742'N	04 02,67'W	High	War losses with lives lost.
SS Duckbridge	878	101963	British Steamship, 1491 tons. Cargo of coal From Cardiff.	Sunk by mine laid in the Whitten Head field. 18 lives lost.	-	58 41,309'N	04 00,737'W	High	War losses with lives lost.
HMS King Edward VII	946	101964 & 101982	. Battleship, 16,350 tons.	Sunk by mine in the Whitten Head field. No lives lost.	-	58 42,342'N	03 53,654'W	Medium-High	Warship, no lives lost but of historical interest, especially due to transition period.
Unknown 4	891	-	Vessel, 60 m long with a height of 7 m 000/180 deg.	Unknown	-	58 49,574'N	04 00,671'W	Unknown	Unknown
SS Lily	-	296776	Danish Steamship 945 ton. Cargo China clay.	Left Kirkwall for Liverpool, Torpedoed by U-13. All crew lost.	26/04/1940	u/k	u/k	High	War losses with lives lost
Orkney offshore export cable corridor search area									
MFV Daystar (Probably)	1115	330817	Motor fishing Vessel. 31 ton. 17.4 m long.	Taking on water, abandoned by crew taken in tow by MFV Chance but sank.	10/03/1982	58 50,725'N	03 42,923'W	Low	Vessel of common type. Modern.
Non-Sub Contact 1 (DEAD)	1081	-	-	First reported in 1941,, attacked by HMT Lord Lloyd in 1943. Located by Escort Group 30 in 1945. Not located by BUE Subsea in 1984. Amend to dead.	-	58 52,974'N	03 41,09'W	Unknown	Unknown
Obstruction 1	1053	-	-	Non Sub Contact reported 1945. Survey by BUE Subsea reports probable rock pinnacle.	-	58 52,024'N	03 37,274'W	Unknown	Unknown
HMS Pheasant	62013	-	M Class Destroyer.	Struck a mine laid by U-80. Entire crew of 88 lost. Only one body recovered.	01/03/1917	Charted 58 52,07'N; Actual 58 52.150N	Charted 03 27,41'W; Actual 03 27.669W	High	War Grave PoMRA
Caledonian	-	275387	Barque of Greenock. Built 1841. 622 tons. Wood. Cargo of timber. From Bay Chaleur to the Clyde.	Wrecked at Rackwick Bay, Hoy.	06/12/1842	-	-	Low	Vessel of common type. Cargo of low interest.
Peggy	-	287770	Brigantine of Whitehaven. Built 1782. 6 tons. Wood. Cargo listed as provisions.	Wrecked at Rackwick Bay, Hoy.	02/02/1797	u/k	u/k	Medium	Napoleonic War era, cargo could be of interest.

NAME	UKHO	CANMORE	DESCRIPTION	CIRCUMSTANCE OF LOSS	DATE LOST	LAT	LONG	IMPORTANCE	REASON
Unknown 1	-	327108	Craft	Wreckage washed ashore at Rackwick, Hoy.	1824	u/k	u/k	Unknown	Unknown
Jockie	-	287769	Sloop of Campbeltown. Wood. Cargo Herring and Beef.	Vessel was wrecked at Rackwick, Hoy. Crew saved.	00/03/1768	u/k	u/k	Medium	Due to age. Cargo of no interest.
Generous Friend	-	287559	Vessel	Taken and burnt by two French privateers ''off Stromness''. Registration: Liverpool. Capt. Cowan.	14/10/1778	u/k	u/k	High	Late 18th century and involved in International trade. Conflict with France.
Obstruction 2	82868	-	Obstruction reported by MV Hamnavoe in 2015.	-	-	58 56,394'N	03 23,091'W	Unknown	Unknown
FV Leicester City (GY106)	1105	-	Steam trawler, steel, 411 tons, 47.9 m x 8.1 m x 3.7 m.	Ran in heavy weather at Breibuster Head in Hoy Sound, Returning from the Iceland fishing grounds. 7 crew lost.	22/03/1953	58 55,974'N	03 21,393'W	Medium	Lives lost and not found.

Table 2-55 Known Aircraft Losses within the Offshore Marine Area

NAME	UKHO	CANMORE	DESCRIPTION	CIRCUMSTANCE OF LOSS	DATE LOST	LAT	LONG	IMPORTANCE	REASON
Supermarine Seafire IIC	-	326078	Supermarine Seafire IIC MA976, 807 Sqn	Crashed into the sea 10 miles W of Hoy.	18/09/1942	unknown	unknown	High	PoMRA
Blackburn Skua II	-	287560	Blackburn Skua II L2951, 771 Sqn	Crashed into the sea 6 miles West of Stromness. Both crew lost.	26/04/1944	unknown	unknown	High	PoMRA
Blackburn Roc	-	288032	Blackburn Roc L3177, 771 Sqn	Ditched in the sea on the Pentland Firth side of Hoy.	18/09/1942	unknown	unknown	High	PoMRA
Fairey Albacore I	-	287558	Fairey Albacore I N4155, 827 Sqn	Ditched 13 miles 232 degrees from Brough Head.	15/09/1942	unknown	unknown	High	PoMRA
Grumman Avenger I	-	287822	Grumman Avenger I FN787, 845 Sqn	Spun into the sea off Old Man of Hoy. 3 crew lost.	09/10/1943	unknown	unknown	High	PoMRA
Junkers JU88	-	287823	German bomber	Shot down off Hoy.	02/04/1940	unknown	unknown	High	PoMRA
Junkers JU88	-	287824	German bomber, KG30 Sqn	Crashed off Hoy.	20/09/1939	unknown	unknown	High	PoMRA
Supermarine Sea Otter	-	287564	Supermarine Sea Otter JM761, 771 Sqn	While flying from Abbotsinch (Glasgow) to the airfield at Twatt (HMS Tern) with two crew and a gunnery officer as passenger, when she suffered an engine failure, the pilot made a forced landing in Hoy Sound. Hull was damaged and the Sea Otter sank.	26/04/1944	unknown	unknown	High	PoMRA

2.9.4.2 SCAPA FLOW

2.9.4.2.1 Vessels and Vessel Debris

There are marine cultural heritage statutory designations within the Scapa Flow scoping boundary, and the potential for discovery of vessels and aircraft that would be designated if found (see Figure 2-40, and Table 2-56and Table 2-57), such as any aircraft lost while on military service (automatically protected under the terms of PoMRA) and any vessels (including merchant vessels) that were lost during war actions with the death of crew onboard. There are also known vessels of Medium or High importance due to their historical value despite no people being lost (see Table 2-56).

The SMS Karlsruhe is one of a group of four vessels of the German High Seas Fleet scuttled in Scapa Flow on 21 June 1919 that is a Scheduled Monument, along with three other vessels from the Fleet that are Scheduled individually. The other three vessels that are part of this Scheduled Monument, along with the three separately Scheduled Monuments lie north and north-east of Cava, outwith the Project. In each case, there is a scatter of debris, formed in part when the vessel sank and surrounds the hull of the vessel in part by subsequent salvage attempts, accidental damage and slow attrition. The Scheduled areas include an area of seabed 500 m in diameter, centred around each vessel. There is a known aircraft located within the Project, which is Grumman Wildcat JV751, lost over the side of HMS Trumpeter in WW2. This falls under the protection of PoMRA.

Also within the Scapa Flow offshore export cable corridor search area are sites and areas that are being considered for inclusion in the proposed Scapa Flow Historic Marine Protected Area (HMPA), including the whole area between Rysa Little and Cava, and most of Rysa Sound between Rysa Little and Pegal Head on Hoy, as well as the wrecks of the SS Prudentia and HMD Chance (Figure 2-40). This area contains sites associated with Scapa Flow's Royal Navy base during WW1 and WW2 (OIC, 2020).

The Scapa Flow offshore export cable search area contains large areas designated ''Foul'' and ''Foul Ground'' (see Figure 2-40). The area between Cava and Rysa Little was used in 1918-19 to anchor the majority of the German High Seas Fleet Battleships and Battle Cruisers. On 21st June 1919 all the ships in this area were scuttled. Between 1927 and 1940 all these ships were raised with the exception of SMS Karlsruhe. This left a large amount of debris on the seabed, ranging from masts and spotting tops, bridge structures, steam and diesel pinnaces. As the ships were towed to Lyness, further structures were blasted away to allow clearance navigating along Gutter Sound. The whole area between Cava and Rysa Little has debris from the movement of these ships including masts, funnels and anchors, which is why it is being considered for inclusion in the proposed Scapa Flow Marine Historic Protected Area (Christie *et al.*, 2014; Henry *et al.*, 2018; Heath & Thomson 2019).

There are other ''Foul'' areas north east of Fara, one with a radius of 120 m and consists of wartime boom net and wires. The entire northern section of Gutter Sound between Fara and Hoy is marked ''Foul'' because this area is where the German Destroyers were moored, scuttled, then raised (ibid.). There are some masts and anchors and debris as far south as Mill Bay. The area around Lyness also has debris from the salvaging of the German Fleet as well as wire hawsers, old moorings and modern fish farm debris.

Table 2-56 and Table 2-57 list vessels and aircraft with verified locations (shown on Figure 2-40) and known losses that have no known location, but could be within the Scapa Flow offshore export cable corridor search area, derived from the UKHO and Canmore databases. These, and any others found by further research or marine geophysical survey, will be included in the EIA process.

2.9.4.2.2 Aircraft

Four aircraft are known to have crashed within the area and only one has been located (see Table 2-57 and Figure 2-40). Others have reportedly crashed ''in Scapa Flow'' but no exact position given and as such may be within the area. Any aircraft lost on military service are automatically protected by PoMRA.

2.9.4.2.3 Historic Ordnance

During both World Wars a large amount of ordnance, both offensive and defensive, was used in the seas around the Orkney Islands and throughout Scapa Flow. Some of these munitions still exist and are regularly found by divers or fishermen. These finds are taken very seriously by the MoD who immediately deploy a bomb disposal team to assess and deal with the items located. They are usually detonated where they are found as it is considered too dangerous to move them. During a survey for HES in 2017, a live British torpedo was found west of Cava. This was blown up by the Royal Navy Bomb Disposal Unit but shows the potential for unexploded ordnance in this area. Live shells are reported by divers as being seen off Lyness.

2.9.4.2.4 Submerged Paleolandscape Deposits, Archaeological Sites and Artefacts

RSL change in Orkney has been investigated by Bates *et al*. (2013) who have shown that RSL rose significantly following the last glacial period from c. -10 m OD around 8,500 cal BC to -2 m OD at approximately 5500 cal BC. RSL rise is then seen to be more gradual between around 5,500 to c.1200 cal BC rising from -2 m OD to +1 m OD and then potentially stabilizes to its present-day height (Bates *et al.*, 2013). Physical evidence for lower shorelines, former terrestrial land surfaces and the past environment of Orkney's landscape is reflected in the presence of intertidal peats across Orkney, many of which have been observed to contain remnants of prehistoric woodland surviving as submerged forest deposits as well as archaeological cultural materials (e.g. de la Vega-Leinert *et al.*, 2000, 2012; Keatinge and Dickson, 1979; Timpany *et al.*, 2017).

Intertidal peats are known from small bays across Orkney (e.g. de la Vega *et al.*, 2000; Timpany *et al.*, 2017) indicating the possibility for such deposits to exist. Intertidal peats have previously been recorded on Hoy at Mill Bay by the Rising Tides team. This intertidal peat was sampled for analysis, with plant microfossils indicating a former wooded environment existed in this area, which included alder and birch (Bates *et al.*, 2011). That former woodland existed in these now intertidal areas in Orkney has been demonstrated by the recording of macro wood remains representing the remnants of these actual woodlands now preserved as submerged forests. These have been recorded in locations across Orkney (Timpany *et al.*, 2017). The thickness of these peats varies from tens of centimetres through to >2 m across Orkney and have the potential to contain micro and macrofossils valuable for palaeoenvironmental work (e.g. former woodland reconstruction) and also anthropogenic finds, such as the half-split radial oak timber at the Bay of Ireland (Timpany *et al.*, 2017). Radiocarbon dates from these peats have shown them to largely date between 4800-3000 cal BC (e.g. Timpany *et al.*, 2017) covering a critical period in prehistory, the Mesolithic-Neolithic transition, when the hunter-gatherer lifestyle was replaced with one of sedentism and agriculture.

The summary above highlights that there is at least moderate potential for submerged peat deposits and associated archaeological sites to be present in Scapa Flow in sheltered intertidal (and littoral onshore) zones such as in Mill Bay and other bays along the coastline, with negligible to low potential on exposed rocky shorelines.

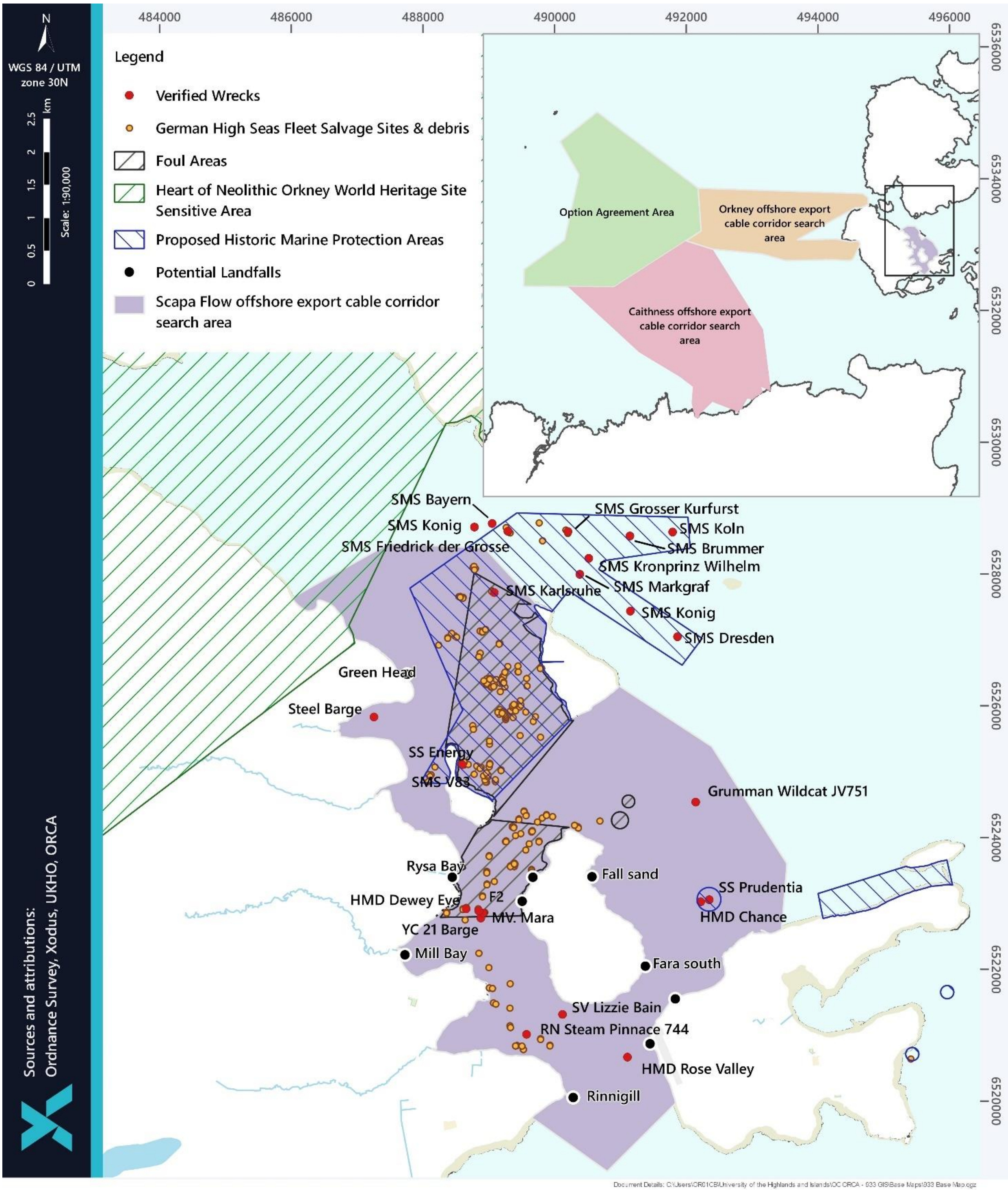

Figure 2-40 Charted Wrecks and Verified Debris in Scapa Flow Offshore Export Cable Corridor Search Area

Table 2-56 Charted Wrecks within the Scapa Flow Offshore Export Cable Corridor Search Area

NAME	UKHO	CANMORE	DESCRIPTION	CIRCUMSTANCE OF LOSS	DATE LOST	LAT	LONG	IMPORTANCE	REASON
SMS Karlsruhe	1085	102307	German Cruiser.	Scuttled June 21st 1919. All saved	21/06/1919	58 53,345'N	03 11,363'W	High	Scheduled Monument.
Steel Barge	65006	330766	Steel barge 32 m x 14 m x 1.5 m.	Unknown	unknown	58 52,325'N	03 13,259'W	Low	Common type, no cargo.
SMS V83	1052	102284	German destroyer.	Scuttled June 21st 1919. All saved.	21/06/1919	58 51,938'N	03 11,861'W	High	Historic.
SS Energy	-	102987	Wooden drifter converted to salvage vessel.	Sank alongside V 83. All saved.	17/10/1925	Next to V83 port side		Low	Common vessel type. No cargo.
HMD Dewey Eve	998	230161	Wooden drifter. 119 ton 28.4 m x 5.9 m x 2.9 m.	Sank after collision with puffer, all crew saved.	09/06/1940	58 50,758'N	03 11,794'W	Low	Common vessel type.
F2	997	119012	German WW2 Escort Destroyer.	Sank while at mooring while waiting to be towed south and scrapped.	1947	58 50,742'N	03 11,594'W	Medium	German destroyer; popular shallow dive attraction.
YC 21 Barge	996	119013	Wooden salvage barge.	Sank while moored above the German Escort Destroyer F2.	1968	58 50,683'N	03°11,561'W	Low	Common vessel type. No cargo.
MV. Mara	1154	102338	Ex dive vessel.	Towed out and sunk.	Jan 1995	58 50,725'N	03 11,527'W	Negligible	Common vessel type.
SS Prudentia	1000	102254	Steamship converted to carry oil.	Sank following a collision. All crew saved.	12/01/1916	58 50,838'N	03 07,955'W	High	Pollution risk. Exclusion zone enforced by OIC.
HMD Chance	85568	286830	Wooden Steam Drifter used as Harbour Service Vessel.	Foundered.	26/01/1916	58 50,821'N	03 08,088'W	Low	Common vessel type but within the SS Prudentia exclusion zone.
RN Steam Pinnace 744	1119	361517	Steam pinnace from HMS Royal Sovereign.	Foundered during a gale. No lives lost.	1942	58 49,733'N	03 10,834'W	Medium	Of historical interest, few survive but been heavily salvaged.
SV Lizzie Bain	82281	228200	Sloop of Kirkwall.	In collision with the SS Queen. Three crew drowned, local men from Kirkwall.	06/11/1888	58 49,897'N	03 10,267'W	Medium	Of local interest, Local crew lost.
HMD Rose Valley	59275	330751	Wooden drifter.	Used to carry torpedoes. Lost following a collision. All crew saved; torpedoes recovered.	16/12/1943	58 49,549'N	03 09,24'W	Low	Common vessel.

Table 2-57 Known Aircraft Losses within the Scapa Flow Offshore Export Cable Corridor Search Area

NAME	UKHO	CANMORE	DESCRIPTION	CIRCUMSTANCE OF LOSS	DATE LOST	LAT	LONG	IMPORTANCE	REASON
Grumman Wildcat JV751	81411	287184	846 Sqn. Fighter aircraft.	Lost over side of HMS Trumpeter. Pilot escaped unhurt.	02/12/1944	58 51,636'N	03 08,171'W	High	PoMRA
Airspeed Oxford BG555	-	287631	598 Sqn. Training Aircraft.	Crashed into the sea north of Cava. With the loss of 3 crew. Searchlight exercise.	09/05/1944	unknown	unknown	High	PoMRA
Miles Martinet	-	287575	771 Sqn Target towing aircraft.	Crashed into the sea off Rysa Little with loss of 2 crew.	14/8/1944	unknown	unknown	High	PoMRA
Junkers Ju 88	-	-	German bomber.	Shot down over Scapa Flow and crashed at Pegal Burn. One survivor, three killed. (Data Source – A.R.G.O.S.)	17/10/39	unknown	unknown	High	PoMRA

2.9.4.3 Summary and Key Issues

Table 2-58 Summary and Key Issues for Marine Historic Environment

SUMMARY AND KEY ISSUES	
	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• HMS King Edward VII. Battleship. There was no loss of life on this vessel after hitting a mine in the Whitten Head mine field but considered to be of historic interest and as position in known could easily be avoided; • HMT Orsino was sunk by U Boat, most likely in the area but has not been located. Any remains of a possible trawler should be avoided as this vessel is a war grave. Six crew were lost when sunk on 28/09/1916; • HMS *Pheasant*, located in the Orkney offshore export cable corridor search area, is protected under The Protection of Military Remains Act 1986; • There are several merchant war losses within the area. Two have known locations, the SS Duckbridge and SS Orlock Head, and can be avoided. The wreck site of Danish steamship SS Lily has not been identified but there is a possibility to be within study area. All the crew, Danish nationals were lost; • Aircraft are recorded going missing without trace off the north coast of Scotland and off the west coast of Orkney. The chances of finding one within the area, although not likely, cannot be discounted. Any aircraft lost on military service are automatically protected by PoMRA; • Parts of the Whitten Head minefield are in or very close to the Project and there is a possibility that live mines from the Whitten Head minefield could have drifted into the Project area; • There are losses recorded in the area dating from the 18th and early 19th century that would be at least of Medium importance if they survive and are found. Also the SS Polarstjernen from Norway that blew up after catching fire 6 miles NW of Thurso in 1897; • There is moderate potential for submerged peat deposits and associated archaeological sites to be present in sheltered intertidal (and littoral onshore) zones in both Caithness and Orkney, such as Melvich Bay and Sandside Bay near Dounreay; and • A key issue will be addressing impacts and cumulative impacts on the setting of onshore historic environment assets by the offshore array, including the Heart of Neolithic Orkney World Heritage Site and surrounding sensitive area, as expressed by THC in their Pre-Application Advice Response (Ref: 20/04850/PREMAJ, Date of Issue: 10/02/2021) and HES in their West of Orkney Offshore Wind Farm Pre-Application Advice Response, (Date of Issue 26/11/2020, HES Case ID 300047487), hereafter HES Response 26/11/2020.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• The SS Karlsruhe, a Scheduled Monument and part of the German High Seas Fleet is within the Scapa Flow offshore export cable corridor search area; • The Scapa Flow offshore export cable corridor search area is littered with salvage sites and debris from salvaging the German High Seas Fleet; • Overlap with the proposed Scapa Flow Historic Marine Protected Area. HES would prefer selection of an alternative option for routing the wind farm cable (HES Pre-Application Advice 26/11/2020);

- Four aircraft are known to have crashed within the area and only one has been located, all would be protected under PoMRA. Others have reportedly crashed ''in Scapa Flow'' but no exact position given and may be within the study area. Any aircraft lost on military service are automatically protected by PoMRA; and
- There is at least moderate potential for submerged peat deposits and associated archaeological sites to be present in Scapa Flow in sheltered intertidal (and littoral onshore) zones such as in Mill Bay and other bays along the coastline.

2.9.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to eliminate or reduce the potential for impacts to the historic environment. These measures will follow best practice and are outlined within Table 2-59.

Table 2-59 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Pre-construction marine desk-based assessment, geophysical and intertidal walkover surveys will be conducted to identify any sensitive receptors and micro site around them	Primary	Final infrastructure locations and cable routes will be outlined in the Project Plans, which is a condition of the Section 36 and/or Marine licence consents
2	Seabed preparation, device locations, cable routing and installation activities will avoid any identified seabed heritage assets and anthropogenic geophysical anomalies by a minimum of 30 m as a result of conducting historic environment DBA using data sources identified and archaeological review of site-specific commissioned geophysical surveys	Primary	Final infrastructure locations and cable routes will be outlined in the Project Plans, which is a condition of the Section 36 and/or Marine licence consents
3	Use of cable protection systems that minimise seabed scouring, where possible.	Primary	Requirements outlined within the Construction Method Statement which is required under Section 36 and/or Marine Licence consent conditions
4	Decommissioning activities will ensure no further disturbance to historic environment assets on the seabed during the process	Tertiary	The preparation of a decommissioning programme is required under

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
			Section 105 of the Energy Act 2004 (as amended).
5	The preparation of a marine heritage Written Scheme of Investigation (WSI) and Protocol for Accidental Discoveries (PAD) to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest.	Tertiary	Production of a WSI and PAD will be a requirement of the Section 36 and/or Marine Licence consent conditions

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on marine historic environment receptors and will be consulted upon with consultees throughout the EIA process.

2.9.6 Scoping of Impacts

A number of potential direct impacts on historic environment receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research and HES Pre-Application Advice issued 26/11/2020. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

Specific concerns were expressed by HES on the proposed routing of a cable through the western entrance to Scapa Flow at the Burra and Clestrain Sounds between Hoy, Graemsay and the Mainland, which would impact a high volume of blockships occupying the Burra Sound between Hoy and Graemsay, and the First World War anti-submarine barrier known as the Clestrain Hurdles in Clestrain Sound (HES Pre-Application Advice 26/11/2020). Routing of a cable through the western entrance to Scapa Flow at the Burra and Clestrain Sounds Routing has now been excluded from the proposal.

The main environmental impacts and associated pathways of effect for intertidal and marine historic environment receptors have been identified in Table 2-60. This includes potential impacts on the setting of onshore historic environment assets by the offshore array and ancillary marine infrastructure, including the Heart of Neolithic Orkney World Heritage Site. This will ensure that all major development activities will be considered and provides structure for the identification of the significance of any potential effects on marine and intertidal cultural heritage receptors. Scoping of potential direct impacts to onshore historic environment assets at landfall will be considered in the onshore scoping sections (see sections 3.4 and 4.4).

None of the potential impacts are proposed to be scoped out of the assessment at this stage as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 2-60 EIA Scoping Assessment for the Marine Historic Environment

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Loss of or damage to known marine and intertidal historic environment assets	1, 2, 5	Scoped In	Any aspects of the offshore infrastructure that impacts on 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. Similar effects may be expected from vessel anchoring systems that impact the seabed, or the removal of devices and other infrastructure in ways that disturb the seabed or intertidal zone during decommissioning activities. Effects are considered to be permanent.	Desk based assessment of existing data sources alongside analysis of site-specific survey data including marine geophysical data.	Desk based assessment, including interpretation of Project specific survey data, considering the maximum design scenario of the Project.
Loss of or damage to unknown marine and intertidal historic environment assets	1, 3, 4, 5	Scoped In	Any aspects of the offshore infrastructure that impacts on the seabed or intertidal zone have the potential to result in the damage/loss of unknown archaeological features, which may lie undiscovered on or below the surface of the seabed or in the intertidal zone, if any are present. Similar effects may be expected from vessel anchoring systems that impact the seabed, or the removal of devices and other infrastructure in ways that disturb the seabed or intertidal zone during decommissioning activities. Effects are considered to be permanent.	Desk based assessment of existing data sources alongside analysis of site-specific survey data including marine geophysical data.	Desk based assessment, including interpretation of Project specific survey data, considering the maximum design scenario of the Project.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Loss of or damage to submerged prehistoric landscapes	5	Scoped In	Any aspects of the offshore infrastructure that impacts on the seabed or the intertidal zone have the potential to result in the damage/loss of submerged prehistoric landscape deposits or features, if any are present. Similar effects may be expected from vessel anchoring systems that impact the seabed, or the removal of devices and other infrastructure in ways that disturb the seabed and intertidal zone during decommissioning activities. Although the likelihood of impact is low, effects are considered to be permanent.	Desk based assessment of existing data sources alongside analysis of site-specific survey data including marine geophysical data.	Desk based assessment, including interpretation of Project specific survey data, considering the maximum design scenario of the Project.
Operations and Maintenance					
Loss of or damage to known marine historic environment assets	1, 2, 5	Scoped In	Any aspects of the offshore infrastructure on the seabed, including foundation anchoring systems, or in the water column above that results in localised scouring or seabed abrasion have the potential to result in the damage/loss of archaeological features lying on the seabed if such assets are shown to be present. Maintenance vessel anchoring systems that impact the seabed, or the repeated removal and replacement of devices and other infrastructure in ways that disturb the seabed also have the potential to result in the damage/loss of any archaeological features lying on the seabed. Effects are considered to be permanent.	Desk based assessment of existing data sources alongside analysis of site-specific survey data including marine geophysical data.	Desk based assessment, including interpretation of Project specific survey data, considering the maximum design scenario of the Project.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Loss of or damage to unknown marine historic environment assets	5	Scoped In	Any aspects of the offshore infrastructure on the seabed, including foundation anchoring systems, or in the water column above that result in localised scouring have the potential to result in the damage/loss of unknown archaeological features, which may lie undiscovered on or below the surface of the seabed, if any are present. Maintenance vessel anchoring systems that impact the seabed, or the repeated removal and replacement of devices and other infrastructure in ways that disturb the seabed also have the potential to result in the damage/loss of any such features. Effects are considered to be permanent.	Desk based assessment of existing data sources alongside analysis of site-specific survey data including marine geophysical data.	Desk based assessment, including interpretation of Project specific survey data, considering the maximum design scenario of the Project.
Loss of or damage to submerged prehistoric landscapes	5	Scoped In	Any aspects of the offshore infrastructure on the seabed, including foundation anchoring systems, or in the water column above that result in localised scouring have the potential to result in the damage/loss of submerged prehistoric landscape deposits or features, if any are present. Maintenance vessel anchoring systems that impact the seabed, or the repeated removal and replacement of devices and other infrastructure in ways that disturb the seabed also have the potential to result in the damage/loss of any such features. Although the likelihood of impact is low, effects are considered to be permanent.	Desk based assessment of existing data sources alongside analysis of site-specific survey data including marine geophysical data.	Desk based assessment, including interpretation of Project specific survey data, considering the maximum design scenario of the Project.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Long-term changes to the setting of historic environment assets	N/A	Scoped In	There is a possibility that the offshore turbines could have long-term effects on the setting of an onshore historic environment asset, impacting the way in which the asset is understood, appreciated and experienced, and thus the significance/ importance of the historic asset.	Maximum design details, ZTVs, identification of assets and their setting, wireframes, and visualisations from key receptors. Use of a 3-D model to visualise impact from specific locations.	Assessment to follow using HES *Managing Change in the Historic Environment: Setting*, (2020). Interpretation of wireframes and visualisations.

2.9.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on historic environment receptors.

The EIA will include consideration of the potential cumulative impact (direct and indirect) of the Project and other developments on the marine historic environment, including the Pentland Floating Offshore Wind Farm located approximately 6 km off Dounreay and the SHET-L Caithness to Orkney interconnector. These effects will be localised on the seabed, however there is potential for cumulative effects if cable corridors and landfalls converge. Another key consideration is the potential for cumulative effects on the surviving wartime remains on the seabed in Scapa Flow due to all activities concentrated in the Flow, such as the Flotta Oil terminal, maritime transport, berthing of rigs, commercial and recreational diving, fishing and fish farms, existing utility pipes and cables.

The marine historic environment CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in sections 1.4.3 and 2.9.9.

Potential cumulative impacts on the setting of onshore historic environment assets by the offshore devices will be considered, including the Pentland Floating Offshore Wind Farm (previously the Dounreay Trì floating wind demonstration project) located approximately 6 km off Dounreay, the existing Hammars Hill and Burgar Hill wind farms in Orkney's West Mainland, the recently approved Hoy and Quanterness Community Wind Farm Projects, and the existing and proposed windfarms across Caithness and Sutherland. Serious concerns regarding such cumulative impacts were expressed by THC in their Pre-Application Advice Response (Ref: 20/04850/PREMAJ, Date of Issue: 10/02/2021).

2.9.8 Potential Transboundary Impacts

There is no potential for transboundary impacts upon marine historic environment receptors due to construction, operation, maintenance and decommissioning of the Project. The potential impacts are contained within the area that will be directly impacted by the Project, within UK and Scottish Waters, and therefore transboundary impacts do not need to be considered further.

2.9.9 Analysis and Assessment Approaches

2.9.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on marine historic environment will utilise Project-specific and publicly available data (see section 2.9.3) and will be augmented by consultation during the EIA phase. Consultees will include:

- Marine Scotland;
- HES;
- OIC; and
- THC.

In order to facilitate resource effective stakeholder consultation though the development phase of the Project, a number of working groups will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs. Historic setting issues are likely to be a discussion topic in the seascape, landscape and visual working group. The Project has already undertaken some initial consultation with Historic Environment Scotland who issued Pre-Application Advice in 2021 (Ref: 20/04850/PREMAJ, Date of Issue: 10/02/2021).

The approaches used to identify and analyse the historic environment baseline and assess the potential impacts will be in accordance with standards and guidelines produced by the Scottish Government, Historic Environment Scotland, the Licensing and Planning Authorities and the Chartered Institute for Archaeologists, and take into account the advice supplied by HES and THC's Historic Environment Team in their Pre-Application Advice Response (Ref: 20/04850/PREMAJ, Date of Issue: 10/02/2021).

The desk-top data sources that will be examined for the EIA marine baseline characterisation are outlined in section 2.9.3 above. Site-specific geophysical surveys will be conducted for the Project and the datasets reviewed and analysed with a view to identifying anthropogenic geophysical anomalies and the presence of submerged paleolandscape deposits, with previously unknown or unconfirmed locations.

The marine geophysical surveys (SSS, MBES, MAG and SBP) will be conducted to appropriate professional standards for archaeological review (as outlined in Plets *et al.*, 2013). High resolution targeted surveys may be conducted within the Option Agreement Area and the export cable corridor search areas based on the results of reconnaissance surveys. These will identify objects on the seabed (or just buried at the surface) that are 1 m in size, in order to capture the presence/absence of anchors, cannon and aircraft engines that could indicate assets of moderate or high importance.

The relative importance (e.g. national, regional, local) or sensitivity (high, medium, low) of each cultural heritage asset identified in the datasets will be assessed (with reference to Historic Environment Scotland Designation Policy and Selection Guidance 2019). Anomalies identified in the marine geophysical surveys will be assessed as to whether they are anthropogenic, potentially anthropogenic or natural features.

In terms of setting, statutorily designated assets including Scheduled Monuments, Listed Buildings, Gardens & Designed Landscapes, and Conservation Areas within 60 km of the boundary of the area and within the ZTV, will be identified using HES datasets downloaded from https://portal.historicenvironment.scot/downloads. Consideration will also be given to any sites outwith the ZTV that may be affected. In order to keep the size of the assessment reasonable and proportionate, it is proposed that a selection of designated sites and areas, such as Scheduled Monuments and Listed Buildings, will be considered rather than every such site and area, which can act as proxy for the range of effects on other designated and undesignated sites. Relevant non-designated sites will be identified in consultation with the local planning authority archaeologists. The importance of sites and sensitivity of setting will be identified using HES *Managing Change in the Historic Environment: Setting*, (2020) and HES 2019, *Designation Policy and Selection Guidance*, including Annexes. Key receptors for viewpoints, visualisations, photomontages, and wireframes will be agreed with the Landscape and Visual consultants and the statutory authority, and produced according to standard best practice guidance (Landscape Institute & IEMA *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), 3rd edition 2013; and SNH (now NatureScot) *Visual Representation of Wind Farms Guidance*, v2.2, 2017).

The potential effects of the Project on the marine historic environment assets identified by the baseline assessment will be undertaken (with reference to SNH (now NatureScot) and HES Environmental Impact Assessment Handbook

2018). The assessment approach will be based on the maximum design scenario for the Project and will consider both direct and indirect impacts, as well as temporary and long-term effects as appropriate.

2.9.9.2 EIA Methodology

The marine historic environment EIA will be undertaken in line with the methodology set out in section 1.4.2, and the specific legislation and guidance documents outlined below in Table 2-61 will be considered in relation to the EIA. The methodologies used in the investigation will be in accordance with standards and guidelines produced by the Scottish Government, Historic Environment Scotland, the Licensing and Planning Authorities and the Chartered Institute for Archaeologists, including those recommended in the pre-application responses (THC Ref: 20/04850/PREMAJ 10/02/2021; HES Response 26/11/2020). Specific detailed methodology for the marine historic environment will be agreed in consultation with statutory stakeholders. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-61 Legislation and Guidance for the Marine Historic Environment

LEGISLATION / GUIDANCE	SUMMARY
Legislation and guidance	
The United Nations Convention of the Law of the Sea (UNCLOS)	Countries have a duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose.
Annex to the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001	The protection of underwater cultural heritage through in situ preservation shall be considered as the first option. Accordingly, activities directed at underwater cultural heritage shall be authorised in a manner consistent with the protection of that heritage, and subject to that requirement may be authorised for the purpose of making a significant contribution to protection or knowledge or enhancement of underwater cultural heritage.
The European Convention on the Protection of the Archaeological Heritage (revised), known as the Valletta Convention	Contains provisions for the protection of archaeological heritage both underwater and on land, preferably in situ, but with provisions for appropriate recording and recovery if disturbance is unavoidable.
The Protection of Military Remains Act 1986 (PoMRA)	Has the principal concern to protect the sanctity of vessels and aircraft that are military maritime graves. Any aircraft lost while in military service is automatically protected under this Act.
The Marine (Scotland) Act 2010	Requires licensing activities in the marine environment to consider potential impacts on the marine environment including features of archaeological or historic interest and in Section 73 defines marine historic assets [see section 2.9.1 above]. Historic Environment Scotland is a statutory consultee on any development proposals that may affect the site or setting of an Historic Marine Protected Area.
The Ancient Monuments and Archaeological Areas Act 1979	Concerns sites that warrant statutory protection due to being of national importance and are Scheduled under the provisions of the Act. The Act is administered in Scotland by Historic Environment Scotland.
Scotland's National Marine Plan: A Single Framework for Managing Our Seas (March 2015)	Covers both Scottish inshore waters (out to 12 NM) and offshore waters (12 to 200 NM). It contains policies and advice concerning the marine historic environment, including that development and use of the marine

LEGISLATION / GUIDANCE	SUMMARY
	environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance and that as well as designated marine heritage assets there are likely to be a number of undesignated sites of demonstrably equivalent significance, which are yet to be fully recorded or await discovery. Recommends that Historic Marine Planning Partnerships and licensing authorities should seek to identify significant historic environment resources at the earliest stages of planning or development process and preserve them in situ wherever feasible. Adverse impacts should be avoided, or, if not possible, minimised and mitigated. Where this is not possible licensing authorities should require developers to record and advance understanding of the significance of the heritage asset before it is lost, in a manner proportionate to that significance.
Pentland Firth and Orkney Waters (PFOW) Marine Spatial Plan 2016	Has been adopted as non-statutory planning guidance by OIC and THC, and is a material consideration in the determination of relevant planning applications. General Policy 6: Historic Environment includes that development with potential to have an adverse effect on the significance of heritage assets will be expected to demonstrate that all reasonable measures will be taken to mitigate any loss of significance, and that any lost significance which cannot be mitigated is outweighed by social, economic, environmental, navigation or safety benefits.
The Historic Environment Policy Statement for Scotland (HEPS) 2019	Includes policies that decisions affecting any part of the historic environment require understanding of its significance and consideration of avoiding or minimising detrimental impacts.
Historic Environment Scotland Designation Policy and Selection Guidance 2019	Stands alongside HEPS 2019 and outlines the principles and criteria that underpin the designation of HMPAs.
Historic Environment Scotland Managing Change in the Historic Environment Guidance Series: Setting (revised in 2020)	Planning authorities are guided to this Guidance which states that "Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance. Planning authorities must take into account the setting of historic assets or places when drawing up development plans and guidance, when considering environmental and design assessments/statements, and when making decisions on planning applications."

LEGISLATION / GUIDANCE	SUMMARY
Orkney Islands Council Heart of Neolithic Orkney Supplementary Planning Guidance (2010).	Establishes a detailed policy context for impacts on the Outstanding Universal Value of the World Heritage Site, including issues associated with the component sites and their wider setting.
The Chartered Institute for Archaeologists (CifA) *Codes, Standards and Guidance* (various)	CifA has developed a range of Regulations, Standards and guidance that are binding on all members and Registered Organisations to ensure that CifA members work to high ethical and professional standards.
Historic Environment Scotland. 2016, updated in 2020. *Managing Change in the Historic Environment* guidance series, especially the *Setting* and *World Heritage* guidance notes	This document is part of a series of non-statutory guidance notes about managing change in the historic environment. They explain how to apply the policies in the Historic Environment Policy for Scotland.
Scottish Natural Heritage & Historic Environment Scotland. 2018. Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland.	The Handbook is intended to provide competent authorities, statutory consultees and others involved in the EIA process with practical guidance and a ready source of information about the process.
The Joint Nautical Archaeology Policy Committee and Crown Estate. 2006. Maritime Cultural Heritage & Seabed Development: JNAPC Code of Practice for Seabed Development. York: CBA	Code presents an overview of procedures for consultation and co-operation between seabed developers and marine archaeologists.
Wessex Archaeology. 2007. *Historic Environment Guidance for the Offshore Renewable Energy Sector*, commissioned by COWRIE Ltd (project reference ARCH-11-05)	Generic guidance note on the survey, appraisal and monitoring of the historic environment during the development of offshore renewable energy projects in the UK.

LEGISLATION / GUIDANCE	SUMMARY
Oxford Archaeology & George Lambrick Archaeology and Heritage. 2008. *Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy*, commissioned by COWRIE Ltd (project reference CIARCH-11-2006)	Guidance on the assessment of cumulative impacts on the historic environment arising from offshore renewable energy projects.
The Crown Estate. 2021 Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects Offshore Renewables Projects, Wessex Archaeology Ltd for The Crown Estate	Guidance document outlining the latest requirements and responsibilities for the historic environment.
The Crown Estate. 2014. *Protocol for Archaeological Discoveries: Offshore Renewables Projects*, Wessex Archaeology Ltd for The Crown Estate	Protocol for archaeological discoveries.
English Heritage. 2012. Ships and Boats: Prehistory to Present. Designation Selection Guide. Swindon: English Heritage	Historic England's selection guides help to define which historic assets are likely to meet the relevant tests for national designation and be included on the National Heritage List for England.
Wessex Archaeology. 2011. *Assessing Boats and Ships 1860-1913, 1914-1938 and 1939-1950*. Archaeological Desk-Based Assessments in 3 volumes. Salisbury: Wessex Archaeology	A series of three desk-based studies, split into the periods 1860-1913, 1914-1938 and 1939-1950, and a methodology report.

2.9.10 Scoping Questions

- Do you agree that the identification of what constitutes the baseline historic marine environment is adequate?
- Do you agree that the data sources listed for conducting a DBA to identify the baseline historic marine and intertidal environment are sufficient?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the project site-specific studies (marine geophysical surveys) proposed are sufficient to inform the proposed assessment?
- Are any marine historic environment assets not identified that you would like to see included in the EIA?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for marine archaeology and cultural heritage?
- Do you agree with scoping out transboundary impacts?
- Do you agree with the approach to identifying sites whose setting may be impacted by the array and are there any specific sites you wish to see addressed?
- Do you agree with the proposed assessment approach?

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2.10 Military and Aviation

2.10.1 Introduction

This section of the Scoping Report identifies the military and aviation receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of the proposed Project.

The potential effects of turbines on aviation are widely publicised, but the primary concern is one of safety. Despite innumerable subtleties in the actual effects, there are two dominant scenarios that lead to potential impacts:

- Physical obstruction: turbines can present a physical obstruction to aircraft; and
- Impacts on aviation radar systems and the provision of radar-based Air Traffic Services (ATS): Turbines can create unwanted radar clutter which appears on radar displays and can affect the provision of ATS to pilots. Radar clutter (or false radar returns) can confuse air traffic controllers making it difficult to differentiate between aircraft and those radar returns resulting from the detection of turbines. Furthermore, the appearance of multiple false targets in close proximity can generate false aircraft tracks and seduce those returns from 'real' aircraft away from the true aircraft position.

It should be noted that adverse effects on radar systems are only possible if the wind turbine blades are moving, therefore this impact is applicable to the operation and maintenance phase only.

Information that may be considered relevant to this section is also presented within the below section:

- Other sea users, section 2.12.

This section of the Scoping Report has been prepared by Coleman Aviation.

2.10.2 Study Area

The military and aviation study area has been defined by the range of the affected aviation receptors; in particular, Air Traffic Control (ATC) and Air Defence (AD) Primary Surveillance Radars (PSRs). The military and aviation study area covers radars in the north of Scotland that could potentially detect wind turbines within the OAA; with the extent of the military and aviation study area defined by the furthest potential aviation receptor. The operating range of aviation radars can be up to 200 NM (370 km); however, it is only the likely radar coverage over the OAA that needs to be taken into account, as the question of whether the wind turbines themselves are visible to radar is the determining factor relating to aircraft safety. This has assisted in identifying whether any relevant PSRs, and stakeholders, may be affected. The military and aviation study area can be seen in Figure 2-41 together with the locations of the relevant aviation receptors.

2.10.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the proposed Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-62.

Table 2-62 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Civil Aviation Authority (CAA) 1:500,000 Visual Flight Rules Aviation Chart	CAA	2021	CAA
UK Integrated Aeronautical Information Package (UK IAIP)	CAA	2021	CAA
UK Military Aeronautical Information Publication (UK Mil AIP)	MoD	2021	MOD
National Air Traffic Services (NATS) Self-Assessment Maps	NATS	2021	NATS
Helicopter Certification Agency (HCA): Helicopter Landing Area Certificates	HCA	2021	HCA
Scottish Government (SG) Sectoral Marine Plan for Offshore Wind Energy	SG	2020	SG
Highlands and Islands Airports Limited (HIAL) Air Traffic Management Strategy 2030	HIAL	2018	HIAL
Beatrice Offshore Wind Farm Ltd (BOWL) ES	BOWL	2012	BOWL
Moray East Offshore Wind Farm (Moray East) ES	Moray East	2012	Moray East
Moray West Offshore Wind Farm (Moray West) EIA Report	Moray West	2014	Moray West
Dounreay Tri ES	Dounreay Tri	2016	Dounreay Tri

2.10.3.1 Site-Specific Surveys

No site-specific surveys have been undertaken to inform the military and aviation Scoping Report. This is because the baseline characterisation developed through existing data sources and consultation is considered sufficient to inform the military and aviation scoping; this is also expected to be the case for the EIA.

2.10.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-62) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The key features of military and aviation which are likely to require consideration within the EIA are:

- Civil airport patterns and procedures;
- Military aerodrome patterns and procedures;
- NLB;
- HIAL;
- Civil ATC radar;
- Military ATC radar;
- Military AD radar;
- Low flying (including SAR);
- Helicopter Main Routes (HMRs);
- Offshore helicopter installations (oil and gas platforms/lighthouses);
- Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military Exercise and Training Areas (MEXAs);
- Meteorological (Met) Office radar; and
- Space Hub Sutherland.

Initial consultation has been undertaken with MOD (via their Pre-application consultation service, Ref: DIO10052014), HIAL and Space Hub Sutherland.

There are a number of civilian and military aviation interests which the Project could affect (see Figure 2-41). As a result, there is a potential aviation safety risk and the Project may only proceed once all risks have been appropriately managed and all risks resolved.

The following sections provide information on the key spatial differences for the military and aviation assemblage across the following areas:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area (section 2.10.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.10.4.2).

2.10.4.1 OFFSHORE MARINE AREA

The OAA is located approximately 12 NM (23 km) off the north coast of Scotland and approximately 15 NM (28 km) west of the Orkney Islands. In aviation terms, the offshore Project environment is situated in a relatively uncomplicated piece of airspace but with an active HMR in close proximity. HMR YANKEE is located approximately 3 NM (6 km) outside the eastern boundary of the OAA. CAA guidance is that, where possible, 2 NM (4 km) either side of a HMR should be kept obstacle-free; consequently, the helicopter operations on HMR YANKEE will not be affected by WTGs within the OAA. Although the ground-track of HMR YANKEE penetrates the lateral boundaries of the Caithness offshore export cable corridor search area, the subsea nature of the export cables means that helicopter operations on HMR YANKEE will not be affected.

Immediately to the west of the OAA is military Danger Area D801, which is activated periodically, from the surface up to Flight Level (FL) 550 (55,000 ft), for air to ground bombing exercises. The Project's western boundary abuts the eastern boundary of D801. MoD will have to be consulted further, however, provided the Project's turbines are outside the lateral boundaries of D801, MoD operations within the Danger Area should not be affected. This will be covered in detail in the EIA.

Sule Skerry lighthouse is located approximately 3 NM (6 km) outside the northwest boundary of the OAA. The lighthouse is unmanned, but is serviced by approximately 3-4 helicopter flights per year to enable maintenance work to be undertaken without the need for sea landings. The Northern Lighthouse Board (NLB), who operate the Sule Skerry lighthouse, will need to be consulted; however, review of the HCA website has revealed that a Helicopter Landing Certificate has not been issued for low-visibility procedures into the lighthouse's helipad. This indicates that helicopter approaches to the lighthouse will only be flown under Visual Flight Rules (VFR) meaning that the Project should have minimal impact on helicopter operations. This will also be covered in detail in the EIA. Helicopter access to Sule Skerry is restricted at certain times due to bird sensitives.

The nearest major civil airports to the OAA are Kirkwall Airport at 31 NM (56 km) and Wick Airport at 38 NM (69 km) both of which are operated by HIAL. As the proposed Project's WTGs are outside the safeguarding area for both airports, coupled with the subsea nature of the export cables (located within the export cable search areas), this means that there will no impact on these airports' Instrument Flight Procedures (IFPs). There are also six minor aerodromes situated on the Northern Isles of Orkney: Eday, North Ronaldsay, Papa Westray, Sanday, Stronsay and Westray. These airfields are operated by OIC and are located in uncontrolled airspace situated some 14 NM (26 km) to 28 NM (52 km) north of Kirkwall Airport. Scheduled passenger flights operate from Kirkwall Airport to all six aerodromes however, none of the aerodromes have published IFPs which means that aircraft only operate to/from the airports under VFR. In terms of future operations, HIAL announced in 2018 their proposed Air Traffic Management Strategy 2030, which included the potential implementation of combined surveillance radar at several HIAL airports including Sumburgh and Wick, noting now that the tendering process for this centralised approach has been halted. This is something that will be continuously monitored by the Applicant and if needed, any impacts will be covered in the EIA.

In August 2020 planning permission was granted for the construction of the Space Hub Sutherland, a vertical launch space port with launch operations control centre, site integration facility, launch pad complex, antenna park, access road, fencing, services and associated infrastructure at Talmine, Tongue. The Space Hub Sutherland facility is located 29 km to the south southwest of the OAA. HIE have been progressing the Space Hub Sutherland project to date but will soon be appointing a Launch Site Operator (LSO) who will be responsible for the operation of the facility. The first launch from the facility is expected to take place in 2022 / 2023 and thereafter a maximum of 12 launches per year (as per a condition of the planning permission). Space Hub Sutherland is in the process of discharging its planning conditions and obtaining other legal consents, including:

- The definition of a maritime personnel exclusion zone which will be required during launch events, to be approved by Marine Scotland and likely to located in the vicinity of / immediately to the west of the OAA. No details are currently available with respect to the geographical and temporal coverage of this potential maritime exclusion zone;
- Definition of an Air Space Change Plan (ACP), to be approved by the CAA, currently at ACP Stage 2; and
- Operational Licences as required by the Space Industry Regulations and approved by the CAA: and
- Development of range facilities for tracking and control of launched vehicles which may include the use of radar.

Once further details on the operational procedures for Space Hub Sutherland are available, the potential for any impacts can be established.

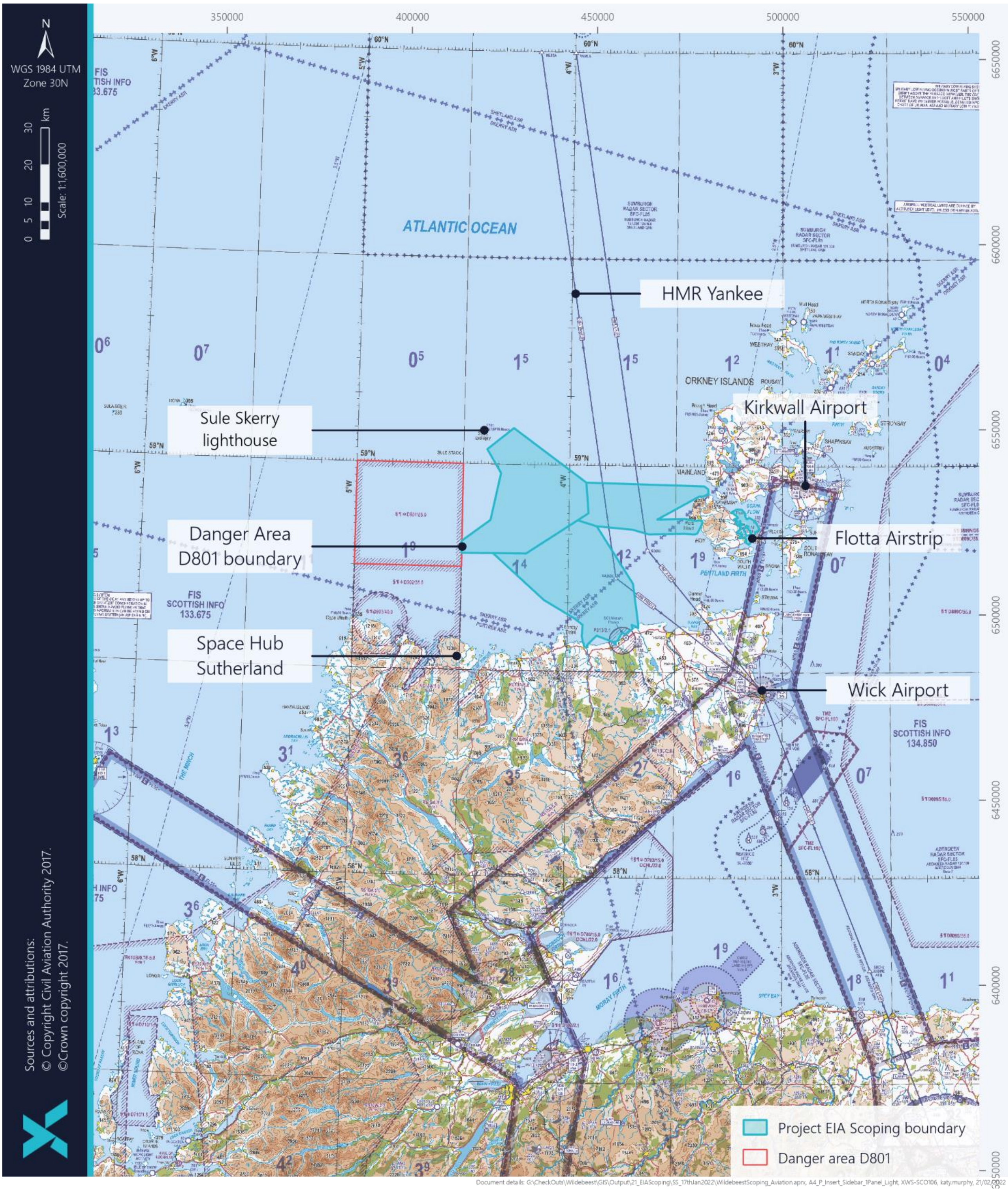

Figure 2-41 Military and Aviation Study Area and Location of Aviation Receptors

2.10.4.2 SCAPA FLOW

Flotta airfield is located on the west coast of the Isle of Flotta. The airfield is owned and operated by the Flotta Oil Terminal owners, Repsol Sinopec Resources UK Limited and is not in regular use. There is also a Non-Directional Beacon (NDB) located at the airfield. While the Scapa Flow offshore export cable corridor search area is not expected to impact directly on the airport's operations, the airport operators will need to be consulted to ensure that local aviation operators, and the NDB, remain unaffected by the construction of the offshore export cable.

2.10.4.3 Summary and Key Issues

Table 2-63 Summary and Key Issues for Military and Aviation

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA TO AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Potential impact on military low flying and SAR helicopter operations due to the presence of wind turbines as obstacles to aviation; • Potential impact on offshore helicopter operations at Sule Skerry lighthouse; • Presence of Danger Area D801 immediately adjacent to the Array Area boundary; and • Potential impact on the Space Hub Sutherland launch safety zone.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Potential impact on aviation operations at Flotta airfield.

2.10.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-64.

Table 2-64 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Approval and implementation of an LMP, which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines, as required under CAA	Primary	The LMP will be prepared in consultation with the CAA, MoD and MCA and will take into account requirements for aviation lighting as

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
	(2016). Civil Aviation Publication (CAP) 393, Air Navigation: The Order and the Regulations (2016).		specified in Article 223 of the UK ANO, 2016 and changes to ICAO Annex 14 Volume 2, Chapter 6, paragraph 6.2.4 promulgated in November 2016. The production and approval of an LMP will be a condition of the Section 36 consent / Marine Licence.
2	All structures of more than 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC), which maintains the UK's database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction.	Primary	Consultation with the CAA, MCA, MoD and NLB prior to agreement of the LMP and the Design Specification and Layout Plan (DSLP). Both the LMP and the DSLP will be conditions of the Section 36 / Marine Licence consent.
3	Any temporary obstacles associated with wind farms which are of more than 91.4 m in height (e.g. construction infrastructure such as cranes and/or meteorological masts) are to be alerted to aircrews by means of the Notice to Airmen (NOTAM) system.	Tertiary	Consultation with CAA will be required to ensure that temporary obstacles of more than 91.4 m are identified to aircrews by NOTAM. Notification of temporary obstacles will be a condition of the Section 36 / Marine Licence consent.
4	CAA will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of construction and the maximum heights of any construction equipment to be used, prior to the start of construction.	Primary	Consultation with CAA will be required. Inclusion of locations, heights and lighting status of the wind turbines on aviation charts and in the UK IAIP will be a condition of the Section 36 / Marine Licence consent.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures will be dependent on the significance of the effects on military and aviation receptors and will be consulted upon with consultees throughout the EIA process.

2.10.6 Scoping of Impacts

A number of potential impacts on military and aviation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

A number of impacts are proposed to be scoped out of the assessment for military and aviation receptors. These impacts are outlined, together with a justification for scoping them out.

Table 2-65 EIA Scoping Assessment for Military and Aviation

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Civil airport patterns and procedures	N/A	Scoped Out	The proposed Project's WTGs are outside the safeguarding area for two civil airports, Kirkwall and Wick, and none of the aerodromes within the study area have published IFPs which means that aircraft only operate to/from the airports under VFR. The Project will therefore not create any physical obstacles within the safeguarding area for any civil airports/aerodromes and as such the impact has been scoped out of the EIA.	N/A	N/A
Military aerodrome patterns and procedures	N/A	Scoped Out	The Project will not create a physical obstacle within the safeguarding area for any military aerodrome.	N/A	N/A
Low flying (including SAR)	1	Scoped In	There is the potential for the Project to impact on low-flying aircraft and as such the impact has been scoped into the EIA. A LMP will be agreed with all relevant aviation stakeholders and details of the Project will be included in aviation documentation and displayed on aviation charts.	Desk top study and consultation with the CAA, MCA, MoD and NLB.	Desktop assessment using the maximum design scenario of the Project.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
HMRs	N/A	Scoped Out	In line with CAA guidance, the Projects WTGs are more than 2 NM (4 km) from any HMR. Helicopters operations on HMRs will not be affected. As such the impact has been scoped out of the EIA.	N/A	N/A
Offshore helicopter installations (Sule Skerry lighthouse)	N/A	Scoped In	There is the potential for the Project to impact on offshore helicopter installations and as such the impact has been scoped into the EIA.	Desk top study and consultation with NLB.	Desktop assessment using the maximum design scenario of the Project and consultation on the assessment conclusions with NLB.
Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military Exercise and Training Areas (MEXAs)	N/A	Scoped In	There is the potential for the Project to impact on local airspace restrictions, specifically military Danger Area D801, and as such the impact has been scoped into the EIA.	Desk top study and consultation with MoD.	Desktop assessment using the maximum design scenario of the Project and consultation on the assessment conclusions with MoD.
Space Hub Sutherland	N/A	Scoped In	There is the potential for the Project to impact on Space Hub Sutherland operations and as such the impact has been scoped into the EIA.	Desk top study and consultation with Space Hub Sutherland.	Desktop assessment using the maximum design scenario of the Project and consultation on the assessment conclusions with Space Hub Sutherland.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Operations and Maintenance					
Civil ATC radar	N/A	Scoped Out	The Project is not within radar coverage of any civil ATC radar systems. As such the impact has been scoped out of the EIA.	N/A	N/A
Military ATC radar	N/A	Scoped Out	The Project is not within radar coverage of any military ATC radar systems. As such the impact has been scoped out of the EIA.	N/A	N/A
Military AD radar	N/A	Scoped Out	The Project is not within radar coverage of any military AD radar systems. As such the impact has been scoped out of the EIA.	N/A	N/A
Met Office radar	N/A	Scoped Out	The Project is not within radar coverage of any Met Office radar systems. As such the impact has been scoped out of the EIA.	N/A	N/A

2.10.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on military and aviation receptors. However, although the predicted effects from the Project on military and aviation receptors are considered to be localised to within the footprint of the Project, there is potential for the predicted impacts to interact with impacts from other projects and activities in the military and aviation study area and lead to a cumulative effect on receptors. For example, the Pentland Floating Offshore Wind Farm and other ScotWind OWF lease areas off the northern coast of Scotland. To ensure cumulative impacts are appropriately assessed, the maximum adverse scenarios for each of the projects or activities across all phases of the Project will be considered.

The military and aviation CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

2.10.8 Potential Transboundary Impacts

There is no potential for transboundary impacts upon military and aviation receptors due to construction, operation, maintenance and decommissioning of the Project. The potential impacts are localised and therefore do not need to be considered further from a transboundary perspective.

2.10.9 Approach to Analysis and Assessment

2.10.9.1 Analysis and Assessment Approaches

A detailed desk-top review will be undertaken to characterise existing and future aviation and military baseline conditions in the military and aviation study area to inform the EIA Report. This will be undertaken by reviewing the relevant aviation legislation and guidance documents (as described in section 2.4.3), in particular the UK IAIP, and will be augmented by consultation during the EIA phase. Key consultees will include:

- CAA;
- HIAL;
- MCA;
- MoD;
- NATS;
- NLB;
- North Sea helicopter operators;
- THC;
- OIC; and
- Space Hub Sutherland.

The Project has already undertaken initial consultation with aviation stakeholders including the MoD, Space Hub Sutherland and HIAL. The MoD issued Pre-Application Advice on the N1 PO to the Project in July 2021 (Ref DIO10052014).

2.10.9.2 EIA Methodology

The military and aviation EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-66 will also be considered in relation to the military and aviation EIA:

Table 2-66 Legislation and Guidance for Military and Aviation

LEGISLATION / GUIDANCE	SUMMARY
CAP 393 – Air Navigation: The Order and the Regulations	Contains the Air Navigation Order (ANO) 2016 and Regulations made under the order; and Defines the Rules of the Air regarding civil aviation in the United Kingdom.
CAP 670 – Air Traffic Services Safety Requirements (Version 3, 23 May 2014)	Sets out the safety regulatory framework and requirements associated with the provision of ATS.
CAP 764 – CAA Policy and Guidelines on Wind Turbines (Version 6, February 2016)	Provides CAA policy and guidance on a range of issues associated with wind turbines and their effect on aviation that need to be considered by aviation stakeholders, wind energy developers and Local Planning Authorities when assessing the viability of wind turbine developments.
CAP 774 – The UK Flight Information Services (Version 3, 25 May 2017)	Details the suite of ATS which (excluding aerodrome services) are the only services provided in Class G airspace within the UK Flight Information Region. This document is equally applicable to civilian and military pilots and air traffic controllers.
MAA: MAA Regulatory Publication 3000 Series: Air Traffic Management Regulations (last updated 23 Nov 2016)	Provides the regulatory framework and instructions to military personnel for provision of military air traffic control.
MAA: Manual of Military Air Traffic Management (last updated 26 Oct 2016)	Provides regulations for military ATC and emergency procedures and utilisation of military designated airspace.
UK IAIP	Provides comprehensive information on UK civilian aerodromes and aviation procedures within UK airspace.
UK Mil AIP	Provides comprehensive information on UK military aerodromes and guidance to military aircrew on in-flight navigation procedures.
Marine Guidance Note (MGN) 543: Offshore Renewable Energy Installations (OREIs) – Guidance	Highlights issues with assessing the impact on navigational safety and emergency response caused

LEGISLATION / GUIDANCE	SUMMARY
on UK Navigational Practice, Safety and Emergency Response Issues (last updated 19 August 2016)	by OREIs in UK internal waters, Territorial Sea and Exclusive Economic Zone.

2.10.10 Scoping Questions

- Do you agree that the existing data available to describe the military and aviation baseline remains sufficient to describe the physical environment in relation to the Project?
- Do you agree that the embedded mitigation described provides a suitable means for managing and mitigating the potential effects of the Project on the military and aviation receptors?
- Do you agree with the assessment of military and aviation receptors to be scoped out of the Project EIA?
- Do you agree with the proposed assessment methodology?

2.10.11 References

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2.11 Seascape, Landscape and Visual

2.11.1 Introduction

This section of the Scoping Report identifies the seascape, landscape and visual receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project. The focus of the seascape, landscape and visual impact assessment (SLVIA) will be on the OAA only (WTGs and OSPs), this is the only area where infrastructure will above the sea surface and therefore visible. The offshore export cables will be subsea with no potential to create significant seascape, landscape or visual effects. As such the Caithness, Orkney and Scapa Flow offshore export cable corridor search areas have not been included within the baseline characterisation.

Seascape, landscape and visual assessments are separate although linked processes, describing closely related but distinct sets of effects as described below.

Seascape as defined by NatureScot's Guidance on Coastal Character Assessment (SNH (now NatureScot), 2018) consists of three components: '*the often narrow margin of the coastal edge, its immediate hinterland and areas of sea*'. Compared to landscape character assessment which focuses on the terrestrial landscape, seascape or coastal character assessment considers '*the aspects associated specifically with the coast, such as marine influences, the coastal edge and its immediate hinterland as well as the inter-relationship between these components*.' (SNH, 2018). It should be noted that published guidance from various sources may use either or both of the terms *Seascape Character* and *Coastal Character* for the above definition, however, for the purposes of this assessment, they should be considered interchangeable. Effects on the seascape character relate to direct physical changes caused by development, or indirect changes to seascape character and how the seascape is perceived following the development.

Landscape effects, in relation to the offshore aspects of the Project, are changes to landscape character resulting from how the landscape is perceived following the development. Seascape and landscape impact assessments consider these effects both in terms of the individual components of the seascape and landscape and on the structure, coherence and character of the seascape and landscape as a whole.

Visual effects are changes in the composition and character of views available in the area affected by the Project. Visual impact assessments consider the response of the people who experience these effects, who may be living or working in the area, enjoying recreational activities or simply passing through. The assessment considers the overall consequence of the effects on the visual amenity – the pleasantness of the view or outlook – that the people affected enjoy.

Information that may be considered relevant to this section is also presented within the below sections:

- Marine archaeology and cultural heritage, section 2.9.

Information from this section will be used to consider of the impact of the offshore array on the setting of onshore historic environment assets, see section 2.9.

This section of the Scoping Report has been prepared by WSP.

2.11.2 Study Area

The preliminary proposed study area for the SLVIA of the offshore WTGs is a 60 km radius from the perimeter of the OAA. This takes into account the proposed design envelope with WTGs of up to 370 m (above LAT) to blade tip. To inform the extent of the study area, a ZTV has been produced for the OAA (Figure 2-42), based on 370 m blade tip WTG and taking a worst-case scenario of WTGs along the full perimeter of the OAA. This illustrates that potential visibility would be, as expected, along the north coast of Caithness and Sutherland, and the west coast of Hoy, mainland Orkney, Rousay and Westray. It is not continuous visibility along the north coast due to the fissured and rocky cliff character with many sheltered inlets and bays. Inland in Sutherland, the visibility is very fragmented, largely within approximately 20 km from the coastline and limited to the north facing elevated areas. This includes around Kyle of Tongue and north-west Sutherland. In the east, inland visibility is very limited, to within approximately 10 km from the coast, due to the lower moorland and flows landscape in this area which has no intervisibility with the sea. Inland on Orkney, potential visibility is illustrated along the moorland hills between Kirkwall in the south and Evie in the north.

The visual assessment will consider only the area covered by the ZTV (by definition, visual effects can only occur where a development is visible). However, the seascape and landscape assessment will consider the effect on the entire defined units of seascape and landscape character potentially affected, not simply on those parts covered by the ZTV.

Curvature of the earth, atmospheric visibility and prevailing weather conditions, as well as acuity of the human eye, are all factors which can affect the prediction of likely significant effects and will be considered in defining the final study area. Taking the curvature of the earth into account, a WTG at 370 m to blade tip would be completely below the horizon line at 68.7 km when viewed at sea level. A 200 m hub height would be below the horizon at 50.5 km when viewed at sea level. This is relevant for the beaches and receptors at sea, but it is acknowledged that this distance increases when viewed from elevated locations (in theory from the summit of Ben Hope, at 927 m Above Ordnance Datum (AOD), the distance to the horizon would be 108.7 km). However, it is useful to understand to inform the scope and study area extents.

2.11.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-67 . Scottish Natural Heritage (SNH) is referenced for publications issued prior to their rebranding as NatureScot.

Table 2-67 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
An assessment of the sensitivity and capacity of the Scottish seascape in relation to wind farms. SNH Commissioned Report No. 103	SNH (www.nature.scot)	2005	Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R.

TITLE	SOURCE	YEAR	AUTHOR
Assessment of Highland Special Landscape Areas	The Highland Council (THC) (www.highland.gov.uk)	2011 (updated 2019)	Horner+ Maclennan with Mike Wood for THC in partnership with SNH
Coastal Character Assessment: Orkney and North Caithness	SNH (now NatureScot) (www.nature.scot)	2016	LUC for SNH (now NatureScot)
Landscape Sensitivity Appraisal: Black Isle, Surrounding Hills and Moray Firth Coast, Caithness – Addendum Supplementary Guidance 'Part 2B' as part of Onshore Wind Energy Supplementary Guidance	THC (www.highland.gov.uk)	2017	THC
Orkney Islands Marine Region: State of the Environment Assessment	OIC	2020	OIC
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Marine Scotland, The Scottish Government	2016	The Scottish Government
Scotland Landscape Character Assessment	NatureScot (www.nature.scot)	2019	NatureScot
Scotland's National Coastal Character Map	SNH (now NatureScot) (www.nature.scot)	2010	SNH (now NatureScot)
The Special Qualities of the National Scenic Areas. SNH Commissioned Report No.374	SNH (now NatureScot) (www.nature.scot)	2010	SNH (now NatureScot)
Wild Land Areas map and descriptions	SNH (now NatureScot) (www.nature.scot)	2014	SNH (now NatureScot)
The Highland Council Wind Turbine Map	THC (https://www.highland.gov.uk/info/198/planning_-_long_term_and_area_policies/152/renewable_energy/4)	2021	THC

2.11.3.1 Project Site-Specific Surveys

An initial desktop study of the OAA and the proposed preliminary 60 km study area has been undertaken in support of this Scoping Report. This research has identified the baseline seascape character, landscape related planning designations, landscape character typology, other onshore and offshore windfarms in the area, and views from key locations such as routes and settlements. Local studies including landscape capacity studies and studies from other, nearby windfarms were also reviewed.

Site-specific surveys will be undertaken as part of the SLVIA process to corroborate the desk-based research, capture representative baseline photography from agreed viewpoint locations, and undertake the assessment of potential effects.

2.11.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-20) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process. Reference should also be made to Figure 2-43 and Figure 2-44, which illustrates the seascape and landscape character, and Figure 2-45 which illustrates landscape designations within the study area.

The key types of seascape, landscape and visual receptors which are likely to require consideration within the EIA are:

- Coastal and hinterland landscapes with a strong association with the sea;
- Elevated landscape in the hinterland with sea views;
- Designated landscapes (national and local) with a special qualities relating to the sea;
- People travelling or undertaking recreational pursuits within the marine environment;
- Residents in coastal settlements;
- Users of coastal roads or inland roads with sea views; and
- Visitors to beaches, coastal paths, specific visitor destinations and other areas of high amenity value.

These are discussed in more detail below. As mentioned, information has only been presented in relation to the aspects of the Project which are above the sea surface and therefore visible. This includes the Offshore Marine Area, including the OAA, but as stated previously excludes the Orkney offshore export cable corridor search area and the Caithness offshore export cable corridor search area. No reference is made to the Scapa Flow offshore export cable corridor search area.

2.11.4.1 OFFSHORE MARINE AREA

As described in section 1.3, the Project is located 23 km north of Scotland's northern mainland coast and 28 km west of the island of Hoy, Orkney. The OAA will occupy an area of open sea where there are currently no visible natural or manmade features. To the north west of the OAA lies two small islands: Sule Skerry and Sule Stack. Sule Skerry is 0.16 km^2 in size and is home to the most remote manned lighthouse in Great Britain. Sule Stack Is a remote island/stack and is home to thousands of gannets.

There are several ferry routes that lie to the east of the OAA within the study area, including between Scrabster and Stromness, Gills Bay and St Margaret's Hope and John O' Groats and South Ronaldsay, in addition to the ferry routes between the smaller Orkney Islands. Cruise ships are also now a frequent visitor to Kirkwall and Stromness, and travel through or close to the OAA. According to the Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (The Scottish Government, 2016) recreational activities in the offshore marine area include recreational dive sites, Royal Yachting Association cruising routes and sailing areas. Closer to the coastline of both the North Coast and Orkney Islands, sea kayaking, canoeing, surfing, wind surfing and sea angling are common activities.

The landward component of the study area includes the administrative areas of THC and OIC. The SLVIA study area can therefore be divided into two main areas:

- The north coast of mainland Scotland (Caithness and Sutherland) (hereafter referred to as the North Coast); and
- Orkney Islands.

2.11.4.1.1 North Coast

Within the North Coast, the study area incorporates the full extents of the northern coastline from Duncansby Head, John O'Groats in the east to Cape Wrath in the west. Much of this coastline comprises high cliffs and rocky shores, with occasional sheltered bays and inlets, including Balnakeil Bay, Tongue Bay, Torrisdale Bay, Strathy Bay, and Sandside Bay. The generally open and exposed nature of this coastline is highlighted by the openness of the farmland that forms the immediate hinterland, and where tree cover is sparse. Views to the north and north-west are predominantly drawn out across the featureless expanse of the Atlantic Ocean/North Sea, while views to the northeast extend across the Pentland Firth to the Orkney Islands.

The scenic value of the coastline is recognised through designations which include the Kyle of Tongue National Scenic Area (NSA), Cape Wrath, Ben Hee and Ben Hope Wild Land Areas (WLA), and five Special Landscape Areas (SLAs)[11].

The hinterland to the North Coast comprises mostly of sweeping moorland and flows, rocky hills, and rugged mountains whose remote and largely undeveloped nature are acknowledged by their WLA status. The topography of the hinterland is generally more mountainous to the west with the highest point within the study area at Ben Hope (927 m AOD). The east is generally more settled, and includes low lying gently undulating farmland, consisting of a mix of improved pastures and occasional arable fields interspersed with areas of rougher grazing and wetland. While the association with the seascape typically lessens with the distance from the coast, the higher hills, particularly in the west, maintain a connection with the wider context and the Atlantic Ocean to the north.

Settlements along the North Coast are typically sparse and rural in character. There are some small nucleated and linear settlements, the most notable being John o' Groats, Castletown, Thurso, Reay, Melvich and Portskerra, Bettyhill, Tongue, and Durness. While many of the properties are inset from the coastal edge, the predominant orientation is out toward the Atlantic Ocean/North Sea, with properties in elevated locations maximising these views.

The A836 and A838 are the main coastal roads between John O' Groats and Durness and Scourie and form part of the North Coast 500 and an 'on-road cycle route' not on the National Cycle Network also part of the John O'Groats to Land's End cycle route. Views from the road are largely open, with some sections affording broad views to the north across the Atlantic Ocean and Pentland Firth. There are some sections of the A836 and the A838 that are set further inland, where intervening landforms often contains seaward views. The alignment of the A836 and A838 is generally west-east, and although views towards the OAA from most sections of these roads would be oblique, several of the coastal sections are broadly orientated north-east or north-west, which focuses on sea views. The ZTV illustrates that there would be no visibility from the other main roads inland within

[11] *SLAs are regionally important landscapes within the Highland Council area.*

the study area; the A9, which heads south from Scrabster to Latheron; and the A897, which heads north south between Melvich and Kinbrace along the Halladale River Valley floor.

In addition to the beaches and coastal paths of the north coast, popular visitor attractions or promoted viewpoints include the lighthouses at Cape Wrath, Strathy Point, Dunnet Head, Kilns of Hawick and Gardens and Designed Landscapes at Castle of Mey, and Tongue House.

2.11.4.1.2 Orkney Islands

2.11.4.1.2.1 Hoy

The Hoy coastline is described as having elevated and exposed high cliffs, with steep slopes and sheer rock faces, with narrow shingle beaches at the base of the cliffs. The topography of Hoy can be broadly divided between the more elevated rugged hills to the north-west and the lower lying moorland hills to the south. The highest point on Hoy is Ward Hill at 481 m AOD in the north of the Island. The Hoy hinterland is characterised by rugged and exposed moorland hills with a wild character. The scenic value of Hoy is recognised through the Orkney – Hoy and West Mainland NSA and Hoy WLA. The Old Man of Hoy is a notable landscape feature (and visitor destination) on the western coast of Hoy, north west of the small settlement of Rackwick.

Settlement is largely contained to the eastern side of Hoy, with scattered houses along the main road (B9047) and villages at Lyness, Hoy and on the west coast at Rackwick which sits in a sheltered bay. There are almost no properties inland, except for a few crofts. The Gardens and Designed landscape, Melsetter House, is located on the southeast coast of Hoy.

2.11.4.1.2.2 Mainland Orkney

The western mainland Orkney coastline comprises high, rugged indented cliffs, with distinctive features. It is more undulating compared to Hoy, the highest point is also called Ward Hill at 269 m AOD near Orphir. There are only small settlements along this elevated and exposed coastline, with residential dwellings being limited to small farms. The main settlement is Stromness located along the southern coast of west mainland Orkney. The hinterland is characterised by predominantly pasture and rough grazing, on gently south facing slopes. The scenic value of these coastlines is recognised through the Orkney – Hoy and West Mainland NSA and Heart of Neolithic Orkney World Heritage Site (WHS). The Gardens and Designed landscape, Skaill House is located on the northwest of Mainland Orkney. In addition, Balfour Castle is located on the Island of Shapinsay. The A965 and A967 run north south along the western side of western mainland Orkney. Intervening landform limits open views towards the Project from these roads.

The islands of Rousay and Westray lie to the north of mainland Orkney and have an open west coast with views towards the OAA.

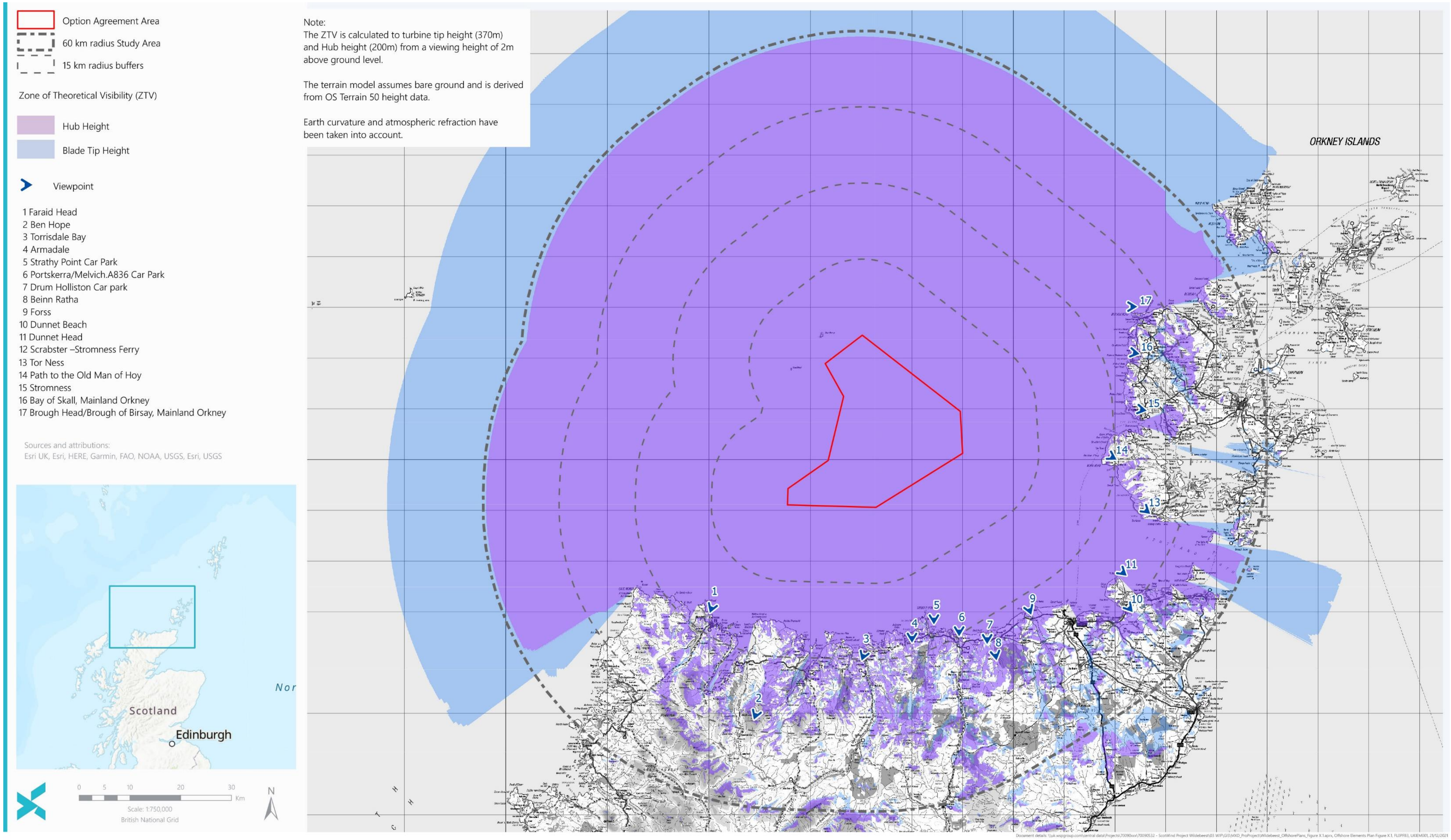


Figure 2-42 Zone of Theoretical Visibility and Viewpoint Locations

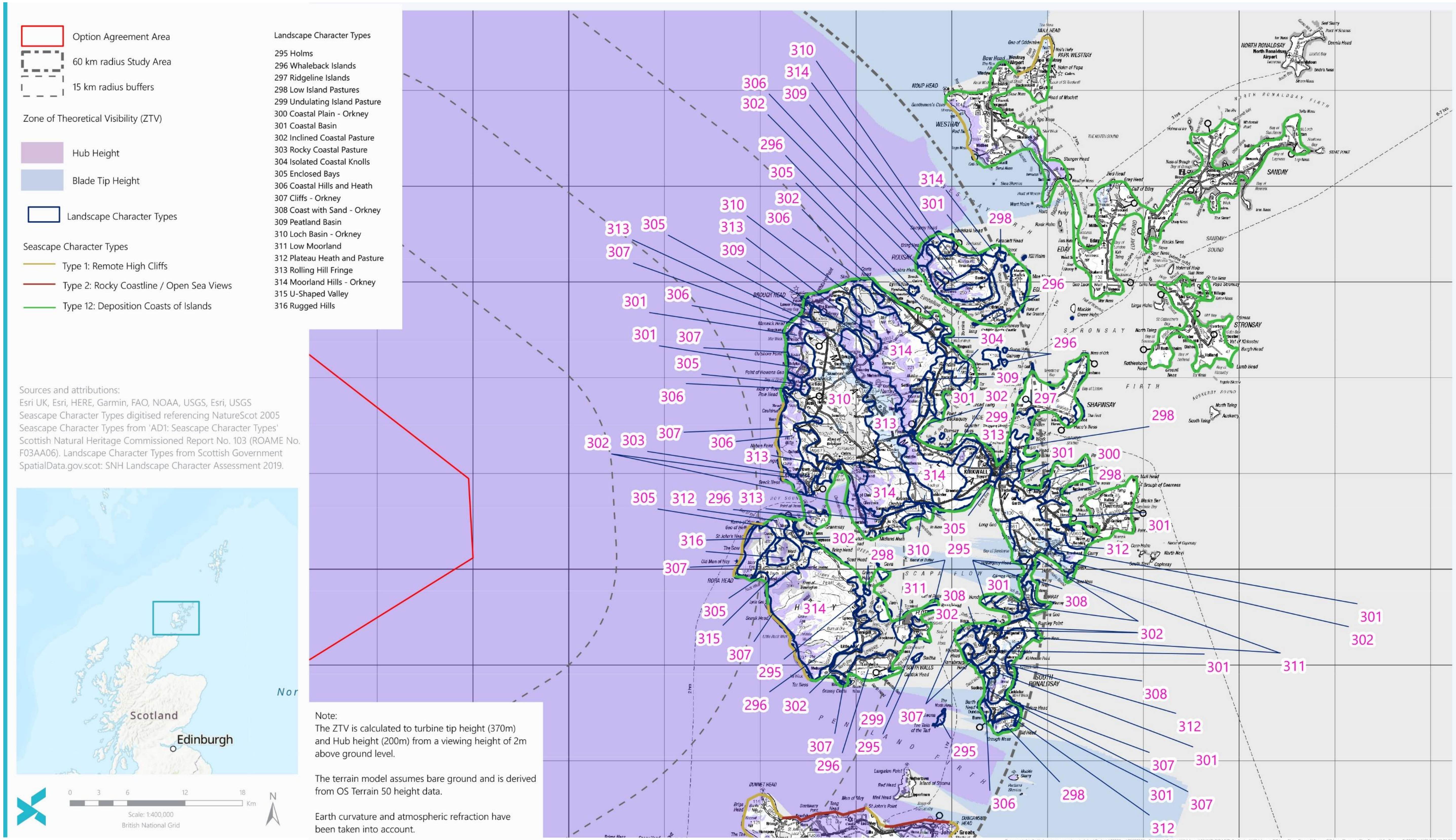


Figure 2-43 Seascape and Landscape Character – Orkney

Option Agreement Area
60 km radius Study Area
15 km radius buffers

Zone of Theoretical Visibility (ZTV)

Hub Height
Blade Tip Height

Landscape Character Types

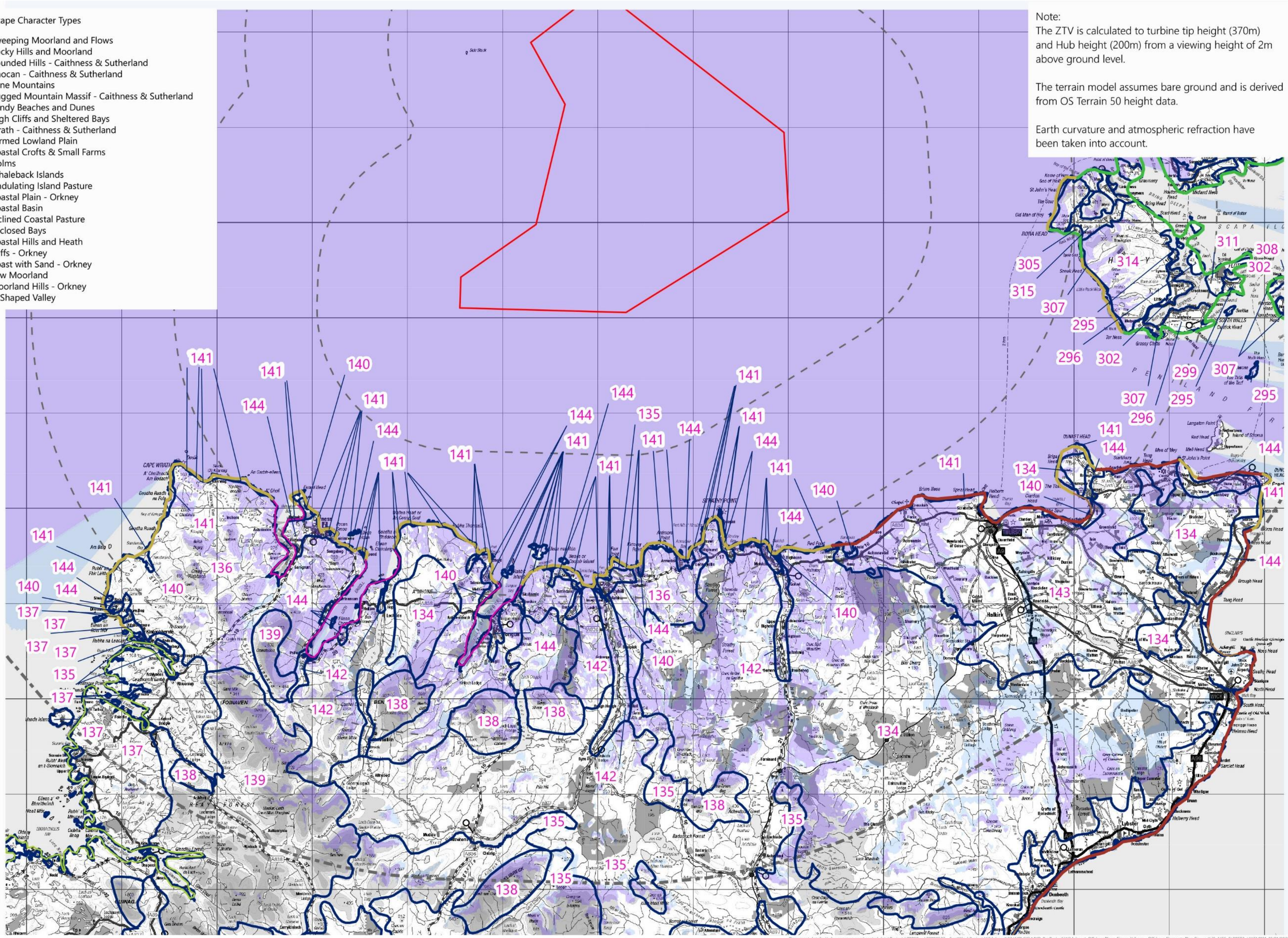
Seascape Character Types
- Type 1: Remote High Cliffs
- Type 2: Rocky Coastline / Open Sea Views
- Type 3: Deposition Coastline, Open Views
- Type 6: Narrow Coastal Shelf
- Type 7: Kyles and Sea Lochs
- Type 8: Enclosed Bays, Islands and Headlands
- Type 12: Deposition Coasts of Islands

Sources and attributions:
Esri UK, Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS
Seascape Character Types digitised referencing NatureScot 2005
Seascape Character Types from 'AD1: Seascape Character Types' Scottish Natural Heritage Commissioned Report No. 103 (ROAME No. F03AA06). Landscape Character Types from Scottish Government SpatialData.gov.scot: SNH Landscape Character Assessment 2019.

0 3.5 7 14 21 Km
Scale: 1:450,000
British National Grid
N

Landscape Character Types

134 Sweeping Moorland and Flows
136 Rocky Hills and Moorland
135 Rounded Hills - Caithness & Sutherland
137 Cnocan - Caithness & Sutherland
138 Lone Mountains
139 Rugged Mountain Massif - Caithness & Sutherland
140 Sandy Beaches and Dunes
141 High Cliffs and Sheltered Bays
142 Strath - Caithness & Sutherland
143 Farmed Lowland Plain
144 Coastal Crofts & Small Farms
295 Holms
296 Whaleback Islands
299 Undulating Island Pasture
300 Coastal Plain - Orkney
301 Coastal Basin
302 Inclined Coastal Pasture
305 Enclosed Bays
306 Coastal Hills and Heath
307 Cliffs - Orkney
308 Coast with Sand - Orkney
311 Low Moorland
314 Moorland Hills - Orkney
315 U-Shaped Valley



Note:
The ZTV is calculated to turbine tip height (370m) and Hub height (200m) from a viewing height of 2m above ground level.

The terrain model assumes bare ground and is derived from OS Terrain 50 height data.

Earth curvature and atmospheric refraction have been taken into account.

Figure 2-44Seascape and Landscape Character – north coast of Caithness

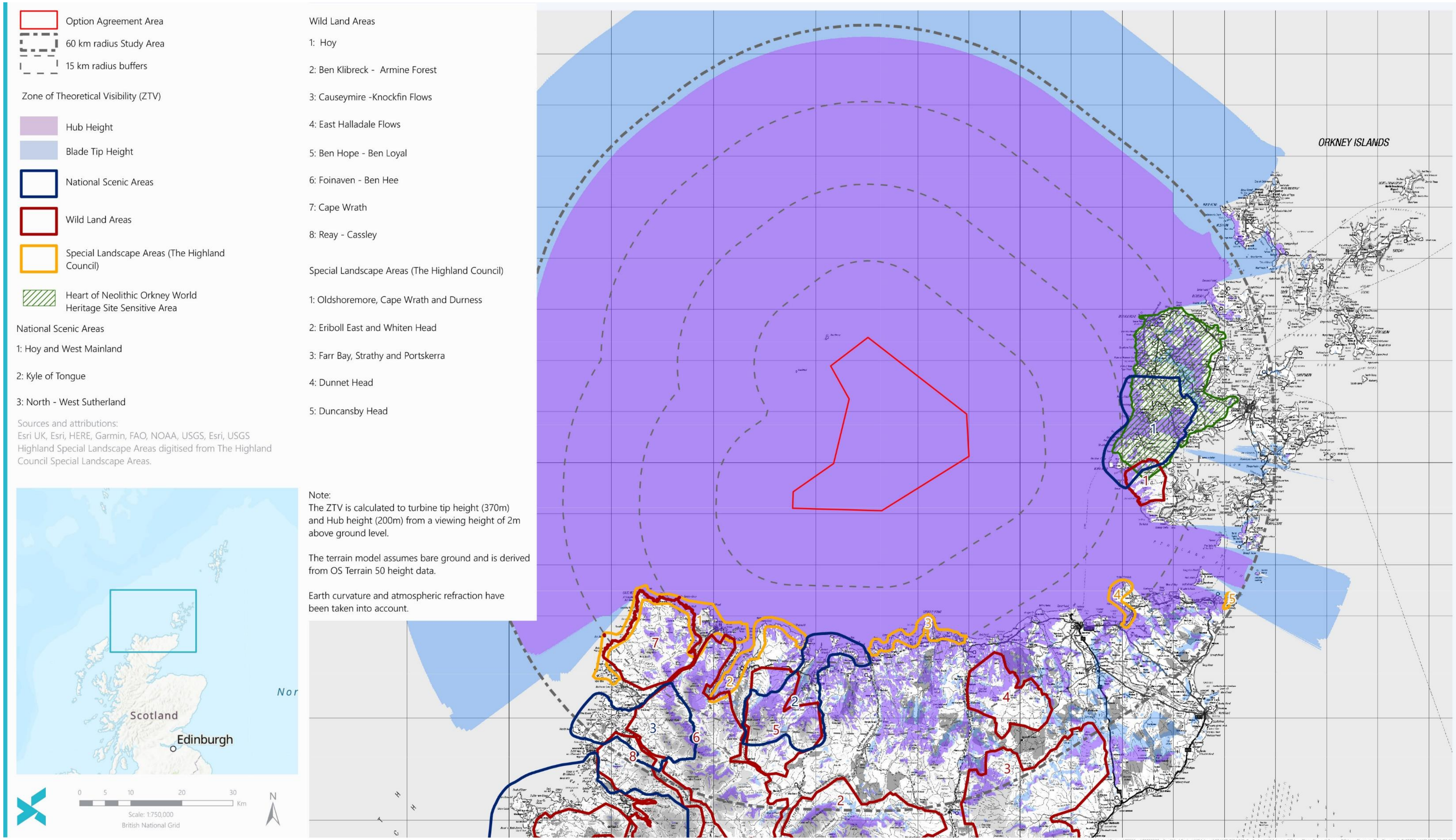


Figure 2-45 Landscape Designations

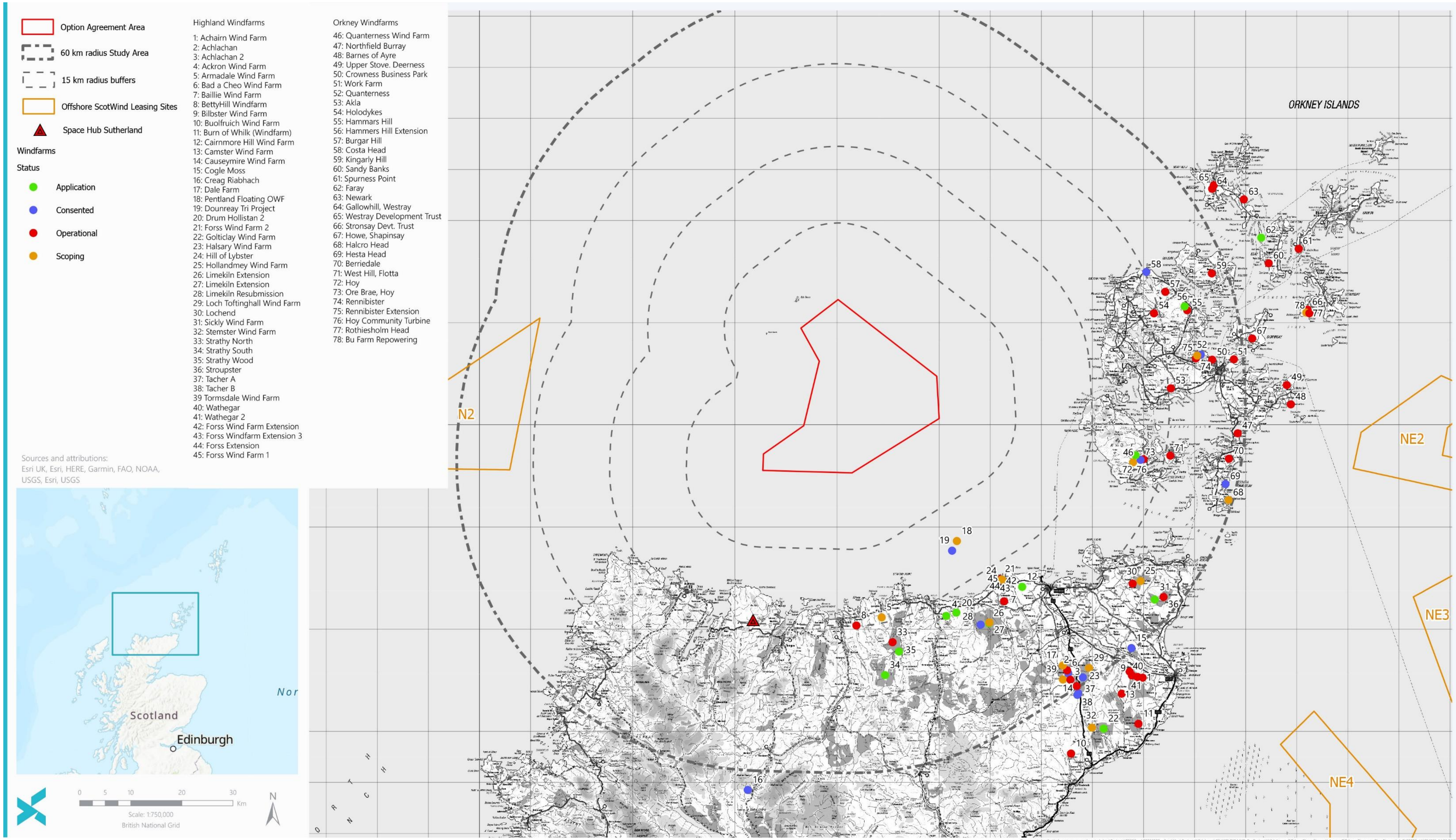


Figure 2-46 Cumulative Site Locations

2.11.4.2 Proposed Viewpoints

The following representative viewpoints presented in Table 2-68 are proposed to aid the assessment, their location based upon initial review of the ZTV and the key seascape, landscape and visual receptors identified above in Table 2-69. These are illustrated on Figure 2-42. Final viewpoint locations will be confirmed through site survey, consultation and liaison with the cultural heritage consultant to ensure adequate coverage of impacts on the setting of onshore historic environment assets. It is proposed to present cumulative wirelines to both NatureScot visualisation guidance (SNH, 2017) and THC visualisation standards (THC, 2016) from each viewpoint, with photomontages presented for a selection, to be agreed with consultees. Photomontages illustrating the necessary WTG lighting from a selection of viewpoints will also be included. An analysis of sequential effects upon users of A838/A836 (North Coast 500) route within the study area is also proposed.

Table 2-68 Proposed Representative Viewpoints

VPT NO.	NAME	APPROXIMATE GRID REF	APPROXIMATE DISTANCE FROM SITE	REASON FOR INCLUSION
North Coast				
1	Faraid Head	NC 39057, 71210	25 km	Walkers
2	Ben Hope	NC 47742, 50172	42 km	High Point Kyle of Tongue NSA and Ben Hope Wild Land Area
3	Torrisdale Bay	NC 68968, 61805	28 km	Visitors
4	Armadale	NC 78451, 64858	27 km	Residents/Walkers
5	Strathy Point Car Park	NC 82774, 68503	23 km	Visitors / Tourists Farr Bay, Strathy Point and Portskerra SLA
6	Portskerra/Melvich.A836 Car Park	NC 87745, 66118	29 km	Residents / Visitors Local and regional road users on A836 Cyclists on NCR1 / North Coast 500 Farr Bay, Strathy Point and Portskerra SLA
7	Drum Holliston Car Park	NC 93261, 64623	32 km	Residents Local and regional road users on A836

VPT NO.	NAME	APPROXIMATE GRID REF	APPROXIMATE DISTANCE FROM SITE	REASON FOR INCLUSION
				Cyclists on NCR / North Coast 500
8	Beinn Ratha	NC 94972, 61078	36 km	Hill walkers East Halladale Flows WLA
9	Forss	ND 01723, 69777	33 km	Walkers, residents
10	Dunnet Beach	ND 21665,69628	44 km	Visitors
11	Dunnet Head	ND 20557, 76518	39 km	Formal viewpoint on OS map Locals / Visitors Dunnet Head SLA
12	Scrabster – Stromness Ferry	TBC	25 km	Ferry passengers
Orkney Islands				
13	Tor Ness	ND 25164, 88691	37 km	Walkers
14	Path to the Old Man of Hoy	ND 18698, 99056	28 km	Walkers Hoy and West Mainland NSA
15	Stromness	HY 25030, 08228	35 km	Walkers/Residents/Visitors
16	Bay of Skall, Mainland Orkney	HY 23600, 19400	34 km	Walkers
17	Brough Head/Brough of Birsay , Mainland Orkney	HY 23400, 28500	38 km	Walkers

2.11.4.3 Summary and Key Issues

The seascape and landscape character for the study area is defined from local to national scale within NatureScot and local authority documents (Table 2-67). For the offshore elements of the Project, it is proposed that the regional scale of coastal character is most appropriate baseline for the SLVIA. For the majority of the study area this would be as defined in SNH's Coastal Character Assessment: Orkney and North Caithness (SNH, 2016). For the Sutherland coastline not included in the aforementioned assessment, it is proposed that the character will be determined from the National Coastal Character types, with additional detail derived from Scotland's Landscape Character Assessment (NS, 2019) and site survey.

Table 2-69 identifies the key seascape, landscape and visual receptors that are proposed to be included within the SLVIA. The measurement presented in brackets for each receptor is the approximate distance to the OAA. It is anticipated that these receptors will be refined through the design process and final project envelope to ensure a focus on potential significant effects only.

Table 2-69 Summary and Key Issues for Seascape, Landscape and Visual

SUMMARY AND KEY ISSUES

PROJECT COMPONENT

OFFSHORE MARINE AREA – OAA

Offshore

- Ferry passengers;
- Cruise Ship passengers; and
- Other recreational sailing.

North Coast

- National Coastal Character Types (SNH 2010)
  - Remote High Cliffs (1); and
  - Kyles and Sea Locks (7).
- Regional Coastal Character Areas (LUC-SNH, 2016)
  - Portskerra (47);
  - Brims Ness (46);
  - Dunnet Bay and Thurso Bay (45);
  - Scarfskerry and Dunnet Head (44); and
  - Gills Bay and John o' Groats (43).
- Landscape Character Types (NS, 2019)
  - Coastal Crofts and Small Farms (LCT 144);
  - Farmed Lowland Plain (LCT 143);
  - High Cliffs and Sheltered Bays (LCT 141);
  - Sweeping Moorland and Flows (LCT 134); and
  - Rocky Hills and Moorland (LCT 136).
- Landscape Designations
  - National
    - Kyle of Tongue National Scenic Area (25 km);
    - East Halladale Flows Wild Land Area (35 km);
    - Cape Wrath and Foinaven – Ben Hee Wild Land Area (28 km); and
    - Ben Hope – Ben Loyal Wild Land Area (32 km).
  - Local
    - Oldshoremore, Cape Wrath and Durness Special Landscape Area (25 km)
    - Eriboll East and Whiten Head Special Landscape Area (23 km)
    - Farr Bay, Strathy and Portskerra Special Landscape Area (23 km)
    - Dunnet Head Special Landscape Area (38 km)
    - Duncansby Head Special Landscape Area (56 km)
- Visual Receptors
  - Residents at key settlements
    - Durness (27 km);
    - Bettyhill (28 km); and
    - Thurso (38 km).
  - Visitor Destinations
    - Gardens and Designed Landscapes – Tongue House (31 km); and
    - Dunnet Head Viewpoint (29 km).
  - Recreational
    - Walkers along coastal core paths; and
    - Coastal pursuits (surfing, canoeing, sea kayaking, sea angling).

Orkney	
• Regional Coastal Character Areas (LUC-SNH, 2016) – Brough Ness and Barth Head (40); – Rora Head and St John's Head (37); – West Hoy Cliffs (36); – Graemsay (29); – Brough Head to Costa Head (27); – Marwick Head and Bay of Skaill (26); – Breckness and Row Head (25); – Stromness and Clestrain Sound (24); and – Rousay North (10). • Landscape Character Types (NS, 2019) – Moorland Hills (Orkney) (LCT 314); – Rugged Hills (LCT 316); – Coastal Hills and Heath (LCT 306); – Enclosed Bays (LCT 305); – Cliffs – Orkney (LCT 307); and – Ridgeline Islands (LCT 297).	• Landscape Designations – National ▪ Hoy and West Mainland National Scenic Area (25 km); and ▪ Hoy Wild Land Area (31 km). – Local ▪ No local landscape designations. • Visual Receptors – Residents ▪ Stromness (35 km). – Visitor Destinations ▪ Heart of Neolithic Orkney World Heritage Site Sensitive Area (28 km); and ▪ Old Man of Hoy (34 km). – Recreational ▪ Walkers along coastal core paths and inland including Ward Hill Mountain summit, Hoy (33 km); and ▪ Coastal pursuits (surfing, canoeing, sea kayaking, sea angling).

2.11.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-70.

The primary form of mitigation for seascape, landscape and visual effects is through the iterative design of the layout of the WTGs, OSPs and associated infrastructure, as outlined in Table 2-70. Maximum heights of WTG, their spacing requirements, layout formation (grid, offset grid, or arcs for example), and also OSP locations are key factors in minimising potential effects, and also will be considered in relation to other offshore windfarm sites within the study area. Design principles will be developed in discussion with consultees during the design process and through the TWG forums. These may consider aspects such as areas of the OAA to avoid, ensuring a balanced and coherent layout without outliers or inconsistent gaps for example. The colour of the WTGs and the necessary lighting will also be a consideration in the design process. It is proposed that a selection of viewpoints will be used as 'design viewpoints' to test different design options through the use of wirelines.

Table 2-70 Embedded Mitigation Measure that are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Iterative design of the WTG array with regard to seascape, landscape and visual sensitive receptors.	Primary	Through the design process, Technical Working Group discussions, establishing design principles and Section 36 and/or Marine Licence consent conditions requiring a Development Specification and Layout Plan.
2	Design statement presents information of the design evolution of the final Project and visualisations of the final Project, to ensure relevant stakeholders are informed.	Tertiary	Requirement of the Section 36 / and/or Marine Licence consent conditions
3	Development Specification and Layout Plan confirms details of the design and layout of the Project.	Tertiary	Requirement of the Section 36 and/or Marine Licence consent conditions

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on seascape, landscape and visual receptors and will be consulted upon with consultees throughout the EIA process.

2.11.6 Scoping of Impacts

A number of potential impacts on seascape, landscape and visual receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Pre-Application Advice from THC has also informed impact identification and scoping (Ref: 20/04/04850/PREMAJ, date of issue 10/02/2021). Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

A number of impacts are proposed to be scoped out of the assessment for seascape, landscape and visual receptors. These impacts are outlined in Table 2-71, together with a justification for scoping them out.

Table 2-71 EIA Scoping Assessment for Seascape, Landscape and Visual

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Impacts on seascape and landscape character types within the ZTV	1, 2 ,3	Scoped Out	The construction and decommissioning of the Project would create only temporary and largely distant impacts that would have limited potential to cause significant effects on seascape and landscape character.	N/A	N/A
Impacts on NSAs, WLAs, WHS and SLAs within the ZTV	1, 2 ,3	Scoped Out	The construction and decommissioning of the Project would create only temporary and largely distant impacts that would have limited potential to cause significant effects on the special qualities of the landscape designations.	N/A	N/A
Impacts on visual receptors within the ZTV	1, 2 ,3	Scoped Out	The construction and decommissioning of the Project would create only temporary and largely distant impacts that would have limited potential to cause significant effects for visual receptors within the study area.	N/A	N/A
Operations and Maintenance					
Impacts of the offshore cable routes on seascape,	1, 2 ,3	Scoped Out	The offshore cable routes will be buried within or laid on the seabed and will not have any potential	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
landscape and visual receptors			to create significant effects on seascape, landscape and visual receptors.		
Impacts of WTGs on seascape and landscape character types within the ZTV	1, 2 ,3	Scoped In	The operation and maintenance of the Project would have the potential to create significant effects on seascape and landscape character.	• Desktop study; site survey; • viewpoint photography; ZTVs; wirelines; photomontages; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 2-72).
Impacts of WTGs on landscape character types within the study area but outwith the ZTV	1, 2 ,3	Scoped Out	The operation and maintenance of the Project would not have the potential to create significant effects on seascape and landscape character where there is no potential visibility of the Project.	N/A	N/A
Impacts on NSAs, WLAs, WHS and SLAs within the ZTV	1, 2 ,3	Scoped In	The operation and maintenance of the Project has the potential to significantly impact the special qualities of the NSAs, WLAs, WHS and SLAs which include areas of coastline and elevated landscape with associated sea views, in particular: Kyle of Tongue NSA, Hoy and West Mainland Orkney NSA, Neolithic Orkney WHS, Hoy WLA; Cape Wrath WLA; Foinaven-Ben Hee WLA, Oldshoremore, Cape Wrath and Durness SLA, Eriboll East and Whiten Head SLA, Farr Bay,	• Desktop study; site survey; • viewpoint photography; ZTVs; wirelines; photomontages; and • 3D Modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 2-72).

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			Strathy and Portskerra SLA, and Dunnet Head SLA.		
Impacts on NSAs, WLAs and SLAs within the study area but outwith the ZTV	1, 2 ,3	Scoped Out	The operation and maintenance of the Project would not have the potential to create significant effects on the special qualities of landscape designations where there would be none or very limited potential visibility of the Project. In particular this includes: North West Sutherland NSA, Ben Hope and Ben Loyal WLA, East Halliday Flows WLA, and Duncansby Head SLA.	N/A	N/A
Impacts of WTGs on Residential Visual Amenity	1, 2 ,3	Scoped Out	No residential properties within 22 km of the offshore elements of the Project. Significant and overbearing residential visual amenity impacts are very unlikely.	N/A	N/A
Impacts of WTGs on Road Users on the A838 and A836 (North Coast 500 and cycle routes), and A967	1, 2 ,3	Scoped In	The operation and maintenance of the Project has the potential to create significant effects on the visual amenity of road users on these routes within the study area.	• Desktop study; site survey; • viewpoint photography; ZTVs; wirelines; photomontages; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 2-72).
Impacts of WTGs on Road Users on the A9 and A897	1, 2 ,3	Scoped Out	The operation and maintenance of the Project will not be visible from the A9 or A897 and	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			therefore there is not potential for significant effects to occur.		
Impacts of WTGs on Ferry passengers, Cruise Ship passengers and recreational sailors	1, 2 ,3	Scoped In	The Project has the potential to significantly impact the visual amenity of passengers/sailors on ferry, cruise ship and sailing routes.	• Desktop study; site survey; • ZTVs; wirelines; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 2-72).
Impacts of WTGs on people occupied in coastal recreational pursuits; visitors/walkers on coastal core paths, beaches and promoted viewpoints	1, 2 ,3	Scoped In	The operation and maintenance of the Project has the potential to create significant effects on the visual amenity of users of people occupied in coastal recreational pursuits, walkers along coastal paths and visitors to promoted viewpoints along the coast.	• Desktop study; site survey; • viewpoint photography; ZTVs; wirelines; photomontages; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 2-72).
Impacts of WTGs on visitors/walkers on core paths and recreational routes inland within the study area.	1, 2 ,3	Scoped Out	The operation and maintenance of the Project would not affect walkers and visitors to core paths and recreational areas inland within the study area where sea views are limited or incidental.	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Impacts of WTG navigation and aviation lighting on seascape, landscape and visual receptors	1, 2 ,3	Scoped In	The required navigation and aviation WTG lighting for the Project, in additional to other cumulative lighting, has the potential to significantly impact seascape, landscape and visual amenity within the study area.	• Desktop study; site survey; dark sky mapping; night-time viewpoint photography; ZTVs; wirelines; photomontages; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 2-72).

2.11.7 Potential Cumulative Effects

There is potential for cumulative impacts from the addition of the Project to onshore and offshore application, consented or operational projects, resulting in cumulative effects on seascape, landscape and visual receptors. The cumulative assessment will be an integrated part of the main SLVIA assessment and undertaken in line with the methodology outlined in SNH's (now NatureScot) Assessing the Cumulative Impact of Onshore Wind Energy Developments (NS, 2021) and with regard to the guidelines presented in Renewable UK (RUK)'s Cumulative Impact Assessment Guidelines (RUK, 2013). Through analysis of ZTVs and desk-based study the developments within an initial 60 km radius to the Project with most potential to create significant cumulative seascape, landscape and visual effects will be included within the assessment. The current potential cumulative sites within the study area are illustrated on Figure 2-46. THC, Energy Consents Unit and Marine Scotland will be consulted to identify upcoming projects to consider within the cumulative sites.

In terms of reporting, operational and in-construction sites will be included as part of the baseline. Consented (but un-built) projects will be considered as 'future baseline'. Application sites will be considered separately in the cumulative assessment. It is proposed that the other ScotWind OWF leasing areas within the study area will be included in the cumulative assessment based on the level of information that can be provided at the time, noting these would likely be at pre-planning stage when the SLVIA is undertaken.

All viewpoint wirelines will include cumulative sites, and a series of cumulative ZTVs will accompany the assessment. Sequential cumulative diagrams will also be produced to show the potential effects on road users of the A836/A838 (North Coast 500).

2.11.8 Potential Transboundary Impacts

There is no potential for transboundary impacts upon seascape, landscape and visual receptors, and as such transboundary impacts have been scoped out of the EIA.

2.11.9 Approach to Analysis and Assessment

2.11.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on seascape, landscape and visual receptors will utilise desk top data sources as well as sites specific field work (see section 2.11.3) and will be augmented by consultation during the EIA phase. Key consultees will include:

- Marine Scotland;
- NatureScot;
- OIC;
- THC;
- Visit Scotland
- Community councils; and
- Marine tourism providers.

In order to facilitate resource effective stakeholder consultation through the development phase of the Project, a seascape, landscape and visual working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs. The Project has already undertaken some initial consultation with a number of organisations including NatureScot, THC and OIC with respect to seascape, landscape and visual issues associated with the Project.

NatureScot's 'Assessment of Potential Seascape, Landscape and Visual Impacts and Provision of Design Guidance' (NS, 2020) in response to Marine Scotland's Draft Sectoral Plan for Offshore Wind (MS, 2019) sets outs their key landscape and visual sensitivities, design approaches and strategic design recommendations for the N1 PO. This has been considered in the preparation of this Scoping Report and will be taken into consideration in the design development and assessment stages. Pre-application advice from The Highland Council (Ref 20/04850/PREMAJ date of issue 10/02/2021) on landscape and visual matters has also been considered in the preparation of this Scoping Report and will inform the design and assessment stages.

The SLVIA will be based on the maximum design scenario from the project design envelope. It is anticipated due to the distance offshore this will relate to the height of turbines rather than number, noting that sometimes a larger number of smaller turbines can create greater effects than fewer taller turbines. To determine the maximum design scenario, ZTVs and wirelines from design viewpoints will be created and analysed, as well as interrogating 3D modelling, and agreement sought from consultees. Only one scenario will be assessed.

Wherever possible, identified impacts are quantified, but the nature of seascape, landscape and visual assessment also requires interpretation by professional judgement. In order to provide consistency in determining seascape, landscape and visual sensitivity and the prediction of magnitude of change, pre-defined criteria will be used. These will be derived from the Guidelines for Landscape and Visual Impact Assessment (LI and IEMA, 2013) as refined for the purposes of offshore windfarm assessment. All impacts identified are considered to be direct impacts.

2.11.9.2 EIA Methodology

The seascape, landscape and visual EIA will be undertaken in line with the methodology set out in section 1.4.2 and the specific legislation and guidance documents outlined below in Table 2-72. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-72 Legislation and Guidance for Seascape, Landscape and Visual Assessment

LEGISLATION / GUIDANCE	SUMMARY
Assessing impacts on National Scenic Areas – DRAFT technical guidance (NS, 2020a)	The SLVIA will follow this guidance for assessing the impact of the Project on NSAs.
Assessing impacts on Wild Land Areas – technical guidance (NS, 2020b)	The SLVIA will follow this guidance for assessing the impact of the Project on WLAs.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NS, 2021)	The cumulative assessment will be undertaken in accordance with this guidance.

LEGISLATION / GUIDANCE	SUMMARY
Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RUK, 2013)	Directly relevant to offshore cumulative windfarm impacts, these guidelines provide useful information on design envelopes and proportional assessment.
General Pre-application and Scoping Advice for Onshore Wind Farms Guidance (NS, 2020c)	Annex 2 of this guidance provides advice on the scope of assessment for wind turbine lighting.
Guidance on Coastal Character Assessment (C.Anderson for SNH, 2018)	The key guidance for establishing coastal character areas which will inform the definition and assessment of coastal areas within Sutherland as part of the SLVIA.
Guidelines for Landscape and Visual Impact Assessment: Third Edition (LI and IEMA, 2013) ('GLVIA3')	The key industry best practice guidance Ih provides the basis to the approach for the SLVIA.
Visual Representation of Windfarms Version 2.2 (SNH, 2017)	The visualisations for this project will be produced to comply with the requirements of this guidance.
Visualisation Standards for Wind Energy Developments, (THC, 2016)	Visualisations are required to comply with this guidance by THC for all windfarm applications affecting their administrative area.

2.11.10 Scoping Questions

- Do you agree with the proposed 60 km study area?
- Do you agree with the data sources which are suggested for the assessment of seascape, landscape and visual impacts?
- Are there any additional data sources or guidance documents that should be considered?
- Are the proposed viewpoint locations acceptable, including for night-time assessment?
- Has the consultee identified any further seascape, landscape or visual receptors to be considered within the assessment (e.g. where potential significant effects may occur)?
- Do you agree with the proposed receptors that are scoped in and out of the EIA?
- Do you agree with scoping out transboundary impacts?
- Do you agree to the approach and proposed scale of seascape and landscape baseline?
- Are there any comments on the overall methodology proposed to assess effects on seascape, landscape and visual receptors, including cumulative effects?
- Are there any other cumulative sites, in addition to those illustrated, to consider as part of the cumulative assessment?
- Do you agree with the proposed approach assessment?
- Are there any other key consultees that should be consulted on SLVIA matters?

2.11.11 References

Carol Anderson Landscape Associates for Scottish Natural Heritage (2018). Guidance note: Coastal Character Assessment.

Horner and Maclennan, Wood, M. (2011). Assessment of Highland Special Landscape Areas. The Highland Council in partnership with Scottish Natural Heritage Commissioned Report.

Landscape Institute and IEMA (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd Edition.

Land Use Consultants (LUC) for Scottish Natural Heritage (2016). Coastal character assessment: Orkney and North Caithness.

NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments.

NatureScot (2020a). Assessing impacts on National Scenic Areas – DRAFT technical guidance.

NatureScot (2020b). Assessing impacts on Wild Land Areas – technical guidance.

NatureScot (2020c). General pre-application and scoping advice for onshore wind farms (Annex 2).

NatureScot (2019). Scottish Landscape Character Types Map and Descriptions. Available online at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/ cottish-landscape-character-types-map-and-descriptions. [Accessed 09/12/2021].

Orkney Islands Council (2020). Orkney Islands Marine Region: State of the Environment Assessment.

Renewable UK (2013). Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms.

Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103.

Scottish Natural Heritage (2018). Guidance on Coastal Character Assessment.

Scottish Natural Heritage (2017). Visual Representation of Windfarms Version 2.2.

Scottish Natural Heritage (2014). Wild Land Areas map and descriptions. Available online at: https://www.nature.scot/doc/wild-land-areas-map-and-descriptions-2014. [Accessed 09/12/2021].

Scottish Natural Heritage (2010a). Scotland's National Coastal Character Map. Available online at: https://www.nature.scot/sites/default/files/2018-05/National%20coastal%20character%20map.pdf [Accessed 09/12/2021].

Scottish Natural Heritage (2010b). The Special Qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report 374.

The Highland Council (2017). Landscape Sensitivity Appraisal: Black Isle, Surrounding Hills and Moray Firth Coast, Caithness – Addendum Supplementary Guidance 'Part 2B' as part of Onshore Wind Energy Supplementary Guidance.

The Highland Council (2016). Visualisation Standards for Wind Energy Developments.

The Scottish Government (2016). Pilot Pentland Firth and Orkney Waters Marine Spatial Plan.

2.12 Other Sea Users

2.12.1 Introduction

This section of the Scoping Report identifies other sea users receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project.

Information that may be considered relevant to this section is also presented within the below sections:

- Commercial fisheries, section 2.7;
- Military and aviation, section 2.10;
- Shipping and Navigation, section 2.8; and
- Socio-economics, section 2.12.

This section of the Scoping Report has been prepared by Xodus Group.

2.12.2 Study Area

The study area is defined as the area that will be directly impacted by the offshore infrastructure (including WTGs and associated foundations and substructures, the OSPs and associated foundations, the inter-array cables, offshore export cables). A buffer of 10 NM (~18 km) has also been placed around the offshore infrastructure to consider a wider area around the Project and consider the movement of mobile other users, consistent with the study area buffer used for shipping and navigation. For the Scapa Flow offshore export cable corridor search area, this buffer has been limited to the extent of the Scapa Flow inland sea region.

2.12.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-73.

Table 2-73 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
The Marine Scotland National Marine Plan Interactive (NMPi) Maps	Marine Scotland – National Marine Plan Interactive (atkinsgeospatial.com)	2021	Marine Scotland
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan: Consultation Draft	PFOW MSP SocioEconomic Baseline Review.pdf (consult.gov.scot)	2015	Marine Scotland

TITLE	SOURCE	YEAR	AUTHOR
Scotland's National Marine Plan	Scotland's National Marine Plan – gov.scot (www.gov.scot)	2015	Scottish Government
Sectoral marine plan: regional locational guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/	2020	The Scottish Government
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/	2020	OIC
Orkney Marine Planning Tourism and Recreation Survey	Marine Planning (orkney.gov.uk)	Planned for 2022	OIC, Marine Planning
Regional Marine Plan for the Orkney Islands: Statement of Public Participation	Regional Marine Plan For The Orkney Islands: Statement of Public Participation	2021	OIC
Scottish Marine Recreation and Tourism Survey	Scottish Marine Recreation & Tourism Survey 2015 | Marine Scotland Information	2015	Marine Scotland
UK Coastal Atlas of Recreational Boating	uk-coastal-atlas-of-recreational-boating (rya.org.uk)	2019	RYA
Marine and Coastal Tourism and Recreation in the Pentland Firth and Orkney Waters: A Case Study	Microsoft Word – PFOW report V2 (marine.gov.scot)	2015	Aquatera
Energy & Infrastructure Spatial Data	https://www.crownestatescotland.com/resources/documents	2021	CES
Aquaculture Spatial Data	https://www.crownestatescotland.com/resources/documents	2021	CES
Leisure Activities	UK + Ireland Surf Reports and Forecasts, Live Beach Cams & Spot Map – Magicseaweed	2021	Magic Seaweed
Military Low Flying	Military low flying – GOV.UK (www.gov.uk)	2014	MoD

TITLE	SOURCE	YEAR	AUTHOR
Exercise Joint Warrior	Exercise Joint Warrior | Royal Navy (mod.uk)	2017	Royal Navy
Orkney Islands Council Marine Services Annual Report 2019-2020.	Orkney Islands Council Marine Services Annual Report 2019-2020 – Page 1 – Created with Publitas.com	2020	OIC
Energy	Energy | Orkney Islands Council Harbour Authority (orkneyharbours.com)	2021	OIC Harbour Authority
Dounreay	DSRL Dounreay 2021 V2.cdr (publishing.service.gov.uk)	2021	DSRL

2.12.3.1 Project Site-Specific Surveys

No site-specific surveys with regards to other sea users have been carried out to inform this Scoping Report. Consultation with other user organisations will be an important source of data for the EIA. Initial consultation has been undertaken with relevant stakeholders (e.g. with MoD) who will be further consulted during the EIA.

2.12.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-73) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The key features of other sea users present in or around the Project area are:

- Offshore Renewable Energy Projects;
- Subsea Cables and Utilities;
- Military and Defence Activity;
- Aquaculture;
- Oil and Gas, including Carbon Capture and Storage;
- Recreation and Tourism;
- Licensed Spoil Disposal Sites;
- Nuclear Infrastructure; and
- Other Infrastructure.

The following sections provide information on the key spatial differences across the study area for the other sea users:

1. Offshore Marine Area, including the OAA, the Orkney offshore export cable corridor search area, the Caithness offshore export cable corridor search area (section 2.12.4.1); and
2. The Scapa Flow offshore export cable corridor search area (section 2.12.4.2).

2.12.4.1 OFFSHORE MARINE AREA

2.12.4.1.1 Offshore Renewable Energy Projects

There are several offshore renewable energy projects either in the development phase or undergoing the consenting process within the study area (Figure 2-47). Following the announcement of the ScotWind offshore wind leasing round in January 2022, there will be another round of projects entering the consenting phase in 2022. Several recently awarded ScotWind OAA's are located off the northern coast of Scotland, within for example the N2, N3, and N4 Pos (Figure 2-48).

The Pentland Floating Offshore Wind Farm is an extension of the previously consented Dounreay Trì Project located approximately 9 km off Dounreay. It is a proposed floating offshore wind farm with 6-10 turbines and an installed capacity of up to 100 MW. The Pentland Project will be connected to the power distribution system at a suitable grid connection point on or near the Caithness coast (Marine Scotland, 2020).

There are two offshore wind farms that have been postponed indefinitely or cancelled, and as such will not be considered further:

- The Dounreay Demonstration Centre (DDC) was a proposed project located in Dounreay, approximately 6 km from Crosskirk. After receiving a Screening Opinion in February 2015, the Project has since been cancelled.
- The proposed Katanes Floating Energy Park located approximately 18 km south of the Project was for a pilot 8 MW offshore wind array, however, the project status is now dormant.

The MeyGen tidal project is located is located in the Inner Sound of the Pentland Firth, to the east of the Caithness offshore export cable corridor search area. The site is consented to deploy tidal devices across several phases. The site is consented for up to 61 turbines and a total capacity of up to 398 MW. Phase 1A of the site is now operational, which consists of 4 turbines (Tethys, 2022).

EMEC has a wave test site (Billia Croo), which is located off the west coast of Orkney Mainland (Tethys, 2021a). The Billia Croo Test site is located less than 1 km north of the proposed Orkney offshore export cable corridor search area. The test site has 6 berths, five of which are cabled in up to 70 m water depth, and one which is located in shallower water closer to shore. The site has a total capacity of 7 MW. The purpose of the site is for the deployment of wave energy technologies to verify the capacity of wave devices so that further investment could be obtained for establishing tidal technology. The site is being expanded for future testing requirements (Tethys, 2021a).

There are two other marine energy projects that have been previously proposed in and around Orkney, but will not be considered further due to the current status of the projects:

- The Brims Tidal Array, which is proposing to develop an offshore tidal array which will include up to 200 fully submerged tidal turbines and is located on the south coast of Hoy (Tethys, 2020), approximately 19 km south-east of the Orkney offshore export cable corridor search area. In July 2018, project partners (for the Brims Tidal Array) OpenHydro's parent company, Naval Energies, made the decision to liquidate OpenHydro. There still remains uncertainty regarding how the project will proceed (Tethys, 2021b).
- The Farr Point Wave Farm was a proposal for up to ten Pelamis wave energy converters situated approximately 10 km south-west of the Caithness offshore export cable corridor search area. This project has undergone scoping, but the technology developer has since gone into administration and there are currently no new proposals to continue development of this site.

2.12.4.1.2 Subsea Cables and Utilities

There are two telecommunication cables that overlap with the Project:

- The BT Northern Lights cable, running from Dunnet in Caithness to Skaill Bay on Orkney Mainland; and
- Farice, running from Castletown in Dunnet Bay, Caithness and continues north past Orkney Mainland.

The Project also overlaps with three subsea power cables:

- The SHET-L Caithness to Orkney interconnector overlaps with both the Caithness offshore export cable corridor search area and the Orkney offshore export cable corridor search area. The 70 km 220 kV subsea electricity transmission connection runs from the existing connection site at Dounreay to Warebeth on the west coast of Orkney (SSE, 2019). The project is consented but the construction date is still to be confirmed.
- Pentland Firth East and Pentland Firth West are two active power cables (a third cable is disused), which have connection points between Murkle Bay, near Thurso and Rackwick Bay on the west coast of Hoy, Orkney. Both are approximately 36 km in length and will overlap the Orkney export cable corridor search area.

2.12.4.1.3 Military and Defence Activity

The MoD operates in Scotland's coastal areas and adjacent seas where they carry out maritime and aerial training activities and surveillance of potential threats to the country's offshore interests. Defence activities include the operation of naval vessel aircraft, navigational interests, underwater acoustic ranges, maritime exercise areas, amphibious exercises, coastal training ranges and coastal test and evaluation ranges.

The Project is located directly adjacent to Military Danger Area Practice and Exercise Area (PEXA) D801: Cape Wrath (North West), which is utilised for Live Firing/ Bombing/ Unmanned Aircraft System (VLOS/BVLOS)/ High Energy Manoeuvres. The southern boundary of D801 abuts the northern boundary of PEXA D802: Cape Wrath (South East), which is located 5 km south-west of the Project. D802 is utilised for Live Firing/ Bombing/ Unmanned Aircraft System (VLOS/BVLOS). D712B and D712C are classified as Areas of Intense Aerial Activity (AIAA), where military practises occur. This area extends along the north coast of Scotland into the North Sea, and occupies the OAA and offshore export cable corridor search areas. The Joint Warrior is a UK-led biannual war exercise that is linked directly with the NATO Military Training Exercise Programme to exploit the training opportunities provided by the exercise and to practice skills required for collective defence. Made up of Royal Navy, RAF and Army personnel, the scenario of the exercises mirror a broad range of crisis and conflict situations which could realistically be experienced in real-world operations. The exercise takes place around the north and west of Scotland (Royal Navy, 2017).

2.12.4.1.4 Aquaculture

There are no active finfish or shellfish marine aquaculture sites within the study area (Scapa Flow considered in section 2.1.4.2). The north of Scotland coastline has also been identified as an area where the development of new aquaculture sites is restricted and only existing aquaculture sites can be extended.

2.12.4.1.5 Oil and Gas Activity, including Carbon Capture and Storage

There is currently no oil and gas infrastructure in the vicinity of the study area. The majority of oil and gas activities are concentrated in other areas of Scottish waters further north and in the northern North Sea off the east coast of Scotland. The nearest potential carbon capture and storage (CCS) sites are located in the Moray Firth and North Sea east of the Scottish mainland, outside of the study area and therefore will not be impacted by the Project. Oil and Gas activities within Scapa Flow is considered within section 2.1.4.2.

2.12.4.1.6 Recreation and Tourism

The Scottish Marine Recreation and Tourism Survey (SMRTS) highlighted the importance of recreational and tourism activity around the Scottish coastline. The tourism and recreation study by Marine Scotland (2015a) identifies areas of recreational vessel activity and the main routes to and from all major marinas and ports in the area as well as commonly used bays and anchorages.

Figure 2-51 presents a heat map of all recreation activities within the study area. The majority of recreational activities occur within 10 km of the shoreline. There are several recreational activities that occur along the coast or offshore areas of the study area, such as SCUBA diving, surfing, canoeing or kayaking, coastal climbing and coasteering, and wildlife watching. Sea angling takes place in several Orkney sites including Yesnaby, Orphir, Burwick and on the west coast of Hoy, as well as an annual competition run out of Stromness. There are a number of dive sites along the Caithness coast, west Orkney coast and within the OAA. There are popular surfing beaches located all along the Caithness coastline including Sandside Bay, Thurso East, and Brimms Ness which is located 2 km from the potential landfall at Crosskirk (Magic Seaweed, 2020). Wildlife watching is promoted as a tourist and recreational activity throughout the Pentland Firth and Orkney Waters. It is particularly known for seals, whales and birds including the Atlantic puffin and other seabirds which nest abundantly on the sea cliffs in the area (Aquaterra, 2015).

An RYA medium recreational use cruising route passes along the north coast of Scotland, with another running from around the mouth of Loch Eriboll over to the north west coast of mainland Orkney (Scottish Government, 2016). There are also a number of RYA light recreation use cruising routes running from Scrabster, Loch Eriboll and Cape Wrath over to the west coast of Orkney and the Hoy Sound. There is a frequently used cruising route from Scrabster to Stromness and intensity increases at the entrance of the Hoy Sound and the west coast of the Orkney Mainland. Particularly strong tides are present within the Hoy Sound, which can present restrictions on timings for optimum vessel movements in relation to the flood and ebb tides. Boating activity is highest during summer months (Aquaterra, 2015). The closest marinas to the Project are at Scrabster, Stromness and Kirkwall (NMPi, 2021).

It is noted that all recreational activities are highly seasonal and dependant on certain weather and tidal conditions. In this regard the OAA has avoided the southeast corner of the N1 PO to avoid interaction with the RYA cruising routes from Loch Eriboll to Orkney. This is a critical route for recreational craft visiting Orkney due to tidal conditions and limited sailing windows through Hoy Sound.

OIC are launching a Marine and Coastal Recreation Survey to collect information about where and when coastal and marine activities are taking place in Orkney. The information will inform the Regional Marine Plan and where available will be used to inform the EIA(OIC, 2021).

2.12.4.1.7 Licensed Spoil Disposal Site

There is one active disposal site that overlaps with the Project, Stromness C (FI045), just offshore of the Murra landfall. Another active disposal site is located within 1 km of the Project, Stromness A (FI040) (Figure 2-49).

2.12.4.1.8 Nuclear Infrastructure

Dounreay nuclear site is located on the north coast of Caithness and is within the Caithness offshore export cable corridor search area and the Caithness landfall sites. The site consists of 73 active facilities, including the Dounreay Nuclear Power Development Establishment (NPDE), managed by DSRL, and the Vulcan Naval Reactor Test Establishment (NRTE), managed by the MoD, along with the reactors, fuel cycle areas, and nuclear and radioactive waste facilities (DSRL, 2021). DSRL is the licence company responsible for the decommissioning of the Dounreay NPDE. As a result of operational standards in reprocessing during the 1960s and 1970s, some radioactive particles were released into the sea via an active discharge pipeline in a subsea tunnel that extends approximately 600 m offshore. A number of radioactive particles have been discovered on the seabed close to the old discharge point. An extensive programme of remediation activity has been undertaken by DSRL to detect and retrieve hazardous particles from a 60-hectare area of seabed near the outfall using ROVs, clean-up vehicles and divers. Sandside Bay is routinely monitored for particles and other contamination (DSRL, 2017). This remediation work is currently ongoing. Additionally, the Nuclear Decommissioning Authority are looking to decommission the facility between 2022 and 2033. Impacts to sediment and water quality as a result of the Project are considered within section 2.2. The Vulcan NRTE site is also expected to be decommissioned in the near future[12].

2.12.4.1.9 Other Infrastructure

In August 2020 planning permission was granted for the construction of the Space Hub Sutherland, a vertical launch space port with launch operations control centre, site integration facility, launch pad complex, antenna park, access road, fencing, services and associated infrastructure at Talmine, Tongue. The Space Hub Sutherland facility is located 29 km to the south southwest of the OAA. HIE have been progressing the Space Hub Sutherland project to date but will soon be appointing a LSO who will be responsible for the operation of the facility. The first launch from the facility is expected to take place in 2022 / 2023 and thereafter a maximum of 12 launches per year (as per a condition of the planning permission). Space Hub Sutherland is in the process of discharging its planning conditions and obtaining other legal consents including:

- The definition of a maritime personnel exclusion zone which will be required during launch events, to be approved by Marine Scotland and likely to located in the vicinity of / immediately to the west of the OAA. No details are currently available with respect to the geographical and temporal coverage of this potential maritime exclusion zone;
- Definition of an ACP, to be approved by the CAA, currently at ACP Stage 2; and
- Operational Licences as required by the Space Industry Regulations and approved by the CAA;
- Development of range facilities for tracking and control of launched vehicles which may include the use of radar.

Once further details on the operational procedures for Space Hub Sutherland are available, the potential for any impacts can be established.

[12] *https://www.bbc.co.uk/news/uk-scotland-highlands-islands-51927359*

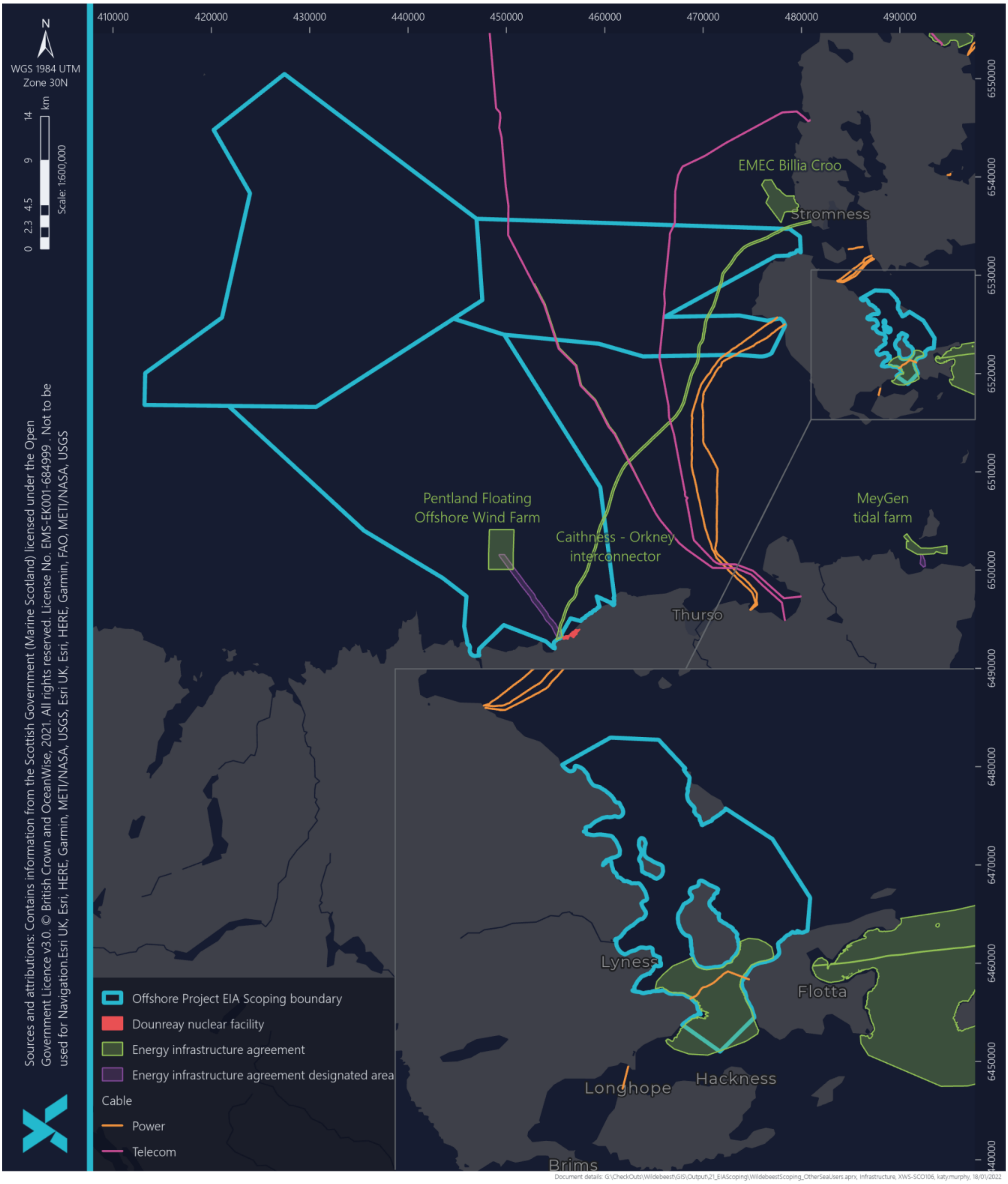


Figure 2-47 Existing Offshore and Coastal Infrastructure within the Study Area

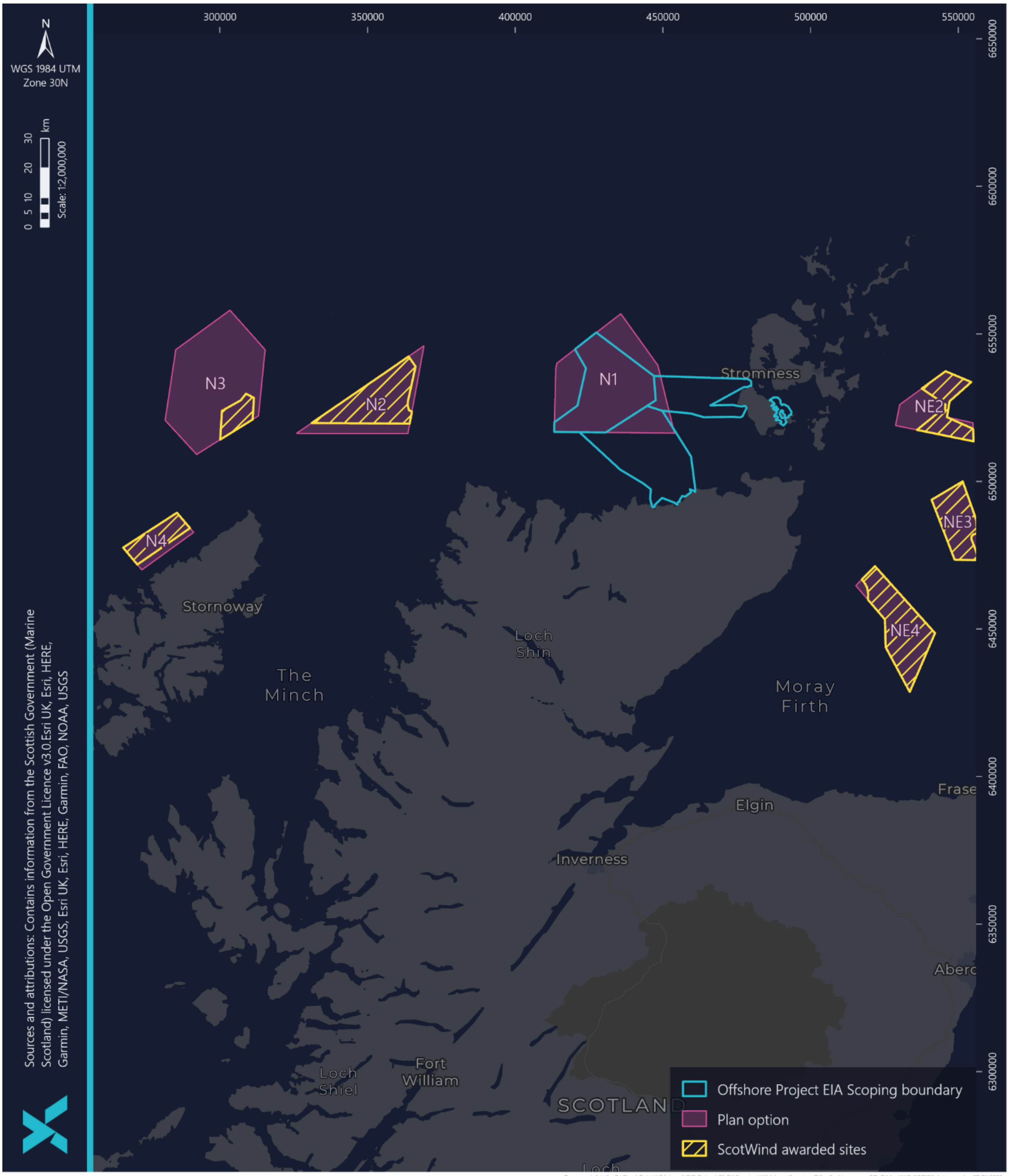


Figure 2-48 ScotWind PO's and Awarded Sites

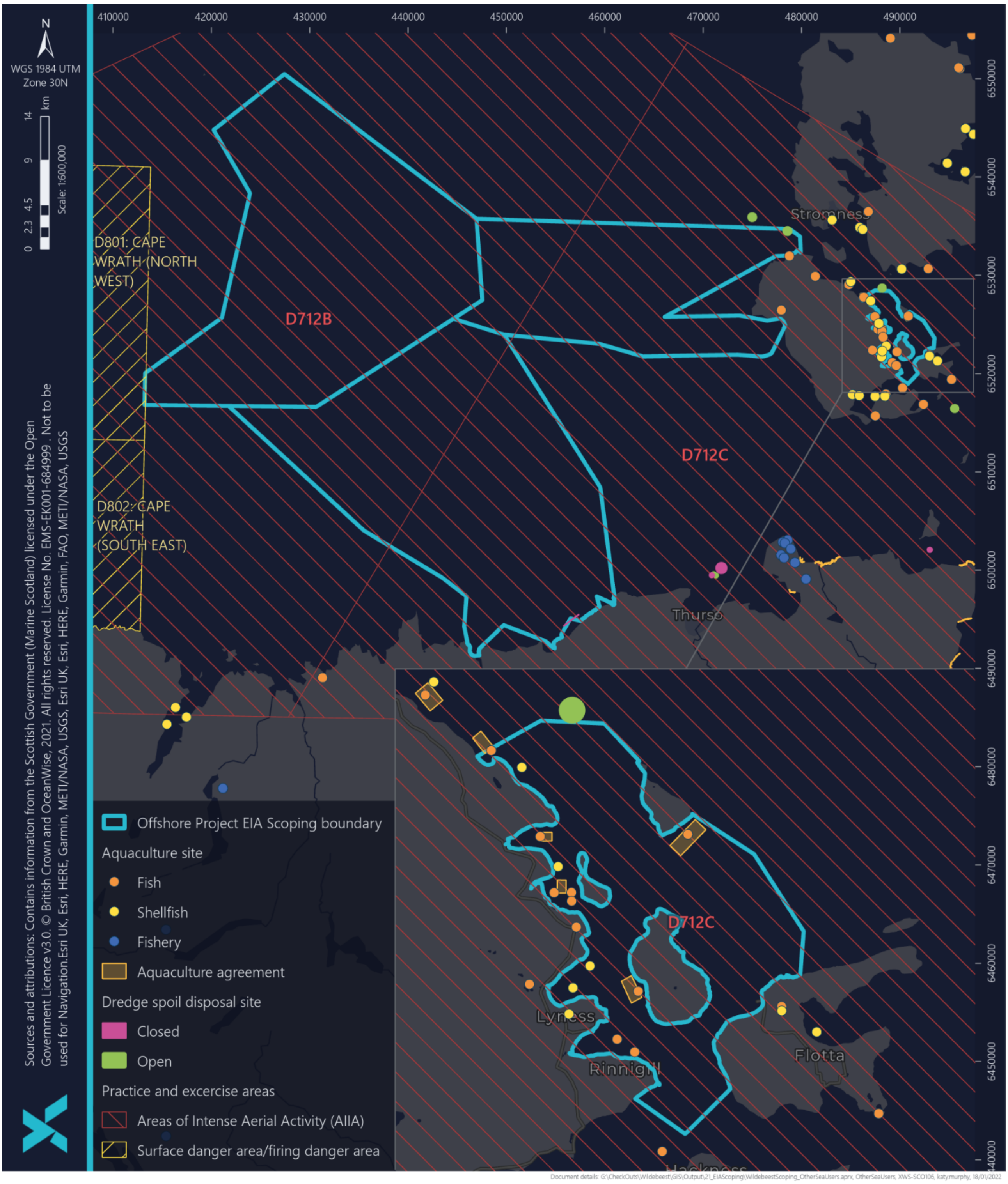


Figure 2-49 Aquaculture Sites, Dredge Disposal Sites and Military Practice and Exercise Areas within the Vicinity of the Project

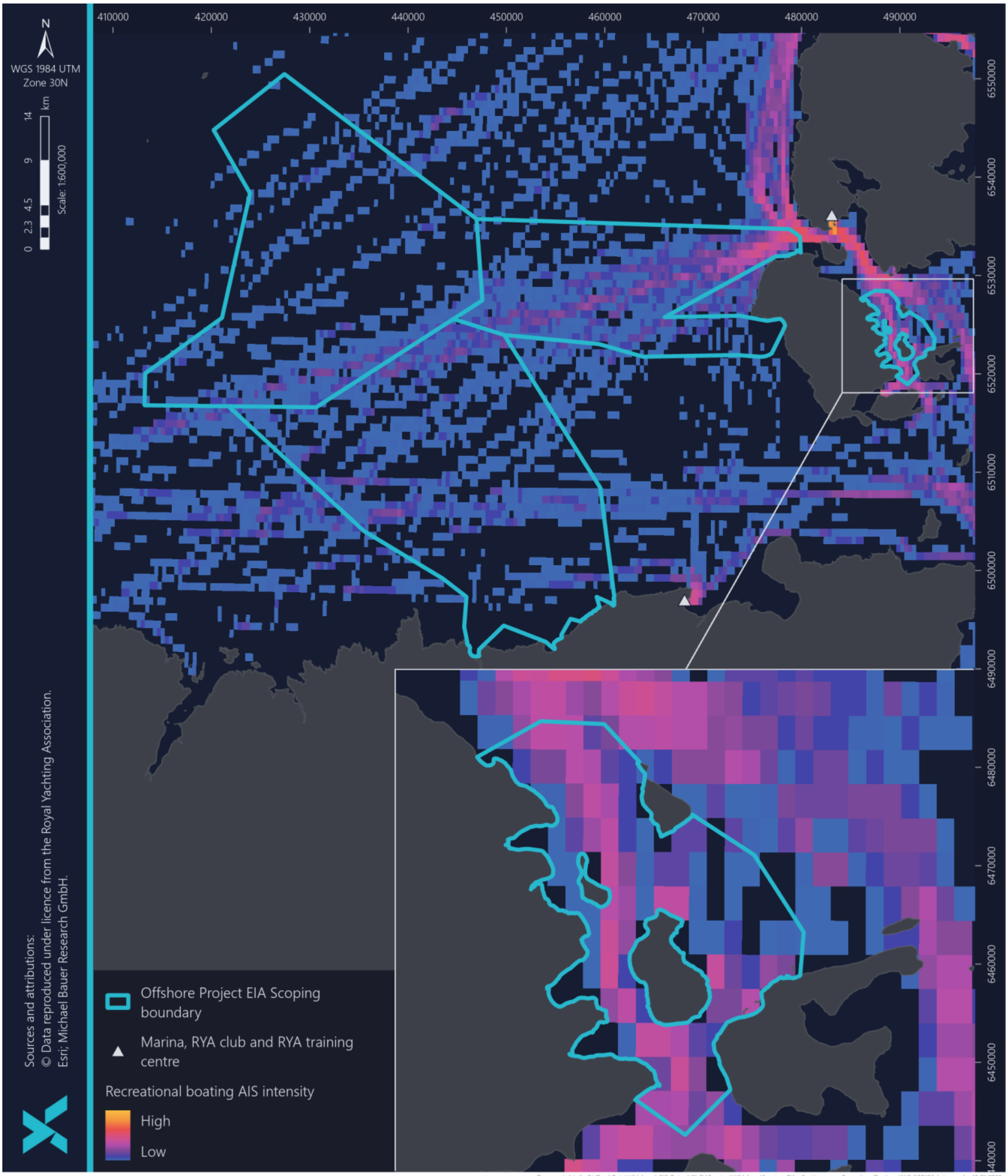


Figure 2-50 Recreational Boating AIS activity within the Vicinity of the Project

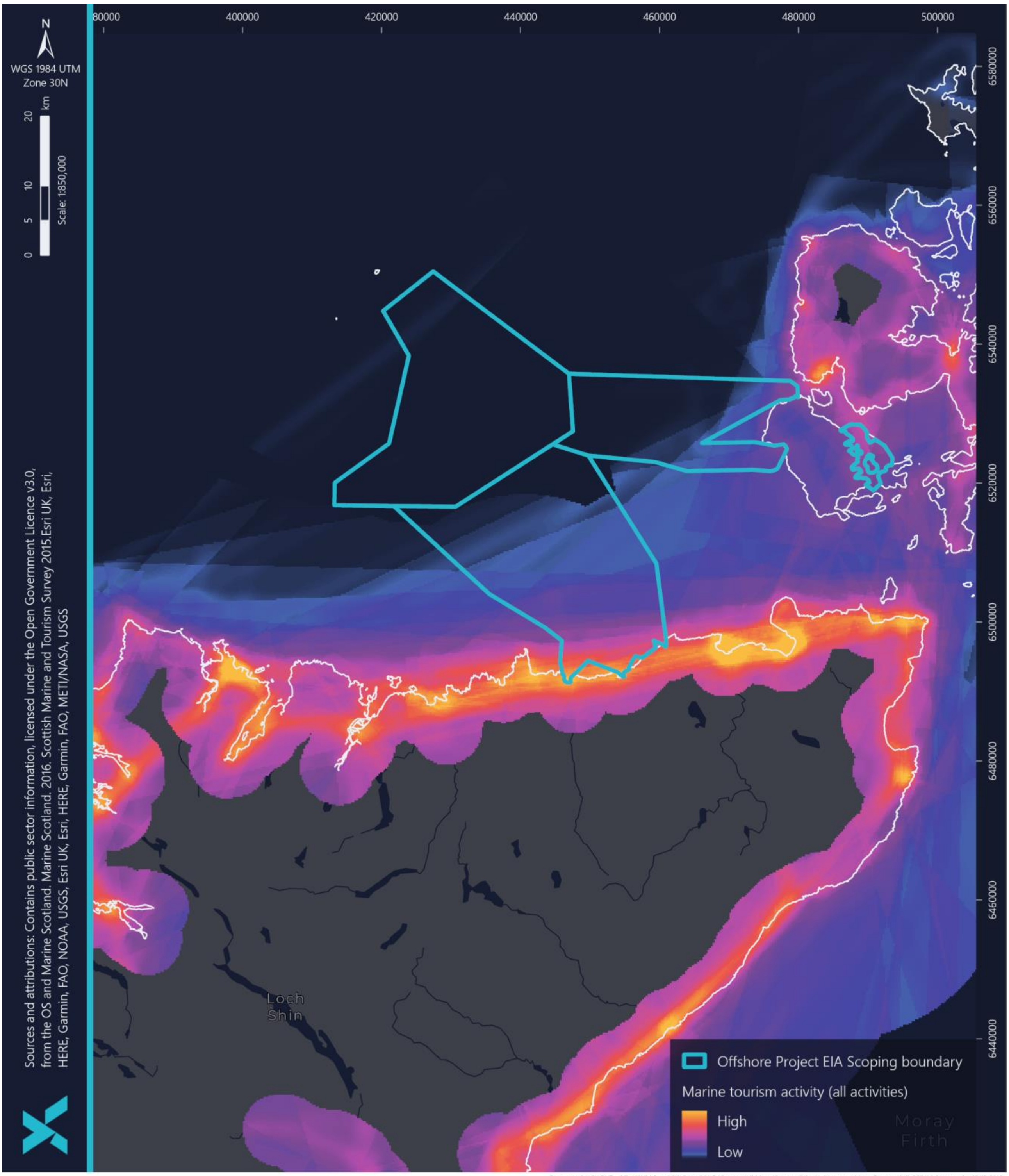


Figure 2-51 Recreational and tourism activity around the Scottish coastline

2.12.4.2 SCAPA FLOW

2.12.4.2.1 Offshore Renewable Energy Projects

EMEC have an intermediate scale wave test site in Scapa Flow, located offshore from Howequoy Head near St. Mary's on Orkney Mainland. The site is located on the east edge of Scapa Flow, 12 km from the Scapa Flow offshore export cable corridor search area.

2.12.4.2.2 Subsea Cables and Utilities

There are several subsea power and telecommunication cables connecting Orkney mainland to other Orkney islands located within Scapa Flow.

The Scapa Flow offshore export cable corridor search area overlaps with the Hoy to Flotta subsea power cable operated by Scottish and Southern Electricity Networks (SSEN), which runs south of Fara. Additionally there are two disused subsea cables connecting Hoy to Fara and Fara to Flotta (NMPi, 2021).

In the wider vicinity of the Project there are:

- Three SSEN inter-island cables that connect from Houton on Orkney Mainland to points on North Hoy located; Orkney – Hoy North, Orkney – Hoy Centre and Orkney – Hoy South. These are located approximately 2.5 km north of the Scapa Flow offshore export cable corridor search area;
- An inter-island cable from Mainland Orkney to Graemsay, located 7 km from the Scapa Flow offshore export cable corridor search area;
- Proposed bt telecommunications cables (as part of the R100 Scottish Isles Fibre-optic Project) between Hoy and Flotta and Flotta and South Ronaldsay (both yet to be consented); and
- Additionally, there are a number disused cables extending off Orkney Mainland and Flotta into Scapa Flow, for which sections may remain on the seabed (NMPi, 2021).

2.12.4.2.3 Military and Defence Activity

There is no active military activity within the Scapa Flow.

2.12.4.2.4 Aquaculture

Active aquaculture sites are installations where farmed fish or shellfish are stocked for either private or commercial recreational fishing.

Atlantic salmon are farmed in Scapa Flow. There are 10 active seawater finfish sites in Scapa Flow including four located on the eastern coast of Hoy (Bring Head, Chalmers Hope, Lyrawa Bay, and Pegal Bay), Fara West on Fara, and South Cava on the island Cava, which overlap with the Project. Additionally, located to the north and east of the Scapa Flow offshore export cable corridor search area are the active finfish sites Westerbister and Toyness on the Orkney Mainland, Hunda on Burray, Lober Rock on South Ronaldsay.

There are a two active shellfish sites within Scapa Flow located in the vicinity of the Project area:

- Head of Bank, Orphir, harvesting common mussel, located 2.5 km north of the Project; and

- North Bay West, harvesting Pacific oyster, located on South Hoy, approximately 4 km west of the Project.

2.12.4.2.5 Oil and Gas, including Carbon Capture and Storage

The majority of oil and gas activities are undertaken offshore beyond territorial waters and are particularly concentrated further north and along eastern offshore waters. However, Scapa Flow is the largest natural harbour in Europe and is the hub of the oil and gas operations in Orkney water (OIC Harbour Authority, 2021). At the centre of Orkneys oil and gas operations is the Flotta Oil Terminal, which is a coastal development that is located within Scapa Flow. There is a pipeline that runs from Flotta out to the east of the study area to several offshore installations in the northern North Sea. There are also two pipelines that extend north of Flotta to fixed SPM sites, which are currently mothballed (Repsol Sinopec, 2017). Oil related activities, such as Ship to Ship (STS) operations and offshore platform moorings, occur in the Scapa Flow Oil Port (OIC, 2020). The proposed Scapa Deep Water Quay is a new multi-user deep water pier and quayside facility that will be located in the Bay of Deepdale. The proposed project will include the creation of a 575 m quayside and will be completed in three phases (Marine Scotland, 2021a). The Project will potentially make use of the proposed facility.

Scapa Flow is one of the principal locations in Europe for Ship-to-Ship (STS) operations of the transfer of crude and fuel oils. Scapa Flow offers a large, sheltered, deep-water designated anchorage for these operations. All the anchorages are located in the eastern portion of Scapa Flow.

The nearest potential CCS sites are located in the Moray Firth and North Sea east of the Scottish mainland and therefore not likely to interact with the Offshore Study Area.

2.12.4.2.6 Recreation and Tourism

Figure 2-51 presents a heat map of all recreation activities within the study area. The majority of recreational activities occur within 10 km of the shoreline. A range of recreational activities take place within Scapa Flow:

- Motoring cruising and sailing occurs through Scapa Flow but is focused around the Hoy Sound. There are a few sailing clubs in Orkney, including Stromness Sailing Club, Longhope Sailing Club, and Holm Sailing Club, which have sailing routes within Scapa Flow. The closest harbour to the Project is Stromness Harbour, which is located approximately 5 km from the Orkney export cable corridor search area. Sailing activity intensity increases near Stromness Harbour and Hoy Sound, with frequent routes from Stromness to Longhope, Hoy and from Stromness down past the east of Flotta into the Pentland Firth (NMPi, 2021). The sailing route from Stromness to Longhope will intersect the Scapa Flow export cable corridor search area. Recreational sailing is restricted to summer months (Aquaterra, 2015).
- Scuba diving is a popular activity within Scapa Flow, which gives rise to the local dive tourism industry that provide diving courses as well recreational dives exploring the wrecks of the World War One fleet located in Scapa Flow (SNH, 2016), refer to section 2.10. Scapa Flow is ranked as one of the world's top diving destinations. The SMS Karlsruhe is located to the north-east of Cava and The F2 and Barge located between Hoy and Fara are both known diving sites (NMPi, 2021) are located within the Project area. There are additional shipwrecks that are used for recreational diving within Scapa Flow outside of the Project area.
- Canoeing and kayaking are popular recreational activities that occur mostly within 2 km from the shoreline of Orkney, and intensity increases in Stromness Harbour and in St. Mary's areas outside of the Project but within the wider vicinity (NMPi, 2021).
- Sea swimming activities continue throughout the year, including informal annual swimming events in Stromness Harbour and a 400 m open water sea swim in Longhope, Hoy approximately 5 km from the Scapa Flow offshore export cable corridor search area (Aquaterra, 2015).
- Coastal activities including sea angling, wildlife watching and walking (e.g. along Core Paths) all occur around Scapa Flow. There are five areas in Orkney Mainland, Burray, and South Ronaldsay where sea angling from

the shore has been recorded, the closest is on the coastline near Orphir, and is approximately 3 km from the Scapa Flow offshore export cable corridor search area (NMPi, 2021). There are a number of wildlife tours based in Orkney, Caithness, and Sutherland that operate in Scapa Flow, during the summer months (Aquaterra, 2015). Bird and Wildlife watching is concentrated mainly along the coasts of Orkney Mainland with moderate activity occurring on the north-east coastline of Hoy, Burray, and South Ronaldsay (NMPi, 2021).

As mentioned above, OIC are launching a Marine and Coastal Recreation Survey to collect information about where and when coastal and marine activities are taking place in Orkney. The information will inform the Regional Marine Plan and where available will be used to inform the EIA (OIC, 2021).

2.12.4.2.7 Licensed Spoil Disposal Sites

There is an active dredge spoil disposal site in Scapa Flow, Stromness B (FI050) located approximately 2 km north-east of Cava and sitting adjacent to the northern boundary of the Project.

2.12.4.2.8 Flotta Hydrogen Hub

The Flotta Hydrogen Hub is a proposed development that will be used for a production and export facility at a repurposed area of the existing Flotta Oil Terminal to create a green hydrogen hub. OWPL have an exclusive partnership for the Project to power the Flotta Hydrogen Hub. The preferred site for the Hydrogen Hub is located to the north-east of the Oil Terminal with target operation in 2030.

2.12.4.3 Summary and Key Issues

Table 2-74 Summary and Key Issues for Other Sea Users

	PROJECT COMPONENT
SUMMARY AND KEY ISSUES	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Presence of the Pentland Floating Offshore Wind Farm and EMEC Billia Croo Wave Test Site; • Potential overlap of the offshore export cable corridor search areas with existing and planned subsea cables; • Potential interactions with the existing military activity in PEXA areas D801 and D802, low flying aircraft and the bi-annual Joint Warrior training exercise; • Recreational activities taking place along the north coast of Caithness and the vicinity of the OAA; • Close proximity and / or overlap with two active disposal sites; • Ongoing decommissioning activities associated with Dounreay Nuclear Facility; and • Potential overlap with the exclusion zones required during launch events at the Space Hub Sutherland.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Presence of numerous subsea cables; • The Flotta Oil Terminal and operational activities associated with the development; • Ship to ship transfers and platform mooring activities in Scapa Flow; • Recreational and tourist activities, including sailing, sea swimming, scuba diving, canoeing and kayaking and sea angling; • Presence of one active disposal site 2 km from the island of Cava within Scapa Flow; and • Presence of a number of aquaculture sites.

2.12.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-23.

Table 2-75 Embedded Mitigation Measures that are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Promulgation of information: timely and efficient distribution of NtM, Kingfisher notifications and other navigational warnings of the position	Primary	Promulgation of information to the UKHO to ensure all information required is provided in a timely fashion for

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
	and nature of works associated with the Project.		inclusion on charts, a condition of the Section 36 and / or Marine Licence
2	Application and use of statutory and advisory safety zones during construction, maintenance and decommissioning activities associated with wind turbines and offshore platforms.	Primary	Safety zone application will be made before the start of offshore construction, with the intention to apply noted within the EIA.
3	Crossing and proximity agreements with known existing cable operators.	Tertiary	Secured through consultation with asset owners.
4	Emergency Response Cooperation Plan (ERCoP).	Tertiary	Secured through the Section 36 and/or Marine Licence consent conditions.
5	Appropriate marking on Admiralty charts by the UKHO.	Tertiary	Secured within the Navigational Safety Plan, which will be required as part of the Section 36 and/or Marine Licence consent conditions.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on other sea users receptors and will be consulted upon with consultees throughout the EIA process.

2.12.6 Scoping of Impacts

A number of potential impacts on other sea users receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. Industry understanding and agreement around the specific impacts of floating wind is still developing. The Project will continue to engage with consultees and the ORE Catapult Floating Offshore Wind Centre of Excellence to ensure that impacts, specific to floating wind, are adequately considered within the EIA.

A number of impacts are proposed to be scoped out of the assessment for other sea users receptors. These impacts are outlined, together with a justification for scoping them out or into the assessment.

Table 2-76 EIA Scoping Assessment for Other Sea Users

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Temporary obstruction of recreational activities	1, 2, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct recreation vessels or activities. Likewise, decommissioning activities may also displace recreation vessels.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Temporary obstruction to the Pentland Floating Offshore Wind Farm	1, 2, 3, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct activities associated with the Pentland Floating Offshore Wind Farm.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Temporary obstruction to the EMEC wave test sites	1, 2, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct activities associated with the EMEC wave test sites (Billia Croo and Scapa Flow).	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Temporary obstruction to oil and gas activities within Scapa Flow	1, 2, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct activities	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			associated with the oil and gas activities within Scapa Flow.		
Temporary obstruction to subsea cables (telecommunication and power cables)	1, 2, 3, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct activities associated with the subsea cable construction, operation and maintenance.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Temporary obstruction to spoil disposal	1, 2, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct activities associated with spoil disposal.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Temporary obstruction to Dounreay NPDE and Vulcan NRTE seabed decommissioning activities	1, 2, 4, 5	Scoped In	The construction of infrastructure and implementation of safety distances around construction vessels may obstruct activities associated with the Dounreay nuclear facility seabed decommissioning.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Temporary obstruction to carbon capture, natural gas storage,	1, 2, 4, 5	Scoped Out	There are no carbon capture, natural gas storage, underground gasification or coal deposit projects within the Project and other users study area. As such, impacts on carbon capture, natural gas	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
underground gasification and coal deposits			storage, underground gasification and coal deposit projects have been scoped out of the assessment.		
Temporary obstruction or interference to the Project from the Space Hub Sutherland.	1	Scoped In	Potential for the exclusion zone that will be required during launch events to extend offshore. No details are currently available with respect to the geographical and temporal coverage of this potential exclusion zone. Once these details are available the potential for any impacts can be established.	Desk top study, supplemented through further consultation with Space Hub Sutherland.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Operations and Maintenance					
Obstruction of recreational activities	1, 2, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may obstruct recreation vessels or activities.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Obstruction of Pentland Floating Offshore Wind farm activities	1, 2, 3, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may obstruct activities associated with the Pentland Floating Offshore Wind Farm.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Obstruction of EMEC wave test sites	1, 2, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may	Desktop data sources and ongoing	A qualitative assessment will be undertaken and presented within

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			obstruct activities associated with the EMEC wave and tidal test sites.	consultation with relevant stakeholders.	the EIA based on the maximum design scenarios for the Project.
Obstruction of Oil and Gas activities	1, 2, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may obstruct activities associated with the oil and gas activities within Scapa Flow including those associated with the Flotta Oil Terminal, ship to ship transfers and platform mooring.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Obstruction of subsea cables,	1, 2, 3, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may obstruct activities associated with subsea cables.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Obstruction of spoil disposal	1, 2, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may obstruct activities associated with spoil disposal.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Obstruction of Dounreay nuclear facility decommissioning	1, 2, 4, 5	Scoped In	The presence of infrastructure and implementation of safety distances around maintenance vessels may obstruct activities associated with the seabed decommissioning of the Dounreay nuclear facility.	Desktop data sources and ongoing consultation with relevant stakeholders.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.
Obstruction of carbon capture,	N/A	Scoped Out	There are no carbon capture, natural gas storage, underground gasification or coal deposit projects	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
natural gas storage, underground gasification and coal deposits			within the Project and other users study area. As such, impacts on carbon capture, natural gas storage, underground gasification and coal deposit projects have been scoped out of the assessment.		
Temporary obstruction or interference to the Project from the Space Hub Sutherland	1	Scoped In	Potential for the exclusion zone that will be required during launch events to extend offshore. No details are currently available with respect to the geographical and temporal coverage of this potential exclusion zone. Once these details are available the potential for any impacts can be established.	Desk top study, supplemented through further consultation with Space Hub Sutherland.	A qualitative assessment will be undertaken and presented within the EIA based on the maximum design scenarios for the Project.

2.12.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on other sea users receptors. For example, there could be cumulative impacts within Scapa Flow if the Project and other future planned projects, such as the Scapa Deep Water Quay and the Flotta Hydrogen Hub and other ScotWind OWF lease area off the northern coast of Scotland, are being constructed at the same time. The impacts on other sea users are anticipated to be localised around the offshore infrastructure itself, project vessels or associated safety zones.

There is the potential for cumulative effect and the other sea users CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

2.12.8 Potential Transboundary Impacts

There is no potential for transboundary impacts upon other sea user receptors due to construction, operation, maintenance and decommissioning of the Project. No other sea users receptors associated with other EEA states have been identified and therefore there is no requirement for further assessment. Transboundary impacts on other sea users have been scoped out of the assessment.

2.12.9 Approach to Analysis and Assessment

2.12.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on other sea users will utilise publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. A desktop study will be conducted and supported by consultation with relevant stakeholders and operators. The consultation allows for identification of activities or future activities within the vicinity of this Project. Consultees will include:

- Aquaculture site operators;
- Subsea cables operators;
- Marine Renewable Energy lease owners;
- Recreational users and groups;
- Ministry of Defence; and
- Disposal site users.

In order to facilitate resource effective stakeholder consultation though the development phase of the Project, a socio economic and tourism working group will be established, which will be used to consult on survey methods, interim results, assessment methods and outputs. This working group will be relevant to other sea users.

Consultation will focus around understanding the nature, timing and duration of any works and other marine activity within the study area. Consultation will be undertaken with relevant stakeholders and operators even if specific impacts have been scoped out of the EIA.

Any potential impacts scoped in, either cumulatively or alone, will be identified and assessed in a desk-based format considering the maximum design envelope of the Project. Information will be drawn for other assessment sections where relevant (e.g. shipping and navigation or military and aviation) and both direct and indirect impacts will be considered. The sensitivity of a receptor will consider both the capacity to accommodate any change and consideration of value. The magnitude of an impact will be derived from the maximum design scenario of the Project.

2.12.9.2 EIA Methodology

The other sea users EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 2-25 will also be considered in relation to the other sea users EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-77 Legislation and Guidance for Other Sea Users

LEGISLATION / GUIDANCE	SUMMARY
The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019)	This paper sets out the RYA's position to the development of offshore renewable wind energy and is intended to enable developers to take accurate account of recreational boating concerns.
Assessment of Impact of Offshore Wind Energy Structures on the Marine Environment (Marine Institute, 2000)	The objective of this study was to present information from a desk-based review of the current knowledge on the impact of offshore wind energy structures on the marine environment, including other sea users.
Guidance on Environmental Impact Assessment of Offshore Renewable Energy Development on Surfing Resources and Recreation (Surfers Against Sewage (SAS), 2009)	The guidance acknowledges the growth in the marine renewable energy sector, which may impact popular surfing sites and therefore have a socio-economic impact on the recreational activity. The guidance provided includes information on surfing resources and recreation, impacts on surfing resources and recreation, and guidance on environmental impact.
European Subsea Cables Association (ESCA) Guideline No 6, The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK Waters (ESCA, 2016) (*currently being updated*)	The document provides guidance on the considerations that should be given by all Stakeholders in the development of projects requiring proximity agreements between offshore wind farm projects and subsea cable project in UK Waters. The guidance addresses installation and maintenance constraints related to offshore wind structures, cables, and other subsea cables which occupy the seabed.
International Cable Protection Committee (ICPC) recommendations (ICPC, 2019)	This documentation provides recommendations as a guide to aid cable owners and other seabed users in promoting the highest goals of reliability and safety in the submarine cable environment. Including recommendations for laying cables, repairing cables, and employing procedures.

LEGISLATION / GUIDANCE	SUMMARY
Oil and Gas UK, Pipeline Crossing Agreement and Proximity Agreement Pack (Oil and Gas UK, 2015)	The guide describes the process related to the entering into of proximity agreements and pipeline crossing agreements based on the model agreements included in the approved Norwegian Oil and Gas Recommended Guidelines for use of standard agreement. It is aimed at personnel handling operations that require the entering of proximity and pipeline crossing agreements, and provides a step-by-step description on how to proceed when the need for such agreement is required.
The Crown Estate (TCE) Guidance: Export transmission cables for offshore renewable installations – Principles of cable routeing and spacing (TCE, 2012a)	The guideline is intended to serve as guidance to developers when bringing forward their application to TCE for cable route/corridor for an export transmission cable from an offshore renewable installation.
TCE Guidance: Submarine cables and offshore renewable energy installation – Proximity study (TCE, 2012b)	This guidance provides recommendations for the basic principles of submarine cable and renewable energy installation proximity guidelines. The principle arguments arising from the Proximity Study are: • The creation of a Proximity Agreement protocol; and • Proper understanding of Minimum Distance Approach.

2.12.10 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree that the existing data available to describe the infrastructure and other users baseline remains sufficient?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree with the potential impacts to be scoped out of the Project assessment?
- Do you agree with scoping out transboundary impacts?
- Are there any other key stakeholders or stakeholder organisations that should be consulted?
- Do you agree with the proposed approach assessment?

2.12.11 References

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2.13 Offshore Air Quality, Airborne Noise and Vibration

2.13.1 Introduction

This section of the Scoping Report identifies the elements of offshore airborne noise and offshore air quality of relevance to the offshore aspects of the Project. It considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project on all receptors, onshore and offshore. This fulfils the requirement to investigate potential impacts on human health from airborne noise, vibration and air quality, from the offshore aspects of the Project.

Offshore airborne noise and vibration can occur through the construction phase of the Project, from activities such as piling, drilling, use of vessels or other heavy machinery, or during the decommissioning phase through the removal of any infrastructure. Noise or vibration during the operational period will be limited to turbine motion, mechanical noise from the turbines or Project vessels. Air quality will be limited to emissions from the use of vessels or other heavy machinery during the construction, operation and maintenance and decommissioning of the Project.

The offshore scope of this report considers work conducted in the marine environment. Onshore noise and vibration and air quality have been considered further within sections 3.7, 3.8, 4.7 and 4.8, which include consideration of intertidal works and the associated potential impacts on onshore receptors.

There is the potential for a positive environmental impact with regard to carbon saving and avoidance of gaseous discharges associated with global climate change, as well as a carbon cost on account of the Project development activities. This will be considered in a standalone GHG assessment (see section 1.4.6.3).

This section of the Scoping Report has been prepared by Xodus Group.

2.13.2 Study Area

The offshore airborne noise, vibration and air quality study area is defined as below, and in accordance with the Institute of Air Quality Management (IAQM) guidance:

- The study area of offshore airborne noise and air quality relates to the footprint of the Project including the OAA, offshore export cable corridor search areas and landfalls up to MHWS. Activities occurring above MLWS will be considered within the onshore EIA Scoping Report;
- Designated ecological receptors within 50 m of potential landfall construction activities (Ushat Head, Sandside Bay, Strathy Coast and Hoy SSSI); and
- Human receptors (residential properties and public amenity areas) within 350 m of potential landfall construction activities.

2.13.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 2-20.

Table 2-78 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Airborne Noise			
The Orkney Local Development Plan 2017	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf	2017	OIC
Highland-wide Local Development Plan	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan	2012	THC
Caithness and Sutherland Local Development Plan	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan	2018	THC
Highland Coastal Development Strategy	https://www.highland.gov.uk/downloads/file/23371/hwldp2_main_issues_report	2021	The Planning and Development Service, THC
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/	2016	Scottish Government
Air Quality			
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/	2020	OIC
Cleaner Air for Scotland (CAFS) The Road to a Healthier Future, 2018/2019 Progress Report	Scottish Government	2020	Scottish Government
Offshore Energy SEA 3, Appendix 1E: Air Quality	DECC (now BEIS)	2016	DECC (now BEIS)

TITLE	SOURCE	YEAR	AUTHOR
Air Pollutant Inventories for England, Scotland, Wales, and Northern Ireland: 1990-2017	Department for Environment, Food and Rural Affairs (Defra), The Scottish Government, The Welsh Government and The Northern Ireland Department for Agriculture, Environment and Rural Affairs	2019	National Atmospheric Emissions Inventory
Scottish Government and Defra background concentrations maps for nitrogen dioxide (NO2) and particulate matter (PM10) and (PM2.5)	Scottish Government and Department for Environment Food and Rural Affairs	2017	Scottish Government and Department for Environment Food and Rural Affairs
Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction V1.1	IAQM	2014	Holman *et al.*

2.13.3.1 Project Site-Specific Surveys

No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for ambient noise, vibration or air quality seaward of MHWS. This is because there is sufficient information on the baseline environment to support the decision of scoping out offshore airborne noise, vibration and offshore air quality from the EIA (see section 2.13.6).

2.13.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 2-78) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

Existing offshore airborne noise within the region and along the coastlines is likely to be generated from a combination of anthropogenic and natural sources. Due to the general lack of offshore industrial development in the seas off the north coast of Scotland, the key anthropogenic noise source vessel traffic. Natural airborne noise occurs from wind, wave action and precipitation. Similarly, the main offshore source of atmospheric emissions in proximity to the Project is anticipated to be from exhaust emissions from existing vessel traffic, since there is very little other offshore industrial activity (e.g. oil and gas installations) off the north coast of Scotland, or off the west coast of Orkney, where the Project is located. The primary pollutants from vessel emissions are sulphur dioxide (SO_2), nitrogen oxides (NO_x) and carbon dioxide (CO_2). The main source of vessel traffic within the area is from vessels navigating along the north coast of Scotland, between the north coast and Orkney, and within the Orkney Islands, including Scapa Flow (see section 2.8 for further details on vessel traffic patterns). Additionally, fishing vessels are active within the wider region (see section 2.7).

Coastal ambient noise levels and air quality levels are anticipated to be low/good along the surrounding coastlines. The northern Caithness coastline (adjacent to the Caithness offshore cable corridor search area) is largely rural with limited coastal development, traffic and industry. Areas of marginally higher levels of ambient noise and air quality will be associated with greater level of coastal development, both residential and industrial. Existing noise sources along the coastline occur from urban development, both industrial from the Dounreay nuclear site and coastal residential areas. THC has noted air quality to be generally very good. Therefore, there are no Air Quality Management Areas (AQMA) within the study area of the Project from both Orkney and Caithness and Sutherland (The Highland Council, 2016).

The surrounding Orkney coastline (adjacent to Orkney offshore export cable corridor search area and the Scapa Flow offshore export cable corridor search area) is also largely rural with limited coastal development, traffic and industry. Only rural settlements are present on Hoy and Flotta, as categorised by the Orkney Local Development Plan 2017. The island of Hoy is expected to have low ambient noise levels and air quality levels, limited to small rural settlements. Existing sources on Flotta, specifically the north coast, which is closest to the potential landfall sites, are expected to be limited to small, low density residential areas and to the existing Flotta Oil Terminal. Air quality within the Orkney Islands is noted to be relatively good with pollutant concentrations substantially below the national limits (OIC, 2020). OIC have not identified any areas where national or European air quality objectives are under threat

The Scottish Government has reported that across Scotland emissions of air pollutants have reduced, and air quality has improved (Scottish Government, 2020), with the National Atmospheric Emissions Inventory (NAEI) showing a reduction in all priority pollutants between from 2005 to 2019, aside from NH_3 for which no strong decline was seen (NAEI, 2021).

Human receptors sensitive to offshore airborne noise, vibration and air quality include:

- Offshore marine users:
  - Commercial shipping vessels and routes (see section 2.8 for further information;
  - Commercial fishing vessels (see section 2.7 for further information); and
  - Marine leisure and recreational users including recreational fishing; motor cruising; water sports and scuba diving (see section 2.12 for further information).
- Onshore sensitive receptors within the study area:
  - Industrial developments;
  - Residential areas;
  - Coastal recreation; and
  - Ecological designated sites (see sections3.2, 3.3, 3.4, 4.2, 4.3 and 4.4).

Marine ecology receptors sensitive to offshore airborne noise include offshore bird species, which is covered in section 2.5.

Table 2-79 Main Coastal Settlements with Populations Greater than 500 People (The Highland Council, 2014; USP, 2021)

REGION	COASTAL TOWN	POPULATION	CLOSEST DISTANCE TO OAA (KM)	CLOSEST DISTANCE TO OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREAS (KM)
Caithness and Sutherland	Thurso	8,992	39	8
	Castletown	1,207	44	16
	Dunnet	898	44	19
	Bettyhill	576	29	17
Orkney	Stromness	1,758	36	4

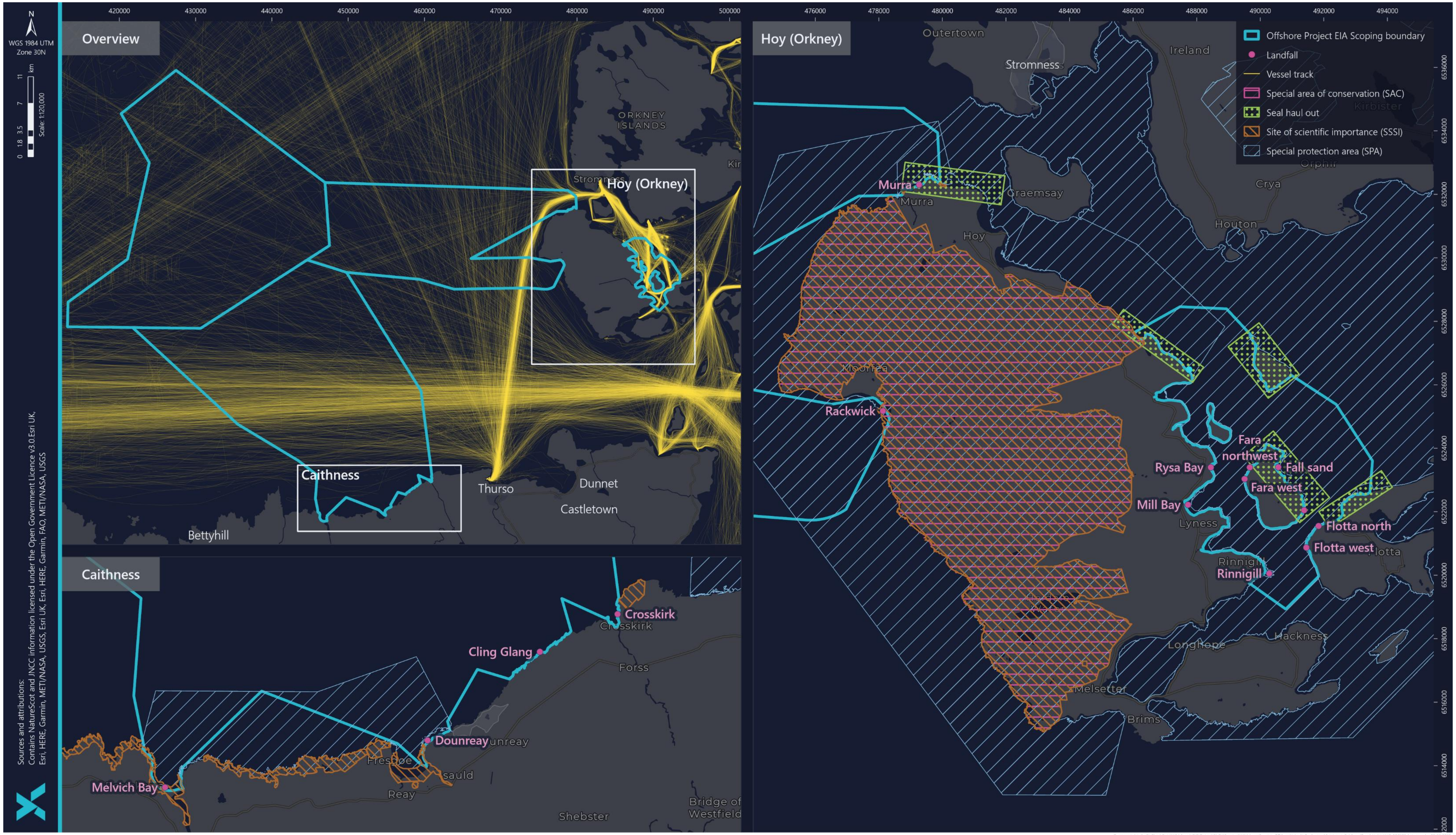

Figure 2-52 Key Offshore Noise, Vibration and Air Quality Receptors

2.13.4.1 Summary and Key Issues

Table 2-80 Summary and Key Issues for Offshore Air Quality, Airborne Noise and Vibration

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	OFFSHORE MARINE AREA – OAA, CAITHNESS OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND ORKNEY OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• General lack of offshore industrial development in the seas off the north coast of Scotland and Orkney, with the key anthropogenic noise and emissions source being vessel traffic. Natural airborne noise occurs from wind, wave action and precipitation; and • The Caithness and Orkney coastline is largely rural with limited coastal development, traffic and industry.
	SCAPA FLOW – SCAPA FLOW OFFSHORE EXPORT CABLE CORRIDOR SEARCH AREA
	• Existing noise and emissions sources on Flotta, are dominated by the Flotta Oil Terminal. Elsewhere, Hoy and Fara and rural in nature and Frta is uninhabited.

2.13.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 2-23.

Table 2-81 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
Airborne Noise			
1	Environmental Management Plan will provide the over-arching framework for on-site environmental management during the phases of development.	Tertiary	Secured under Section 36 and/or Marine Licence consent conditions
2	CoCP.	Tertiary	Required as a condition of planning permission
3	Piling strategy to outline the details of proposed piling works.	Tertiary	Secured under Section 36 and/or Marine Licence consent conditions

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
4	Onshore construction noise mitigation.	Primary	As may be required as a condition of planning permission
Air Quality			
5	VMP (including compliance with relevant national and international air quality standards and legislation)	Tertiary	Required under section 36 and/or Marine Licence consent conditions

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects of offshore airborne noise, vibration impacts and air quality impacts.

2.13.6 Scoping of Impacts

A number of potential offshore airborne noise, vibration and air quality impacts on human receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C), as well as industry experience and scientific research. All impacts are proposed to be scoped out of the assessment for offshore airborne noise, vibration and air quality. These impacts are outlined, together with a justification for scoping them out.

Construction works within the intertidal area with the potential to generation noise, vibration and effect air quality, which may in turn effect onshore human receptors have been considered within onshore scoping sections 3.7, 3.8, 4.7 and 4.8.

Overall, the Project will be a source of clean, renewable energy and therefore as a whole will contribute to a reduction in emissions at a national and global level by facilitating a reduced reliance on fossil fuels and help move Scotland towards its 2045 goal of net zero emissions of all greenhouse gases set by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

Table 2-82 EIA Scoping Assessment for Offshore Air Quality, Airborne Noise and Vibration

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION
Construction and Decommissioning			
Piling activities generating airborne noise/vibration that may impact other marine users	3, 4	Scoped Out	The minimum distance that commercial vessels will pass from construction activities will be 500 m. Vessels are transient in nature and therefore will only be in the vicinity of construction activities for a short period of time. Considering existing sources of anthropogenic and natural airborne noise, the effect of airborne noise from piling on receptors onboard other marine vessels, will be negligible and hence the impact has been scoped out of the EIA.
Piling activities generating airborne noise/vibration that may impact onshore human receptors on the north coast of Scotland and Orkney	3, 4	Scoped Out	Piling activities within the OAA generating noise and vibration are not predicted to affect onshore receptors due to the Project's location offshore. Hence the impact has been scoped out of the EIA.
Cable installation activities generating noise/vibration that may impact marine users and onshore human/ecological receptors	1, 2 and 4	Scoped Out	Airborne noise associated with the installation of the inter-array cables and export cables will occur from the cable laying vessels. Noise emissions from vessels is generally low; and localised around the vessels being used, will be of short duration, transient (as the vessel moves along the cable corridor, only present nearshore for a short time) and unlikely to result in significantly elevated noise levels beyond the baseline considering the existing vessel movements across the wider region, other anthropogenic noise and natural noise sources. Hence the impact has been scoped out of the EIA.
Auxiliary construction activities (project vessels, helicopter movements, use of other	1, 2, 4 and 5	Scoped Out	Auxiliary construction noise is expected to be localised around the vessels being used and unlikely to result in the significant propagation of airborne noise or vibration considering the limited

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION
machinery and generators) generating noise and vibrations that may impact marine users, onshore human receptors impacting human health and/or onshore ecological receptors			existing vessel traffic within the area, limited nearby receptors and other anthropogenic noise and natural noise sources. Hence the impact has been scoped out of the EIA.
Exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of SO_2, NO_2, PM_{10} and $PM_{2.5}$ and impact human health and/or onshore ecological receptors	5	Scoped Out	Engine emissions from offshore vessels associated with all phases of the Project would contribute, at a small scale, to atmospheric emissions from existing shipping traffic in the area. It is considered that associated atmospheric emissions of infrequent vessel movements associated with the Project would be negligible in comparison to the total shipping activity in the area. The specific port locations where vessels will travel to and from to support offshore construction, operation and maintenance and decommissioning activities has not yet been identified, however it is likely to be an established commercial/industrial port in the north of Scotland and / or Orkney. The Vessel Management Plan will outline the final vessel construction, operation and maintenance and decommissioning strategies for the Project, ensuring the most efficient use of vessels where possible. It will also ensure compliance with relevant national and international air quality standards and legislation including MARPOL Annex VI Regulations for the Prevention of Air Pollution from Ships (IMO, 2016), the European Directive 2012/33/EC on the Sulphur Content of Marine Fuels (European Parliament, 2012) and the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008 (as amended). The potential effects of increased emissions on onshore receptors are therefore considered to be negligible, and hence the impact has been scoped out of the EIA.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION
Operations and Maintenance			
Operation of WTGs producing airborne noise/vibration	4	Scoped Out	The movement of turbine blades is expected to result in low levels of airborne noise, which considering the existing anthropogenic and natural sources of noise offshore and along the coastline (wind, wave and precipitation), is not considered audible by onshore receptors or transient marine users. Hence the impact has been scoped out of the EIA.
Maintenance vessel and equipment activity noise, vibration or vessel emissions that may impact marine users, onshore human receptors and/or onshore ecological receptors	1, 5	Scoped Out	See justification for construction. Maintenance works will be short term, transient and of a lesser scale than construction. Hence, as per construction, the impact has been scoped out of the EIA.

2.13.7 Potential Cumulative Effects

No other OWFs, which could result in piling operations and as such airborne noise, are located within close proximity to the OAA area. The nearest marine renewable project is the Pentland Floating Offshore Wind Farm, located 19 km from the OAA. However, based on the current published development schedule for the Pentland Floating Offshore Wind Farm construction is unlikely to occur at the same time. Airborne noise from auxiliary construction activities and cable laying is expected to be highly localised around the vessels being used, and therefore will not result in significant cumulative effects.

Likewise, no air quality cumulative effects are anticipated as any emissions affecting air quality from the Project will be temporary and focused within the footprint of the Project. Therefore, it is considered that the Project will not result in cumulative effects, hence the cumulative assessment for airborne noise, vibration and air quality has been scoped out of the EIA.

2.13.8 Potential Transboundary Impacts

Transboundary effects are not anticipated as airborne noise, vibration and air quality impacts from the Project will largely be localised and temporary. As such transboundary effects have been scoped out of the EIA.

2.13.9 Scoping Questions

- Do you agree with scoping out all offshore airborne noise, vibration and air quality impacts?

2.13.10 References

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2.14 Socio-economics

2.14.1 Introduction

This section of the Scoping Report identifies the elements of onshore and offshore socio-economics (including tourism) of relevance to the Project. The section considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project on onshore and offshore socio-economic and tourism receptors.

For socio-economics the Project has been considered as a whole (onshore and onshore) and the socioeconomic baseline completed on a regional basis. This is because the economic impacts of the Project on the region are inherently linked.

Information that may be considered relevant to this section is also presented within the below sections:

- Commercial fisheries, section 2.7;
- Shipping and navigation, section 2.8; and
- Other sea users, section 2.12.

This section of the Scoping Report has been prepared by Development Economics.

2.14.2 Study Area

The selection of study areas for the socio-economics EIA will take account of the spatial scale at which impacts on different socio-economic receptors are likely to occur. This is likely to vary across different receptors and will therefore require a hierarchy of study areas.

The principal study area intended for the socio-economics assessment covers the Project and two local authority areas: i.e., THC and OIC areas respectively. For the purpose of the assessment of effects on socio-economic receptors, this combined area is termed the regional study area, which will cover both offshore and onshore aspects of the Project. As the spatial area covered by THC is very large, it is also useful to access socio-economic baseline data for smaller, more localised spatial areas, such as the Caithness, Sutherland & Easter Ross (Westminster) parliamentary constituency, or the respective Thurso and Wick Travel to Work Areas (TTWAs).

A larger sub-regional study area will also be defined to reflect the likely effects of the Project on Gross Value Added (GVA) and employment generated through supply chain effects. This sub-regional study area will be defined following a review of the results of the socio-economic impact assessment being undertaken and following consultation with stakeholders.

The potential socio-economic effects of the Project at a national level will also be assessed, both for Scotland and for the United Kingdom.

2.14.3 Data Sources to Inform the EIA Baseline Characterisation

An initial desk-based review of literature and data has revealed a number of relevant pre-existing datasets. Key datasets to be utilised by the assessment include but are not limited to those set out in Table 2-20 below.

Table 2-83 Summary of Key Datasets and Reports

INDICATOR	SOURCE	YEAR
Highland-Wide Local Development Plan	THC	2012
Orkney Local Development Plan	OIC	2017
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Scottish Government	2016
State of the Environment Assessment: A Baseline Assessment of the Orkney Islands Marine Region	OIC	2020
Sectoral Marine Plan for Offshore Wind Energy: Social and Economic Assessment report	Scottish Government	2019
Regional Gross Value Added (balanced) by industry: all NUTS level regions	Office of National Statistics (ONS)	2019
Regional Gross Value Added (balanced) by industry: local authorities	ONS	2019
UK Business Counts: local authorities	ONS Business Demography datasets	2020
Working age population: local authorities	ONS Mid-year Population Estimates	2020
All People in employment, economically active and unemployed: local authorities	ONS Annual Population Survey	2020/21
Employment by Occupation: local authorities	ONS Annual Population Survey	2020/21
Employee jobs by industry: local authorities	ONS Business Register and Employment survey	2020
Visit Scotland	Local authority factsheets/visitor survey	2019

OIC are launching a Marine and Coastal Recreation Survey to collect information about where and when coastal and marine activities are taking place in Orkney. The information will inform the Regional Marine Plan and where available will be used to inform the EIA (OIC, 2021).

2.14.3.1 Project Site-Specific Surveys

No site-specific surveys have been undertaken to inform this socio-economics section, and no surveys are intended to be undertaken to support the EIA. There is sufficient secondary data available for the compilation of a baseline against which the potential impacts can be assessed.

Consultation, through the setup of a socio economic and tourism working group will be used to facilitate the discussion on baseline data, interim results, assessment methods and outputs (see section 2.14.9).

2.14.4 Baseline Environment

An initial desk-based review of literature and available data sources (see) has been undertaken to support this EIA Scoping Report. The findings of this research are summarised in this sub-section to provide an understanding of the regional study area baseline environment and to inform the Scoping process.

The key features of the regional study area economy which are likely to require consideration within the EIA are:

- Demographic characteristics;
- Labour supply potential;
- Size and structure of the local business base;
- The relative importance of industries that have the potential for either positive or negative interactions with the Project, such as construction and tourism;
- Economic output performance; and
- The volume and value of tourism activity in the area.

The baseline provided within this section is focused on a regional and national scale and as such may not be representative of local conditions at Caithness and Sutherland. As described in section 2.14.2 and 2.14.9, the EIA will consider smaller, more localised spatial areas to ensure the statistics are representative.

2.14.4.1 Demographic Characteristics

Information from the 2020 ONS Population Estimates indicates that the regional study area had a combined population (Highland and Orkney) of nearly 258,000, with over 91% of this total accounted for by the Highland local authority area.

The ONS definition of working age population remains those aged 16-64 years (despite changes to the State Pension Age). The working age population of the regional study area in 2020 amounted to just over 156,000, which was 60.6% of the area’s normally resident population. By contrast, the proportion of Scotland’s population that is of working age in 2020 was 63.9%.

Table 2-84 Demographic Characteristics of the Regional Study Area

AREA	POPULATION COUNT ('000S)	WORKING AGE (%)
Highland	235.4	60.7%
Orkney	22.4	59.8%
Scotland	5,466.0	63.9%
United Kingdom	67,081.2	62.4%

Source: ONS Population Estimates, 2020

2.14.4.2 Labour Supply Potential

A review of ONS labour market data available from the NOMIS portal indicates that the economic activity[13] rate in both THC (75.2%) and OIC (86.6%) areas are both significantly higher than the average rate for Scotland as a whole (72.2%) (see Table 2-85). The average employment rate in both areas is also higher than the average for Scotland.

Table 2-85 Labour Supply Potential in the Regional Study Area

AREA	ECONOMIC ACTIVITY RATE (%)	EMPLOYMENT RATE (%)	UNEMPLOYMENT (%, MODEL BASED)
Highland	75.2%	76.5%	3.7%
Orkney	86.6%	78.2%	3.8%
Scotland	72.2%	75.9%	4.7%
United Kingdom	75.6%	78.9%	4.3%

Source: ONS Annual Population Survey, July 2020-June 2021

The ONS also produces estimates of local unemployment rates using a definition that is consistent with that used by the International Labour Organisation. This definition focuses on working age persons who do not have a job but who want a job and are available for work. Using this approach, the unemployment rate in both the THC area (3.7%) and in OIC (3.8%) are both significantly lower than the national average for Scotland (4.7%).

[13] *the employment rate plus those of working age not currently in employment but who would like a job and are available for and actively seeking work.*

2.14.4.3 Business Population and Formation

According to ONS Business Counts (sourced from the Inter Departmental Business Register), in 2021 there were 10,775 business units located in the THC area, and a further 1,445 located in the OIC area.

An often-used measure of the relative density of the business population of an area can be determined by dividing that area's business population its' working age population. On this measure, the business population per 1,000 working age population of THC (75.4) and OIC (107.8) are both significantly greater than for Scotland as a whole (50.2). The equivalent statistic for the UK as a whole is 66.2.

It is also relevant to note that the size structure of the local business population in both local areas is similar to that found across the national economy. For example, in the THC area 89.0% of enterprises are micro-businesses (i.e., have less than 10 employees), while in the OIC area the proportion is 89.3%. The equivalent statistic for Scotland is 88.1%, whilst for the UK it is 89.7%.

A commonly used measure of the dynamism of the local business base is the annual count of new businesses established per 1,000 working age population. According to the most recent ONS Business Demography statistics (2020), the number of new businesses formed in the THC area was 51.1 per 1,000 working age population. This was a very similar figure to that occurring across Scotland as a whole (50.9), but lower than that for the UK (85.5). However, the equivalent figure for the OIC area was 33.6, which is significantly lower than that occurring nationally.

2.14.4.4 Employment Base

According to the ONS Business Register and Employment Survey (BRES), in 2020 there were 104,000 employee jobs located in the THC area. The estimated number of employee jobs in the OIC area was approximately 10,000. The table below (Table 2-86) sets out the importance of selected industries, based on their proportionate contribution to the total number of employee jobs found in each area.

Table 2-86 Employee Jobs in Selected Industries in the Regional Study Area

SECTOR	HIGHLAND	ORKNEY	SCOTLAND	UK
Manufacturing	4.8%	4.0%	7.2%	7.3%
Energy, water supply	2.9%	1.7%	1.6%	1.0%
Construction	6.7%	7.0%	5.1%	6.6%
Wholesale & retail	15.4%	15.0%	13.9%	13.9%
Transport & storage	4.8%	9.0%	4.5%	5.1%
Accommodation; food & drink services	11.5%	6.0%	7.2%	6.8%

SECTOR	HIGHLAND	ORKNEY	SCOTLAND	UK
Professional services	5.8%	5.0%	7.1%	9.2%
Education, Health, Public Admin	33.7%	36.5%	31.5%	25.9%
Other sectors	14.4%	15.8%	21.9%	24.2%

Source: ONS Business Register and Employment Survey, 2020

Considering the figures in Table 2-86, it is notable that the energy and water supply industries are comparatively more important as a source of employee jobs for both the THC and OIC areas compared to Scotland as a whole (and also compared to the UK total). It is also worth noting that the construction sector is comparatively more important within the regional study area: in the THC and OIC areas, 6.7% and 7.0% of employee jobs respectively are contributed by this sector, compared to 5.1% for Scotland.

Employee numbers in the accommodation and food services sector can be indicative of the relative importance of tourism activity for employment in an area. In the case of the THC area, 11.5% of jobs are found in this sector, compared to 7.2% for Scotland. However, in the OIC area only 6.0% of jobs are contributed by this sector, suggesting that tourism activity is less important to the Orcadian economy compared to the average for Scotland as a whole.

2.14.4.5 Economic Output

The contribution of individual companies, specific industries, and sub-national areas to national economic output (Gross Domestic Product) is measured by GVA.

According to the most recent data published by the ONS, Scotland contributed £144.25 billion in GVA to the UK economy in 2019, representing 7.4% of the UK total.[14]

ONS also provide GVA data at a local authority level. According to the most recent data:

- The THC area contributed £6.27 billion in GVA in 2019, accounting for 4.3% of the Scotland total; and
- The OIC area contributed £0.55 billion in GVA in 2019, accounting for 0.4% of the Scotland total.

In 2019, GVA per capita in the THC area was about 92.3% of the UK average. This is slightly higher than the equivalent statistic for Scotland, where GVA per capita was 91.4% of the UK average. On the other hand, GVA per capita for OIC was only 85.2% of the UK average.

[14] *Regional gross value added (balanced) by industry; all NUTS level regions, Table 1b (ONS, June 2021)*

2.14.4.6 Tourism Overview

According to data published by Visit Scotland, in 2019 there were 12.48 million visits by tourists to the Highlands, which in turn generated £1,553 million of expenditure across the THC area. In the same year, tourist visits to Orkney were estimated by Visit Scotland to amount to 0.19 million, generating expenditure worth £67 million for the OIC area. The relative importance of sectors such as Accommodation and Food & drink services as a component of the local employment base has already been highlighted in a previous sub-section of this section.

2.14.4.7 Summary and Key Issues

Table 2-87 Summary and Key Issues for Socio-economics

	PROJECT COMPONENT
	ONSHORE AND OFFHSORE ASPECTS OF THE PROEJCT COMBINED
SUMMARY AND KEY ISSUES	• There is evidence that there may be below average levels of spare labour market capacity in the regional study area. However, it is acknowledged that statistics at a regional scale may not be representative of local conditions at Caithness and Sutherland. This interim conclusion derives from the below average proportion of the population that is of working age, and the above average levels of employment (and below average levels of model-based unemployed) found in both local authority areas. This feature of the local demography and labour market indicators could suggest that a higher than usual proportion of the temporary construction phase workforce may need to be brought into the local area to work on the Project.; • On the other hand, the BRES data indicates that a higher proportion of the exiting local employed is currently working for businesses operating in the construction and civil engineering sector. This in turn suggests that there may be an above-average level of opportunity for local businesses to benefit from the Project by supplying services via project procurement activity.; and • Tourism is confirmed to be an important industry locally, especially in the THC area. The potential for negative interactions with the Project – such as through competition for bedspaces during the construction phase – will need to be assessed carefully during the assessment.

2.14.5 Embedded Mitigation Considered Within the EIA

It is expected that the most significant impacts on socio-economics receptors – such as direct jobs and GVA created directly by the Project, and indirectly through supply chain stimulus – would be positive in their nature. These impacts would therefore not require mitigation.

Where the assessment does identify any potential negative impacts on socio-economics receptors, the requirement and feasibility of any mitigation measures would be dependent on the potential level of significance of these effects and would be consulted upon with relevant stakeholders as part of the of the assessment process.

Opportunities to enhance the extent of potential beneficial impacts within the regional study area will be considered as part of the socio-economics assessment process. The Project have already stated publicly that they are committed to achieving 40% of content within Scotland, and 60% within the UK.

The assessment of impacts will be supported by – and be fully consistent with – the findings of and information generated by a bespoke Supply Chain Development Statement (SCDS) that has been developed for the Project in accordance with the requirements for offshore wind power developments under the auspices of ScotWind Leasing, as specified by Crown Estate Scotland.[15] *The SCDS includes information on the supply chain expenditure that the Project has committed to across both project stages (development, manufacturing and fabrication, installation and operations) and geographical regions (Scotland, the rest of the UK, the European union and elsewhere). The project will be held to these commitments under its agreement with CES. In additional, the SCDS, will include information on the Project's ambitions in terms of supply chain expenditure, which are likely to be greater than that already committed.*

The Project are committed to investing heavily in early supply chain, innovation, and skills initiatives, including:

- Over £21 million in the first three years on port and other infrastructure, innovation, and skills;
- Over £33 million into a supply chain investment fund; and
- £50 million to be invested in key supplier readiness.

The Project are also currently engaging with stakeholders concerning the creation of a targeted community benefit programme focusing on addressing regional and local priorities.

2.14.6 Scoping of Impacts

A number of potential impacts on socio-economics receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Sectoral Marine Plan for Offshore Wind and the supporting Strategic Environmental Assessment (particularly Appendix C) and the Social and Economic Impact Assessment, as well as industry experience and scientific research. The impacts that have been scoped into the Project assessment are set out in the table below, together with descriptions of any proposed additional data collection and supporting analysis (i.e., modelling) that will be undertaken to generate a full assessment of potential impacts. A number of impacts are proposed to be scoped out of the assessment, these impacts are outlined, together with a justification for scoping them out.

It should be noted that the potential impact of the Project on commercial fishing are considered in section 2.12.7 Commercial Fisheries rather than as part of the socio-economics assessment.

[15] *CES statement on gold panning updated final (crownestatescotland.com)*

Table 2-88 EIA Scoping Assessment for Socio-economics

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Employment in the supply chain	N/A	Scoped In	Construction and decommissioning phase project expenditure has the potential to support employment in local and other Scottish companies directly engaged in providing services to the Project. It also has the potential to support jobs indirectly through supply chain activity and multiplier effects.	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	An economic impact model will be developed to estimate direct, indirect, and induced employment impacts of the Project at a range of spatial levels, including the THC (including Caithness and Sutherland) and OIC areas, as well as Scotland and UK.
Economic output effects in the supply chain	N/A	Scoped In	Construction and decommissioning phase project expenditure has the potential to generate GVA by local and other Scottish companies directly engaged in providing services to the Project. It also has the potential to generate GVA indirectly through supply chain activity and multiplier effects	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	An economic impact model will be developed to estimate direct, indirect, and induced GVA impacts of the Project at a range of spatial levels, including the THC (including Caithness and Sutherland) and OIC areas, as well as Scotland and UK.
Access to job opportunities by local residents	N/A	Scoped In	Direct, indirect, and induced employment associated with the construction and decommissioning of the Project could generate new job opportunities accessible to the population of the regional study area.	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions,	The potential for local job opportunities will be estimated as part of the employment impact modelling described above.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
				including an assessment of the business and skills base.	
Impact on demand for housing and local services	N/A	Scoped In	Direct, indirect, and induced employment associated with the construction and decommissioning of the Project could generate demand for housing and local services during the construction and/or decommissioning phases.	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	No specific modelling is required. Instead, the assessment will be undertaken using professional judgement based on local baseline evidence and a review of the experience of similar projects elsewhere in Scotland.
Impacts on the economic value of tourism and recreation activities	N/A	Scoped In	The construction and/or decommissioning of the Project could potentially disrupt local tourism activity. Effects could be negative if Project activities deter visitors, but could on the other hand lead to demand for bedspaces locally to accommodate the proportion of the workforce that is non-locally based.	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	No specific modelling is required. Instead, the assessment will be undertaken using professional judgement based on local baseline evidence and a review of the experience of similar projects elsewhere in Scotland.
Socio-cultural effects	N/A	Scoped Out	Socio-cultural effects cover matters such as impacts on lifestyles, family structure, social problems (such as crime, deprivation), human rights, community character, etc. In the case of the Project, the largely offshore location and relatively short-term duration of construction and eventual decommissioning activity means that the potential for significant	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			negative socio-cultural effects of this type would be expected to be limited, and therefore insignificant. Therefore, it is not proposed to undertake a distributional assessment as part of the overall assessment.		
Distributional effects	N/A	Scoped Out	Distribution effects refer to the potential for impacts on specific groups in society (such as different age groups, religious groups, ethnic minorities, etc.) or communities defined by location. In the case of the Project, the largely offshore location and the relatively short-term duration of construction and eventual decommissioning activity means that the potential for any negative distributional effects to be concentrated among specific groups would be negligible. Therefore, it is not proposed to undertake a distributional assessment as part of the overall assessment.	N/A	N/A
Operations and Maintenance					
Employment in the supply chain	N/A	Scoped In	Operation and maintenance phase project expenditure has the potential to support employment in local and other Scottish companies directly engaged in providing services to the Project. It also has the potential to support jobs	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions,	An economic impact model will be developed to estimate direct, indirect, and induced employment impacts of the Project at a range of spatial levels, including the THC

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			indirectly through supply chain activity and multiplier effects.	including an assessment of the business and skills base.	and OIC areas, as well as Scotland and UK.
Economic output effects in the supply chain	N/A	Scoped In	Operation and maintenance phase project expenditure has the potential to generate GVA by local and other Scottish companies directly engaged in providing services to the project. It also has the potential to generate GVA indirectly through supply chain activity and multiplier effects	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	An economic impact model will be developed to estimate direct, indirect, and induced GVA impacts of the Project at a range of spatial levels, including the THC and OIC areas, as well as Scotland and UK.
Access to job opportunities by local residents	N/A	Scoped In	Direct, indirect, and induced employment associated with the operation and maintenance of the Project could generate new job opportunities accessible to the population of the regional study area.	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	The potential for local job opportunities will be estimated as part of the employment impact modelling described above.
Impact on demand for housing and local services	n/a	Scoped In	Direct, indirect, and induced employment associated with the operation and maintenance of the Project could generate demand for housing and local services during the construction and/or decommissioning phases.	Desk-based review to develop a detailed baseline assessment of relevant socio-economic conditions, including an assessment of the business and skills base.	No specific modelling is required. Instead, the assessment will be undertaken using professional judgement based on local baseline evidence and a review of the experience of similar projects elsewhere in Scotland.
Impacts on tourism, recreation	N/A	Scoped In	The operation and maintenance of the Project could potentially disrupt local tourism activity. Effects could be negative if project operational	Desk-based review to develop a detailed baseline assessment of relevant socio-	No specific modelling is required. Instead, the assessment will be undertaken using professional

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
activity and associated economic value			activity deters visitors, but on the other hand maintenance and repair activities during the operational stage of the project is likely to require occasional visits to the area by technicians and other specialist staff who might require accommodation during their stay, which could benefit local accommodation and food & drink service providers.	economic conditions, including an assessment of the business and skills base.	judgement based on local baseline evidence and a review of the experience of similar projects elsewhere in Scotland.
Socio-cultural effects	N/A	Scoped Out	As per the construction and decommissioning phases, the largely offshore location of the Project means that the potential for any negative socio-cultural effects to be concentrated among specific groups or communities is expected to be highly limited or non-existent. Therefore, it is not proposed to undertake a distributional assessment as part of the overall assessment.	N/A	N/A
Distributional effects	N/A	Scoped Out	As per the construction and decommissioning phases, the largely offshore location of the Project means that the potential for any negative distributional effects to be concentrated among specific groups would be expected highly limited or non-existent. Therefore, it is not proposed to undertake a distributional assessment as part of the overall assessment.	N/A	N/A

2.14.7 Potential Cumulative Effects

It is conceivable that there is potential for the predicted impacts from the Project to interact with impacts from other projects, plans and activities occurring within the regional study area during either the construction phase and/or the operational phase of the Project, thereby resulting in the potential for cumulative effects on socio-economic receptors.

Projects and activities located within the regional study area which will be considered in terms of potential cumulative effects will include (but not necessarily be limited to):

- Other offshore renewable energy projects and associated infrastructure, such as the Pentland Floating Offshore Wind Farm;
- Onshore energy generation projects;
- Energy infrastructure developments in the hydrogen and oil & gas sectors, such as the potential Flotta Hydrogen Hub;
- Onshore transportation infrastructure projects, including ports and harbours;
- Major onshore commercial development projects; and
- Onshore minerals extraction projects.

The socio-economics CEA will consider the maximum adverse design scenario for each of the projects, plans or activities in question, based on publicly available information and in line with the methodology outlined in 1.4.3.

2.14.8 Potential Transboundary Impacts

Potential transboundary impacts on socio-economics receptors could also arise from the purchase of project components, equipment, services, or the sourcing of the project workforce from companies or workers that are based outside of the UK. The sourcing of materials, services, or workers from outside the UK is assumed to generate positive socio-economic effects on non-UK economies, so the consideration of measures that are envisaged to reduce or mitigate such effects are not considered relevant in the consideration of potential transboundary effects.

Transboundary impacts to other topics which may have relevance to socio-economics such as non-UK commercial fishing fleets and non-UK shipping and commercial navigation (sections 2.7 and 2.8 respectively) are being considered within the relevant topic sections.

It is therefore proposed that the consideration of transboundary impacts on non-UK socioeconomic receptors is scoped out of the assessment of socio-economics.

2.14.9 Approach to Analysis and Assessment

2.14.9.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on socio-economics receptors will utilise both Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. Consultation will be undertaken to ensure that the potential for interactions between the Project and local economic activities (including, tourism, recreation, housing, public services, etc.) are appropriately addressed by the assessment. Consultations will be undertaken with:

- Marine Scotland;
- OIC;
- THC; and
- Local stakeholders.

In order to facilitate resource effective stakeholder consultation though the development phase of the Project, a socio economic and tourism working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs.

As described in section 2.14.5, the assessment of impacts will be supported by – and be fully consistent with – the findings of and information generated by the bespoke SDCS.

The assessment of impacts associated with the Project will include the quantification of a number of types of potential effects during both the construction and decommissioning phases, and during the operations and maintenance phase. The quantification of potential effects will be developed using an economic impact model, which will provide estimates of the following indicators at a variety of spatial levels local, regional, Scotland, UK, outside of UK:

- Employment – i.e., direct, indirect, and induced effects;
- GVA – i.e., direct, indirect, induced effects;
- Potential for additional revenues for local businesses supplying services to the Project and/or benefiting from expenditure by the project workforce;
- Types of jobs needed – e.g., by occupational type and skills level;
- Implications for workforce recruitment, training opportunities, etc.;
- Likely extent of local recruitment of workforce, etc.;
- Potential scale of non-local recruitment; and
- Implications for associated additional demand for housing and local services such as health and education facilities.

The proposed approach to the development of a socio-economic impact model will be based on the following types of project specific information:

- Estimates of capital expenditure for the construction and decommissioning phases will be a principal input into the model; and
- Estimates of Project operational expenditure will also be an important input into the model.

Estimates of both capital and operational expenditure would be used in tandem with coefficients obtained from the most up-to-date edition of the Scottish Government's Input Output tables, in order to develop estimates of direct, indirect, and induced employment and GVA at different spatial levels during both the construction, operational, and decommissioning stages.

The assessment will also consider the potential implications of the Project for existing local industries, including tourism. This assessment will draw upon information and assessment provided by other assessment topics, including:

- Shipping and navigation (section 2.8);
- Seascape, landscape, and Visual (section 2.11); and
- Other sea users (section 2.12).

The spatial distribution of Project expenditure cannot be predicted with certainty at the assessment stage. This is because the outcome will be determined through competitive tendering processes, and because likely bidders for significant components of procurement expenditure are likely to be located both within and outside the various local, regional, and national study areas that are defined for the purpose of the assessment. To enable estimation of impacts on indicators such as employment and GVA, a number of scenarios will be developed with differing proportions of local and regional content for the major items of Project expenditure. At this stage it is envisaged that two scenarios will be developed, one covering the minimum realistic level of local and regional content (the 'Low' scenario) and another covering the maximum realistic level (the 'High' scenario). Specific assumptions regarding proportions of procurement expenditure benefiting local and regional suppliers under each scenario will be developed through discussion and exchange of information with the Project and their other advisers. A project-level technical report will be developed that sets out the assumptions used in the model and provides details of the results.

2.14.9.2 EIA Methodology

The socio-economics EIA will be undertaken in line with the methodology set out in section 1.4.2. In the case of the assessment of socio-economic impacts of offshore wind farms, there is no specific legislation that is specific to the topic. Marine Scotland is in the process of producing guidance on how to carry out socio-economic impact assessments for offshore renewables developments. However, this guidance is still in draft form and is not publicly available. The current recommendation from Marine Scotland is that assessments be informed by guidance developed by Professor John Glasson at the Impact Assessment Unit (IAU) of Oxford Brookes University in a document entitled *Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs)*.

Apart from the IAU document, other guidance documents that will be considered in relation to the socio-economics EIA will include those set out in Table 2-89. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 2-89 Other Guidance for Socio-economics

GUIDANCE	SUMMARY
HM Treasury, *The Green Book*, (2020)	The Green Book provides guidance on how the economic, financial, social, and environmental assessments of projects and programmes should be undertaken and combined.
Scottish Government, *Draft Advice on Net Economic Benefit and Planning* (2016)	Provides draft guidance intended to help developers capture the contribution of development proposals to the economy.
HCA/Homes England, *Additionality Guide, Fourth edition* (2014)	Provides guidance on the appropriate treatment of additionality factors including deadweight, displacement, leakage, substitution, and multiplier

GUIDANCE	SUMMARY
	effects in the quantification of the impacts of regeneration and development projects.

Any additional relevant guidance that becomes available during the course of the assessment will also be considered.

2.14.10 Scoping Questions

- Do you agree with the study areas defined?
- Are the identified data sources appropriate for the baseline characterisation of the local study area?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that all receptors and impacts have been identified for socio-economics?
- Do you agree that the impacts suggested can be scoped out of the EIA section?
- Which major energy or other infrastructure projects should be included as part of the cumulative impact assessment?
- Do you agree with scoping out transboundary impacts?
- Do you agree with the proposed approach assessment?

2.14.11 References

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3 ONSHORE CAITHNESS EIA SCOPING

Caithness is located on the north coast of Scotland. The Caithness onshore export cable corridor search area and onshore substation search area are located on the north coast of Caithness (Figure 3-1). There are potential export cable landfalls at Melvich, Dounrey, Cling Glang, and Crosskirk.. The Onshore Caithness EIA Scoping section of this report identifies the potential receptors of relevance, which have a potential to be impacted as a result of this Project. The baseline environment has been detailed for each receptor, which when considered alongside the embedded mitigation has been used to inform potential impacts and scope of the EIA.

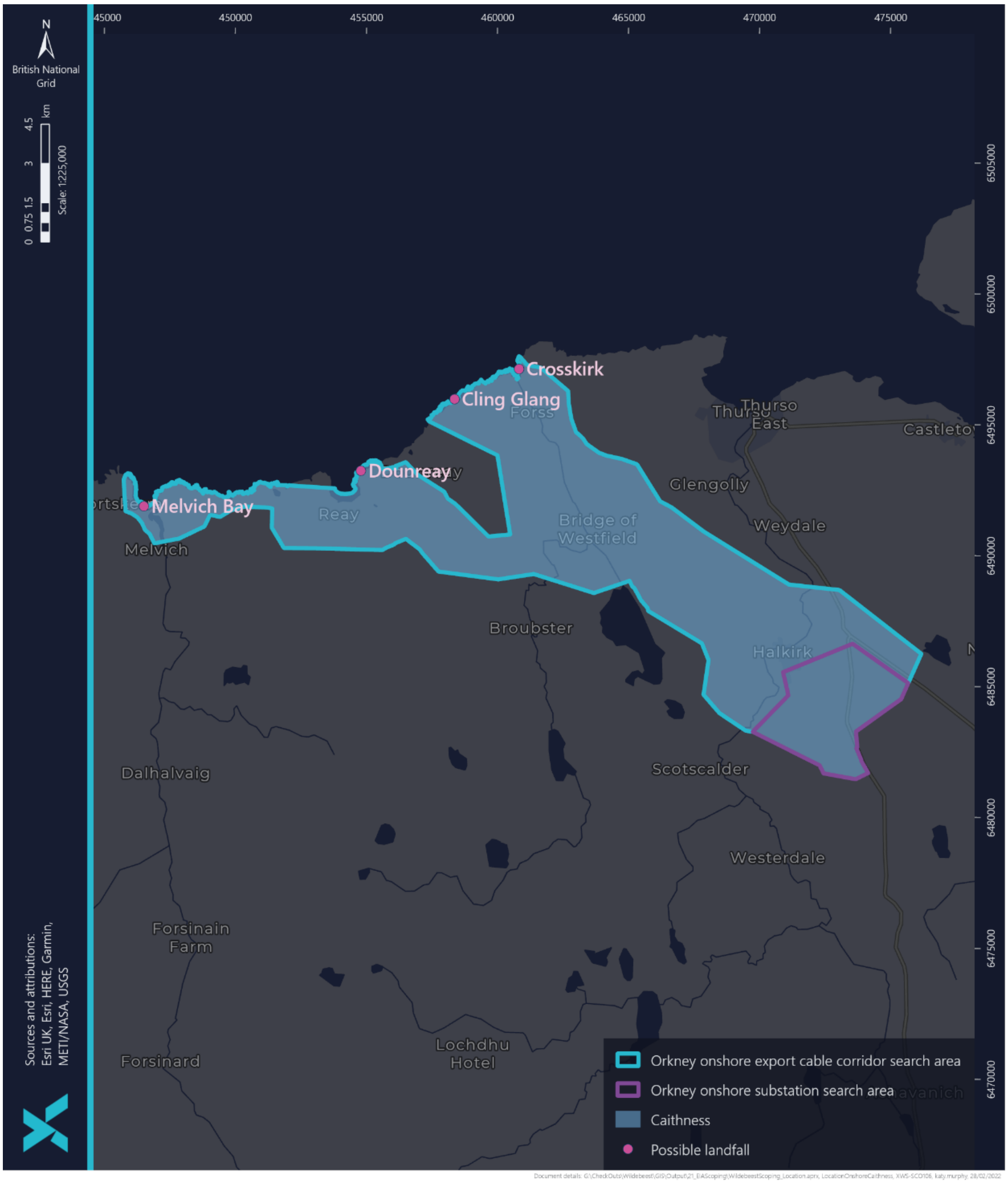

Figure 3-1 Onshore Caithness Scoping Boundary

3.1 Geology and Hydrology

3.1.1 Introduction

This section of the Scoping Report identifies the geology and hydrology receptors of relevance to the onshore aspects of the Project for the export cable corridor search area in Caithness and associated Spittal grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project.

Key issues of concern for hydrology include control of surface water and silty water, water crossings and any public and private water supply assets within the study area. For hydrogeology, matters of interest relate to groundwater-dependent wetland habitats and the potential for modifying groundwater flow paths. Geological concerns relate to the nature of soils and peatland within the study area, ground stability and the potential for contaminated land. Areas designated for aspects relating to geology and hydrology are also of importance.

Information that may be considered relevant to this section is also presented within the below sections:

- Land use and other users section 3.5; and
- Terrestrial non-avian ecology, section 3.3.

This section of the Scoping Report has been prepared by RSKW Ltd.

3.1.2 Study Area

The geology and hydrology study area is defined by four potential landfall areas at the following locations: Melvich Bay; Dounreay; Cling Glang north-east of Dounreay; and Crosskirk. From the landfalls, the onshore export cable corridor search area forms three main sub-sections. From the western landfall at Melvich Bay, the search area runs eastwards, parallel to the coast and extending inland to an area up to 2.5 km inland from the coastline. The A836 runs through part of the search area. After the potential landfall at Dounreay, the search area comes inland from the coast and forms a corridor around the minor road between Isauld and Newlands of Geise. The second sub-section includes the two landfalls at Cling Glang and Crosskirk, forming a corridor running roughly south-east from these locations to the minor road between Isauld and Newlands of Geise. The Forss Water is located within this area of search. The final sub-section extends south-east from the minor road mentioned above, where the first two sub-sections join. This sub-section forms a corridor inland to Halkirk and the railway line near Georgemas Junction. Part of the River Thurso is included in this sub-section.

The Caithness onshore substation search area lies between Halkirk and Spittal, covering an area approximately 5 km by 3.5 km in size. The A882 forms the north-eastern boundary to this search area.

Hydrological and hydrogeological considerations would be investigated for these search areas, plus for any areas located downstream of the search area boundary as some potential impacts can be transported downstream within the water body. For this assessment, hydrological and hydrogeological aspects would be considered as far downstream as the Caithness coast.

3.1.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 3-1.

Table 3-1 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Highland-wide Local Development Plan	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans	2012	THC
Caithness and Sutherland Local Development Plan	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan	2018	THC
GeoIndex Onshore: geological mapping	British Geological Survey online mapping portal	N/A	BGS
National Soil Map of Scotland	Scotland's Environment online portal	N/A	James Hutton Institute
Carbon and Peatland Map	Scotland's Environment online portal	2016	SNH (now NatureScot)
Coal Authority mining information portal	Coal Authority/British Geological Survey online mapping portal	N/A	Coal Authority
Water Environment and Water Classification Hubs	SEPA online portals	Various	SEPA
Flood Mapping	Scottish Environment Protection Agency online portal	Various	SEAPA
The Geology of Scotland	The Geological Society of London (publisher)	2004	N.H. Trewin
British Regional Geology: the Northern Highlands of Scotland	British Geological Survey (publisher)	1989	G.S. Johnstone and W. Mykura
Private Water Supply details	The Highland Council Environmental Health Department	N/A	THC Environmental Health Department
Contaminated Land Register	The Highland Council Environmental Health Department	N/A	THC Environmental Health Department

3.1.3.1 Project Site-Specific Surveys

No surveys have been undertaken to date. However, extensive desk-top studies were conducted as part of the site selection process to identify key onshore constraints. It is proposed that two types of survey are carried out, to gather relevant information regarding the search areas:

- A reconnaissance survey would be undertaken to gain an overview of the search areas and their immediate surroundings. This survey would involve visiting the search areas to gain site-specific information concerning particular elements of concern such as private or public water supply assets, surface water conditions at potential crossing locations, any areas of wetland habitat that has potential to be groundwater-dependent, any designated areas within the areas of search, and any areas where suspected contamination may be present; and
- A more detailed survey would be undertaken to gather site-specific data on peat depth. This survey would be restricted to areas where peat cover is present or suspected to be present, and would be focused around preferred cable corridor search areas to keep the survey effort to a reasonable level. It is anticipated that the peat survey would gather data on a 100 m grid across the proposed cable route corridors, with more focused data collection in areas required for additional infrastructure e.g. substation, construction compounds. The survey will be in line with the Scottish Government's Guidance on Developments on Peatland – Peatland Survey (2017).

3.1.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-1) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of geology and hydrology which are likely to require consideration within the EIA are:

- Bedrock and superficial geology;
- Soils including areas of peat;
- Mineral resources;
- Contaminated land;
- Groundwater quality and quantity;
- Groundwater-dependent terrestrial ecosystems (GWDTE);
- Surface water quality and quantity; and
- Designated sites.

3.1.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

The Caithness onshore export cable corridor search area and the Caithness onshore substation search area are located along and inland of the north coast of Scotland and is mainly relatively low lying. Much of the coastline is rocky, with cliffs of less than 100 m in height in the area near Melvich Bay. Inland, the countryside is rolling with small hills typically between 100 and 200 m in height. The general slope is northwards towards the coastline, with most drainage directed to the north.

The bedrock geology is dominated by sandstones and siltstones from the Old Red Sandstone Supergroup of Devonian age (BGS, 2021; Johnstone & Mykura, 1989; McCourt *et al.*, 1985; Michie *et al*., 1985; Trewin, 2004). These follow the coastline east from Melvich before extending inland from just east of Reay.

Inland of the coastal section between Reay and Melvich, the bedrock is characterised by migmatitic psammites and a number of igneous intrusions. The migmatitic psammites form part of the Moine Supergroup, one of the oldest rock formations in the UK and part of the Precambrian. The bedrock is formed from metamorphosed sandstones, siltstones and mudstones. Within the Moine rocks, the Strath Halladale granite intrusion is present at Melvich and inland of Reay. This is described as a biotite granite. The Reay Diorite is a smaller intrusion located around Reay and Sandside Bay.

The area is strongly cut by minor fault lines, mainly running north-east to south-west with a less frequent set running north-west to south-east.

The superficial geology is dominated by Quaternary deposits including diamicton till, glacial deposits and peat (BGS, 2021). Sand deposits are present along parts of the coastline and alluvial deposits, consisting of mud, silt and sand, are present along some river valleys.

The peat is mainly located in the western part of the search area, between Melvich and Westfield. The coastal section includes hummocky glacial deposits of sand, gravel and boulders, with more diamicton till present in the part of the study area lying east from Reay. Diamicton till is a highly heterogeneous deposit consisting of mixed clay, silt, sand, gravel and boulders deposited by glaciers and frequently forms a blanket over the bedrock.

The National Soil Map of Scotland (Scotland's Soils, 2021) identifies the main soil types as mineral gleys, peaty podzols, peat and brown soils. Mineral gleys cover a large section of the study area and are noncalcareous, occurring across the undulating landscape from Dounreay inland to Spittal and beyond. Peat is indicated to be present in the western part of the search area, between Melvich and Dounreay. A small additional area of peat is indicated south-west of Westfield and a third area south of Halkirk within the substation area of search. The Carbon and Peatland map (Scotland's Soils, 2016) indicates that the majority of the eastern search area, from Cling Glang and Crosskirk inland to Halkirk and Spittal, is underlain by mineral soils (Class 0 soils). Two small areas of Class 1 peatland are present, one south of Halkirk and one south-west of Westfield. These correspond with the mapped areas of peat. The western search area includes some larger extents of Class 1 and also some Class 2 peatland. Both Classes 1 and 2 are considered to be peatland of national importance by NatureScot.

The Old Red Sandstone bedrock is classed as a moderately productive aquifer with flow mainly within fractures and other discontinuities. The Moine and igneous bedrock are both classed as low productivity aquifers with limited amounts of groundwater in near-surface weathered zones and secondary fractures (Scottish Government, 2021).

The superficial deposits are likely to hold variable amounts of groundwater, with deposits such as blown sand and alluvium potentially forming locally important aquifers. Groundwater storage within till and glacial deposits can be highly variable owing to the variation in clay content. Groundwater can form an important resource for private water supplies even in areas where groundwater is relatively limited in quantity.

The search areas lie across a number of main watercourse catchment areas. From the western side, these are the Halladale River, the Sandside Burn, the Reay Burn, the Achvarasdal Burn, the Forss Water and the River Thurso. The two catchment areas containing the largest proportion of the search areas are the Forss Water and the River Thurso.

SEPA's water environment hub (SEPA, 2021) identifies key details in relation to these waterbodies. Details are provided in Table 5-2.

Table 3-2 Water Quality Details for the Main Search Area Waterbodies

WATERBODY NAME & ID	STATUS	IDENTIFIED PRESSURES
20614 Halladale River	Overall: Moderate Water flows and levels: High Water Quality: High	N/A
20622 Sandside Burn	Overall: Good Water flows and levels: High Water Quality: Good	N/A
20623 Achvarasdal Burn	Overall: Good Water flows and levels: High Water Quality: Good	N/A
20624 Dounreay Burn	Overall: Good Water flows and levels: High Water Quality: Good	N/A
20633 Furs Water – Allt Forsiescye to sea	Overall: Good Water flows and levels: High Water Quality: High	N/A
20637 River Thurso – Loch More to sea	Overall: Good Water flows and levels: High Water Quality: Good	N/A
200224 Strathy Point to Dunnet Head	Overall: Good Water Quality: Good	N/A

There are a number of designated sites within the search area plus others that are located nearby; these are listed in Table 5-3 (SiteLink, 2021). The main designations are SAC and SSSI. The table also includes GCR sites; this is a non-statutory designation for sites of geological interest. Many GCR sites are also designated as SSSI.

Table 3-3 Designated Areas with Relevance to Geology and Hydrology

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
River Thurso SAC, SSSI	Flood-plain fen, vascular plant assemblage	Within search area
Westfield Bridge SSSI	Fen meadow, lowland calcareous grassland	Within search area
Sandside Bay SSSI	Sand dunes	Within search area
Ushat Head SSSI	Maritime cliff	Within search area
Red Point Coast SSSI including Drumhollistan GCR and Red Point GCR	Maritime cliff, non-marine Devonian, Quaternary of Scotland	Within search area
Loch Leiurary SSSI	Basin fen	Within search area
Newlands of Geise Mire SSSI	Valley fen	2.4 km
Caithness and Sutherland Peatlands SAC **East Halladale SSSI**	Blanket bog	Adjacent
Broubster Leans SAC	Transition mires and quaking bogs	0.3 km
Sgeir Ruadh GCR	Moine	Within search area
Achanarras Quarry	Non-marine Devonian	Adjacent
Banniskirk Quarry	Silurian-Devonian Chordata	Adjacent

There are a number of active quarries, primarily for sandstone as building stone or aggregate, within the search area. These are listed below in Table 5-4.

Table 3-4 Active Quarries within the Search Area

SITE/MATERIAL	DISTANCE FROM STUDY AREA
Lieurary Quarry – sandstone	Within study area

SITE/MATERIAL	DISTANCE FROM STUDY AREA
Bower Quarry – sandstone	1.8 km
Cregan Loiste Quarry – igneous	Within study area
Kirkton Farm Gravel Pit – sand and gravel	1.4 km
Braehour Peat Workings – peat	4.2 km
Spittal Mains Quarry – sandstone	0.5 km
Spittal Quarries – sandstone	1.5 km

There is no historic or active mining in the search area or within 2 km of the scoping boundary (BGS, 2021; Coal Authority, 2021).

With regards to contaminated land in the study area, there are several sites of which to be aware. Key locations are the Dounreay NDPE and associated Vulcan NRTE near Dounreay. Other sites which may be of relevance are disused quarries and historic and current landfill sites.

3.1.4.2 Summary and Key Issues

Table 3-5 Summary and Key issues for Geology and Hydrology

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND CAITHNESS ONSHORE SUBSTATION SEARCH AREA
	• Old Red Sandstone bedrock; • Class 1 Peatland; • Moderately productive aquifer with potential for private water supply abstractions; • Sensitive watercourses and waterbodies; • Dounreay NPDE and Vulcan NRTE; • Other potential contaminated land areas including quarries and landfill sites; and • Various designations for geological and hydrological reasons.

3.1.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-6..

Table 3-6 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Avoidance of sensitive areas (peatland, potential groundwater-dependent terrestrial ecosystems, designated areas)	Primary	Established within the design principles and secured within the Section 36 and/or planning application
2	Minimisation of watercourse crossings	Primary	Established within the design principles and secured within the Section 36 and/or planning application
3	Avoidance of cable routes parallel to watercourses for distances greater than 500 m	Primary	Established within the design principles and secured within the Section 36 and/or planning application
4	Avoidance of suspected areas of land contamination	Primary	Established within the design principles and secured within the Section 36 and/or planning application
5	Control of diffuse pollution	Primary	Utilisation of best practice sediment management techniques
6	Control of point-source pollution	Primary	Employment of best practice pollution prevention techniques
7	Production of a Construction Environmental Management Plan (CEMP), which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on geology and hydrology and will be consulted upon with consultees throughout the EIA process.

3.1.6 Scoping of Impacts

A number of potential impacts on the geology and hydrology key receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness.

Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received 10/02/2021). None of the potential impacts are proposed to be scoped out of the assessment at this stage, as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 3-7 EIA Scoping Assessment for Geology and Hydrology

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Changes to soil quality	1, 4, 5, 6, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on sensitive soils. Without careful handling these could be long-term or permanent.	Desktop study and site survey.	Desktop assessment using existing soils datasets, updated by site-specific survey data to identify higher sensitivity areas.
Soil compaction and erosion	1, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on sensitive soils. Without careful handling these could be long-term or permanent.	Desktop study and site survey.	Desktop assessment using existing soils datasets, updated by site-specific survey data to identify higher sensitivity areas.
Groundwater flow, levels and quality	2, 5, 6, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on shallow groundwater. These would be expected to be permanent.	Desktop study and site survey.	Desktop assessment using existing geology and hydrogeology datasets, updated by site-specific survey data.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Contamination of surface watercourses or waterbodies	2, 3, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on surface waterbodies. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using existing surface water quality details, updated by site-specific survey data.
Changes to surface water runoff	2, 3, 5, 6, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on surface water runoff patterns. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using existing surface water catchment statistics, updated using proposed construction and decommissioning details.
Changes in flow and/or contamination of private water supplies	2, 3, 4, 5, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on flow and contamination of private water supply sources. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using existing private water supply data, followed by a location-specific risk assessment process for each supply source.
Risk of flooding to the development and	2, 5, 7	Scoped In	The construction and decommissioning of works within	Desktop study and site survey.	Desktop assessment using available flood risk datasets

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
increased risk of flooding in areas downstream			the coastal zone will be at risk of flooding. The construction and decommissioning of the Project have potential to increase flood risk to areas adjacent to and downstream of the Project. These could be temporary or permanent depending on the situation.		and existing surface water catchment statistics, updated using proposed construction and decommissioning details.
Operation and Maintenance					
Changes to soil and groundwater quality	1, 5, 6	Scoped In	The operation and maintenance of the Project has potential to create significant effects on soils and shallow groundwater. These could be temporary or permanent.	Desktop study and site survey.	Desktop assessment using existing soils, geology and hydrogeology datasets and proposed operation methods, including pollution prevention planning, updated by site-specific survey data.
Contamination of surface watercourses or waterbodies	2, 3, 5, 6	Scoped In	The operation and maintenance of the Project has potential to create significant effects on surface waterbodies. These could be temporary or permanent.	Desktop study and site survey.	Desktop assessment using existing surface water quality datasets and proposed operation methods, including pollution prevention

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
					planning, updated by site-specific survey data.
Contamination of private water supplies	2, 3, 5, 6	Scoped In	The operation and maintenance of the Project has potential to create significant effects on private water supplies. These could be temporary or permanent.	Desktop study and site survey.	Desktop assessment using existing private water supply datasets and proposed operation methods, including pollution prevention planning, updated by site-specific survey data.

3.1.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on geology and hydrology receptors. For example, onshore wind projects and associated transmission infrastructure. Potential impacts on soils and geology are usually localised in nature and rarely result in cumulative effects; however, impacts on hydrology and hydrogeology may be transmitted downstream for longer distances and therefore need to be considered for any other developments within the same hydrological catchment areas. These relate particularly to water flow variations, including increased flood risk downstream, and to water pollution including potential sediment release from construction works.

The geology and hydrology CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2. The geology and hydrology risk assessment will include consideration of potential cumulative effects resulting from the Project in parallel with other existing and/or approved development.

3.1.8 Approach to Analysis and Assessment

3.1.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on geology and hydrology will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. It is anticipated that consultees will include:

- THC;
- SEPA;
- NatureScot; and
- Scottish Water.

The Project has already undertaken some initial consultation on the geology and hydrology issues associated with the Project including THC and NatureScot.

Gathering of site-specific data will form a key part of the assessment. Data collected will include:

- Measurement of peat and soil depths, to inform the design process as a constraint and to underpin any requirement for peat volume calculations for a peat management plan (PMP);
- Identification of any springs or seepages that may contribute to the presence of GWDTE within the search areas;
- Ground-truthing locations of private water supply source locations, if relevant, so that they can be fully considered in the cable route design process; and
- Ground-truthing any areas identified as potentially contaminated so that an appropriate level of risk assessment can be undertaken with regard to these areas.

The geology and hydrology assessment will be based on what is considered to be the maximum design scenario for each element of the Onshore Project from the project design envelope. This ensures that the assessment will cover the worst-case scenario and therefore the highest magnitude impact if more than one design option requires consideration. The assessment will consider direct effects i.e. effects that are made directly to a receptor, such as the effects of excavation on soils, and indirect effects i.e. effects that arise as a result of a change made to a different receptor, such as a change in water flow to a private water supply resulting from changes to groundwater flow paths from excavation works. The assessment will mainly be qualitative in nature, as the majority of the potential impacts are not readily quantifiable.

3.1.8.2 EIA Methodology

The geology and hydrology EIA will be undertaken in line with the methodology set out in Section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-8 will also be considered in relation to the geology and hydrology EIA. Consideration will be given to all relevant planning guidance at all levels with respect to geological and hydrological regulation. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 3-8 Legislation and Guidance for Geology and Hydrology

LEGISLATION / GUIDANCE	SUMMARY
The Environmental Protection Act 1990 (as amended)	Establishes businesses legal responsibly for a duty of care of waste, contaminated land and statutory nuisances.
SEPA's Position Statement WAT-PS-10-01: Assigning Groundwater Assessment Criteria for Pollutant Inputs (2014)	Describes how the prevent and limit requirements of Directive 2000/60/EC (the Water Framework Directive or 'WFD') should be applied to assess potentially polluting high risk point sources inputs of pollutants into groundwater where a quantitative assessment is being carried out.
The Water Environment and Water Services (Scotland) Act 2003	The Act sets out arrangements for the protection of the water environment and changes how new connections to the public water and sewerage infrastructure are to be funded.
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended	Apply regulatory controls over activities which may affect Scotland's water environment
The Pollution Prevention and Control (Scotland) Regulations 2012	Implement the requirements of the Industrial Emissions Directive (IED).
The Water Environment (Oil Storage) (Scotland) Regulations 2006	Outlines the regulatory requirements for the storage of oil.
The Contaminated Land (Scotland) Regulations 2005	Amends Part IIA of the Environmental Protection Act 1990("the 1990 Act"), which was inserted by section 57 of the Environment Act 1995. It also makes amendments to the Contaminated Land (Scotland) Regulations 2000 ("the 2000 Regulations").

LEGISLATION / GUIDANCE	SUMMARY
Scottish Government's Planning Advice Note 51: planning, environmental protection and regulation (2006)	Supports the existing policy on the role of the planning system in relation to the environmental protection regimes.
SEPA's GPPs, with particular reference to: • **GPP 1: Understanding your environmental responsibilities – good environmental practices;** • **GPP 5: Works and maintenance in or near water;** • **PPG 6: Working at construction and demolition sites;** • **GPP 13: Vehicle washing and cleaning;** • **GPP 21: Pollution incident response planning;** • **GPP 22: Dealing with spills.**	GPPs provide environmental good practice guidance.
SEPA's Developments on Peat and Off-Site Uses of Waste Peat (2017)	Provides guidance on the hierarchy of management options for excavated peat.
Scottish Government's Guidance on Developments on Peatland – Peatland Survey (2017)	Provides guidance on sampling methodology for peat surveys and how to report these findings.
SEPA's Technical Flood Risk Guidance for Stakeholders – SEPA Requirements for undertaking a Flood Risk Assessment (2019)	Outlines the submission requirements for SEPA to undertake a Flood Risk Assessment.

3.1.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment? Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Does the Local Authority hold any records for private water supplies within 1 km of the search area boundary?
- Does the Local Authority hold any records of potentially contaminated land, such as landfill sites, within 1 km of the search area boundary?
- Do you agree that all receptors and impacts have been identified?
- Do you agree with the proposed approach assessment?
- Is the proposed consideration of peat acceptable?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects on hydrology and geology?

3.1.10 References

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3.2 Freshwater Ecology

3.2.1 Introduction

This section of the Scoping Report identifies the freshwater ecology receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and associated Caithness onshore substation search area, and considers the potential impacts from the construction, operation, maintenance and decommissioning of the proposed Project.

The main potential issues of interest relate to the freshwater stages of Atlantic salmon, and anadromous variants of the brown trout known widely as sea trout. This includes protection of the fish species and their habitats. The key life history stages are:

- Freshwater return adult migrations;
- Reproductive behaviours including spawning and incubation;
- Recruitment of young fish to older cohorts; and
- Juvenile migration downriver and access to the sea.

Seaward return of surviving adult salmonids (known as kelts) following spawning will also be considered.

Additional fish species of relevance include the European eel, and the three species of native lamprey – brook, river, and sea. Freshwater Pearl Mussel (FPM) are also relevant and will be assessed.

It should be noted that all channels are potentially subject to the requirements of the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act, 2003, irrespective of whether they are located within a protected area. This Act is commonly referred to as the Salmon Act. This provides additional protection to certain fish species and their habitats outside of the standard legal protections described in elsewhere in section 3.

Information that may be considered relevant to this section is presented within the below sections:

- Geology and hydrology, section 3.1;
- Non-avian ecology, section 3.3; and
- Land-use and other users, section 3.53.4.

This section of the Scoping Report has been prepared by Caledonian Conservation Ltd.

3.2.2 Study Area

A total of 27 named channels are found within the Project area. The freshwater ecology study area is defined by the onshore Project EIA scoping boundary, including the proposed landfall points (Melvich, Dounreay, Cling Glang and Crosskirk), the onshore export cable corridor search area and the substation search area around Spittal. The potential links between these nodes covers a substantial area and a number of possible river crossing points. It is expected that as the Project progresses these crossing points will be refined.

3.2.3 Data Sources to Inform the EIA Baseline Characterisation

The relevant existing data sets and literature to inform the baseline characterisation for the EIA are outlined in Table 3-9.

These sources relate to the potential for migratory fish to access relevant channels and the observed fish density of certain species; the presence of protected areas; and the WFD status classifications of Water Bodies (WBs) which may be impacted by the Project. Information on all relevant species is not available as data for non-salmonid fish species are not presented within the National Electrofishing Programme for Scotland (NEPS) Shiny app.

Table 3-9 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Barriers to fish migration	MSS mapping portal, NMPI	N/A	SEPA
Sitelink	NatureScot	N/A	NatureScot
WFD Status assessments	Water Environment Hub	N/A	SEPA
NEPS Survey Overview	MSS Shiny App R	2019 (data year)	MSS
Salmon distribution map	MSS mapping portal, NMPI	N/A	MSS

3.2.3.1 Site-Specific Surveys

No surveys have been carried out at this point. It is proposed that the following surveys are carried out to inform on freshwater ecological quality and mitigation as part of the planning process:

- Remote and mapping data to be assessed as part of a desk-based assessment to determine potential areas of risk for fish and FPM populations. This will utilise characteristics such as observed presence of deposition features, channel slope, catchment position, channel typology, channel reference typology, and overall catchment form to assess the potential presence of key fish habitats and FPM within the Project area. There is no standard methodology for this approach for river channel assessment.
- A rapid reconnaissance walkover of all channels identified within the desk-based assessment to obtain information on spawning habitats for salmonids and lamprey, and on FPM habitat. The latter should record habitats as per the G1-G3 standards as used in Cooksley *et al.*, 2011. This survey will aim to be carried out prior to June to ensure riparian and channel vegetation does not obscure critical features to be recorded.
- Once sensitive areas have been identified, in-detail habitat assessment and FPM surveys will be carried out at each crossing location irrespective of channel size. The survey extents will correspond to NatureScot's "*Freshwater Pearl Mussel Survey Protocol – for use in site specific projects*" (NatureScot, 2021), with that method being used to assess FPM risk. A complete fish habitat inventory over the same extent will also be carried out, broadly conforming to the "Hendry & Cragg-Hine" (Environment Agency, 1997) method. This approach will be adapted to ensure relevance to current standards and approaches (e.g., not recording large woody debris as a

barrier, description of habitat form as opposed to unvalidated habitat uses and using digital data and mapping methods).

3.2.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-9) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

3.2.4.1 CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

There are several WBs within the study area as determined and used by SEPA for regulatory purposes (Water Framework Directive WFD) (see Table 3-10); however, it should be noted that not all channels capable of hosting key species and their habitats are assessed under WFD in Scotland, with only those over 11ha catchment size receiving a designation.

Table 3-10 SEPA Water Bodies and Current Overall Conditions Status within the Study Area

WBID	NAME	STATUS
20614	Halladale D/S Forsinian Burn	Moderate
20622	Sandside Burn	Good
20623	Achvarasdal Burn	Good
20624	Dounreay Burn	Good
20633	Forss Water – Allt Forsiescye	Good
20637	Thurso – Loch More to sea	Good
20642	Halkirk Burn	Moderate

With the exceptions of WBIDs 20614 (Halladale D/S Forsinian Burn) and 20642 (Halkirk Burn), all WBs are listed at Good Overall Status, supporting the view of functionally intact river ecosystems with sufficient quality to sustain quality river biotic communities over the long term. Of those not listed as Good, 20614 is reduced due to Physical Condition, which suggests in-stream habitat quality may be reduced and/or not resilient to extreme events such as drought or flood, and 20642, which is similarly downgraded for Physical Condition and also a reduced ecological quality based on "impacted" fish communities. No further information or cause is provided

Both the WFD data and a review of the SEPA barriers database, available on the MSS map portal NMPi (Marine Scotland Science, 2021a) demonstrate an absence of significant in-channel barriers within the Project search area. Only one natural barrier was identified, on the Allt Achadh an Gaodha immediately due west of Sandside Bay. This is an impassable barrier and will prevent access by salmon, trout, and lampreys, as well as potentially constraining access by eel. All other channels within the footprint will permit access to migratory salmonids and other diadromous fish.

A review of the most recent available regional NEPS data from 2019 (Marine Scotland Science, 2021b) shows widespread salmon access across the search area. This data, which is divided between Northern and Caithness DSFBs, shows the presence of both fry (salmon hatched in the year in question, also called 0+ fish) and parr (juvenile fish hatched prior to the year in question, >0+ fish). This indicates that local rivers are regularly supporting spawning by salmon. The picture with respect to trout is less clear; however, both species use broadly the same habitats and presence of one usually supports the conclusion that habitat is available for both species. The distribution of salmon juveniles recorded in 2019 is shown in Figure 3-2 and Figure 3-3, while trout juvenile distribution is shown in Figure 3-4 and Figure 3-5.

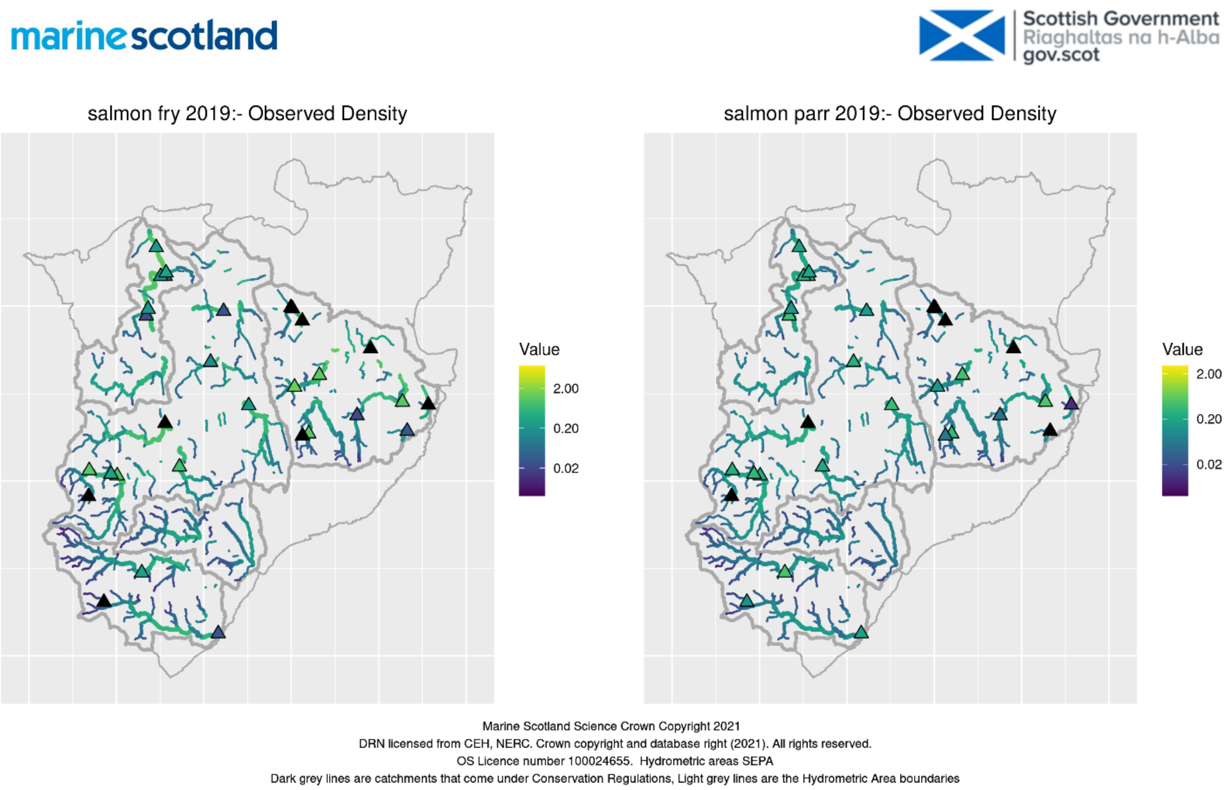

Figure 3-2 Screenshot from NEPS Shiny App, Caithness District Juvenile Salmon Distribution, 2019

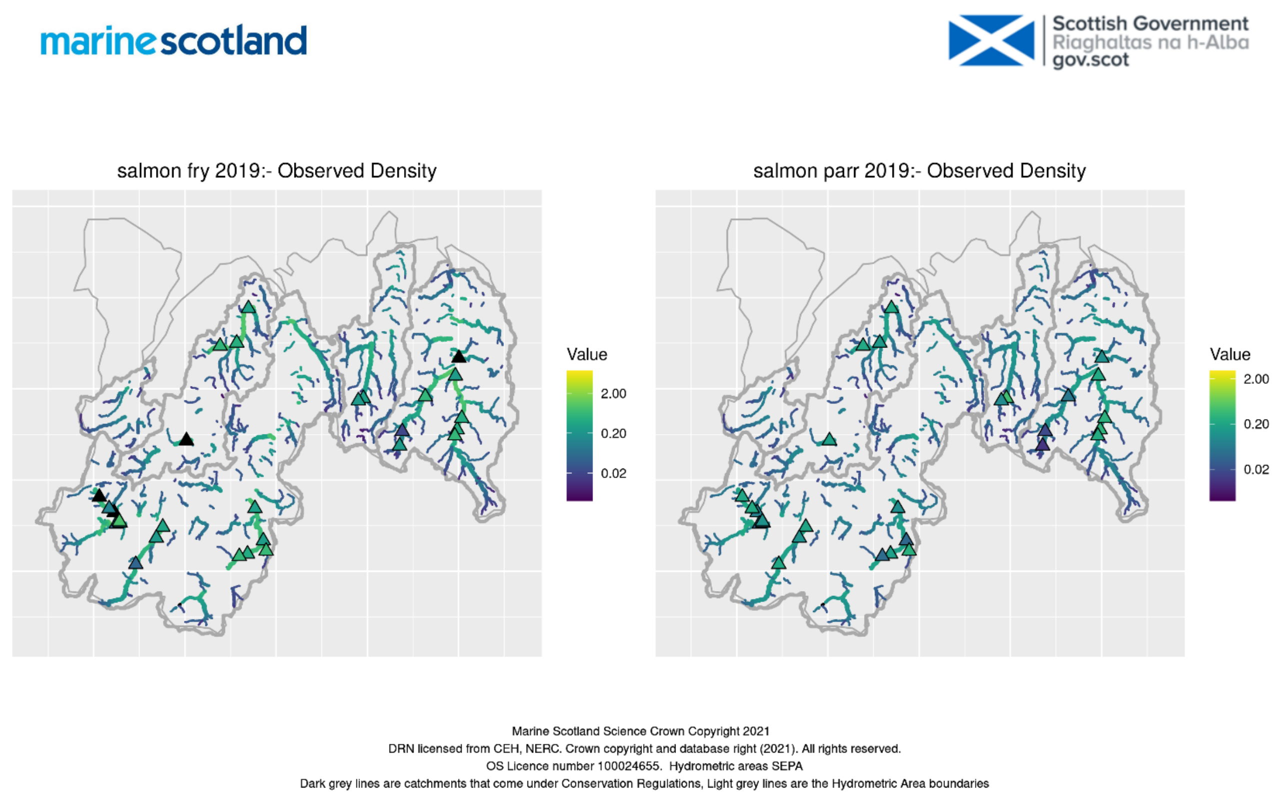

Figure 3-3 Screenshot from NEPS Shiny App, Northern District Juvenile Salmon Distribution, 2019

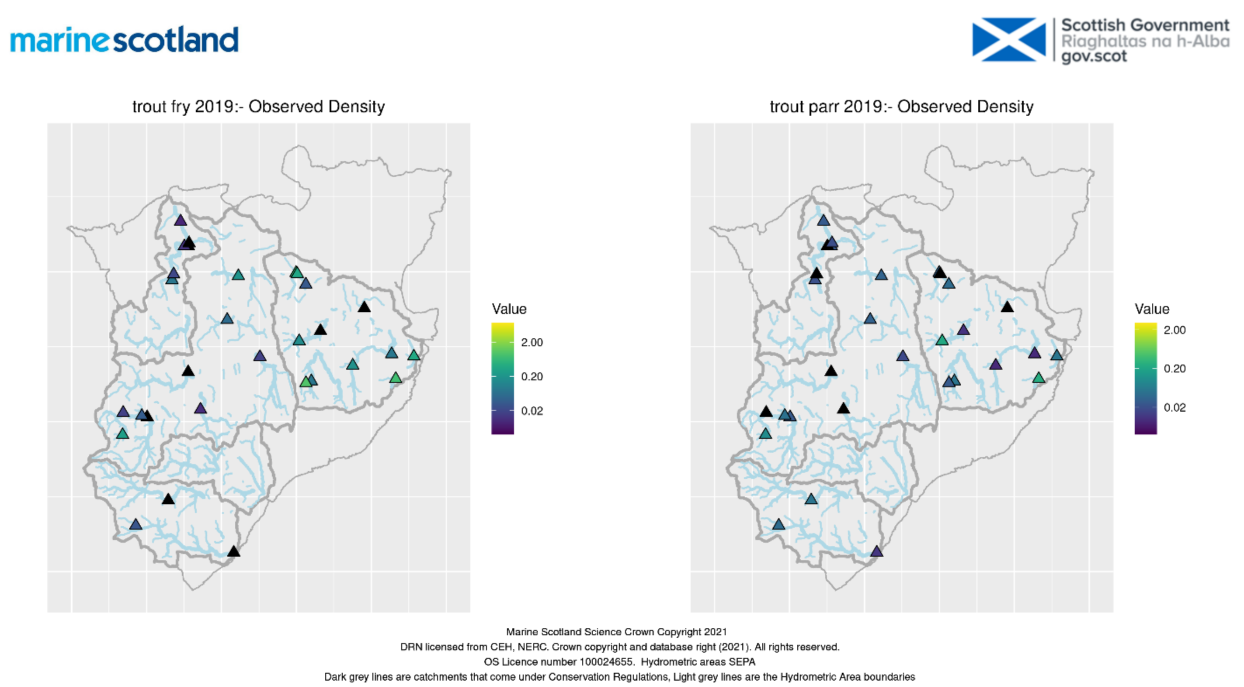

Figure 3-4 Screenshot from NEPS Shiny App, Caithness District Juvenile Trout Distribution, 2019

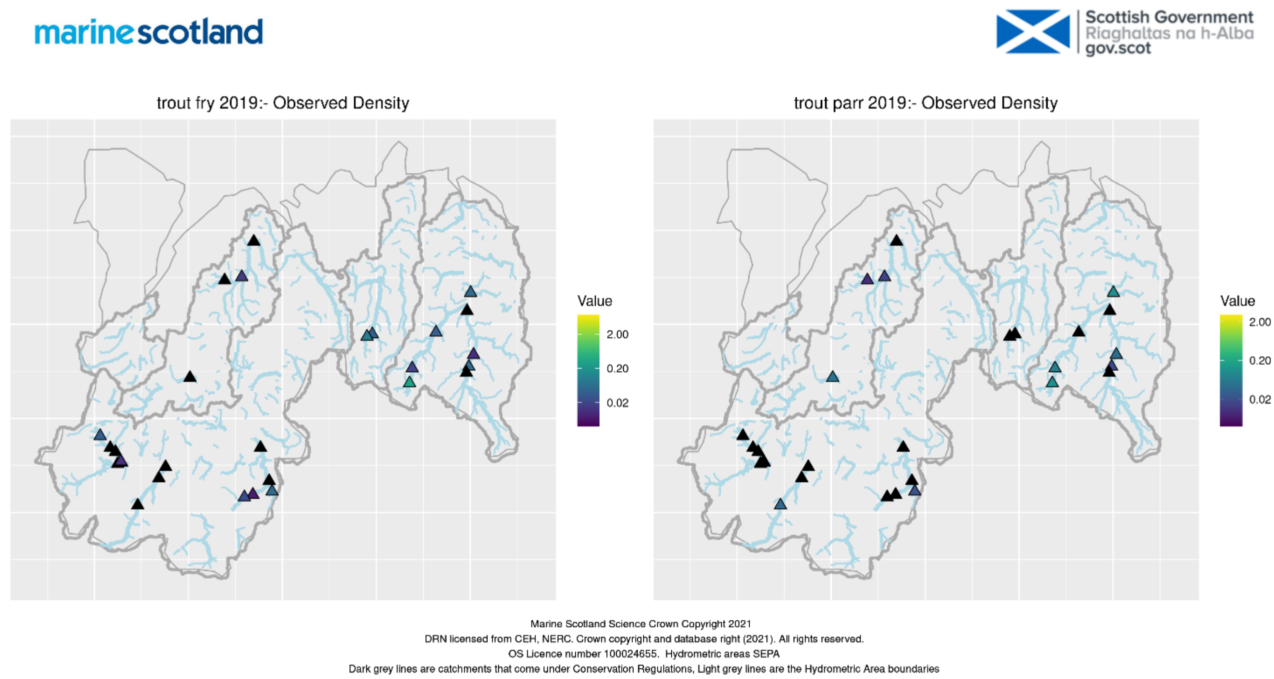

Figure 3-5 Screenshot from NEPS Shiny App, Northern District Juvenile Trout Distribution, 2019

It should be noted that the data presented in Figures 3-1 to 3-4 are based on a randomized sample design with a small number of fixed sites (surveyed every year), along with additional sites as a changing set (each set is referred to as a panel) making up the remaining yearly surveys. Therefore, spatial coverage is not total. These data do however show the widespread presence of salmon and trout juveniles throughout the search area, albeit with highly variable density. This view is supported by additional information provided on the Salmon Map (MSS 2022) showing salmon presence in rivers not covered by NEPS in 2019, including around Reay.

Relevant protected areas are present within the search area based on NatureScot's Sitelink. Thurso SAC, which is designated for Atlantic salmon is present within the eastern portion of the study area. The SAC is currently assessed at *Unfavourable Recovering* condition with overgrazing and forestry as causal pressures. A map of this SAC is shown in Figure 3-6.

Other fish species of importance are European eel and lamprey. European eel receive no formal legal protective status in Scotland; however, they are listed as Critically Endangered (Jacoby & Gollock, 2014). An eel management plan has been produced for Scotland (DEFRA, 2010); however, recent information on their distribution and abundance in Scotland is not freely available. In the absence of further information and, critically, extensive barriers within rivers, the presence of eel should be assumed.

Three species of lamprey are potentially found within the study area. Brook lamprey and river lamprey (*Lampetra* spp.) are related lamprey species commonly found in Scotland. Brook lamprey complete their entire life cycle within freshwater while river lamprey migrates to coastal areas, parasitising marine fish before returning to local rivers to spawn. The sea lamprey (*Petromyzon marinus*) is a much larger fish but displays a similar life history to river lamprey. Although none of these species hold specific protected status other than restrictions on their method of capture (Schedule 3 Conservation (Natural Habitats, &c.) Regulations 1994) (as amended), they can form the basis of protected area designations elsewhere in Scotland.

FPM are a bivalve mollusc listed as Endangered on a Global scale and Critically Endangered in Europe (Moorkens 2011) and exploitation of the species is banned within the UK. Despite Scotland being a stronghold for the species (Langan *et al.*, 2007), this decline has occurred here. Subsequently, it receives protection as a Schedule 5 species within the Wildlife and Countryside Act 1981 (as amended). Due to the risks of wildlife crime, public records of their presence are not available and if there is a risk that a development could impact on the species a survey is required. FPM are present in the region (Cosgrove *et al.*, 2016).

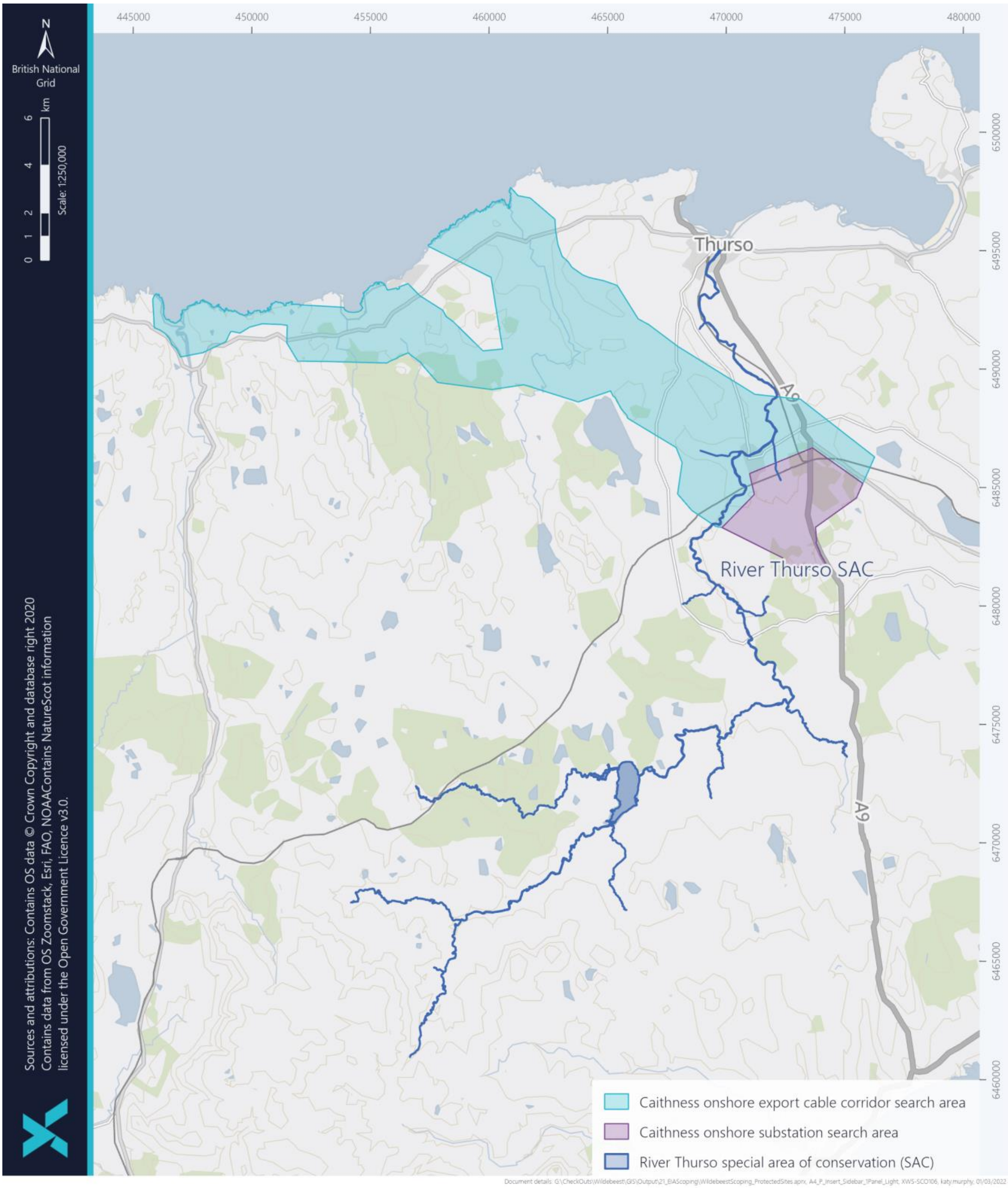

Figure 3-6 Location of the River Thurso SAC

3.2.4.2 Summary and Key Issues

Key issues regarding freshwater ecology within the study area for Caithness are listed in Table 3-11.

Table 3-11 Summary and Key Issues for Freshwater Ecology

	PROJECT COMPONENT
SUMMARY AND KEY ISSUES	CAITHNESS EXPORT CABLE CORRIDOR SEARCH AREA AND ONSHORE SUBSTATION SEARCH AREA
	• Atlantic salmon and sea trout as protected within the Salmon Act and the Thurso SAC; • FPM; • Eel (acknowledging that presence has been assumed due to lack of data) and lampreys; • The habitats of these species; and • Access to those habitats.

3.2.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the freshwater environment. These measures will follow best practice and are outlined within Table 3-12. At this early stage many of these measures should be considered generic and can be refined as more detail becomes available.

Table 3-12 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Protect local salmonid spawning and incubation through avoidance of sensitive areas and timings where appropriate.	Primary	Establish within design and secured within CAR licensing and planning application
2	Protect wider scale salmonid spawning and incubation through no in-channel working between October to May where appropriate.	Primary	Establish within work programme and secured within CAR licensing and planning application
3	Protect salmonid spawning and incubation through no trial pitting or borehole drilling within 10m of bankside between October to May where appropriate.	Primary	Establish within work programme and secured within CAR licensing and planning application

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
4	Avoid crossing locations with confirmed FPM presence.	Primary	Establish at design or with subsequent variation in route and secure within planning application
5	Sustain passage of fish through site during works at crossing locations where appropriate.	Primary	Establish at design and secure within planning conditions
6	No post construction channel barriers.	Primary	Establish at design and secure within planning conditions and CAR licensing
7	Prevent fish and FPM mortality with rescues at all working areas within channels where appropriate.	Primary	Establish within work programme and secure within CAR licensing and planning conditions
8	Return location to pre-construction state.	Primary	Establish at design and work programming and secure with CAR licensing and planning conditions
9	Determine site pollution control using WAT-SG-74 (SEPA 2018) and GPP-22 (SEPA 2011).	Primary	Establish within work programme and secure within CAR licensing and planning conditions
10	Ensure appropriately qualified EcoW presence at sensitive locations and/or sensitive periods where appropriate.	Primary	Establish within work programme and secure within CAR licensing and planning conditions
11	Create and implement AMP including controls, to quantify a baseline ecological standard. This should use standard family level benthic macroinvertebrate surveys, yearly fully quantitative electrofishing surveys and post construction walkovers. The scope of the monitoring programme should be proportional to the size of the scheme.	Primary	Establish within work programme and secure within CAR licensing and planning conditions

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on freshwater ecology and will be consulted upon with consultees throughout the EIA process.

3.2.6 Scoping of Impacts

A number of potential impacts on freshwater ecology receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. This list presented below in Table 3-13 is likely to be refined once more detailed information on the export cable corridors and receptor risk is gathered through advancing design and survey phases. None of the potential impacts are proposed to be scoped out at this stage as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 3-13 EIA Scoping Assessment for Freshwater Ecology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Mortality of important receptors	1, 2, 3, 4, 7, 8, 10, 11	Scoped In	Construction and decommissioning works have the potential to cause injury or death to aquatic biota (salmon, trout, eel, lamprey and FPM) through physical damage, drying and contamination.	Desktop study and Project site specific surveys and assessments.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys.
Damage to key freshwater habitats	5, 8, 10 ,11	Scoped In	Through changing site hydrodynamics, construction and decommissioning works have to potential to alter local habitats and prevent a return to pre-works habitat process regimes.	Desktop study and Project site specific surveys and assessments.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys, review of draft design by ecology team.
Interruptions to fish passage	1, 2, 3, 5, 10, 11	Scoped In	Construction and decommissioning works have the potential to prevent upstream and downstream migration of fish.	Desktop study, Project site specific surveys and assessments, method statement review, regulator discussion	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys, creation of seasonal sensitivity table, review of draft method statement by ecology team.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Operation and Maintenance					
Mortality of important receptors	8, 11	Scoped In	The operation and maintenance phase has the potential to cause chronic pressures such as external sediment access and channel instability, which has the potential to cause injury or death to aquatic biota (salmon, trout, eel, lamprey and FPM).	Desktop study, Project site specific surveys and assessments, design review, AMP, regulator discussion	Desktop assessment using available online assets, discussion with regulators and site surveys, AMP, review of design by ecology team
Damage to key freshwater habitats	8, 11	Scoped In	Through changing site hydrodynamics, the operation and maintenance works have to potential to alter local habitats and prevent a return to pre-works habitat process regimes and ecological quality.	Desktop study and Project site specific surveys and assessments, design review, AMP, regulator discussion.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys, review of draft design by ecology team.
Interruptions to fish passage	6, 8, 11	Scoped In	The final site state has the potential to prevent upstream and downstream migration of fish.	Desktop study, Project site specific surveys and assessments, design review, AMP, regulator discussion	Desktop assessment using site surveys, AMP, review of design by ecology team

3.2.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on freshwater ecology receptors for example transmission infrastructure associated with onshore windfarms. Potential impacts on river biota are normally local; however, through transmission of pressures downstream by flows there is the possibility of widespread impact at the reach and river scale. Serious pressure can result in the loss of an entire year class of fish with subsequent loss or reduction in adult returns (for salmonids and lamprey) and juveniles (eel) in subsequent years, and changes to regional abundance. Any impacts on FPM may be severe due to their very old ages, conservation status, and limited recruitment potential.

The freshwater ecology Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2. The freshwater ecology assessment will include assessment of the combined potential cumulative effects from this Project along with other current or approved schemes.

3.2.8 Approach to Analysis and Assessment

3.2.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on freshwater ecology will utilise Project-specific and publicly available data (see section 3.2.3) and will be augmented by consultation during the EIA phase. Consultees should include:

- Northern DSFB;
- Caithness DSFB;
- THC;
- SEPA; and
- NatureScot.

OWPL has already undertaken some initial consultation on onshore ecology issues, including freshwater ecology, associated with the Project including THC and NatureScot.

The following approach to data collection will be implemented:

- Remote and mapping data to be assessed as part of a desk-based assessment to determine potential areas of risk for fish and FPM populations. This will utilise characteristics such as observed presence of deposition features, channel slope, catchment position and overall catchment form to assess likelihood of key fish habitats and FPM presence within the Project area.
- Rapid reconnaissance walkovers of channels identified within the desk-based assessment to verify, at a high level, potentially sensitive channel reaches. This will include the identification of FPM habitats, fish spawning habitats, and lamprey juvenile habitat.
- Detailed habitat walkovers and FPM surveys at defined sensitive areas to assess site-specific risk.

- Development of a generic seasonal sensitivity table to be refined by local regulators to advise on critical local timings of key life history stages of fish species such as smolt run and salmonid adult migration phases such as river entry and migration to spawning areas. This refined table will then guide work timings.
- Site locations for AMP will be agreed and baseline data collection using fully quantitative electrofishing and family level invertebrate sampling should begin. These surveys will aim to be carried out across the months of August-September.

These data will be assessed considering Maximum Design Scenarios to ensure all potential impacts and their scales have been reviewed with respect to collected data. Impacts should be considered directly; for example, potential site mortality during construction and indirectly, such as impacts on FPM mediated via effects on salmonid hosts, or transmission of impacts downstream by flows into sensitive areas.

European sites with respect to freshwater ecology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with freshwater ecology features and assess the adverse impact on the integrity of the European site.

3.2.8.2 EIA Methodology

The freshwater ecology EIA will be undertaken in line with the methodology set out in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018). The specific legislation and guidance documents outlined below in Table 3-14 will also be considered in relation to the ecology and nature conservation EIA.

Table 3-14 Legislation and Guidance for Freshwater Ecology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018)	Industry standard professional guidance to be followed when undertaking an Ecological Impact Assessment (EcIA) including when it is part of an EIA.
A Handbook on Environmental Impact Assessment, Version 5 (Historic Environment Scotland and SNH, 2018)	Guidance to be followed when undertaking EIA published by SNH (now NatureScot) and Historic Environment Scotland.
The Habitats Directive	Bats, otter and great crested newt are provisioned with legal protection under the EC Habitats and Species Directive. This is transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and domestic legislation continues to be aligned after Scotland left the European Union with the UK through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020. The Habitats Directive also identifies plant species (Annex V) and habitats which require conservation in their own right (Annex I). Another major provision of the Directive is the identification and classification of Special Areas of

LEGISLATION / GUIDANCE	SUMMARY
	Conservation (SACs) for rare or vulnerable species and habitats.
Scottish Biodiversity List	The Scottish Biodiversity List (SBL) is a list of habitats and species that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and (along with biodiversity lists from other UK countries) supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011).
Highland Nature Biodiversity Action Plan 2021-2026	This Local Biodiversity Action Plan (LBAP) defines nature conservation priorities, actions, and targets for the Highlands.
Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment	Scottish Government Planning Advice Note regarding Environmental Impact Assessment
Scottish Planning Policy 2014	Scottish Planning Policy
Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Executive, 2004)	A strategy for the conservation and enhancement of biodiversity in Scotland
2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Government, 2013)	An update to the strategy for the conservation and enhancement of biodiversity in Scotland described above.
The Water Environment and Water Services (Scotland) Act 2003	The Act sets out arrangements for the protection of the water environment and provides the legal framework for WFD implementation in Scotland.
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended	Apply regulatory controls over activities which may affect Scotland's water environment.
GPP-22 (SEPA 2018b)	SEPA Guidance for Pollution Prevention.
WAT-SG-74 (SEPA 2018a)	SEPA practical guidance on the application of best practice of environmental standards at sites.
The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 (The Salmon Act)	Protection and management of fish, fish stocks and their habitats. Includes measures focused on conservation and exploitation of the community.

LEGISLATION / GUIDANCE	SUMMARY
The Wildlife and Countryside Act 1981 (as amended)	Gives full protection to FPM
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021)	Guidance from NatureScot regarding Assessing the Cumulative Impact of Onshore Wind Energy Developments

It should be noted that the Salmon Act also legislates for the potential economic impact on the Fishing Rights holder from any breaches of the Act.

3.2.9 Scoping Questions

- Do you agree that all regulators/statutory consultees have been identified?
- Do you agree that all available data sources have been identified, and if not what additional resources could be accessed?
- Do you agree that all relevant receptors have been identified and survey methods are appropriate to inform assessment?
- Are there any records of the identified receptors that can be provided to the assessment team?
- Are there any barriers which have been identified but have not yet been placed in the SEPA barrier dataset?

3.2.10 References

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Environment Agency. (1997). *Restoration of riverine salmon habitat*. EA Fisheries Technical Manual 4. EA Bristol.

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Historic Environment Scotland and SNH. 2018. A Handbook on Environmental Impact Assessment, Version 5. Historic Environment Scotland, Edinburgh.

Jacoby, D. & Gollock, M. (2014). *Anguilla cottish*. The IUCN Red List of Threatened Species 2014.

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NatureScot. (2021). Assessing the cumulative impact of onshore wind energy developments. NatureScot. Guidance – Assessing the cumulative landscape and visual impact of onshore wind energy developments | NatureScot. [Accessed 05/01/2022]

NatureScot. (2021). Freshwater Pearl Mussel Survey Protocol – for use in site specific projects. Available online at: https://www.nature.scot/doc/freshwater-pearl-mussel-survey-protocol-use-site-specific-projects

Ordnance Survey (2021). 1:25000 map. Available online at: https://explore.osmaps.com

Scottish Executive (2004). Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland. Scottish Executive, St Andrew's House, Edinburgh.

Scottish Government (2013). 2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland. Scottish Government, St Andrew's House, Edinburgh.

Scottish Government (2014). National Planning Framework 3. https://www.gov.scot/publications/national-planning-framework-3/. [Accessed 15/01/2022].

SEPA. (2011). *Pollution Prevention Guidelines: Dealing with spills*. Guidance document PPG 22 produced by SEPA, NIEA and the EA.

SEPA. (2018). *Supporting Guidance (WAT-SG-75)*. Sector Specific Guidance: Construction sites. Version 1.

UK Government (2005). Circular 06/05: Biodiversity and Geological Conservation – Statutory Obligations and their impact Within the Planning System (DCLG). Ref: ISBN 9780117539518.

3.3 Terrestrial Non-Avian Ecology

3.3.1 Introduction

This section of the Scoping Report identifies the terrestrial non-avian ecology receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and associated Caithness onshore substation search area, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the proposed Project.

Key issues of concern for terrestrial non-avian ecology include damage to or loss of protected habitat, damage to or loss of GWDTEs, disturbance to or loss of protected species and/or populations, damage to or loss of areas designated for habitats, species or communities of interest.

Information that may be considered relevant to this section is presented within the below sections:

- Geology and hydrology, section 3.1;
- Freshwater ecology, section 3.2; and
- Land-use and other users, section 3.5.

This section of the Scoping Report has been prepared by Caledonian Conservation Ltd.

3.3.2 Study Area

The terrestrial non-avian ecology study area is defined by four potential landfall areas at the following locations: Melvich Bay; Dounreay; Cling Clang north-east of Dounreay; and Crosskirk. From the landfalls, the onshore export cable corridor search area forms three main sub-sections running to the onshore substation search area, which lies between Halkirk and Spittal, covering an area approximately 5 km by 3.5 km in size. The A882 forms the north-eastern boundary to this search area.

Terrestrial non-avian ecology considerations will be investigated for these search areas, plus a buffer area since some potential impacts can occur outwith the site boundary for many species. Recommended buffer sizes vary between 50 m and 250 m depending on best practice guidance for the habitat- and species-specific surveys in question.

3.3.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 3-15. Data requests will be made to organisations which may hold relevant records.

Table 3-15 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Special Areas of Conservation (SACs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Sites of Special Scientific Interest (SSSIs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Site Condition Monitoring Reports For Protected Sites	NatureScot online reports	Various	NatureScot
Highland Biological Recording Group (HBRG) Dataset	HBRG	Various	HBRG
Datasets Available on NBN Atlas With Data Licenses Permitting Commercial Use (CC-BY or OGD)	NBN Atlas	Various	Various
Datasets on Non-Native Invasive Species	GB Non-Native Invasive Species Secretariat (NNSS)	Various	NNSS
Deer Census Results	NatureScot	Various	NatureScot
The Birds and Mammals of Caithness	Hugh Clark	2004	Clark and Sellers
The Management of Wild Deer in Scotland: Deer Working Group report	Scottish Government	2020	Deer Working Group
The Mammal Society Datasets	The Mammal Society	Various	The Mammal Society
Scottish Badgers Datasets	Scottish Badgers	Various	Scottish Badgers
Inverness Bat Group Datasets	Inverness Bat Group	Various	Inverness Bat Group
Amphibian and Reptile Conservation Trust (ARC) Datasets	ARC	Various	ARC
Botanical Society of Britain and Ireland (BSBI) Datasets	BSBI	Various	BSBI
Bumblebee Conservation Trust (BBCT) Datasets	BBCT	Various	BBCT

3.3.3.1 Site-Specific Surveys

No surveys have been undertaken to date. A desk based Phase 1 using remote-sensing data and an ecological desk study will be undertaken for the Caithness onshore export cable corridor search area and associated Spittal onshore substation search area to gain an overview of the likely habitats present within the study area and immediate surroundings, using available aerial photography and other information about habitats and species (e.g. NatureScot Habitat Data, NBN Gateway) to ensure the field survey effort is reasonable and proportionate. The remote-sensing exercise and desk study will determine the relevant study areas where it is necessary to gain more detailed habitat- and species-specific information concerning particular elements of concern, such as likely protected habitats present, potential presence of GWDTEs, and protected species within these areas of search including those detailed in Table 3-15. Ground-truthing surveys will be undertaken to verify the outputs of the remote-sensing Phase 1 survey. The identified relevant habitat- and species-specific study areas will thereafter be surveyed in the field, using the relevant standard survey methodologies, as detailed in Table 3-16.

If the export cable corridor search area and substation search area are further refined in line with the survey programme, then the ecological desk top study and subsequent field surveys will be focused around the export cable corridor and onshore substation footprints including survey specific buffers following the standard survey methodology outlined in Table 3-16.

Table 3-16 Proposed Surveys, Desk Studies, and Methodologies

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
Ecological Desk Study	A desk study survey will involve a search for designated sites within 5 km of the Project (20 km for international designations) and notable species records. A search for invasive non-native species will also be included. This will include searches from online resources and local environmental record centres.	CIEEM (2020)
Phase 1 Habitat Survey	Standard Phase 1 Habitat methodology will be used to map all habitats and identify habitats areas of ecological importance (JNCC 2010). The survey will include the Project plus a 250 m survey buffer to provide context. Descriptive target notes regarding important habitat features and all protected species signs will be recorded on field maps.	JNCC (2010)
Deer Assessment – Desk Study	A desk study survey will include searches from online resources and local environmental record centres and consultations with relevant groups. It will follow the guidance as detailed in: Planning and Development – What to Consider and Include in Deer Assessment and Management at Development Sites.	NatureScot (2016)
Non-Native Invasive Species of Plants and Animals Survey	Survey methodologies as appropriate for the Non-Native Invasive Species of plants and animals likely present within the Project will be used. The survey will include the Project plus a 250 m survey buffer to provide context. Existing records and	• JNCC (2010) • Stace (2010)

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
	surveys undertaken will be used to identify the requirement for further species-specific surveys.	
NVC Survey	National Vegetation Classification (NVC) methodology will be used to map habitat classification in the field following best practice guidelines describe in in Rodwell (2006). The survey will include the Project plus a 250 m survey buffer to provide context. NVC level of identification will allow classification of Annex I habitats listed in the Habitats Directive (JNCC, 2015). Vascular plant species names will follow Stace (2010) and bryophyte names will follow Hill *et al.* (2008).	• Hill *et al.* (2008) • JNCC (2015) • Rodwell (2006) • Stace (2010) • Elkington at al. (2001)
Species-specific Botanical Survey (e.g., Scottish Primrose)	All habitats will be identified during the NVC survey but in addition, particular attention will be paid to identifying and recording habitats and species of ecological importance (e.g., Scottish Primrose which is included on the Scottish Biodiversity List). Existing records and surveys undertaken will be used to identify the requirement for a species-specific survey.	Stace (2010)
Badger Survey	A badger (*Meles meles*) survey will be carried out following standard methodology (Scottish Badgers, 2018) and using an appropriate field guide (Bang and Dahlstrøm 2006). Field signs include: • Setts – recording the number and classification of entrance holes and sett category; • Footprints – distinctive from other species by their shape and size; • Latrines and dung pits- small excavated pits where dung is deposited. Latrines designated as a collection of dung pits used as territorial markers; • Hairs – highly distinctive, and often snagged on fences or found within the entrances to setts; • Feeding signs – snuffle holes (small scrapes where badgers have searched for earthworms, insects or tubers); and • Paths – routes that badgers take when moving between setts and foraging areas. The survey will include a 250 m survey buffer around the Project to provide context.	• Bang and Dahlstrøm (2006) • Roper (2010) • NatureScot (2020) • Scottish Badgers (2018) • Scottish Natural Heritage (SNH) (2001)
Otter Survey	An otter (*Lutra lutra*) survey will be carried out following standard methodology and using an appropriate field guide (Bang and Dahlstrøm 2006). Field signs include: • Holts – below ground resting places; • Couches – above ground resting places; • Footprints – characteristic prints that can be found in soft ground and muddy areas; • Spraints – faeces used as territorial markers, with a characteristic sweet odour;	• Bang and Dahlstrøm, (2006) • Chanin (2003a) • Chanin (2003b • Davison *et al.* (2002) • NatureScot (2020)

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
	• Prey remains – feeding signs found at preferred feeding areas. • Path and slides – territorial route that otters take between resting-up sites and watercourses (including traveling along bank sides). Slides are worn areas on steep slopes where otters will slide to watercourses below. The survey will include a 250 m survey buffer around the Project to provide context.	
Water Vole Survey	A water vole (*Arvicola amphibius*) survey will be carried out following standard methodology and using an appropriate field guide (Dean, 2021). Field signs include: • Burrows – distinguishable from rat burrows by size and position; • Droppings/latrines – distinctive faeces by size and shape, deposited at discrete locations; • Footprints – distinguishable from rat footprints by size; and • Feeding signs – gnawed vegetation approximately up to 10 cm long. Grazed 'lawns' associated with burrow entrances. The survey will include a 50 m survey buffer around the Project to provide context.	• Dean (2021) • Dean *et al.* (2016) • Strachan *et al.* (2011)
Pine Marten Survey	A pine marten survey will be carried out following standard methodology (Cresswell *et al.*, 2012) and using an appropriate field guide (Bang and Dahlstrøm 2006). Field signs included: • Scats (faeces) – recognisable by their size, shape, and content, and also distinguishable from fox (*Vulpes vulpes*) droppings by their smell, if not desiccated; • Dens – usually in hollows in trees, but also subterranean dens amongst tree roots, should no suitable tree dens be present; and • Footprints – may be found on softer ground and can be differentiated from fox and other mustelids by size and shape. The survey will include a 250 m survey buffer around the Project to provide context.	• Bang and Dahlstrøm (2006) • Cresswell *et al.* (2012)
Invertebrate Survey	Habitats that are known to support terrestrial invertebrates of conservation importance will be noted during surveys. Invertebrate species often depend on specific microhabitats that have a varied habitat structure. Key habitats known for their importance for supporting invertebrate communities include deadwood, grassland, woodlands, pond, open mosaics, and brownfields (English Nature, 2005; Buglife, 2011a; 2011b; 2011c; 2012; 2015; Cathrine, 2020). Targeted detailed invertebrate surveys will be undertaken if habitats or protected sites likely to	• English Nature (2005) • Buglife (2011a) • Buglife (2011b) • Buglife (2011c) • Buglife (2012) • Buglife (2015b) • Cathrine (2020)

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
	support invertebrate communities of conservation importance may be impacted by the Project.	
Bat Survey (Bat Roost Potential Assessment)	A bat survey to conduct a Bat Roost Potential Assessment will be carried out following current Bat Conservation Trust best practice guidelines (Collins, 2016). Data will be taken across the Project area where features or signs indicate potential use by bats, such as: • Buildings with potential to support bat roosts; • Old or veteran trees with potential to support bat roosts; • Bridges with potential to support bat roosts; and • Other features with potential to support bat roosts (e.g. mines). The survey will include a 250 m survey buffer around the Project to provide context. In addition, habitat features that provide information on commuting routes or foraging areas will be taken. The surveys undertaken will be used to identify the requirement for further targeted surveys.	• Boye and Dietz (2005) • Collins (2016) • Cowan (2006) • Forestry Commission Scotland (FCS) (2006) • Mitchell-Jones (2004) • Mitchell-Jones and McLeish (2004) • Scottish Natural Heritage *et al.* (2021) • Walsh and Buckland (1996)
Reptile Surveys	The presence of any reptiles will be noted and habitat assessed regarding its suitability to support reptiles following best practice guidance (Cathrine, 2018). Suitable habitat should offer shelter, basking opportunities, and hibernacula.	• Cathrine (2018) • Buckley and Cole (2004)
Amphibian Surveys	Ponds identified within the study area will be assessed using the great crested newt Habitat Suitability Index (I) following standard methods described in Oldham *et al.* (2000) as amended by Amphibian and Reptile Groups of the UK (ARG UK) (2010) and using the updated Geographic Suitability Index (SI) Factor map published by O'Brien *et al.* (2017). I scores inform the likelihood of great crested newts being present and will inform if further detailed survey methods are required. The survey will include a 250 m survey buffer around the Project to provide context.	• Amphibian and Reptile Groups of the UK (ARG UK) (2010) • O'Brien *et al.* (2017) • Oldham *et al.* (2000) • Buckley and Cole (2004)

3.3.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-15) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of terrestrial non-avian ecology which are likely to require consideration within the EIA are:

- Protected species;
- Protected habitats;
- GWDTE; and

- Designated sites.

A deer assessment will be undertaken as part of the ecological assessment. Non-Native invasive species will also be considered.

3.3.4.1 CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

Due to the climate being wetter and cooler in Caithness, upland habitats descend to sea level and expansive areas of peat are a common feature of the landscape. The expansive pool-studded bog landscapes of the Flow Country of Caithness and Sutherland are unique in Europe. The largest expanses of blanket bog in the wider area are present outside the search area to the west, at the nearby Caithness and Sutherland Peatlands SAC and East Halladale SSSI. The search area itself encompasses low and gently undulating ground largely derived of acid soils which predominate due to the bedrock and leaching of mineral soils. Agriculturally improved fields predominate the eastern extent where mineral soils are most extensive. Small extents of blanket bog, fen, basin mire and calcareous grassland also occur. In addition, there are some spectacular sea cliffs where perhaps the most diverse and notable habitats are present.

Within the search area deep peat is present but more limited in extent overall. The eastern extent of the search area traverses small areas of blanket bog south of Halkirk and south west of Westfield. There are larger expanses of peatland present in the western extent of the search area, where they extend outwith the search area beyond. Intact areas of blanket bog are typically dominated by Sphagnum moss and cotton grasses, but some areas of vegetation may be modified due to drainage, burning and grazing.

The eastern extent of the search area from Spittal to Crosskirk, and west towards Sandside Bay is largely comprised of agriculturally improved fields. Based on the land use, climate and geology it is likely these fields are largely comprised of botanically species poor mesotrophic grassland communities and improved acid grasslands derived from modified peatlands. Any areas with mixed farming and crofting, and field margins left unsprayed may provide opportunity for notable arable plants to occur (such as corn marigold and northern knotgrass).

Woodland is uncommon within the search area, however, there are several scattered blocks of plantation conifer at various stages of production. South of Shebster the search area encompasses a continuous extent of commercial forest plantation east of the Achvarasdal Burn. Some areas of this forestry may occur over peatland of varying depths and the forest breaks likely comprise areas of species poor heathlands, acid grasslands and marshy grassland. There are several small clusters of woodland present south of Reay with native canopy cover and five small woodland blocks listed in the Ancient Woodland Inventory of Scotland at Sandside House near Reay, Forss House at Forss, and Banniskirk House at Halkirk. All listings are Long Establish Plantation Origin based on 1860 1st edition Ordnance Survey Maps.

The current search area encompasses Loch Lieurary SSSI which lies 5km southwest of Thurso, notified for basin fen, and Westfield Bridge SSSI, 8km south west of Thurso next to the Forss Water at Westfield, notified for fen meadow and lowland calcareous grassland. Both are seasonally flooded habitats which are sensitive to drainage.

Perhaps the most diverse and notable habitats within the search area are present along the coast. The area from Melvich to Reay encompasses Strathy Coast SSSI, Red Point Coast SSSI and Sandside Bay SSSI. Notified habitats within these sites include coastal saltmarsh, coastal sand dunes, machair, maritime cliffs and slopes and upland heaths. These habitats all conform with Annex I habitats.

In addition, existing data on habitats east of Sandside Bay include marginal areas of maritime cliff vegetation, coastal grasslands, alkaline fens, North Atlantic wet heath and European dry heath, all conforming with Annex I habitats.

The River Thurso, Forss Water and Halladale River are the principal watercourses within the search area. Numerous burns, including the Sandside Burn, the Reay Burn and Achvarasdal Burn also run through the search area. Riparian zones may increase the diversity of habitat types present, including the coastal saltmarsh in the upper section of intertidal mudflats at the mouth of the Halladale River in the Strathy Coast SSSI.

Potentially groundwater dependent habitats may be encountered including mires, fens, swamps, flushes, wet heaths and grassland habitats.

There are six designated sites within the search area plus 13 located adjacent or nearby. Designated sites are listed in Table 3-17 and shown on Figure 3-7 and Figure 3-10. The main designations are SAC and SSSI. A list of potential sensitive habitats within the search area is provided in Table 3-18. A list of potential protected species of animals and plants within the search area is provided in Table 3-18.

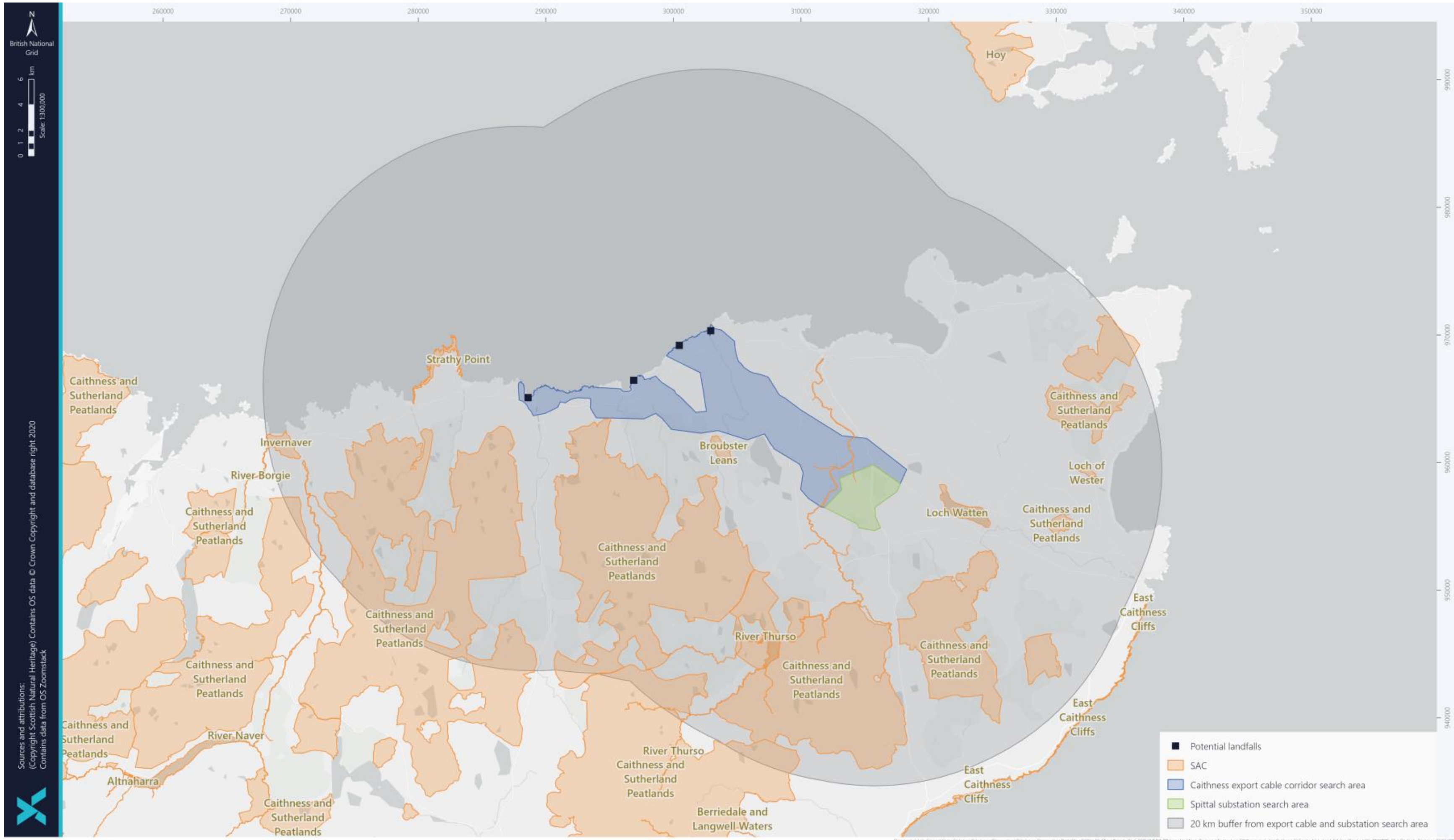

Figure 3-7 Onshore SACs in the Vicinity of the Project

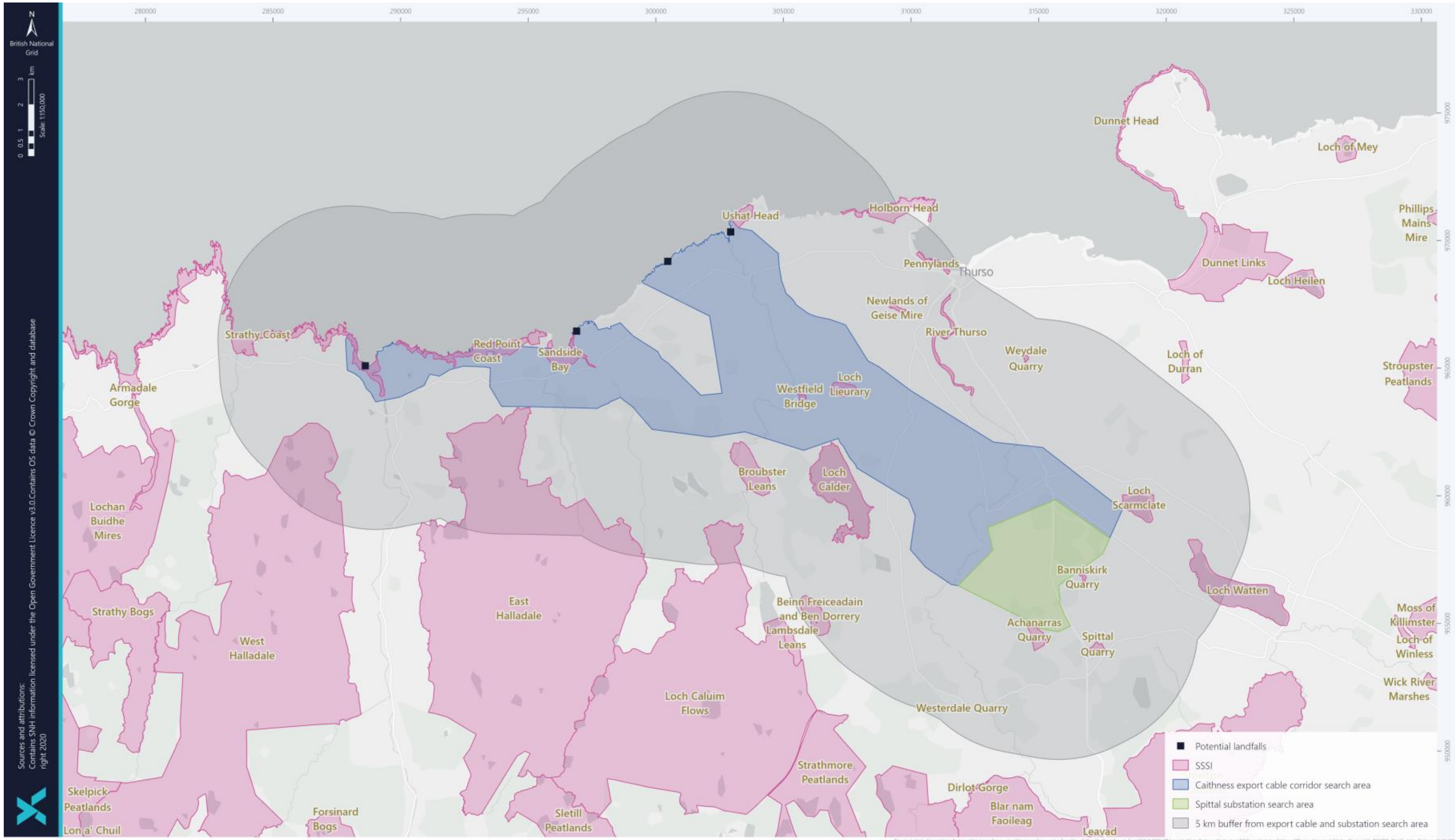

Figure 3-8 Onshore SSSIs in the Vicinity of the Project

Table 3-17 Designated Areas with Relevance to Terrestrial Non-Avian Ecology

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
Red Point Coast SSSI	Vascular Plant: Scottish primrose (*Primula scotica*), Maritime cliff	Within search area
Sandside Bay SSSI	Sand dunes	Within search area
Ushat Head SSSI	Maritime cliff	Within search area
Westfield Bridge SSSI	Fen meadow, lowland calcareous grassland	Within search area
Strathy Coast SSSI	Vascular plants: Vascular plant assemblage, Machair, Saltmarsh, Sand dunes, Maritime cliff	Within search area
Loch Lieurary SSSI	Basin fen	Within search area
Caithness and Sutherland Peatlands SAC	Blanket bog, Depressions on peat substrates, Very wet mires (quacking surface), Wet heathland with cross-leaved heath (*Erica tetralix*), Vascular Plant: Marsh saxifrage (*Saxifraga hirculus*), Otter (*Lutra lutra*)	Adjacent
Caithness and Sutherland Peatlands RAMSAR	Blanket bog	Adjacent
East Halladale SSSI	Blanket bog	Adjacent
Broubster Leans SAC	Very wet mires (quaking surface)	0.4 km from search area
Strathy Point SAC	Vegetated sea cliffs	4.0 km from search area
Invernaver SAC	Alpine and subalpine calcareous grasslands, Alpine and subalpine heaths, Base-rich fens, Coastal dune heathland, Dune grassland, Dunes with creeping willow, Dunes with juniper thickets, Shifting dunes with marram	18.0 km from search area
River Borgie SAC	Otter	19.0 km from search area
Broubster Leans SSSI	Hydromorphological mire range	0.4 km from search area
Newlands of Geise Mire SSSI	Valley fen	2.0 km from search area
West Halladale SSSI	Blanket bog	2.0 km from search area

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
Loch Caluim Flows SSSI	Blanket bog	3.4 km from search area
Holborn Head SSSI	Maritime cliff	4.0 km from search area
Beinn Freiceadain and Ben Dorrery SSSI	Subalpine dry heath, Tall herb ledge	4.3 km from search area

Table 3-18 Potential Sensitive Habitats within the Search Area

NAME	DESCRIPTION	CONSERVATION STATUS
Coastal saltmarsh	Salt tolerant vegetation communities formed in the upper section of intertidal mudflats in sheltered locations. This habitat provides important resources for birds including waders and wildfowl. Occurs in the mouth of Halladale River within Strathy Coast SSSI.	Annex I (Habitats Directive), SBL , Highland LBAP
Coastal sand dunes	Sand blown from the intertidal zone, forming dune systems which may include mobile dunes, fixed dunes, dune slacks and dune heath, which typically support rich flowering plant and invertebrate assemblages. Occurs at Melvich Bay and Sandside Bay including within Sandside Bay SSSI and Strathy Coast SSSI.	Annex I, SBL, Highland LBAP
Machair	A calcareous coastal grassland type influenced by sand blown from the shore. Important for plant and invertebrate communities as well as bird fauna including corncrake and corn bunting. In Britain this habitat is limited to the north and west of Scotland. Occurs within Strathy Coast SSSI.	Annex I, SBL, Highland LBAP
Maritime cliff and slopes	Sloping to vertical coastal rock faces and cliff top habitat, which supports specialist vegetation communities reflecting local conditions including exposure and rock type. Examples within the search area include both hard and soft rock cliffs. Occurs at Holborn Head SSSI, Red Point Coast SSSI, Strathy Coast SSSI, Ushat Head SSSI.	Annex I, SBL, Highland LBAP
Lowland fens	A type of peatland fed by water and nutrients from the soil, rock and ground water in addition to rainfall. Examples include: Fen meadow at Westfield Bridge SSSI and Basin fen at Loch Lieurary SSSI.	SBL, Highland LBAP
Rivers	This habitat covers the area between the bank tops and includes a wide range of running watercourses from small, fast flowing headwaters to large rivers. River Thurso, Forss Water and Halladale River are the principle watercourses, all of which support Atlantic	SBL, Highland LBAP

NAME	DESCRIPTION	CONSERVATION STATUS
	salmon populations. Part of the River Thurso SAC designated for Atlantic salmon is within the search area. Numerous burns including the Sandside Burn, the Reay Burn and Achvarasdal Burn also run through the search area.	
Standing water	Numerous standing waterbodies occur within the search area. These are likely to represent a range of freshwater types including oligotrophic and dystrophic lakes.	Included in SBL and Annex I freshwater habitat types.
Arable field margins	Any areas with mixed farming and crofting, and field margins left unsprayed may provide opportunity for notable arable plants to occur (such as corn marigold and northern knotgrass).	SBL
Agrostis – Festuca grassland	Mat-grass dominated upland species-rich grassland. Occurs at Borrowston Mains, near Forss.	Annex I
Lowland calcareous grassland	Unimproved grassland on base-rich soils, often in dry locations with southerly aspects. Comprised of diverse grasses and herbs including base-tolerant specialists. A rare habitat in Caithness, which occurs at Westfield Bridge SSSI.	Annex I, SBL
Lowland hay meadows	Unimproved grassland on neutral, well-drained soils. Occurs at Borrowston Mains, near Forss.	Annex I, SBL, Highland LBAP
Purple moorgrass meadows	Dominated by purple moorgrass (Molinia caerulea) and rush species, on damp, acidic soils within agricultural land. Occurs at Borrowston Mains, near Forss.	Annex I
Ancient woodland	Ancient Woodland is defined as woodland that has been continuously present at a site since 1750 and may support biodiverse plant and animal assemblages. Five small polygons listed in the Ancient Woodland Inventory of Scotland occur within the search area at: Sandside House, Reay; Forss House, Forss; Banniskirk House, Halkirk. All listings are Long Establish Plantation Origin based on 1860 1st edition Ordnance Survey Maps.	Ancient Woodland Inventory (AWI) of Scotland
Blanket bog	Acidic peatland habitat characterised by deep peat, primarily fed by precipitation. Important for specialist plant species and breeding bird populations including waders of international significance. Occurs nearby in Caithness and Sutherland Peatlands SAC and East Halladale SSSI. Other smaller patches of rain-fed peatland habitat may occur within the search area.	Annex I, SBL, Highland LBAP

NAME	DESCRIPTION	CONSERVATION STATUS
Upland heathland	Upland heathland is dominated by heather and other dwarf shrubs as well as smaller proportions of grasses, sedges and herbs. This habitat is important for breeding birds specialist plant and invertebrate species. The largest occurrence of this habitat is between Melvich and Sandside Bay. Smaller areas of heath may be present at Hill of Shebster and Hill of Lieurary.	Annex I, SBL, Highland LBAP
Ground Water Dependent Terrestrial Ecosystems (GWDTEs)	GWDTE are wetland habitats dependent upon groundwater rather than receiving their water from rain and surface water. They can support biodiverse, botanical communities. Habitat types may including mires, fens, swamps, flushes, wet heaths and grassland habitats, which may occur throughout much of the search area.	EU WFD

Table 3-19 Potential Species of Conservation Concern within the Search Area

SPECIES	CONSERVATION STATUS
Badger (*Meles meles*)	Protection of Badgers Act
Otter (*Lutra lutra*)	Annex IV of Habitats Directive
Pine marten (*Martes martes*)	Schedule 5 of Wildlife and Countryside Act
Water vole (*Arvicola amphibius*)	Schedule 5 of Wildlife and Countryside Act
Common pipistrelle bat (*Pipistrellus pipistrellus*)	Annex IV of Habitats Directive
Soprano pipistrelle bat (*Pipistrellus pygmaeus*)	Annex IV of Habitats Directive
Nathusius' pipistrelle bat (*Pipistrellus nathusii*)	Annex IV of Habitats Directive
Daubenton's bat (*Myotis cottish d*)	Annex IV of Habitats Directive
Brown long-eared bat (*Plecotus cottis*)	Annex IV of Habitats Directive
Common frog (*Rana temporaria*)	SBL
Common toad (*Bufo bufo*)	SBL
Adder (*Vipera berus*)	Schedule 5 of Wildlife and Countryside Act
Common lizard (*Zootica vivipara*)	Schedule 5 of Wildlife and Countryside Act
Slow worm (*Anguis fragilis*)	Schedule 5 of Wildlife and Countryside Act
Invertebrate communities of conservation concern	e.g. Scottish Biodiversity List (SBL)

SPECIES	CONSERVATION STATUS
Great yellow bumblebee (*Bombus distinguendus*)	SBL
Moss carder bee (*Bombus muscorum*)	SBL
Alpine bearberry (*Arctostaphyllos alpinus*)	Nationally Scarce
Alpine pearlwort (*Sagina saginoides*)	SBL, Nationally Scarce
Baltic rush (*Juncus balticus*)	Vulnerable, Nationally Scarce
Bog hair-grass (*Deschampsia setacea*)	Nationally Scarce
Crowberry (*Empetrum nigrum ssp hermaphroditum*)	Vulnerable
Curved sedge (*Carex maritima*)	SBL, Endangered, Nationally Scarce
Eyebright (*Euphrasia foulaensis*)	Nationally Scarce
Frog orchid (Coeloglossum viride)	Vulnerable
Hair sedge (Carex maritima)	Nationally Scarce
Holy grass (*Hierochloe odorata*)	Nationally Rare
Juniper (*Juniperus communis alpinus*)	SBL
Killarney fern (*Trichomanes speciosum*)	WCA-Sch8
Lesser spearwort (*Ranunculus flammula minimus*)	Nationally Rare
Long-stalked pondweed (*Potamogeton praelongus*)	Endangered, Near Threatened
Marshall's eyebright (*Euphrasia marshallii*)	SBL Endangered, Nationally Rare.
Northern knotgrass (*Polygonum boreale*)	Nationally Scarce
Oyster plant (*Mertensia maritima*)	Nationally Scarce
Purple oxytropis (*Oxytropis hallerii*)	SBL, Nationally Scarce
Pyramidal bugle (*Ajuga pyramidalis*)	SBL, Nationally Scarce
Round-leaved eyebright (*Euphrasia rotundifolia*)	SBL, Endangered, Nationally Rare.
Scottish primrose	SBL

SPECIES	CONSERVATION STATUS
Scottish scurvy-grass (*Cochlearia officinalis subsp. Scotica*)	SBL
Slender-leaved pondweed (*Potamogeton filiformis*)	Nationally Scarce
Small cranberry (*Vaccinium microcarpum*)	Nationally Scarce
Sun spurge (*Euphorbia helioscopia*)	SBL

3.3.4.2 Summary and Key Issues

Key issues regarding terrestrial non-avian ecology within the search area for Caithness are listed in Table 3-20.

Table 3-20 Summary and Key Issues for Terrestrial Non-Avian Ecology

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS EXPORT CABLE CORRIDOR SEARCH AND ONSHORE SUBSTATION SEARCH AREA
	• Protected species of plants and animals (see Table 3-19); • Protected and sensitive habitats (including GWDTEs) (see Table 3-18); and • Various designations for biological reasons (see Table 3-17).

3.3.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-21.

Table 3-21 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Avoidance of sensitive areas (peatland, potential groundwater-dependent terrestrial ecosystems, designated areas) wherever possible. Where impacts cannot be avoided, these will be minimalised.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
2	Minimising impact on cliff coastal habitats which associated with designated sites, or communities otherwise of conservation importance, by use of HDD where possible.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
3	Return location to pre-construction state.	Primary	Established within the design principles and secured within the Section 36 and/or planning conditions.
4	Control of diffuse pollution.	Primary	Utilisation of best practice sediment management techniques.
5	Control of point-source pollution.	Primary	Employment of best practice pollution prevention techniques.
6	Minimisation of watercourse crossings.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
7	Construction Environmental Management Plan (CEMP), which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning conditions.
8	Create and implement Species and Habitat Protection Plan (SHPP).	Primary	Secured within the Section 36 and/or planning conditions.
9	Ensure appropriately qualified Ecological Clerk of Works (EcoW) presence at sensitive locations and/or sensitive periods.	Primary	Secured within the Section 36 and/or planning conditions.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on terrestrial non-avian ecology and will be consulted upon with consultees throughout the EIA process.

3.3.6 Scoping of Impacts

A number of potential impacts on terrestrial non-avian ecology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by Pre-Application Advice issued by THC (Ref 20/04850/PREMAJ issued 10/02/2021).

None of the potential impacts are proposed to be scoped out at this stage as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 3-22 EIA Scoping Assessment for Terrestrial Non-Avian Ecology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Direct habitat loss due to land-take	1, 2, 4, 5, 6, 7, 8, 9	Scoped In	The onshore construction works will involve construction of the onshore export cable and substation/switchgear, as well as hardstanding and other construction-related works, all of which would result in direct habitat loss. This could be temporary or permanent depending on the situation.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat data, updated by site-specific survey data.
Disturbance and damage/injury to habitats or protected species	1, 2, 4, 5, 6, 7, 8, 9	Scoped In	The effects of disturbance to habitats are variable in their extent, depending on the nature of the disturbance and sensitivity of the habitat affected. Some disturbance types (for example, creation of temporary hardstanding areas) result in medium- to long-term disturbance with extended recovery periods. In other cases (for example, installation of cables) disturbance is short-term, and certain habitat types are able to recover quickly. Construction and decommissioning works may also cause damage to habitats and plant species, and injury (which may lead to mortality) in animal species, e.g. through trampling, damage caused by vehicles, or entrapment in trenches etc. In addition to effects resulting from potential disturbance to habitats used by protected species, animals may also	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			be disturbed by increases to noise and light levels and perceived predation risk associated with the presence of site personnel and vehicles.		
Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation	2, 4, 6, 7, 8, 9	Scoped In	Indirect effects on habitats and species that may arise as a result of construction and decommissioning activities include hydrological effects, pollution, sedimentation and effects of dust. For example, if an access track bisects an area of bog, this can result in one half drying out. Heavy rainfall can result in silt runoff and peat slides, which may cause siltation of watercourses, while pollution of watercourses may occur as a result of chemical or fuel spillage. These could be temporary or permanent depending on the situation.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.
Operation and Maintenance					
Disturbance and damage/injury to habitats or protected species	1, 2, 4, 5, 6, 7, 8, 9	Scoped In	Human activities related to maintenance of onshore infrastructure have the potential to cause temporary and localised disturbance effects on ecological features. Due to the unpredictable nature of the requirement for maintenance works, it is difficult to determine precise effects on habitats and species. However, it is expected that maintenance activities would be infrequent and small scale, resulting in temporary disturbance effects of a lower magnitude than those during construction, likely to be of a similar level to existing human use.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation	2, 3, 4, 6, 7, 8	Scoped In	Maintenance may also result in indirect effects on habitats, e.g. pollution of watercourses as a result of spillage. However, the potential for indirect effects to occur during operation is generally lower than that during construction. Without careful handling these could be long-term or permanent.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

3.3.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on terrestrial non-avian ecology receptors, for example onshore windfarms and associated transmission infrastructure.

The context in which cumulative effects are considered depends upon the ecology of the habitat or species in question. For example, it may be appropriate to consider cumulative effects to otters associated with an SAC within the context of their wider foraging range. For other ecological features such as a scarce plant species, it may be appropriate to consider the effects on the local population in the context of any planned windfarms in the immediate vicinity which have the potential to cause additional effects on the plant (e.g. through loss of habitat).

The terrestrial non-avian ecology Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2. The terrestrial non-avian ecology assessment will include assessment of the combined potential cumulative effects from this Project along with other current or approved schemes.

3.3.8 Approach to Analysis and Assessment

3.3.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on terrestrial non-avian ecology will utilise Project-specific and publicly available data (see section 3.3.3) and will be augmented by consultation during the EIA phase.

It is anticipated that consultees will include:

- ARC;
- BSBI;
- BBCT;
- Butterfly Conservation;
- Caithness Biodiversity Group;
- Deer Management Group;
- Highland Biological Recording Group (HBRG);
- Inverness Bat Group;
- MoD;
- NatureScot;
- RSPB Scotland;
- Scottish Badgers;
- Scottish Wildlife Trust (SWT);
- THC; and
- The Mammal Society.

The Project has already undertaken some initial consultation on onshore ecology issues associated with the Project including THC and NatureScot.

Gathering of site-specific data will form a key part of the assessment. Data collated will include:

- Protected habitats and species present; and
- Designated sites present.

The terrestrial non-avian ecology assessment will be based on what is considered to be the maximum design scenario for each element of the onshore Project from the maximum design envelope. This ensures that the assessment will cover the worst-case scenario and therefore the highest magnitude impact if more than one design option requires consideration.

The assessment will consider direct effects i.e. effects that are made directly to a receptor, such as the effects of work activities on species and habitats, and indirect effects i.e. effects that arise as a result of a change made to a different receptor, such as a change in water flow within an area of GWDTE resulting from changes to groundwater flow paths from excavation works. The assessment will mainly be qualitative in nature, as the majority of the potential impacts are not readily quantifiable, apart from habitat loss calculations.

European sites with respect to terrestrial non-avian ecology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with terrestrial non-avian features and assess the adverse impact on the integrity of the European site.

3.3.8.2 EIA Methodology

The terrestrial non-avian ecology EIA will be undertaken in line with the methodology set out in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018) – notably the use of matrices is not compatible with these requirements of professional ecology industry best practice. The specific legislation and guidance documents outlined below in Table 3-23 will also be considered in relation to the ecology and nature conservation EIA.

Table 3-23 Legislation and Guidance for Terrestrial Non-Avian Ecology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018)	Industry standard professional guidance to be followed when undertaking an EcIA including when it is part of an EIA.
A Handbook on Environmental Impact Assessment, Version 5 (Historic Environment Scotland and SNH, 2018)	Guidance to be followed when undertaking EIA published by SNH (now NatureScot) and HES.
The Habitats Directive	Bats, otter and great crested newt are provisioned with legal protection under the EC Habitats and Species Directive. This is transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and domestic legislation continues to be aligned after Scotland left the European Union with the UK through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020. The Habitats Directive also identifies plant species (Annex V) and habitats which require conservation in their own right (Annex I). Another major provision of the Directive is the identification and classification of SACs for rare or vulnerable species and habitats.

LEGISLATION / GUIDANCE	SUMMARY
The Wildlife and Countryside Act 1981 (as amended)	The Wildlife and Countryside Act 1981 (as amended in Scotland) is the primary legislation protecting animals, plants and certain habitats in the UK. It is also the principal legislation dealing with non-native species in Scotland.
Protection of Badgers Act (1992)	Badgers are protected under the Protection of Badgers Act 1992 (as amended in Scotland).
Scottish Biodiversity List	The SBL is a list of habitats and species that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and (along with biodiversity lists from other UK countries) supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011).
Highland Nature Biodiversity Action Plan 2021-2026	This LBAP defines nature conservation priorities, actions, and targets for the Highlands.
EU Regulation (1141/2014) on invasive alien (non-native) species	This imposes restrictions on a list of species known as 'species of Union concern', published in Commission Implementing Regulation 2016/1141. These are species whose potential adverse effects across the European Union are such that concerted action across Europe is required. The list is drawn up by the European Commission and managed with Member States using risk assessments and scientific evidence. The list is still applicable in a Scottish context as domestic legislation continues to be aligned after Scotland left the European Union with the UK through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020.
Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment	Scottish Government Planning Advice Note regarding Environmental Impact Assessment.
Scottish Planning Policy 2014	Scottish Planning Policy.
Government Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (Office of the Deputy Prime Minister [ODPM])	Statutory Obligations and their Impact within the Planning System.
Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation	A strategy for the conservation and enhancement of biodiversity in Scotland.

LEGISLATION / GUIDANCE	SUMMARY
and enhancement of biodiversity in Scotland (Scottish Executive, 2004)	
2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Government, 2013)	An update to the strategy for the conservation and enhancement of biodiversity in Scotland described above.
The Highland Council Supplementary Guidance. Highland's Statutory Protected Species (2013)	Highland's Statutory Protected Species.
Good Practice During Windfarm Construction (Scottish Renewables *et al.*, 2019)	Good Practice guidelines.
Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments (SEPA, 2012)	Planning Guidance on Windfarm Developments.
Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2014)	Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems.
WFD95: A Functional Wetland Typology for Scotland – Project Report (Scotland and Northern Ireland Forum for Environment Research [SNIFFER], 2009)	Report on functional Wetland Typology for Scotland.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021)	Guidance from NatureScot regarding Assessing the Cumulative Impact of Onshore Wind Energy Developments.

3.3.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment? Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the Project site-specific surveys are sufficient to inform the proposed assessment approach?
- Do you agree that all relevant receptors have been identified?
- Are there any records of the identified receptors that can be provided to the assessment team?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects on terrestrial non-avian ecology?

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3.4 Terrestrial Ornithology

3.4.1 Introduction

This section of the Scoping Report identifies the terrestrial ornithology receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and associated Caithness onshore substation search area, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the proposed Project.

Key issues of concern for the terrestrial ornithology receptors include damage to and/or disturbance of protected species of bird, and areas designated for species of interest.

Information that may be considered relevant to this section is presented within the below sections:

- Offshore ornithology, section Offshore Ornithology;
- Non-avian ecology, section 3.3; and
- Land-use and other users, section 3.5.

This section of the Scoping Report has been prepared by Caledonian Conservation Ltd.

3.4.2 Study Area

The terrestrial ornithology study area is defined by four potential landfall areas at the following locations: Melvich Bay; Dounreay; Cling Glang north-east of Dounreay; and Crosskirk. From the landfalls, the onshore export cable corridor search area forms three main sub-sections, running to the Caithness onshore substation search area, which lies between Halkirk and Spittal, covering an area approximately 5 km by 3.5 km in size. The A882 forms the north-eastern boundary to this search area.

Terrestrial ornithology considerations will be investigated for these search areas, plus a buffer area since some potential impacts can occur outwith the site boundary for many species. Recommended buffer sizes vary from 500 m to 6 km depending on best practice guidance for the species in question.

3.4.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 3-24. Data requests will be made to organisations which may hold relevant records.

Table 3-24 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Special Protection Areas (SPAs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Sites of Special Scientific Interest (SSSIs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Site Condition Monitoring Reports For Protected Sites	NatureScot online reports	Various	NatureScot
Highland Biological Recording Group (HBRG) Datasets	HBRG	Various	HBRG
Highland Raptor Study Group Datasets	Highland Raptor Study Group	Various	Highland Raptor Study Group
British Trust for Ornithology (BTO) Datasets	BTO	Various	BTO
Royal Society for the Protection of Birds (RSPB) Datasets	RSPB	Various	RSPB
Wildfowl and Wetlands Trust (WWT) Datasets and Reports	WWT	Various	WWT
Datasets Available on NBN Atlas With Data Licenses Permitting Commercial Use (Types: By Attribution (CC-BY) or Open Government Data (OGD))	NBN Atlas	Various	Various
Birds of Caithness including The Breeding & Wintering Atlas 2007-2012. Revised Edition.	Caithness Scottish Ornithologists' Club (SOC)	2016	Davey *et al.*
The Birds of Scotland	SOC	2007	Forrester *et al.*
Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland	BTO	2013	Balmer *et al.*
Seabird Populations of Britain and Ireland	T & A.D. Poyser	2004	Mitchell *et al.*
The Migration Atlas. Movements of the Birds of Britain and Ireland	BTO	2002	Wernham *et al.*

3.4.3.1 Site-Specific Surveys

No surveys have been undertaken to date. A desk based Phase 1 using remote-sensing data and an ornithological desk study will be undertaken for the Caithness onshore export cable corridor and associated Caithness onshore substation search area to gain an overview of the likely habitats present within the study area and immediate surroundings, using available aerial photography and other information about habitats and species (e.g. NatureScot Habitat Data, NBN Atlas) to ensure the field survey effort is reasonable and proportionate. The remote-sensing exercise and desk study will determine the relevant targeted field survey study areas to gain species-specific information concerning particular elements of concern within these areas of search using datasets including those detailed in Table 3-25. Ground-truthing surveys will be undertaken to verify the outputs of the remote-sensing Phase 1 survey. The identified relevant species-specific study areas will thereafter be surveyed in the field, using the relevant standard survey methodologies, as detailed in Table 3-25.

If the export cable corridor search area and substation search area are further refined in line with the survey programme, then the ornithological desk top study and subsequent field surveys will be focused around the export cable corridor and onshore substation footprints including survey specific buffers following the standard survey methodology outlined in Table 3-25.

Table 3-25 Proposed Surveys and Methodologies

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
Ornithological Desk Study	A desk study survey will involve a search for designated sites within 5 km of the Project (20 km for international designations) and notable species records. This will include searches from online resources and local environmental record centres (see Table 3-2).	CIEEM (2020)
Breeding Bird Survey	Project + 500 m buffer Four survey visits between April and July to undertake a walkover which approaches within 100 m of all open habitat (surveying each 500x500 m quadrat for 20 – 25 minutes) and point counts in forest habitat if necessary. All species seen or heard will be recorded to map territories of breeding birds and estimate breeding bird density. Surveys to be taken during the first six hours after sunrise.	• Gilbert *et al.*, 1998 • SNH, 2017 • Calladine *et al.*, 2009
Wintering Bird Survey	Project + 500 m buffer Three survey visits will be made between September and February to undertake a walkover which approaches within 200 m of all areas (surveying each 500x500 m quadrat for 20 – 25 minutes). All species seen or heard will be recorded to assess how birds use the site in winter.	• Gilbert *et al.*, 1998 • SNH, 2010
Wetland Bird Survey	All shoreline of Project + 500 m buffer Counts of all waders and wildfowl species using the shore will be made from vantage points. Surveys will be undertaken within 3.5 hours	Gilbert *et al.*, 1998

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
	before and 3.5 hours after low tide. Surveys will be completed monthly between September and March.	
Breeding Raptor, Owl	Project + 2 km buffer unless otherwise stated. Walkovers searching for signs and short vantage point watches to observe birds to be undertaken in all suitable breeding habitat. At least two survey visits to be carried out between April and July to determine occupancy of breeding territories. Golden and white-tailed eagle surveys to include 6 km buffer area.	• Gilbert *et al.*, 1998 • SNH, 2017 • Hardey *et al.*, 2013 • Barn Owl Trust, 2001; 2012; 2020 • Shawyer, 2011
Breeding Seabird Surveys	All shoreline of Project + 2 km buffer Counts of apparently occupied nest sites will be undertaken in order to estimate numbers of breeding birds. Survey visits to take place in June during the middle of the day.	• Walsh *et al.*, 1995 • SNH, 2017
Foraging Goose Survey	Project + 3 km buffer Observation of fields from vantage points will be carried out. Surveys to be undertaken fortnightly between September and March to establish the number of geese foraging and use of the site during winter.	• Gilbert *et al.*, 1998 • SNH, 2017
Corncrake Survey	Project + 250 m buffer Two visits will be made at night (00:00 to 03:00) between end May and June to survey for calling corncrake in all fields or other habitats with vegetation over 20cm.	Gilbert *et al.*, 1998
Diver Survey	Project + 1 km Two visits between April and July to all small waterbodies to survey for breeding red- and black-throated divers.	• Gilbert *et al.*, 1998 • SNH, 2017
Tern Survey	Project + 2 km Counts of apparently incubating adult terns to be made from vantage points at least once in the first half of June (depending on timing of season). If no suitable vantage point exists for a colony, counts to be made by ground survey for small colonies only.	• Walsh *et al.*, 1995 • Gilbert *et al.*, 1998
Black Guillemot Survey	All shoreline of Project + 2 km Counts of adult plumaged birds on land or on sea within 200 m of shore will be carried out in April to early May to estimate number of breeding birds. Surveys to take place between 05:00 and 08:00.	• Walsh *et al.*, 1995 • Gilbert *et al.*, 1998

3.4.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-25) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of terrestrial ornithology which are likely to require consideration within the EIA are:

- Protected species of birds; and
- Designated Sites.

3.4.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

Due to the climate being wetter and cooler in Caithness, upland habitats descend to sea level and expansive areas of peat are a common feature of the landscape. The expansive pool-studded bog landscapes of the Flow Country of Caithness and Sutherland are unique in Europe. The largest expanses of blanket bog in the wider area are present outside the search area to the west, at the nearby Caithness and Sutherland Peatlands SPA and East Halladale SSSI. The search area itself encompasses low and gently undulating ground largely derived of acid soils which predominate due to the bedrock and leaching of mineral soils. Agriculturally improved fields predominate the eastern extent where mineral soils are most extensive. Small extents of blanket bog, fen, basin mire and calcareous grassland also occur. In addition, there are some spectacular sea cliffs where perhaps the most diverse and notable habitats are present, including the North Caithness Cliffs SPA. Several SPAs, Ramsar sites and SSSIs are adjacent to the search area, while North Caithness Cliffs SPA and Red Point Coast SSSI overlap with the search area (see Table 3-26).

The peatland habitats, many of which are designated for supporting bird populations of conservation importance (see Table 3-7), provide nesting, foraging, and roosting opportunities for a diverse range of species, notably during the breeding season, including waders (e.g. dunlin, greenshank, wood sandpiper, and golden plover), raptors (e.g. golden eagle, merlin, and hen harrier), short-eared owls, red- and black-throated divers, as well as common scoter and wigeon.

The wider landscape also includes many agriculturally improved fields, which provide foraging habitat for wintering geese and swans, including Greenland white-fronted geese, greylag geese, and whooper swans associated with Caithness Lochs SPA, which also holds a number of other designations (see Table 3-7). This agricultural landscape also provides habitat for barn owls.

Perhaps the most diverse and notable habitats within the search area are present along the coast. The search area encompasses North Caithness Cliffs SPA, which also holds a number of other designations (see Table 3-7). This area supports a great variety of breeding birds associated with the seacliffs and coastal habitats, including fulmar, kittiwake, guillemot, puffin, razorbill, and peregrine falcon, amongst other species. The coastal saltmarsh and intertidal mudflats also support a great diversity of wintering bird species (notably waders) and those on passage, providing foraging habitat.

There are two designated sites within the search area plus 12 located adjacent or nearby. Designated sites are listed in Table 3-26 and shown on Figure 3-9 and Figure 3-10. The main designations are SPA, Ramsar sites, and SSSI. A list of potential protected species of birds within the Caithness onshore export cable corridor and associated Spittal grid connection search area, based on a preliminary desk study, is provided in Table 3-27.

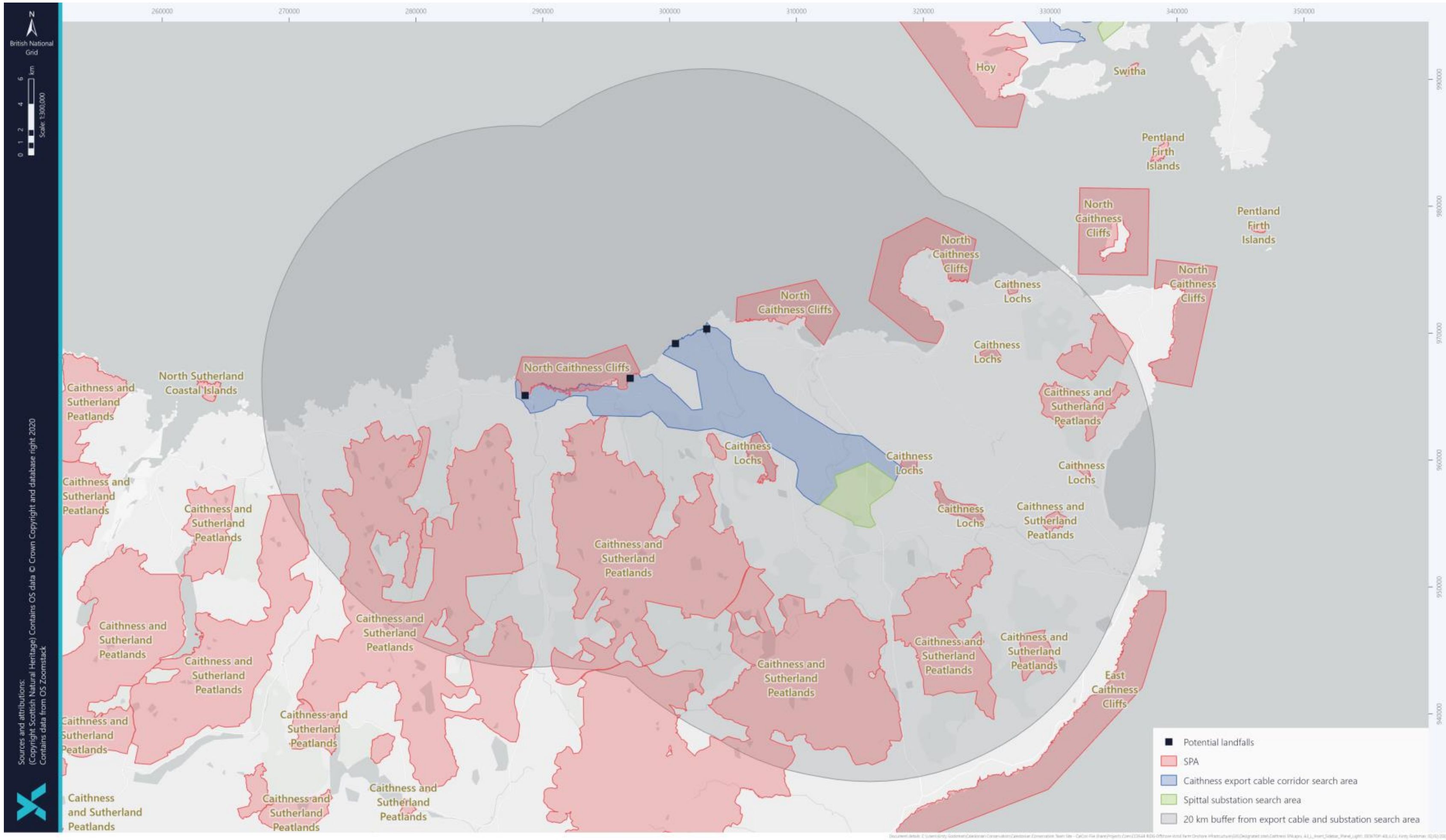

Figure 3-9 Onshore Caithness SPAs in the Vicinity of the Project

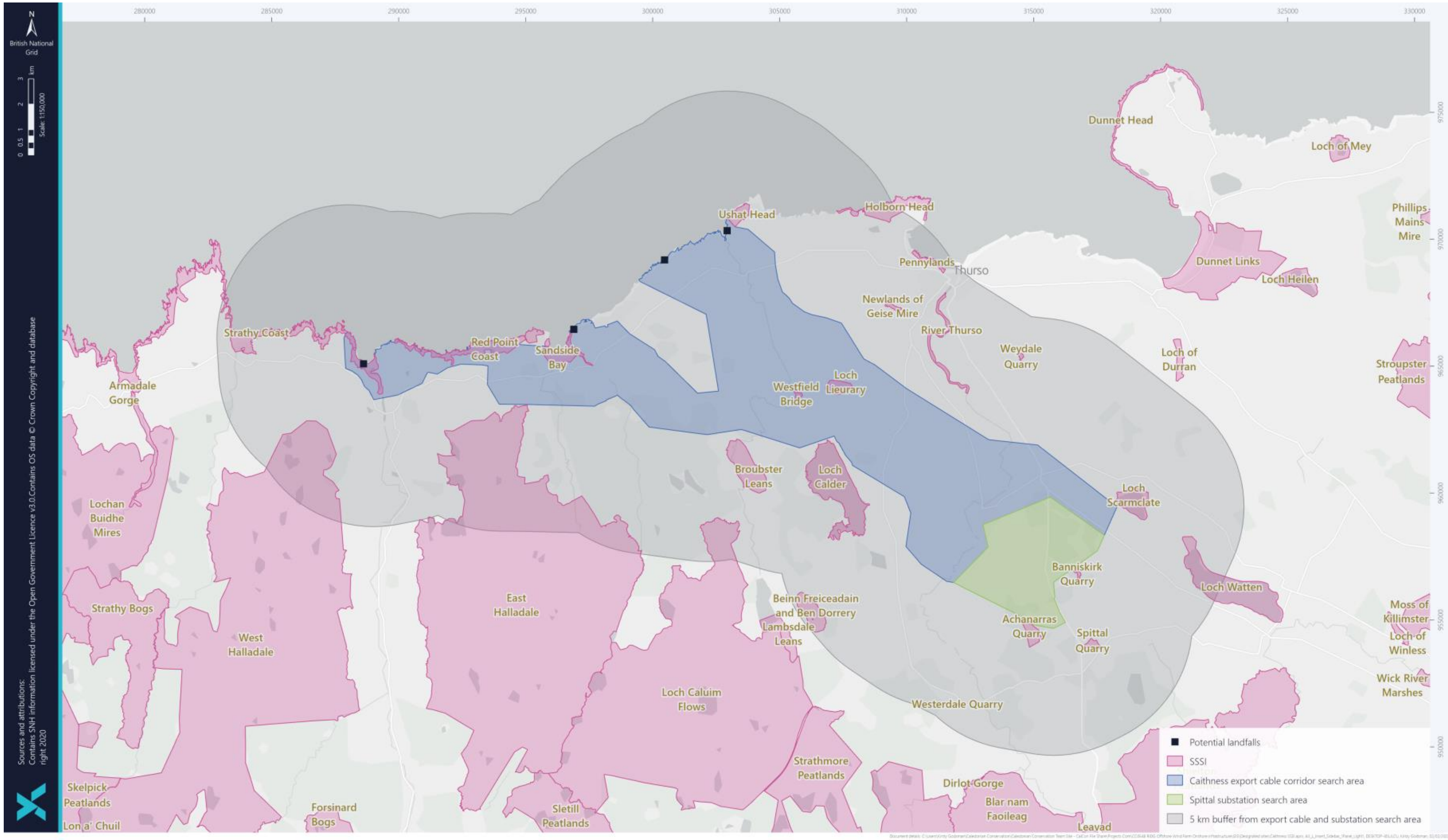

Figure 3-10 Onshore SSSIs in the Vicinity of the Project

Table 3-26 Designated Areas with Relevance to Terrestrial Ornithology

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
North Caithness Cliffs SPA	Fulmar (*Fulmarus glacialis*), Guillemot, Kittiwake (*Rissa tridactyla*), Peregrine (*Falco peregrinus*), Puffin (*Fratercula arctica*), Razorbill (*Alca torda*), Seabird assemblage breeding	Within search area
Red Point Coast SSSI	Guillemot (*Uria aalge*)	Within search area
Caithness and Sutherland Peatlands SPA	Black-throated diver (*Gavia arctica*), Common scoter (*Melanitta nigra*), Dunlin, Golden Eagle (*Aquila chrysaetos*), Golden plover (*Pluvialis apricaria*), Greenshank (*Tringa Nebularia*), Hen harrier (*Circus cyaneus*), Merlin (*Falco columbarius*), Red-throated diver (*Gavia stellata*), Short-eared owl (*Asio flammeus*), Wigeon (*Anas cottish*), Wood sandpiper (*Tringa glareola*)	Adjacent
Caithness Lochs SPA	Greenland white-fronted goose (*cotti albifrons flavirostris*), Greylag goose	Adjacent
Caithness Lochs RAMSAR	Greenland white-fronted goose, Greylag goose, Whooper swan (Cygnus cygnus)	Adjacent
Caithness and Sutherland Peatlands RAMSAR	Dunlin (*Calidris alpina schinzii*), Greylag goose (*cotti cotti*), Breeding bird assemblage	Adjacent
East Halladale SSSI	Dunlin, Golden plover, Breeding bird assemblage	Adjacent
Loch Calder SSSI	Greenland white-fronted goose, Greylag goose, Whooper swan	Adjacent
Loch Scarmclate SSSI	Greylag goose	Adjacent
Broubster Leans SSSI	Breeding bird assemblage	0.4 km from search area
River Thurso SSSI	Whooper swan	1.2 km from search area
West Halladale SSSI	Black-throated diver, Common scoter, Breeding bird assemblage	2.0 km from search area
Loch Watten SSSI	Greylag goose	3.0 km from search area

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
Loch Caluim Flows SSSI	Dunlin, Golden plover, Greenshank	3.4 km from search area

Table 3-27 Potential Bird Species of Conservation Importance within the Search Area

SPECIES	CONSERVATION STATUS
Arctic skua (*Stercorarius parasiticus*)	• Red listed; and • SBL.
Arctic tern (*Sterna paradisea*)	• Annex I of EC Wild Birds Directive; • Amber listed; • Highland Biodiversity Action Plan (HBAP); and • SBL.
Barn owl (*Tyto alba*)	• Schedule 1 of WCA 1981; and • SBL.
Barnacle goose (*Branta leucopsis*)	• Annex I of EC Wild Birds Directive; • Amber listed; and • SBL.
Bar-tailed godwit (*Limosa lapponica*)	• Amber listed; and • SBL.
Bean goose (*cotti fabalis*)	• Amber listed; and • SBL.
Black guillemot (Cepphus cotti)	Amber listed
Black-headed gull (*Chroicocephalus ridibundus*)	• Amber listed; and • SBL.
Black-tailed godwit (*Limosa lapponica*)	• Schedule 1 of WCA 1981; • Red listed; and • SBL.
Black-throated diver (*Gavia arctica*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • HBAP.
Brambling (*Fringilla montifringilla*)	• Schedule 1 of WCA 1981; and • SBL.
Bullfinch (*Pyrrhula pyrrhula*)	• Amber listed; and • SBL (watching brief).
Common gull (*Larus canus*)	Amber listed

SPECIES	CONSERVATION STATUS
Common sandpiper (*Actitis hypoleucos*)	Amber listed
Common scoter (*Melanitta nigra*)	• Schedule 1 of WCA 1981; • Red listed; • SBL; and • HBAP.
Common tern (*Sterna hirundo*)	• Annex I of EC Wild Birds Directive; • Amber listed; • SBL; and • HBAP.
Corncrake (*Crex crex*)	• Annex I of EC Wild Birds Directive; • Schedule I of WCA 1981; • Red listed; • SBL; and • HBAP.
Cuckoo (*Cuculus canorus*)	• Red listed; and • SBL.
Curlew (*Numenius arquata*)	• Red listed; • SBL; and • HBAP.
Dipper (*Cinclus cinclus*)	Amber listed
Dunlin (*Calidris alpina*)	• Red listed; • SBL; and • HBAP.
Dunnock (*Prunella modularis*)	Amber listed
Eider (*Somateria mollissima*)	Amber listed
Fieldfare (*Turdus pilaris*)	• Schedule I of WCA 1981; and • Red listed.
Fulmar (*Fulmaris glacialis*)	Amber listed
Gadwall (*Anas strepera*)	Amber listed
Garganey (*Anas querquedula*)	• Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Golden eagle (*Aquila chrysaetos*)	• Annex I of EC Wild Birds Directive; • Schedule 1, A1, and 1A of WCA 1981; and • SBL. HBAP
Goldeneye (*Bucephala clangula*)	Red listed

SPECIES	CONSERVATION STATUS
Golden plover (*Pluvialis apricaria*)	• Annex I of EC Wild Birds Directive; • SBL; and • HBAP.
Goshawk (*Accipiter gentilis*)	• Schedule 1 of WCA 1981; and • HBAP.
Grasshopper warbler (*Locustella naevia*)	• Red listed; and • SBL.
Great black-backed gull (*Larus marinus*)	Amber listed
Great northern diver (*Gavia immer*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Great skua (*Catharacta skua*)	Amber listed
Greenfinch (*Chloris chloris*)	Red listed
Greenland white-fronted goose (*cotti albifrons flavirostris*)	• Annex I of EC Wild Birds Directive; • Red listed; • SBL; and • HBAP.
Greenshank (*Tringa nebularia*)	• Schedule 1 of WCA 1981; • Amber listed; and • HBAP.
Greylag goose (*cotti cotti*)	• Schedule 1/II of WCA 1981; and • Amber listed.
Grey wagtail (*Motacilla cinerea*)	Amber listed
Guillemot (*Uria aalge*)	Amber listed
Hen harrier (*Circus cyaneus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 and 1A of WCA 1981; • Red listed; • SBL; and • HBAP.
Herring gull (*Larus argentatus*)	• Red listed; and • SBL.
Hooded crow (*Corvus cornix*)	SBL
House martin (*Delichon urbicum*)	Red listed
House sparrow (*Passer domesticus*)	• Red listed; and • SBL (watching brief).

SPECIES	CONSERVATION STATUS
Kestrel (*Falco tinnunculus*)	• Amber listed; and • SBL.
Kittiwake (*Rissa tridactyla*)	Red listed
Lapwing (*Vanellus vanellus*)	• Red listed; • SBL; and • HBAP.
Lesser black-backed gull (*Larus fuscus*)	Amber listed
Linnet (*Carduelis cannabina*)	• Red listed; and • SBL.
Little tern (*Sternula albifrons*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • HBAP.
Long-tailed duck (*Clangula hyemalis*)	• Schedule 1 of WCA 1981; and • Red listed.
Mallard (*Anas platyrhynchos*)	Amber listed
Marsh harrier (*Circus aeruginosus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Meadow pipit (*Anthus pratensis*)	Amber listed
Merlin (*Falco columbarius*)	• Schedule I of WCA 1981; • Red listed; • SBL; and • HBAP.
Mistle thrush (*Turdus viscivorus*)	Red listed
Moorhen (*Gallinula chloropus*)	Amber listed
Osprey (*Pandion haliaetus*)	• Annex I of EC Wild Birds Directive; • Schedule I of WCA 1981; • Amber listed; and • SBL.
Oystercatcher (*Haematopus ostralegus*)	• Amber listed; and • HBAP.
Peregrine Falcon (*Falco peregrinus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • SBL; and • HBAP.

SPECIES	CONSERVATION STATUS
Pink-footed goose (*cotti brachyrhynchus*)	Amber listed
Pintail (*Anas acuta*)	Amber listed
Pochard (*Aythya cotti*)	• Red listed; and • SBL,
Puffin (*Fratercula arctica*)	Red listed
Purple sandpiper (*Calidris maritima*)	• Schedule 1 of WCA 1981; • Red listed; and • SBL.
Razorbill (*Alca torda*)	Amber listed
Reed bunting (*Emberiza shoeniclus*)	• Amber listed; and • SBL.
Red-breasted merganser (*Mergus serrator*)	Amber listed
Redpoll (*Acanthis flammea*)	Red listed
Redshank (*Tringa tetanus*)	• Amber listed; and • HBAP.
Red-throated diver (*Gavia stellate*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • SBL; and • HBAP.
Redwing *Turdus iliacus*)	• Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Ringed plover (*Charadrius hiaticula*)	Red listed
Sanderling (*Calidris alba*)	Amber listed
Sandwich tern (*Sterna sandvicensis*)	• Amber listed; and • SBL.
Scaup (*Aythya marila*)	• Schedule 1 of WCA 1981; • Red listed; and • SBL.
Scottish crossbill (*Loxia scotica*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; and • HBAP.
Sedge warbler (*Acrocephalus schoenobaenus*)	Amber listed
Shag (*Phalacrocorax aristotelis*)	Red listed

SPECIES	CONSERVATION STATUS
Shelduck (*Tadorna tadorna*)	Amber listed
Short-eared owl (*Asio falmmeus*)	• Annex I of EC Wild Birds Directive; • Amber listed; and • SBL.
Shoveler (*Anas clypeata*)	Amber listed
Siskin (*Carduelis spinus*)	SBL
Skylark (*Alauda arvensis*)	• Red listed; and • SBL.
Slavonian grebe (*Podiceps cottis*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Red listed; and • SBL.
Snipe (*Gallinago gallinago*)	• Amber listed; and • HBAP.
Snow bunting (*Plectrophenax nivalis*)	• Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Song thrush (*Turdus philomelos*)	• Amber listed; and • SBL.
Sparrowhawk (*Accipiter nisus*)	Amber listed
Spotted crake (*Porzana porzana*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Spotted flycatcher (*Muscicapa striata*)	• Red listed; and • SBL.
Starling (*Sturnus vulgaris*)	• Red listed; and • SBL.
Swift (*Apus apus*)	• Red listed; • SBL; and • HBAP.
Tawny owl (*Strix aluco*)	Amber listed
Teal (*Anas crecca*)	Amber listed
Tree pipit (*Anthus trivialis*)	• Red listed; and • SBL.
Tree sparrow (*Passer montanus*)	• Red listed; and • SBL.

SPECIES	CONSERVATION STATUS
Turnstone (*Arenria interpres*)	Amber listed
Twite (*Carduelis flavirostris*)	• Red listed; and • SBL.
Velvet scoter (*Melanitta fusca*)	• Schedule 1 of WCA 1981; and • Red listed.
Wheatear (*Oenanthe cottish*)	Amber listed
Whimbrel (*Numenius phaeopus*)	• Schedule 1 of WCA 1981; and • Red listed.
Whinchat (*Saxicola rubetra*)	Red listed
White-tailed eagle (*Haliaeetus albicilla*)	• Annex I of EC Wild Birds Directive; • Schedule 1, A1, and 1A of WCA 1981; • Amber listed; • SBL; and • HBAP.
Whooper swan (*Cygnus cygnus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; and • SBL.
Wigeon (*Anas cottish*)	Amber listed
Willow warbler (*Phylloscopus trochilus*)	Amber listed
Woodcock (*Scolopax rusticola*)	Amber listed
Woodpigeon (*Columba palumbus*)	Amber listed
Wood sandpiper (*Tringa glareola*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • HBAP.
Wren (*Troglodytes troglodytes*)	Amber listed
Yellowhammer (*Emberiza cottish*)	• Red listed; and • SBL (watching brief).

3.4.4.2 Summary and Key Issues

Key issues regarding terrestrial ornithology within the search areas for Caithness are listed in Table 3-28..

Table 3-28 Table Summary and Key Issues for Terrestrial Ornithology

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS EXPORT CABLE CORRIDOR SEARCH AND ONSHORE SUBSTATION SEARCH AREA
	• Protected species of birds (see Table 3-27); and • Various designations for ornithological reasons (see Table 3-26).

3.4.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-29.

Table 3-29 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Avoidance of designated sites and sensitive areas wherever possible (designated sites and semi-natural habitats important to supporting diverse bird communities of conservation importance and Schedule 1 species such as peatlands, woodlands, machair, montane habitats etc). Where impacts cannot be avoided, these will be minimalised using best available techniques.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
2	Minimising impact on cliff coastal habitats which may support nesting seabird communities associated with designated sites, or communities otherwise of conservation importance, by use of HDD where possible.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
3	Avoidance of loss of any nest sites for birds included under Schedule A1 of the Wildlife and Countryside Act 1981 (as amended) identified during site-specific surveys (see Table 3-31).	Primary	Established within the design principles and secured within the Section 36 and/or planning application, and overseen by Ecological Clerk of

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
			Works (EcoW) (see Ref 10 below).
4	Avoidance of loss or impacts on roost sites for birds included under Schedule 1A of the Wildlife and Countryside Act 1981 (as amended) identified during site-specific surveys (see Table 3 12).	Primary	Established within the design principles and secured within the Section 36 and/or planning application, and overseen by Ecological Clerk of Works (EcoW) (see Ref 10 below).
5	Minimisation of watercourse crossings.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
6	Control of diffuse pollution.	Primary	Utilisation of best practice sediment management techniques.
7	Control of point-source pollution.	Primary	Employment of best practice pollution prevention techniques.
8	Undergrounding of all cable removing risk of bird collisions and long-term or permanent loss of nesting, foraging, and/or roosting habitat along the onshore export cable corridor.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
9	Construction Environmental Management Plan (CEMP), which will outline how the Project will ensure the suitable implementation and control of the mitigation measures..	Primary	Secured within the Section 36 and/or planning conditions.
10	Ensure appropriately qualified EcoW presence at sensitive locations and/or sensitive periods.	Primary	Secured within the Section 36 and/or planning conditions.
11	Avoidance of construction during bird breeding season (as appropriate to species recorded during site-specific surveys) wherever possible,	Primary	Secured within the Section 36 and/or

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
	prioritising designated sites and sensitive areas identified.		planning conditions, and overseen by EcoW.
12	Where avoidance of construction during the bird breeding season is not possible, exclusion zones will be established around nest or lek sites confirmed during pre-construction surveys or nesting bird checks. Exclusion zones will vary depending on species identified.	Primary	Secured within the Section 36 and/or planning conditions, and overseen by EcoW.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on terrestrial ornithology and will be consulted upon with consultees throughout the EIA process.

3.4.6 Scoping of Impacts

A number of potential impacts on terrestrial ornithology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by Pre-Application Advice issued by THC (Ref 20/04850/PREMAJ issued 10/02/2021). Some impacts are proposed to be scoped out of the assessment for terrestrial ornithology. These impacts are outlined, together with a justification for scoping them out.

Table 3-30 EIA Scoping Assessment for Terrestrial Ornithology

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Direct loss of habitat used by birds for nesting, foraging, roosting, and/or other activities due to land-take	1, 2, 3, 4, 5, 6, 7, 9, 10	Scoped In	The onshore construction works will involve construction of the onshore export cable corridor and substation/switchgear, as well as hardstanding and other construction-related works, all of which would result in direct loss of habitats used by birds for nesting, foraging, roosting, and/or other activities. This could be temporary or permanent depending on the situation.	Desktop study and Project site specific surveys survey.	Desktop assessment using existing habitat data, updated by site-specific survey data.
Disturbance and damage/injury to habitats used by these animals or to individual birds	2, 3, 4, 5, 6, 7, 9, 10, 11, 12	Scoped In	The effects of disturbance to habitats are variable in their extent, depending on the nature of the disturbance and sensitivity of the habitat affected. Some disturbance types (for example, creation of temporary hardstanding areas) result in medium- to long-term disturbance with extended recovery periods. In other cases (for example, installation of cables) disturbance is short-term, and certain habitat types are able to recover quickly. Construction and decommissioning works may also cause damage to habitats and injury	Desktop study and Project site specific surveys survey.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			(which may lead to mortality) to individual birds, e.g. through trampling, damage caused by vehicles, vegetation removal etc. In addition to effects resulting from potential disturbance to habitats used by these animals, individual birds may also be disturbed by increases to noise and light levels and perceived predation risk associated with the presence of site personnel and vehicles.		
Indirect effects on habitats used by birds e.g. due to pollution or sedimentation	1, 2, 3, 4, 5, 6, 7	Scoped In	Indirect effects on habitats and species that may arise as a result of construction and decommissioning activities include hydrological effects, pollution, sedimentation and effects of dust. For example, if an access track bisects an area of bog, this can result in one half drying out. Heavy rainfall can result in silt runoff and peat slides, which may cause siltation of watercourses, while pollution of watercourses may occur as a result of chemical or fuel spillage. These could be temporary or permanent depending on the situation., and negatively affect habitats used by birds.	Desktop study and Project site specific surveys survey.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Operation and Maintenance					
Collision of birds with cables	8	Scoped Out	Birds are at risk of collision with overhead cables. However, the onshore export cable is to be underground, and so there is no risk of collision for birds.	N/A	N/A
Disturbance and damage/injury to habitats used by these animals or to individual birds	9, 10, 12	Scoped In	Human activities related to maintenance of onshore infrastructure have the potential to cause temporary and localised disturbance effects on ecological features. Due to the unpredictable nature of the requirement for maintenance works, it is difficult to determine precise effects on habitats and species. However, it is expected that maintenance activities would be infrequent and small scale, resulting in temporary disturbance effects of a lower magnitude than those during construction, likely to be of a similar level to existing human use.	Desktop study and Project site specific surveys survey.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Indirect effects on habitats used by these animals or to individual birds, e.g. due to pollution or sedimentation	5, 6, 7, 10, 12	Scoped In	Maintenance may also result in indirect effects on habitats, e.g. pollution of watercourses as a result of spillage. However, the potential for indirect effects to occur during operation is generally lower than that during construction. Without careful handling these could be long-term or permanent.	Desktop study and Project site specific surveys survey.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

3.4.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on terrestrial ornithology receptors, for example onshore windfarm projects and associated transmission infrastructure.

The context in which cumulative effects are considered depends upon the avian ecology of the habitat or species in question. For example, it may be appropriate to consider cumulative effects to bird species associated with an SPA within the context of their wider foraging range. For other ornithological features such as birds of prey, it may be appropriate to consider the effects on the local population in the context of any planned windfarms in the immediate vicinity which have the potential to cause additional effects (e.g. through collision risk).

The terrestrial ornithology CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the EIA methodology outlined in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018). The terrestrial ornithology assessment will include assessment of the combined potential cumulative effects from this Project along with other current or approved schemes.

3.4.8 Approach to Analysis and Assessment

3.4.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on terrestrial ornithology will utilise Project-specific and publicly available data (see section 1.4.2) and will be augmented by consultation during the EIA phase.

It is anticipated that consultees will include:

- THC;
- MoD;
- NatureScot;
- RSPB Scotland;
- SWT;
- HBRG; and
- Caithness Biodiversity Group.

OWPL has already undertaken some initial consultation on onshore ecology issues, including terrestrial ornithology, associated with the Project including THC and NatureScot.

Gathering of site-specific data will form a key part of the assessment. Data collected will include:

- Protected species of birds present; and
- Relevant designated sites present.

The terrestrial ornithology assessment will be based on what is considered to be the maximum design scenario for each element of the onshore Project from the maximum design envelope. This ensures that the assessment will cover the worst-case scenario and therefore the highest magnitude impact if more than one design option requires consideration. The assessment will consider direct effects i.e. effects that are made directly to a receptor, such as the effects of work activities on species and habitats, and indirect effects i.e. effects that arise as a result of a change made to a different receptor, such as a change in water flow within an area resulting from changes to groundwater flow paths from excavation works which negatively impacts nesting or foraging habitat for bird species. Note that as the onshore export cable is to be underground there will be no risk of collision to birds in flight. The assessment will mainly be qualitative in nature, as the majority of the potential impacts are not readily quantifiable, apart from habitat loss calculations. In some cases Population Viability Analysis modelling may be required to inform the assessment to determine whether impacts on species will be significant over time or cumulatively.

European sites with respect to terrestrial ornithology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with terrestrial ornithology features and assess the adverse impact on the integrity of the European site.

3.4.8.2 EIA Methodology

The terrestrial ornithology EIA will be undertaken in line with the methodology set out in Section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018) – notably the use of matrices is not compatible with these requirements of professional ecology industry best practice. The specific legislation and guidance documents outlined below in Table 3-31 will also be considered in relation to the ecology and nature conservation EIA:

Table 3-31 Legislation and Guidance for Terrestrial Ornithology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018)	Industry standard professional guidance to be followed when undertaking an EcIA including when it is part of an EIA.
A Handbook on Environmental Impact Assessment, Version 5 (SNH, 2018)	Guidance to be followed when undertaking EIA published by SNH (now NatureScot).
The Birds Directive	Annex I of Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive') lists bird species that are of conservation importance at a European level. One of the main provisions of the Directive is the identification and classification of SPAs for rare or vulnerable Annex I bird species, as well as for all regularly occurring migratory species. Legislation prohibits activities that have a negative effect on the conservation objectives of an SPA. EU Directives are transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and domestic legislation continues to be aligned after Scotland left the European Union

LEGISLATION / GUIDANCE	SUMMARY
	with the UK through The UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020.
The Wildlife and Countryside Act 1981 (as amended)	The Wildlife and Countryside Act 1981 (as amended in Scotland) is the primary legislation protecting animals, plants and certain habitats in the UK, including all wild birds and their nests, eggs and chicks. Under this legislation, it is an offence to intentionally or recklessly kill, injure or take any wild bird or their eggs, or to take, damage, destroy, obstruct or otherwise interfere with the nest of any wild bird while it is in use or being built. Additional protection of birds at or around their nests is afforded to rare breeding species in the UK, and/or species under threat of human persecution – these species are listed on Schedule 1 of the Act. Furthermore, certain Schedule 1 raptor species are afforded further protection under Schedules 1A and/or A1 of the Act: the nests of birds included on Schedule A1 of the Act are protected year round and birds included on Schedule 1A of the Act are protected from harassment year round.
Scottish Biodiversity List	The SBL is a list of habitats and species that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and (along with biodiversity lists from other UK countries) supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011).
Highland Nature Biodiversity Action Plan 2021-2026	This LBAP defines nature conservation priorities, actions, and targets for the Highlands.
UK Birds of Conservation Concern	The UK Birds of Conservation Concern (BoCC) is a periodic national review assessing the population and trends for UK breeding bird species. It uses a traffic light system to indicate an increasing level of conservation concern. Species that have a declining range and/or population, or that are vulnerable to population effects due to their small population size, are Red- or Amber-listed, depending on the extent of the decline or vulnerability, while those which are stable, increasing, or experiencing only small declines, are Green-listed. The most recent review (BoCC 5) was published in December 2021 (Stanbury *et al.* 2021). Although not a legal document, this is a useful framework within which to consider conservation status of birds.
Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment	Scottish Government Planning Advice Note regarding Environmental Impact Assessment.
Scottish Planning Policy 2014	Scottish Planning Policy.

LEGISLATION / GUIDANCE	SUMMARY
Government Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (Office of the Deputy Prime Minister [ODPM])	Statutory Obligations and their Impact within the Planning System.
Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Executive, 2004)	A strategy for the conservation and enhancement of biodiversity in Scotland.
2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Government, 2013)	An update to the strategy for the conservation and enhancement of biodiversity in Scotland described above.
The Highland Council Supplementary Guidance. Highland's Statutory Protected Species (2013)	Highland's Statutory Protected Species guidance adopted as statutory Supplementary Guidance under the Planning Etc. (Scotland) Act 2006. The guidance reflects the policy advice given in Scottish Planning Policy, and supplements Policy 58 of The Highland Council's Highland wide Local Development Plan.
Good Practice During Windfarm Construction (Scottish Renewables *et al.*, 2019)	Good Practice guidelines.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021)	Guidance from NatureScot regarding Assessing the Cumulative Impact of Onshore Wind Energy Developments.

3.4.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the Project site-specific surveys are sufficient to inform the proposed assessment approach?
- Do you agree that all relevant receptors have been identified?
- Are there any records of the identified receptors that can be provided to the assessment team?
- Do you agree with the proposed approach assessment?
- Do you agree with the impacts that have been scoped out of the EIA?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects on terrestrial ornithology?

3.4.10 References

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3.5 Land-use and Other Users

3.5.1 Introduction

This section of the Scoping Report identifies the land-use and other users receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and associated Caithness onshore substation search area, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project. The assessment includes a consideration of existing land uses, existing and planned infrastructure and recreational activities.

Information that may be considered relevant to this section is also presented within the below sections:

- Geology and hydrology, section 3.1;
- Terrestrial non-avian ecology, section 3.3;
- Terrestrial ornithology, section 3.4;
- Terrestrial archaeology and cultural heritage, section 3.6; and
- Traffic and access, section 3.9.

This section of the Scoping Report has been prepared by Xodus Group.

3.5.2 Study Area

The land-use and other users study area is defined by the total Caithness onshore export cable corridor search area and Caithness onshore substation search area. Effects on land-use and other users will be highly localised around the works, so therefore only the area that exists directly within the footprint of the works will have the potential to be affected. Therefore, this section focuses on the area that will be directly impacted by the onshore export cable corridor search area and substation search area, which extends from the potential landfall locations along the Caithness coastline between Melvich Bay in the west, Crosskirk in the east and inland to Spittal, with a current width of up to 4 km at the search areas widest point.

3.5.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the land-use and other users EIA are outlined in Table 3-32.

Table 3-32 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Highland-wide Local Development Plan	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans	2012	THC

TITLE	SOURCE	YEAR	AUTHOR
Scotland Environmental and interactive web map	https://map.environment.gov.scot/sewebmap/	2021	SEPA
Caithness and Sutherland Local Development Plan	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan	2018	THC
National scale land capability for agriculture (LCA)	https://soils.environment.gov.scot/maps/capability-maps/national-scale-land-capability-for-agriculture/	1983	Scottish Government
Pre-Application Advice	Pre-Application Advice Response	2021	THC
Google Earth	https://www.google.co.uk/intl/en_uk/earth/	2021	Google
The Highland Council Renewable Energy Wind	https://www.highland.gov.uk/info/198/planning_-_long_term_and_area_policies/152/renewable_energy/4	2021	THC

3.5.3.1 Project Site-Specific Surveys

To date, there have been site visits to the Project area in Caithness. These site visits involved a walkover of the area (Public Rights of Way and public roads) to confirm desktop sources. A Phase 1 Habitat Survey will be undertaken to inform the EIA, the results of which will inform the land-use and other users assessment.

3.5.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-32) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of land-use and other users which are likely to require consideration within the EIA are:

- Trees and woodland;
- Agricultural land;
- Infrastructure; and
- Tourism and recreation.

Socioeconomics is also a key consideration, this has been considered separately for the Project as a whole within section 2.12. Trees and woodland from an ecological perspective has also been considered within section 3.3.

3.5.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

3.5.4.1.1 Trees and Woodland

Land-use within the study area is mainly made up of improved grassland, with areas of bracken, heather moor, and blanket bog and peatlands to the west. Within the Caithness onshore export cable corridor search area and the Caithness onshore substation search area, the majority of the soil is identified as being mineral soil. There are some areas of carbon rich soils which are discussed further in section 3.1.

The majority of the Caithness onshore export cable corridor search area and the Caithness onshore substation search area are located within Class F6 for capability of forestry, with some of the area being covered by Class F5 (see Figure 3-11). Class F6 is defined as "*land with very limited flexibility for the growth and management of tree crops*". Class F5 is defined as "*land with limited flexibility for the growth and management of tree crops*". There are limited areas within the Caithness onshore export cable corridor search area and the Caithness onshore substation search area with existing woodland coverage with the majority of this is associated with the wider Broubster Forest to the northwest of the study which would be avoided at the detailed routeing stage. Some small areas of native and ancient woodland have also been identified, however would be avoided at detailed routeing or through micrositing of infrastructure. Trees and woodland as an ecological habitat is considered within section 3.3.

3.5.4.1.2 Agricultural Land

In terms of agricultural land, the Caithness onshore export cable corridor search area and the Caithness onshore substation search area covers a range of agricultural land forming a complex mosaic of different capability classes (see Figure 3-12). The majority of the Project contains Class 4.2 land, which is defined as "*land capable of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops*" and Class 4.1 "*Land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal*". There are also some areas of Class 3.2 land, being "*land capable of average production though high yields of barley, oats and grass can be obtained. Grass leys are common*", Class 5.2 "*land capable of use as improved grassland. Few problems with pasture establishment but may be difficult to maintain*", Class 5.3 "*Land capable of use as improved grassland. Pasture deteriorates quickly*", Class 6.2 "*Land capable of use as rough grazings with moderate quality plants*" and Class 6.3 "*Land capable of use as rough grazings with low quality plants*".

3.5.4.1.3 Tourism and Recreation

There are a number of tourism and recreational receptors as well as residential receptors within the wider study area particularly along the northern Caithness coastline, including coastal settlements that draw tourists to the area to visit as part of the North Coast 500. The Caithness onshore export cable corridor search area will pass within close proximity of some small settlement areas that could be affected during the construction phase of the Project.

Consideration of the currently adopted Caithness and Sutherland LDP, indicated that the Caithness onshore export cable corridor search area and the Caithness onshore substation search area are situated within the wider 'Areas for Energy Business Expansion' strategy area, which recognises the potential for marine renewable energy generation and seeks to maximise opportunities arising from offshore renewables including employment-generation.

3.5.4.1.4 Infrastructure

Since the early sixties the nuclear power station at Dounreay has underpinned the economy of Caithness and was at one time the largest employer in Caithness. The local economy is heavily dominated by Dounreay nuclear facility and its spin-off industries. Similarly, Vulcan NRTE is located immediately to the west of the Dounreay site, another key employer in the region. Both facilities are currently set for decommissioning with Dounreay's programme currently underway.

A number of onshore wind farm sites overlap with the onshore export cable corridor search area in varying stages of development from under construction to early planning. Figure 3-13 outline the onshore wind farms that overlap with the Caithness onshore export cable corridor search area and the Caithness onshore substation search area.

Table 3-33 Onshore Wind Farms within the Study Area

NAME	STATUS	NUMBER OF TURBINES	TURBINE SIZE (KW)
Ackron Wind Farm	In Planning	12	4,100
Drum Hollistan 2	In Planning	7	5,000
Limekiln Extension	Scoping/Screening	7	5,000
Limekiln Extension	In Planning	5	4,200
Limekiln Resubmission	Under Construction	24	3,000
Baillie Wind Farm	Constructed	21	2,500
Forss Extension	Scoping/Screening	2	4,200
Forss Wind Farm Extension	Scoping/Screening	5	1,950
Forss Wind Famr 1	Constructed	2	2,000
Forss Wind Farm 2	Constructed	3	5,200
Hill of Lybster	Consented	1	500
Forss Windfarm Extension 3	In Planning	2	4,200
Cairnmore Hill Wind Farm	In Planning	8	4,200
Dale Farm	Scoping/Screening	2	4,300

Existing services, utility and electrical apparatus, particularly underground cables and overhead lines in the vicinity of energy and industrial developments, including the cluster of current and proposed substations around Doureay and the existing SHET-L substation at Spittal will also be considered.

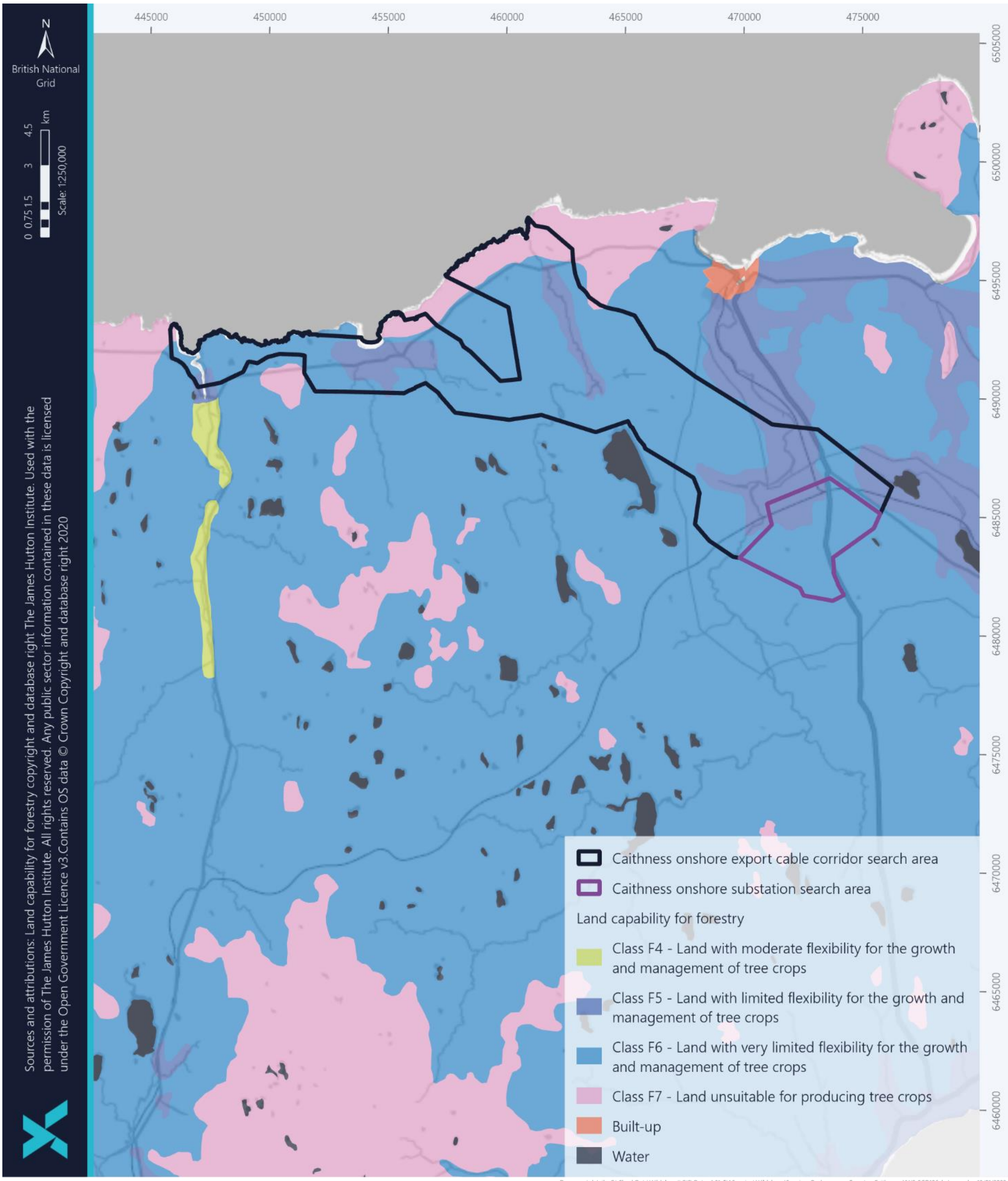

Figure 3-11 Land Capability of Forestry in the Study Area

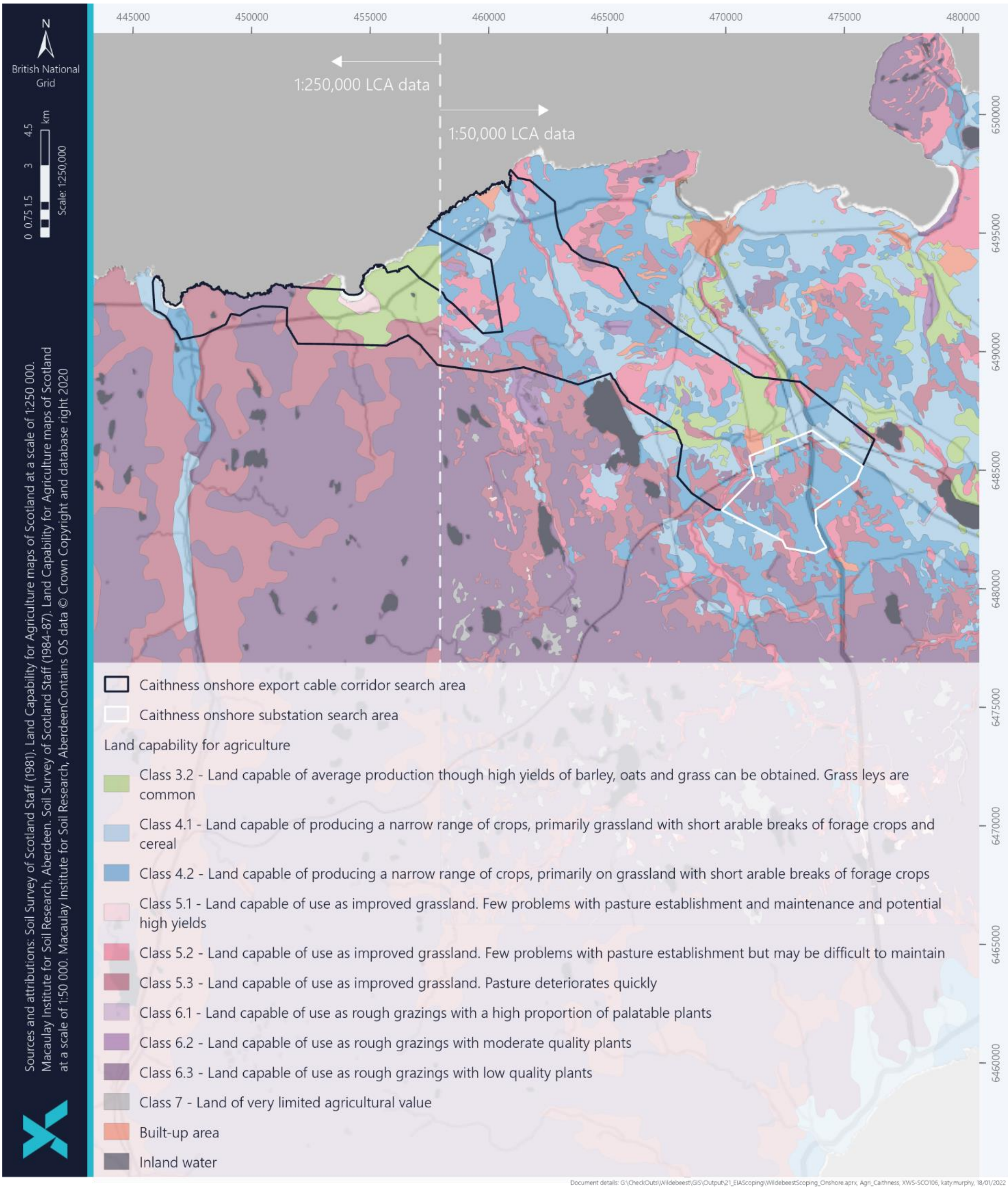

Figure 3-12 Land Capability of Agriculture in the Study Area

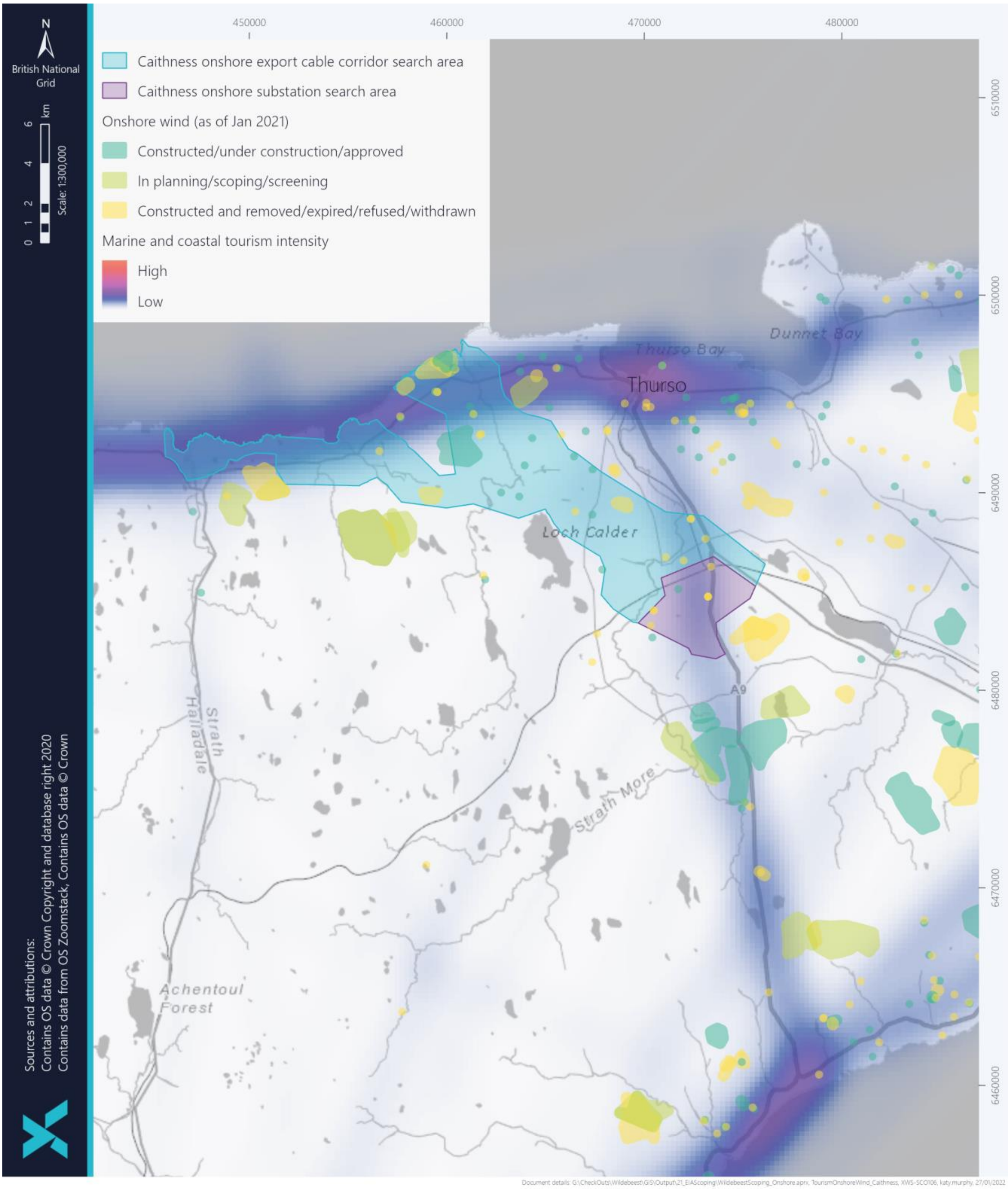

Figure 3-13 Onshore Wind Farms and Marine and Coastal Tourism Intensity in the Study Area

3.5.4.2 Summary and Key Issues

Table 3-34 Summary and Key issues for Land-use and Other Users

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND CAITHNESS ONSHORE SUBSTATION SEARCH AREA
	• Overlap with the Broubster Forest located to the northwest of the study area; • The study area covers a range of agricultural land forming a complex mosaic of different capability classes; • Proximity to tourism and recreational receptors as well as residential receptors, including coastal settlements that draw tourists to the area to visit as part of the North Coast 500; and • Proximity to other onshore infrastructure, including onshore wind farms and associated transmission infrastructure, the Dounreay nuclear facility and spin off industries.

3.5.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-35. The full EIA will be used to establish appropriate project specific mitigation (if relevant).

Table 3-35 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	The final proposed cable corridor will avoid areas of high agricultural or forestry value.	Primary	Established within the design principles and secured within the final Section 36 and/or planning application.
2	Following construction, agricultural land not required through the operational phase will be reinstated to ensure it can return to agricultural use.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
3	The land take for the Project will be kept to the minimum necessary for safe construction and operation of the works.	Primary	Established within the design principles and Section 36 consent and/or planning application.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
4	Close liaison with affected landowners will be maintained during planning, and construction phases to ensure they are fully aware of proposals and sequence of construction activities and how these could interact with planned farm and other activities.	Tertiary	Established within the project communication plan and Section 36 consent and/or planning conditions.
5	Water supplies for livestock will be protected at all times and alternative supplies will be provided where access could be compromised by any works.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
6	All reasonable precautions will be taken during construction to avoid as far as is possible, the spreading of soil borne pests and diseases, and animal and crop diseases. Precautions as recommended by the Scotland's Environment and Rural Services will be observed.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
7	A Soil Resource Management Plan (SRMP) will be developed in detail prior to construction to ensure that soil resources are managed in accordance with best practice.	Tertiary	The preparation of an SRMP will be a consent condition. The plan will be developed by the contractor and agreed with THC.
8	If required, a PMP will be developed and form part of the wider mitigation measures within the CEMP.	Tertiary	The preparation of an PMP will be consent condition. The plan will be developed by the contractor and agreed with THC.
9	Where compensatory planting or new planting will take place, this will be undertaken at a time which takes account of the needs of the landowner, the progress of the works and the suitability of the time for establishing new planting.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
10	Although the avoidance of forestry is inherent in routeing design, any tree felling within the existing shelterbelt will be planned to reduce the risk of wind throw. Felling works will be supervised by a qualified forester.	Tertiary	Established within the design principles and procedure outline within the CEMP, a condition of Section 36 and/or planning consent.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
11	An Access Management Plan (AMP) will be developed to be included in the wider CEMP in conjunction with THC and through consultation with local stakeholders.	Tertiary	The preparation of an AMP will be planning condition. The plan will be developed by the contractor and agreed by THC.
12	Avoidance of third-party infrastructure during the detailed routeing stage where practicable. Where crossings are required consultation with asset operators will be undertaken and suitable crossing or proximity agreements entered into.	Tertiary	Established within the design principles and secured within the final application.
13	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on land-use and other users and will be consulted upon with consultees throughout the EIA process.

3.5.6 Scoping of Impacts

A number of potential impacts on land-use and other users have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received 10/02/2021). None of the potential impacts are proposed to be scoped out of the assessment at this stage, as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 3-36 EIA Scoping Assessment for Land-use and Other Users

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Temporary and permanent loss of agricultural land and soils including peatland	1, 2, 3, 4, 5, 6, 7, 8, 13	Scoped In	The Project may result in a temporary or permanent loss of agricultural land and soils during construction and decommissioning. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Changes in agricultural activity and type of land-use	1, 2, 3, 4, 5, 6, 7, 8, 13	Scoped In	The construction and decommissioning of the Project may result in change of agricultural activity and type of land-use. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Temporary and permanent loss of forestry	1, 3, 4, 5, 9, 10, 13	Scoped In	The construction and decommissioning of the Project may result in an adverse impact on existing woodland. The site has some areas of woodland along the route corridor and substation location, including ancient	Desk study and site-specific surveys including Phase 1 habitat survey.	Desk study calculating potential area of impact based on the maximum design scenario.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			woodland. Further assessment is required.		
Interference with recreation/tourism and/or residential receptors	11, 13	Scoped In	Construction and decommissioning may temporarily hinder the recreation and tourism activities in the area as well as impact local residential land-use	Desk top study using existing available information, supported by consultation.	Desk top qualitative assessment.
Temporary impacts on third-party infrastructure, including utilities.	12, 13	Scoped in	There is the potential for temporary impacts as well as the requirements to cross third-party infrastructure, including on utility and other underground apparatus, during construction and decommissioning.	Desk study with reference to publicly available information supported by consultation with asset operators and local stakeholders.	Desk top qualitative assessment.
Operation and Maintenance					
Long term loss of agricultural land and soils including peatland	1, 2, 3, 4, 5, 6, 7, 8	Scoped In	The Project may result in a long-term loss of agricultural land. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Long term changes in agricultural activity and type of land-use	1, 2, 3, 4, 5, 6, 7, 8	Scoped In	The Project may result in change of agricultural activity and type of land-use. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Long term loss of forestry	1, 3, 4, 5, 9, 10,	Scoped In	The Project may result in an adverse impact on existing woodland. The Project area has a significant covering of trees, including ancient woodland. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Long term interference with recreation/tourism and/or residential receptors	11	Scoped Out	Operation and maintenance activities are considered to be minor. The export cables will be buried and therefore not interfere within receptors.	N/A	N/A
Long term impacts on third-party infrastructure, including utilities	12	Scoped Out	Operation and maintenance activities are considered to be minor. The export cables will be buried and therefore not interfere within receptors.	N/A	N/A

3.5.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on land-use and other user receptors. For example onshore wind farms and associated transmission infrastructure. These effects will likely be localised around the Caithness onshore export cable corridor search area and the Caithness onshore substation search area. The land-use and other users Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

3.5.8 Approach to Analysis and Assessment

3.5.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on land-use and other users will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase and build on the advice already provided from Highland Council through their pre-application advice service. Consultation will be undertaken with but not limited to:

- THC;
- Farming groups;
- Local tourist and activity groups;
- Third party asset operators; and
- Local landowners.

A desk-top study will be undertaken using publicly available source of information and consultation responses with relevant bodies. This desk-top study will be supplemented by site-specific surveys to confirm desk-top sources. Assessments will be undertaken qualitatively based on the maximum design scenarios of the Project and consider both direct and indirect impacts. The predicted significance of effects will be determined based on the relationship between the magnitude of impact and the sensitivity of the receptor through a standard method of assessment based on professional judgement and the application of appropriate evaluation criteria.

3.5.8.2 EIA Methodology

The land-use and other users EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-37 will also be considered in relation to the ecology and nature conservation EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 3-37 Legislation and Guidance for Land-use and Other Users

LEGISLATION / GUIDANCE	SUMMARY
National planning policy on agriculture – Scottish Government's Scottish Planning Policy (SPP) (2014)	Policy statement on how nationally important land-use planning matters should be addressed across the country.

LEGISLATION / GUIDANCE	SUMMARY
A future strategy for Scottish agriculture: final report (2018)	A report from the Scottish Government's Agriculture Champions on the development of a future agriculture strategy.
Land use – getting the best from our land: strategy 2021 to 2026 (2021)	Scotland's Third Land Use Strategy setting out the Scottish Government's vision, objectives and policies to achieve sustainable land-use.
Highland-wide Local Development Plan – Policy 37	Development in the Wider Countryside
Highland-wide Local Development Plan – Policy 42	Previously Used Land
Highland-wide Local Development Plan – Policy 51	Trees and Development
Highland-wide Local Development Plan – Policy 52	Principle of Development in Woodland
Highland-wide Local Development Plan – Policy 55	Peats and Soils
The Scottish Soils Framework (Scottish Government, 2009)	The Scottish Soil Framework sets out the vision for soil protection in Scotland.
Scotland's Forestry Strategy 2019–2029	The Scottish Government's long-term framework for the expansion and sustainable management of Scotland's forests and woodland.
Joint SEPA, NatureScot and FCS guidance on Use of Trees Cleared to Facilitate Development on Afforested Land	This is joint guidance from the SEPA, NatureScot and Forestry Commission Scotland (FCS) on use of trees cleared to facilitate development on afforested land.

3.5.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

3.5.10 References

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The Highland Council (2018) Caithness and Sutherland Local Development Plan (Adopted 2018), Available at: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan.

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The James Hutton Institute (1983) Land Capability for Agriculture (LCA), available at: https://www.hutton.ac.uk/learning/natural-resource-datasets/landcover/land-capability-agriculture.

Scottish Government (1983) National scale land capability for agriculture, Available at: https://soils.environment.gov.scot/maps/capability-maps/national-scale-land-capability-for-agriculture/.

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The Scottish Government (2010). The Marine (Scotland) Act. Available at: https://www2.gov.scot/Topics/marine/seamanagement/marineact.

3.6 Terrestrial Archaeology and Cultural Heritage

3.6.1 Introduction

This section of the Scoping Report identifies the terrestrial archaeology and cultural heritage receptors of relevance to the onshore aspects of the Project for the Caithness export cable corridor search area and associated Caithness onshore substation search area, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the proposed Project.

Historic environment assets are defined within *The Ancient Monuments and Archaeological Areas Act 1979* as:

> "*any building, structure or work above or below the surface of the land, any cave or excavation; any site comprising the remains of any such building, structure or work or any cave or excavation; and any site comprising or comprising the remains of any vehicle, vessel or aircraft or other movable structure or part thereof*" (Section 61 (7)),

with the additional definition of "*anything, or group of things, that evidences previous human activity*" derived from section 14 of the *Historic Environment (Amendment) (Scotland) Act 2011*.

Information that may be considered relevant to this section is also presented within the below sections:

- Geology and hydrology, section 3.1;
- Land-use and other users, section 3.3;
- Landscape and visual, section 3.10; and
- Marine archaeology and cultural heritage, section 2.9.

This section of the Scoping Report has been prepared by the Orkney Research Centre for Archaeology (ORCA).

3.6.2 Study Area

The terrestrial archaeology and cultural heritage study area is defined by the area that will be directly impacted by the onshore landfalls, buried cable routes, the Spittal substation and any other associated terrestrial infrastructure (see Figure 3-14, Figure 3-15 and Figure 3-16).

There will be separate study areas for identifying potential impacts on the setting of historic environment assets. These have yet to be defined but will include assets up to 60 km from the offshore turbine deployment area, which is addressed in the offshore scoping, section 2.9. The potential for impacts on the setting of onshore heritage assets caused by the cables and other associated onshore infrastructure including substations will be addressed once design details, such as indicative heights and locations of built infrastructure, are more fully developed. As indicative ZTVs are developed, consultation will be undertaken with statutory stakeholders (Historic Environment Scotland and The Highland Council) to ensure a suitable study area is agreed.

3.6.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this scoping report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 3-38. The Canmore entries in the table, statutory lists, registers and designated areas, including Lists of Scheduled Monuments and Listed Buildings have been used to inform this Scoping Report. Any other data sources used are referenced in the text.

Table 3-38 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
The National Record of the Historic Environment (NRHE) of Scotland	Canmore (https://canmore.org.uk/) and Pastmap database (http://pastmap.org.uk/)	Ongoing	Historic Environment Scotland
Historic Environment Record (HER)	Highland HER https://her.highland.gov.uk/	Ongoing	THC
Ordnance Survey Historic Map Collection	https://maps.nls.uk/	Ongoing	National Library of Scotland
Old and New Statistical Accounts of Scotland	https://digital.nls.uk/learning/ cottish-enlightenment/statistical-account/	1791-1845	National Library of Scotland
Statutory lists, registers and designated areas, including Lists of Scheduled Monuments, Listed Buildings, Gardens and Designed Landscapes and Battlefield Areas	The Historic Environment Scotland Data Portal https://portal.historicenvironment.scot/	Ongoing	HES
Conservation Areas	https://www.highland.gov.uk/	Ongoing	THC
Historic documentary and cartographic sources	Caithness Archive Centre, Wick https://www.highlifehighland.org/ nucleus-nuclear-caithness-archive/archive-collections-held-at-nucleus/ Highland Archive Centre, Inverness https://www.highlifehighland.com/highland-archive-centre/	Ongoing	THC

3.6.3.1 Project Site-Specific Surveys

A full desk-based study of the data sources listed above in Table 3-38 and other relevant sources, including surveys undertaken in the area for other projects, if available will be undertaken. In addition, walkover surveys, will be undertaken by an appropriately qualified and experienced team of archaeologists, to assess the current state of previously identified heritage assets, to identify any previously unrecorded heritage assets that are visible on the ground, and to assess the potential for undisturbed archaeological remains to be present within the project boundary.

3.6.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-38) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment and inform the Scoping process. This appraisal has been completed in accordance with the relevant sections of the CIfA *Standard and Guidance for historic environment desk-based assessment* (2014, revised January 2020).

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

- Scheduled Monuments;
- Listed Buildings; and
- Undesignated sites of local or regional importance, including peat.

3.6.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND ONSHORE SUBSTATION SEARCH AREA

There are twenty designated Scheduled Monuments within the Caithness onshore export cable corridor search area, and these are distributed throughout the search area (see **Table 3-39**, **Figure 3-14**, **Figure 3-15** and **Figure 3-16**). Sixteen of the Scheduled Monuments are prehistoric in date and include nine chambered tombs or cairns of Neolithic date, and eight Iron Age brochs. The remaining Scheduled Monuments are all medieval in date and include two chapels (SM 2658; SM 90086) and Braal castle (SM 619). Also designated are two Pictish carved stones (SM 616) which were recovered in 1853 and 1911 and set in their current location at Sandside House.

There are 27 designated Listed Buildings within the Caithness onshore export cable search area (see **Table 3-40**, **Figure 3-14**, **Figure 3-15** and **Figure 3-16**), three of which are Grade-A. These date from the eighteenth century, the earliest probably being the parish church at Reay (LB 14992). The walled garden and pavilion at Bighouse (LB 7160) were built in the mid-eighteenth century and the extensive ranges of buildings at Sandside House (LB 14986), comprising a cottage, byres, a dairy, a kiln barn and an implement shed were built in the late eighteenth and early nineteenth century with the kiln barn being the earliest surviving structure.

There are 510 undesignated sites in the export cable search area listed in the Canmore database and these will require consideration by the EIA. The Highland Council HER will contain a similar amount, mostly overlapping with the Canmore sites. These include over 100 prehistoric sites, ranging from burial cairns and burial mounds, brochs, hut circles, cists, standing stones, burnt mounds and fields systems. These include some 200 post-medieval sites, ranging from vernacular farmsteads, agricultural buildings, chapels, toll houses, bridges and field boundaries. There are over 30 medieval sites, including villages, churches and burial grounds. There are 20 20th-century sites, including observation posts and a Home Guard hideout. Almost 100 sites are of uncertain nature and date.

There are six designated Scheduled Monuments within the Caithness onshore substation search area (**see Table 3-41** and **Figure 3-16**). These are all located towards the south corner of the search area around Achanarras. There is a grouping of two cairns (SM 2400; SM 2401) and a hut circle (SM 1402) of prehistoric date close to an Iron Age broch (SM 2235), with another prehistoric cairn (SM 475) and further hut circles approximately 500 m to the south.

Close to Spittal Mains is the site of St Magnus' chapel (SM 5413), a medieval site with upstanding remains. There is also an associated graveyard and a hospital which was recorded in a Royal Charter of 1476 and demolished in the nineteenth century. The site was on the pilgrimage route associated with the martyred St Magnus of Orkney.

There are no Listed Buildings within the Caithness onshore substation search area.

There are 67 undesignated sites listed in the Canmore database and these will require full consideration by the EIA. The Highland Council HER will contain a similar amount, mostly overlapping with the Canmore sites. Almost all of these comprise post-medieval farmsteads and agricultural buildings.

There is moderate potential for areas of deep peat to be present in the Caithness onshore export cable corridor search area, while not running through the Flow Country per se. Such peat can contain paleoenvironmental evidence of the full paleoenvironmental history of the area after the last Ice Age. There is a rich history of paleoenvironmental study in Caithness with the peat of the Flow Country providing anaerobic deposits suitable for palynological and plant macrofossil study to investigate the changing vegetation landscape of this region (e.g. Peglar, 1979; Robinson 1987; Charman, 1994; Dawson and Smith, 1997), providing a general understanding of environmental change during the Holocene and reflecting wider landscape change.

A deposit that is also of interest from this area of northern Scotland is a layer of silty sand and marine shell that was laid down around 8,200 BP and is evidence of the Storegga tsunami extreme event that has been recorded in sediment sequences from northern Shetland to as far south as north east England (Smith *et al*., 2004). This often thin layer has been recorded in sediments in the lower Wick valley (Dawson and Smith 1997), below the intertidal peat in Dunnet Bay (McIllvenny et al., 2013) and at Strath Halladale, west of Dounreay (Dawson 1999).

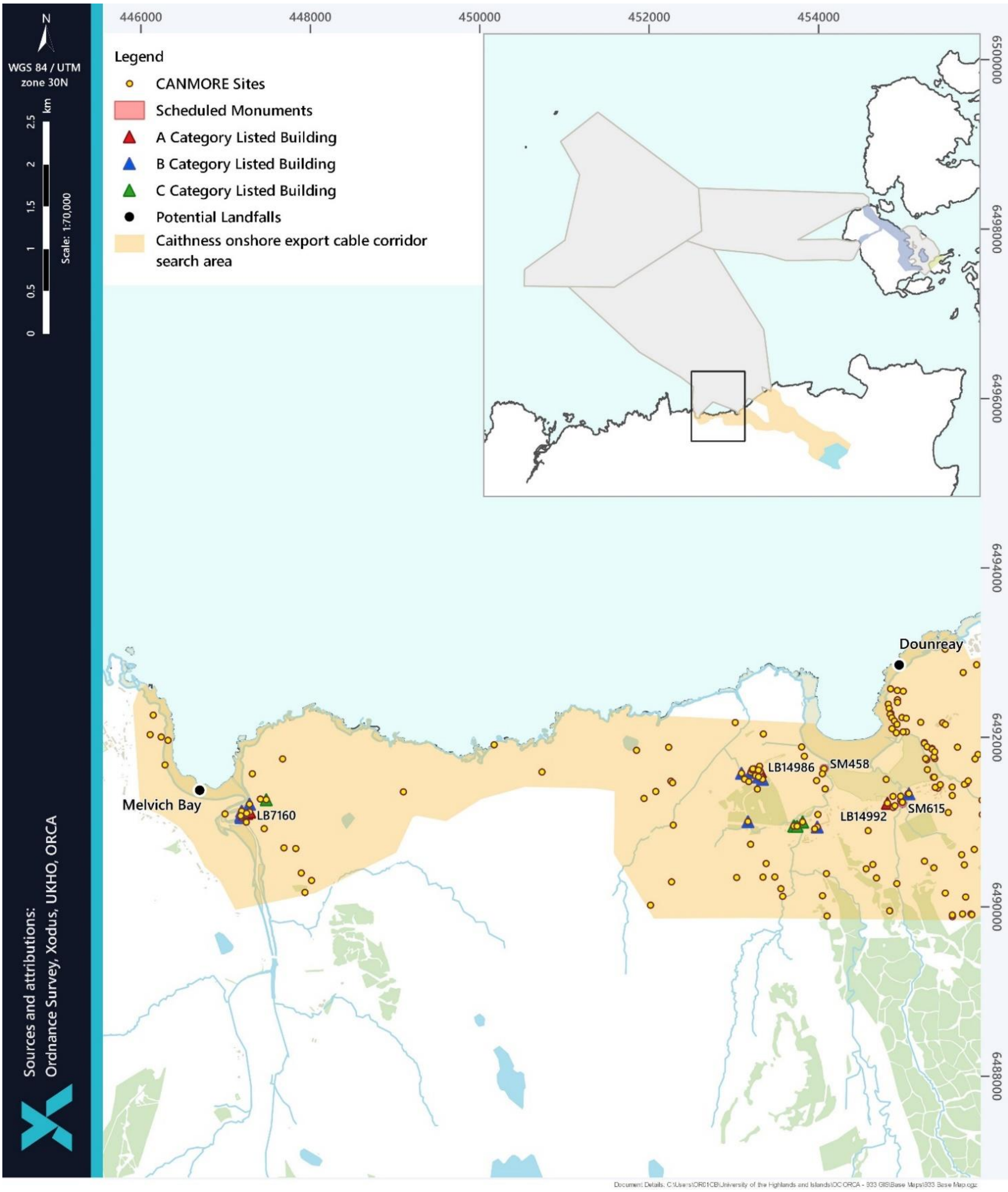

Figure 3-14 Identified Sites in the Melvich Bay to Dounreay Section of the Caithness Onshore Export Cable Corridor Search Area

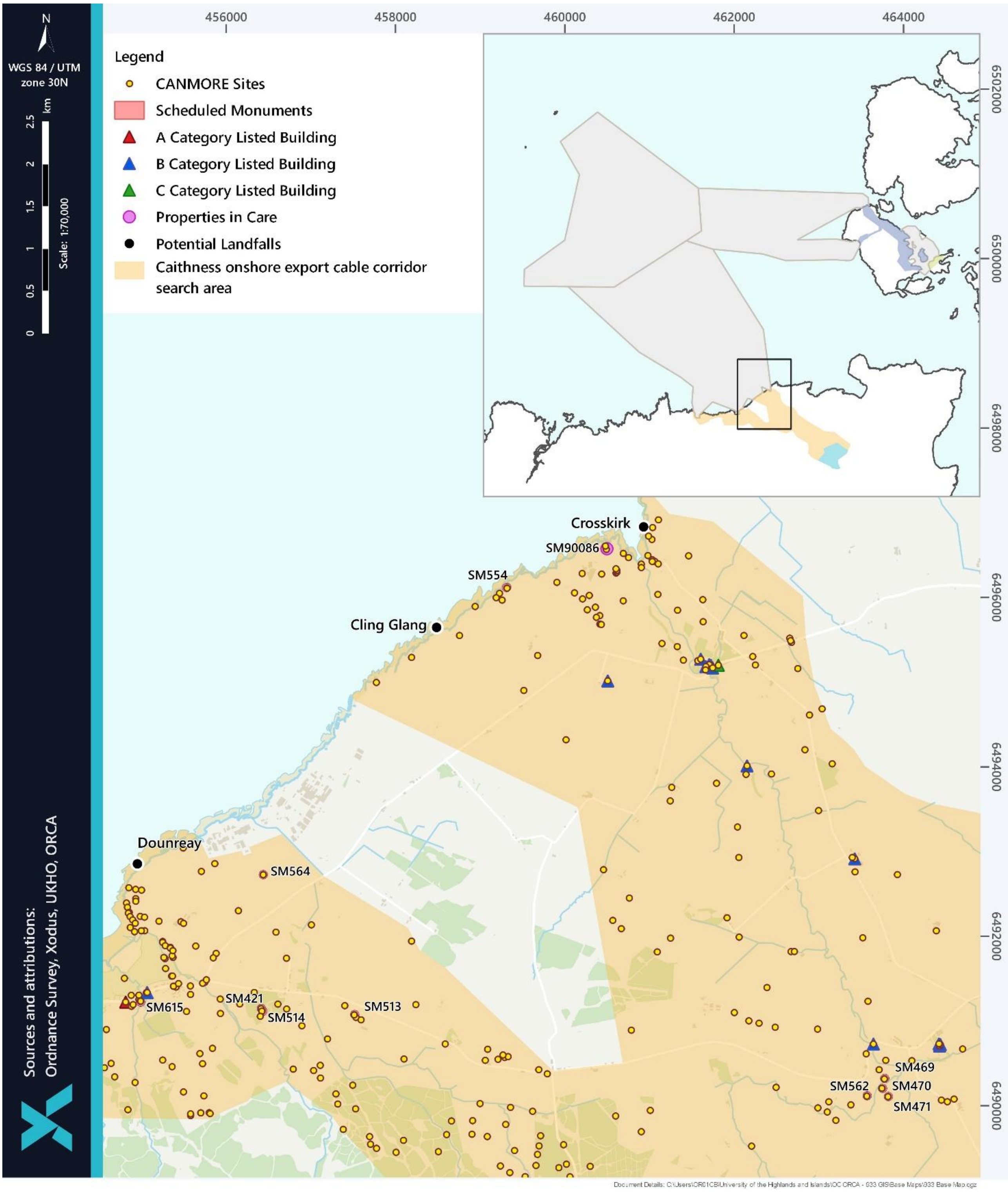

Figure 3-15 Identified Sites in Northern Section of the Caithness Onshore Export Cable Corridor Search Area

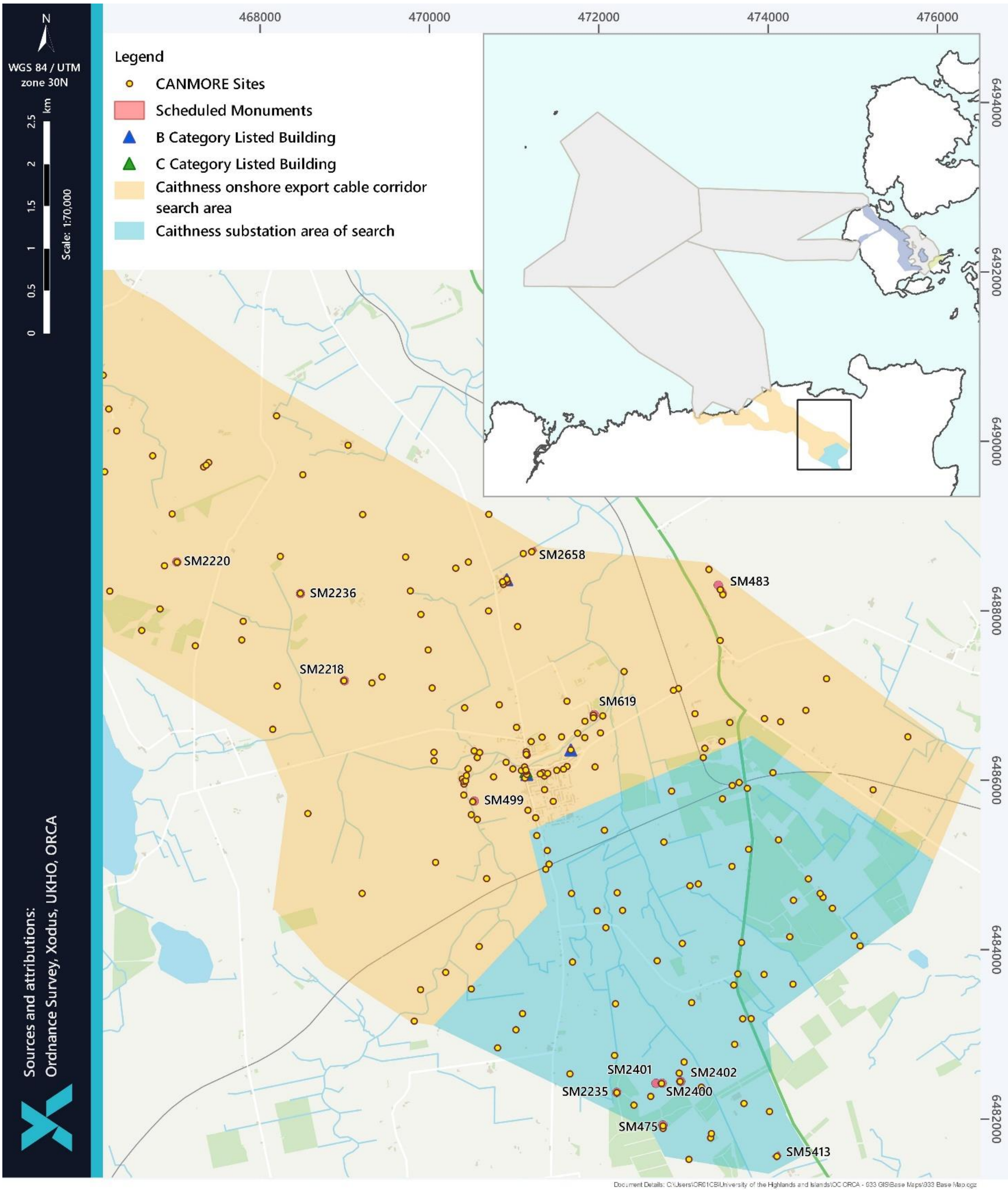

Figure 3-16 Identified Sites in Southern Section of the Caithness Onshore Export Cable Corridor Search Area and Caithness Onshore Substation Search Area

Table 3-39 Designated Scheduled Monuments within the Caithness Onshore Export Cable Corridor Search area

NAME	TYPE	NGR	SAM NO.	DESCRIPTION	PERIOD
SANDSIDE HOUSE	CARVED STONES	NC 95193 65169	SM616	Two carved stones of Early Historic date, both in the garden of Sandside House, Reay. Both are regarded as being Pictish with one being an example of a Class I type.	Late Iron Age/ Early Medieval
KNOCK STANGER	CAIRN	NC 95994 65240	SM458	The mound is about 18 m in diameter and 4 m high, composed of dune sand with a substantial body of stone also present.	Prehistoric
REAY	BURIAL GROUND, OLD CHURCH AND CROSS-SLAB	NC 96908 64819	SM615	A burial ground containing a burial aisle which incorporates the remains of a medieval church and housing a cross-slab dating from the late ninth or the tenth century.	Medieval
ACHVARASDAL HOUSE	BROCH	NC 98352 64687	SM514	Broch, dating to between 600BC and AD 400, visible as a substantial grassy mound with exposed interior walls, located on a flat-topped low rise of ground north of Achiegullan Burn.	Iron Age
ACHVARASDAL HOUSE	TWO STONES	NC 98332 64729	SM421	Two monoliths which have evidently been standing stones at one time lie fallen some 50 m NE of the garden at Achvarasdal Lodge.	Prehistoric
KNOCK URRAY	BROCH	NC 98383 66304	SM564	Grass covered mound 27 m in diameter and 3 m high.	Iron Age
ACHUNABUST	BROCH	NC 99432 64637	SM513	The remains of a broch surviving as a turf-covered mound 1.3 m high which has been extensively quarried so that the broch shape is destroyed. The mural cell with its entrance to the broch interior survives.	Iron Age
GREEN TULLOCHS	BROCH AND CAIRN	ND 01300 69644	SM554	The broch remains as a grass-covered circular enclosure 2.7 m maximum height, strewn with large numbers of rubble stones. It has been destroyed in the N by coastal erosion revealing the outer wall face. Human skeleton found in 1815.	Prehistoric/ Iron Age
UPPER SOUR	BROCH	ND 10855 60557	SM2218	The remains of a broch surviving as a mound surmounting a larger mound, all overgrown with rough grass. The broch mound is about 18 m diameter and 1.5 m high but it is truncated on N side by ploughing, and mutilated by surface quarrying. A content of slabs is exposed in N flank.	Iron Age
NORTH CALDER	BROCH	ND 10351 61597	SM2236	Broch situated on a small hillock within an arable field, visible as a grassed-over mound approximately 3.5 m in height	Iron Age
FRAMSIDE	BROCH	ND 08902 62000	SM2220	Possible broch consisting of a grass-covered circular mound 5 m high in which no trace of walling is visible. Despite this an estimated diameter of about 16 m has been suggested. Outworks are reported.	Iron Age
ST THOMAS'S CHAPEL	CHAPEL	ND 13102 62064	SM2658	Ruined medieval parish church 19 x 6 m on a natural hillock within a disused graveyard. Upright cross slab some 2 m from the chapel, another removed and in Thurso Museum.	Medieval (?)
ST MARYS CHAPEL	CHAPEL, BROCH	ND 02493 70114	SM90086	The site comprises the roofless remains of the chapel of St Mary (which may date from the twelfth century) within a burial ground, together with the adjacent remains of a broch and its outer defensive works.	Iron Age, Medieval
KNOCKGLASS	BROCH	ND 05474 63585	SM562	Grass-covered mound 18.5 m in diameter and 2 m high and standing on a flat-topped knoll [1]; the outer scarp of the mound shows signs of walling. There are suggestions of outer defences and two concentric stretches of curved wallface 2.3 m apart, on the south-east and one course high, have been interpreted as parts of the outer face of the broch and of the inner face of the first-floor intra-mural gallery.	Iron Age
MILL OF KNOCKGLASS	CAIRN	ND 05658 63669	SM470	A round cairn, probably a chambered tomb of Neolithic date, in an area between ploughed fields and the east bank of Forss Water.	Neolithic

NAME	TYPE	NGR	SAM NO.	DESCRIPTION	PERIOD
MILL OF KNOCKGLASS	LONG CAIRN	ND 05685 63787	SM469	A long cairn, oriented NE-SW and c.40 m long, located on a rise on the west bank of the Forss Water.	Neolithic
MILL OF KNOCKGLASS	CHAMBERED CAIRN	ND 05725 63572	SM471	A round cairn, probably a chambered tomb, 11 m in diameter in an area that has been left uncultivated.	Neolithic
TULLOCH OF MILTON	CHAMBERED CAIRN	ND 12368 59118	SM499	Chambered cairn now measures 31 by 24 m and 1.7 m high. Only the nine stones in the S half can be identified and these suggest two chambers. Severely robbed.	Neolithic
BRAAL CASTLE	CASTLE	ND 13798 60120	SM619	Braal Castle occupies a bank on the north side of the River Thurso, first mentioned in 1375 when it was resigned to King Robert II by a claimant to the Earldom of Caithness.	Medieval
GALLOW HILL	LONG CAIRNS, CHAMBERED CAIRN	ND 15289 61620	SM483	Two long cairns and a single round chambered cairn.	Neolithic

Table 3-40 Designated Listed Buildings within the Caithness Onshore Export Cable Search Area

NAME	TYPE	NGR	LB NO.	CATEGORY	DESCRIPTION	PERIOD
SANDSIDE HOUSE	COTTAGE AND DAIRY, BYRE, KILN BARN, IMPLEMENT SHED	NC 95216 65234	LB14986	A	Byres, cottage and dairy; long single storey range of buildings running north/south from kiln barn. Probably late 18th-early 19th century. All rubble with tooled rubble dressings. Kiln Barn; probably mid 18th century, south arm of L-plan range. Implement shed; mid 19th century. All rubble tooled with rubble dressings.	18th and 19th century
BIGHOUSE	GARDEN PAVILION AND WALLED GARDEN	NC 89201 64831	LB7160	A	Garden pavilion; mid-18th century, small square 2-storey, 3-bay garden pavilion. Harl pointed rubble, polished ashlar dressings and margins. Walled garden; high coped rubble garden walls. Mid 18th century square channelled ashlar gate piers, with cornice and square cap.	Mid 18th century
REAY PARISH CHURCH	CHURCH AND ENCLOSURE WALL	NC 96733 64822	LB14992	A	T-plan, built 1739 with alterations in 1933.Harled with ashlar dressings and margins. Retains original seating plan.	18th century
"THE BARRACKS", BIGHOUSE	HOUSE	NC 89099 64766	LB7161	B	Dated 1738. Small 2-storey, 3-bay house with well advanced outer bays forming U-plan. Harl pointed rubble, ashlar margins.	18th century
BIGHOUSE	HOUSE, GARDEN WALLS AND WEST GATE PIERS	NC 89115 64815	LB7159	B	Austere mansion of 2 storeys, mid/later 18th century, with earlier/mid 19th century alterations and additions. Garden walls; coped rubble wall encloses west and north, including rear service court and offices. Gate piers; pair square mid-18th century chanelled ashlar gate piers with cornice and square caps.	18th and 19th century
	ICEHOUSE		LB7162	B	Large tall cylindrical rubble ice house built into hillside.	Early 19th century
	STEADING		LB7140	C	U-plan single storey steading with south facing court enclosed by later semi-circular coped rubble wall.	Late 19th century
BRIDGE OF FORSS	BRIDGE	ND 03724 68663	LB14926	B	Two-span bridge with later widening in south side.	18th/ 19th century
TOLLHOUSE, FORSS	TOLLHOUSE	ND 03792 68693	LB14924	C	Single storey, 3-bay cottage with white-washed rubble walls.	19th century

NAME	TYPE	NGR	LB NO.	CATEGORY	DESCRIPTION	PERIOD
FORSS HOUSE	HOUSE	ND 03585 68768	LB14923	B	Double house of 2 storeys and dormerless attic over raised basement. Harled with tooled ashlar margins.	19th century
WEST MILL, FORSS	MILL	ND 03644 68681	LB14990	B	Two-storey mill built into side of north-facing bank. Rubble, irregular wide, single-storey, 2-bay south front with entrance in right and single loft door breaking wallhead at left.	Early 19th century
EAST MILL, FORSS	MILL AND MILLER'S HOUSE	ND 03684 68702	LB14925	B	Mill range with miller's house abutting southeast gable of mill.	Early 19th century
OLD BRIDGE OF FORSS	HUMPBACK BRIDGE	ND 04113 67501	LB44721	B	Single, high round-arched humpback bridge. Rubble construction with squared voussoirs, banked abutments.	Mid 18th century
OLD PARISH CHURCH, HALKIRK	PARISH CHURCH AND BURIAL GROUND	ND 13522 59695	LB7801	B	Simple T-plan church. All harled rubble with tooled ashlar dressings and margins.	Mid 18th century
CHURCH, BRIDGE STREET, HALKIRK	CHURCH AND GATE PIERS	ND 12993 59423	LB7799	B	Rectangular church with Italian Romanesque west gable facade.	19th century
ROSS INSTITUTE, BRIDGE STREET, HALKIRK	BUILDING, GATE PIERS AND WALLS	ND 12984 59459	LB7800	C	Tall symmetrical Baronial-style, 2-storey, 5-bay building, with central advanced tower; coursed tooled rubble, ashlar dressings. Presented to Halkirk by Mr John Ross of Dunedin, New Zealand and late of Halkirk.	Early 20th century
LYBSTER FARM	STEADING	ND 02483 68529	LB14991	B	L-plan steading with cottage and stable.	Mid 19th century
LYTHMORE FARM	STEADING	ND 05369 66385	LB14953	B	Symmetrical 2-storey, 7-bay west-facing range; rubble, tooled rubble dressings.	Early-mid 19th century
MARKET CROSS	MARKET CROSS	NC 95900 64553	LB18831	B	Plain shaft with cross bar.	16th/ 17th century
BRACKSIDE BRIDGE	BRIDGE	NC 95728 64615	LB14981	C	Twin arch bridge; rubble; paired dressed rubble arch rings; dressed rubble triangular cut-waters and parapet cope; shallow end buttresses; splayed approaches.	Early-mid 19th century
REAYBURN HOUSE	DWELLINGS	NC 96988 64930	LB17592	B	Range of 3 houses, now 1 dwelling. All rubble, rubble dressings; centre doors to each 3-bay house.	Early-mid 19th century
REAY VILLAGE	SMITHY COTTAGE AND STEADING RANGE	NC 95629 64567	LB14982	C	Single storey range of cottages, 9 irregular bays, now as one dwelling. All whitewashed rubble, tooled rubble dressings.	Early-mid 19th century
SANDSIDE HOUSE	DWELLING	NC 95215 65155	LB14984	B	East-facing portion built 1751, extended in 19th century to form H-plan building. All harled with ashlar dressings and margins.	Mid 18th century
SANDSIDE LODGE	DWELLING	NC 95083 64629	LB14987	B	Single storey 3-bay gate lodge; coursed rubble, tooled dressings.	Late 19th century
SKINNET HOUSE	DWELLING	ND 12791 61726	LB10812	B	East facing symmetrical 2-storey, 3-bay house with flanking single storey, 2-bay wings and symmetrical rear elevation. All harled rubble. The remains of the chapel of St Thomas (SM 2658) are northeast of house.	Late 18th century
WESTFIELD LODGE	DWELLINGS AND DOVECOTE	ND 06338 64160	LB7796	B	Symmetrical 2-storey, 5-bay double pile house (rear pile possibly slightly later addition). Harled with ashlar margins. Cote with centre door in base and loft door in first floor. Pyramidal roof.	Mid-late 18th century

NAME	TYPE	NGR	LB NO.	CATEGORY	DESCRIPTION	PERIOD
BRIDGE OF WESTFIELD	BRIDGE	ND 05557 64194	LB7795	B	high 2-arch rubble bridge, WITH arches of differing sizes. dressed rubble arch rings, the wider and higher spanning Forss Water, the second spanning field as flood arch.	Early 19th century

Table 3-41 Designated Scheduled Monuments within the Caithness Onshore Substation Search Area

NAME	TYPE	NGR	SAM NO.	DESCRIPTION	PERIOD
ST MAGNUS' CHURCH	CHAPEL, BURIAL GROUND AND HOSPITAL	ND 15881 54875	SM5413	The remains of St Magnus' church, hospital and graveyard, first recorded in 1476, situated on the farm of Spittal Mains.	Medieval
ACHIES	BROCH	ND 13999 55653	SM2235	Large grassy mound some 46.8 m in diameter and 3.7-4.3 m high. There is a central mound c. 23.8 m in diameter – presumably the broch – on top of a flat platform which projects from under the mound as a terrace 3.7-6.1 m wide. The mound has been dug into from the south-east and human remains were found in 1850. There are traces of a surrounding wall or rampart with an outer ditch.	Iron Age
THE SHEAN	CAIRN	ND 14539 55257	SM475	Subcircular, grass-covered mound 12 m in diameter, with a central depression 2 x 2.25 m.	Prehistoric/ Neolithic
ACHANARRAS	CAIRN B	ND 14464 55754	SM2401	Probable cairn, in a similar topographic position to and 75 m W of 'A'. It survives to a height of 1 m.	Prehistoric/ Neolithic
ACHANARRAS	CAIRN A	ND 14539 55757	SM2400	Cairn surrounded by five prostrate stones, situated at the foot of Achanarras Hill in marshy open moorland. 10.0 m in diameter and 0.5 m in height.	Prehistoric/ Neolithic
ACHANARRAS	HUT CIRCLE	ND 14753 55770	SM2402	Grass and heather covered hut circle 13 m diameter. Entrance in west.	Prehistoric

3.6.4.2 Summary and Key Issues

Table 3-42 Summary and Key Issues for Terrestrial Archaeology and Cultural Heritage

	PROJECT COMPONENT
	CAITHNESS EXPORT CABLE CORRIDOR SEARCH AND ONSHORE SUBSTATION SEARCH AREA
SUMMARY AND KEY ISSUES	• All Scheduled Monuments and Listed Buildings require avoidance; • Key issues may include how the onshore export cable corridor avoids particular sites, such as the dense area of sites in the vicinity of Reay village and Crosskirk; • Sites that have not been designated may still be of local, regional or national importance and require avoidance or mitigation of impacts; • There is at least moderate potential for buried archaeology to be present in the export cable corridor search area that may require identification and investigation; • There is moderate potential where there are peat deposits for them to contain paleoenvironmental information and obscure archaeological sites at the base of the peat; • There is moderate potential for submerged peat and tsunami deposits and archaeological sites to be present in sheltered intertidal (and littoral onshore) zones, such as Melvich Bay and Sandside Bay near Dounreay; and • A key issue will be how to mitigate and manage impacts and cumulative impacts on the setting of onshore historic environment assets by the substation.

3.6.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the historic environment. These measures will follow best practice and are outlined within Table 3-43.

Table 3-43 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Pre-construction desk-based assessment, walkover surveys will be conducted to identify any sensitive receptors and micro site around them.	Primary	Final export cable routes and substation location will be outlined in the Project Plans, submitted as part of the Section 36 / planning application.
2	Substation location, cable routing and installation activities including temporary infrastructure such as access routes, laydown areas and compounds, will avoid all designated assets and wherever possible any heritage assets identified as a result of conducting historic environment desk based	Primary	Final export cable routes and substation location will be outlined in the Project Plans, submitted as part of the

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
	assessment using data sources identified and archaeological walkover surveys. Where avoidance is not possible, appropriate mitigation strategies will be developed in consultation with the statutory authorities.		Section 36 / planning application.
3	Reinstatement of terrain and ground cover to avoid any impacts on the setting of historic assets by the underground onshore export cables.	Primary	Reinstatement methods and requirements will be outlined within the Design Statement for the planning application and implemented through planning conditions.
4	Operations, Maintenance and Decommissioning activities will ensure no further disturbance outwith ground already disturbed during the Construction phase and thus no further disturbance to historic environment assets.	Tertiary	Operations and maintenance activities will be included in the Design Statement for the planning application. A decommissioning programme is required under Section 105 of the Energy Act 2004 (as amended).
5	The preparation of appropriate Written Schemes of Investigation (WSIs), which may include archaeological intrusive evaluations, watching briefs and excavations, and a Protocol for Accidental Discoveries (PAD) to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest.	Tertiary	Production of WSIs and PAD will be developed during the EIA process and outlined within the Construction Method Statement.
6	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on historic environment receptors and will be consulted upon with consultees throughout the EIA process.

3.6.6 Scoping of Impacts

A number of potential impacts on onshore historic environment receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received

10/02/2021). Any of impacts proposed to be scoped out of the assessment for historic environment receptors will also be outlined below, together with a justification for scoping them out. Specific concern was expressed by HES that the potential for direct impacts on designated heritage assets are avoided where possible (HES west of Orkney Windfarm Pre-Application Advice Response 26/11/2020 HES Care ID 300047487).

The main direct environmental impacts and associated pathways of effect for onshore historic environment receptors have been identified in Table 3-44. This will ensure that all major development activities will be considered and provides structure for the identification of the significance of any potential effects on cultural heritage receptors.

Table 3-44 EIA Scoping Assessment for Onshore Caithness Historic Environment

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Loss of or damage to known historic environment assets	1, 2, 5, 6	Scoped In	During construction and decommissioning, any aspects of the substation, export cable and associated infrastructure that cuts into the ground surface has the potential to result in the damage/loss of archaeological features. Effects are considered to be permanent. Although known sites will be avoided, impacts cannot be scoped out until the information required to inform the assessment has been collected, reviewed, and suitable mitigation and management plans formulated.	Desk based survey of existing data sources alongside site-specific walkover survey.	Desk based assessment considering the maximum design scenario of the Project.
Loss of or damage to unknown historic environment assets	1, 4, 5, 6	Scoped In	During construction and decommissioning, any aspects of the substation, export cable and associated infrastructure that cuts into the ground surface have the potential to result in the damage/loss of unknown archaeological features. Effects are considered to be permanent. Impacts cannot be scoped	Desk based survey of existing data sources identifying potential for unknown assets to be present below the ground surface alongside site-specific walkover survey results.	Desk based assessment considering the maximum design scenario of the Project.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			out until the information required to inform the assessment has been collected, reviewed, and suitable mitigation and management plans formulated.		
Loss of or damage to deposits of paleoenvironmental interest	4, 5, 6	Scoped In	During construction and decommissioning, any aspects of the substation, export cable and associated infrastructure that cuts into peat have the potential to result in the damage/loss of paleoenvironmental deposits. Effects are considered to be permanent. Impacts cannot be scoped out until the information required to inform the assessment has been collected, reviewed, and suitable mitigation and management plans formulated.	Desktop-study on paleoenvironmental interests.	Desk based assessment considering the maximum design scenario of the Project.
Operation and Maintenance					
Loss of or damage to known historic environment assets	4	Scoped Out	Scoped out on the assumption that operation and maintenance activities will ensure no further disturbance outwith ground already disturbed during the construction phase and thus no further disturbance to historic environment assets, direct impacts can be scoped out.	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Loss of or damage to unknown historic environment assets	4	Scoped Out	Scoped out on the assumption that operation and maintenance activities will ensure no further disturbance outwith ground already disturbed during the construction phase and thus no further disturbance to historic environment assets, direct impacts can be scoped out.	N/A	N/A
Loss of or damage to deposits of paleoenvironmental interest	4	Scoped Out	Scoped out on the assumption that operation and maintenance activities will ensure no further disturbance outwith ground already disturbed during the construction phase and thus no further disturbance to historic environment assets, direct impacts can be scoped out.	N/A	N/A
Long-term changes to the setting of historic environment assets	N/A	Scoped In	There is a possibility that the substation and associated infrastructure could have long-term effects on the setting of an onshore historic environment asset, impacting the way in which the asset is understood, appreciated and experienced, and thus the significance/ importance of the historic asset.	Maximum design details, ZTVs, identification of assets and their setting, wireframes, and visualisations from key receptors.	Assessment to follow HES *Managing Change in the Historic Environment: Setting*, (2020).
Temporary changes to the setting of	3	Scoped Out	Temporary impacts on setting due to the presence of construction plant,	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
historic environment assets			reinstatement of the underground export cable corridor or maintenance visits are not considered significant and have been scoped out.		

3.6.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on historic environment receptors. For example from offshore wind farms and associated transmission infrastructure. The onshore historic environment CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in sections 1.4.2 and 1.4.3.

The EIA will include consideration of the potential cumulative impact (direct and indirect) of the Project and other developments on the onshore historic environment, including other utility cable projects for telecoms and electricity. These effects will be localised, however there is also potential for cumulative effects if cable routes and landfalls converge.

Potential cumulative impacts on the setting of onshore historic environment assets by the substation will be considered, including SHET-L's Spittal converter station.

3.6.8 Approach to Analysis and Assessment

3.6.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on the historic environment will utilise Project-specific and publicly available data (see 3.4.2) and will be augmented by consultation during the EIA phase. Consultees will include:

- Marine Scotland;
- HES; and
- THC.

The approaches used to identify and analyse the historic environment baseline and assess the potential impacts will be in accordance with standards and guidelines produced by the Scottish Government, HES, the Licensing and Planning Authorities and the CIfA, and take into account the advice supplied by HES (received 26/11/2020, HES Care ID 300047487) and THC's Historic Environment Team in their Pre-Application Advice Response (Ref: 20/04850/PREMAJ, Date of Issue: 10/02/2021), which concerned impacts on setting and impacts on buried archaeological sites. Evaluations of archaeological potential are preferred in advance of submitting a planning application, although such work could be carried out as a condition of any consent that may be granted.

The desk-top data sources that will be examined for the onshore Orkney EIA baseline characterisation are outlined in section 4.4.3 above. Site-specific desk-top, walkover surveys will be conducted for the Project. Datasets will be reviewed and analysed with a view to identifying previously unidentified assets visible on the surface, the potential for unknown archaeological sites and paleoenvironmental deposits to be present below the surface. The surveys will be conducted to appropriate professional standards for archaeological review (as outlined in relevant CIfA Standards and Guidances CIfA regulations, standards and guidance | Chartered Institute for Archaeologists; and The Highland Council *Standards For Archaeological Work* (2012), https://www.highland.gov.uk/downloads/file/1022/standards_for_archaeological_wok;).

The relative importance (e.g. national, regional, local) or sensitivity (high, medium, low) of each cultural heritage asset identified in the datasets will be assessed (with reference to Historic Environment Scotland Designation Policy and Selection Guidance 2019).

In terms of setting, statutorily designated assets including Scheduled Monuments, Listed Buildings, Gardens & Designed Landscapes, and Conservation Areas within 30 km of the boundary of the substation (possibly less, depending on the height and visibility of the substation) and within the ZTV, will be identified using HES datasets downloaded from https://portal.historicenvironment.scot/downloads. Consideration will also be given to any sites outwith the ZTV that may be affected. In order to keep the size of the assessment reasonable and proportionate, it is proposed that a selection of designated sites and areas, such as Scheduled Monuments and Listed Buildings, will be considered rather than every such site and area, which can act as proxy for the range of effects on other designated and undesignated sites. Relevant non-designated sites will be identified in consultation with the local planning authority archaeologists. The importance of sites and sensitivity of setting will be identified using HES *Managing Change in the Historic Environment: Setting*, (2020) and HES 2019, *Designation Policy and Selection Guidance*, including Annexes. Key receptors for viewpoints, visualisations, photomontages, and wireframes will be agreed with the Landscape and Visual consultants and the statutory authority and produced according to standard best practice guidance (Landscape Institute & IEMA *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), 3rd edition 2013; and SNH (now NatureScot) *Visual Representation of Wind Farms Guidance*, v2.2, 2017).

The potential effects of the Project on the historic environment assets identified by the baseline assessment will be undertaken with reference to SNH (now NatureScot) & HES's *Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*, (V5, 2018). The assessment approach will be based on the maximum design scenario for the Project and will consider both direct and indirect impacts, and long-term effects, as appropriate.

3.6.8.2 EIA Methodology

The EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-45 will also be considered in relation to the EIA. The methodologies used in the investigation will be in accordance with standards and guidelines produced by the Scottish Government, HES, the Licensing and Planning Authorities and the CIfA.

Specific detailed methodology for the marine historic environment will be agreed in consultation with statutory stakeholders.

Table 3-45 Legislation and Guidance for the Historic Environment

LEGISLATION / GUIDANCE	SUMMARY
The European Convention on the Protection of the Archaeological Heritage (revised), known as the Valletta Convention	Contains provisions for the protection of archaeological heritage both underwater and on land, preferably in situ, but with provisions for appropriate recording and recovery if disturbance is unavoidable.

LEGISLATION / GUIDANCE	SUMMARY
The European Landscape Convention (ratified by the UK government in 2006)	Promotes the protection, management and planning of landscapes, including the historical and cultural aspects of landscapes.
The Ancient Monuments and Archaeological Areas Act 1979	Concerns sites that warrant statutory protection due to being of national importance and are Scheduled under the provisions of the Act. The Act is administered in Scotland by Historic Environment Scotland.
Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 and amendments	Planning authorities, prior to granting planning permission, consult with Historic Environment Scotland as a statutory consultee on any development proposals that may affect the site or setting of a Scheduled Monument, an A-Listed building, an Inventoried Garden or Designed Landscape, or an Inventoried Historic Battlefield. This means that the presence of such sites within the area of a proposed development and the protection of the setting of sites are material considerations in the planning process. The setting of non-designated sites and B- and C-Listed buildings is also a consideration in the planning process.
Scottish Planning Policy (SPP) 2014, revised in 2020	States that authorities should protect archaeological sites and monuments (and a range of other historic assets) and related settings as an important, finite and non-renewable resource and preserve them in situ wherever possible. Where preservation in situ is not possible, authorities should ensure that developers undertake appropriate excavation, recording, analysis, publication and archiving before and/or during development. If archaeological discoveries are made during any development, they should be reported to the authority to enable discussion on appropriate mitigation measures. Change should be sensitively managed in order to best avoid or minimise adverse impacts on the fabric and setting of heritage assets.
The Historic Environment Policy Statement for Scotland (HEPS) 2019	Includes policies that decisions affecting any part of the historic environment require understanding of its significance and consideration of avoiding or minimising detrimental impacts.
Historic Environment Scotland Designation Policy and Selection Guidance 2019	Stands alongside HEPS 2019 and outlines the principles and criteria that underpin the designation of historic environment assets.
Historic Environment Scotland Managing Change in the Historic Environment Guidance Series: Setting (revised in 2020)	Planning authorities are guided to this Guidance which states that "Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance. Planning authorities must take into account the setting of historic assets or places when drawing up development plans and guidance, when considering environmental and design assessments/statements, and when making decisions on planning applications."

LEGISLATION / GUIDANCE	SUMMARY
The Highland-Wide Local Development Plan (2012) https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan	A material consideration in the determination of relevant planning applications. Highland-Wide LDP 2012 Policy 57: Natural, Built & Cultural Heritage includes that development with potential to have significant adverse effects must not have unacceptable impacts or show that the impact is clearly outweighed by social, economic, environmental or safety benefits.
Highland Historic Environment Strategy Supplementary Planning Guidance 2013 https://www.highland.gov.uk/downloads/download/727/highland_historic_environment_strategy	Supplements the Highland-Wide LDP 2012 in more detail.
The Caithness and Sutherland Local Development Plan (2018) https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan	States that 'Safeguarding and promoting appreciation of valued historic environment assets, by taking account of key historic features in choosing sites to allocate for development and in setting requirements for developers'.
The Chartered Institute for Archaeologists (CIfA) *Codes, Standards and Guidance* (various, updated 2020) CIfA regulations, standards and guidance | Chartered Institute for Archaeologists	CIfA has developed a range of Regulations, Standards and guidance that are binding on all members and Registered Organisations to ensure that CIfA members work to high ethical and professional standards.
The Highland Council *Standards For Archaeological Work* (2012), https://www.highland.gov.uk/downloads/file/1022/standards_for_archaeological_wok)	This document seeks to set practical standards for a consistent approach to the management of the historic environment in Highland.
Historic Environment Scotland. 2016 (revised 2020). *Managing Change in the Historic Environment guidance series*, especially the *Setting* guidance notes	This document is part of a series of non-statutory guidance notes about managing change in the historic environment. They explain how to apply the policies in the Historic Environment Policy for Scotland.
Scottish Natural Heritage & Historic Environment Scotland. 2018. *Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental*	The Handbook is intended to provide competent authorities, statutory consultees and others involved in the EIA process with practical guidance and a ready source of information about the process.

LEGISLATION / GUIDANCE	SUMMARY
Impact Assessment process in Scotland. V5. Edinburgh	
Oxford Archaeology & George Lambrick Archaeology and Heritage. 2008. *Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy*, commissioned by COWRIE Ltd (project reference CIARCH-11-2006)	Guidance on the assessment of cumulative impacts on the historic environment arising from offshore renewable energy projects.
The Crown Estate. 2021 *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects*, Wessex Archaeology Ltd for The Crown Estate	Guidance document outlining the latest requirements and responsibilities for the historic environment.
The Crown Estate. 2014. *Protocol for Archaeological Discoveries: Offshore Renewables Projects*, Wessex Archaeology Ltd for The Crown Estate	Protocol for archaeological discoveries.

3.6.9 Scoping Questions

- Do you agree that the identification of what constitutes the baseline historic environment is adequate?
- Do you agree that the sources listed for conducting a desk based assessment to identify the baseline historic environment are sufficient?
- Do you agree that the surveys proposed will be sufficient to provide an adequate assessment of the baseline historic environment?
- Are any historic environment assets not identified that you would like to see included in the EIA?
- Do you agree with the EIA approach and methodology?
- Do you agree with the potential impacts scoped in and out?
- Do you agree with the approach to identifying sites whose setting may be impacted by the substation and other associated onshore infrastructure and are there any specific sites you wish to see addressed?
- Do you agree that the potential impacts identified are sufficient and are there any missing?
- Do you agree that the embedded mitigations proposed for the Project will provide suitable means by which to manage and mitigate the potential effects of the Project on the historic environment?
- Do you agree that the approach to data gathering and assessment is adequate for the provision of an EIA on which informed licensing and planning decisions can be made?

3.6.10 References

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3.7 Air Quality

3.7.1 Introduction

This section of the Scoping Report identifies the air quality receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area to Spittal and associated grid connection (Caithness onshore substation search area), and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project. The primary focus of the scoping assessment will therefore be the generation of dust and other emissions, especially in dry and windy conditions and the potential impacts of this on human health. A standalone GHG assessment will also be completed and appended to the EIA (see section 1.4.6.3), to investigate the potential for both carbon savings and the avoidance of gaseous discharges associated with climate change, as well as the carbon cost of Project development activities.

Information that may be considered relevant to this section is also presented within the below sections:

- Terrestrial non-avian ecology, section 3.3;
- Terrestrial ornithology, section 3.4;
- Land-use and other users, section 3.5; and
- Traffic and access, section 3.9.

This section of the Scoping Report has been prepared by Xodus Group.

3.7.2 Study Area

The air quality study area is defined by the Caithness onshore export cable corridor search area and the Caithness onshore substation search area. The Caithness onshore export cable corridor search area has been developed forming broad corridors between the potential landfalls and the Caithness grid connection at Spittal. The Caithness onshore export cable corridor search area has been based on significant routing work, which considered key technical, environmental and land-use constraints. The Caithness onshore substation search area at Spittal is located near to the existing SHET-L Spittal substation. A 100 m for ecological receptors, and 500 m buffer, for human receptors, around the study area has been assumed for the purpose of the assessment. This buffer is inclusive of the preferred 350 m buffer for the identification of human receptors, and 50 m for ecological receptors as specified by the IAQM, 2014 Guidance on the Assessment of dust from demolition and construction.

Climate change issues associated with carbon dioxide are on a global scale, hence no specific study area has been defined for this aspect of the assessment. Nonetheless, carbon emissions associated with the Project will be accounted for within the EIA Report once final decisions on the Project design envelope are made

3.7.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 3-46.

Table 3-46 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
2019 Air Quality Annual Progress Report (APR)	http://www.scottishairquality.scot/assets/documents//Highland_Council_APR_2019.pdf	2019	THC
Highland 2020 Annual Report	http://www.scottishairquality.scot/assets/documents//Highland_annual_2020.html	2020	THC
Highland-wide Local Development Plan Planning Policies (Policy 73 – Air Quality)	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan	2012	THC
Air Quality in Scotland	http://www.scottishairquality.scot/laqm/aqma	2021	Air Quality in Scotland

3.7.3.1 Project Site-Specific Surveys

To date, there have been site visits to the Project area in Caithness. These site visits involved a walkover of the area to confirm desktop sources and confirmation of existing key contributors to air quality. Further site visits will take place during the EIA, however it is not proposed that any baseline air quality measurements are required as with the mitigation measures implemented, it is predicted that there will be no significant effects on air quality.

3.7.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-46) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment, including the presence of receptors sensitive to air quality, and to inform the Scoping process. The key receptors for air quality, which are likely to require consideration within the EIA are:

- Protected species;
- Areas of conservation or scientific interest;
- Residential areas; and
- Areas of natural beauty;

3.7.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

The only AQMA in the THC area is in Inverness City Centre approximately 121 km (75 miles) south of the study area and therefore not relevant to the assessment for the Project. THC have three automatic air quality monitoring sites; these are in Inverness, Fort William and Strath Viach. Through 2018 there was an additional 29 non-automatic monitoring sites for Nitrogen Dioxide utilising passive diffusion tubes in Inverness, Dingwall and Fort William (The Highland Council, 2019). All of THC monitoring locations are too far from the study area to be representative of the study area. However, the lack of monitoring would suggest that there are no air quality issues in the area. Additionally, the study area is currently largely farmland and as such is assumed to have a relatively high air quality level.

Existing local sources of particulate matter and dust likely includes windblown dust from agricultural land, exhaust emissions from road vehicles, active quarries in the area (see section 3.5) and the nuclear plant activities and plant vehicles.

The Dounreay and Vulcan nuclear sites are located adjacent to the Project. DSRL is undergoing a programme of decommissioning including building demolition, which could give rise to dust. The Vulcan NRTE shut down in July 2015 for the final time and as such it can be presumed that this site will also be moving into a decommissioning phase and could give rise to dust associated with demolition activities. Adjacent to the development there is also the onshore cable landfall of the Pentland Floating Wind Farm export cable.

The Lieurary Quarry is an active Quarry in located within the onshore export cable search area, the quarry itself is targeted for Caithness flagstone. Both the workshop and processing facilities are located on-site. While the Lieurary Quarry and its associated facilities are small in comparison to other quarries, operations would still have the potential to give rise to dust.

Wind speed and wind direction will influence the dispersion of dust and particulate matter from the onshore project works. Wind direction is predominantly southwesterly, and wind speeds are generally in the range of 9 – 9.4 ms (CMWF's ERA5 global climate model). The average wind speed across the UK (2001-2020) is 4.2 ms-1 (Statista, 2021), indicating that the study area of Caithness is a particularly windy environment.

Additionally, the grain size of superficial deposits may also influence dust dispersal radius. As described in section 3.1, the main soil types encountered within the vicinity of the study area are found to be namely mineral gleys, peaty podzols, peat and brown soils. The actual materials encountered during excavations will depend on the final onshore cable routing and substation placement, however it is noted that the larger particle size materials (sand and gravel) are less likely to give rise to dust. Clay based material, is more likely to give rise to dust due to its small particle size.

Within the study area, human and ecological receptors have been identified, in line with IAQM 2014 and IAQM 2020 guidance, that have the potential to be impacted by dust and particulate matter within the search area and close to the area. The findings are summarised in Table 3-47.

Table 3-47 Receptors Screened for Potential Impacts from Air Quality issues in the Vicinity of the Study Area

RECEPTOR TYPE	*WITHIN STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Present within 500 m of the study area	• Melvich Primary School; • Halkirk Primary School; and • Raey Primary School.
Residential Properties	Present within 500 m of the study area	• Multiple residential properties are located within the Project area

RECEPTOR TYPE	*WITHIN STUDY AREA BUFFER	SPECIFIC RECEPTOR
Non – Residential Properties	Present within 500 m of the study area	• St Marys Chapel; • Forss Business & Energy Park; • GS Donn Mechanical Maintenance & Repairs; • JGC Engineering Technical Services; • Lieurary Quarry (active); • Achscrabster Farm Cottage; • Bardnaclavan Farm; • Westfield Timber Supplies; • Forss House Hotel; • Melvich Hotel; • Scottish SPCA; and • The Halladale Inn & North Coast Touring Park.
Amenity Areas	Present within 500 m of the study area	• North Coast 500 Route; • Shinval Garden Centre; • Brims Castle; • Reay Golf Course; • Sandside Bay Beach; • Melvich Beach; • Mackay Country Landmark; • Puffin Cove (Drumhollistan); • Loch na Moine; • Loch Hollistan; • Lochan Buidhe; • Loch Calder; • Cnoc an Fhreiceadain Long Cairns; • North Coast 500 Route; and • Achanarras Quarry.
Designated Sites	Present within 100 m of the study area	• Caithness and Sutherland Peatlands (SAC); • Loch Lieurary (SSSI); • Westfield Bridge (SSSI); • Achanarras Quarry (SSSI); • Banniskirk Quarry (SSSI); • Spittal Quarry (SSSI); • Loch Calder (SSSI); • Caithness Lochs (SPA); • Broubster Leans (RSPB & SSSI); • Sandside Bay (SSSI);

RECEPTOR TYPE	*WITHIN STUDY AREA BUFFER	SPECIFIC RECEPTOR
		• Red Point Coast (SSSI); • Strathy Coast (SSSI); • Caithness Cliffs (SSSI); • North Caithness Cliffs (SPA); • Ushat Head (SSSI); and • Newlands of Geise Mire (SSSI).
Red Data List Species*	Not present within 100 m of the study area.	N/A
Carparks	Present within 500 m of the study area.	• St Mary's Chapel Car Park; and • North Coast Touring Park.

**Ecology receptors present within designated sites and Red Listed Species are only considered if present within the 100 m buffer, as per the 2014 IAQM guidance.*

The baseline concentration for the study area has been taken from the Scottish Government and DEFRA background concentration maps for the 1 km x 1 km grid squares that cover the study area. The average mean concentration for NO_2 is 1.70 µG/M^3, for PM_{10} is 5.42 µg/m^3 and for $PM_{2.5}$ is 3.17 µG/M^3. The baseline NO_x concentration is relevant for sensitive ecological receptors. All background concentrations within the study area are significantly below the annual mean AQSs of 30µG/M^3 for NO_x, 40µG/M^3 for NO_2, 18µG/M^3 for PM_{10} and 10µG/M^3 for $PM_{2.5}$.

3.7.4.2 Summary and Key Issues

Table 3-48 Summary and Key Issues for Air Quality

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AND CAITHNESS ONSHORE SUBSTATION SEARCH AREA
	• The study area is largely rural and as such is assumed to have a relatively high air quality level; • Existing local sources of particulate matter and dust likely includes windblown dust from agricultural land, exhaust emissions from road vehicles, active quarries and the nuclear plant activities and plant vehicles; and • Proximity to human and ecological receptors.

3.7.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-49. The full EIA will be used to establish appropriate project specific mitigation (if relevant).

Table 3-49 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Dust and Air Quality Management Plan (DMP) will be produced with approval from the Highland Council prior to construction.	Tertiary	The preparation of an DMP will be a planning condition. The plan will be developed by the contractor and agreed with OIC.
2	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.
3	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.
4	Hold regular liaison meetings with any other high-risk construction sites within 500 m of the site boundary to ensure plans are co-ordinated and dust and particulate emissions are minimised with particular attention to off-site transport/deliveries which may use the same strategic road network routes.	Tertiary	Procedure outlined within the DMP, a requirement of the consent/planning conditions, and established within the project communication plan.
5	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.
6	Increase frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
7	Plan site layouts so that machinery and dust causing activities are located away from receptors, as far as possible.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
8	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
9	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period, e.g. fine-screen fencing or temporary construction tent.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
10	Avoid site runoff of water or mud.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
11	Keep site fencing, barriers and scaffolding clean using wet methods.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
12	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
13	Cover, seed or fence stockpiles to prevent wind whipping.	Tertiary	Established within the design principles and consent and/or planning conditions.
14	Ensure all Non-Road Mobile Machinery (NRMM) is compliant with the engine emission regulations in place at the time of use on site.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
15	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
16	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
17	Use enclosed chutes and conveyors and covered skips.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
18	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
19	Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event, using wet cleaning methods.	Tertiary	Established in design and managed through the Traffic Management Plan (TMP), a condition of consent/planning.
20	Ensure all vehicles switch off engines when stationary.	Tertiary	Established within the design principles and consent and/or planning conditions.
21	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
22	Re-vegetate earthworks and exposed areas/soils stockpiles to stabilise surfaces as soon as practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
23	Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
24	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate control measures are in place.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
25	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
26	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
27	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require a sweeper being continuously in use.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
28	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
29	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
30	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
	prior to leaving the site where reasonably practicable).		Section 36 consent and/or planning conditions.
31	Speed will be kept to a minimum on site and on the access track (20mph or less on surfaced roads and 5mph or less for unmade surfaces) to reduce the potential of creating dust and to enhance site safety.	Tertiary	The preparation of an DMP will be planning condition. The plan will be developed by the contractor and agreed with OIC.
32	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on air quality and will be consulted upon with consultees throughout the EIA process.

3.7.6 Scoping of Impacts

A number of potential impacts on air quality receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received 10/02/2021). A number of impacts are proposed to be scoped out of the assessment for air quality conservation. These impacts are outlined, together with a justification for scoping them out. Impacts to ecological receptors, designated sites and protected species, have been considered within sections 3.2, 3.3 and 3.4.

Table 3-50 EIA Scoping Assessment for Air Quality

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Dust emissions associated with Project works	1-9, 12, 15, 16, 24-26, 32	Scoped In	Ground works and the use of aggregates and cements on site has the potential to give rise to local dust issues. There is a potential for dust to be created during the decommissioning of the sub-station/switch gear, especially if the floor is to be removed as it will need to be broken up.	Desk study and accurate estimations/quantities for a material inventory along with a proposed activities schedule.	Desk study calculating potential area of impact.
Dust (Onshore cable laying)	1-9, 12, 13, 15, 22, 23, 32	Scoped In	Onshore cable laying will involve excavations, if stored spoil becomes dry then it can give rise to dust. If the onshore cable is to be removed during decommissioning, then the excavation of soil could give rise to dust.	Desk study and proposed activities schedule.	Desk study calculating potential area of impact.
Dust (Access roads / tracks)	1-9, 12, 15, 16, 24-26, 32	Scoped Out	Ground works and the use of aggregates associated with the construction of a temporary access road does not have the potential to give rise to significant local dust issues. Hence, the impact has been scoped out of the EIA.	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Dust and emissions from vehicle use	27 – 31, 32	Scoped Out	A temporary increase in vehicle use on and in close proximity to the Project during construction and decommissioning does not have the potential to give rise to significant local dust or air quality issues. Construction traffic will be strictly controlled by the Traffic and Transport Management Plan. Hence, the impact has been scoped out of the EIA.	N/A	N/A
Operation and Maintenance					
Dust and emissions resulting from operation and maintenance works	1-31	Scoped Out	It is not expected that any significant volumes of dust or vehicle emissions will be generated once construction is complete. The number of vehicle trips required during operation will be limited. Hence, the impact has been scoped out of the EIA.	N/A	N/A

3.7.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on air quality receptors. Caithness is attracting several development proposals at present both on-shore and off-shore, as such this will likely lead to extensive cumulative impacts including onshore wind farms and associated infrastructure. Potential demolition works being carried out at the Dounreay nuclear sites, the construction throughout the region relating to SHET-L infrastructure and the construction of the Pentland Floating Offshore Wind Demonstrator amongst others could give rise to cumulative impacts depending on the timings associated with these activities in connection with the Project onshore activities.

The air quality Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

3.7.8 Approach to Analysis and Assessment

3.7.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on air quality will utilise Project-specific and publicly available data (see section 3.7.3) and will be augmented by consultation during the EIA phase and build on the advice already provided from Highland Council through their pre-application advice service.

A desk-top study will be undertaken using publicly available source of information and consultation responses. Consultation will be undertaken with:

- THC;
- Other statutory consultees (SEPA and NatureScot);
- Local landowners and communities; and
- Other interest groups/organisations.

The views and information gathered from these consultations will be used to help shape the Project and ensure that wherever possible, adverse effects on people and the natural environment have been avoided or reduced, and where possible benefits have been delivered. Assessments will be undertaken qualitatively based on the maximum design scenarios of the Project. The predicted significance of effects will be determined based on the relationship between the magnitude of impact and the sensitivity of the receptor through a standard method of assessment based on professional judgement and the application of appropriate evaluation criteria.

One of the main attractions of wind energy technology is the fact that it is a sustainable source of power and does not create greenhouse gas emissions or emit pollution when generating electricity. There is the potential for a positive environmental impact with regard to carbon saving and avoidance of gaseous discharges associated with global climate change, as well as a carbon cost on account of the Project development activities. This will be considered in a standalone GHG assessment (see section 1.4.6.3).

3.7.8.2 EIA Methodology

The air quality EIA will be undertaken in line with the methodology set out in Section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-60 will also be considered in relation to the air quality EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 3-51 Legislation and Guidance for Air Quality

LEGISLATION / GUIDANCE	SUMMARY
EU Directive 2008/50/EC Ambient Air Quality and Cleaner Air for Europe	The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM 10 and PM 2.5) and nitrogen dioxide (NO 2).
The Environment Act 1995	Includes important provisions relating to air quality, with particular regard to preparing a National Air Quality Strategy
The Air Quality Standards (Scotland) Regulations 2010	These regulations set air quality standards for key pollutants and implement policies on air quality management and assessment.
United Kingdom Air Quality Strategy	The UK Air Quality strategy was originally adopted in 1995 and has since been periodically updated and revised. The Clean Air Strategy was most recently published in 2019. The strategy sets out the air quality standards and objectives which have been set to benchmark air quality in terms of protecting human health and the environment.
Cleaner Air for Scotland 2 – Towards a Better Place for Everyone	This strategy updates Cleaner Air for Scotland and sets out the strategies, objectives and actions to improve air quality in Scotland.
Part III of the Environmental Protection Act 1990	Identify dust as a nuisance. The provisions of Part III of the Environmental Protection Act 1990 relating to statutory nuisance were enacted in Scotland by the Environment Act 1995.
Highland-wide Local Development Plan (2012) Planning Policies (Policy 73 – Air Quality)	Sets out the overarching spatial planning policy for the whole of the Highland Council area – Policy 73 directly refers to Air Quality.
Guidance on the Assessment of dust from demolition and construction (IAQM, 2014)	The document provides guidance for developers, their consultants and environmental health practitioners on how to undertake a construction impact assessment (including demolition and earthworks).

LEGISLATION / GUIDANCE	SUMMARY
Guidance on land-use planning and development control: Planning for air quality (IAQM, 2017)	Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have produced this guidance, which replaces the 2010 EPUK Guidance document, to ensure that air quality is adequately considered in the land-use planning and development control processes.
Air Quality Monitoring in the vicinity of Demolition and Construction Sites (IAQM, 2018)	This document provides updated guidance on air quality monitoring in the vicinity of demolition and construction sites.
A guide to the assessment of air quality impacts on designated nature conservation sites (IAQM, 2020).	This publication signposts the appropriate thresholds used by local authorities, the Environment Agency and other regulators to conclude that there will not be a significant effect.
Pollution Prevention Guidelines 6 (PPG6): Working at Construction and Demolition Sites (currently under review) (SEPA *et al.*, 2012)	These guidelines are intended to assist those in the construction and demolition industry with responsibility for managing the environmental impact on air quality from their activities.

3.7.9 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Do you agree that the impacts suggested can be scoped out of the EIA?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

3.7.10 References

Air Quality in Scotland (2021a). *Air Quality Management Areas*. Available at: http://www.scottishairquality.scot/laqm/aqma?id=368.

Air Quality in Scotland (2021b). *Data for Local Authority Review and Assessment Purposes*. Available at: http://www.scottishairquality.scot/data/mapping?view=data.

Air Quality in Scotland (2021c). *Standards*. Available at: http://www.scottishairquality.scot/air-quality/standards.

Highland Council (2020). Annual Progress Report (APR) for Highland Council, In fulfilment of Part IV of the Environment Act 1995, Local Air Quality Management, Version 2.0, April 2021. Available at: http://www.scottishairquality.scot/assets/documents//Highland_annual_2020.html.

EPUK & IAQM (2017). *Land-Use Planning & Development Control: Planning for Air Quality*. Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

Holman *et al.*, (2014). IAQM Guidance on the assessment of dust from demolition and construction V1.1. Available at: http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

IAQM (2018). Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, October 2018, version 1.1. Available at: https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf.

3.8 Noise and Vibration

3.8.1 Introduction

This section of the Scoping Report identifies the noise and vibration receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and associated Caithness onshore substation search area for the Spittal grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project. The importance of potential noise and vibration impacts is identified by consideration to the prevailing local noise environment, the proximity and sensitivity of local receptors, and the potential for the development to generate noise and/or vibration during both the construction and operational phases. The primary focus of the scoping assessment will be the generation noise and vibration and the potential impacts of this on human health. In order to comprehensively assess the potential noise and vibration impacts that may arise from the Project, this section will interface with both the Traffic and Access assessment and the Onshore Ecology assessment.

Information that may be considered relevant to this section is also presented within the below sections:

- Terrestrial non-avian ecology, section 3.3;
- Terrestrial ornithology, section 3.2;
- Land-use and other users, section 3.3; and
- Traffic and access, section 3.9.

This section of the Scoping Report has been prepared by Xodus Group.

3.8.2 Study Area

The noise and vibration study area is defined by the Caithness onshore export cable corridor search area and the Caithness onshore substation search area, encompassing the onshore design envelope area with 2 km buffer around the search areas. The Caithness onshore export cable corridor search area and the Caithness onshore substation search area are based on significant routing work, which considered key technical, environmental and land-use constraints. The Caithness onshore export cable corridor search area forms broad corridors between the potential landfalls and the Caithness grid connection at Spittal. The Caithness onshore substation search area at Spittal is located near to the existing SHET-L Spittal substation.

3.8.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the noise and vibration EIA are outlined in Table 3-52.

Table 3-52 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
OS Map	https://osmaps.ordnancesurvey.co.uk/	2021	Ordinance Survey
Pre-Application Advice	Stakeholder Engagement: The Highland Council	2021	THC
Google Earth	https://www.google.co.uk/intl/en_uk/earth/	2021	Google

3.8.3.1 Project Site-Specific Surveys

To date, there have been site visits to the Project area in Caithness. These site visits involved a walkover of the area to confirm desktop sources. Further site visits will be undertaken to inform the EIA, including the identification of noise sensitive receptors in the vicinity of the Project.

A desk-based review and consultation will be undertaken to identify potentially sensitive receptors. Background noise monitoring will be undertaken at residential properties where the potential for significant noise effects from the Project are identified, and where needed to inform the noise assessment. The desk study will include identification of any existing noise measurements in the Project area, for example at locations such as the existing SHET-L Spittal substation; onshore windfarms along the proposed cable route(s) or other relevant locations.

Any surveys will be agreed in consultation with THC Environmental Health Department and will be carried out for a sufficient period to allow typical sound levels to be established, taking account of different types of noise sources and weather conditions that occur.

Baseline survey measurements will be conducted in accordance with current guidance, including BS4142:2014+A1:20198 Method for Rating and Assessing Industrial and Commercial Sound, and BS7445-2:1991 Description and measurement of environmental noise. Noise surveys may be accompanied by the acquisition of supplementary non-acoustic data (rainfall and wind records), as required.

3.8.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-52) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment, including receptors sensitive to noise and vibration, and to inform the Scoping process.

3.8.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

The Project is sited in a rural area, remote from significant environmental noise sources such as heavily trafficked roads (e.g. motorways and dual carriageways), railways and airports. The rural nature of the area therefore increases the likelihood of potential impacts and hence the importance of their consideration. As described in section 3.3, the land-use in this area consists predominantly of dispersed residential areas and agricultural farmland (particularly on the fields immediately inland from the coast). The western portion of the study area lies immediately adjacent to the Dounreay NPDE and Vulcan NRTE.

The Dounreay NPDE has entered into a phase of decommissioning and remediation. Furthermore, it is anticipated that the Vulcan NRTE will also enter into a phase of decommissioning and these two sources of anthropogenic noise will be the major contributor to the baseline noise in the area around the potential Dounreay landfall. Additional sources of anthropogenic onshore noise are attributed to agricultural work (e.g. from farming machinery such as tractors), onshore wind farms (as described in Section 3.3), and traffic from the A9, A836 and A882, which run the through Caithness onshore export cable corridor search area and / or Caithness onshore substation search area. Notably, the A9 is a major trunk road which connects roads from the north of Scotland to the south. This road is in close proximity to the existing Spittal substation and intersects the Caithness onshore export cable corridor search area and the Caithness onshore substation search area. Additionally, the Georgemas Junction train station, which is part of a Network Rail line which connects Inverness to Wick and Thurso is located within the Caithness onshore substation search area and the Caithness onshore export cable corridor search area also overlaps with this railway line between Georgemas Junction and Thurso. Passenger trains run from Wick and Helmsdale four times a day and the line is also used for freight transport. Other potential noise sources include the Lieurary quarry (although this quarry is relatively small-scale) and an RAF tactical training area. Therefore, due to the decommissioning activities (which also involves demolition activities), farming activities and the close proximity of the study area to major roads, a railway line, quarry and an RAF tactical training area, baseline noise sources for the study area would be primarily characterised as resulting from anthropogenic sources. Additionally, 'natural' sources of noise such as wind, wave, disturbed vegetation and livestock noise from the adjacent fields, will also contribute to the baseline noise within the vicinity of the study area.

The key noise and vibration sensitive receptors which are likely to require consideration within the EIA are:

- Hospitals, care homes and schools;
- Residential and non-residential properties;
- Local amenities;
- Areas of conservation or scientific interest;
- Protected species; and
- Other areas which are utilised by the public e.g. carparks

Within the study area, human and ecological receptors were identified that have the potential to be impacted by noise and vibration within the search area and close to the area. The findings are as summarised in Table 3-53 below.

Table 3-53 Receptors Screened for Potential Impacts from Noise and Vibration issues in the vicinity of the Onshore Project Area

RECEPTOR TYPE	WITHIN THE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Present within the study area / 2 km buffer.	• Melvich Primary School; • Halkirk Primary School; and • Raey Primary School.
Residential Properties	Present within the study area / 2 km buffer.	• Multiple residential properties are located within the Project area.
Non – Residential Properties	Present within the study area / 2 km buffer.	• St Marys Chapel; • Forss Business & Energy Park; • GS Donn Mechanical Maintenance & Repairs; • JGC Engineering Technical Services; • Lieurary Quarry (active); • Achscrabster Farm Cottage; • Bardnaclavan Farm; • Westfield Timber Supplies; • Forss House Hotel; • Melvich Hotel; • Scottish SPCA; and • The Halladale Inn & North Coast Touring Park.
Amenity Areas	Present within the study area / 2 km buffer.	• North Coast 500 Route; • Shinval Garden Centre; • Brims Castle; • Reay Golf Course; • Sandside Bay Beach; • Melvich Beach; • Mackay Country Landmark; • Puffin Cove (Drumhollistan); • Loch na Moine; • Loch Hollistan; • Lochan Buidhe; • Cnoc an Fhreiceadain Long Cairns; • North Coast 500 Route; • Achanarras Quarry; and • Broubster Forest.

RECEPTOR TYPE	WITHIN THE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Designated Sites	Present within the study area / 2 km buffer.	• Caithness and Sutherland Peatlands (SAC); • Loch Lieurary (SSSI); • Westfield Bridge (SSSI); • Achanarras Quarry (SSSI); • Banniskirk Quarry (SSSI); • Spittal Quarry (SSSI); • Loch Calder (SSSI); • Caithness Lochs (SPA); • Broubster Leans (RSPB & SSSI); • Sandside Bay (SSSI); • Red Point Coast (SSSI); • Strathy Coast (SSSI); • Caithness Cliffs (SSSI); • North Caithness Cliffs (SPA); • Ushat Head (SSSI); • Newlands of Geise Mire (SSSI); and • River Thurso (SSSI).
Red Data List Species	Not Present within the study area / 2 km buffer.	N/A
Carparks	Present within the study area / 2 km buffer.	• St Mary's Chapel Car Park; and • North Coast Touring Park.

3.8.4.2 Summary and Key Issues

Table 3-54 Summary and Key Issues for Noise and Vibration

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND CAITHNESS ONSHORE SUBSTATION SEARCH AREA
	• Proximity to sensitive receptors including schools, residential homes, non-residential properties, amenity areas, designated sites and carparks; and • Proximity to other anthropogenic noise sources such as the Dounreay Nuclear Site, onshore wind farms, road and railway networks and SHET-L Spittal Substation.

3.8.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-55. Mitigation measures have also taken into account the Pre-Application Advice provided by THC, suggesting the need for a noise assessment. The full EIA will be used to establish appropriate project specific mitigation (if relevant).

Table 3-55 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Core working hours for the construction of the onshore elements of the Project will be Monday to Sunday 07.00 – 19.00 hour. In certain circumstances, specific works may have to be undertaken outside the normal working hours and will be agreed in advance with THC, Environmental Health Department.	Primary	Establish within the design principles and Section 36 consent and/or planning condition.
2	Activities carried out during mobilisation and maintenance will not generate significant noise or vibration levels (such as piling, or other such noisy activities).	Tertiary	Establish within the design principles and Section 36 consent and/or planning condition.
3	Based on the noise assessment/modelling results, where noise has the potential to cause disturbance the use of mufflers, acoustic barriers and screening will be considered.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
4	Best Practicable Means (BPM) to limit the impacts of noise and vibration at sensitive receptors.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
5	Monitoring of noise and vibration related complaints will be undertaken.	Tertiary	Procedure outlined within the CEMP, a Section 36 consent and/or planning condition.
6	The selection of quieter equipment where reasonably practicable will be undertaken.	Tertiary	Establish within the design principles.
7	Installation of acoustic barriers and enclosures, where required.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
8	Installation/ construction of a landform/embankment around the substation site, if required.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
9	Installation/use of vibration isolation pads and anti-vibration mounts, if required.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
10	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application

There is a commitment for the Project to implement these measures as appropriate and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects of noise and vibration and will be consulted upon with consultees throughout the EIA process.

3.8.6 Scoping of Impacts

A number of potential impacts on noise and vibration sensitive receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received 10/02/2021). Impacts to ecological receptors, designated sites and protected species, have been considered within sections 3.2, 3.3 and 3.4. None of the potential impacts are proposed to be scoped out of the assessment at this stage, as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 3-56 EIA Scoping Assessment for Noise and Vibration

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Onshore noise associated with construction/ decommissioning of onshore components	2, 3, 4, 5, 6, 7, 8, 10	Scoped In	Due to the short term, localised and transient nature of the onshore construction/ decommissioning process, any temporary noise generated is likely to be minimal and concentrated to the study area. However further study required to understand effects of noise on sensitive receptors.	Desk study and accurate noise modelling campaign for proposed activities. The need for baseline noise measurements will be established following desk top studies and consultation.	Desk study and noise modelling calculating potential area of impact.
Ground-borne vibration associated with construction/ decommissioning of onshore components	2, 3, 4, 5, 7, 8, 9, 10	Scoped In	Due to the short term and localised nature of the onshore construction/ decommissioning process, any temporary vibration generated is likely to be minimal and concentrated to the study area. However further study required to understand the effects on sensitive receptors.	Desk study and accurate estimations/quantities of vibration along with a proposed activities schedule.	Desk study calculating potential area of impact.
Onshore noise and ground-borne vibration	1, 2, 3, 4, 5, 6, 7, 10	Scoped In	Use of large-scale construction and decommissioning vehicles has the potential to give rise to local noise and vibration issues. Further study required	Desk study, proposed activities schedule along with approximate vehicle usage during the Project.	Desk study calculating potential area of impact.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
associated with vehicle use			to understand the effects on sensitive receptors.		
Operation and Maintenance					
Onshore noise associated with operation and maintenance of onshore components	2, 3, 4, 5, 6, 7, 8	Scoped In	Noise impacts related to the onshore operation and maintenance activities will be limited to noise from the substation. Scoped into the EIA until confirmation of the Project final location and proximity/effects to sensitive receptors.	Desk study and accurate noise modelling campaign for proposed activities. The need for baseline noise measurements will be established following desk top studies and consultation.	Desk study and noise modelling calculating potential area of impact.
Ground-borne vibration associated with operation and maintenance of onshore components	2, 3, 4, 5, 7, 8, 9	Scoped In	Vibration impacts related to the onshore operation and maintenance activities will be limited to vibration from the substation. Scoped into the EIA until confirmation of the Project final location and proximity/effect to sensitive receptors.	Desk study and accurate estimations/quantities for a material inventory along with a proposed activities schedule.	Desk study calculating potential area of impact.

3.8.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on noise and vibration receptors. Caithness and the surrounding area is currently attracting several on shore and offshore developments (including onshore windfarms and associated infrastructure), as such this may lead to cumulative impacts. Potential demolition works being carried out at the Dounreay nuclear sites, the construction throughout the region of SHET-L infrastructure and the construction of the onshore aspects of the Pentland Floating Offshore Wind Demonstrator as well as onshore wind farms could give rise to cumulative impacts depending on the timings associated with these activities in connection with the Project onshore activities. However, it is deemed unlikely that these projects will produce a material increase in the predicted noise and vibration levels at sensitive receptors.

The noise and vibration CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

3.8.8 Approach to Analysis and Assessment

3.8.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on noise and vibration will utilise Project-specific and publicly available data (see section 2.4.3). The requirement for baseline noise measurements will be discussed with consultees. Consultation will augment the assessment during the EIA phase. Advice has already been provided from Highland Council through their pre-application advice service. Consultation will be undertaken with:

- THC Environmental Health Department;
- Local landowners and communities; and
- Other interest groups/organisations.

The views and information gathered from these consultations will be used to help shape the Project and ensure that wherever possible, adverse effects on people and the natural environment have been avoided or reduced, and where possible benefits have been delivered.

Noise and vibration issues associated with the construction of the Project would be assessed using the guidance contained in BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites', which defines the most suitable accepted prediction methods and source data for various construction plant and activities. Noise impacts from construction and decommissioning would be based on the likely construction programme and associated activities, including, substation works, cable laying using open trench and trenchless techniques, construction traffic and access routes. The type and number of vehicles and plant equipment/machinery required for construction/decommissioning will be detailed and the main sources of noise from the Project will be identified.

The assessment will consider 'worst case' receptors i.e. the vehicles and plant are located at the closest possible point to a receptor. The study area of the construction/decommissioning noise assessment would include the following geographic coverage:

- A 2 km buffer zone from the Project, where significant activities have the potential to affect noise sensitive receptors (including Public Rights of Way (PRoW)); and
- Traffic routes and routes subject to significant changes in traffic flows (and/or percentage heavy goods vehicle (HGV)) due to Project activities (see section 3.9). Potential noise disturbance at night or other unsocial hours (i.e. weekends and public holidays) will be addressed.

Operational and maintenance impacts would include noise impacts associated with the substation. The guidance and methodology contained in BS 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound.', would be used to assess noise impacts arising from the substation.

3.8.8.2 EIA Methodology

The noise and vibration EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-57 will also be considered in relation to the noise and vibration EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 3-57 Legislation and Guidance for Noise and Vibration

LEGISLATION / GUIDANCE	SUMMARY
Environmental Protection Act 1990	The Environmental Protection Act 1990 makes provision for the improved control of pollution to the air, water and land by regulating the management of waste and the control of emissions.
Control of Pollution Act 1974	The aim of the Act is to deal with a variety of environmental issues, including waste on land, water pollution, abandoned mines, noise pollution and the prevention of atmospheric pollution.
Highland-wide Local Development Plan (2012) Planning Policies (Policy 72)	Sets out the overarching spatial planning policy for the whole of the Highland Council area – Policy 73 refers to pollution.
Scottish Government (2014), Scottish Planning Policy (SPP)	Policy statement on how nationally important land-use planning matters should be addressed across the country.
PAN50 (1996) Controlling the Environmental Effects of Surface Mineral Workings	Planning Advice Note (PAN) 50 provides advice on the more significant environmental effects arising from mineral working operations.
British Standards Institution (2014) Code of practise for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (BS 5228-1)	This part of BS 5228 gives recommendations for basic methods of noise control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work

LEGISLATION / GUIDANCE	SUMMARY
	activities/operations generate significant noise levels, including industry-specific guidance.
British Standards Institution (2014) Code of practise for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration (BS 5228-2)	This part of BS 5228 gives recommendations for basic methods of vibration control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work activities/operations generate significant vibration levels, including industry-specific guidance.
British Standards Institution (2014, amended 2019) - Methods for rating and assessing industrial and commercial sound (BS 4142)	This guidance provides a method of assessing the impact of a source of industrial or commercial sound including sound from industrial and manufacturing processes, fixed installations, the loading and unloading of goods and mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes
British Standards Institution (2003) Description and measurement of environmental noise — Part 1: Guide to quantities and procedures (BS 7445-1)	This part of BS 7445 describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of the community's environment, individually and in combination. The results are expressed as equivalent continuous A-weighted sound pressure levels, LAeq, T.
British Standards Institution (2014) Guidance on sound insulation and noise reduction for buildings (BS 8233)	This document sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms as well as typical noise level guidance for nondomestic buildings

3.8.9 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative noise impacts?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

3.8.10 References

BSI, (2014). British Standards Institution [BS] 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise". BSI, London.

BSI, (2014). British Standards Institution [BS] 5228-2: 2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration". BSI London.

BSI, (2019). British Standards Institution BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI, London.

BSI (2003). British Standards Institution BS 7445-1:2003 - Description and measurement of environmental noise. Guide to quantities and procedures. BSI, London.

Department of Energy & Climate Change (DECC) (2011d). Overarching National Policy Statement for Energy (EN-1), Planning for New Energy Infrastructure, Presented to Parliament pursuant to Section 5(9) of the Planning Act 2008.

Scottish Government (2011). Technical Advice Note (TAN) 1:2011 Assessment of Noise, available at https://www.gov.scot/publications/technical-advice-note-assessment-noise/pages/1/.

3.9 Traffic and Access

3.9.1 Introduction

This section of the Scoping Report identifies the traffic and access receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and the Caithness onshore substation search area for the associated Spittal grid connection and considers the potential impacts from the likely traffic generated from the construction, operation and maintenance and decommissioning of the Project.

Information that may be considered relevant to this section is also presented within the below sections:

- Land-use and other users, section 3.3;
- Air quality, section 3.7; and
- Noise and vibration, section 3.8.

This section of the Scoping Report has been prepared by Xodus Group.

3.9.2 Study Area

The final study area for assessment will consider routes along the public road network which traffic will most likely be utilised during the construction phase of the Project. The Caithness onshore export cable corridor search area forms broad corridors between the landfall sites and the Caithness grid connection at Spittal. The Caithness onshore substation search area at Spittal is located near to the existing SHET-L Spittal substation. The Caithness onshore substation search area is directly adjacent to the A9 which is the main trunk roads connecting the north of Scotland to the south. There is a network of other roads in the immediate study area including the A836, A882, B870 and B874 as well as several unclassified local public roads which could provide additional relief to local road users during the construction phase of this Project.

The study network will therefore not extend further than the following traffic and access receptors:

- The A9 Trunk Road surrounding the proposed Spittal substation;
- The A836, B870 and B874 that intersect the Caithness onshore export cable corridor search area;
- The A882 between the substation site and port facilities at Wick; and
- Network Rail Scotland north east rail network.

The traffic and access study area will be further refined in the EIA Report once the preferred infrastructure locations have been refined and selected.

3.9.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the traffic and access EIA are outlined in Table 3-58.

Table 3-58 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Highland-wide Local Development Plan – Policy	https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan	2012	THC
Transport Scotland's National Transport Strategy	https://www.transport.gov.scot/media/47052/national-transport-strategy.pdf	2020	Transport Scotland
The Department of Transport Road Traffic Statistics interactive map	https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints	2021	Department for Transport
Pre-Application Advice	Pre-Application Advice Response	2021	THC
OS Map	https://osmaps.ordnancesurvey.co.uk/	2021	Ordinance Survey

3.9.3.1 Project Site Specific Surveys

The requirement for site specific surveys to support the EIA Report will be determined based upon further refinement of the Caithness onshore export cable corridor search area and Caithness onshore substation search area and once the preferred infrastructure locations have been selected. Similarly, the requirements for such surveys will be better understood following the availability of more detailed landfall installation and construction methodologies subject to further discussion with statutory agencies and in consideration of current good practice and policy advice. Site-specific surveys could potentially include additional traffic count surveys utilising video/automatic traffic counters at strategic locations along the road network as well as manual sample counts to supplement existing published traffic count data. Additionally drive-through surveys and site visits may be undertaken as necessary to identify potential constraints and upgrades required along transport routes to accommodate Project generated construction traffic, including consideration of junction visibility splays.

3.9.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-58) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the scoping process.

3.9.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

The Project is mainly served by the A9, which runs directly past the Caithness onshore substation search area to the east and acts as the main trunk road connecting the north of Scotland to the south providing broader access to the strategic port facilities around the Cromarty and wider Moray Firth. The other major roads in the area include the A836 west of Thurso, which intersects the study area and runs along the north coast of Caithness, a main road that links local communities and serves as a tourist hot spot as part of the North Coast 500 route. This road is very popular in the summer months with tourists travelling the route in caravans etc. To the east the A882 connects Thurso to Wick, while more widely the A99 links Wick and Latheron along the Moray Firth Coast. The majority of the wider public road network within the study area comprises minor, unnamed roads, linking small towns to each other in the area. As per The Highland Council's Pre-Application Consultation response it is noted that roads to the west of Spittal and up towards Shebster are generally quite weak due to the underlying ground conditions. Roads in this area are likely to require major improvement works in order to accommodate significant construction traffic. Roads to the east of Thurso tend to be stronger and, therefore, less likely to fail due to significant increases in HGV traffic.

At this stage, the most likely access route for traffic associated with the Project is yet to be determined subject to further refinement of the Caithness onshore export cable corridor search area and Caithness onshore substation search area and once the preferred infrastructure locations have been selected. However, it is envisaged that the transportation of materials, where not sourced locally, could involve loads being delivered by road, rail and sea. It is considered likely at this stage that the majority of personal and deliveries will utilise the A9 from the south, while all of the landfall locations will require access via the A836.

There is a single-track Network Rail Scotland railway line that runs through the study area. This line links Inverness to Wick and Thurso and provides rail access to the wider UK network. The rail line is already used for transporting freight such as sections of pipeline to the region and the line could be used if appropriate for delivery of equipment to the substation site. The rail route may also provide a useful link for project staff and site workers travelling from elsewhere in the UK. The journey times are however still generally longer than can be achieved by road. Passenger trains run between Wick and Helmsdale four times per day. If rail freight were to be utilised to transport any components, then it would likely be brought by train to Georgemas Junction, where there is the facility to offload materials. It would then travel by road on the A9 either north to join the A836 or immediacy south to the Caithness onshore substation search area. In the event transportation by sea were to be utilised there are likely viable port facilities available at Wick and Scrabster which offer good onward access to the Project areas, including for abnormal loads. It should also be noted that Wick airport offers a transportation link form people and materials from further afield where necessary. THC has been conducting a Pilot Scheme for Street Design Review Service, which runs alongside Major Pre-applications. The service aims to provide detailed feedback on the road layout at the pre-application stage, to help align planning applications with the requirements for Road Construction Consent. Consultation with the THC will confirm whether this pilot scheme will be accessible to and/or suitable for the Project.

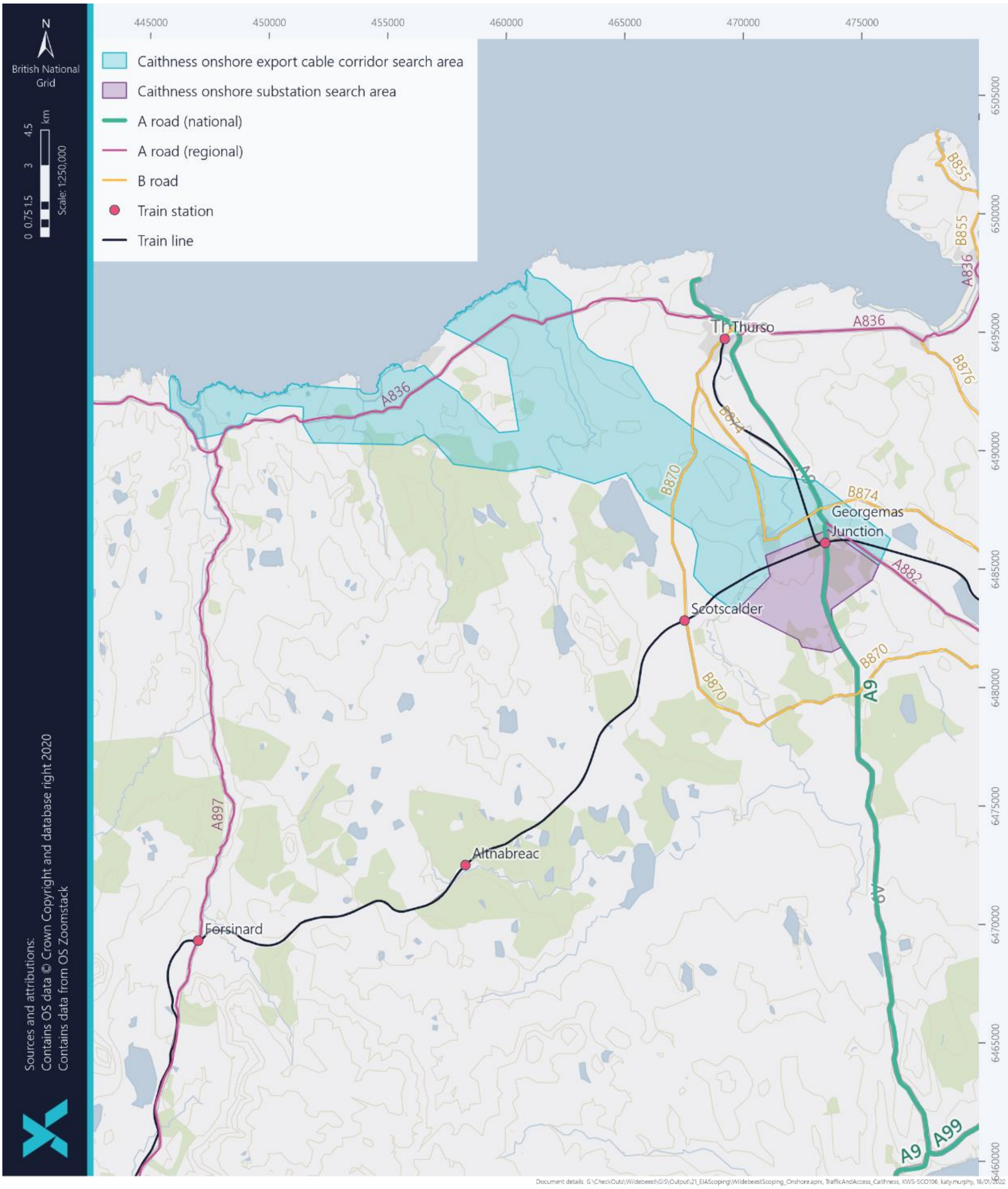

Figure 3-17 Traffic and Access Receptors within the Study Area

3.9.4.2 Summary and Key Issues

Table 3-59 Summary and Key Issues for Traffic and Access

SUMMARY AND KEY ISSUES	PROJECT COMPONENT
	CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND CAITHNESS ONSHORE SUBSTATION SEARCH AREA
	• The transportation of materials, where not sourced locally, could involve loads being delivered by road, rail and sea; • Key road links in the area include the A9, the A836, A882 and the A99; • Roads to the west of Spittal and up towards Shebster are generally quite weak due to the underlying ground conditions; • There is a single-track Network Rail Scotland railway line that runs through the study area; and • Port facilities available at Wick and Scrabster.

3.9.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-60.

Table 3-60 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	A Traffic Management Plan (TMP) will be developed and agreed with THC and relevant parties outlining the mechanisms for managing the movement of construction related traffic.	Tertiary	Developed by the contractor and agreed by THC.
2	Suitable access points and appropriate locations for ancillary works will be identified while Transportation, including deliveries to and from the construction areas will be taken from the existing trunk and local road network.	Primary	Inherent in design and managed through the TMP, a condition of Section 36 and/or planning consent.
3	Where required, infrastructure updates will be undertaken and/or a commitment to repair any damage caused to the existing road network as a result of construction traffic movements will be made.	Secondary	Agreed by THC and secured via a post-consent condition.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
4	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on traffic and access and will be consulted upon with consultees throughout the EIA process. Mitigation required may include new or improved infrastructure, road safety measures and traffic management as outlined in the Highland Council pre-application advice document. Any and all physical mitigation will be determined during the EIA process.

3.9.6 Scoping of Impacts

A number of potential impacts on traffic receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received 10/02/2021). Impacts during operations and maintenance are proposed to be scoped out of the assessment for traffic and access. These impacts are outlined, together with a justification for scoping them out.

Table 3-61 EIA Scoping Assessment for Traffic and Access

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Impacts arising from the increased generation of traffic	1, 2, 4	Scoped In	Potential increases to traffic flows, including HGVs on the local and wider road networks as a result of construction and decommissioning traffic.	Desktop study and project specific surveys as required.	Traffic management assessment.
Impacts on road safety as a result of the generation of increased traffic	1, 2, 4	Scoped In	Potential impacts on road safety as a result of the increase to traffic flows, including HGVs on the local and wider road networks as a result of construction and decommissioning traffic.	Desktop study and project specific surveys as required.	Traffic management assessment.
Impacts on the local community	1, 2, 4	Scoped In	Potential for increased traffic, severance and driver delay in residential areas due to project construction and decommissioning.	Desktop study and project specific surveys as required.	Traffic management assessment.
Impact on road carriageway, verges and associated structures; and impact on road users	1, 3, 4	Scoped In	Roads to the west of Spittal and up towards Scrabster are generally quite weak due to the underlying ground conditions. Roads in this area are likely to require major improvement works in order to accommodate significant construction and decommissioning traffic.	Desktop study and project specific surveys as required.	Traffic management assessment.
Operation and Maintenance					
Impacts during operations and maintenance on	1	Scoped Out	It is considered likely that operational effects will not be significant and so it is proposed that they are	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
existing traffic flows and the local road network			scoped out of any detailed assessment as part of the EIA.		

3.9.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on traffic receptors. Caithness is attracting several development proposals at present both onshore and offshore (including onshore windfarms and associated infrastructure), as such, this will likely lead to cumulative impacts on various receptors in the area. Potential demolition works being carried out at the adjacent nuclear sites, the construction of the SHE-Transmission infrastructure in the region and the construction of the onshore aspects of the Pentland Floating Offshore Wind Demonstrator as well as onshore wind farms could give rise to cumulative impacts depending on the timings associated with these activities in connection with the Project onshore activities.

There is also a possibility of cumulative traffic effects generated by the construction of the substation and the installation of the underground cables especially since they are likely to occur at the same time. The contractor will be required to plan activities to reduce the potential for effects on the local road system.

The traffic and access CEA will consider the maximum adverse design scenario for each of the project, plans or activity in question in line with the methodology outlined in section 1.4.3.

3.9.8 Approach to Analysis and Assessment

3.9.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on traffic and access will utilise Project-specific and publicly available data (see section 3.9.3) and will be augmented by consultation during the EIA phase. The assessment will be undertaken predominately as a desk-study, although if required project specific surveys will be undertaken to support the assessment.

The Project has already undertaken some initial consultation with THC on the traffic and access issues associated with the Project. As per the Pre-Application Advice received from THC, due consideration will be given to the full extent of the development and its component parts, including construction programme, the anticipated number and type of vehicles, including abnormal loads, that will be generated at each stage of construction. Taking account of expected equipment and material sources, the routes to site shall be clearly identified, as well as a schedule of likely access and egress points to/from the adopted road network. As part of the EIA process consultation will be undertaken with:

- THC Roads Department;
- Transport Scotland;
- Network Rail;
- Other statutory consultees;
- Local landowners and communities; and
- Other interest groups/organisations.

The views and information gathered from these consultations will be used to help shape the Project and ensure that wherever possible, adverse effects on people and the natural environment have been avoided or reduced, and where possible benefits have been delivered. Further consultation will be undertaken with key stakeholders to determine whether there are any restrictions in place on the existing rail crossings in the study area or whether the existing bridges have been subject to a recent structural survey.

The principal approach to assessing the environmental impacts of road traffic associated with new developments are set out within The IEMA publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic (1993). The IEMA Guidelines suggest the following rules to define the extent and scale of the assessment required:

- Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the number of HGVs are predicted to increase by more than 30%); and
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

Following the relevant IEMA Guidelines the predicted significance of effects will be determined based on the relationship between the magnitude of impact and the sensitivity of the receptor through a standard method of assessment based on professional judgement and the application of appropriate evaluation criteria. Predicted traffic volumes will be compared to existing baseline traffic volumes to determine whether there are any exceedances of the thresholds set out in the rules above. Effects arising as a result of additional traffic on driver delay, road safety and community effects will therefore be identified and assessed.

During the EIA process, assumptions will be made about the design, construction and mitigation measures in order to allow the assessment to progress. If any changes to these project assumptions and commitments are made that could result in effects greater than those described in the EIA Report, then additional intervention measures will be considered and, if necessary, an addendum will be published for public consultation and comment and further consideration by THC.

3.9.8.2 EIA Methodology

The traffic and access EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-62 will also be considered in relation to the traffic and access EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 3-62 Legislation and Guidance for Traffic and Access

LEGISLATION / GUIDANCE	SUMMARY
National Planning Framework (NPF) 3 (2014)[16]	The third National Planning Framework, setting out a long-term vision for development and investment across Scotland over the next 20 to 30 years.

[16] *It should be noted that the draft consultation document for the fourth (NPF4) National Planning Framework was laid before Parliament in November 2021 with the expectation that this will be approved by the Scottish Parliament and adopted by the Scottish Ministers in 2022.*

LEGISLATION / GUIDANCE	SUMMARY
Scottish Planning Policy (SPP) (2014)	Policy statement on how nationally important land-use planning matters should be addressed across the country.
Highland-wide Local Development Plan – Policy 56 Travel	Outlines all development guidance for travel in the Highland council area.
Highland-wide Local Development Plan – Policy 67 Renewable Energy Developments	Outlines all development guidance for renewable energy developments in the Highland council area.
Highland-wide Local Development Plan – Policy 77 Public Access	Outlines all development guidance for public access in the Highland council area.
Highland-wide Local Development Plan – Policy 78 Long Distance Routes	Outlines all development guidance for long distance routes in the Highland council area.
The Scottish Government Planning Advice Note (PAN) 75 – Planning for Transport	Planning for Transport provides advice on the requirements for Transport Assessments.
The Highland Council Roads and Transport Guidelines for New Developments	The guidelines include the procedures, design and construction standards to be followed for roads and other transport infrastructure that is to be adopted.
Transport Assessment Guidance (2012)	Aims to assist in the preparation of Transport Assessments for development proposals in Scotland.
The Institute of Environmental Management and Assessment (1993) Guidance Notes No. 1 Guidelines for the Environmental Assessment of Road Traffic (IEMA Guidelines)	Intended for the assessment of the effect of road traffic associated with major new developments.

3.9.9 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative traffic and transport impacts?
- Do you agree that the operational impacts suggested can be scoped out of the EIA section?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

3.9.10 References

Highways Agency *et al.*,. (various dates). Design Manual for Roads and Bridges: Volume 11 – Environmental Assessment. Available at: https://www.standardsforhighways.co.uk/dmrb/.

Institute of Environmental Assessment, (IEA, now IEMA) (1993). The Guidelines for the Environmental Assessment of Road Traffic.

Scottish Executive (2003). Planning Advice Note: PAN 66 - Best Practice in Handling Planning Applications affecting Trunk Roads. Available at: https://www.gov.scot/publications/planning-advice-note-pan66-best-practice-handling-planning-applications-affecting/.

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Transport Scotland (2012). Transport Assessment Guidance. Available at: https://www.transport.gov.scot/media/4589/planning_reform_-_dpmtag_-_development_management__dpmtag_ref__17__-_transport_assessment_guidance_final_-_june_2012.pdf.

3.10 Landscape and Visual

3.10.1 Introduction

This section of the Scoping Report identifies the landscape and visual receptors of relevance to the onshore aspects of the Project for the Caithness onshore export cable corridor search area and the Caithness onshore substation search area for the associated Spittal grid connection. The export cable landfall and onshore cables will be underground and the substation will be the only above ground permanent feature. As such, the landscape and visual impact assessment (LVIA) will consider the potential impacts from the construction, operation and maintenance and decommissioning of the substation, and only the construction and decommissioning stages of the landfalls and export cables. Whilst considering onshore elements of the Project, the seascape character will still be of relevance, particularly to the landfall locations.

Seascape, landscape and visual assessments are separate although linked processes, describing closely related but distinct sets of effects as described below.

Seascape as defined by NatureScot's Guidance on Coastal Character Assessment (SNH, 2018) consists of three components: '*the often narrow margin of the coastal edge, its immediate hinterland and areas of sea*'. Compared to landscape character assessment which focuses on the terrestrial landscape, seascape or coastal character assessment considers '*the aspects associated specifically with the coast, such as marine influences, the coastal edge and its immediate hinterland as well as the inter-relationship between these components*.' (SNH, 2018). It should be noted that published guidance from various sources may use either or both of the terms *Seascape Character* and *Coastal Character* for the above definition, however, for the purposes of this assessment, they should be considered interchangeable.

Landscape effects, in relation to the offshore aspects of the Project, are changes to landscape character resulting from how the landscape is perceived following the development. Seascape and landscape impact assessment consider these effects both in terms of the individual components of the seascape and landscape and on the structure, coherence and character of the seascape and landscape as a whole.

Visual effects are changes in the composition and character of views available in the area affected by the Project. Visual impact assessment considers the response of the people who experience these effects, who may be living or working in the area, enjoying recreational activities or simply passing through. The assessment considers the overall consequence of the effects on the visual amenity - the pleasantness of the view or outlook – that the people affected enjoy.

Information that may be considered relevant to this section is also presented within the below sections:

- Land-use and other users, section 3.3;
- Terrestrial archaeology and cultural heritage, section 3.6; and
- Seascape, landscape and visual, section 2.11.

This section of the Scoping Report has been prepared by WSP.

3.10.2 Study Area

The study area for the onshore substation is proposed to be a 3 km radius from the redline boundary. As currently only an onshore search area has been defined, a 3 km radius from this search area will be considered to inform site selection. The study area for the potential landfalls and export cables (underground cables) is proposed as a 500 m radius from the Caithness onshore export cable corridor search area. This distance has been determined by the type of development proposed (taking into account the landfalls and export cables will not include any permanent above ground features) and likely extent of significant effects based on experience of similar projects and an understanding of the baseline environment.

The visual assessment will consider only the area covered by the ZTV (by definition, visual effects can only occur where a development is visible), which will be produced once the final location of the onshore infrastructure is determined. However, the landscape and seascape assessment will consider the effect on the entirety of the defined units of landscape or seascape character potentially affected, not simply on those parts covered by the ZTV.

3.10.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project which have been used to inform this scoping report and proposed to inform the baseline characterisation for the EIA are outlined in Table 3-63. SNH is referenced for publications issued prior to their rebranding as NatureScot.

Table 3-63 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Assessment of Highland Special Landscape Areas	THC (www.highland.gov.uk)	2011 (updated 2019)	Horner+Maclennan with Mike Wood for THC in partnership with SNH
Coastal Character Assessment: Orkney and North Caithness	SNH (now NatureScot) (www.nature.scot)	2016	Land-use consultants for SNH (now NatureScot)
Landscape Sensitivity Appraisal: Black Isle, Surrounding Hills and Moray Firth Coast, Caithness – Addendum Supplementary Guidance 'Part 2B' as part of Onshore Wind Energy Supplementary Guidance	THC (www.highland.gov.uk)	2017	THC
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Marine Scotland, The Scottish Government	2016	The Scottish Government

TITLE	SOURCE	YEAR	AUTHOR
Scotland Landscape Character Assessment	NatureScot (www.nature.scot)	2019	NatureScot
Scotland's National Coastal Character Map	SNH (now NatureScot) (www.nature.scot)	2010	SNH (now NatureScot)
Wild Land Areas map and descriptions	SNH (now NatureScot) (www.nature.scot)	2014	SNH (now NatureScot)
Sectoral Marine Plan: Regional Locational Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/	2020	The Scottish Government

3.10.3.1 Project Site-Specific Surveys

An initial desktop study of the study areas has been undertaken in support of this Scoping Report. This research has identified information such as landscape related planning designations, landscape character typology, cumulative developments, and views from key locations such as routes and settlements.

Site surveys will be undertaken as part of the LVIA process to corroborate the desk-based research, capture representative baseline photography from agreed viewpoint locations, and undertake the assessment of potential effects. Subject to the project's programme, photography would be taken in winter months to reflect a worst-case scenario[17].

3.10.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 3-63) has been undertaken to support this Scoping Report. The findings of this research are presented below to provide an understanding of the Project environment and inform the Scoping process. Reference should also be made to Figure 3-18, illustrates the seascape and landscape character, and landscape designations within the study area.

The key types of landscape and visual receptors which are likely to require consideration within the EIA are:

- Coastal and hinterland landscapes;
- Designated landscapes (national and local);
- Local residents in settlements and individual properties;
- Roads users;
- Walkers along core paths and other accessible areas; and
- Visitors to beaches, specific visitor destinations, and other areas of high amenity value.

[17] *Winter is worst case due to deciduous vegetation losing its leaves and allowing views which in summer would be screened. The relevance of screening of views is dependent on the location of the viewpoint.*

3.10.4.1 CAITHNESS ONSHORE EXPORT CABLE SEARCH AREA AND SUBSTATION SEARCH AREA

The Project is located within Caithness, in the administrative area of THC. The study area extends along the coast from Portskerra in the west to Crosskirk in the east, with the exception of a small extent north of Dounreay. Inland, the study area extends to the southeast to near the town of Halkirk.

From the west, the study area is a relatively narrow margin of rocky cliff coastline, incorporating the sandy bays at Melvich beside Portskerra, and Sandside Bay at Reay. The Halladale River flows out to the sea at Melvich Bay and marks the western edge of the study area. Inland along this part of the study area, is the northern edge of the Sweeping Moorland and Flows Landscape Character Type (LCT) which extends to the rocky cliff coastal edge. East of Dounreay, the study area includes the lower lying coastal edge to Crosskirk Bay. Dounreay Nuclear Power Station and onshore windfarms are prominent features along this section of coastline.

The study area extends inland to the southeast, largely falling with the Farmed Lowland Plain LCT. This LCT is described as open, low-lying, gently undulating agricultural fields, with scattered lochs, although there are no lochs within the study area. Loch Calder lies just beyond the south western edge. The edge of the Sweeping Moorland and Flows LCT lies just within the southern part of the study area, distinguished by the slighting higher land, with moorland and large areas of commercial forestry. Windfarms, overhead transmission lines, the A9, a railway and a network of minor roads are features across the study area. The landform within the study area is relatively low lying, with sporadic local high points including the highest at Spittal Hill (176 m AOD) in the south of the study area. The River Thurso runs broadly north south through the eastern part of the study area with Forss Water running north south through the centre of the study area.

There are no national landscape designations within the study area. The northern end of the East Halladale Flows Wild Land Area (WLA) lies just to the south of the study area, south of Reay. Melvich Bay and Porkskerra lie within the Farr Bay, Strathy and Portskerra SLA.

Settlements within the study area include isolated properties and small villages along the coastline, including Portskerra, Reay, and Crosskirk, all accessed from the A836. Inland, the main town is Halkirk, in the south-eastern part of the study area. There are numerous scattered individual farms and cottages throughout the study area all linked by a network of minor roads and tracks which stem from the main A9 and A836 roads. The A836 road forms part of the North Coast 500 and national cycle route, including an alternate route for the John O' Groats to Land's End cycle route. There are several short core paths within the study area, particularly around Halkirk. Railways lie across the eastern and south part of the study area, with Georgemas Junction station, east of Halkirk, connecting to Thurso in the north and Wick to the east.

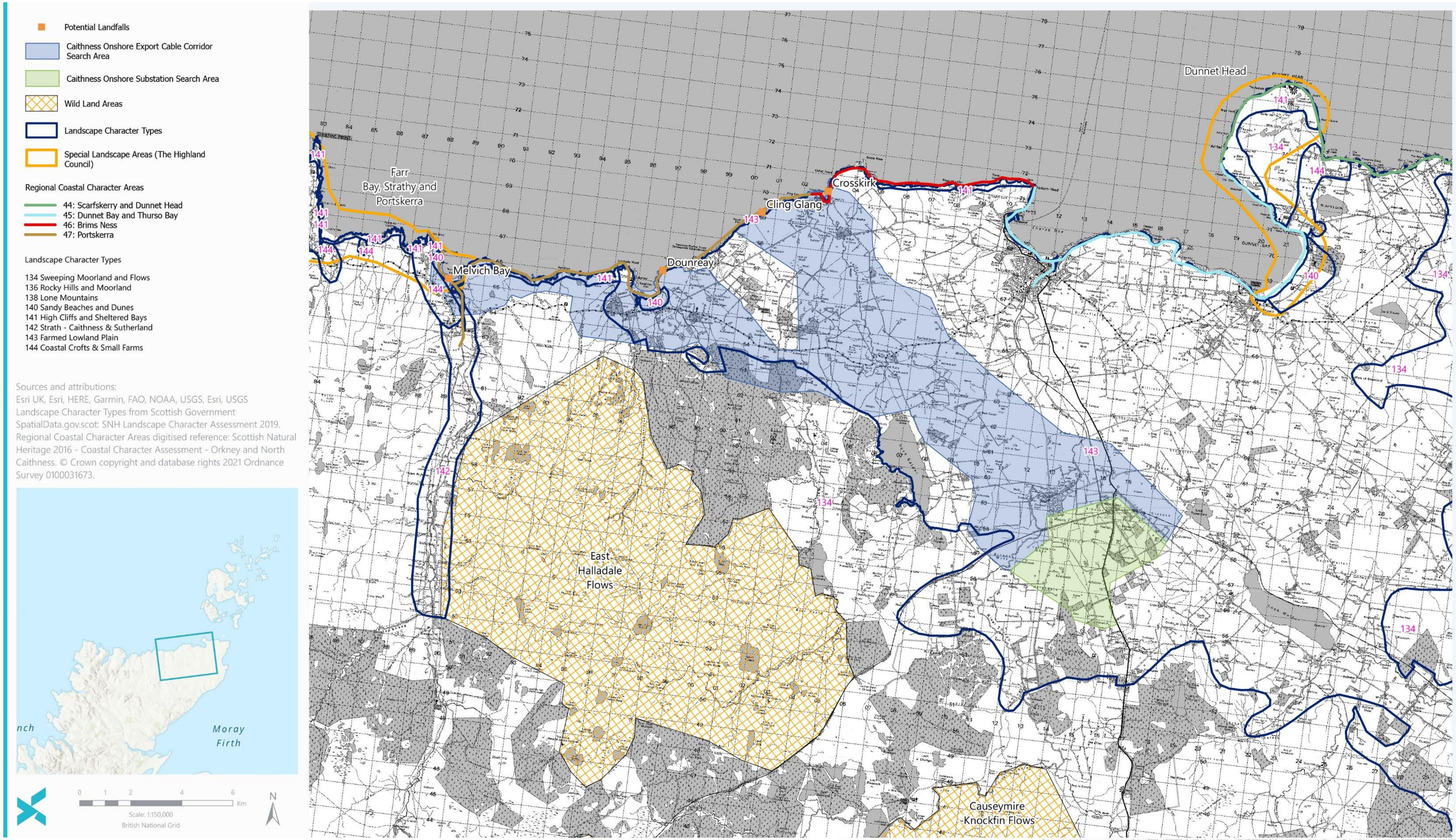

Figure 3-18 Seascape Character, Landscape Character and Landscape Designations

3.10.4.2 Summary and Key Issues

The landscape character of the study area is defined from local to national scale within NatureScot and local authority documents (Table 3-63). For the onshore elements of the Project, it is proposed to use NatureScot's Landscape Character Assessment (NS, 2019), Coastal Character Assessment (SNH, 2010) and Coastal character assessment: Orkney and North Caithness (LUC-SNH, 2016) to inform the baseline landscape character assessment of the Project and study area. The local character types identified in the 2016 Orkney and North Caithness assessment are considered an appropriate scale to consider the landfall impacts. For the cable route and substation, the regional character areas will be used, with additional local detail provided as necessary from desk and site survey.

Table 3-64 identifies the key landscape and visual receptors that are proposed to be included within the LVIA. It is anticipated that these will be refined through the design process and final project design envelope to ensure a focus on potential significant effects only. Viewpoints from key locations to represent these receptors will be identified through the site/route selection process and using ZTV plans with the final viewpoints for assessment to be agreed with consultees.

Table 3-64 Summary of Key Issues for Landscape Character and Visual Amenity

	PROJECT COMPONENT	
	CAITHNESS ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND CAITHNESS ONSHORE SUBSTATION SEARCH AREA	
SUMMARY AND KEY ISSUES	• Landscape Character (NS, 2019) – NS LCT 143: Farmed Lowland Plain; – NS LCT 134: Sweeping Moorland and Flows; and – NS LCT 141 High Cliffs and Sheltered Bays. • Coastal Character (LUC-SNH, 2016) – 46b – Long Rock to Crosskirk Bay; – 47a – Crosskirk Bay to White Geos; – 47b – White Geos to Sandside Head; – 47c – Sandside Hed to Leac Chailein; and – 47d – Leac Chailein to Rubha Bhra. • Landscape Designations – East Halladale Flows WLA; and – Farr Bay, Strathy and Portskerra SLA.	• Visual Receptors – Residential ▪ Portskerra; ▪ Reay; ▪ Crosskirk; and ▪ Halkirk. – Transport ▪ A836 (North Coast 500 and National Cycle Route); ▪ A9; and ▪ Railway. – Recreational/Visitor destinations ▪ Melvich Bay; ▪ Sandside Bay; ▪ Crosskirk Bay; and ▪ Core Paths within the study area.

3.10.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 3-65.

Table 3-65 Embedded Mitigation Measures that are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Consideration of landscape character, landscape designations and visual amenity throughout the site/route selection process and design of the chosen locations.	Primary	Through the design process, TWG discussions, establishing design principles and Section 36 consent and / or planning applications.
2	Landscape Plan presents the design of the final development	Tertiary	Requirement of the Section 36 and/or planning application conditions
3	Landscape Maintenance and Management Plan (LMMP) provides assurances on how the design of the Project meets landscape proposals	Tertiary	Requirement of the Section 36 and/or planning application conditions

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on landscape and visual receptors and will be consulted upon with consultees throughout the EIA process.

3.10.6 Scoping of Impacts

A number of potential impacts on landscape and visual receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Caithness. Impact identification has been informed by the Pre-Application Advice issued by THC (Ref no. 20/04850/PREMAJ received 10/02/2021). A number of impacts are proposed to be scoped out of the assessment for landscape and visual receptors. These impacts are outlined in Table 3-66, together with a justification for scoping them out.

Table 3-66 EIA Scoping Assessment for Landscape and Visual Receptors

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Impacts of all onshore Project elements on the Portskerra SLA, Halladalde Flows WLA and seascape/ landscape character within the study area	1, 2, 3	Scoped In	The construction and decommissioning of the Project have the potential to create significant effects, albeit temporary, on the special qualities of the SLA, WLA and character of the seascape and landscape within the study area.	Desktop study; site survey; and viewpoint photography.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 3-67).
Impacts of all onshore Project elements on visual amenity of local residents, road users, walkers, and visitors within the study area	1, 2, 3	Scoped In	The construction and decommissioning of the Project have the potential to create significant effects, albeit temporary, on visual amenity for local residents, road users, walkers and visitors within the study area.	Desktop study; site survey; and viewpoint photography.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 3-67).
Operations and Maintenance					
Impacts of all onshore Project elements on the	1, 2, 3	Scoped Out	There will be no permanent above ground infrastructure associated with the cable landfalls and onshore export cables as they	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Portskerra SLA, Halladale Flows WLA, and seascape/ landscape character within the study area			will be all underground. Therefore, there will be no potential to create significant effects on the special qualities of the SLA, WLA and character of the seascape and landscape within the study area.		
Impacts of substation on landscape character within the study area	1, 2, 3	Scoped In	The operations and maintenance of the substation has potential to create significant effects on the landscape character of the study area due to the type of development, scale, and potential visibility.	• Desktop study; site survey; • viewpoint photography; ZTVs; wirelines; photomontages; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 3-67).
Impacts of landfalls and UGCs on visual amenity of local residents, road users, walkers, and visitors within the study area	1, 2, 3	Scoped Out	There will be no permanent above ground infrastructure associated with the cable landfalls and onshore export cables as they will be all underground. Therefore there will be no potential to create significant effects on visual amenity within the study area.	N/A	N/A
Impacts of substation on visual amenity of local residents, road users, walkers, and visitors within the study area	1, 2, 3	Scoped In	The operations and maintenance of the substation has potential to create significant effects on visual amenity for local residents study area, road users, walkers and visitors within the study area due to the type of development, scale, and potential visibility.	• Desktop study; site survey; • viewpoint photography; ZTVs; wirelines; photomontages; and • 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 3-67).

3.10.7 Potential Cumulative Effects

There is the potential for impacts from the substation element of the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on landscape and visual receptors. For example with the proposed SHET-L extension of the Spittal substation. These cumulative effects are likely to be relatively localised given the type, scale, and size of development and the landscape character of the Caithness onshore substation search area.

As the export cable landfall(s) and export cables will not have any permanent above ground infrastructure it is not anticipated there will be potential for any significant cumulative landscape and visual effects. It is therefore proposed to scope out cumulative assessment for these elements.

The landscape and visual CEA will consider the maximum adverse design scenario for each of the Project, plan or activity in question, in line with the methodology outlined in 1.4.3. A 5 km radius cumulative study area from the onshore substation location is proposed to consider potential cumulative effects with other similar types of development (e.g. Dale Farm onshore wind farm). Through analysis of ZTVs and desk-based study the cumulative sites with most potential to create significant cumulative landscape and visual effects will be included within the assessment.

In terms of reporting, operational and in-construction sites will be included as part of the baseline. Consented (but un-built) projects will be considered as 'future baseline'. Application sites will be considered separately in the cumulative assessment, if relevant. It is proposed that, where possible, onshore infrastructure relating to the other ScotWind leasing sites will be included in the cumulative assessment based on the level of information that can be provided at the time, noting these would likely be at pre-planning stage when the LVIA is undertaken.

3.10.8 Approach to Analysis and Assessment

3.10.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on landscape and visual receptors will utilise Project-specific and publicly available data (see section 3.10.3) and will be augmented by consultation during the EIA phase. In order to facilitate resource effective stakeholder consultation though the development phase of the Project, a seascape, landscape and visual working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs. Key consultees will include:

- NatureScot;
- THC;
- Local landowners and communities; and
- Other interest groups/organisations

The Project has already undertaken some initial consultation with a number of organisations including NatureScot, THC and OIC with respect to seascape, landscape and visual issues associated with the Project. Pre-Application Advice from THC (Ref no. 20/04850/PREMAJ received 10/02/2021) on landscape and visual matters relating to the onshore infrastructure has been considered in the preparation of this Scoping Report and will inform the design and assessment stages.

The LVIA will be based on what is considered to be the maximum design scenario for each element of the onshore infrastructure from the Project design envelope. This will be determined by ZTVs, desk and site survey and design viewpoints. The use of 3D modelling and feedback from public consultation events will also inform the assessment.

Wherever possible, identified impacts are quantified, but the nature of landscape and visual assessment also requires interpretation by professional judgement. In order to provide consistency in determining landscape sensitivity and the prediction of magnitude of change, pre-defined criteria will be used. These will be derived from the Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and IEMA, 2013, 3rd Edition).

The findings of the LVIA assessment will be used to inform the terrestrial archaeology and cultural heritage assessment on historic setting, see section 3.6.

3.10.8.2 EIA Methodology

The landscape and visual EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 3-67 will also be considered in relation to the landscape and visual EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 3-67 Legislation and Guidance for Landscape and Visual Impact Assessment

LEGISLATION / GUIDANCE	SUMMARY
Assessing impacts on Wild Land Areas - technical guidance (NS, 2020)	The LVIA will follow this guidance for assessing the impact of the Project on WLAs.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NS, 2021)	Whilst focussed on windfarms, the principles set out in this guidance are still relevant to inform the cumulative assessment.
Guidance on Coastal Character Assessment (C.Anderson for SNH, 2018)	The key guidance for establishing coastal character areas which will inform any additional coastal character assessment required.
Guidelines for Landscape and Visual Impact Assessment: Third Edition (LI and IEMA, 2013) ('GLVIA3')	The key industry best practice guidance which provides the basis to the approach for the LVIA.
Landscape Institute TGN 06/19 Visual representation of development proposals (LI, 2019a)	It provides guidance as to appropriate techniques to capture site photography and produce appropriate visualisations.
Residential Visual Amenity Assessment Technical Guidance Note 02/2019 (LI, 2019b)	Where development is in close proximity to residential areas and has the potential to create effects, this

LEGISLATION / GUIDANCE	SUMMARY
	guidance will be used to identify and assess any potential significantly overbearing effects.
Visualisation Standards for Wind Energy Developments, (THC, 2016)	Whilst focussed on windfarms, this guidance will inform the approach to visualisations as part of the LVIA.
Highland-wide Local Development Plan (2012) Planning Policies (*particularly Policy 57 – Natural, Built & Cultural Heritage (includes SLAs), Policy 61 – Landscape, Policy 36 – Development in Wider Countryside and Policy 49 – Coastal Development*)	Sets out the overarching spatial planning policy for the whole of the Highland Council area.

3.10.9 Scoping Questions

- Do you agree with the proposed study areas?
- Do you agree to the approach and proposed scale of landscape baseline?
- Has the consultee identified any further landscape or visual receptors to be considered within the assessment (e.g. where potential significant effects may occur)?
- Do you agree with the proposed landscape and visual receptors that are scoped out?
- Are there any specific cumulative sites in planning to consider as part of the cumulative assessment?
- Are there any comments on the overall methodology proposed to assess effects on seascape, landscape and visual receptors, including cumulative effects?
- Are there any further consultees that should be consulted on LVIA matters?

3.10.10 References

Carol Anderson Landscape Associates for Scottish Natural Heritage (2018). Guidance note: Coastal Character Assessment.

Horner + Maclennan, Wood, M. (2011). Assessment of Highland Special Landscape Areas. The Highland Council in partnership with Scottish Natural Heritage Commissioned Report.

Landscape Institute (2019a) Technical Guidance Note 02/19 Residential Visual Amenity Assessment.

Landscape Institute (2019b) Technical Guidance Note 06/19 Visual representation of development proposals.

Landscape Institute and IEMA (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd Edition.

LUC for Scottish Natural Heritage (2016). Coastal character assessment: Orkney and North Caithness.

NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments.

NatureScot (2020). Assessing impacts on Wild Land Areas - technical guidance, NatureScot.

NatureScot (2019). Scottish Landscape Character Types Map and Descriptions. Available online at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions. [Accessed 09/12/2021].

Scottish Natural Heritage (2014). Wild Land Areas map and descriptions. Available online at: https://www.nature.scot/doc/wild-land-areas-map-and-descriptions-2014. [Accessed 09/12/2021].

Scottish Natural Heritage (2010a). Scotland's National Coastal Character Map. Available online at: https://www.nature.scot/sites/default/files/2018-05/National%20coastal%20character%20map.pdf [Accessed 09/12/2021].

The Highland Council (2017). Landscape Sensitivity Appraisal: Black Isle, Surrounding Hills and Moray Firth Coast, Caithness – Addendum Supplementary Guidance 'Part 2B' as part of Onshore Wind Energy Supplementary Guidance.

The Highland Council (2016). Visualisation Standards for Wind Energy Developments.

The Scottish Government (2016). Pilot Pentland Firth and Orkney Waters Marine Spatial Plan.

4 ONSHORE ORKNEY EIA SCOPING

Orkney is an archipelago located off the north-eastern coast of Scotland and comprises over seventy islands, only of which 20 are inhabited. The Orkney onshore export cable corridor search area is located across Hoy, Fara and Flotta and the Orkney onshore substation search area is located on the island of Flotta (Figure 4-1). There are potential export cable landfalls at Murra and Rackwick, located on the northwest coast of Hoy, on the east coast of Hoy (Greenhead, Rinnigill, Mill Bay and Rysa), Fara (Fara south, Fall sand, Fara north-west and Fara west) and Flotta (Flotta north and Flotta west). The Onshore Orkney EIA Scoping section of this report identifies the potential receptors of relevance, which have a potential to be impacted as a result of this Project. The baseline environment has been detailed for each receptor, which when considered alongside the embedded mitigation has been used to inform potential impacts and scope of the EIA.

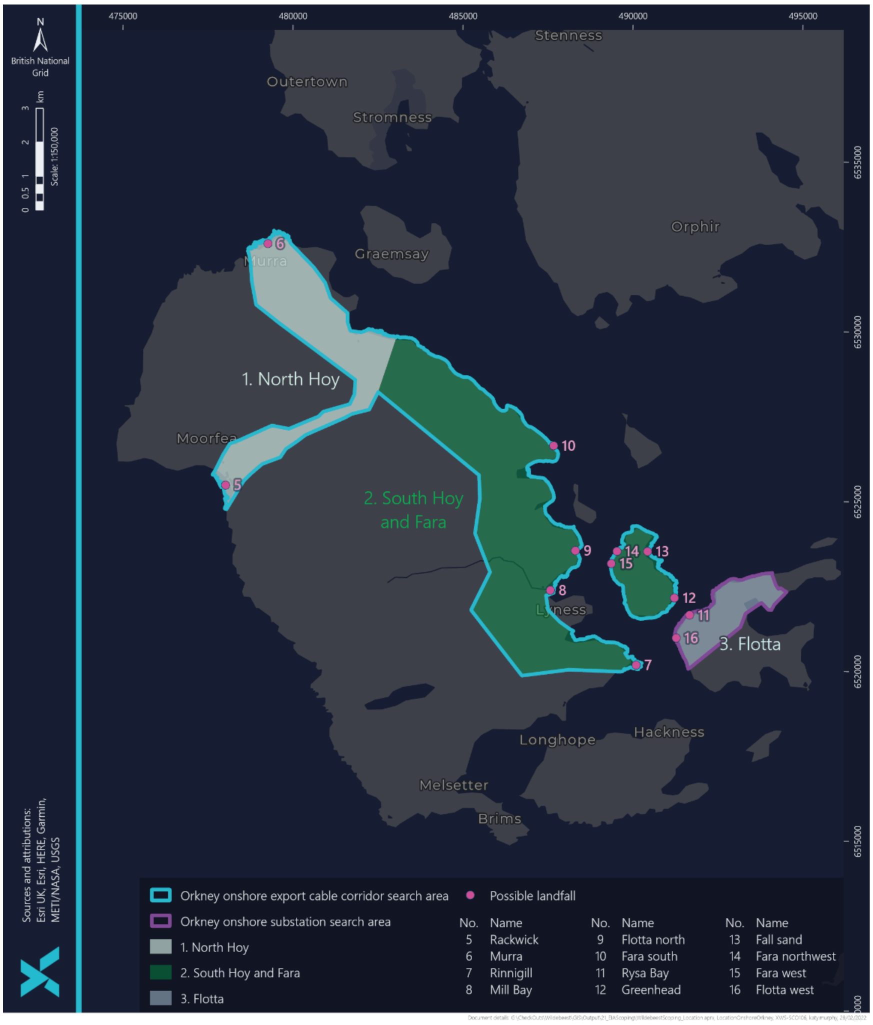

Figure 4-1 Onshore Orkney Scoping Boundary

The differentiation between North Hoy and South Hoy in the baseline is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.1 Geology and Hydrology

4.1.1 Introduction

This section of the Scoping Report identifies the geology and hydrology receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project.

Key issues of concern for hydrology include control of surface water and silty water, water crossings and any public and private water supply assets within the study area. For hydrogeology, matters of interest relate to groundwater-dependent wetland habitats and the potential for modifying groundwater flow paths. Geological concerns relate to the nature of soils and peatland within the study area, ground stability and the potential for contaminated land. Areas designated for aspects relating to geology and hydrology are also of importance.

Information that may be considered relevant to this section is also presented within the below sections:

- Land use and other users section 4.3; and
- Terrestrial non-avian ecology, section 4.3.

This section of the Scoping Report has been prepared by RSKW Ltd.

4.1.2 Study Area

The geology and hydrology study area lies across three of the Orkney Islands: Hoy, Fara and Flotta. Initial landfall is proposed for western or northern Hoy, with route options potentially crossing either directly to Flotta or passing from Hoy to Fara to Flotta. The Orkney substation search area is located on Flotta.

The Orkney onshore export cable corridor search area forms three main sub-sections, one on each of the three islands. On Hoy, two initial landfall locations have been identified at Murra and at Rackwick. From Murra, the search area runs roughly parallel to the north-eastern coast to Quoyness. From Rackwick, the search area follows a natural col through the hills, roughly parallel to the South Burn (Rackwick Burn) and the minor road to Moorfea and Rackwick. This col runs east-north-east before turning north as it approaches the north-east coast. This search area joins the route from Murra near Quoyness and they continue as one area. The combined Orkney onshore export cable corridor search area continues roughly parallel to the north-east and east coasts of Hoy, with four potential landfall locations located on the eastern coast at Greenhead, Rysa Bay, Mill Bay and Rinnigill. All the search areas on Hoy avoid as far as possible the higher mountainous ground in the centre of the island.

On Fara, the search area encompasses the entire island. Two potential landfall locations have been identified on the west coast (Fara north-west and Fara west) and two on the east coast (Fall sand and Fara south).

On Flotta, the search area covers most of the northern part of the island, including the existing oil terminal area. Areas downslope of the search area would be considered within the assessment where relevant. Two potential landfall locations have been identified, Flotta north and Flotta west.

4.1.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 4-1.

Table 4-1 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Local Orkney Development Plan	https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf	2017	OIC
GeoIndex Onshore: geological mapping	British Geological Survey online mapping portal	N/A	BGS
National Soil Map of Scotland	Scotland's Environment online portal	N/A	James Hutton Institute
Carbon and Peatland Map	Scotland's Environment online portal	2016	SNH (now NatureScot)
Coal Authority mining information portal	Coal Authority/British Geological Survey online mapping portal	N/A	Coal Authority
Water Environment and Water Classification Hubs	Scottish Environment Protection Agency online portals	Various	SEPA
Flood Mapping	SEPA online portal	Various	SEPA
The Geology of Scotland	The Geological Society of London (publisher)	2004	N.H. Trewin
British Regional Geology: Orkney and Shetland	BGS (publisher)	1976	W. Mykura
Private Water Supply details	OIC Environmental Health Department	N/A	OIC Environmental Health Department
Contaminated Land Register	OIC Environmental Health Department	N/A	OIC Environmental Health Department

4.1.3.1 Project-Specific Surveys

No surveys have been undertaken to date. However, extensive desk top studies were conducted as part of the site selection process to identify key onshore constraints. It is proposed that two types of survey are carried out, to gather relevant information regarding the search areas:

- A reconnaissance survey would be undertaken to gain an overview of the search areas and their immediate surroundings. This survey would involve visiting the search areas to gain site-specific information concerning particular elements of concern such as private or public water supply assets, surface water conditions at potential crossing locations, any areas of wetland habitat that has potential to be groundwater-dependent, any designated areas within the areas of search, and any areas where suspected contamination may be present.; and
- A more detailed survey would be undertaken to gather site-specific data on peat depth. This survey would be restricted to areas where peat cover is present or suspected to be present, and would be focused around preferred cable corridor search area to keep the survey effort to a reasonable level. It is anticipated that the peat survey would gather data on a 100 m grid across the proposed cable route corridors, with more focused data collection in areas required for additional infrastructure e.g. substation, construction compounds. The survey will be in line with the Scottish Government's Guidance on Developments on Peatland – Peatland Survey (2017).

4.1.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-1) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of geology and hydrology which are likely to require consideration within the EIA are:

- Bedrock and superficial geology
- Soils including areas of peat;
- Mineral resources;
- Contaminated land;
- Groundwater quality and quantity;
- GWDTE;
- Surface water quality and quantity; and
- Designated sites.

The following sections provide information on these key spatial differences for geology and hydrology which is relevant for the following areas:

1. The section of the Orkney onshore export cable corridor search area across North Hoy (see section 4.1.4.1)
2. The section of the Orkney onshore export cable corridor search area across South Hoy and Fara (see section 4.1.4.2); and
3. The section of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area on Flotta (see section 4.1.4.3).

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.1.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The bedrock geology of North Hoy consists almost entirely of sandstones and siltstones from the Old Red Sandstone Supergroup, of Middle and Upper Devonian age (BGS, 2021; Mykura, 1976; Trewin, 2004). A few small igneous intrusions of olivine microgabbro are present in parts of the area, also of Devonian age. A significant 599eptember cuts across North Hoy from Rackwick to the north-east coast east of Quoyness; the col that crosses the island follows the same route and is anticipated to exploit the line of the fault.

The superficial geology consists mainly of peat with some diamicton till, glaciofluvial deposits, hummocky glacial deposits, alluvium and blown sand. Small areas of alluvial fan deposits and marine beach deposits are noted. Diamicton till is a highly heterogeneous deposit consisting of mixed clay, silt, sand, gravel and boulders deposited by glaciers and frequently forms a blanket over the bedrock. Most of the other deposits apart from peat consist of a mix of gravel, sand, clay and silt of varying proportions.

The National Soil Map of Scotland (Scotland's Soils, 2021) identifies the main soil types as mineral gleys and peaty podzols with some alpine podzols on higher ground and an area of blanket peat near Rackwick.

The Carbon and Peatland map (Scotland's Soils, 2016) indicates that much of the search area from Rackwick is underlain by Classes 1 and 3 peatland, whereas the search area from Murra is underlain by Class 4 and mineral soils (Class 0). Class 1 is considered to be peatland of national importance by NatureScot.

The Old Red Sandstone bedrock is classed as a moderately productive aquifer with flow mainly within fractures and other discontinuities (Scottish Government, 2021). The superficial deposits are likely to hold variable amounts of groundwater, with deposits such as blown sand and alluvium potentially forming locally important aquifers. Groundwater storage within till and glacial deposits can be highly variable owing to the variation in clay content. Groundwater can form an important resource for private water supplies even in areas where groundwater is relatively limited in quantity. A small number of wells are indicated on OS mapping around Murra, Hoy, Quoyness and Rackwick.

Although there are several watercourses indicated on North Hoy, only one is large enough to have a classification from SEPA for water quality (SEPA, 2021; Table 4-2). Other watercourses of note within the search area are the Braebuster Burn and the Whaness Burn.

Table 4-2 Water Quality Details for the North Hoy Search Area Waterbodies

WATERBODY NAME & ID	STATUS	IDENTIFIED PRESSURES
20696 Rackwick Burn (South Burn)	Overall: Good Water flows and levels: High Water Quality: Good	N/A

Much of Hoy has been designated as an SAC and SSSI for shingle and sea cliffs; inland water bodies (both standing and running water); bogs, marshes, water-fringed vegetation and fens; heath, scrub, maquis and garrigue/phygrana; dry grassland and steppe, broad-leaved deciduous woodland; and inland rocks, screes, sands and permanent snow and ice (SiteLink, 2021). Four areas are also identified as GCR: the West Coast of Orkney for coastal geomorphology of Scotland; North Hoy for Quaternary of Scotland; Old Man of Hoy Coast for Non-marine Devonian, and Too of the Head for Old Red Sandstone Igneous.

One disused quarry is indicated on OS mapping near Quoys on North Hoy. There are no records of former mine workings or quarries for mineral extraction (BGS, 2021; Coal Authority, 2021).

4.1.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The bedrock geology of South Hoy and Fara consists almost entirely of sandstones and siltstones from the Old Red Sandstone Supergroup, of Middle and Upper Devonian age (BGS, 2021; Mykura, 1976). A significant 600eptember cuts along the west side of North Bay through to Rysa Little, separating the easternmost edge of Hoy from the main body of the island.

The superficial geology on South Hoy and Fara is primarily peat and diamicton till, with the till focused towards the northern part and peat becoming increasingly important further south. Alluvium deposits are present around most of the watercourses, with blown sand indicated in Mill Bay and Ore Bay.

The National Soil Map of Scotland (Scotland's Soils, 2021) identifies the main soil types on South Hoy as peaty podzols, blanket peat and mineral gleys with some alpine podzols on higher ground. Fara is indicated to be underlain by peaty gleys, mineral gleys and blanket peat.

The Carbon and Peatland map (Scotland's Soils, 2016) indicates that much of the search area on South Hoy is Classes 4 and 5 soils, with some areas of Class 1 peatland and mineral soils (Class 0). Class 1 is considered to be peatland of national importance by NatureScot.

The Old Red Sandstone bedrock is classed as a moderately productive aquifer with flow mainly within fractures and other discontinuities (Scottish Government, 2021). The superficial deposits are likely to hold variable amounts of groundwater, with deposits such as blown sand and alluvium potentially forming locally important aquifers. Groundwater storage within till and glacial deposits can be highly variable owing to the variation in clay content. Groundwater can form an important resource for private water supplies even in areas where groundwater is relatively limited in quantity. A well is indicated near Lyness.

Although there are several watercourses indicated on South Hoy, only one is large enough to have a classification from SEPA for water quality (SEPA, 2021; Table 4-3). Other watercourses of note within the Orkney onshore export cable corridor search area are the Lyrawa Burn, the Pegal Burn and the Burn of Ore. There are two minor watercourses shown on Fara.

Table 4-3 Water Quality details for the South Hoy Search Area Waterbodies

WATERBODY NAME & ID	STATUS	IDENTIFIED PRESSURES
20697 Mill Burn	Overall: Good Water flows and levels: High Water Quality: Good	N/A

The northernmost part of the South Hoy aspect of the Orkney onshore export cable corridor search area lies within the area designated as an SAC and SSSI, as described above. There are no other designations with relevance to geology and hydrology in South Hoy and Fara.

One disused quarry is indicated on OS mapping near Lyness. There are no other records of former mine workings or quarries for mineral extraction on South Hoy or Fara (BGS, 2021; Coal Authority, 2021).

There is potential for contaminated land in the area around Lyness, associated with former war time activities in this area.

4.1.4.3 FLOTTA – ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

The bedrock geology of Flotta consists entirely of sandstone, siltstone and mudstone of the Old Red Sandstone Supergroup of Devonian age (BGS, 2021; Mykura, 1976).

The superficial geology consists of peat in the western part of the island, with diamicton till and marine beach deposits in the eastern part.

The National Soil Map of Scotland (Scotland's Soils, 2021) identifies the main soil types on Flotta as mineral gleys, blanket peat, and a small area of peaty podzols.

The Carbon and Peatland map (Scotland's Soils, 2016) indicates that much of the search area on Flotta is Class 1 peatland, with some areas of Class 5 soils and mineral soils (Class 0). Class 1 is considered to be peatland of national importance by NatureScot.

The Old Red Sandstone bedrock is classed as a moderately productive aquifer with flow mainly within fractures and other discontinuities (Scottish Government, 2021). The superficial deposits may hold variable amounts of groundwater, although the size of Flotta indicates these are unlikely to be significant. Groundwater storage within till can be highly variable owing to the variation in clay content. Groundwater can form an important resource for private water supplies even in areas where groundwater is relatively limited in quantity. A large number of wells are indicated on OS mapping.

There are some minor watercourses shown on Flotta.

There are no records of former mine workings or quarries for mineral extraction on Flotta (BGS, 2021; Coal Authority, 2021).

The Flotta Oil Terminal is anticipated to be a potential source of contaminated land within and immediately adjacent to its boundary. An effluent outfall from the terminal is present in Kirk Bay; it is possible that there would be contaminated land potential around the pipeline leading to the outfall (regular seabed surveys are undertaken to ascertain any impacts from the effluent discharge). There may also be potential for contaminated land associated with the Flotta air strip located along the west coast of Flotta.

4.1.4.4 Summary and Key Issues

Table 4-4 Summary and Key Issues for Geology and Hydrology

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	• Old Red Sandstone bedrock; • Class 1 Peatland; • Moderately productive aquifer with potential for private water supply abstractions; • Sensitive watercourses and waterbodies; • One disused quarry; and • Various designations for geological and hydrological reasons.	• Old Red Sandstone bedrock; • Class 1 Peatland; • Moderately productive aquifer with potential for private water supply abstractions; • Potential for contaminated land around Lyness; and • One disused quarry.	• Old Red Sandstone bedrock; • Class 1 Peatland; • Moderately productive aquifer with potential for private water supply abstractions; • Many mapped wells; and • Potential for contaminated land associated with Flotta Oil Terminal, disused airfield and pipeline to effluent outfall.

4.1.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-5.

Table 4-5 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Avoidance of sensitive areas (peatland, potential groundwater-dependent terrestrial ecosystems, designated areas).	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
2	Minimisation of watercourse crossings.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
3	Avoidance of cable routes parallel to watercourses for distances greater than 500 m.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
4	Avoidance of suspected areas of land contamination.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
5	Control of diffuse pollution.	Primary	Utilisation of best practice sediment management techniques.
6	Control of pollution.	Primary	Employment of best practice pollution prevention techniques.
7	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on geology and hydrology and will be consulted upon with consultees throughout the EIA process.

4.1.6 Scoping of Impacts

A number of potential impacts on geology and hydrology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. None of the potential impacts are proposed to be scoped out of the assessment, as it is considered that all impacts have the potential to be significant and therefore that they require assessment.

Table 4-6 EIA Scoping Assessment for Geology and Hydrology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Changes to soil quality	1, 4, 5, 6, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on sensitive soils. Without careful handling these could be long-term or permanent.	Desktop study and site survey.	Desktop assessment using existing soils datasets, updated by site-specific survey data to identify higher sensitivity areas.
Soil compaction and erosion	1, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on sensitive soils. Without careful handling these could be long-term or permanent.	Desktop study and site survey.	Desktop assessment using existing soils datasets, updated by site-specific survey data to identify higher sensitivity areas.
Groundwater flow, levels and quality	2, 5, 6, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on shallow groundwater. These would be expected to be permanent.	Desktop study and site survey.	Desktop assessment using existing geology and hydrogeology datasets, updated by site-specific survey data.
Contamination of surface watercourses or waterbodies	2, 3, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on surface waterbodies. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using existing surface water quality details, updated by site-specific survey data.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Changes to surface water runoff	2, 3, 5, 6, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on surface water runoff patterns. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using existing surface water catchment statistics, updated using proposed construction and decommissioning details.
Change in flow and/or contamination of private water supplies	2, 3, 4, 5, 7	Scoped In	The construction and decommissioning of the Project have potential to create significant effects on flow and contamination of private water supply sources. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using existing private water supply data, followed by a location-specific risk assessment process for each supply source.
Risk of flooding to the development and increased risk of flooding in areas downstream	2, 7	Scoped In	The construction and decommissioning of works within the coastal zone will be at risk of flooding. The construction and decommissioning of the Project have potential to increase flood risk to areas adjacent to and downstream of the Project. These could be temporary or permanent depending on the situation.	Desktop study and site survey.	Desktop assessment using available flood risk datasets and existing surface water catchment statistics, updated using proposed construction and decommissioning details.
Operation and Maintenance					
Changes to soil and groundwater quality	1, 5, 6	Scoped In	The operation and maintenance of the Project has potential to create significant	Desktop study and site survey.	Desktop assessment using existing soils, geology and hydrogeology datasets and

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			effects on soils and shallow groundwater. These could be temporary or permanent.		proposed operation methods, including pollution prevention planning, updated by site-specific survey data.
Contamination of surface watercourses or waterbodies	2, 3, 5, 6	Scoped In	The operation and maintenance of the Project has potential to create significant effects on surface waterbodies. These could be temporary or permanent.	Desktop study and site survey.	Desktop assessment using existing surface water quality datasets and proposed operation methods, including pollution prevention planning, updated by site-specific survey data.
Contamination of private water supplies	2, 3, 5, 6	Scoped In	The operation and maintenance of the Project has potential to create significant effects on private water supplies. These could be temporary or permanent.	Desktop study and site survey.	Desktop assessment using existing private water supply datasets and proposed operation methods, including pollution prevention planning, updated by site-specific survey data.

4.1.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on effect on geology and hydrology receptors, for example the Hoy community wind farm and the proposed Flotta Hydrogen Hub. Potential impacts on soils and geology are usually localised in nature and rarely result in cumulative effects; however, impacts on hydrology and hydrogeology may be transmitted downstream for longer distances and therefore need to be considered for any other developments within the same hydrological catchment areas. These relate particularly to water flow variations, including increased flood risk downstream, and to water pollution including potential sediment release from construction works.

The geology and hydrology Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

4.1.8 Approach to Analysis and Assessment

4.1.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on geology and hydrology will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. It is anticipated that consultation would be undertaken with:

- OIC;
- SEPA;
- NatureScot; and
- Scottish Water.

The Project has already undertaken some initial consultation on the geology and hydrology issues associated with the Project including OIC and NatureScot.

Gathering of site-specific data will form a key part of the assessment. Data collected will include:

- Measurement of peat and soil depths, to inform the design process as a constraint and to underpin any requirement for peat volume calculations for a peat management plan;
- Identification of any springs or seepages that may contribute to the presence of GWDTE within the search areas;
- Ground-truthing locations of private water supply source locations, if relevant, so that they can be fully considered in the cable route design process; and
- Ground-truthing any areas identified as potentially contaminated so that an appropriate level of risk assessment can be undertaken with regard to these areas.

The geology and hydrology assessment will be based on what is considered to be the maximum design scenario for each element of the Onshore Project from the project design envelope. This ensures that the assessment will cover the worst-case scenario and therefore the highest magnitude impact if more than one design option requires consideration. The assessment will consider direct effects i.e. effects that are made directly to a receptor, such as the effects of excavation on soils, and indirect effects i.e. effects that arise as a result of a change made to a different receptor, such as a change in water flow to a private water supply resulting from changes to groundwater flow paths from excavation works. The assessment will mainly be qualitative in nature, as the majority of the potential impacts are not readily quantifiable.

4.1.8.2 EIA Methodology

The geology and hydrology EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-7 will also be considered in relation to the ecology and nature conservation EIA. Consideration will be given to all relevant planning guidance at all levels with respect to geological and hydrological regulation. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 4-7 Legislation and Guidance for Geology and Hydrology

LEGISLATION / GUIDANCE	SUMMARY
The Environmental Protection Act 1990 (as amended)	Establishes businesses' legal responsibly for a duty of care of waste, contaminated land and statutory nuisances.
SEPA's Position Statement WAT-PS-10-01: Assigning Groundwater Assessment Criteria for Pollutant Inputs (2014)	Describes how the prevent and limit requirements of Directive 2000/60/EC (the Water Framework Directive or 'WFD') should be applied to assess potentially polluting high risk point sources inputs of pollutants into groundwater where a quantitative assessment is being carried out.
The Water Environment and Water Services (Scotland) Act 2003	The Act sets out arrangements for the protection of the water environment and changes how new connections to the public water and sewerage infrastructure are to be funded.
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended	Apply regulatory controls over activities which may affect Scotland's water environment
The Pollution Prevention and Control (Scotland) Regulations 2012	Implement the requirements of the IED.
The Water Environment (Oil Storage) (Scotland) Regulations 2006	Outlines the regulatory requirements for the storage of oil.
The Contaminated Land (Scotland) Regulations 2005	Amends Part IIA of the Environmental Protection Act 1990("the 1990 Act"), which was inserted by section 57 of the Environment Act 1995. It also makes amendments to the Contaminated Land (Scotland) Regulations 2000 ("the 2000 Regulations").

LEGISLATION / GUIDANCE	SUMMARY
Scottish Government's Planning Advice Note 51: planning, environmental protection and regulation (2006)	Supports the existing policy on the role of the planning system in relation to the environmental protection regimes.
SEPA's GPPs, with particular reference to: • **GPP 1: Understanding your environmental responsibilities – good environmental practices;** • **GPP 5: Works and maintenance in or near water;** • **PPG 6: Working at construction and demolition sites;** • **GPP 13: Vehicle washing and cleaning;** • **GPP 21: Pollution incident response planning;** • **GPP 22: Dealing with spills.**	GPPs provide environmental good practice guidance.
SEPA's Developments on Peat and Off-Site Uses of Waste Peat (2017)	Provide guidance on the hierarchy of management options for excavated peat.
Scottish Government's Guidance on Developments on Peatland – Peatland Survey (2017)	Provides guidance on sampling methodology for peat surveys and how to report these findings.
SEPA's Technical Flood Risk Guidance for Stakeholders – SEPA Requirements for undertaking a Flood Risk Assessment (2019)	Outlines the submission requirements for SEPA to undertake a Flood Risk Assessment.

4.1.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Does the Local Authority hold any records for private water supplies within 1 km of the search area boundary?
- Does the Local Authority hold any records of potentially contaminated land, such as landfill sites, within 1 km of the search area boundary?
- Do you agree that all receptors and impacts have been identified?
- Is the proposed consideration of peat acceptable?
- Is the proposed scope of peat assessment acceptable?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects on hydrology and geology?

4.1.10 References

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4.2 Freshwater Ecology

4.2.1 Introduction

This section of the Scoping Report identifies the freshwater ecology receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of proposed Project.

The main potential issues of interest relate to the freshwater stages of Atlantic salmon, and anadromous variants of the brown trout known widely as sea trout. This includes protection of the fish species and their habitats. The key life history stages are:

- Return adult migrations;
- Reproductive behaviours including spawning and incubation;
- Recruitment of young fish to older cohorts; and
- Juvenile migration downriver and access to the sea.

Seaward return of surviving adults following spawning should also be considered.

Additional fish species of relevance include the European eel, and the three species of native lamprey – brook, river, and sea lamprey. FPM are also relevant and will be assessed.

It should be noted that all channels are potentially subject to the Salmon Act irrespective of whether they are located within a protected area. This provides additional protection to anadromous salmonids and their habitats outside of the standard other legal protections described in elsewhere in Section 4. This Act also protects the economic asset of the fishery, which is considered elsewhere.

Information that may be considered relevant to this section is presented within the below sections:

- Geology and hydrology, section 4.1;
- Non-avian ecology, section 4.3; and
- Land-use and other users, section 4.5.

This section of the Scoping Report has been prepared by Caledonian Conservation Ltd.

4.2.2 Study Area

The freshwater ecology study area is defined by the Project EIA scoping boundary, including the proposed landfall points on three Orkney Islands, Hoy, Fara and Flotta, with the substation search area located on Flotta. A total of 23 named channels are found within the Project area located on Hoy and Fara with none noted from Flotta The potential links between these nodes covers a substantial area and a very large number of possible crossing points. It is expected that as the Project progresses these crossing points will be refined.

4.2.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project proposed to inform the baseline characterisation for the EIA are outlined in Table 4-8.

These sources related to the potential for migratory fish to access relevant channels and the observed fish density of certain species; the presence of protected areas, habitats, and species; and the WFD status classifications of WBs which may be impacted by the Project.

Table 4-8 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Barriers to fish migration	MSS mapping portal, NMPI	N/A	SEPA
Salmon distribution map	MSS mapping portal, NMPI	N/A	MSS
Sitelink	NatureScot	N/A	NatureScot
WFD Status assessments	Water Environment Hub	N/A	SEPA
NEPS Survey Overview	MSS Shiny App R	2019	MSS
Orkney Wildlife Information and Records Centre	OWIARC map hub	N/A	OWAIRC
Orkney Trout Fishing Association	Webpage	N/A	OFTA
Orkney Local Biodiversity Action Plan	Orkney Biodiversity Steering Group	2018	Orkney Environment Partnership

4.2.3.1 Site-Specific Surveys

No relevant surveys have been carried out at this point. It is proposed that the following assessments and surveys are carried out to inform on freshwater ecological quality and mitigation as part of the planning process:

- Remote and mapping data to be reviewed as part of a desk-based assessment to determine potential areas of risk for fish and FPM populations. This will utilise characteristics such as observed presence of deposition features, channel slope, catchment position, channel typology, channel reference typology, and overall catchment form to assess the likelihood of key fish habitats and FPM presence within the Project area. There is no standard methodology for this approach for river channel assessment.;
- A rapid reconnaissance walkover of all potentially sensitive channels identified within the desk-based assessment to obtain information on spawning habitats for salmonids and lamprey, and on FPM habitat. The latter should record habitats as per the G1-G3 standards as used in Cooksley *et al.*, 2011. This survey will aim to be carried out prior to June to ensure riparian and channel vegetation does not obscure critical features to be recorded.; and

- Once sensitive areas have been identified; in-detail habitat assessment and FPM surveys will be carried out at each crossing location irrespective of channel size. The survey extents will correspond to NatureScot's "*Freshwater Pearl Mussel Survey Protocol – for use in site specific projects*" (NatureScot, 2021), with that method being used to assess FPM risk. A complete fish habitat inventory will also be carried out, broadly conforming to the "Hendry & Cragg-Hine" (Environment Agency, 1997) method. This approach will be adapted to ensure relevance to current standards and approaches (e.g., not recording large woody debris as a barrier, description of habitat form as opposed to unvalidated habitat uses and using digital data and mapping methods). Again, this will aim to be carried out prior to June to avoid issues of vegetation growth obscuring features.

4.2.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-8) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.2.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

There is a single WB within the proposal area (**Table 4-9**); however, it should be noted that not all channels capable of hosting key species and their habitats are assessed under WFD in Scotland, with only those over 11 ha catchment size receiving a designation.

Table 4-9 SEPA Water Bodies and Current Overall Conditions Status within the Project Area

WBID	NAME	STATUS
20696	Radwick Burn (North Hoy)	Good

Only one WB is present within the search area - 20696. It is at Good Condition suggesting fully functioning river ecosystems is present.

There are no in-channel barriers that could impact on receptor presence within the search area (MSS 2021a).

There are no NEPS data available for the Northern Isles (MSS 2021b). The MSS salmon distribution map indicates that salmon may be present on Hoy. This is contradicted by The State of the Environment Assessment (OIC, 2020) which states salmon are not resident and this is a widely understood to be the situation (e.g. Orkney LBAP, Orkney Biodiversity Steering Group, 2018). OIC (2020) and the Orkney Trout Fishing Association (OFTA) both show that sea trout are common, with Thomson (2015) and OIC (2020) showing most burns within the Project Area hosting sea trout. Summary conclusions from electrofishing surveys carried out by OFTA are presented within the Orkney LBAP (Orkney Biodiversity Steering Group, 2018); however, the link to the data is broken. This data could be reviewed as part of the EIA. Under the Salmon Act, sea trout are legally considered as equal to salmon and all protections required for the latter should be applied to sea trout. Given that sea trout and salmon both use the same habitats within rivers to spawn, there is salmon habitat available and until formal clarification is received salmon has been included within assessments.

There are no protected areas designated for the receptors identified within the search area.

No information is currently available for FPM, potentially as it is illegal to reveal publicly the location of this sensitive species. Further information may be made available in consultation with regulators. Given NatureScot guidance that they should be assessed where they could be present and that at this stage their presence cannot definitively be excluded within the Project area, they have been included here for further assessment.

Given the paucity and/or contradictory nature of supporting data, a precautionary approach should be followed and Atlantic salmon, sea trout and FPM should be scoped in. This information can be clarified during EIA

Other fish species of importance are European eel and lampreys. European eel receive no formal legal protective status in Scotland however their numbers have declined sufficiently that they are now listed as Critically Endangered (IUCN, 2020). An eel management plan has been produced for Scotland (DEFRA, 2010). However, this document does not provide any real practical information to support eel conservation for a scheme such as this, and recent information on their distribution and abundance in Scotland is not freely available. In the absence of further information and, critically, extensive barriers within rivers, the presence of eel should be assumed.

Three species of lamprey are potentially found within North Hoy. Brook lamprey and river lamprey (*Lampetra* spp.) are related lampreys commonly distributed within Scotland. Brook lamprey complete their entire life cycle within freshwater while river lamprey migrates to coastal areas, parasitising marine fish before returning to local rivers to spawn. The sea lamprey (*Petromyzon marinus*) is a much larger fish but displays a similar life history to river lamprey. Although none of these species hold specific protected status other than restrictions on their method of capture (Schedule 3 Conservation (Natural Habitats, &c.) Regulations 1994) (as amended)), they can form the basis of protected area designations elsewhere in Scotland.

4.2.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

There is a single WB (ID 20697) on South Hoy shown on Table 4-10, however it should be noted that not all catchments capable of hosting important receptors receive a WB designation.

Table 4-10 SEPA Water Bodies and Current Overall Conditions Status within the Project Footprint

WBID	NAME	STATUS
20697	Mill Burn (South Hoy)	Good

Only one WB is present, on South Hoy. It is at Good Condition suggesting fully functioning river ecosystems is present.

There are no WBs on Fara.

There are no in-channel barriers that could impact on receptor presence within the area of interest (MSS 2021a).

There are no NEPS data available for the Orkney Isles (MSS 2021b). The MSS salmon distribution map indicates that salmon may be present on Hoy. This is contradicted by The State of the Environment Assessment (OIC, 2020) which states salmon are not resident and this is a widely understood to be the situation (e.g. Orkney LBAP, Orkney Biodiversity Steering Group, 2018). OIC (2020) and the Orkney Trout Fishing Association (OFTA) both show that sea trout are common as resident and coastal species, with Thomson (2015) showing most burns within the Project Area hosting sea trout. Under the Salmon Act, sea trout are legally considered as equal to salmon and all protections required for the latter should be applied to sea trout. Given that sea trout and salmon both use the same habitats within rivers to spawn, there is salmon habitat available and until formal clarification is received salmon should be included within assessments. Summary conclusions from electrofishing surveys carried out by OFTA is presented within the Orkney LBAP (Orkney Biodiversity Steering Group, 2018); however, the link to the data is broken. This data could be reviewed as part of the EIA.

There are no protected areas designated for the receptors identified within the search area.

No information is currently available for FPM, potentially as it is illegal to reveal publicly the location of this sensitive species. Given NatureScot guidance that they should be assessed where they could be present and given that at this stage their presence cannot definitively be excluded within the Project area, they should be included here.

Given the paucity and/or contradictory nature of supporting data, a precautionary approach should be followed and Atlantic salmon, sea trout and FPM should be scoped in. This information can be clarified during EIA.

No information on eel is available within the search area. In the absence of further information and, critically, extensive barriers within rivers, the presence of eel should be assumed.

No information on lamprey is available within the search area. In the absence of further information and, critically, extensive barriers within rivers, the presence of lamprey should be assumed.

4.2.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

There is no available information, WB's or NEPS data for Flotta. MSS (2022) salmon distribution map shows no presence of the species on Flotta. Thomson (2015) does not include trout on Flotta in its distribution map, but there is no indication that surveys were carried out on the Island as part of that study.

No information is currently available for FPM, potentially as it is illegal to reveal publicly the location of this sensitive species. Given NatureScot guidance that they should be assessed where they could be present and given that at this stage their presence cannot definitively be excluded within the Project area, they should be included here.

There is no evidence of salmon or sea trout on Flotta; however, it may be that surveys have not been carried out or using outdated electrofishing methods. Given the paucity or uncertainty nature of supporting data, a precautionary approach should be followed and Atlantic salmon, sea trout and FPM should be scoped in. This information can be clarified during EIA.

No information on eel is available within the search area. In the absence of further information and, critically, extensive barriers within rivers, the presence of eel has been assumed.

No information on lamprey is available within the search area. In the absence of further information and, critically, extensive barriers within rivers, the presence of lamprey has been assumed.

4.2.4.4 Summary and Key Issues

The key features of freshwater ecology which are likely to require consideration within the EIA are detailed in Table 4-11.

Table 4-11 Summary and Key Issues for Freshwater Ecology

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	• Atlantic salmon and sea trout (acknowledging the paucity and/or contradictory nature of supporting data on species presence); • FPM (acknowledging that presence is assumed due to lack of information); • Eel (acknowledging that presence is assumed due to lack of information) and lampreys; • The habitats of these species and; • Access to these habitats.	• Atlantic salmon and sea trout (acknowledging the paucity and/or contradictory nature of supporting data on species presence); • FPM (acknowledging that presence is assumed due to lack of information); • Eel and lampreys (acknowledging that presence is assumed due to lack of information); and • The habitats of these species and; • Access to these habitats.	• Atlantic salmon and sea trout (acknowledging that no information currently suggests the presence of the species); • FPM (acknowledging that presence is assumed due to lack of information); • Eel and lampreys (acknowledging that presence is assumed due to lack of information) ; and • The habitats of these species and; • Access to these habitats.

4.2.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-12. At this early stage many of these measures should be considered generic and can be refined as more detail becomes available during progression.

Table 4-12 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Protect local salmonid spawning and incubation through avoidance of sensitive areas and timings where appropriate.	Primary	Establish within design and secured within CAR licensing and Section 36/planning application.
2	Protect wider scale salmonid spawning and incubation through no in-channel working between October to May where appropriate.	Primary	Establish within work programme and secured within CAR licensing and Section 36/planning application.
3	Protect salmonid spawning and incubation through no trial pitting or borehole drilling within 10m of bankside between October to May where appropriate.	Primary	Establish within work programme and secured within CAR licensing and Section 36/planning application.
4	Avoid crossing locations with confirmed FPM presence.	Primary	Establish at design or with subsequent variation in route and secure within Section 36/planning application.
5	Sustain passage of fish through site during works at crossing locations where appropriate.	Primary	Establish at design and secure within Section 36/planning conditions.
6	No post construction channel barriers.	Primary	Establish at design and secure within Section 36/planning application and CAR licensing.
7	Prevent fish and peal mussel mortality with rescues at all dried working areas within channels where appropriate.	Primary	Establish within work programme and secure within CAR licensing and Section 36/planning conditions.
8	Return location to pre-construction state.	Primary	Establish at design and work programming and secure with CAR licensing and Section 36/planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
9	Determine site pollution control using WAT-SG-74 (SEPA 2018a) and GPP-22 (SEPA 20118b).	Primary	Establish within work programme and secure within CAR licensing and Section 36/planning application.
10	Ensure appropriately qualified ECoW presence at sensitive locations and/or sensitive periods where appropriate.	Primary	Establish within work programme and secure within CAR licensing and Section 36/planning conditions.
11	Create and implement AMP including controls, to quantify a baseline ecological standard. This should use standard family level benthic macroinvertebrate surveys, yearly fully quantitative electrofishing surveys and post construction walkovers. The scope of the monitoring programme should be proportional to the size of the scheme.	Primary	Establish within work programme and secure within CAR licensing and Section 36/planning conditions.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on freshwater ecology and will be consulted upon with consultees throughout the EIA process.

4.2.6 Scoping of Impacts

A number of potential impacts on freshwater ecology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. This list presented in Table 4-13 will be refined once more detailed information on the export cable corridors and receptor risk is gathered through advancing design and survey phases. None of the potential impacts are proposed to be scoped out at this stage as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 4-13 EIA Scoping Assessment for Freshwater Ecology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Mortality of important receptors	1, 2, 3, 4, 7, 8, 10, 11	Scoped In	Construction and decommissioning works have the potential to cause injury or death to aquatic biota (particularly salmon, trout, eels, lampreys, and FPM) through physical damage, drying and contamination.	Desktop study and Project site specific surveys and assessments.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys.
Damage to key freshwater habitats	5, 8, 10, 11	Scoped In	Through changing site hydrodynamics, construction and decommissioning works have to potential to alter local habitats and prevent a return to pre-works habitat process regimes.	Desktop study and Project site specific surveys and assessments.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys, review of draft design by ecology team.
Interruptions to fish passage	1, 2, 3, 5, 10, 11	Scoped In	Construction and decommissioning works have the potential to prevent upstream and downstream migration of fish.	Desktop study, Project site specific surveys and assessments, method statement review, regulator discussion.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys, creation of seasonal sensitivity table, review of draft method statement by ecology team.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Operation and Maintenance					
Mortality of important receptors	8, 11	Scoped In	The operation and maintenance phase has the potential to cause chronic pressures such as external sediment access and channel instability, which has the potential to cause injury or death to aquatic biota (particularly salmon, trout, eels, lampreys and FPM).	Desktop study, Project site specific surveys and assessments, method statement review, regulator discussion.	Desktop assessment using available online assets, discussion with regulators and site surveys, AMP, review of design by ecology team.
Damage to key freshwater habitats	8, 11	Scoped In	Through changing site hydrodynamics, the operation and maintenance works have to potential to alter local habitats and prevent a return to pre-works habitat process regimes and ecological quality.	Desktop study and Project site specific surveys and assessments, design review, AMP, regulator discussion.	Desktop assessment using available online assets, AMP, discussion with regulators and site surveys, review of draft design by ecology team.
Interruptions to fish passage	6, 8, 11	Scoped In	Final site state has the potential to prevent upstream and downstream migration of fish.	Desktop study, Project site specific surveys and assessments, method statement review, regulator discussion.	Desktop assessment using site surveys, AMP, review of design by ecology team.

4.2.7 Potential Cumulative Effects

It is possible that the potential impacts from the Project could interact with impacts from other projects, plans and activities, for example the Hoy Community windfarm and the proposed Flotta Hydrogen Hub. This could result in a cumulative effect on freshwater ecology receptors. Potential impacts on river biota are normally local; however, through transmission of pressures downstream by flows there is the possibility of widespread impact at the reach and river scale. Serious pressure can result in the loss of an entire year class of fish with subsequent loss or reduction in adult returns (for salmonids and lamprey) and juveniles (eel) in subsequent years, and changes to regional abundance. Any impacts on FPM may be severe due to their very old ages, conservation status, and limited recruitment potential.

The freshwater ecology CEA will consider the maximum adverse design scenario for each of the project, plan, or activity in question in line with the methodology outlined in section 1.4.2. The freshwater ecology assessment will include assessment of the combined potential cumulative effects from this Project along with other current or approved schemes.

4.2.8 Approach to Analysis and Assessment

4.2.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on freshwater ecology will utilise Project-specific and publicly available data (see section 4.2.3) and will be augmented by consultation during the EIA phase. As there is no DSFB charged with regulating the Salmon Act on the Orkneys, the responsibilities are shared between the local council, MSS, and the Orkney Trout Fishing Association.

Consultees will include:

- Orkney Trout Fishing Association;
- OIC;
- MSS;
- SEPA; and
- NatureScot.

OWPL has already undertaken some initial consultation on onshore ecology issues, including freshwater ecology, associated with the Project including OIC and NatureScot.

The following approach to data collection will be implemented:

- Remote and mapping data to be assessed as part of a desk-based assessment to determine potential areas of risk for fish and FPM populations. This will utilise characteristics such as observed presence of deposition features, channel slope, catchment position and overall catchment form to assess likelihood of key fish habitats and FPM presence within the Project area.;
- Rapid reconnaissance walkovers of channels identified within the desk-based assessment to verify, at a high level, potentially sensitive channel reaches. This will include the identification of FPM habitats, fish spawning habitats, and lamprey juvenile habitat.;

- Detailed habitat walkovers and FPM surveys at defined sensitive areas to assess site-specific risk.;
- Development of a generic seasonal sensitivity table to be refined by local regulators to advise on critical local timings of key life history stages of fish species such as smolt run and salmonid adult migration phases such as river entry and migration to spawning areas. This refined table will then guide work timings.; and
- Site locations for AMP should be agreed and baseline data collection using fully quantitative electrofishing and family level invertebrate sampling should begin. These surveys will aim to be carried out in August-September

These data should be assessed considering maximum design scenarios to ensure all potential impacts and their scales have been reviewed with respect to collected data. Impacts should be considered directly; for example, potential site mortality during construction and indirectly, such as impacts on FPM mediated via effects on salmonid hosts, or transmission of impacts downstream by flows into sensitive areas.

European sites with respect to freshwater ecology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with freshwater ecology features and assess the adverse impact on the integrity of the European site.

4.2.8.2 EIA Methodology

The freshwater ecology EIA will be undertaken in line with the methodology set out in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018). The specific legislation and guidance documents outlined below in Table 4-14will also be considered in relation to the ecology and nature conservation EIA:

Table 4-14 Legislation and Guidance for Freshwater Ecology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018)	Industry standard professional guidance to be followed when undertaking an EcIA including when it is part of an EIA.
A Handbook on Environmental Impact Assessment, Version 5 (Historic Environment Scotland and SNH, 2018)	Guidance to be followed when undertaking EIA published by SNH (now NatureScot) and Historic Environment Scotland.
The Habitats Directive	Bats, otter and great crested newt are provisioned with legal protection under the EC Habitats and Species Directive. This is transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and domestic legislation continues to be aligned after Scotland left the European Union with the UK through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020. The Habitats Directive also identifies plant species (Annex V) and habitats which require conservation in their own right (Annex I). Another major provision of the Directive

LEGISLATION / GUIDANCE	SUMMARY
	is the identification and classification of SACs for rare or vulnerable species and habitats.
Scottish Biodiversity List	The SBL is a list of habitats and species that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and (along with biodiversity lists from other UK countries) supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011).
The Orkney Local Biodiversity Plan 2018-2022	This LBAP defines nature conservation priorities, actions, and targets for Orkney. It should be noted that a new cycle begins in 2022.
Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment	Scottish Government Planning Advice Note regarding Environmental Impact Assessment.
Scottish Planning Policy 2014	Scottish Planning Policy.
Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Executive, 2004);	A strategy for the conservation and enhancement of biodiversity in Scotland.
2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Government, 2013);	An update to the strategy for the conservation and enhancement of biodiversity in Scotland described above.
The Water Environment and Water Services (Scotland) Act 2003	The Act sets out arrangements for the protection of the water environment and provides the legal framework for WFD implementation in Scotland.
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended	Apply regulatory controls over activities which may affect Scotland's water environment.
GPP-22 (SEPA 2018b)	SEPA Guidance for Pollution Prevention.
WAT-SG-74 (SEPA 2018a)	SEPA practical guidance on the application of best practice of environmental standards at sites.
The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 (The Salmon Act)	Protection and management of fish, fish stocks and their habitats. Includes measures focused on conservation and exploitation of the community.

LEGISLATION / GUIDANCE	SUMMARY
The Wildlife and Countryside Act 1981 (as amended)	Gives full protection to FPM.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021).	Guidance from NatureScot regarding Assessing the Cumulative Impact of Onshore Wind Energy Developments.
Orkney Islands Council Supplementary Guidance: Natural Environment (2017).	Orkney Islands Council Supplementary Guidance: Natural Environment (2017).

It should be noted that the Salmon Act also legislates for the potential economic impact on the Fishing Rights holder from any breaches of the Act. This would apply to salmon, sea trout, brown trout and any other freshwater fish species that constitutes a fishery.

4.2.9 Scoping Questions

- Do you agree that all regulators/statutory consultees have been identified?
- Do you agree that all available data sources have been identified, and if not what additional resources, such as OFTA electrofishing data, could be accessed?
- Are there any publicly accessible records for fish communities on the Islands?
- Do you agree that all relevant receptors have been identified and survey methods are appropriate to inform assessment?
- Are there any records of the identified receptors that can be provided to the assessment team?
- Are there any barriers which have been identified but have not yet been placed in the SEPA barrier dataset?

4.2.10 References

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4.3 Terrestrial Non-Avian Ecology

4.3.1 Introduction

This section of the Scoping Report identifies the non-avian terrestrial ecology receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of proposed Project.

Key issues of concern for terrestrial non-avian ecology include damage to or loss of protected habitat, damage to or loss of groundwater dependent terrestrial ecosystems (GWDTEs), disturbance to or loss of protected species and/or populations, damage to or loss of areas designated for habitats, species or communities of interest.

Information that may be considered relevant to this section is presented within the below sections:

- Geology and hydrology, section 4.1;
- Freshwater ecology, section 4.2; and
- Land-use and other users, section 4.5.

This section of the Scoping Report has been prepared by Caledonian Conservation Ltd.

4.3.2 Study Area

The non-avian terrestrial ecology study area lies across three of the Orkney Islands: Hoy, Fara and Flotta. Initial landfall is proposed for western or northern Hoy, with route options potentially crossing either directly to Flotta or passing from Hoy to Fara to Flotta. The Orkney onshore substation search area is located on Flotta.

The Orkney onshore export cable corridor search area forms three main sub-sections, one on each of the three islands. On Hoy, two initial landfall locations have been identified at Murra and at Rackwick. From these potential landfall locations the export cable corridor search area continues roughly parallel to the north-east and east coasts of Hoy, with four potential landfall locations located on the eastern coast at Green Head, Rysa Bay, Mill Bay and Rinnigill. All the search areas on Hoy avoid as far as possible the higher mountainous ground in the centre of the island.

On Fara, the search area encompasses the entire island. Two potential landfall locations have been identified on the west coast (Fara north-west and Fara west) and two on the east coast (Fall Sand and Fara south).

On Flotta, the search area covers most of the northern part of the island, including the existing oil terminal area. Areas downslope of the search area will be considered within the assessment where relevant. Two potential landfall locations have been identified, Flotta north and Flotta west.

Terrestrial non-avian ecology considerations will be investigated for these search areas, plus a buffer area since some potential impacts can occur outwith the site boundary for many species. Recommended buffer sizes vary from 50 m to 250 m depending best practice guidance for the habitat- and species-specific surveys in question.

4.3.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 4-24. Data requests will be made to organisations which may hold relevant records.

Table 4-15 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Sites of Special Scientific Interest (SSSIs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Site Condition Monitoring Reports For Protected Sites	NatureScot online reports	Various	NatureScot
Orkney Wildlife Information and Records Centre (OWIARC) Dataset	OWIARC	Various	OWIARC
Datasets Available on NBN Atlas With Data Licenses Permitting Commercial Use (CC-BY or OGD)	NBN Atlas	Various	Various
Datasets on Non-Native Invasive Species	GB NNSS	Various	NNSS
The Mammal Society Datasets	The Mammal Society	Various	The Mammal Society
The Mammals of Orkney	C & J Booth	1994	Booth and Booth
Status and Checklist of the Vertebrate Fauna of Orkney	C & J Booth	1998	Booth and Booth
The Orkney Book of Wildflowers	Orcadian Ltd	2014	Dean and Bignall
Amphibian and Reptile Conservation Trust (ARC) Datasets	ARC	Various	ARC
Botanical Society of Britain and Ireland (BSBI) Datasets	BSBI	Various	BSBI
Wildflowers in Orkney: A New Checklist	Elaine Bullard	1995	Bullard
Lepidoptera of the Orkney Islands	E W Classey	1983	Lorimer
Bumblebee Conservation Trust (BBCT) Datasets	BBCT	Various	BBCT

4.3.3.1 Site-Specific Surveys

No surveys have been undertaken to date. A desk based Phase 1 using remote-sensing data and an ecological desk study will be undertaken for the Orkney onshore export cable corridor search area and associated grid connection to gain an overview of the likely habitats present within the study area and immediate surroundings, using available aerial photography and other information about habitats and species (e.g. NatureScot Habitat Data, NBN Gateway) to ensure the survey effort is reasonable and proportionate. The remote-sensing exercise and desk study will determine the relevant study areas where it is necessary to gain more detailed habitat- and species-specific information concerning particular elements of concern, such as likely protected habitats present, potential presence of GWDTEs, and protected species within these areas of search including those detailed in Table 4-15. Ground-truthing surveys will be undertaken to verify the outputs of the remote-sensing Phase 1 survey. The identified relevant habitat- and species-specific study areas will thereafter be surveyed, using the relevant standard survey methodologies, as detailed in Table 4-16.

If the export cable corridor search area and substation search area are further refined in line with the survey programme, then the ecological desk top study and subsequent field surveys will be focused around the export cable corridor and onshore substation footprints including survey specific buffers following the standard survey methodology outlined in Table 4-16.

Note: due to the lack of deer on Orkney, deer are scoped out of the EIA.

Table 4-16 Proposed Surveys and Methodologies

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
Desk Study	A desk study survey will involve a search for designated sites within 5 km of the Project (20 km for international designations) and notable species records. A search for invasive non-native species will also be included. This will include searches from online resources and local environmental record centres.	CIEEM (2020)
Phase 1 Habitat Survey	Standard Phase 1 Habitat methodology will be used to map all habitats and identify habitats areas of ecological importance (JNCC 2010). The survey will include the Project plus a 250 m survey buffer to provide context. Descriptive target notes regarding important habitat features and all protected species signs will be recorded on field maps.	JNCC (2010)
Non-Native Invasive Species of Plants and Animals Survey	Survey methodologies as appropriate for the Non-Native Invasive Species of plants and animals likely present within the study area will be used. The survey will include the Project plus a 250 m survey buffer to provide context. Existing records and surveys undertaken will be used to identify the requirement for further species-specific surveys.	• JNCC (2010) • Stace (2010)

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
NVC Survey	NVC methodology will be used to map habitat classification in the field following best practice guidelines describe in in Rodwell (2006). The survey will include the Project plus a 250 m survey buffer to provide context. NVC level of identification will allow classification of Annex I habitats listed in the Habitats Directive (JNCC, 2015). Vascular plant species names will follow Stace (2010) and bryophyte names will follow Hill *et al.* (2008).	• Hill *et al.* (2008) • JNCC (2015) • Rodwell (2006) • Stace (2010) • Elkington at al. (2001)
Species-specific Botanical Survey (e.g., Scottish Primrose)	All habitats will be identified during the NVC survey but in addition, particular attention will be paid to identifying and recording habitats and species of ecological importance (e.g., Scottish Primrose which is included on the Scottish Biodiversity List). Existing records and surveys undertaken will be used to identify the requirement for a species-specific survey.	Stace (2010)
Otter Survey	An otter (*Lutra lutra*) survey will be carried out following standard methodology and using an appropriate field guide (Bang and Dahlstrøm 2006). Field signs include: • Holts – below ground resting places; • Couches – above ground resting places; • Footprints – characteristic prints that can be found in soft ground and muddy areas; • Spraints – faeces used as territorial markers, with a characteristic sweet odour; • Prey remains – feeding signs found at preferred feeding areas. • Path and slides – territorial route that otters take between resting-up sites and watercourses (including traveling along bank sides). Slides are worn areas on steep slopes where otters will slide to watercourses below. The survey will include a 250m survey buffer around the Project to provide context.	• Bang and Dahlstrøm, (2006) • Chanin (2003a) • Chanin (2003b • Davison *et al.* (2002) • NatureScot (2020)
Invertebrate Survey	Habitats that are known to support terrestrial invertebrates of conservation importance will be noted during surveys. Invertebrate species often depend on specific microhabitats that have a varied habitat structure. Key habitats known for their importance for supporting invertebrate communities include deadwood, grassland, woodlands, pond, open mosaics, and brownfields (English Nature, 2005; Buglife, 2011a; 2011b; 2011c; 2012; 2015; Cathrine, 2020). Targeted detailed invertebrate surveys will be undertaken if habitats or protected sites likely to support invertebrate communities of conservation importance may be impacted by the Project	• English Nature (2005) • Buglife (2011a) • Buglife (2011b) • Buglife (2011c) • Buglife (2012) • Buglife (2015b) • Cathrine (2020)

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
Bat Survey (Bat Roost Potential Assessment)	A bat survey to conduct a Bat Roost Potential Assessment will be carried out following current Bat Conservation Trust best practice guidelines (Collins, 2016). Data will be taken across the Project onshore search areas where features or signs indicate potential use by bats, such as: • Buildings with potential to support bat roosts; • Old or veteran trees with potential to support bat roosts; • Bridges with potential to support bat roosts; and • Other features with potential to support bat roosts (e.g. mines). The survey will include a 250 m survey buffer around the Project to provide context. In addition, habitat features that provide information on commuting routes or foraging areas will be taken. The surveys undertaken will be used to identify the requirement for further targeted surveys.	• Boye and Dietz (2005) • Collins (2016) • Cowan (2006) • Forestry Commission Scotland (FCS) (2006) • Mitchell-Jones (2004) • Mitchell-Jones and McLeish (2004) • Scottish Natural Heritage *et al.* (2021) • Walsh and Buckland (1996)

4.3.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-24) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of terrestrial non-avian ecology which are likely to require consideration within the EIA are:

- Protected species;
- Protected habitats;
- GWDTEs; and
- Designated sites.

Non-Native invasive species will also be considered.

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.3.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The majority of Hoy is characteristic of the Scottish Highlands. The north of the island is dominated by steep hills, valleys and cliffs and the vegetation that occurs here includes arctic alpine plants which are otherwise characteristic of the Cairngorms at 1,000 m on mainland Britain. There are two steep sided hills at Cuilags and Ward Hill, Orkney's highest point at 479 m. Bands of calcareous rock also adds a greater diversity of vegetation including notable plant species. The coast is dominated by high sea cliffs rising to 338 m at St John's Head on the west coast of Hoy.

Hoy SSSI and SAC encompasses a large part of the island with over 4,000 ha of undisturbed blanket bog.

The dominant habitat across the search area is heathland with several extents of blanket bog and Agricultural land. In addition there are small extents of coniferous and broadleaved woodland, coastal dunes and shores and maritime cliffs and slopes.

There are a wide range of watercourses from small, fast flowing headwaters to large rivers. The main watercourse within the search area is the Rackwick Burn (South Burn) with numerous other burns including the Braebstur and Whaness Burn, flowing eastwards off the rolling hills across the low lying agricultural land to the east.

There is a mixed style of farming on Orkney and arable fields may be found at Linksness in the north east of the search area.

The search area traverses Hoy SSSI/SAC north of Lyrawa Hill, for approximately 4 km to Quoyness. Just north of Lywara Hill are the Water of Hoy and Water of the Wicks, small lochans surrounded by moorland. Beyond Quoyness the search area extends to a landfall option at Murra, encompassing agricultural fields which dominate on the lower lying ground and reaching the lower slopes of Ward Hill and Cuilags. The search area extends from Quoyness westwards to a landfall option at Rackwick. The valley marks the fault line separating North Hoy from the rest of the island. Habitats across the valley and slopes are dominated with heathland and blanket bog.

A few small woodland blocks are present across the search area including coniferous and broadleaved plantation woodlands and policy woodlands. Native upland birchwood is present to the east of Ward Hill beyond the minor road which leads from Quoyness to Rackwick. Native upland oakwood is present outside the search area to the north east of Rackwick. This is Berriedale wood, the most northerly native woodland in Britain and largest relict of native woodland in Orkney.

4.3.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The south and east of Hoy are largely agricultural with many sheltered bays. The onshore export cable corridor search area options on Hoy make landfall on the east at Rinnigall, Mill Bay and Greenhead. From Rinnigall the search area heads northwards along the east coast extending between 2 and 3 km inland, dominated by heathland, blanket bog, and agricultural land, with small patches of woodland, and marginal areas of the western boundary of Hoy SSSI/SAC.

There is a mixed style of farming on Orkney and arable fields may be found at Lyness on the south east.

Within the search area some of the most diverse and notable habitats may be present along the coast. Limited elements of coastal dunes and sandy shores may occur at Lyness and Mill Bay where salt tolerant vegetation communities form in sheltered locations of intertidal mudflats and maritime cliff vegetation may be present on sloping to vertical rock faces and cliff top habitat. These habitats support specialist vegetation communities.

The coastal fringes on the east coast include lowland dry acid grassland occurring on free draining soils, and purple moor grass (*Molinia caerulea*) meadows on damp acidic soils within agricultural land. Grasslands dominated by mat grass (*Nardus stricta*) also occur on free draining soils where there has been extensive grazing. Another form of mat grass dominated grassland which is more species rich is present in the coastal fringes on the east of the island where there is some flushing on the slopes.

The geology of Fara is more similar in nature to the southern extent of Hoy and to Flotta with fertile low lying ground. There are areas of peatland habitat including blanket bog and heath. Blanket bog is dominant across Fara with small fringes of heathland on the coastal margins. Landfall options on Fara are at Peat Bay and Whiting Point. There are some minor watercourses.

4.3.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

Bog is the dominant habitat type on the western extent of Flotta, with extents of heathland and rough grasslands across the north and south eastern extent, often on the margins of arable land. The search area on Flotta encompasses the existing Flotta Oil Terminal and surrounding habitats of bog, heathland, arable land, intertidal habitats and small blocks of plantation coniferous woodland. Landfall options on Flotta are at Sutherland and Weddel. There are some minor watercourses.

There are five designated sites within the search area plus 13 located adjacent or nearby. Designated sites are listed in **Table 4-17**. The main designations are SAC and SSSI. A list of potential sensitive habitats within the search area is provided in **Table 4-18**. A list of potential protected species of animals and plants within the search area is provided in **Table 4-19**.

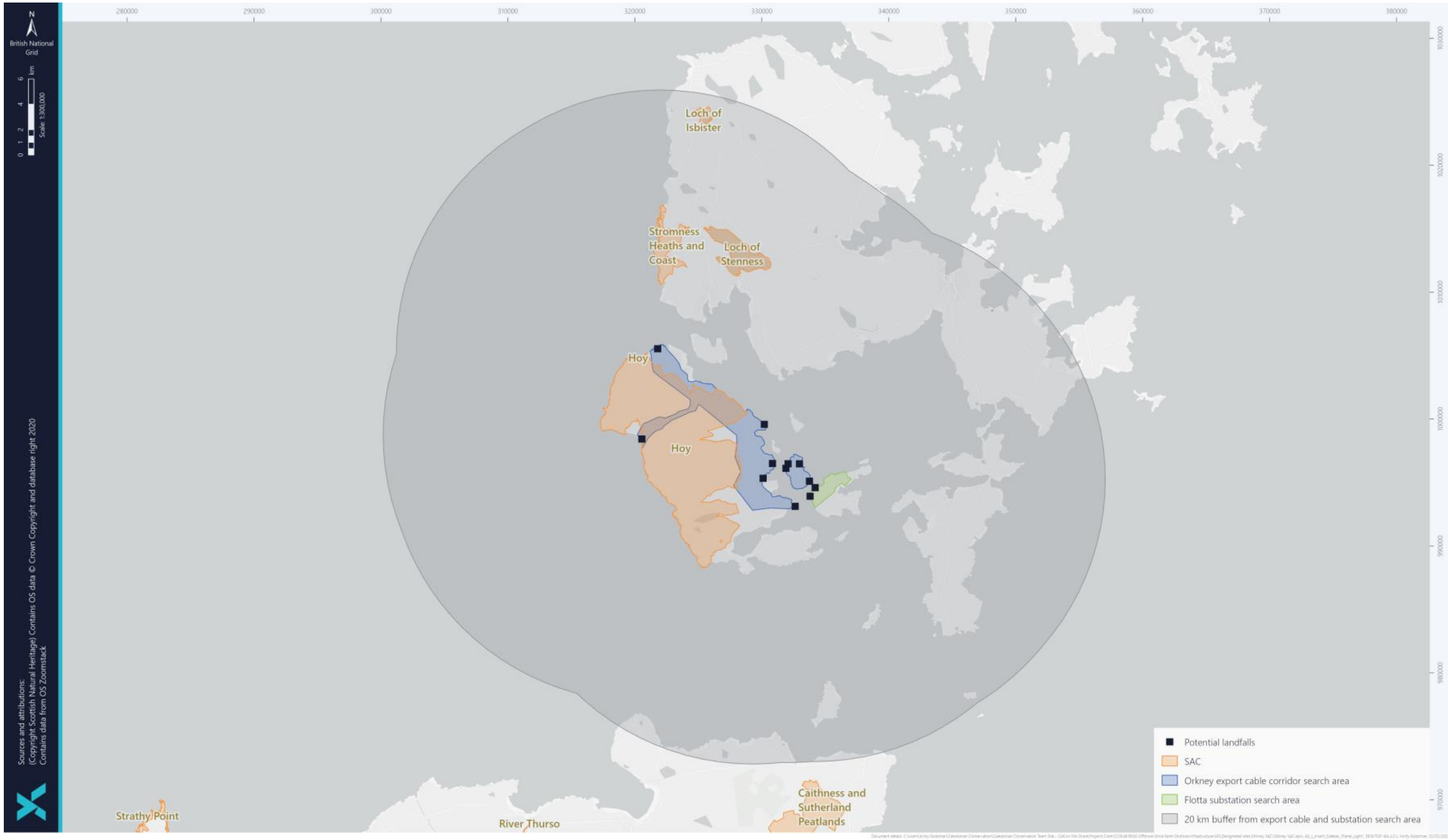

Figure 4-2 Onshore SACs within the Vicinity of the Project

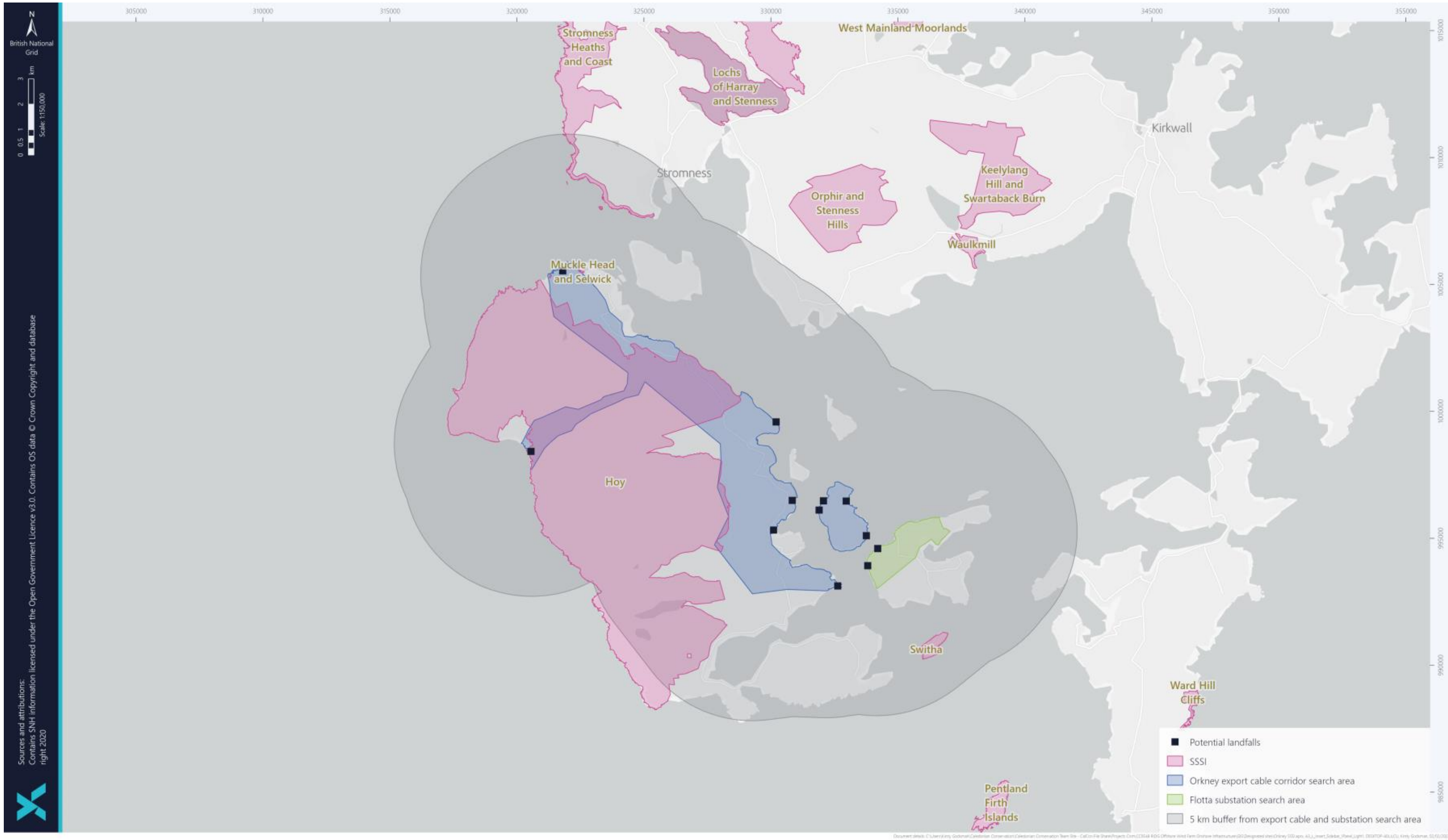

Figure 4-3 Onshore SSSIs within the Vicinity of the Project

Table 4-17 Designated Areas with relevance to Terrestrial Non-Avian Ecology

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
Hoy SAC	Alpine and subalpine heaths, Base-rich fens, Blanket bog, Dray heath, Hard-water springs depositing lime, Plants in crevices on base-rich rocks, Wet heathland with cross-leaved heath (*Erica tetralix*), Vegetated sea cliffs.	Within search area
Hoy SSSI	Blanket bog, Upland assemblage, Upland oak woodland.	Within search area
Stomness Heaths and Coast SAC	Base-rich fens, Dry heaths, vegetated sea cliffs.	4.9 km from search area
Loch of Isbister SAC	Very wet mires (quacking surface), Otter (*Lutra lutra*).	18.0 km from search area
Stromness Heaths and Coast SSSI	Maritime cliff, Subalpine dry heath.	4.9 km from search area

Table 4-18 Potential Sensitive Habitats within the Search Area related to Terrestrial Non-Avian Ecology

NAME & DESIGNATION	QUALIFYING FEATURES	CONSERVATION STATUS
Coastal dunes and sandy shores	Salt tolerant vegetation communities formed in the upper section of intertidal mudflats in sheltered locations. This habitat provides important resources for birds including waders and wildfowl. Limited elements of this habitat type may occur at Lyness and Mill Bay on Hoy.	SBL, Orkney LBAP, possibly Annex I
Maritime cliff and slopes	Sloping to vertical coastal rock faces and cliff top habitat, which support specialist vegetation communities reflecting local conditions including exposure and rock type. Small examples of maritime cliffs and associated grasslands may occur in the search area.	Annex I, SBL, Orkney LBAP (maritime grassland only)
Ponds	Permanent or seasonal waterbodies of up to 2ha. Small water bodies including Water of Hoy and Water of the Wicks are present.	SBL, possibly Annex I
Rivers and streams	This habitat type covers the area between the bank tops and includes a wide range of running watercourses from small, fast-flowing headwaters to large rivers. A number of burns flow through the search area on Hoy.	Orkney LBAP (burns and canalised burns only)

NAME & DESIGNATION	QUALIFYING FEATURES	CONSERVATION STATUS
Arable crops	The mixed style of farming on Orkney provides excellent breeding and feeding resources for a wide range of notable bird species including waders and corncrake. Arable fields may be present around Linksness and Lyness on Hoy as well as on Fara.	Orkney LBAP
Lowland dry acid grassland	Lowland acid grassland usually occurs on nutrient-poor, free-draining soils. Examples of this habitat categorised as 'heathmeadows and humid swards' occurs on Hoy along the coastal fringe in the east.	SBL
Agrostis-Festuca grassland	Mat-grass dominated upland species-rich grassland. Occurs on Hoy in the coastal fringe on the east of the island.	Annex I
Nardus stricta swards	This mat-grass dominated habitat occurs on well-drained acid soils, usually where extensive grazing has occurred over a prolonged period. Occurs on Hoy in the coastal fringe on the east of the island.	Annex I
Purple moorgrass meadows	Dominated by purple moorgrass and rush species on damp, acidic soils within agricultural land. Occurs on Hoy in the coastal fringe on the east of the island.	Annex I
Built up areas and gardens	Gardens and built environments provide novel habitats, which may support a range of generalist and specialist species. Gardens can provide sheltered conditions with high plant diversity including food resources for pollinators. Settlement is focussed around Hoy and Lyness on Hoy.	Orkney LBAP
Broad-leaved plantations and policy woodlands	Valuable habitat features can develop in broadleaved plantations over time, including deadwood accumulation and a diverse woodland flora. Occurs at Lyness on Hoy.	Orkney LBAP (Broad-leaved plantations and policy woodlands)
Upland oakwood	This woodland contains at least 30% pedunculate or sessile oak and occurs in the upland areas on acidic to neutral soils. Occurs within 1.5km of the search area at Berriedale Wood is Hoy SSSI.	Annex I, SBL
Upland birchwood	Woodland where the canopy is dominated by birch species. This occurs as a climax community where conditions are too poor for oak or ash to dominate. Occurs in White Glen on Hoy.	SBL, possibly Annex I
Blanket bog	Acidic peatland habitat characterised by deep peat, primarily fed by precipitation. Important for specialist plant species and breeding bird populations including waders of international	Annex I, SBL

NAME & DESIGNATION	QUALIFYING FEATURES	CONSERVATION STATUS
	significance. Occurs throughout the search area including on Hoy.	
Upland heathland	Upland heathland is dominated by heather and other dwarf shrubs as well as smaller proportions of grasses, sedges and herbs. This habitat is important for breeding birds, specialist plant and invertebrate species. Both dry and wet heath are extensive throughout the search area including on Hoy.	Annex I, SBL, Orkney LBAP (specific heath types only)
GWDTE	GWDTEs are wetland habitats dependent upon groundwater rather than receiving their water from rain and surface water. They can support biodiverse, botanical communities. Habitat types including mires, flushes, wet heaths and grassland habitats may occur throughout much of the search area.	WFD

Table 4-19 Potential Species of Conservation Importance within the Search Area

SPECIES	CONSERVATION STATUS
Otter (*Lutra lutra*)	Annex IV of Habitats Directive
Brown hare (*Lepus europaeus*)	SBL, Orkney LBAP
Mountain hare (*Lepus timidus*)	SBL, Orkney LBAP
Hedgehog (*Erinaceus europaeus*)	SBL, Orkney LBAP
Pygmy shrew (*Sorex minutus*)	Orkney LBAP
Water shrew (*Neomys fodiens*)	Orkney LBAP
Wood mouse (*Apodemus sylvaticus*)	Orkney LBAP
Common Pipistrelle (*Pipistrellus pipistrellus*)	Annex IV of Habitats Directive
Nathusius' pipistrelle bat (*P. nathusii*)	Annex IV of Habitats Directive
Brown long-eared bat (*Plecotus auritus*)	Annex IV of Habitats Directive
Common frog (*Rana temporaria*)	SBL
Common toad (*Bufo bufo*)	SBL, Orkney LBAP
Great yellow bumblebee (*Bombus distinguendus*)	SBL
Moss carder bee (*Bombus muscorum*)	SBL

SPECIES	CONSERVATION STATUS
Alpine bearberry Arctostaphylos alpinus	Nationally Scarce
Alpine meadow-grass (*Poa alpina*)	Nationally Scarce
Autumn gentian (*Gentianella amarella subsp. septentrionalis*)	Near Threatened
Black bindweed (*Fallopia convolvulus*)	SBL
Charlock (*Sinapis arvensis*)	SBL
Confused eyebright (*Euphrasia confusa*)	Vulnerable
Corn marigold (*Glebionis segetum*)	Vulnerable
Corn spurrey (*Spergula arvensis*)	Vulnerable
Curved sedge (*Carex maritima*)	SBL, Endangered, Nationally Scarce
Dwarf cornel (*Cornus suecica*)	Near Threatened
Field gentian (*Gentianella campestris*)	SBL, Vulnerable
Foula eyebright (*Euphrasia foulaensis*)	Nationally Scarce
Great sundew (*Drosera anglica*)	Near Threatened
Heath cudweed (*Gnaphalium sylvaticum*)	SBL, Endangered
Hoary whitlowgrass (*Draba incana*)	SBL
Holly fern (*Polystichum lonchitis*)	SBL, Vulnerable
Interrupted clubmoss (*Lycopodium annotinum*)	Nationally Scarce, Vulnerable
Juniper (*Juniperus communis*)	SBL, Near Threatened
Northern knot-grass (*Polygonum boreale*)	Nationally Scarce
Purple ramping-fumitory (*Fumaria purpurea*)	SBL, Nationally Scarce, Vulnerable
Scottish primrose (*Primula scotica*)	SBL, Nationally Scarce
Slender eyebright (*Euphrasia micrantha*)	SBL, Nationally Scarce, Endangered
Slender-leaved pondweed (*Potamogeton filiformis*)	Nationally Scarce
Small adder's-tongue (*Ophioglossum azoricum*)	Nationally Scarce

SPECIES	CONSERVATION STATUS
Small white orchid (*Pseudorchis albida*)	SBL, Vulnerable
Sun spurge (*Euphorbia helioscopia*)	SBL
Wild pansy (*Viola tricolor* subsp. *tricolor*)	Near Threatened
Wilson's filmy-fern (*Hymenophyllum wilsonii*)	Near Threatened

4.3.4.4 Summary and Key Issues

Key issues regarding terrestrial non-avian ecology within the search areas for Orkney are listed in Table 4-20.

Table 4-20 Summary and Key Issues for Non-Avian Terrestrial Ecology

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	• Protected species of plants and animals (see Table 4-19); • Protected and sensitive habitats (including GWDTEs) (see Table 4-18); and • Designations (Hoy SAC & SSSI) for biological reasons (see Table 4-17).	• Protected species of plants and animals (see Table 4-19); • Protected and sensitive habitats (including GWDTEs) (see Table 4-18); and •	• Protected species of plants and animals (see Table 4-19); • Protected and sensitive habitats (including GWDTEs) (see Table 4-18); and •

4.3.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-21.

Table 4-21 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Avoidance of sensitive areas (peatland, potential groundwater-dependent terrestrial ecosystems, designated areas) wherever possible. Where impacts cannot be avoided, these will be minimalised.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
2	Minimising impact on cliff coastal habitats which associated with designated sites, or communities otherwise of conservation importance, by use of HDD where possible.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
3	Return location to pre-construction state.	Primary	Established within the design principles and secured within the Section 36 and/or planning conditions.
4	Control of diffuse pollution.	Primary	Utilisation of best practice sediment management techniques.
5	Control of point-source pollution.	Primary	Employment of best practice pollution prevention techniques.
6	Minimisation of watercourse crossings.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
7	Construction Environmental Management Plan (CEMP), which will outline how the Project will ensure the suitable implementation and control of the mitigation measures..	Tertiary	Secured within the Section 36 and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
8	Create and implement SHPP.	Primary	Secured within the Section 36 and/or planning conditions.
9	Ensure appropriately qualified ECoW presence at sensitive locations and/or sensitive periods.	Primary	Secured within the Section 36 and/or planning conditions.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on terrestrial non-avian ecology and will be consulted upon with consultees throughout the EIA process.

4.3.6 Scoping of Impacts

A number of potential impacts on non-avian terrestrial ecology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. None of the potential impacts are proposed to be scoped out at this stage as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 4-22 EIA Scoping Assessment for Terrestrial Non-Avian Ecology

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Direct habitat loss due to land-take	1, 2, 4, 5, 6, 7, 8, 9	Scoped In	The onshore construction works will involve construction of the onshore cable corridor and substation/switchgear, as well as hardstanding and other construction-related works, all of which would result in direct habitat loss. This could be temporary or permanent depending on the situation.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat data, updated by site-specific survey data
Disturbance and damage/injury to habitats or protected species	1, 2, 4, 5, 6, 7, 8, 9	Scoped In	The effects of disturbance to habitats are variable in their extent, depending on the nature of the disturbance and sensitivity of the habitat affected. Some disturbance types (for example, creation of temporary hardstanding areas) result in medium- to long-term disturbance with extended recovery periods. In other cases (for example, installation of cables) disturbance is short-term, and certain habitat types are able to recover quickly. Construction and decommissioning works may also cause damage to habitats and plant species, and injury (which may lead to mortality) in animal species, e.g. through trampling, damage caused by vehicles, or entrapment in trenches etc. In addition to effects resulting from potential disturbance to habitats used by protected species, animals may also be disturbed by increases to noise and light levels and	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			perceived predation risk associated with the presence of site personnel and vehicles.		
Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation	2, 4, 6, 7, 8, 9	Scoped In	Indirect effects on habitats and species that may arise as a result of construction and decommissioning activities include hydrological effects, pollution, sedimentation and effects of dust. For example, if an access track bisects an area of bog, this can result in one half drying out. Heavy rainfall can result in silt runoff and peat slides, which may cause siltation of watercourses, while pollution of watercourses may occur as a result of chemical or fuel spillage. These could be temporary or permanent depending on the situation.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data
Operation and Maintenance					
Disturbance and damage/injury to habitats or protected species	1, 2, 4, 5, 6, 7, 8, 9	Scoped In	Human activities related to maintenance of onshore infrastructure have the potential to cause temporary and localised disturbance effects on ecological features. Due to the unpredictable nature of the requirement for maintenance works, it is difficult to determine precise effects on habitats and species. However, it is expected that maintenance activities would be infrequent and small scale, resulting in temporary disturbance effects of a lower magnitude than those during construction, likely to be of a similar level to existing human use.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation	2, 3, 4, 6, 7, 8	Scoped In	Maintenance may also result in indirect effects on habitats, e.g. pollution of watercourses as a result of spillage. However, the potential for indirect effects to occur during operation is generally lower than that during construction. Without careful handling these could be long-term or permanent.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data

4.3.7 Potential Cumulative Effects

There is the potential for impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on terrestrial non-avian ecology receptors for example the Hoy Community windfarm and the proposed Flotta Hydrogen Hub.

The context in which cumulative effects are considered depends upon the ecology of the habitat or species in question. For example, it may be appropriate to consider cumulative effects to otters associated with an SAC within the context of their wider foraging range. For other ecological features such as a scarce plant species, it may be appropriate to consider the effects on the local population in the context of any planned windfarms in the immediate vicinity which have the potential to cause additional effects on the plant (e.g. through loss of habitat).

The terrestrial non-avian ecology CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2. The terrestrial non-avian ecology assessment will include assessment of the combined potential cumulative effects from this Project along with other current or approved schemes.

4.3.8 Approach to Analysis and Assessment

4.3.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on terrestrial non-avian ecology will utilise Project-specific and publicly available data (see section 4.3.3) and will be augmented by consultation during the EIA phase.

It is anticipated that consultees will include:

- ARC;
- OIC;
- NatureScot;
- RSPB Scotland;
- BSBI;
- HBRG;
- Butterfly Conservation;
- BBCT;
- The Mammal Society;
- SWT;
- OWIARC; and
- Orkney Field Club.

Some initial consultation on onshore ecology issues associated with the Project including OIC and NatureScot has already been undertaken.

Gathering of site-specific data will form a key part of the assessment. Data collected will include:

- Protected habitats and species present; and
- Designated sites present.

The terrestrial non-avian ecology assessment will be based on what is considered to be the maximum design scenario for each element of the onshore Project from the maximum design envelope. This ensures that the assessment will cover the worst-case scenario and therefore the highest magnitude impact if more than one design option requires consideration.

The assessment will consider direct effects i.e. effects that are made directly to a receptor, such as the effects of work activities on species and habitats, and indirect effects i.e. effects that arise as a result of a change made to a different receptor, such as a change in water flow within an area of GWDTE resulting from changes to groundwater flow paths from excavation works. The assessment will mainly be qualitative in nature, as the majority of the potential impacts are not readily quantifiable, apart from habitat loss calculations.

European sites with respect to terrestrial non-avian ecology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with terrestrial non-avian features and assess the adverse impact on the integrity of the European site.

4.3.8.2 EIA Methodology

The terrestrial non-avian ecology EIA will be undertaken in line with the methodology set out in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018) – notably the use of matrices is not compatible with these requirements of professional ecology industry best practice. The specific legislation and guidance documents outlined below in Table 4-23 will also be considered in relation to the ecology and nature conservation EIA.

Table 4-23 Legislation and Guidance for Terrestrial Non-Avian Ecology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018)	Industry standard professional guidance to be followed when undertaking an EcIA including when it is part of an EIA.
A Handbook on Environmental Impact Assessment, Version 5 (Historic Environment Scotland and SNH, 2018)	Guidance to be followed when undertaking EIA published by SNH (now NatureScot) and Historic Environment Scotland.
The Habitats Directive	Bats, otter and great crested newt are provisioned with legal protection under the EC Habitats and Species Directive. This is transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and domestic legislation continues to be aligned after Scotland left the European Union with the UK through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020. The Habitats Directive also

LEGISLATION / GUIDANCE	SUMMARY
	identifies plant species (Annex V) and habitats which require conservation in their own right (Annex I). Another major provision of the Directive is the identification and classification of SACs for rare or vulnerable species and habitats.
The Wildlife and Countryside Act 1981 (as amended)	The Wildlife and Countryside Act 1981 (as amended in Scotland) is the primary legislation protecting animals, plants and certain habitats in the UK. It is also the principal legislation dealing with non-native species in Scotland.
Protection of Badgers Act (1992)	Badgers are protected under the Protection of Badgers Act 1992 (as amended in Scotland).
Scottish Biodiversity List	The SBL is a list of habitats and species that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and (along with biodiversity lists from other UK countries) supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011).
Orkney Local Biodiversity Action Plan 2018 to 2022	This LBAP defines nature conservation priorities, actions, and targets for Orkney.
EU Regulation (1141/2014) on invasive alien (non-native) species	This imposes restrictions on a list of species known as 'species of Union concern', published in Commission Implementing Regulation 2016/1141. These are species whose potential adverse effects across the European Union are such that concerted action across Europe is required. The list is drawn up by the European Commission and managed with Member States using risk assessments and scientific evidence. The list is still applicable in a Scottish context as domestic legislation continues to be aligned after Scotland left the European Union with the UK through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020.
Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment	Scottish Government Planning Advice Note regarding Environmental Impact Assessment.
Scottish Planning Policy 2014	Scottish Planning Policy.
Government Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their Impact	Statutory Obligations and their Impact within the Planning System.

LEGISLATION / GUIDANCE	SUMMARY
within the Planning System (Office of the Deputy Prime Minister [ODPM])	
Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Executive, 2004)	A strategy for the conservation and enhancement of biodiversity in Scotland.
2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Government, 2013)	An update to the strategy for the conservation and enhancement of biodiversity in Scotland described above.
The Highland Council Supplementary Guidance. Highland's Statutory Protected Species (2013)	Highland's Statutory Protected Species.
Good Practice During Windfarm Construction (Scottish Renewables *et al.*, 2019)	Good Practice guidelines.
Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments (SEPA, 2012)	Planning Guidance on Windfarm Developments.
Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2014)	Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and GWDTEs.
WFD95: A Functional Wetland Typology for Scotland – Project Report (Scotland and Northern Ireland Forum for Environment Research [SNIFFER], 2009)	Report on functional Wetland Typology for Scotland.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021)	Guidance from NatureScot regarding Assessing the Cumulative Impact of Onshore Wind Energy Developments.
Orkney Islands Council Supplementary Guidance: Natural Environment (2017)	Orkney Islands Council Supplementary Guidance: Natural Environment (2017).

4.3.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the Project site-specific surveys are sufficient to inform the proposed assessment approach?
- Do you agree that all relevant receptors have been identified?
- Are there any records of the identified receptors that can be provided to the assessment team?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects on terrestrial non-avian ecology?

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4.4 Terrestrial Ornithology

4.4.1 Introduction

This section of the Scoping Report identifies the terrestrial ornithology receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of proposed Project.

Key issues of concern for the terrestrial ornithology receptors include damage to and/or disturbance of protected species of birds, and designated sites for species of interest.

Information that may be considered relevant to this section is presented within the below sections:

- Offshore ornithology, section 2.5;
- Non-avian ecology, section 4.3; and
- Land-use and other users, section 4.5.

This section of the Scoping Report has been prepared by Caledonian Conservation Ltd.

4.4.2 Study Area

The terrestrial ornithology study area lies across three of the Orkney Islands: Hoy, Fara and Flotta. Initial landfall is proposed for western or northern Hoy, with route options potentially crossing either directly to Flotta or passing from Hoy to Fara to Flotta. The Orkney substation search area is located on Flotta.

The Orkney onshore export cable corridor search area forms three main sub-sections, one on each of the three islands. On Hoy, two initial landfall locations have been identified at Murra and at Rackwick. From these potential landfall locations the export cable corridor search area continues roughly parallel to the north-east and east coasts of Hoy, with four potential landfall locations located on the eastern coast at Green Head, Rysa Bay, Mill Bay and Rinnigill. All the search areas on Hoy avoid as far as possible the higher mountainous ground in the centre of the island.

On Fara, the search area encompasses the entire island. Two potential landfall locations have been identified on the west coast (Fara north-west and Fara west) and two on the east coast (Fall Sand and Fara south).

On Flotta, the search area covers most of the northern part of the island, including the existing oil terminal area. Areas downslope of the search area will be considered within the assessment where relevant. Two potential landfall locations have been identified, Flotta north and Flotta west.

Terrestrial ornithology considerations will be investigated for these search areas, plus a buffer area since some potential impacts can occur outwith the site boundary for many species. Recommended buffer sizes vary from 500 m to 6 km depending best practice guidance for the habitat- and species-specific surveys in question.

4.4.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project which have been used to inform this Scoping report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 4-24. Data requests will be made to organisations which may hold relevant records.

Table 4-24 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Special Protection Areas (SPAs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Sites of Special Scientific Interest (SSSIs)	NatureScot Natural Spaces online portal	N/A	NatureScot
Site Condition Monitoring Reports For Protected Sites	NatureScot online reports	Various	NatureScot
Orkney Wildlife Information and Records Centre (OWIARC) Dataset	OWIARC	Various	OWIARC
British Trust for Ornithology (BTO) Datasets	BTO	Various	BTO
Royal Society for the Protection of Birds (RSPB) Datasets	RSPB	Various	RSPB
Wildfowl and Wetlands Trust (WWT) Datasets and Reports	WWT	Various	WWT
Datasets Available on NBN Atlas With Data Licenses Permitting Commercial Use (CC-BY or OGD)	NBN Atlas	Various	Various
The Orkney Book of Birds. Second Edition	Orcadian Ltd	2015	Dean & Hall
The Orkney Book of Birds. Pocket Edition	Orcadian Ltd	2018	Dean & Hall
The Birds of Scotland	Scottish Ornithologists' Club (SOC)	2007	Forrester *et al.*

TITLE	SOURCE	YEAR	AUTHOR
Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland	BTO	2013	Balmer *et al.*
Seabird Populations of Britain and Ireland	T & A.D. Poyser	2004	Mitchell *et al.*
The Migration Atlas. Movements of the Birds of Britain and Ireland	BTO	2002	Wernham *et al.*

4.4.3.1 Project Site-Specific Surveys

No surveys have been undertaken to date. A desk based Phase 1 using remote-sensing data and an ornithological desk study will be undertaken for the Orkney onshore export cable corridor and associated grid connection search area to gain an overview of the likely habitats present within the study area and immediate surroundings, using available aerial photography and other information about habitats and species (e.g. NatureScot Habitat Data, NBN Atlas) to ensure the field survey effort is reasonable and proportionate. The remote sensing exercise and desk study will determine the relevant targeted field survey study areas to gain species-specific information concerning particular elements of concern within these areas of search using datasets including those detailed in Table 4-24. Ground-truthing surveys will be undertaken to verify the outputs of the remote-sensing Phase 1 survey. The identified relevant species-specific search areas will thereafter be surveyed in the field, using the relevant standard survey methodologies, as detailed in Table 4-25.

If the export cable corridor search area and substation search area are further refined in line with the survey programme, then the ornithological desk top study and subsequent field surveys will be focused around the export cable corridor and onshore substation footprints including survey specific buffers following the standard survey methodology outlined in Table 4-25.

Table 4-25 Proposed Surveys and Methodologies

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
Ornithological Desk Study	A desk study survey will involve a search for designated sites within 5 km of the Project (20 km for international designations) and notable species records. This will include searches from online resources and local environmental record centres (see Table 3-2).	CIEEM (2020)
Breeding Bird Survey	Project + 500 m buffer Four survey visits between April and July to undertake a walkover which approaches within 100 m of all open habitat (surveying each 500x500 m quadrat for 20 – 25 minutes) and point counts in forest habitat if necessary. All species seen or heard will be recorded to	• Gilbert *et al.*, 1998 • SNH, 2017 • Calladine *et al.*, 2009

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
	map territories of breeding birds and estimate breeding bird density. Surveys to be taken during the first six hours after sunrise.	
Wintering Bird Survey	Project + 500 m buffer Three survey visits will be made between September and February to undertake a walkover which approaches within 200 m of all areas (surveying each 500x500 m quadrat for 20 – 25 minutes). All species seen or heard will be recorded to assess how birds use the site in winter.	• Gilbert *et al.*, 1998 • SNH, 2010
Wetland Bird Survey	All shoreline within Project + 500 m buffer Counts of all waders and wildfowl species using the shore will be made from vantage points. Surveys will be undertaken within 3.5 hours before and 3.5 hours after low tide. Surveys will be completed monthly between September and March.	Gilbert *et al.*, 1998
Breeding Raptor, Owl Survey	Project + 2 km buffer unless otherwise stated. Walkovers searching for signs and short vantage point watches to observe birds to be undertaken in all suitable breeding habitat. At least two survey visits to be carried out between April and July to determine occupancy of breeding territories. Golden and white-tailed eagle surveys to include 6 km buffer area.	• Gilbert *et al.*, 1998 • SNH, 2017 • Hardey *et al.*, 2013 • Barn Owl Trust, 2001; 2012; 2020 • Shawyer, 2011
Breeding Seabird Surveys	All shoreline within Project + 2 km buffer Counts of apparently occupied nest sites will be undertaken in order to estimate numbers of breeding birds. Survey visits to take place in June during the middle of the day.	• Walsh *et al.*, 1995 • SNH, 2017
Foraging Goose Survey	Project + 3 km buffer Observation of fields from vantage points will be carried out. Surveys to be undertaken fortnightly between September and March to establish the number of geese foraging and use of the site during winter.	• Gilbert *et al.*, 1998 • SNH, 2017
Corncrake Survey	Project + 250 m buffer Two visits will be made at night (00:00 to 03:00) between end May and June to survey for calling corncrake in all fields or other habitats with vegetation over 20 cm.	Gilbert *et al.*, 1998
Diver Survey	Project + 1 km Two visits between April and July to all small waterbodies to survey for breeding red- and black-throated divers..	• Gilbert *et al.*, 1998 • SNH, 2017
Tern Survey	Project + 2 km Counts of apparently incubating adult terns to be made from vantage points at least once in the first half of June (depending on	• Walsh *et al.*, 1995 • Gilbert *et al.*, 1998

SURVEY TYPE	SUMMARY OF METHODOLOGY	REFERRENCES
	timing of season). If no suitable vantage point exists for a colony, counts to be made by ground survey for small colonies only.	
Black Guillemot Survey	All shoreline within Project + 2 km Counts of adult plumaged birds on land or on sea within 200 m of shore will be carried out in April to early May to estimate number of breeding birds. Surveys to take place between 05:00 and 08:00.	• Walsh *et al.*, 1995 • Gilbert *et al.*, 1998

4.4.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-24) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of terrestrial ornithology which are likely to require consideration within the EIA are:

- Protected species of birds; and
- Designated sites.

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.4.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The majority of Hoy is characteristic of the Scottish Highlands. The north of the island is dominated by steep hills, valleys and cliffs. The coast is dominated by high sea cliffs rising to 338 m at St John's Head on the west coast of Hoy with their diverse seabird assemblages. The dominant habitat across the search area is heathland with several extents of blanket bog and agricultural land. In addition there are small extents of coniferous and broadleaved woodland, coastal dunes and shores and maritime cliffs and slopes.

Hoy SPA and SSSI encompasses a large part of the island with large areas of high quality blanket bog as well as vegetated seacliffs (see Table 4-8). There are gently rolling hills with large plateaus in the southern extent and the land rises in the north to two steep sided hills at Cuilags and Ward Hill, Orkney's highest point at 479 m. These habitats support a diverse range of birds, and include the following specific qualifying ornithological features in addition to the wider breeding seabird colony present: breeding Arctic skua, great skua, fulmar, kittiwake, great black-backed gull, guillemot, puffin, red-throated diver, and peregrine falcon.

Orkney Mainland Moors SPA lies 6.5 km from the search area and provides further peatland habitats, and supports breeding populations of red-throated diver, hen harrier, and short-eared owl. It is also possible that terns associated with Pentland Firth Islands SPA may use the area.

A few small woodland blocks are present across the search area including coniferous and broadleaved plantation woodlands and policy woodlands. Native upland oakwood is present outside the search area to the north east of Rackwick. This is Berriedale Wood, the most northerly native woodland in Britain and largest relict of native woodland in Orkney. This habitat is likely to support a range of woodland bird species not found elsewhere on the islands.

4.4.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The south and east of Hoy are largely agricultural with many sheltered bays. Elements of coastal dunes and sandy shores may occur at Lyness and Mill Bay where salt tolerant vegetation communities form in sheltered locations of intertidal mudflats and maritime cliff vegetation may be present on sloping to vertical rock faces and cliff top habitat. These areas support a diversity of wintering bird species, and those on passage, notably waders, providing excellent foraging habitat.

Agricultural habitat is important for supporting a wide range of birds, and notably corncrake and twite, as well as various waders. In addition, this landscape plays host to important populations of wintering geese – particularly barnacle geese associated with Switha SPA.

The Hoy SPA and SSSI extends into southern Hoy and is designated for its seabird assemblage, including arctic skua, fulmar, great black-backed gull, and Great skua, as well as other species of birds, such as peregrine falcon.

The geology of Fara is similar in nature to the southern extent of Hoy and Flotta, with fertile low-lying ground and areas of peatland habitat including blanket bog and heath. Blanket bog is dominant across Fara with small fringes of heathland on the coastal margins. Bird communities present on Fara are likely to be similar to those that will be encountered on Hoy and Flotta.

4.4.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

The geology of Flotta is similar to Fara and the southern extend of Hoy with fertile low-lying ground and areas of peatland habitat including blanket bog and heath. Bog is the dominant habitat type on the western extent of Flotta, with extents of heathland and rough grasslands across the north and south eastern extent, often on the margins of arable land. The search area on Flotta encompasses the existing Flotta Oil Terminal and surrounding habitats of bog, heathland, arable land, intertidal habitats and small blocks of plantation coniferous woodland. Bird communities present on Flotta are likely to be similar to those that will be encountered on Hoy and Fara.

There are two designated sites within the search area plus six located adjacent or nearby. Designated sites are listed in Although the newly designated Scapa Flow and North Orkney SPAs are close to the onshore export cable corridor search area, these sites are designated for supporting foraging or wintering seabirds. Therefore, it is the resource which is of importance, and onshore works will not directly affect this or interfere with birds accessing it. As such, there is no pathway for effect identified on Scapa Flow and North Orkney SPAs as a result of onshore elements of the Project. Many of the birds using these marine sites are likely to breed or winter at other SPAs included in Table 4-26 and will be considered in this context as appropriate.

Table 4-26. The main designations are Special Protection Areas (SPA) and Sites of Special Scientific Interest (SSSI). A list of potential protected species of birds within the search area is provided in Table 4-27.

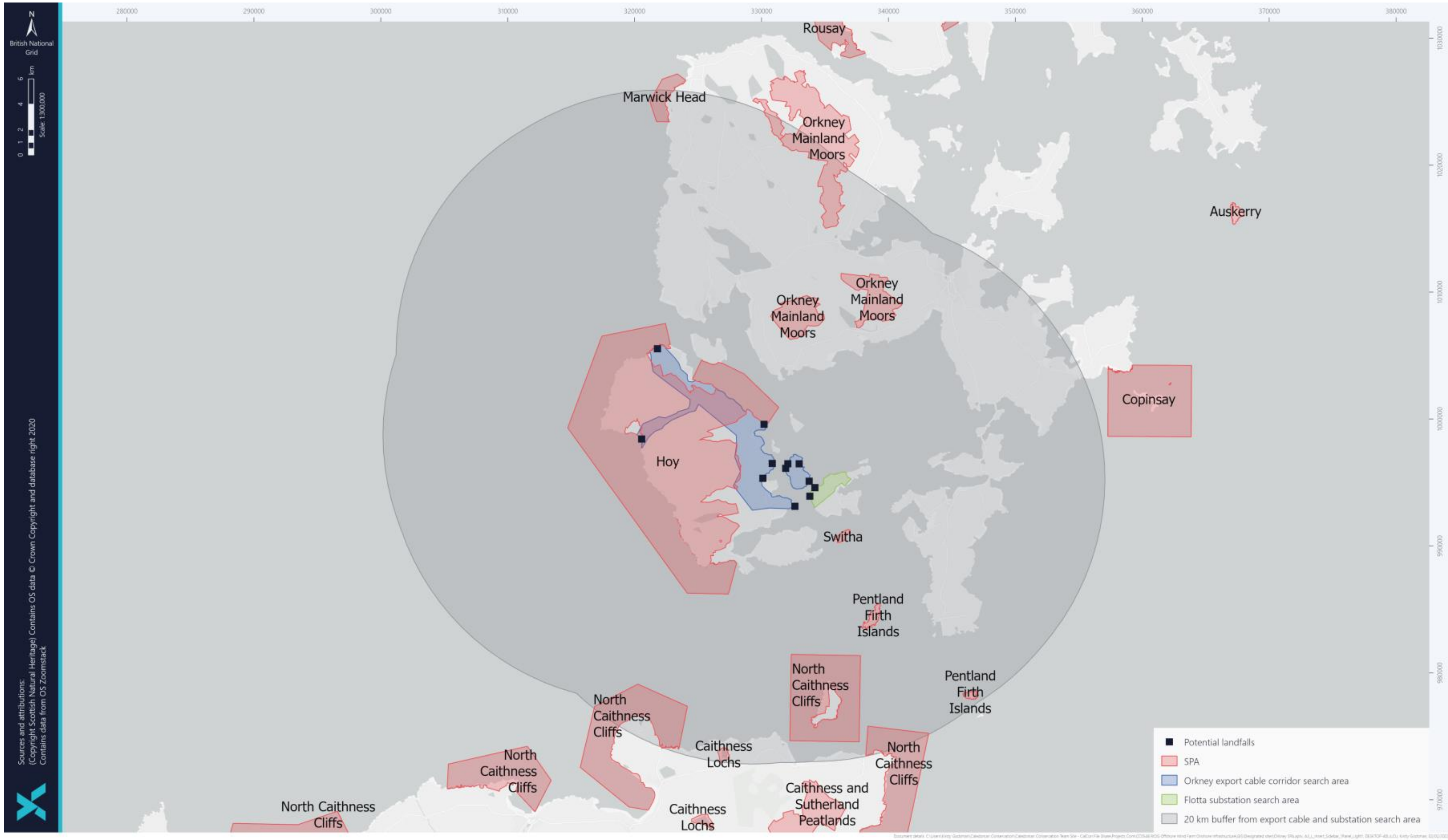

Figure 4-4 Onshore SPAs within the Vicinity of the Project

Although the newly designated Scapa Flow and North Orkney SPAs are close to the onshore export cable corridor search area, these sites are designated for supporting foraging or wintering seabirds. Therefore, it is the resource which is of importance, and onshore works will not directly affect this or interfere with birds accessing it. As such, there is no pathway for effect identified on Scapa Flow and North Orkney SPAs as a result of onshore elements of the Project. Many of the birds using these marine sites are likely to breed or winter at other SPAs included in Table 4-26 and will be considered in this context as appropriate.

Table 4-26 Designated Areas with Relevance to Terrestrial Avian Ecology

NAME & DESIGNATION	QUALIFYING FEATURES	CLOSEST DISTANCE FROM AREA OF SEARCH
Hoy SPA	Artic Skua, Fulmar, Great black-backed gull, Great skua, Guillemot, Peregrine, Kittiwake (*Rissa tridactyla*), Puffin (*Fratercula arctica*), Red-throated diver, Seabird assemblage.	Within search area
Hoy SSSI	Artic skua (*Stercorarius parasiticus*), Fulmar (*Fulmarus glacialis*), Great black-backed gull (*Larus marinus*), Great skua (*Stercorarius skua*), Guillemot (*Uria aalge*), Peregrine (*Falco peregrinus*), Red-throated diver (*Gavia stellata*), Breeding bird assemblage, Seabird colony.	Within search area
Switha SPA	Greenland barnacle goose (*Branta leucopsis*).	2.8 km from search area
Orkney Mainland Moors SPA	Hen harrier (*Circus cyaneus*), Red-throated diver, Short-eared owl (*Asio flammeus*).	6.5 km from search area
Pentland Firth Islands SPA	Artic tern (*Sterna paradisaea*).	9.0 km from search area
North Caithness Cliffs SPA	Fulmar, Guillemot, Kittiwake, Peregrine, Puffin, Razorbill (*Alca torda*), Seabird assemblage.	11.0 km from search area
Marwick Head SPA	Guillemot, Kittiwake, Breeding bird assemblage.	17.5 km from search area
Caithness Lochs SPA	Greenland white-fronted goose (*Anser albifrons flavirostris*), Greylag goose (*Anser anser*).	18.7 km from search area

Table 4-27 Potential Bird Species of Conservation Importance within the Search Area

SPECIES	CONSERVATION STATUS
Arctic skua (*Stercorarius parasiticus*)	• Red listed; • SBL; and • Orkney LBAP.
Arctic tern (*Sterna paradisea*)	• Annex I of EC Wild Birds Directive; • Amber listed;

SPECIES	CONSERVATION STATUS
	• SBL; and • Orkney LBAP.
Barnacle goose (*Branta leucopsis*)	• Annex I of EC Wild Birds Directive; • Amber listed; • SBL; and • Orkney SBL.
Bar-tailed godwit (*Limosa lapponica*)	• Amber listed; • SBL; and • Orkney LBAP.
Bean goose (*Anser fabalis*)	• SBL; • Amber listed; and • Orkney LBAP.
Black guillemot (*Cepphus grylle*)	• Amber listed; and • Orkney LBAP.
Black-headed gull (*Larus ridibundus*)	• Amber listed; • SBL; and • Orkney LBAP.
Black-tailed godwit (*Limosa limosa*)	• Schedule 1 of WCA 1981; • Red listed; • SBL; and • Orkney LBAP.
Black-throated diver (*Gavia arctica*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Brambling (*Fringilla montifringilla*)	• Schedule 1 of WCA 1981; • SBL; and • Orkney LBAP.
Bullfinch (*Pyrrhula pyrrhula*)	• Amber listed; and • SBL (watching brief).
Buzzard (*Buteo buteo*)	Orkney LBAP
Common gull (*Larus canus*)	• Amber listed; and • Orkney LBAP.
Common sandpiper (*Actitis hypoleucos*)	Amber listed
Common scoter (*Melanitta nigra*)	• Schedule 1 of WCA 1981; • Red listed; and • SBL.
Common tern (*Sterna hirundo*)	• Annex I of EC Wild Birds Directive; • Amber listed;

SPECIES	CONSERVATION STATUS
	• SBL; and • Orkney LBAP.
Cormorant (*Phalacrocorax carbo*)	Orkney LBAP
Corncrake (*Crex crex*)	• Annex I of EC Wild Birds Directive; • Schedule I of WCA 1981; • Red listed; • SBL; and • Orkney LBAP.
Cuckoo (*Cuculus canorus*)	• Red listed; and • SBL.
Curlew (*Numenius arquata*)	• Red listed; • SBL; and • Orkney LBAP.
Dipper (*Cinclus cinclus*)	Amber listed
Dunlin (*Calidris alpina*)	• Red listed; • SBL; and • Orkney LBAP.
Dunnock (*Prunella modularis*)	• Amber listed; and • Orkney LBAP.
Eider (*Somateria mollissima*)	• Amber listed; and • Orkney LBAP.
Fieldfare (*Turdus pilaris*)	• Schedule I of WCA 1981; and • Red listed.
Fulmar (*Fulmaris glacialis*)	• Amber listed; and • Orkney LBAP.
Gadwall (*Anas strepera*)	• Amber listed; and • Orkney LBAP.
Garganey (*Anas querquedula*)	• Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Goldcrest (*Regulus regulus*)	Orkney LBAP
Golden eagle (*Aquila chrysaetos*)	• Annex I of EC Wild Birds Directive; • Schedule 1A of WCA 1981; • SBL; and • Orkney LBAP.
Goldeneye (*Bucephala clangula*)	• Red listed; and • Orkney LBAP.
Golden plover (*Pluvialis apricaria*)	• Annex I of EC Wild Birds Directive;

SPECIES	CONSERVATION STATUS
	• SBL; and • Orkney LBAP.
Goshawk (*Accipiter gentilis*)	Schedule 1 of WCA 1981
Grasshopper warbler (*Locustella naevia*)	• Red listed; and • SBL.
Great black-backed gull (*Larus marinus*)	• Amber listed; and • Orkney LBAP.
Great northern diver (*Gavia immer*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Great skua (*Catharacta skua*)	• Amber listed; and • Orkney LBAP.
Greenfinch (*Chloris chloris*)	• Red listed; and • Orkney LBAP.
Greenland barnacle goose (*Branta leucopsis*)	• Annex I of EC Wild Birds Directive; • Amber listed; and • SBL.
Greenland white-fronted goose (*Anser albifrons flavirostris*)	• Annex I of EC Wild Birds Directive; • Red listed; • SBL; and • Orkney LBAP.
Greenshank (*Tringa nebularia*)	• Schedule 1 of WCA 1981; and • Amber listed.
Greylag goose (*Anser anser*)	• Schedule 1/II of WCA 1981; • Amber listed; and • Orkney LBAP.
Grey wagtail (*Motacilla cinerea*)	Amber listed
Guillemot (*Uria aalge*)	Amber listed Orkney LBAP
Hen harrier (*Circus cyaneus*)	• Annex I of EC Wild Birds Directive; • Schedule 1A of WCA 1981; • Red listed; • SBL; and • Orkney LBAP.
Herring gull (*Larus argentatus*)	• Red listed; • SBL; and • Orkney LBAP.

SPECIES	CONSERVATION STATUS
Hooded crow (*Corvus cornix*)	• SBL; and • Orkney LBAP.
House martin (*Delichon urbicum*)	• Red listed; and • Orkney LBAP.
House sparrow (*Passer domesticus*)	• Red listed; and • SBL (watching brief).
Jackdaw (*Corvus monedula*)	Orkney LBAP
Kestrel (*Falco tinnunculus*)	• Amber listed; and • SBL.
Kittiwake (*Rissa tridactyla*)	• Red listed; and • Orkney LBAP.
Lapwing (*Vanellus vanellus*)	• Red listed; • SBL; and • Orkney LBAP.
Lesser black-backed gull (*Larus fuscus*)	• Amber listed; and • Orkney LBAP.
Linnet (*Carduelis cannabina*)	• Red listed; • SBL; and • Orkney LBAP.
Little grebe (*Tachybaptus ruficollis*)	Orkney LBAP
Little tern (*Sternula albifrons*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Long-eared owl (*Asio otus*)	Orkney LBAP
Long-tailed duck (*Clangula hyemalis*)	• Schedule 1 of WCA 1981; • Red listed; and • Orkney LBAP.
Mallard (*Anas platyrhynchos*)	• Amber listed; and • Orkney LBAP.
Marsh harrier (*Circus aeruginosus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Meadow pipit (*Anthus pratensis*)	• Amber listed; and • Orkney LBAP.
Merlin (*Falco columbarius*)	• Schedule I of WCA 1981;

SPECIES	CONSERVATION STATUS
	• Red listed; and • SBL.
Mistle thrush (*Turdus viscivorus*)	Red listed
Moorhen (*Gallinula chloropus*)	Amber listed
Mute swan (*Cygnus olor*)	Orkney LBAP
Osprey (*Pandion haliaetus*)	• Annex I of EC Wild Birds Directive; • Schedule I of WCA 1981; • Amber listed; and • SBL.
Oystercatcher (*Haematopus ostralegus*)	• Amber listed; and • Orkney LBAP.
Peregrine falcon (*Falco peregrinus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; and • SBL.
Pied wagtail (*Motacilla alba*)	Orkney LBAP
Pink-footed goose (*Anser brachyrhynchus*)	Amber listed
Pintail (*Anas acuta*)	• Amber listed; and • Orkney LBAP.
Pochard (*Aythya farina*)	• Red listed; • SBL; and • Orkney LBAP.
Puffin (*Fratercula arctica*)	Red listed
Purple sandpiper (*Calidris maritima*)	• Schedule 1 of WCA 1981; • Red listed; • SBL; and • Orkney LBAP.
Quail (*Coturnix coturnix*)	• Schedule 1 of WCA 1981; and • Orkney LBAP.
Raven (*Corvix corax*)	Orkney LBAP
Razorbill (*Alca torda*)	• Amber listed; and • Orkney LBAP.
Redpoll (*Acanthis flammea*)	Red listed
Redshank (*Tringa tetanus*)	• Amber listed; and • Orkney LBAP.
Red-breasted merganser (*Mergus serrator*)	• Amber listed; and • Orkney LBAP.

SPECIES	CONSERVATION STATUS
Red-throated diver (*Gavia stellate*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • SBL; and • Orkney LBAP.
Redwing (*Turdus iliacus*)	• Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Reed bunting (*Emberiza schoeniclus*)	• Amber listed; • SBL; and • Orkney LBAP.
Ringed plover (*Charadrius hiaticula*)	• Red listed; and • Orkney LBAP.
Robin (*Erithacus rubecula*)	Orkney LBAP
Rock pipit (*Anthus petrosus*)	Orkney LBAP
Sanderling (*Calidris alba*)	• Amber listed; and • Orkney LBAP.
Sand martin (*Riparia riparia*)	Orkney LBAP
Sandwich tern (*Sterna sandvicensis*)	• Amber listed; • SBL; and • Orkney LBAP.
Scaup (*Aythya marila*)	• Schedule 1 of WCA 1981; • Red listed; • SBL; and • Orkney LBAP.
Scottish crossbill (*Loxia scotica*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; and • Amber listed.
Sedge warbler (*Acrocephalus schoenobaenus*)	• Amber listed; and • Orkney LBAP.
Shag (*Phalacrocorax aristotelis*)	• Red listed; and • Orkney LBAP.
Shelduck (*Tadorna tadorna*)	• Amber listed; and • Orkney LBAP.
Short-eared owl (*Asio falmmeus*)	• Annex I of EC Wild Birds Directive; • Amber listed; • SBL; and • Orkney LBAP.
Shoveler (*Anas clypeata*)	• Amber listed; and • Orkney LBAP.

SPECIES	CONSERVATION STATUS
Siskin (*Cardeullis spinus*)	• SBL; and • Orkney LBAP.
Skylark (*Alauda arvensis*)	• Red listed; • SBL; and • Orkney LBAP.
Slavonian grebe (*Podiceps auritus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Red listed; • SBL; and • Orkney LBAP.
Snipe (*Gallinago gallinago*)	• Amber listed; and • Orkney LBAP.
Snow bunting (*Plectrophenax nivalis*)	• Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Song thrush (*Turdus philomelos*)	• Amber listed; • SBL; and • Orkney LBAP.
Sparrowhawk (*Accipiter nisus*)	• Amber listed; and • Orkney LBAP.
Spotted crake (*Porzana porzana*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Spotted flycatcher (*Muscicapa striata*)	• Red listed; and • SBL.
Starling (*Sturnus vulgaris*)	• Red listed; • SBL; and • Orkney LBAP.
Stonechat (*Saxicola torquata*)	Orkney LBAP
Swallow (*Hirundo rustica*)	Orkney LBAP
Swift (*Apus apus*)	• Red listed; and • SBL.
Tawny owl (*Strix aluco*)	Amber listed
Teal (*Anas crecca*)	• Amber listed; and • Orkney LBAP.
Tree pipit (*Anthus trivialis*)	• Red listed; and • SBL.

SPECIES	CONSERVATION STATUS
Tree sparrow (*Passer montanus*)	• Red listed; and • SBL.
Tufted duck (*Aythya fuligula*)	Orkney LBAP
Turnstone (*Arenria interpres*)	• Amber listed; and • Orkney LBAP.
Twite (*Carduelis flavirostris*)	• Red listed; • SBL; and • Orkney LBAP.
Velvet scoter (*Melanitta fusca*)	• Schedule 1 of WCA 1981; • Red listed; and • Orkney LBAP.
Water rail (*Rallus aquaticus*)	Orkney LBAP
Wheatear (*Oenanthe oenanthe*)	• Amber listed; and • Orkney LBAP.
Whimbrel (*Numenius phaeopus*)	• Schedule 1 of WCA 1981; • Red listed; and • Orkney LBAP.
Whinchat (*Saxicola rubetra*)	Red listed
White-tailed eagle (*Haliaeetus albicilla*)	• Annex I of EC Wild Birds Directive; • Schedule 1A of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Whooper swan (*Cygnus cygnus*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; • SBL; and • Orkney LBAP.
Wigeon (*Anas penelope*)	• Amber listed; and • Orkney LBAP.
Willow warbler (*Phylloscopus trochilus*)	Amber listed Orkney LBAP
Woodcock (*Scolopax rusticola*)	• Amber listed; and • Orkney LBAP.
Woodpigeon (*Columba palumbus*)	Amber listed
Wood sandpiper (*Tringa glareola*)	• Annex I of EC Wild Birds Directive; • Schedule 1 of WCA 1981; • Amber listed; and

SPECIES	CONSERVATION STATUS
	• SBL.
Wren (*Troglodytes troglodytes*)	Amber listed
Yellowhammer (*Emberiza citrinella*)	• Red listed; and • SBL (watching brief).

4.4.4.4 Summary and Key Issues

Key issues regarding terrestrial ornithology within the search areas for Orkney are listed in Table 4-28.

Table 4-28 Summary and Key Issues for Terrestrial Ornithology

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	• Protected species of birds (see Table 4-27); and • Various designations for biological (ornithological) reasons (see Although the newly designated Scapa Flow and North Orkney SPAs are close to the onshore export cable corridor search area, these sites are designated for supporting foraging or wintering seabirds. Therefore, it is the resource which is of importance, and onshore works will not directly affect this or interfere with birds accessing it. As such, there is no pathway for effect identified on Scapa Flow and North Orkney SPAs as a result of onshore elements of the Project. Many of the birds using these marine sites are likely to breed or winter at other SPAs included in Table 4-26 and will be considered in this context as appropriate. • Table 4-26).	• Protected species of birds (see Table 4-27); and • Various designations for biological (ornithological) reasons (see Although the newly designated Scapa Flow and North Orkney SPAs are close to the onshore export cable corridor search area, these sites are designated for supporting foraging or wintering seabirds. Therefore, it is the resource which is of importance, and onshore works will not directly affect this or interfere with birds accessing it. As such, there is no pathway for effect identified on Scapa Flow and North Orkney SPAs as a result of onshore elements of the Project. Many of the birds using these marine sites are likely to breed or winter at other SPAs included in Table 4-26 and will be considered in this context as appropriate. • Table 4-26).	• Protected species of birds (see Table 4-27).

4.4.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-29.

Table 4-29 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Avoidance of designated sites and sensitive areas wherever possible (designated sites and semi-natural habitats important to supporting diverse bird communities of conservation importance and Schedule 1 species such as peatlands, woodlands, machair, montane habitats etc). Where impacts cannot be avoided, these will be minimalised using best available techniques.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
2	Minimising impact on cliff coastal habitats which may support nesting seabird communities associated with designated sites, or communities otherwise of conservation importance, by use of HDD where possible.	Primary	Established within the design principles and secured within the Section 36 and/or planning application.
3	Avoidance of loss of any nest sites for birds included under Schedule A1 of the Wildlife and Countryside Act 1981 (as amended) identified during site-specific surveys (see Table 4-31).	Primary	Established within the design principles and secured within the Section 36 and/or planning application, and overseen by Ecological Clerk of Works (ECoW) (see Ref 10 below).
4	Avoidance of loss or impacts on roost sites for birds included under Schedule 1A of the Wildlife and Countryside Act 1981 (as amended) identified during site-specific surveys (see Table 4-31).	Primary	Established within the design principles and secured within the Section 36 and/or planning application, and overseen by ECoW (see Ref 10 below).
5	Minimisation of watercourse crossings.	Primary	Established within the design principles and secured within the

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
			Section 36 and/or planning application.
6	Control of diffuse pollution.	Primary	Utilisation of best practice sediment management techniques.
7	Control of point-source pollution.	Primary	Employment of best practice pollution prevention techniques.
8	Undergrounding of cable removing risk of bird collisions and long-term or permanent loss of nesting, foraging, and/or roosting habitat along the export cable corridor.	Primary	Established within the design principles and secured within the Section 36 and/or planning conditions.
9	Construction Environmental Management Plan (CEMP), which will outline how the Project will ensure the suitable implementation and control of the mitigation measures..	Primary	Secured within the Section 36 and/or planning application.
10	Ensure appropriately qualified Ecological Clerk of Works (ECoW) presence at sensitive locations and/or sensitive periods.	Primary	Secured within the Section 36 and/or planning conditions.
11	Avoidance of construction during bird breeding season (as appropriate to species recorded during site-specific surveys) wherever possible, prioritising designated sites and sensitive areas identified.	Primary	Secured within the Section 36 and/or planning conditions, and overseen by ECoW.
12	Where avoidance of construction during the bird breeding season is not possible, exclusion zones will be established around nest or lek sites confirmed during pre-construction surveys or nesting bird checks. Exclusion zones will vary depending on species identified.	Primary	Secured within the Section 36 and/or planning conditions, and overseen by ECoW.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on terrestrial ornithology and will be consulted upon with consultees throughout the EIA process.

4.4.6 Scoping of Impacts

A number of potential impacts on terrestrial ornithology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. A number of impacts are proposed to be scoped out of the assessment for terrestrial ornithology. These impacts are outlined, together with a justification for scoping them out, in Table 4-30.

Table 4-30 EIA Scoping Assessment for Terrestrial Ornithology

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Direct loss of habitat used by birds for nesting, foraging, roosting, and/or other activities due to land-take	1, 2, 3, 4, 5, 6, 7, 9, 10	Scoped In	The onshore construction works will involve construction of the onshore export cable corridor and substation/switchgear, as well as hardstanding and other construction-related works, all of which would result in direct loss of habitats used by birds for nesting, foraging, roosting, and/or other activities. This could be temporary or permanent depending on the situation.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat data, updated by site-specific survey data.
Disturbance and damage/injury to habitats used by these animals or to individual birds	2, 3, 4, 5, 6, 7, 9, 10, 11, 12	Scoped In	The effects of disturbance to habitats are variable in their extent, depending on the nature of the disturbance and sensitivity of the habitat affected. Some disturbance types (for example, creation of temporary hardstanding areas) result in medium-to long-term disturbance with extended recovery periods. In other cases (for example, installation of cables) disturbance is short-term, and certain habitat types are able to recover quickly. Construction works may also cause damage to habitats and injury (which may lead to mortality) to	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			individual birds, e.g. through trampling, damage caused by vehicles, vegetation removal etc. In addition to effects resulting from potential disturbance to habitats used by these animals, individual birds may also be disturbed by increases to noise and light levels and perceived predation risk associated with the presence of site personnel and vehicles.		
Indirect effects on habitats used by birds e.g. due to pollution or sedimentation	1, 2, 3, 4, 5, 6, 7	Scoped In	Indirect effects on habitats and species that may arise as a result of construction and decommissioning activities include hydrological effects, pollution, sedimentation and effects of dust. For example, if an access track bisects an area of bog, this can result in one half drying out. Heavy rainfall can result in silt runoff and peat slides, which may cause siltation of watercourses, while pollution of watercourses may occur as a result of chemical or fuel spillage. These could be temporary or permanent depending on the situation., and negatively affect habitats used by birds.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.
Operation and Maintenance1					
Collision of birds with cables	8	Scoped Out	Birds are at risk of collision with overhead cables. However, the onshore export cable is to be	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			underground, and so there is no risk of collision for birds.		
Disturbance and damage/injury to habitats used by these animals or to individual birds	9, 10, 12	Scoped In	Human activities related to maintenance of onshore infrastructure have the potential to cause temporary and localised disturbance effects on ecological features. Due to the unpredictable nature of the requirement for maintenance works, it is difficult to determine precise effects on habitats and species. However, it is expected that maintenance activities would be infrequent and small scale, resulting in temporary disturbance effects of a lower magnitude than those during construction, likely to be of a similar level to existing human use.	Desktop study and project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.
Indirect effects on habitats used by these animals or to individual birds, e.g. due to pollution or sedimentation	5, 6, 7, 10, 12	Scoped In	Maintenance may also result in indirect effects on habitats, e.g. pollution of watercourses as a result of spillage. However, the potential for indirect effects to occur during operation is generally lower than that during construction. Without careful handling these could be long-term or permanent.	Desktop study and Project site specific surveys.	Desktop assessment using existing habitat and species data, updated by site-specific survey data.

4.4.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on terrestrial ornithology receptors for example the Hoy Community Windfarm and the proposed Flotta Hydrogen Hub.

The context in which cumulative effects are considered depends upon the ecology of the habitat or species in question. For example, it may be appropriate to consider cumulative effects to bird species associated with an SPA within the context of their wider foraging range. For other ornithological features such as birds of prey, it may be appropriate to consider the effects on the local population in the context of any planned windfarms in the immediate vicinity which have the potential to cause additional effects (e.g. through collision risk).

The terrestrial ornithology Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018). The terrestrial ornithology assessment will include assessment of the combined potential cumulative effects from this Project along with other current or approved schemes.

4.4.8 Approach to Analysis and Assessment

4.4.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on terrestrial ornithology will utilise Project-specific and publicly available data (see section 1.4.2) and will be augmented by consultation during the EIA phase.

It is anticipated that consultees will include:

- OIC;
- NatureScot;
- RSPB Scotland & RSPB Orkney;
- SWT;
- OWIARC; and
- Orkney Field Club.

OWPL has already undertaken some initial consultation on onshore ecology issues, including terrestrial ornithology, associated with the Project including OIC and NatureScot.

Gathering of site-specific data will form a key part of the assessment. Data collected will include:

- Protected species of birds present; and
- Relevant designated sites present.

The terrestrial ornithology assessment will be based on what is considered to be the maximum design scenario for each element of the onshore Project from the maximum design envelope. This ensures that the assessment will cover the worst-case scenario and therefore the highest magnitude impact if more than one design option requires consideration. The assessment will consider direct effects i.e. effects that are made directly to a receptor, such as the effects of work activities on species and habitats, and indirect effects i.e. effects that arise as a result of a change made to a different receptor, such as a change in water flow within an area resulting from changes to groundwater flow paths from excavation works which negatively impacts nesting or foraging habitat for bird species. Note that as the onshore export cable is to be underground there will be no risk of collision to birds in flight. The assessment will mainly be qualitative in nature, as the majority of the potential impacts are not readily quantifiable, apart from habitat loss calculations. In some cases, PVA modelling may be required to inform the assessment to determine whether impacts on species will be significant over time or cumulatively.

European sites with respect to terrestrial ornithology features will be considered through the HRA process (see section 1.4.7), which will run in parallel to the EIA. The HRA process will identify whether there is the potential for LSE on European sites with terrestrial ornithology features and assess the adverse impact on the integrity of the European site.

4.4.8.2 EIA Methodology

The terrestrial ornithology EIA will be undertaken in line with the methodology set out in section 1.4.2, adjusted to be consistent with CIEEM guidance (CIEEM, 2018) – notably the use of matrices is not compatible with these requirements of professional ecology industry best practice. The specific legislation and guidance documents outlined below in *Table 4-31* will also be considered in relation to the ecology and nature conservation EIA:

Table 4-31 Legislation and Guidance for Terrestrial Ornithology

LEGISLATION / GUIDANCE	SUMMARY
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018)	Industry standard professional guidance to be followed when undertaking an EcIA including when it is part of an EIA.
A Handbook on Environmental Impact Assessment, Version 5 (SNH, 2018)	Guidance to be followed when undertaking EIA published by SNH (now NatureScot).
The Birds Directive	Annex I of Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive') lists bird species that are of conservation importance at a European level. One of the main provisions of the Directive is the identification and classification of SPAs for rare or vulnerable Annex I bird species, as well as for all regularly occurring migratory species. Legislation prohibits activities that have a negative effect on the conservation objectives of an SPA. EU Directives are transposed into UK law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and domestic legislation continues to be aligned after Scotland left the European Union

LEGISLATION / GUIDANCE	SUMMARY
	with the UK through The UK Withdrawal from the European Union (Continuity) (Scotland) Act 2020.
The Wildlife and Countryside Act 1981 (as amended)	The Wildlife and Countryside Act 1981 (as amended in Scotland) is the primary legislation protecting animals, plants and certain habitats in the UK, including all wild birds and their nests, eggs and chicks. Under this legislation, it is an offence to intentionally or recklessly kill, injure or take any wild bird or their eggs, or to take, damage, destroy, obstruct or otherwise interfere with the nest of any wild bird while it is in use or being built. Additional protection of birds at or around their nests is afforded to rare breeding species in the UK, and/or species under threat of human persecution – these species are listed on Schedule 1 of the Act. Furthermore, certain Schedule 1 raptor species are afforded further protection under Schedules 1A and/or A1 of the Act: the nests of birds included on Schedule A1 of the Act are protected year round and birds included on Schedule 1A of the Act are protected from harassment year round.
Scottish Biodiversity List	The SBL is a list of habitats and species that the Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. It was developed to meet the requirements of Section 2 (4) of the Nature Conservation (Scotland) 2004 Act for the conservation of biodiversity, and (along with biodiversity lists from other UK countries) supersedes the UK Biodiversity Action Plan. Public bodies must consider SBL species when reporting on their 'Biodiversity Duty' (as defined and required by the Nature Conservation (Scotland) Act 2004 and Wildlife & Natural Environment (Scotland) Act 2011).
Orkney Local Biodiversity Action Plan 2018 to 2022	This LBAP defines nature conservation priorities, actions, and targets for Orkney.
UK Birds of Conservation Concern	The UK BoCC is a periodic national review assessing the population and trends for UK breeding bird species. It uses a traffic light system to indicate an increasing level of conservation concern. Species that have a declining range and/or population, or that are vulnerable to population effects due to their small population size, are Red- or Amber-listed, depending on the extent of the decline or vulnerability, while those which are stable, increasing, or experiencing only small declines, are Green-listed. The most recent review (BoCC 5) was published in December 2021 (Stanbury *et al.* 2021). Although not a legal document, this is a useful framework within which to consider conservation status of birds.
Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment	Scottish Government Planning Advice Note regarding Environmental Impact Assessment.

LEGISLATION / GUIDANCE	SUMMARY
Scottish Planning Policy 2014	Scottish Planning Policy.
Government Circular 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (Office of the Deputy Prime Minister [ODPM])	Statutory Obligations and their Impact within the Planning System.
Scotland's Biodiversity: It's In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Executive, 2004)	A strategy for the conservation and enhancement of biodiversity in Scotland.
2020 Challenge for Scotland's Biodiversity. A Strategy for the conservation and enhancement of biodiversity in Scotland (Scottish Government, 2013)	An update to the strategy for the conservation and enhancement of biodiversity in Scotland described above.
Orkney Islands Council Supplementary Guidance: Natural Environment (2017)	Orkney Islands' Council guidance on Natural Environment and planning, which includes supplementary information on Local Nature Conservation Sites.
Good Practice During Windfarm Construction (Scottish Renewables *et al.*, 2019)	Good Practice guidelines.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021)	Guidance from NatureScot regarding Assessing the Cumulative Impact of Onshore Wind Energy Developments.

4.4.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the project site-specific surveys are sufficient to inform the proposed assessment approach?
- Do you agree that all relevant receptors have been identified?
- Do you agree with the impacts that have been scoped out of the EIA?
- Are there any records of the identified receptors that can be provided to the assessment team?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects on terrestrial ornithology?

4.4.10 References

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4.5 Land-use and Other Users

4.5.1 Introduction

This section of the Scoping Report identifies the land-use and other users receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project. The assessment includes a consideration of existing land-uses, existing and planned infrastructure and recreational activities.

Information that may be considered relevant to this section is also presented within the below sections:

- Geology and hydrology, section 4.1;
- Terrestrial non-avian ecology, section 4.3;
- Terrestrial ornithology, section 4.4;
- Terrestrial archaeology and cultural heritage, section 4.6; and
- Traffic and access, section 4.9.

This section of the Scoping Report has been prepared by Xodus Group.

4.5.2 Study Area

The land-use and other users study area is defined by the total Orkney onshore export cable corridor search area and the Orkney onshore substation search area. Effects on land-use and other users will be highly localised around the works, so therefore only the area that exists directly within the footprint of the works will have the potential to be affected. Therefore, this section focuses on the area that will be directly impacted by the Orkney onshore export cable corridor search area and the Orkney onshore substation search area, which extends from the northwest coast of Hoy, across Hoy and Fara to Flotta .

4.5.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the land-use and other users EIA are outlined in Table 4-32.

Table 4-32 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
National scale land capability for agriculture	https://soils.environment.gov.scot/maps/capability-maps/national-scale-land-capability-for-agriculture/	1983	Scottish Government

TITLE	SOURCE	YEAR	AUTHOR
Land Capability for Agriculture (LCA)	https://www.hutton.ac.uk/learning/natural-resource-datasets/landcover/land-capability-agriculture	1983	The James Hutton Institute
National scale land capability for forestry	https://soils.environment.gov.scot/maps/capability-maps/national-scale-land-capability-for-forestry/	1988	Scottish Government
Orkney Islands Council Statutory Development Plan	OIC's guidance regarding any developments on the islands.	2017	OIC
Orkney Islands Council – Council Plan and Delivery Plan	OIC's delivery plan in relation to new developments.	2018	OIC
Scotland's Environment web and interactive mapping	https://www.environment.gov.scot/	2021	Scottish Government
Google Earth	https://www.google.co.uk/intl/en_uk/earth/	2021	Google

4.5.3.1 Project Site-Specific Surveys

To date, there have been site visits to the Project area in Orkney. These site visits involved a walkover of the area to confirm desktop sources. A Phase 1 Habitat Survey will be undertaken to inform the EIA, the results of which will inform the land-use and other users assessment.

4.5.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-24) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of land-use and other users which are likely to require consideration within the EIA are:

- Agricultural land;
- Trees and woodland;
- Infrastructure; and
- Tourism and recreation.

Socioeconomics is also a key consideration, this has been considered separately for the Project as a whole within section 2.12.

The following sections provide information on these key spatial differences for land-use and other users which is relevant for the following areas:

1. The section of the Orkney onshore export cable corridor search area across North Hoy (see section 4.5.4.1)
2. The section of the Orkney onshore export cable corridor search area across South Hoy and Fara (see section 4.5.4.1); and
3. The section of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area on Flotta (see section 4.5.4.3).

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.5.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

North Hoy is defined as the proportion of Hoy above Rackwick and Quoyness, associated onshore export cable search areas identified by the Project. The island of Hoy measures 143 km^2, with the identified area of North Hoy measuring approximately 37.5 km^2.

4.5.4.1.1 Agricultural Land

In regard to agricultural land, North Hoy contains Class 4.2 land for capability of agriculture, Class 5.2, Class 5.3 and Class 6.3. Class 4.2 is defined as "*land capable of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops*", Class 5.2 as "*land capable of use as improved grassland. Few problems with pasture establishment but may be difficult to maintain*", Class 5.3 "*land capable of use as improved grassland. Pasture deteriorates quickly*" and Class 6.3 "*land capable of use as rough grazings with low quality plants*"

In the Orkney onshore export cable corridor search area, there are a small number of farm settlements. The construction phase may impact the farm areas.

4.5.4.1.2 Trees and Woodland

Orkney is renowned for being treeless as a result of human interaction and Stone Age community expansion. The majority of land on North Hoy are located within Class F6 for capability of forestry, and Class F7. Class F6 is defined as "*land with very limited flexibility for the growth and management of tree crops*". Class F7 is defined as "*land unsuitable for producing tree crops*". The landfall options of Murra and Rackwick fall within Class F7 land. Trees and woodland as an ecological habitat is considered within section 4.3.

4.5.4.1.3 Tourism and Recreation

The island of Hoy is visited by tourists for the natural beauty including moorland, seacliffs and the towering sea stack called the Old Man of Hoy. The Old Man of Hoy is a sandstone sea stack that stretches out of the surf just south of St John's Head. The small community of Rackwick is popular amongst tourists and Orcadians and is the base from which tourists park to visit the Old Man of Hoy and has a number of second homes or holiday homes. Rackwick is a potential landfall for the export cables.

The Dwarfie Stane, a Neolithic burial chamber cut out of a large block of sandstone, is believed to originate from 3,000 BC and is a popular tourist attraction. It is located in a steep-sided glaciated valley between the settlements of Quoys and Rackwick, just to the south of the export cable corridor search area. Betty Corrigall's grave is also a popular tourist site, located to the south of Quoyness.

4.5.4.1.4 Infrastructure

There are no large settlements in North Hoy, the island mostly consists of scattered residential properties and smaller farm settlements. Approximately 400 people live on the isle of Hoy. At the Rackwick landfall option there are four submarine cables that come ashore within the Orkney onshore export cable corridor search area.

The Moaness passenger ferry terminal in the north of the Island run passenger only services to and from Stromness (four sailings per day) and Graemsay. The Moaness pier is used by tourists to visit popular sites such as the Old Man of Hoy and Ward Hill.

Existing services, utility and electrical apparatus, particularly underground cables and overhead lines in the vicinity of commercial and residential properties will also be considered.

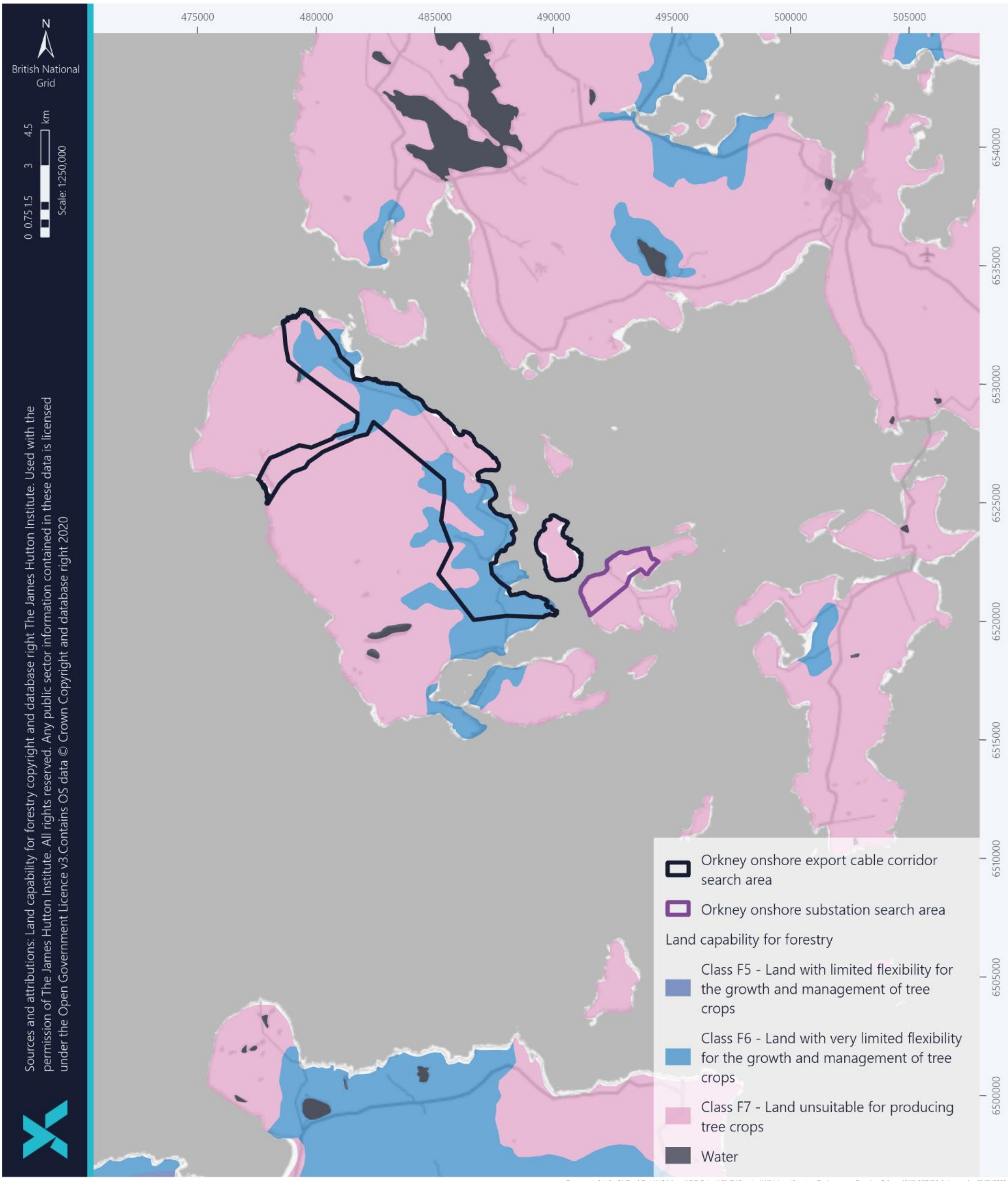

Figure 4-5 Land Capability of Forestry in the Study Area

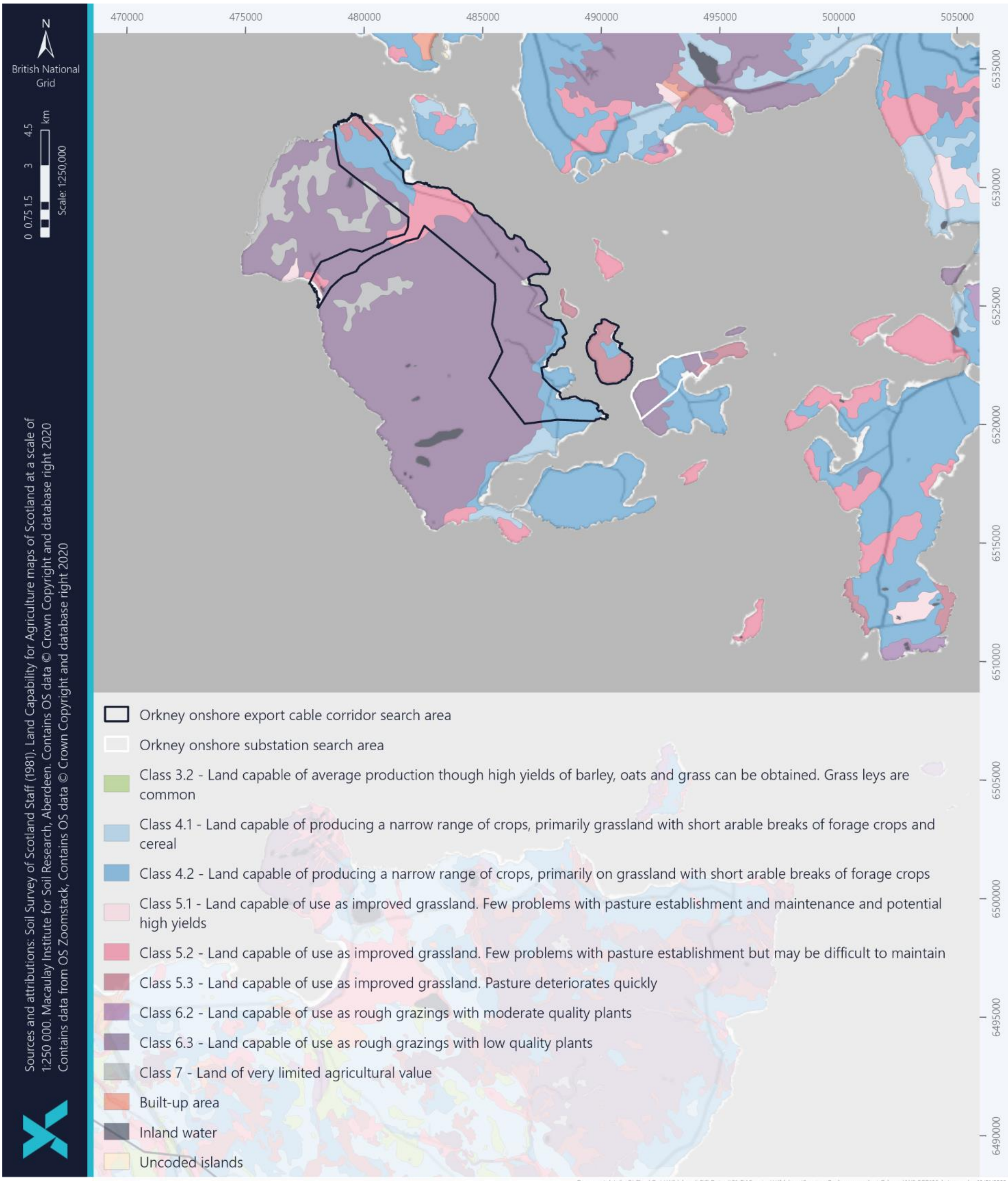

Figure 4-6 Land Capability of Agriculture in the Study Area

4.5.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The identified area of South Hoy measures approximately 107 km^2, with the Isle of Hoy measuring 143 km^2.

4.5.4.2.1 Agricultural Land

Agricultural land on South Hoy is made up of Class 6.3 land for capability of agriculture. Fara is covered by Class 5.3 land, with an area of 4.2 in the northeast of the island. Class 6.3 land is defined as *"Land capable of use as rough grazings with low quality plants"*, Class 5.3 land is defined as *"Land capable of use as improved grassland. Pasture deteriorates quickly"* and Class 4.2 land is defined as *"Land capable of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops"*. The cable landfall sites on South Hoy of Rysa Bay, Mill Bay and Rinnigill fall within Class 4.2 land, with landfall site Greenhead falling within Class 6.3 land. The Fara cable landfall sites of Fara Northwest, Fara West, Fara South and Fall Sand fall within Class 5.3 land.

4.5.4.2.2 Trees and Woodland

The majority of the Orkney onshore export cable corridor search area on South Hoy is located within Class F6 for capability of forestry, and Class F7. Class F6 land is defined as *"Land with very limited flexibility for the growth and management of tree crops"* and Class F7 defined as *"Land unsuitable for producing tree crops"*. The majority of Fara is covered by Class F6 capability of forestry land. The potential landfalls of Rysa Bay, Mill Bay and Rinnigill fall within Class F6 land. The potential landfall of Greenhead falls within Class F7 land.

The land on Fara is located within Class F7 for capability of forestry. Class F7 is defined as *"Land unsuitable for producing tree crops"*. All potential landfalls of Fara Northwest, Fara West, Fara South and Fall Sand fall within this Class F7 land.

4.5.4.2.3 Tourism and Recreation

Tourism in South Hoy is driven by key locations such as the Scapa Flow Museum, which previously attracted 14,000 people each year before its temporary closure in 2019 for refurbishment. The museum is expected to reopen in early 2022 (OIC, 2021). Lyness was the site of a WW2 fleet base (known as HMS Proserpine), and this history is incorporated into the Scapa Flow Visitor Centre & Museum. Commonwealth War Graves are located nearby, which contains graves from both world wars.

4.5.4.2.4 Infrastructure

South Hoy has a number of larger settlements, including Lyness. The main centre of population on South Hoy, the settlement of Longhope lies outwith the study area (compared to North Hoy). The Lyness ferry terminal runs a car Ro-Ro ferry service between Lyness, Hoy and Houton in Orphir, southeast of Stromness and Flotta (two sailings per day). The Isle of Fara has been uninhabited since the 1960s.

There is one onshore wind farm called Hoy Wind Farm, for which planning permission has recently been approved. It is anticipated to have six, 4,800 kW turbines. The wind farm is located in Wee Fea, near Lyness on the south-east of Hoy. Wee Fea is a large area that is situated away from homes and designated sites. The turbine structures will be 149.9 m to tip height and will focus towards the north of the site (OIC, 2021a).

Existing services, utility and electrical apparatus, particularly underground cables and overhead lines in the vicinity of commercial and residential properties will also be considered.

Fara has been uninhabited since the 1960's and as such has limited infrastructure. There are derelict buildings remaining on the island as well as a concrete road.

4.5.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

4.5.4.3.1 Agricultural Land

Agricultural land on Flotta is covered largely by Class 4.2 land for capability of agriculture, with some areas of Class 6.3 land. Class 4.2 land is defined as *"Land capable of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops"* and Class 6.3 land is defined as *"Land capable of use as rough grazings with low quality plants"*. The cable landfall sites Flotta West and Flotta North, identified by this Project, fall within Class 6.3 land.

4.5.4.3.2 Trees and Woodland

The majority of Flotta is located within Class F7 capability of forestry, however, there is an area of Class 5 land to the northeast of the island. Class F5 land is defined as "*land with limited flexibility for the growth and management of tree cops*" and Class F7 land is defined as "*Land unsuitable for producing tree crops*". The landfall options of Flotta North and Flotta West fall within Class F7 land.

4.5.4.3.3 Tourism and Recreation

Similarly, to Hoy there are no large settlements on the island. There are some small settlement areas and farmhouses scattered through the island. Flotta is visited by a limited number of tourists due to its rich wartime history and wildlife. There is a tourist trail running around the island taking in historic sites from both World Wars.

4.5.4.3.4 Infrastructure

The Flotta Oil Terminal which is operated by Repsol Sinopec is the main industry on the island, covering approximately 395 acres (1.6 km^2) (Repsol Sinopec, 2017). It is used to process, store and export crude oil. Crude oil is imported to the facility through a 30" pipeline from fields located off the northeast coast of Scotland, the pipeline makes landfall on the eastern coast of Flotta, entering through Pan Hope Bay. There are now plans to create a hydrogen production and export facility at a repurposed area of the existing Flotta Oil Terminal to create a green hydrogen hub powered by offshore wind project, including the West of Orkney Windfarm.

The Flotta Ro-Ro ferry terminal on the north of the island sails to Houton (four sailings per day), Longhope (one sailing per day) and Lyness (two sailings per day). There is also a crude oil jetty associated with the Flotta Oil Terminal and the Sutherland pier which is largely used by fishing boats.

The West Hill wind farm, consisting of a single 2 MW turbine operated by Scotrenewables Ltd, is located on west hill.

There are two submarine cables that come ashore just to the west of the Orkney onshore export cable corridor search area. In addition, there are five submarine cables that fall to the east of the Orkney onshore substation search area.

There were previous proposals for the development of a container hub on the Golta Peninsula, to the east of the Flotta Oil Terminal, however these are no longer being progressed.

Existing services, utility and electrical apparatus, particularly underground cables and overhead lines in the vicinity of commercial and residential properties will also be considered.

4.5.4.4 Summary and Key Issues

Table 4-33 Summary and Key Issues for Land-use and Other Users

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	• There are no large settlements on Hoy, the island mostly consists of smaller farm settlements; • North Hoy is not covered by any woodland with limited ability for woodland / forestry; • The capability of agriculture on North Hoy is classed as 4.2, 5.2, 5.3 and 6.3; • There are a number of tourist attractions in North Hoy including the famous Old Man of Hoy sea stack; • There are four submarine cables that come ashore at the Rackwick potential landfall; and • Moaness passenger ferry terminal.	• South Hoy and Fara is not covered by any woodland with limited ability for woodland / forestry; • The capability of agriculture on South Hoy is classed as 6.3 and on Fara it is Class 5.3 and 4.2; • The island of Fara is uninhabited; • Tourism in South Hoy centres around the Scapa Flow Visitor Centre and Museum; • Commonwealth War Graves are located nearby, which contains graves from both world wars.; and • Potential interaction with Orkney's Community Windfarm Project during construction.	• Flotta is not covered by any woodland; • The capability of agriculture on Flotta is classed as 4.2 and 6.3; • The Flotta Oil Terminal is the main industry on the island; • There is a ferry terminal on the north of the island, the Flotta Oil Terminal jetty and the Sutherland pier; • There are no large settlements on the island; • The island is visited by a limited number of tourists but doesn't have as many attractions as other islands; and • There are two submarine cables that come ashore just to the west of the Orkney onshore export cable corridor search area. In addition, there are five submarine cables that fall to the east of the Orkney onshore substation search area.

4.5.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-34.

Table 4-34 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	The final proposed cable corridor will avoid areas of high agricultural value.	Primary	Principle built into the design process and secured within the final application.
2	Following construction, agricultural land not required through the operational phase will be reinstated to ensure it can return to agricultural use.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
3	The land take for the Project will be kept to the minimum necessary for safe construction and operation of the works.	Tertiary	Established within the design principles and Section 36 consent and/or planning application.
4	Close liaison with affected landowners will be maintained during planning, and construction phases to ensure they are fully aware of proposals and sequence of construction activities and how these could interact with planned farm and other activities.	Tertiary	Established within the project communication plan and Section 36 consent and/or planning conditions.
5	Water supplies for livestock will be protected at all times and alternative supplies will be provided where access could be compromised by any works.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
6	All reasonable precautions will be taken during construction to avoid as far as is possible, the spreading of soil borne pests and diseases, and animal and crop diseases. Precautions as recommended by the Scotland's Environment and Rural Services will be observed.	Tertiary	Established within the design principles and Section 36 consent and/or planning conditions.
7	A SRMP will be developed in detail prior to construction to ensure that soil resources are managed in accordance with best practice.	Tertiary	The preparation of an SRMP will be planning condition. The plan will be developed by

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
			the contractor and agreed with OIC.
8	An AMP will be developed to be included in the wider CEMP in conjunction with OIC and through consultation with local stakeholders.	Tertiary	The preparation of an AMP will be planning condition. The plan will be developed by the contractor and agreed by OIC.
9	Avoidance of third-party infrastructure during the detailed routeing stage where practicable. Where crossings are required consultation with asset operators will be undertaken and suitable crossing or proximity agreements entered into.	Tertiary	Established within the design principles and consent and/or planning conditions. Agreements with asset operators secured through consultation.
10	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on land-use and other users and will be consulted upon with consultees throughout the EIA process.

4.5.6 Scoping of Impacts

A number of potential impacts on land-use and other user receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. A number of impacts are proposed to be scoped out of the assessment for land-use and other users. These impacts are outlined, together with a justification for scoping them out.

Table 4-35 EIA Scoping Assessment for Land-use and Other Users

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Temporary and permanent loss of agricultural land	1, 2, 3, 4, 5, 6, 7, 10	Scoped In	The Project may result in a temporary loss of agricultural land. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Changes in agricultural activity and type of land-use	1, 2, 3, 4, 5, 6, 7, 10	Scoped In	The Project may result in change of agricultural activity and type of land-use. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Temporary and permanent loss of forestry	N/A	Scoped Out	There is no woodland in the study area, and the area is largely covered by F6 or F7 Class land for capability of forestry. Therefore, no adverse effects of forestry are anticipated from the Project.	N/A	N/A
Interference with recreation/tourism and/or residential receptors	8, 10	Scoped In	The Project may result in a temporary loss interference with recreation/tourism/residential receptors. Further assessment is required.	Desk top study supplemented with consultation with local stakeholders.	Desk qualitative study based on the maximum design scenario.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Temporary impacts on third-party infrastructure, including utilities	9, 10	Scoped In	The Project may result in a temporary loss interference with third-party infrastructure. Further assessment is required.	Desk top study supplemented with consultation with local stakeholders.	Desk qualitative study based on the maximum design scenario.
Operation and Maintenance					
Long-term loss of agricultural land	1, 2, 3, 4, 5, 6, 7, 8	Scoped In	The development may result in a temporary or permanent loss of agricultural land. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Long-term changes in agricultural activity and type of land-use	1, 2, 3, 4, 5, 6, 7, 8	Scoped In	The development may result in change of agricultural activity and type of land-use. Further assessment is required.	Desk study and site-specific surveys including Phase 1 habitat survey and hydrology survey.	Desk study calculating potential area of impact based on the maximum design scenario.
Long-term loss of forestry	1, 3, 4, 5, 9, 10	Scoped Out	As per construction. There is no woodland in the study area, and the area is largely covered by F6 or F7 Class land for capability of forestry. Therefore, no adverse effects of forestry are anticipated from the Project.	N/A	N/A
Long term interference with recreation/tourism	8	Scoped Out	Operation and maintenance activities are considered to be minor. The export cables will be buried and therefore not interfere within receptors.	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
and/or residential receptors.					
Long term impacts on third-party infrastructure, including utilities	9	Scoped Out	Operation and maintenance activities are considered to be minor. The export cables will be buried and therefore not interfere within receptors.	N/A	N/A

4.5.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on land-use and other user receptors. For example from the proposed Flotta Hydrogen Hub. These effects will likely be localised around the proposed Orkney onshore cable route corridor search area and substation location. There may also be potential impacts during the construction phase of the Orkney Community Windfarm site near Lyness. A start date for the project has not yet been announced.

The land-use and other users CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

4.5.8 Approach to Analysis and Assessment

4.5.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on land-use and other users will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. Consultation will be undertaken with but not limited to:

- OIC;
- Farming groups;
- Local tourist and activity groups;
- Third party asset operators; and
- Local landowners.

A desk-top study will be undertaken using publicly available source of information and consultation responses with relevant bodies. This desk-top study will be supplemented by site-specific surveys to confirm desk-top sources. Assessments will be undertaken qualitatively based on the maximum design scenarios and will consider both direct and indirect impacts. The predicted significance of effects will be determined based on the relationship between the magnitude of impact and the sensitivity of the receptor through a standard method of assessment based on professional judgement and the application of appropriate evaluation criteria.

4.5.8.2 EIA Methodology

The land-use and other users EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-36 will also be considered in relation to the ecology and nature conservation EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 4-36 Legislation and Guidance for Land-use and Other Users

LEGISLATION / GUIDANCE	SUMMARY
Orkney Islands Council Statutory Development Plan (Orkney Islands Council, 2017a)	OIC's guidance regarding any developments on the islands.

LEGISLATION / GUIDANCE	SUMMARY
Orkney Islands Council Supplementary Guidance: Energy (Orkney Islands Council, 2017b)	OIC's guidance on energy developments on the islands.
Development Management Guidance on Energy (Orkney Islands Council, 2019c)	OIC's guidance on energy and energy reduction.
Scottish Planning Policy (Scottish Government, 2014)	Scottish governments planning policy.
Orkney Islands Council – Council Plan and Delivery Plan (Orkney Islands Council, 2018);	OIC's delivery plan in relation to new developments.

4.5.9 Scoping Questions

- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Do you agree with the impacts that have been scoped out of the assessment?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

4.5.10 References

Google (2021) Google Earth, Available at: https://www.google.co.uk/intl/en_uk/earth/ [Accessed on 06/12/2021].

The James Hutton Institute (1983) Land Capability for Agriculture (LCA), available at: https://www.hutton.ac.uk/learning/natural-resource-datasets/landcover/land-capability-agriculture.

Orkney Islands Council (2017a). The Orkney Local Development Plan. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf.

Orkney Islands Council (2017b). the Orkney Local Development Plan. Supplementary Guidance: Energy. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Adopted_PPA_and_SG/Energy_SG/Energy_SG.pdf.

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Repsol Sinopec (2017). Flotta Terminal. Available at: https://www.repsolsinopecuk.com/files/ICOP_Flotta_2017.pdf [Accessed on 17/12/21].

Scottish Government (1983) National scale land capability for agriculture, Available at: https://soils.environment.gov.scot/maps/capability-maps/national-scale-land-capability-for-agriculture/.

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Scottish Government (2014). Scottish Planning Policy. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/06/scottish-planning-policy/documents/00453827-pdf/00453827-pdf/govscot%3Adocument/00453827.pdf.

The Scottish Government (2010). The Marine (Scotland) Act. Available at: https://www2.gov.scot/Topics/marine/seamanagement/marineact.

4.6 Terrestrial Archaeology and Cultural Heritage

4.6.1 Introduction

This section of the Scoping Report identifies the terrestrial archaeology and cultural heritage receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of proposed Project.

Historic environment assets are defined within *The Ancient Monuments and Archaeological Areas Act 1979* as:

> "*any building, structure or work above or below the surface of the land, any cave or excavation; any site comprising the remains of any such building, structure or work or any cave or excavation; and any site comprising or comprising the remains of any vehicle, vessel or aircraft or other movable structure or part thereof*" (Section 61 (7)), with the additional definition of "*any thing, or group of things, that evidences previous human activity*" derived from section 14 of the *Historic Environment (Amendment) (Scotland) Act 2011*.

Information that may be considered relevant to this section is also presented within the below sections:

- Geology and hydrology, section 4.1;
- Land-use and other users, section 4.3;
- Landscape and visual, section 4.10; and
- Marine archaeology and cultural heritage, section 2.9.

This section of the Scoping Report has been prepared by the Orkney Research Centre for Archaeology (ORCA).

4.6.2 Study Area

The terrestrial archaeology and cultural heritage study area is defined by the area that will be directly impacted by the Project boundaries for the onshore landfalls, buried cable routes, the Flotta sub-station, and associated terrestrial infrastructure (see Figure 4-7 and Figure 4-8). It should be noted that the Hoy aspect of the onshore export cable corridor area of search excludes the Scheduled Monuments of the Dwarfie Stane in Rackwick valley and Crockness Martello Tower near Rinigall, and the area of Lyness, including the Royal Naval Cemetery, the Scapa Flow Museum and the extensive remains of the main naval base of the British Home Fleet stationed at Scapa Flow, during both World Wars, because these have already been recognised by the Project as sites that must not be directly impacted and so are outwith the Project boundary.

There will be separate study areas for identifying potential impacts on the setting of historic environment assets. These have yet to be defined but will include assets up to 60 km from the offshore turbine deployment area, which is addressed in the offshore scoping section 2.9. The potential for impacts on the setting of onshore heritage assets caused by the cables and other associated onshore infrastructure including substations will be addressed once design details, such as indicative heights and locations of built infrastructure, are more fully developed. As indicative ZTVs are developed, consultation will be undertaken with statutory stakeholders (Historic Environment Scotland and Orkney Islands Council) to ensure a suitable study area is agreed.

4.6.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 4-37. The Canmore database, statutory lists, registers and designated areas, including Lists of Scheduled Monuments and Listed Buildings have been used to inform this Scoping Report. Any other data sources used are referenced in the text.

Table 4-37 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
The National Record of the Historic Environment (NRHE) of Scotland	Canmore (https://canmore.org.uk/) and Pastmap database (http://pastmap.org.uk/)	Ongoing	HES
Sites and Monuments Record (SMR)	Orkney SMR	Ongoing	OIC
Ordnance Survey Historic Map Collection	https://maps.nls.uk/	Ongoing	National Library of Scotland
Old and New Statistical Accounts of Scotland	https://digital.nls.uk/learning/scottish-enlightenment/statistical-account/	1791-1845	National Library of Scotland
Statutory lists, registers and designated areas, including Lists of Scheduled Monuments, Listed Buildings, Gardens and Designed Landscapes and Battlefield Areas	The Historic Environment Scotland Data Portal https://portal.historicenvironment.scot/	Ongoing	HES
Conservation Areas	https://www.orkney.gov.uk/Service-Directory/C/Conservation-Areas.htm	Ongoing	OIC
Historic documentary and cartographic sources	Orkney Library and Archive	Ongoing	OIC
Report on a Coastal Zone Assessment Survey of Orkney: Burray, Flotta, Graemsay, Hoy, South Ronaldsay	orkney1.pdf (scapetrust.org)	1997	Moore, H. & Wilson, G.

4.6.3.1 Site-Specific Surveys

A full desk-based survey using data sources listed above in Table 4-37 and other relevant sources, including surveys undertaken in the area for other projects, if available, will be undertaken. In addition, walkover surveys, will be undertaken by an appropriately qualified and experienced team of archaeologists, to assess the current state of previously identified heritage assets, to identify any previously unrecorded heritage assets that are visible on the ground, and to assess the potential for undisturbed archaeological remains to be present within the project boundary.

4.6.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-37) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process. It has been completed in accordance with the relevant sections of the CIfA *Standard and Guidance for historic environment desk-based assessment* (2014, revised January 2020).

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

- Scheduled Monuments;
- Listed Buildings;
- Wartime defences around Scapa Flow; and
- Undesignated sites of local or regional importance.

The following sections provide information on these key spatial differences for terrestrial archaeology and cultural heritage which is relevant for the following areas:

1. The Orkney onshore export cable corridor search area across Hoy (see section 4.6.4.1)
2. The Orkney onshore export cable corridor search area across Fara (see section 4.6.4.2); and
3. The Orkney export cable corridor search area and Orkney onshore substation search area on Flotta (see section 4.6.4.3).

4.6.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

Within the Orkney onshore export cable corridor search area on Hoy, there are six designated Scheduled Monuments and sixteen Listed Buildings (see Table 4-38 and Table 4-39, Figure 4-7 and Figure 4-8). Approximately half of the Hoy onshore export cable search area lies within the UNESCO-designated 'Heart of Neolithic Orkney' World Heritage Site (WHS) Sensitive Area, which is a designation that ensures potential effects of any development on the wider archaeological landscape setting of the Heart of Neolithic Orkney WHS are considered.

Prehistoric activity on Hoy is well-attested and five of the Scheduled Monuments within the Hoy onshore export cable corridor search area date from this period. Three of these are enclosures and structures, generally marked by earthworks (SM 8664, SM 8662, SM 8663). There are two Scheduled Monuments of Iron Age date: a souterrain (SM 1437); and a square barrow cemetery (SM 13530). The scheduled areas for SM 8662 and SM 13530 are fairly large, measuring 160 m in diameter, and 120 m by 120 m respectively.

The remaining Scheduled Monument is the Scad Head Battery (SM 13497) dating from the Second World War. This is an extensive site and contains elements such as gun emplacements, searchlight batteries, barrage balloon sites and a tramway. The site forms part of the Royal Navy's defences around the Scapa Flow anchorage and the scheduled area extends across from Scad Head up to the edge of the B9047 highway.

Of the sixteen Listed Buildings, five are Grade-A. One of these (LB46375) is a former croft house in Rackwick, dating from the early nineteenth century. The remaining A-Grade buildings are all located around Lyness. There is a former croft (LB18714), which was remodelled in the Arts and Craft style, and three further elements of the Scapa Flow naval facilities: the naval signal station (LB48378) at Wee Fea; the nearby underground oil fuel storage tanks (LB52318); and the oil terminal pumping station (LB52320) at Lyness.

There are also 112 undesignated sites in the Hoy export cable search area listed in the Canmore database and these will require consideration by the EIA (see Figure 4-7 and Figure 4-8). The range of sites includes: prehistoric cists and burnt mounds; but mostly post-mediaeval sites such as farmhouses, agricultural structures, kilns, mills and boathouses; and twentieth century wartime sites, such as gun emplacements, search light emplacements, barrage balloon sites, signal stations, military huts and camps.

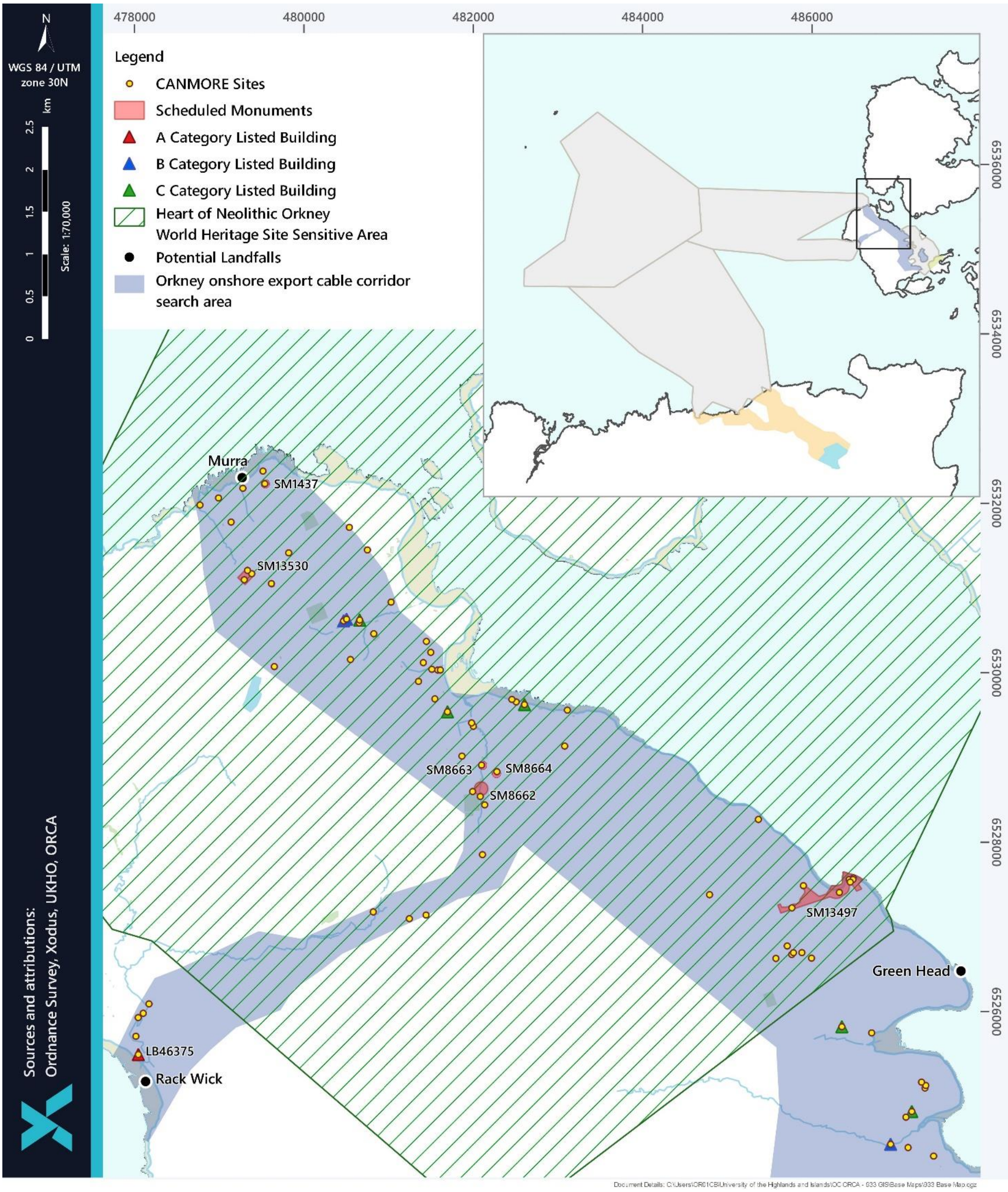

Figure 4-7 Identified Sites in Northern Hoy Onshore Export Cable Corridor Search Area

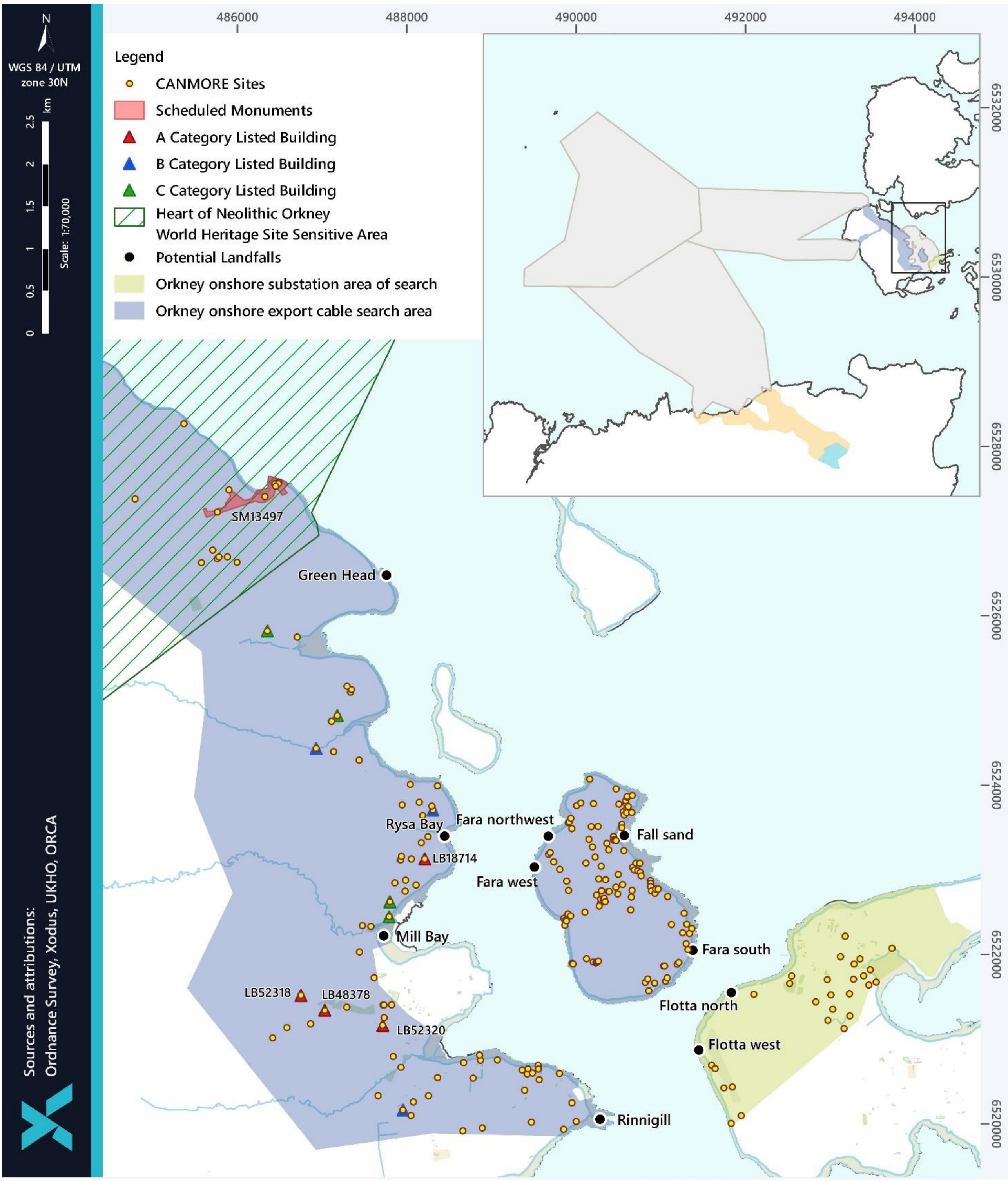

Figure 4-8 Identified Sites in Southern Hoy, Fara and Flotta Onshore Export Cable Corridor and Substation Search Areas

Table 4-38 Designated Scheduled Monuments within the Orkney Onshore Export Cable Corridor Search Area

NAME	TYPE	NGR	SAM NO.	DESCRIPTION	PERIOD
BRAEBISTER, UPPER CAIRN	SOUTERRAIN	HY 2207 0546	SM 1437	A souterrain together with traces of a surface structure, which may be an associated dwelling.	Iron Age
BURN OF QUOYS	ENCLOSURE	HY 2456 0173	SM 8662	An enclosed settlement straddling the Whaness Burn comprising a substantial bank, ditch and structures which may be domestic.	Prehistoric
BURN OF QUOYS	MOUND	HY 2458 0210	SM 8663	An enclosure defined by a low bank with several upright stones indicating the presence of a prehistoric structure.	Prehistoric
BURN OF QUOYS	ENCLOSURE	HY 2476 0202	SM 8664	An enclosure, annex and cairn.	Prehistoric
SLACK	BARROW CEMETERY, SQUARE BARROW	HY 2181 0433 HY 2213 0428	SM 13530	A later prehistoric or early historic square barrow cemetery dating to between AD 200 and AD 800 comprising two discrete groups of barrows some 300 m apart, visible as well-defined square and rectangular earthen platforms.	Iron Age
SCAD HEAD BATTERY	COASTAL BATTERY, GUN EMPLACEMENT, MILITARY CAMP, SEARCHLIGHT BATTERY, ENGINE HOUSE, TRAMWAY	HY 28921 00681	SM 13497	The remains of a coastal artillery battery and associated accommodation camp and railway, established during the Second World War. Visible as a series of concrete structures, hut bases, communication trenches, temporary emplacements and a railway. It forms part of a network of coastal batteries built to defend Scapa Flow.	20th Century

Table 4-39 Designated Listed Buildings within the Orkney Onshore Export Cable Corridor Search Area

NAME	TYPE	NGR	LB NO.	CATEGORY	DESCRIPTION	PERIOD
RYSA LODGE	FARMSTEAD, LODGE	ND 30607 96227	LB18714	A	Substantially re-modelled and extended former croft (1902) with crowstepped gables, wide low first-floor windows at eaves and distinctive chimney stacks.	20th Century
RACKWICK, BURNMOUTH	HOUSE	ND 20475 98744	LB46375	A	An early nineteenth-century, single-storey, roughly rectangular-plan former croft with a heather thatched roof, and adjoining the northeast gable is a lower three-bay former byre with a flagstone roof.	Post-medieval
WALLS, WEE FEA NAVAL COMMUNICATIONS AND OPERATIONAL CENTRE	NAVAL SIGNAL STATION	ND 29399 94456	LB48378	A	Large concrete, rectangular-plan Second World War communications and signal station set on Wee Fea overlooking Lyness.	20th Century
LYNESS, ROYAL NAVAL OIL TERMINAL, PUMPING STATION	PUMPING STATION	ND 3008 9427	LB52320	A	Tall six-bay gabled former pump house part of a significant and large grouping of military structures at Lyness.	20th Century
NEWSTEAD	COTTAGE AND MILL	HY 24187 2735	LB46373	C	Single storey, 3-bay, symmetrical, rectangular-plan cottage built on ground rising to W, with former mill complex (now derelict) adjoining to north.	19th century

NAME	TYPE	NGR	LB NO.	CATEGORY	DESCRIPTION	PERIOD
WEST END	COTTAGE	HY 25097 2807	LB46378	C	Single storey, 3-bay, symmetrical rectangular-plan cottage, sited to E of former croft complex, (now derelict). Harl-pointed random rubble.	Late 19th century
HOY LODGE	LAIRD'S HOUSE, LODGE, KENNELS, BOUNDARY WALLS AND GATEPIERS	HY 22976 3827	LB13628	B	Original range incorporated in L-plan additions in 1900, forming 2-storey, crowstepped-gabled, U-plan traditional Orkney laird's house. Harled.	19th century
ORGIL FARM	STEADING	HY 23166 3834	LB46374	C	Farm complex with domestic and livestock ranges arranged around large internal farmyard.	Late 19th century
MILESTONE TO WEST OF LYRAWA BAY	MILESTONE MARKER	ND 28789 98948	LB48358	C	Segmental-headed stone slab milestone. Inscribed in sans serif characters. 'N.NESS' above number '6'. 'HOY' above '5'.	Early 20th century
MILLHOUSE	DWELLING	ND 30177 95552	LB48371	C	2-storey, 3-bay, rectangular-plan house.	Mid 19th century
MILESTONE TO NORTH OF MILLHOUSE	MILESTONE MARKER	ND 30188 95728	LB48372	C	Segmental-headed stone slab milestone. Inscribed in sans serif characters. 'N.NESS' above number '3'. 'HOY' above '8'.	Early 20th century
MUCKLE RYSA FARMHOUSE	FARMHOUSE	ND 30712 96804	LB48373	B	2-storey, 3-bay farm house. Rendered.	Early 19th century
ORE FARM	MUNITIONS DEPOT	ND 30307 93267	LB48374	B	Former ammunition stores built by Ministry of Supply c.1938.	20th century
BRIDGE TO SOUTH-EAST OF PEGAL HILL	BRIDGE	ND 29344 97552	LB48376	B	Single semi-circular arch; smooth sandstone arch ring.	Early 20th century
MILESTONE TO EAST OF PEGAL HILL	MILESTONE MARKER	ND 29600 97935	LB48377	C	Segmental-headed stone slab milestone. Inscribed in sans serif characters. 'N.NESS' above number '5'. 'HOY' above '6'.	Early 20th century

4.6.4.2 FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

There are no designated Scheduled Monuments or Listed Buildings located within the Fara onshore export cable corridor search area. There are 114 undesignated sites listed in the Canmore database and these will require consideration by the EIA (see Figure 4-8).

These sites include a prehistoric cist and a Norse/ medieval chapel site, along with 22 sites of uncertain date. Many of these have the potential to date from the prehistoric or medieval periods.

There are approximately 50 sites dating from the twentieth century related to the island's role as part of the defences of Scapa Flow naval base. These include former gun emplacements, barrage balloon sites and air raid shelters. The remaining sites within the Fara search area are associated with post-medieval agricultural and fishing activities, including nousts, boathouses, farm buildings and enclosures.

There is moderate potential for peat deposits on Fara to contain paleoenvironmental information and obscure archaeological sites at the base of the peat.

4.6.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

There are no designated Scheduled Monuments or Listed Buildings located within the Orkney onshore export cable corridor search area on Flotta and the Orkney onshore substation search area. There are 27 undesignated sites listed in the Canmore database (see Figure 4-8) and these will require consideration by the EIA.

Prior to the twentieth century was essentially rural but during the First and Second World War the island was used as a base by the Royal Navy and the island formed part of the defences and facilities around the Scapa Flow anchorage. Approximately half of the identified sites within the Flotta onshore export cable and substation search area are related to the naval base with almost all of the remaining sites comprising post-medieval features related to farming. Many of these sites now lie below the Flotta Oil Terminal. The only prehistoric site identified is a burnt mound.

There is moderate potential for peat deposits on Flotta to contain paleoenvironmental information and obscure archaeological sites at the base of the peat.

4.6.4.4 Summary and Key Issues

Table 4-40 Summary and Key Issues for Historic Environment

	PROJECT COMPONENT		
	HOY	FARA	FLOTTA
SUMMARY AND KEY ISSUES	• All Scheduled Monuments and Listed Buildings will require avoidance. Key issues include how the proposed onshore export cable corridor search area avoids particular sites e.g the group of Scheduled Monuments in the area of SM8662; the linear Scheduled Monument of SM13497; and the concentration of sites between Rysa Bay and Mill Bay and onwards to Rinnigill.; • Wartime defences associated with the Scapa Flow naval base make up a group historic environment asset, although not every constituent part may have met the criteria for statutory designation.; • Sites that have not been designated may still be of local or regional importance and require avoidance or mitigation.; • Moderate potential for peat deposits on Hoy to contain paleoenvironmental information and obscure archaeological sites.; and • Likely requirement to address impacts / cumulative impacts on the setting of onshore historic environment assets by onshore infrastructure, including the Heart of Neolithic Orkney World Heritage Site sensitive area (HES West of Orkney Offshore Windfarm Pre-Application Advice Response, 26/11/2020, HES Case ID 300047487), hereafter HES Response 26/11/2020.	• There are no statutorily designated sites on Fara, but there are many non-designated sites (see Figure 4-8).; • Sites that have not been designated may still be of local, regional or national importance and require avoidance or mitigation.; • Wartime defences associated with the Scapa Flow naval base make up a group historic environment asset, although not every constituent part may have met the criteria for statutory designation.; • Moderate potential for peat deposits on Fara to contain paleoenvironmental information and obscure archaeological sites.; and • Likely to be a requirement to address impacts / cumulative impacts on the setting of onshore historic environment assets by onshore infrastructure (HES Response 26/11/2020).	• There are no statutorily designated sites within the search areas on Flotta (see Figure 4-8).; • Sites that have not been designated may still be of local, regional or national importance and require avoidance or mitigation.; • Wartime defences associated with the Scapa Flow naval base make up a group historic environment asset, although not every constituent part may have met the criteria for statutory designation: however, on Flotta, many of these now lie below the oil terminal.; • Moderate potential for peat deposits on Flotta to contain paleoenvironmental information and obscure archaeological sites.; and • There is likely to be a requirement to address impacts / cumulative impacts on the setting of onshore historic environment assets by onshore infrastructure (HES Response 26/11/2020).

4.6.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the historic environment. These measures will follow best practice and are outlined within Table 4-41.

Table 4-41 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Pre-construction desk-based assessment, walkover surveys will be conducted to identify any sensitive receptors and micro site around them.	Primary	Final cable routes and substation location will be outlined in the Project Plans, submitted as part of the planning application.
2	Substation location, cable routing and installation activities including temporary infrastructure such as access routes, laydown areas and compounds, will avoid all designated assets and wherever possible any other heritage assets identified as a result of conducting historic environment desk based assessment using data sources identified and archaeological walkover surveys. Where avoidance is not possible, appropriate mitigation strategies will be developed in consultation with the statutory authorities.	Primary	Final export cable routes and substation location will be outlined in the Project Plans, submitted as part of the planning application.
3	Reinstatement of terrain and ground cover to avoid any impacts on the setting of historic assets by the undergrounded export cable route.	Primary	Reinstatement methods and requirements will be outlined within the Design Statement for the planning application and implemented through planning conditions.
4	Operations, Maintenance and Decommissioning activities will ensure no further disturbance outwith ground already disturbed during the Construction phase and thus no further disturbance to historic environment assets.	Tertiary	Operations and maintenance activities will be included in the Design Statement for the planning application. A decommissioning programme is required under Section 105 of the Energy Act 2004 (as amended).
5	The preparation of appropriate WSIs, which may include archaeological intrusive evaluations, watching briefs and excavations, and a PAD to	Tertiary	Production of WSIs and PAD will be developed during the EIA process and outlined

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
	avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest.		within the Construction Method Statement.
6	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on historic environment receptors and will be consulted upon with consultees throughout the EIA process.

4.6.6 Scoping of Impacts

A number of potential impacts on onshore historic environment receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. Any of impacts proposed to be scoped out of the assessment for historic environment receptors will also be outlined below, together with a justification for scoping them out. Specific concern was expressed by HES that the potential for direct impacts on designated heritage assets are avoided where possible (HES Response 26/11/2020).

The main environmental impacts and associated pathways of effect for onshore historic environment receptors have been identified in Table 4-42. This includes potential impacts on the setting of onshore historic environment assets, including the Heart of Neolithic Orkney World Heritage Site and its wider setting, by the onshore aspects of the Project, including cables, substation and associated infrastructure. This will ensure that all major development activities will be considered and provides structure for the identification of the significance of any potential effects on cultural heritage receptors. Scoping of potential direct impacts to onshore historic environment assets by the offshore array and ancillary marine infrastructure, including the Heart of Neolithic Orkney WHS, are considered in the offshore scoping section (see section 2.9).

Table 4-42 EIA Scoping Assessment for the Onshore Orkney Historic Environment

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Loss of or damage to known historic environment assets	1, 2, 5, 6	Scoped In	Any aspects of the substation, export cable and associated infrastructure that cuts into the ground surface have the potential to result in the damage/loss of archaeological features. Effects are considered to be permanent. Although known sites will be avoided, impacts cannot be scoped out until the information required to inform the assessment has been collected, reviewed, and suitable mitigation and management plans formulated.	Desk based survey of existing data sources alongside site-specific walkover survey results.	Desk based assessment considering the maximum design scenario of the Project.
Loss of or damage to unknown historic environment assets	1, 4, 5, 6	Scoped In	Any aspects of the substation, export cable and associated infrastructure that cuts into the ground surface have the potential to result in the damage/loss of archaeological features. Effects are considered to be permanent. Impacts cannot be scoped out until the information required to inform the assessment has been collected, reviewed, and suitable mitigation and management plans formulated.	Desk based survey of existing data sources identifying potential for unknown assets to be present below the ground surface alongside site-specific walkover survey results.	Desk based assessment considering the maximum design scenario of the Project.

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Loss of or damage to deposits of paleoenvironmental interest	4, 5, 6	Scoped In	Any aspects of the substation, export cable and associated infrastructure that cuts into peat have the potential to result in the damage/loss of paleoenvironmental deposits. Effects are considered to be permanent. Impacts cannot be scoped out until the information required to inform the assessment has been collected, reviewed, and suitable mitigation and management plans formulated.	Desktop-study on paleoenvironmental interests.	Desk based assessment considering the maximum design scenario of the Project.
Operation and Maintenance					
Loss of or damage to known historic environment assets	4	Scoped Out	Scoped out on the assumption that operation and maintenance activities will ensure no further disturbance outwith ground already disturbed during the construction phase and thus no further disturbance to historic environment assets, direct impacts can be scoped out.	N/A	N/A
Loss of or damage to unknown historic environment assets	4	Scoped Out	Scoped out on the assumption that operation and maintenance activities will ensure no further disturbance outwith ground already disturbed during the construction phase and thus no further	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
			disturbance to historic environment assets, direct impacts can be scoped out.		
Loss of or damage to deposits of paleoenvironmental interest	4	Scoped Out	Scoped out on the assumption that operation and maintenance activities will ensure no further disturbance outwith ground already disturbed during the construction phase and thus no further disturbance to historic environment assets, direct impacts can be scoped out.	N/A	N/A
Long-term changes to the setting of historic environment assets	N/A	Scoped In	There is a possibility that the substation and associated infrastructure could have long-term effects on the setting of an onshore historic environment asset, impacting the way in which the asset is understood, appreciated and experienced, and thus the significance/ importance of the historic asset.	Maximum design details, ZTVs, identification of assets and their setting, wireframes, and visualisations from key receptors.	Assessment to follow using HES *Managing Change in the Historic Environment: Setting*, (2020).
Temporary changes to the setting of historic environment assets	3	Scoped Out	Temporary impacts on setting due to the presence of construction plant and temporary ancillary areas, reinstatement of the underground export cable corridor or maintenance visits are not considered significant and have been scoped out.	N/A	N/A

4.6.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on historic environment receptors, for example, the Hoy community windfarm and the proposed Flotta Hydrogen Hub. The onshore historic environment Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in sections 1.4.2 and 4.4.8.

The EIA will include consideration of the potential cumulative impact (direct and indirect) of the Project and other developments on the onshore historic environment, including other utility cable projects for telecoms and electricity. These effects will be localised, however there is also potential for cumulative effects if cable routes and landfalls converge. A key consideration will be the potential for cumulative effects on the surviving wartime remains around Scapa Flow due to all activities concentrated in the location, such as the Flotta Oil Terminal, transport, existing utility pipes and cables.

Potential cumulative impacts on the setting of onshore historic environment assets by the substation and associated onshore infrastructure will be considered.

4.6.8 Approach to Analysis and Assessment

4.6.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on the historic environment will utilise Project-specific and publicly available data (see 2.9.3) and will be augmented by consultation during the EIA phase. Consultees will include:

- Marine Scotland;
- HES; and
- OIC.

The approaches used to identify and analyse the historic environment baseline and assess the potential impacts will be in accordance with standards and guidelines produced by the Scottish Government, Historic Environment Scotland, the Licensing and Planning Authorities and the CIfA, and take into account the advice supplied by HES (HES Response 26/11/2020).

The desk-top data sources that will be examined for the onshore Orkney EIA baseline characterisation are outlined in section 4.4.3 above. Site-specific walkover surveys will be conducted for the Project. Datasets will be reviewed and analysed with a view to identifying previously unidentified assets visible on the surface, the potential for unknown archaeological sites and paleoenvironmental deposits to be present below the surface. The surveys will be conducted to appropriate professional standards for archaeological review (as outlined in relevant CIfA Standards and Guidances CIfA regulations, standards and guidance | Chartered Institute for Archaeologists).

The relative importance (e.g. national, regional, local) or sensitivity (high, medium, low) of each cultural heritage asset identified in the datasets will be assessed (with reference to Historic Environment Scotland Designation Policy and Selection Guidance 2019).

In terms of setting, statutorily designated assets including Scheduled Monuments, Listed Buildings, Gardens & Designed Landscapes, and Conservation Areas within 30 km of the substation (possibly less, depending on the height and visibility of the substation) and within the ZTV, will be identified using HES datasets downloaded from https://portal.historicenvironment.scot/downloads. Consideration will also be given to any sites outwith the ZTV that may be affected. In order to keep the size of the assessment reasonable and proportionate, it is proposed that a selection of designated sites and areas, such as Scheduled Monuments and Listed Buildings, will be considered rather than every such site and area, which can act as proxy for the range of effects on other designated and undesignated sites. Relevant non-designated sites will be identified in consultation with the local planning authority archaeologists. The importance of sites and sensitivity of setting will be identified using HES *Managing Change in the Historic Environment: Setting*, (2020) and HES 2019, *Designation Policy and Selection Guidance*, including Annexes. Key receptors for viewpoints, visualisations, photomontages, and wireframes will be agreed with the Landscape and Visual consultants and the statutory authority, and produced according to standard best practice guidance (Landscape Institute & IEMA *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), 3rd edition 2013; and SNH (now NatureScot) *Visual Representation of Wind Farms Guidance*, v2.2, 2017).

The potential effects of the Project on the historic environment assets identified by the baseline assessment will be undertaken with reference to Scottish Natural Heritage (now NatureScot) & HES's *Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*, (V5, 2018). The assessment approach will be based on the maximum design scenario for the Project and will consider both direct and indirect impacts, and long-term effects, as appropriate.

4.6.8.2 EIA Methodology

The onshore Orkney EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-43 will also be considered in relation to the EIA. The methodologies used in the investigation will be in accordance with standards and guidelines produced by the Scottish Government, HES, the Licensing and Planning Authorities and the Chartered Institute for Archaeologists, including those recommended in pre-application responses (HES Response 26/11/2020).

Specific detailed methodology for the marine historic environment will be agreed in consultation with statutory stakeholders.

Table 4-43 Legislation and Guidance for the Historic Environment

LEGISLATION / GUIDANCE	SUMMARY
The European Convention on the Protection of the Archaeological Heritage (revised), known as the Valletta Convention	Contains provisions for the protection of archaeological heritage both underwater and on land, preferably in situ, but with provisions for appropriate recording and recovery if disturbance is unavoidable.
The European Landscape Convention (ratified by the UK government in 2006)	Promotes the protection, management and planning of landscapes, including the historical and cultural aspects of landscapes.

LEGISLATION / GUIDANCE	SUMMARY
The Ancient Monuments and Archaeological Areas Act 1979	Concerns sites that warrant statutory protection due to being of national importance and are Scheduled under the provisions of the Act. The Act is administered in Scotland by Historic Environment Scotland.
Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 and amendments	Planning authorities, prior to granting planning permission, consult with Historic Environment Scotland as a statutory consultee on any development proposals that may affect the site or setting of a Scheduled Monument, an A-Listed building, an Inventoried Garden or Designed Landscape, or an Inventoried Historic Battlefield. This means that the presence of such sites within the area of a proposed development and the protection of the setting of sites are material considerations in the planning process. The setting of non-designated sites and B- and C-Listed buildings is also a consideration in the planning process.
Scottish Planning Policy (SPP) 2014, revised in 2020	States that authorities should protect archaeological sites and monuments (and a range of other historic assets) and related settings as an important, finite and non-renewable resource and preserve them in situ wherever possible. Where preservation in situ is not possible, authorities should ensure that developers undertake appropriate excavation, recording, analysis, publication and archiving before and/or during development. If archaeological discoveries are made during any development, they should be reported to the authority to enable discussion on appropriate mitigation measures. Change should be sensitively managed in order to best avoid or minimise adverse impacts on the fabric and setting of heritage assets.
The Historic Environment Policy Statement for Scotland (HEPS) 2019	Includes policies that decisions affecting any part of the historic environment require understanding of its significance and consideration of avoiding or minimising detrimental impacts.
Historic Environment Scotland Designation Policy and Selection Guidance 2019	Stands alongside HEPS 2019 and outlines the principles and criteria that underpin the designation of historic environment assets.
Historic Environment Scotland Managing Change in the Historic Environment Guidance Series: Setting (revised in 2020)	Planning authorities are guided to this Guidance which states that "Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance. Planning authorities must take into account the setting of historic assets or places when drawing up development plans and guidance, when considering environmental and design assessments/statements, and when making decisions on planning applications."
The Orkney Local Development Plan (2017)	A material consideration in the determination of relevant planning applications. Orkney LDP 2017 Policy 8: Historic Environment & Cultural Heritage includes that development with potential to have an adverse effect on the significance of heritage assets, including their settings, will be expected to demonstrate that all reasonable measures will be taken to mitigate any loss of significance, and that any lost significance which cannot

LEGISLATION / GUIDANCE	SUMMARY
	be mitigated is outweighed by social, economic, environmental or safety benefits.
Orkney Islands Council Heart of Neolithic Orkney Supplementary Planning Guidance (2010)	Establishes a detailed policy context for impacts on the Outstanding Universal Value of the World Heritage Site, including issues associated with the component sites and their wider setting.
The Chartered Institute for Archaeologists (CIfA) *Codes, Standards and Guidance* (various, updated 2020) CIfA regulations, standards and guidance | Chartered Institute for Archaeologists	CIfA has developed a range of Regulations, Standards and guidance that are binding on all members and Registered Organisations to ensure that CIfA members work to high ethical and professional standards.
Historic Environment Scotland. 2016 (revised 2020). *Managing Change in the Historic Environment guidance series*, especially the *Setting* and *World Heritage* guidance notes	This document seeks to set practical Standards for a consistent approach to the management of the historic environment in Highland.
Scottish Natural Heritage & Historic Environment Scotland. 2018. *Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*. V5. Edinburgh	This document is part of a series of non-statutory guidance notes about managing change in the historic environment. They explain how to apply the policies in the Historic Environment Policy for Scotland.
Oxford Archaeology & George Lambrick Archaeology and Heritage. 2008. *Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy*, commissioned by COWRIE Ltd (project reference CIARCH-11-2006)	The Handbook is intended to provide competent authorities, statutory consultees and others involved in the EIA process with practical guidance and a ready source of information about the process.

LEGISLATION / GUIDANCE	SUMMARY
The Crown Estate. 2021 *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects*, Wessex Archaeology Ltd for The Crown Estate	Guidance on the assessment of cumulative impacts on the historic environment arising from offshore renewable energy projects.
The Crown Estate. 2014. *Protocol for Archaeological Discoveries: Offshore Renewables Projects*, Wessex Archaeology Ltd for The Crown Estate	Guidance document outlining the latest requirements and responsibilities for the historic environment.

4.6.9 Scoping Questions

- Do you agree that the identification of what constitutes the baseline historic environment is adequate?
- Do you agree that the sources listed for conducting a desk based assessment to identify the baseline historic environment are sufficient?
- Do you agree that the surveys proposed will be sufficient to provide an adequate assessment of the baseline historic environment?
- Are any historic environment assets not identified that you would like to see included in the EIA?
- Do you agree with the EIA approach and methodology?
- Do you agree with the potential impacts scoped in and out?
- Do you agree with the approach to identifying sites whose setting may be impacted by the substation and other associated onshore infrastructure are there any specific sites you wish to see addressed?
- Do you agree that the potential impacts identified are sufficient and are there any missing?
- Do you agree that the embedded mitigations proposed for the Project will provide suitable means by which to manage and mitigate the potential effects of the Project on the historic environment?
- Do you agree that the approach to data gathering and assessment is adequate for the provision of an EIA on which informed licensing and planning decisions can be made?

4.6.10 References

HES. 2020. Managing Change in the Historic Environment: Setting. Available online: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=80b7c0a0-584b-4625-b1fd-a60b009c2549

HES. 2019. Designation Policy and Selection Guidance. Available online: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b

Landscape Institute & IEMA. 2013. *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), 3rd edition 2013

Moore, H. & Wilson, G. 1997. Report on a Coastal Zone Assessment Survey of Orkney: Burray, Flotta, Graemsay, Hoy, South Ronaldsay. Available online: orkney1.pdf (scapetrust.org)

NatureScot (previously SNH). 2017. Visual Representation of Wind Farms Guidance. Available online: https://www.nature.scot/doc/visual-representation-wind-farms-guidance

NatureScot (previously SNH) & HES. 2018. Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland. Available online : https://www.nature.scot/doc/handbook-environmental-impact-assessment-guidance-competent-authorities-consultees-and-others

4.7 Air Quality

4.7.1 Introduction

This section of the Scoping Report identifies the air quality receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area from Hoy to Flotta and the Orkney onshore substation search area associated with the Flotta grid connection, and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project. This includes works down to MLWS and as such within the intertidal area. The primary focus of the scoping assessment will therefore be the generation of dust and other emissions, especially in dry and windy conditions and the potential impacts of this on human health. A standalone GHG assessment will also be completed and appended to the EIA (see section 1.4.6.3), to investigate the potential for both carbon savings and the avoidance of gaseous discharges associated with climate change, as well as the carbon cost of Project development activities.

Information that may be considered relevant to this section is also presented within the below sections:

- Terrestrial non-avian ecology, section 4.3;
- Terrestrial ornithology, section 4.4;
- Land-use and other users, section 4.5; and
- Traffic and access, section 4.9.

This section of the Scoping Report has been prepared by Xodus Group.

4.7.2 Study Area

The air quality study area is defined by the Orkney onshore export cable corridor search area and the Orkney onshore substation search area. The Orkney onshore export cable corridor search area has been developed forming broad corridors between the potential landfalls and the connection point at Flotta. The Orkney onshore export cable corridor search area has been based on significant routing work, which considered key technical, environmental and land-use constraints. The Orkney onshore substation search area at is located adjacent to the existing Flotta Oil Terminal operated by Repsol Sinopec. Consultation with Repsol Sinopec will be required. A 100 m, for ecological receptors, and 500 m buffer, for human receptors, around the study area has been assumed for the purpose of the assessment. This buffer is inclusive of the preferred 350 m buffer for the identification of human receptors, and 50 m for ecological receptors as specified by the IAQM, 2014 Guidance on the Assessment of dust from demolition and construction.

Climate change issues associated with carbon dioxide are on a global scale, hence no specific study area has been defined for this aspect of the assessment. Nonetheless, carbon emissions associated with the Project will be accounted for within the EIA Report once final decisions on the Project design envelope are made.

4.7.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 4-44.

Table 4-44 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Air Quality in Scotland	http://www.scottishairquality.scot/laqm/aqma	2021	Air Quality in Scotland
Air Quality Monitoring Stations for the Highland Council – Inverness City Centre	http://www.scottishairquality.scot/data/mapping?view=data	2021	Air Quality in Scotland
Air Quality Monitoring Stations for the Highland Council – Strath Viach	http://www.scottishairquality.scot/data/mapping?view=data	2021	Air Quality in Scotland
Air Quality Monitoring Stations for the Highland Council – Fort William	http://www.scottishairquality.scot/data/mapping?view=data	2021	Air Quality in Scotland
DEFRA Background Concentration Map	https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html	2021	DEFRA

4.7.3.1 Project Site-Specific Surveys

To date, there have been site visits to the Project area in Orkney. These site visits involved a walkover of the area to confirm desktop sources and confirmation of existing key contributors to air quality. Further site visits will take place during the EIA, however it is not proposed that any baseline air quality measurements are required as with the mitigation measures implemented, it is predicted that there will be no significant effects on air quality.

4.7.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-44) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment, including the presence of receptors sensitive to air quality, and to inform the Scoping process. The key receptors for air quality, which are likely to require consideration within the EIA are:

- Protected species;
- Areas of conservation or scientific interest;
- Residential areas; and
- Areas of natural beauty;

The following sections provide information on the key spatial differences for air quality which are relevant for the following areas:

1. The section of the Orkney onshore export cable corridor search area across North Hoy (see section 4.7.4.1)
2. The section of the Orkney onshore export cable corridor search area across South Hoy and Fara (see section 4.7.4.2); and

3. The section of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area on Flotta (see section 4.7.4.3).

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.7.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The island of Hoy measures 143 km^2 and is the second largest island in Orkney, the identified area of North Hoy measuring approximately 37.5 km^2. There are no large settlements on Hoy, the island mostly consists of smaller farm settlements, some of which are located within the Orkney onshore export cable corridor search area.

There is no AQMA within close proximity of to the Project. The closest AQMA is on mainland Scotland within THC Area of Inverness City Centre approximately 105 miles (169 km) south of the study area. Due to the distance of the closest AQMA, it cannot be deemed to be representative of the study area. However, the lack of monitoring would suggest that there are no air quality issues in the area.

The study area is currently largely made up of peatland and is within an RPSB reserve, and as such agricultural emissions are limited. The area is assumed to have a relatively high air quality level. Existing local sources of particulate matter and dust likely includes windblown dust from exhaust emissions from road vehicles and emissions from the areas of agricultural land that are present. Wind speed and wind direction will influence the dispersion of dust and particulate matter from the onshore Project works. Wind direction is predominantly south-easterly, and wind speeds are generally in the range of 10.1 – 10.3 ms-1 (CMWF's ERA5 global climate model). The average wind speed across the UK (2001-2020) is 4.2 ms-1 (Statista, 2021), indicating that the study area is a particularly windy environment. Additionally, the grain size of superficial deposits may also influence dust dispersal radius.

As described in section 4.1, the main soil types encountered within the vicinity of the study area are found to be namely mineral gleys, peaty podzols with some alpine podzols. The actual materials encountered during excavations will depend on the final onshore cable routing and substation placement, however it is noted that the larger particle size materials (sand and gravel) are less likely to give rise to dust. Clay based material, is more likely to give rise to dust due to its small particle size.

Within the study area, human and ecological receptors have been identified in line with IAQM 2014 and IAQM 2020 guidance, which have the potential to be impacted by dust and particulate matter within the search area and close to the area. The findings are as summarised in Table 4-45.

Table 4-45 Receptors Screened for Potential Impacts from Air Quality issues in the Vicinity of the Study Area

RECEPTOR TYPE	*WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Not present within 500 m of the study area.	N/A

RECEPTOR TYPE	*WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Residential Properties	Present within 500 m of the study area.	Multiple residential properties are located within the Project area
Non – Residential Properties	Present within 500 m of the study area.	• Hoy Hostel; • Hoy Post Office; • Hoy Orkney Ferry Terminal; • Rackwick Hostel; and • Rackwick Bothy.
Amenity Areas	Present within 500 m of the study area.	• Braebister Mound; • Sandy Loch; • Bay of Quoys; • Beneth'll Café; • Rackwick Beach; • Cra'as Nest; • Dwarfie Stone; • Old Man of Hoy; • Muckle House (listed); and • Rackwick Bothy.
Designated Sites	Present within 100 m of the study area.	• RSPB Scotland Hoy Nature Reserve; • Muckle Head and Selwick SSSI; • Selwick Seal haul out; • Hoy SSSI; • Hoy SAC; and • NE Hoy designated seal haul out.
Red Data List Species*	Not present within 100 m of the study area.	N/A
Carparks	Present within 500 m of the study area.	• Rackwick Public Car Park; and • Dwarfie Stane Car Park.

**Ecology receptors present within designated sites and Red Listed Species are only considered if present within the 100 m buffer, as per the 2014 IAQM guidance.*

The baseline concentration for the study area has been taken from the Scottish Government and DEFRA background concentration maps for the 1 km x 1 km grid squares that cover the study area. The baseline NOx concentration is relevant for sensitive ecological receptors. The average mean concentration for NO2 is 1.61 μG/M3, for PM10 is 4.49 μg/m3 and for PM2.5 is 2.36 μG/M3. All background concentrations within the study area are significantly below the annual mean AQSs of 30µg/m3 for NOx, 40µg/m3 for NO2, 18µg/m3 for PM10 and 10µg/m3, for PM2.5.

4.7.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

As for North Hoy, there are no large settlements on the island of Hoy, and the island of Fara is uninhabited. There are some small derelict settlement areas and derelict farmhouses scattered across Fara.

Similarly to North Hoy, there is no AQMA within close proximity of to the Project. The lack of monitoring would suggest that there are no air quality issues in the area. Additionally, the study area for South Hoy is currently largely farmland and the island of Fara uninhabited and as such both areas are assumed to have a relatively high air quality level.

Existing local sources of particulate matter and dust likely includes windblown dust from agricultural land. Wind speed and wind direction will influence the dispersion of dust and particulate matter from the onshore Project works. Wind direction is predominantly south-easterly, and wind speeds are on average 10.2 ms-1 (CMWF's ERA5 global climate model. The average wind speed across the UK (2001-2020) is 4.2 ms-1 (Statista, 2021), indicating that South Hoy is a particularly windy environment.

Additionally, the grain size of superficial deposits may also influence dust dispersal radius. As described in section4.1, the main soil types encountered within the vicinity of the study area are found to be namely peaty podzols, peaty gleys, blanket peat, mineral gleys with some alpine podzols. The actual materials encountered during excavations will depend on the final onshore cable routing and substation placement, however it is noted that the larger particle size materials (sand and gravel) are less likely to give rise to dust. Clay based material, is more likely to give rise to dust due to its small particle size.

Within the study area, human and ecological receptors have been identified in line with IAQM 2014 and IAQM 2020 guidance, which have the potential to be impacted by dust and particulate matter within the search area and close to the area. The findings are as summarised in Table 4-46 below.

Table 4-46 Receptors Screened for Potential Impacts from Air Quality issues in the Vicinity of the Onshore Project Area

RECEPTOR TYPE	*WITHIN THE ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Present within 500 m of the study area.	• St. Johns Trust Church; and • St. Johns Trust Church.
Residential Properties	Not present within 500 m of the study area.	N/A
Non – Residential Properties	Present within 500 m of the study area.	• Lyness Post Office; and • Lyness Orkney Ferry Terminal.

RECEPTOR TYPE	*WITHIN THE ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Amenity Areas	Present within 500 m of the study area.	• Peat Bay; • Betty Corrigall's Grave; • Water of Hoy; • Lyrawa Bay Fish Farm; • Pegal Bay; • Emilys Tea Room ; • Wild Heather Rafts; • Lyness Royal Naval Cemetery; • Scapa Flow Visitor Centre and Museum; and • Crockness Martello Tower.
Designated Sites	Present within 100 m of the study area.	• Designated seal haul outs
Red Data List Species*	Present within 100 m of the study area.	N/A
Carparks	Not present within 500 m of the study area.	N/A

**Ecology receptors present within designated sites and Red Listed Species are only considered if present within the 100 m buffer, as per the 2014 IAQM guidance.*

The baseline NO_x concentration is relevant for sensitive ecological receptors. The average mean concentration for NO_2 is 1.83 μG/M^3, for PM_{10} is 4.56 μg/m^3 and for $PM_{2.5}$ is 2.36 μG/M^3. All background concentrations within the study area are significantly below the annual mean AQSs of 30μg/m^3 for NOx, 40μg/m3 for NO_2, 18μg/m^3 for PM_{10} and 10μg/m^3, for $PM_{2.5}$.

4.7.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

There are no large settlements on the island. There are some small settlement areas and farmhouses scattered through the island. As for North Hoy, and South Hoy and Fara, there is no AQMA within close proximity of to the Project. The lack of monitoring would suggest that there are no air quality issues in the area. Additionally, the study area is currently largely farmland and as such is assumed to have a relatively high air quality level.

Existing local sources of particulate matter and dust likely includes windblown dust originating from operational and maintenance activities at the Flotta Oil Terminal, agricultural land and exhaust emissions from road vehicles.

The Flotta Oil Terminal carries out annual monitoring of the hot oil heaters and gas turbines as part of the requirement of the pollution prevention control permit.

Wind speed and wind direction will influence the dispersion of dust and particulate matter from the onshore Project works. Wind direction is predominantly south-easterly, and wind speeds are on average 10.2 ms-1. The average wind speed across the UK (2001-2020) is 4.2 ms-1 (Statista, 2021), indicating that the study area of North Hoy is a particularly windy environment.

Additionally, the grain size of superficial deposits may also influence dust dispersal radius. As described in section 4.1, the main soil types encountered within the vicinity of the study area are found to be namely mineral gleys, planket peat and small area of peaty podzols. The actual materials encountered during excavations will depend on the final onshore cable routing and substation placement, however it is noted that the larger particle size materials (sand and gravel) are less likely to give rise to dust. Clay based material, is more likely to give rise to dust due to its small particle size.

Within the study area, human and ecological receptors have been identified in line with IAQM 2014 and IAQM 2020 guidance, which have the potential to be impacted by dust and particulate matter within the search area and close to the area. The findings are as summarised in Table 4-47 below.

Table 4-47 Receptors Screened for Potential Impacts from Air Quality issues in the Vicinity of the Onshore Project Area

RECEPTOR TYPE	*WITHIN THE ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Present within 500 m of the study area.	• Flotta Community School.
Residential Properties	Present within 500 m of the study area.	• Multiple residential properties are located within the Project area.
Non – Residential Properties	Present within 500 m of the study area.	• Flotta Oil Terminal; • Flotta Post Office & Shop; and • Flotta Airport (disused facility).
Amenity Areas	Present within 500 m of the study area.	• Flotta Orkney Ferry Terminal; • Stanger Head Port Signal Station; and • Flotta Playpark.
Designated Sites	Present within 100 m of the study area.	• Western Flotta Moors Local Nature Conservation Site; • Golta Peninsula Local Nature Conservation Site; and

RECEPTOR TYPE	*WITHIN THE ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
		• Designated seal haul outs.
Red Data List Species*	Not present within 100 m of the study area.	N/A
Carparks	Not resent within 500 m of the study area.	N/A

**Ecology receptors present within designated sites and Red Listed Species are only considered if present within the 100 m buffer, as per the 2014 IAQM guidance.*

The baseline NO_x concentration is relevant for sensitive ecological receptors. The average mean concentration for NO_2 is 2.34µg/m^3, for PM_{10} is 4.77µg/m^3 and for $PM_{2.5}$ is 2.90µg/m^3. All background concentrations within the study area are significantly below the annual mean AQSs of 30 µg/m^3 for NO_x, 40 µg/m^3 for NO_2, 18 µg/m^3 for PM_{10} and 10µg/m$_3$, for $PM_{2.5}$.

4.7.4.4 Summary and Key Issues

Table 4-48 Summary and Key Issues for Air Quality

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	Air quality within the North Hoy project area is deemed to be good. There are no large settlements, and the area mostly consists largely of small rural areas and small farm settlements. In the Orkney onshore export cable corridor search area, there are a small number of farm settlements. There are multiple designated areas which hold the potential to be impacted by damage to Air Quality, these are: with Hoy SAC, SPA, SSSI. There are also three Local Nature Conservation Sites that may be impacted. Wind speeds are high within the North Hoy project area which will aid in distributing any dust that may arise from Project Activities.	The Air Quality is good within the South Hoy and Fara area. This study area is largely made up for South Hoy, which consists of areas of farmland and farm settlements along with small rural communities. The island of Fara is uninhabited. The Hoy and North Walls Moorland Fringes Local Nature Conservation Site, designated seal haul outs and the Lyrawa Bay fish farm would be the most sensitive receptors in the area. Wind speeds are high within the Project area which will aid in distributing any dust that may arise from Project Activities.	The Air Quality is good on the island of Flotta. There are no large settlements on the island. There are some small settlement areas and farmhouses scattered through the island but the largest infrastructure on the island is that of the Flotta Oil Terminal. Key environmental receptors located within the study area are West Flotta Moors Local Nature Conservation Site and the Golta Peninsula Local Nature Conservation Site. There are also designated seal haul outs on Flotta. Wind speeds are high within the Project area which will aid in distributing any dust that may arise from Project Activities.

4.7.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-49.

Table 4-49 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	DMP will be produced with approval from the Orkney Islands Council prior to construction.	Tertiary	The preparation of an DMP will be a planning condition. The plan will be developed by the contractor and agreed with OIC.
2	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.
3	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.
4	Hold regular liaison meetings with any other high-risk construction sites within 500 m of the site boundary to ensure plans are co-ordinated and dust and particulate emissions are minimised with particular attention to off-site transport/deliveries which may use the same strategic road network routes.	Tertiary	Procedure outlined within the DMP, a requirement of the consent/planning conditions, and established within the project communication plan
5	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.
6	Increase frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Tertiary	Procedure outlined within the DMP, a requirement of the Section 36 and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
7	Plan site layouts so that machinery and dust causing activities are located away from receptors, as far as possible.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
8	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
9	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period, e.g. fine-screen fencing or temporary construction tent.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
11	Keep site fencing, barriers and scaffolding clean using wet methods.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
12	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
13	Cover, seed or fence stockpiles to prevent wind whipping.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
14	Ensure all NRMM is compliant with the engine emission regulations in place at the time of use on site.	Tertiary	Established within the design principles and consent and/or planning conditions.
15	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
			Section 36 consent and/or planning conditions
16	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
17	Use enclosed chutes and conveyors and covered skips.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
18	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
19	Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event, using wet cleaning methods.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions
20	Ensure all vehicles switch off engines when stationary.	Tertiary	Established in design and managed through the Traffic Management Plan (TMP), a condition of consent/planning.
21	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Tertiary	Established within the design principles and consent and/or planning conditions.
22	Re-vegetate earthworks and exposed areas/soils stockpiles to stabilise surfaces as soon as practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
23	Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
24	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate control measures are in place.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
25	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
26	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
27	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require a sweeper being continuously in use.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
28	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
29	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
30	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
31	Speed will be kept to a minimum on site and on the access track (20mph or less on surfaced roads and 5mph or less for unmade surfaces) to reduce the potential of creating dust and to enhance site safety.	Tertiary	Established within the design principles and outlined within the DMP, a requirement of the Section 36 consent and/or planning conditions.
32	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on air quality and will be consulted upon with consultees throughout the EIA process.

4.7.6 Scoping of Impacts

A number of potential impacts on onshore air quality receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. A number of impacts are proposed to be scoped out of the assessment for air quality. These impacts are outlined, together with a justification for scoping them out. Impacts to ecological receptors, designated sites and protected species, have been considered within sections 4.2, 4.3 and 4.4.

Table 4-50 EIA Scoping Assessment for Air Quality

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Dust emissions associated with Project works	1-9, 12, 15, 16, 24-26, 32	Scoped In	Ground works and the use of aggregates and cements on site has the potential to give rise to local dust issues. There is a potential for dust to be created during the decommissioning of the sub-station/switch gear, especially if the floor is to be removed as it will need to be broken up.	Desk study and accurate estimations/quantities for a material inventory along with a proposed activities schedule.	Desk study calculating potential area of impact.
Dust (Onshore cable laying)	1-9, 12, 13, 15, 22, 23, 32	Scoped In	Onshore cable laying will involve excavations, if stored spoil becomes dry then it can give rise to dust. If the onshore cable is to be removed during decommissioning, then the excavation of soil could give rise to dust.	Desk study and proposed activities schedule.	Desk study calculating potential area of impact.
Dust (Access roads / tracks)	1-9, 12, 15, 16, 24-26, 32	Scoped Out	Ground works and the use of aggregates associated with the construction of a temporary access road does not have the potential to give rise to significant local dust issues. Hence, the impact has been scoped out of the EIA.	N/A	N/A

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Dust and emissions from vehicle use	27 – 31, 32	Scoped Out	Vehicle use on and in close proximity to the site does not have the potential to give rise to significant local dust issues. Hence, the impact has been scoped out of the EIA.	N/A	N/A
Operation and Maintenance					
Dust and emissions resulting from operation and maintenance works	1-9, 12, 13, 15, 16, 22-26	Scoped Out	It is not expected that any significant volumes of dust or vehicle emissions will be generated once construction is complete. The number of vehicle trips required during operation will be limited. Hence, the impact has been scoped out of the EIA.	N/A	N/A

4.7.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on other receptors. The construction of the Hoy community windfarm and proposed Flotta Hydrogen Hub has the potential to result in cumulative effects and will be considered within the assessment. The Air Quality Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.3.

4.7.8 Approach to Analysis and Assessment

4.7.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on air quality will utilise Project-specific and publicly available data (see section 4.7.3) and will be augmented by consultation during the EIA phase.

A desk-top study will be undertaken using publicly available source of information and consultation responses. Consultation will be undertaken with:

- OIC;
- Other statutory consultees (SEPA and NatureScot);
- Local landowners and communities; and
- Other interest groups/organisations.

The views and information gathered from these consultations will be used to help shape the Project and ensure that wherever possible, adverse effects on people and the natural environment have been avoided or reduced, and where possible benefits have been delivered. Assessments will be undertaken qualitatively based on the maximum design scenarios of the Project. The predicted significance of effects will be determined based on the relationship between the magnitude of impact and the sensitivity of the receptor through a standard method of assessment based on professional judgement and the application of appropriate evaluation criteria.

One of the main attractions of wind energy technology is the fact that it is a sustainable source of power and does not create greenhouse gas emissions or emit pollution when generating electricity. The primary focus of the scoping assessment will be the generation of dust, especially in dry and windy conditions and the potential impacts of this on human health and ecological receptors. There is the potential for a positive environmental impact with regard to carbon saving and avoidance of gaseous discharges associated with global climate change, as well as a carbon cost on account of the Project development activities. This will be considered in a standalone GHG assessment (see section 1.4.6.3).

4.7.8.2 EIA Methodology

The air quality EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-51 will also be considered in relation to the ecology and nature conservation EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 4-51 Legislation and Guidance for Air Quality

LEGISLATION / GUIDANCE	SUMMARY
EU Directive 2008/50/EC Ambient Air Quality and Cleaner Air for Europe	The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM 10 and PM 2.5) and nitrogen dioxide (NO 2).
The Environmental Act 1995	Includes important provisions relating to air quality, with particular regard to preparing a National Air Quality Strategy.
The Air Quality Standards (Scotland) Regulations 2010	These regulations set air quality standards for key pollutants and implement policies on air quality management and assessment.
United Kingdom Air Quality Strategy	The UK Air Quality strategy was originally adopted in 1995 and has since been periodically updated and revised. The Clean Air Strategy was most recently published in 2019. The strategy sets out the air quality standards and objectives which have been set to benchmark air quality in terms of protecting human health and the environment.
Cleaner Air for Scotland 2 – Towards a Better Place for Everyone	This strategy updates Cleaner Air for Scotland and sets out the strategies, objectives and actions to improve air quality in Scotland.
Part III of the Environmental Protection Act 1990	Identify dust as a nuisance. The provisions of Part III of the Environmental Protection Act 1990 relating to statutory nuisance were enacted in Scotland by the Environment Act 1995.
Guidance on the Assessment of dust from demolition and construction (IAQM, 2014)	The document provides guidance for developers, their consultants and environmental health practitioners on how to undertake a construction impact assessment (including demolition and earthworks).
Guidance on land-use planning and development control: Planning for air quality (IAQM, 2017)	Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have produced this guidance, which replaces the 2010 EPUK Guidance document, to ensure that air quality is adequately considered in the land-use planning and development control processes.
Air Quality Monitoring in the vicinity of Demolition and Construction Sites (IAQM, 2018)	This document provides updated guidance on air quality monitoring in the vicinity of demolition and construction sites.

LEGISLATION / GUIDANCE	SUMMARY
A guide to the assessment of air quality impacts on designated nature conservation sites (IAQM, 2020)	This publication signposts the appropriate thresholds used by local authorities, the Environment Agency and other regulators to conclude that there will not be a significant effect.
Pollution Prevention Guidelines 6 (PPG6): Working at Construction and Demolition Sites (currently under review) (SEPA *et al.*, 2012)	These guidelines are intended to assist those in the construction and demolition industry with responsibility for managing the environmental impact on air quality from their activities.
Orkney Local Development Plan 2017 (OIC, 2017)	Sets out a vision and spatial strategy for the development of land in Orkney over the next ten to twenty years. The Plan contains the land-use planning policies which OIC will use for determining applications. It also contains development proposals for towns, villages and rural settlements, and establishes settlement boundaries for each of these areas where the principle of development will be accepted.

4.7.9 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Do you agree that the impacts suggested can be scoped out of the EIA?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

4.7.10 References

Air Quality in Scotland (2021a). *Air Quality Management Areas*. Available at: http://www.scottishairquality.scot/laqm/aqma?id=368.

Air Quality in Scotland (2021b). *Data for Local Authority Review and Assessment Purposes*. Available at: http://www.scottishairquality.scot/data/mapping?view=data.

Air Quality in Scotland (2021c). *Standards*. Available at: http://www.scottishairquality.scot/air-quality/standards.

DEFRA (2021). DEFRA background concentration maps for PM2.5 for Hoy and Flotta 2021. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

EPUK & IAQM (2017). *Land-Use Planning & Development Control: Planning for Air Quality*. Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

Highland Council (2020). Annual Progress Report (APR) for Highland Council, In fulfilment of Part IV of the Environment Act 1995, Local Air Quality Management, Version 2.0, April 2021. Available at: http://www.scottishairquality.scot/assets/documents//Highland_annual_2020.html.

Holman *et al.*, (2014). IAQM Guidance on the assessment of dust from demolition and construction V1.1. Available at: http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

IAQM (2018). Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, October 2018, version 1.1. Available at: https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf.

OIC (2017). Orkney Local Development Plan 2017. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf

Statista (2021). Average wind speed UK, 2001-2020. Available at:https://www.statista.com/statistics/322785/average-wind-speed-in-the-united-kingdom-uk/.

4.8 Noise and Vibration

4.8.1 Introduction

This section of the Scoping Report identifies the noise and vibration receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and associated Orkney onshore substation search area for connection to the proposed Flotta Hydrogen Hub, and considers the potential impacts from the construction, operation and maintenance and decommissioning of Project. This includes works down to MLWS and as such within the intertidal area. The importance of potential noise and vibration impacts is identified by consideration to the prevailing local noise environment, the proximity and sensitivity of local receptors, and the potential for the development to generate noise and/or vibration during both the construction and operational phases. The primary focus of the scoping assessment will be the generation noise and vibration and the potential impacts of this on human health. In order to comprehensively assess the potential noise and vibration impacts that may arise from the project, this section will interface with the Traffic and Access assessment, the terrestrial non-avian ecology and terrestrial ornithology sections.

Information that may be considered relevant to this section is also presented within the below sections:

- Terrestrial non-avian ecology, section 4.3;
- Terrestrial ornithology, section 4.4;
- Land-use and other users, section 4.5; and
- Traffic and access, section 4.9.

This section of the Scoping Report has been prepared by Xodus Group.

4.8.2 Study Area

The noise and vibration study area is defined by the Orkney onshore export cable corridor search area and the Orkney onshore substation search area, that have been developed encompassing the onshore design envelope area with 2 km buffer around the search area. The Orkney onshore export cable corridor search area and the Orkney onshore substation search area are based on significant routing work, which considered key technical, environmental and land-use constraints. The Orkney onshore export cable corridor search area forms broad corridors between the potential landfalls and the connection point at Flotta. The Orkney onshore substation search area is located adjacent to the existing Flotta Oil Terminal operated by Repsol Sinopec.

4.8.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the noise and vibration EIA are outlined in Table 4-52.

Table 4-52 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
webGIS: Designated Sites (SPA, SAC, SSSI, RSPB)	www.wildebeest.maps.arcgis.com	2021	Xodus
OS Map	https://osmaps.ordnancesurvey.co.uk/	2021	Ordinance Survey
Google Earth	https://www.google.co.uk/intl/en_uk/earth/	2021	Google
RSRUK Flotta Oil Terminal Noise Assessment Report	Internal Document: Property of Repsol Sinopec	2021	National Oilwell Varco UK Limited
IPPC Noise Assessment: Flotta Oil Terminal	Internal Document: Property of Talisman Energy	2006	Bureau Veritas

4.8.3.1 Project Site-Specific Surveys

To date, there have been site visits to the Project area in Orkney. These site visits involved a walkover of the area to confirm desktop sources. Further site visits will be undertaken to inform the EIA, including the identification of noise sensitive receptors in the vicinity of the Project.

A desk-based review and consultation will be undertaken to identify potentially sensitive receptors. Background noise monitoring will be undertaken at residential properties where the potential for significant noise effects from the Project are identified, and where needed to inform the noise assessment. The desk study will include identification of any existing noise measurements in the Project area, for example at locations such the Flotta Oil Terminal; the recently approved Hoy onshore windfarm or other relevant locations along the onshore cable route corridor search area.

Any surveys will be agreed in consultation with OIC Environmental Health Department and will be carried out for a sufficient period to allow typical sound levels to be established, taking account of different types of noise sources and weather conditions that occur.

Baseline survey measurements will be conducted in accordance with current guidance, including BS4142:2014+A1:20198 Method for Rating and Assessing Industrial and Commercial Sound, and BS7445-2:1991 Description and measurement of environmental noise. Noise surveys may be accompanied by the acquisition of supplementary non-acoustic data (rainfall and wind records), as required.

4.8.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-52) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment, including the presence of receptors sensitive to noise and vibration, and to inform the Scoping process.

The following sections provide information on these key spatial differences for noise and vibration which is relevant for the following areas:

1. The section of the Orkney onshore export cable corridor search area across North Hoy (see section 4.8.4.1)
2. The section of the Orkney onshore export cable corridor search area across South Hoy and Fara (see section 4.8.4.2); and
3. The section of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area on Flotta (see section 4.8.4.3).

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

The overall baseline environment within the three separate study areas is mainly comprised of remote rural areas with occasional residential properties and industrial sites. Noise in this area is likely to be dominated by anthropogenic noises from farming activities, with some noise from nearby industrial sites like that of the Flotta Oil Terminal. Natural sources of noise will be most dominant within the study area on Fara, as this island is uninhabited.

The key noise and vibration sensitive receptors which are likely to require consideration within the EIA are:

- Hospitals, Care Homes and Schools;
- Residential and non-residential areas Protected species;
- Local amenities;
- Designated sites and protected species; and
- Other areas which are utilised by the public e.g. carparks.

These have been highlighted for each of the three study areas in the sections below.

4.8.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The island of Hoy measures 143 km^2 and is the second largest island in Orkney, the identified area of North Hoy measuring approximately 37.5 km^2. There are no large settlements on Hoy, the island mostly consists of small residential properties, small communities and small farm settlements. A low number of these small farm settlements are located within the Orkney onshore export cable corridor search area.

Anthropogenic onshore noise within the area is attributed to agricultural work (e.g., from farming machinery such as tractors), and traffic from the B9047 road running through the study area. Therefore, due to the farming activities and the close proximity of the study to the B9047, the baseline noise sources for the study area would be primarily characterised as resulting from anthropogenic sources. Additionally, 'natural' sources of noise such as wind, wave, disturbed vegetation and livestock noise from the adjacent fields, will also contribute to the baseline noise within the vicinity of the study area.

Within the study area, human and ecological receptors were identified that have the potential to be impacted by noise and vibration within the search area and close to the area. The findings are as summarised in **Table 4-53** below.

Table 4-53 Receptors Screened for Potential Impacts from Noise and Vibration Issues in the Vicinity of the Study Area

RECEPTOR TYPE	WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Not present within study area / 2 km buffer.	N/A
Residential Properties	Present within study area / 2 km buffer.	• Multiple residential properties are located within the Project area.
Non – Residential Properties	Present within study area / 2 km buffer.	• Hoy Hostel; • Hoy Post Office; • Hoy Orkney Ferry Terminal; • Rackwick Hostel; and • Rackwick Bothy.
Amenity Areas	Present within study area / 2 km buffer.	• Braebister Mound; • Sandy Loch; • Bay of Quoys; • Beneth'll Café; • Rackwick Beach; • Cra'as Nest; • Dwarfie Stone; • Old Man of Hoy; • Muckle House (listed); and • Rackwick Bothy.
Designated Sites	Present within study area / 2 km buffer.	• RSPB Scotland Hoy Nature Reserve; • Muckle Head and Selwick SSSI; • Selwick Seal haul out; • Hoy SSSI; • Hoy SAC; and • NE Hoy designated seal haul out.
Red Data List Species	Not present within study area / 2 km buffer.	N/A
Carparks	Present within study area / 2 km buffer.	• Rackwick Public Car Park; and

RECEPTOR TYPE	WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
		• Dwarfie Stane Car Park.

4.8.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

South Hoy, as with North Hoy has no large settlements, the southern part of the island mostly consists of small residential properties, small communities and small farm settlements. Some of these residential and agricultural areas are located within the Orkney onshore export cable corridor search area. There is a greater level of infrastructure located along the south east coast, when compared to North Hoy. Anthropogenic onshore noise within the area is attributed to agricultural work (e.g., from farming machinery such as tractors), and traffic from the B9047 road running through the study area. Therefore, due to the farming activities and the close proximity of the study area to the B9047, the baseline noise sources for the onshore area would be primarily characterised as resulting from anthropogenic sources. Additionally, 'natural' sources of noise such as wind, wave, disturbed vegetation and livestock noise from the adjacent fields, will also contribute to the baseline noise within the vicinity of the study area.

Throughout the island of Fara there are a small number of derelict settlement areas and derelict farmhouses, however there are no current residents on the island or working farm settlements. As such any baseline noise within this onshore study area would be solely that of natural' sources such as wind, wave, disturbed vegetation and wildlife. No anthropogenic noise sources would be present or contribute to the baseline.

Within the study area, human and ecological receptors were identified that have the potential to be impacted by noise and vibration within the search area and close to the area. The findings are as summarised in Table 4-54 below.

Table 4-54 Receptors Screened for Potential Impacts from Noise and Vibration Issues in the Vicinity of the Onshore Project Area South Hoy and Fara

RECEPTOR TYPE	WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Present within study area / 2 km buffer.	• St. Johns Trust Church; and • St. Johns Trust Church.
Residential Properties	Not present within study area / 2 km buffer.	N/A
Non – Residential Properties	Present within study area / 2 km buffer.	• Lyness Post Office; and • Lyness Orkney Ferry Terminal.
Amenity Areas	Present within study area / 2 km buffer.	• Peat Bay;

RECEPTOR TYPE	WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
		• Betty Corrigall's Grave; • Water of Hoy; • Lyrawa Bay Fish Farm; • Pegal Bay; • Emilys Tea Room; • Wild Heather Rafts; • Lyness Royal Naval Cemetery; • Scapa Flow Visitor Centre and Museum; and • Crockness Martello Tower.
Designated Sites	Present within study area / 2 km buffer.	• Designated seal haul outs
Red Data List Species*	Not present within study area / 2 km buffer.	N/A
Carparks	Not present within study area / 2 km buffer.	N/A

4.8.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

There are no large settlements on the island, however there are some small settlement areas and farmhouses scattered throughout the island. The largest infrastructure on the island and within the study area is the Flotta Oil Terminal.

Anthropogenic onshore noise within the area is largely attributed to operations and maintenance of the Flotta Oil Terminal however, there will also be additional lower levels emitted by agricultural work (e.g., from farming machinery such as tractors), and traffic from roads running through and around the study area. Noise Assessment Reports that have been commissioned to assess noise impacts from the Flotta Oil Terminal, outline that the main source of noise is for the power generation plant and flaring with the majority being categorised as Steady and Tonal noises (Repsol Sinopec, personnel communication). On assessment it was found that results showed Wind Noise dominated recordings with Terminal noise not being audible. Overall, it appears that there is little noise impact of the Terminal on the local environment.

Additionally, 'natural' sources of noise such as wind, wave, disturbed vegetation and livestock noise from the adjacent fields, will also contribute to the baseline noise within the vicinity of the study area.

Within the study area, human and ecological receptors were identified that have the potential to be impacted by noise and vibration within the search area and close to the area. The findings are as summarised in **Table 4-55** below.

Table 4-55 Receptors Screened for Potential Impacts from Noise and Vibration Issues in the Vicinity of the Onshore Project Area - Flotta

RECEPTOR TYPE	WITHIN ONSHORE STUDY AREA BUFFER	SPECIFIC RECEPTOR
Hospitals, Care Homes and Schools	Present within study area / 2 km buffer.	• Flotta Community School.
Residential Properties	Present within study area / 2 km buffer.	• Multiple residential properties are located within the Project area.
Non – Residential Properties	Present within study area / 2 km buffer.	• Flotta Oil Terminal; • Flotta Post Office & Shop; and • Flotta Airport (disused facility).
Amenity Areas	Present within study area / 2 km buffer.	• Flotta Orkney Ferry Terminal; • Stanger Head Port Signal Station; and • Flotta Playpark.
Designated Sites	Present within study area / 2 km buffer.	• Western Flotta Moors Local Nature Conservation Site; • Golta Peninsula Local Nature Conservation Site; and • Designated seal haul outs.
Red Data List Species	Not present within study area / 2 km buffer.	N/A
Carparks	Not present within study area / 2 km buffer.	N/A

4.8.4.4 Summary and Key Issues

Table 4-56 Summary and Key Issues for Noise and Vibration

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	There are no large settlements, and the area mostly consists largely of small rural areas and small farm settlements. In the Orkney onshore export cable corridor search area, there are a small number of farm settlements. There are multiple designated areas which hold the potential to be impacted by damage to noise and vibration, these are: with Hoy SAC, SPA, SSSI. There are also three Local Nature Conservation Sites that may be impacted. Baseline noise for the onshore area of North Hoy would be primarily characterised as resulting from anthropogenic onshore noise within the area attributed to agricultural work (e.g., from farming machinery such as tractors), and traffic from the B9047 road running through the study area and from natural sources.	This study area is largely made up for South Hoy, which consists of areas of farmland and farm settlements along with small rural communities. The island of Fara is uninhabited. Within the study area there are Hoy and North Walls Moorland Fringes Local Nature Conservation Site, designated seal haul outs and the Lyrawa Bay fish farm, which would be considered as key receptors. Baseline noise for the onshore area of South Hoy would be primarily characterised as resulting from anthropogenic sources resulting from residential areas, road use and farmland activities and from natural sources. Baseline noise for the onshore area of Fara would be primarily characterised as resulting from natural sources as the area is uninhabited.	There are some small settlement areas and farmhouses scattered through the island but the largest infrastructure on the island is that of the Flotta Oil Terminal. Key environmental receptors located within the study area are West Flotta Moors Local Nature Conservation Site and the Golta Peninsula Local Nature Conservation Site. There are also designated seal haul outs on Flotta. The baseline noise for the onshore area would be primarily characterised as resulting from anthropogenic sources as a result of the small rural communities and industrial site of Flotta Oil Terminal, as well as natural sources.

4.8.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-57.

Table 4-57 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIRARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Core working hours for the construction of the onshore elements of the Project will be Monday to Sunday 07.00 – 19.00 hour. In certain circumstances, specific works may have to be undertaken outside the normal working hours and will be agreed in advance with OIC, Environmental Health Department.	Primary	Establish within the design principles and Section 36 consent and/or planning condition.
2	Activities carried out during mobilisation and maintenance will not generate significant noise or vibration levels (such as piling, or other such noisy activities).	Tertiary	Establish within the design principles and Section 36 consent and/or planning condition.
3	Based on the noise assessment/modelling results, where noise has the potential to cause disturbance the use of mufflers, acoustic barriers and screening will be considered.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
4	Best Practicable Means (BPM) to limit the impacts of noise and vibration at sensitive receptors.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
5	Monitoring of noise and vibration related complaints will be undertaken.	Tertiary	Procedure outlined within the CEMP, a Section 36 consent and/or planning condition.
6	The selection of quieter equipment where reasonably practicable will be undertaken.	Tertiary	Establish within the design principles.
7	Installation of acoustic barriers and enclosures, where required.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
8	Installation/ construction of a landform/embankment around the substation site, if required.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
9	Installation/use of vibration isolation pads and anti-vibration mounts, if required.	Tertiary	Establish within the design principles and outlined within the CEMP, a Section 36 consent and/or planning condition.
10	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application

There is a commitment for the Project to implement these measures as appropriate and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on noise and vibration and will be consulted upon with consultees throughout the EIA process.

4.8.6 Scoping of Impacts

A number of potential impacts on noise and vibration sensitive receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. Impacts to ecological receptors, designated sites and protected species, have been considered within sections 4.2, 4.3 and 4.4. None of the potential impacts are proposed to be scoped out of the assessment at this stage, as it is considered that all impacts have the potential to be significant and therefore require assessment.

Table 4-58 EIA Scoping Assessment for Noise and Vibration

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Onshore noise associated with construction of onshore components	2, 3, 4, 5, 6, 7, 8, 10	Scoped In	Due to the short term localised and transient nature of the onshore construction/ decommissioning process, any temporary noise generated is likely to be minimal and concentrated to the study area. However further study required to understand effects of noise on sensitive receptors.	Desk study and accurate noise modelling campaign for proposed activities. Need for baseline measurements established during desk study and through consultation.	Desk study and noise modelling calculating potential area of impact.
Ground-borne vibration associated with construction of onshore components	2, 3, 4, 5, 7, 8, 9, 10	Scoped In	Due to the short term and localised nature of the onshore construction/ decommissioning process, any temporary vibration generated is likely to be minimal and concentrated to the study area. However further study required to understand the effects on sensitive receptors.	Desk study and accurate estimations/quantities of vibration along with a proposed activities schedule.	Desk study calculating potential area of impact.
Onshore noise and Ground-borne vibration	1, 2, 3, 4, 5, 6, 7, 10	Scoped In	Use of large-scale construction and decommissioning vehicles has the potential to give rise to local noise and vibration issues. Further study required to	Desk study, proposed activities schedule along with approximate vehicle usage during the Project.	Desk study calculating potential area of impact.

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
associated with vehicle use			understand the effects on sensitive receptors.		
Operation and Maintenance					
Onshore noise associated with operation and maintenance of onshore components	2, 3, 4, 5, 6, 7, 8	Scoped In	Noise impacts related to the onshore operation and maintenance activities will be limited to noise from the substation. Scoped into the EIA until confirmation of the Project final location and proximity/effects to sensitive receptors.	Desk study and accurate noise modelling campaign for proposed activities. Need for baseline measurements established during desk study and through consultation.	Desk study and noise modelling calculating potential area of impact.
Ground-borne vibration associated with operation and maintenance of onshore components	2, 3, 4, 5, 7, 8, 9	Scoped In	Vibration impacts related to the onshore operation and maintenance activities will be limited to vibration from the substation. Scoped into the EIA until confirmation of the Project final location and proximity/effect to sensitive receptors.	Desk study and accurate estimations/quantities for a material inventory along with a proposed activities schedule.	Desk study calculating potential area of impact.

4.8.7 Potential Cumulative Effects

There is very minimal potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on noise and vibration receptors. The construction of the Hoy Community windfarm and proposed Flotta Hydrogen Hub has the potential to result in cumulative effects and will be considered within the assessment. The noise and vibration Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

The noise and vibration Cumulative Effects Assessment will consider the maximum adverse design scenario for each of the project, plan, or activity in question in line with the methodology outlined in Section 1.4.2.

4.8.8 Approach to Analysis and Assessment

4.8.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on noise and vibration will utilise Project-specific and publicly available data (see section 2.4.3). The requirement for baseline noise measurements will be discussed with consultees. Consultation will augment the assessment during the EIA phase. A noise assessment will also be commissioned in order to accurately determine the impacts that may arise from the onshore activities.

Consultation will be undertaken with:

- OIC Environmental Health Department;
- Other statutory consultees (e.g. SEPA);
- Local landowners and communities; and
- Other interest groups/organisations.

The views and information gathered from these consultations will be used to help shape the Project and ensure that wherever possible, adverse effects on people and the natural environment have been avoided or reduced, and where possible benefits have been delivered.

Noise and vibration issues associated with the construction of the Project would be assessed using the guidance contained in BS 5228:2009+A1:2014 '"Code of practice for noise and vibration control on construction and open sites', which defines the most suitable accepted prediction methods and source data for various construction plant and activities. Noise impacts from construction and decommissioning would be based on the likely construction programme and associated activities, including, substation works, cable laying using open trench and trenchless techniques, construction traffic and access routes. The type and number of vehicles and plant equipment/machinery required for construction/decommissioning will be detailed and the main sources of noise from the Project will be identified.

The assessment will consider 'worst case' receptors i.e. the vehicles and plant are located at the closest possible point to a receptor. The study area of the construction/decommissioning noise assessment would include the following geographic coverage:

- A 2 km buffer zone from the Search Area for the Site Boundary, where significant activities have the potential to affect noise sensitive receptors (including PRoW); and
- traffic routes and routes subject to significant changes in traffic flows (and/or percentage HGV) due to Project activities. Potential noise disturbance at night or other unsocial hours (i.e. weekends and public holidays) will be addressed.

Operational and maintenance impacts would include noise impacts associated with the substation. The guidance and methodology contained in BS 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound.', would be used to assess noise impacts arising from the substation.

4.8.8.2 EIA Methodology

The noise and vibration EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-59 will also be considered in relation to the ecology and nature conservation EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 4-59 Legislation and Guidance for Noise and Vibration

LEGISLATION / GUIDANCE	SUMMARY
Environmental Protection Act 1990	The Environmental Protection Act 1990 makes provision for the improved control of pollution to the air, water and land by regulating the management of waste and the control of emissions.
Control of Pollution Act 1974	The aim of the Act is to deal with a variety of environmental issues, including waste on land, water pollution, abandoned mines, noise pollution and the prevention of atmospheric pollution.
Scottish Government (2014), Scottish Planning Policy (SPP)	Policy statement on how nationally important land-use planning matters should be addressed across the country.
PAN50 (1996) Controlling the Environmental Effects of Surface Mineral Workings	Planning Advice Note (PAN) 50 provides advice on the more significant environmental effects arising from mineral working operations.
British Standards Institution (2014) Code of practise for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (BS 5228-1)	This part of BS 5228 gives recommendations for basic methods of noise control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work activities/operations generate significant noise levels, including industry-specific guidance.

LEGISLATION / GUIDANCE	SUMMARY
British Standards Institution (2014) Code of practise for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration (BS 5228-2)	This part of BS 5228 gives recommendations for basic methods of vibration control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work activities/operations generate significant vibration levels, including industry-specific guidance.
British Standards Institution (2014, amended 2019) - Methods for rating and assessing industrial and commercial sound (BS 4142)	This guidance provides a method of assessing the impact of a source of industrial or commercial sound including sound from industrial and manufacturing processes, fixed installations, the loading and unloading of goods and mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.
British Standards Institution (2003) Description and measurement of environmental noise — Part 1: Guide to quantities and procedures (BS 7445-1)	This part of BS 7445 describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of the community's environment, individually and in combination. The results are expressed as equivalent continuous A-weighted sound pressure levels, LAeq, T.
British Standards Institution (2014) Guidance on sound insulation and noise reduction for buildings (BS 8233)	This document sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms as well as typical noise level guidance for nondomestic buildings.
Orkney Local Development Plan 2017 (OIC, 2017)	Sets out a vision and spatial strategy for the development of land in Orkney over the next ten to twenty years. The Plan contains the land-use planning policies which OIC will use for determining applications. It also contains development proposals for towns, villages and rural settlements, and establishes settlement boundaries for each of these areas where the principle of development will be accepted.

4.8.9 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the data sources which are suggested for the assessment?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative noise impacts?

- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

4.8.10 References

BSI, (2014). British Standards Institution [BS] 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise". BSI, London.

BSI, (2014). British Standards Institution [BS] 5228-2: 2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration". BSI London.

BSI, (2019). British Standards Institution BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI, London.

BSI (2003). British Standards Institution BS 7445-1:2003 - Description and measurement of environmental noise. Guide to quantities and procedures. BSI, London.

Department of Energy & Climate Change (DECC) (2011d). Overarching National Policy Statement for Energy (EN-1), Planning for New Energy Infrastructure.

Scottish Government (2011). Technical Advice Note (TAN) 1:2011 Assessment of Noise, available at https://www.gov.scot/publications/technical-advice-note-assessment-noise/pages/1/.

4.9 Traffic and Access

4.9.1 Introduction

This section of the Scoping Report identifies the traffic and access receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area and the Orkney onshore substation search area at Flotta for the associated connection point. This includes the Orkney onshore export cable corridor search areas across the islands of Hoy and Fara and the Orkney onshore substation search area on Flotta and considers the potential impacts from the construction, operation and maintenance and decommissioning of the Project.

Information that may be considered relevant to this section is also presented within the below section:

- Land-use and other users, section 4.3;
- Air quality, section 4.7; and
- Noise and vibration, section 4.8.

This section of the Scoping Report has been prepared by Xodus Group.

4.9.2 Study Area

The final study area for assessment will consider routes along the public road network which traffic will most likely be utilised during the construction phase of the Project. The Orkney onshore export cable corridor search area forms corridors from the north coast of Hoy, down the east coast of Hoy, across Fara and onto the north of Flotta.

There are roads which are likely to be affected by the landfall options on Hoy, and Flotta. The Orkney onshore substation search area is located directly beside the existing Flotta Oil Terminal and is positioned near the B9045 which is the main road on Flotta. Other roads that are located within the study area are the B9047 and B9049, as well as unclassified local public roads. Due to the search areas covering a number of islands, there could also be impacts to the Orkney inter-island ferry network and associated infrastructure.

The study network will therefore not extend further than the following traffic and access receptors:

- The B9047, B9048 and B9049 which intersect the Orkney onshore export cable corridor search area and connect across Hoy;
- The B9045 which intersects the Orkney onshore substation search area
- The smaller single-track roads that lead to various landfalls and areas of the Orkney onshore export cable corridor search area; and
- The ferries and piers used across the three islands.

The traffic and access study area will be further refined in the EIA Report once the preferred infrastructure locations have been refined and selected.

4.9.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the traffic and access EIA are outlined in Table 4-60.

Table 4-60 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Orkney Local Development Plan (LDP)	https://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm	2017	OIC
Transport Scotland's National Transport Strategy	https://www.transport.gov.scot/media/47052/national-transport-strategy.pdf	2020	Transport Scotland
The Department of Transport Road Traffic Statistics interactive map	https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints	2021	Department for Transport
Supplementary Guidance: Settlement Statements	Supplementary Guidance: Settlement Statements (orkney.gov.uk)	2017	OIC
OS Map	https://osmaps.ordnancesurvey.co.uk/	2021	Ordinance Survey
The Orkney Islands of Scotland	The Orkney Islands of Scotland - WorldAtlas	2021	World Atlas
Undiscovered Scotland	Undiscovered Scotland: Home Page	2021	Undiscovered Scotland
Lonely Isles: Fara	Fara - Lonely-Isles (weebly.com)	2021	Lonely Isles

4.9.3.1 Project Site-Specific Surveys

The requirement for site specific surveys to support the EIA Report will be determined based upon further refinement of the Orkney onshore export cable corridor search area and Orkney onshore substation search area and once the preferred infrastructure locations have been selected. Similarly, the requirements for such surveys will be better understood following the availability of more detailed landfall installation and construction methodologies subject to further discussion with statutory agencies and in consideration of current good practice and policy advice. Site-specific surveys could potentially include additional traffic count surveys utilising video/automatic traffic counters at strategic locations along the road network as well as manual sample counts to supplement existing published traffic count data. Additionally, drive-through surveys and site visits may be undertaken as necessary to identify potential constraints and upgrades required along transport routes to accommodate Project generated construction traffic, including consideration of junction visibility splays.

4.9.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-60) has been undertaken to support this Scoping Report. The findings of this research is presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The following sections provide information on these key spatial differences for land-use and other users which is relevant for the following areas:

1. The section of the Orkney onshore export cable corridor search area across North Hoy (see section 4.9.4.1)
2. The section of the Orkney onshore export cable corridor search area across South Hoy and Fara (see section 4.9.4.2); and
3. The section of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area on Flotta (see section 4.9.4.3).

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.9.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

Hoy is the second largest island in Orkney at 142 km^2, located on the west of Scapa Flow. The island has a population of 419 making it Orkney's fifth most populous island (World Atlas, 2021). The major roads in North Hoy are two existing B- roads (B9047 and B9049). The B9047 runs the length of the east coast of Hoy and overlaps with the Orkney onshore export cable corridor search area. The B9049 is a short road which provides an alternative route to Linkness from the B9047, and also overlaps with the Orkney onshore export cable corridor search area. Traffic flows on Hoy are low given the current population and that access is available for car only though one ferry link from mainland Orkney.

At Quoyness a single-track unclassified road extends off the B9047 and connects to Rackwick. There is a small settlement at Rackwick in the west, were approximately 80 residents living there in the 1900. Since then, numbers have dwindled and there is now only five full-time residents (Undiscovered Scotland, 2021a). The Orkney onshore export cable corridor search area to the Rackwick landfall options runs just south of this single track road. At Linkness, another single-track road, heads north west connecting to Murra. This road overlaps with the Orkney onshore export cable corridor search area to the Murra potential landfall. It is unclear the condition of the single-track roads and some work may be required to make it suitable for construction operations. The track may need widened, re-surfaced or re-constructed to make it suitable.

The Moaness passenger ferry terminal in the north of the Island runs services to and from Stromness (four sailings per day) and Graemsay. The Moaness pier is used by tourists to visit popular sites such as the Old Man of Hoy and Ward Hill.

Due to Hoy being an island the transportation of materials, where not sourced locally, will involve loads being delivered via sea and using the local road network. Which pier is used will be determined subject to further refinement of the Orkney onshore export cable corridor search area.

4.9.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The B9047, as described for North Hoy, continues down the east coast of the island, south of Quoyness, connecting to Lyness, Rinnigill and down to the south tip of the island. The B9048 is a short road branching off the B9047 and connecting to the Lyness pier, outside of the Project area. The majority of the wider public road network within the South Hoy comprises minor, unnamed roads, linking the small settlements and streets to each other in the area. Traffic flows on Hoy are low given the current population and that access is available for car only though one ferry link from mainland Orkney.

Lyness is located on the east coast of Hoy near the B9047, largely outside of the Orkney onshore export cable corridor search area which circumnavigates it to the west. Facilities include the Scapa Flow Visitor Centre and Museum, a hotel, housing, and Lyness Pier. Lyness was used as a military base during both World Wars and numerous infrastructure still remain, including the Pier. There are three ferry routes that dock at Lyness Pier: Lyness-Houton, Lyness- Flotta, and Lyness- Longhope.

Fara is an uninhabited island located in the west of Scapa Flow between the islands of Hoy and Flotta and is approximately 3 km^2. In the nineteenth century, Fara was part of the Melsetter estate belonging to the Moodie family. The inhabited area was mainly concentrated on the northeast of the island. The population of Fara began to decline due to poor communication links and lack of transportation routes. A large detachment of troops looked after six barrage balloon sites and an anti-aircraft gun position on Fara during the Second World War. As more people left, the population was less than 10 people in the 1960’s and by early 1970’s, the island was completely abandoned. Today the ferry routes almost circumnavigate Fara and it's close neighbour Flotta continues to prosper (Lonely Isles, 2021). There are derelict buildings remaining on the island as well as a concrete road.

As for North Hoy, due to Hoy and Fara being islands the transportation of materials, where not sourced locally, will involve loads being delivered via sea and using the local road network. Which pier is used will be determined subject to further refinement of the Orkney onshore export cable corridor search area.

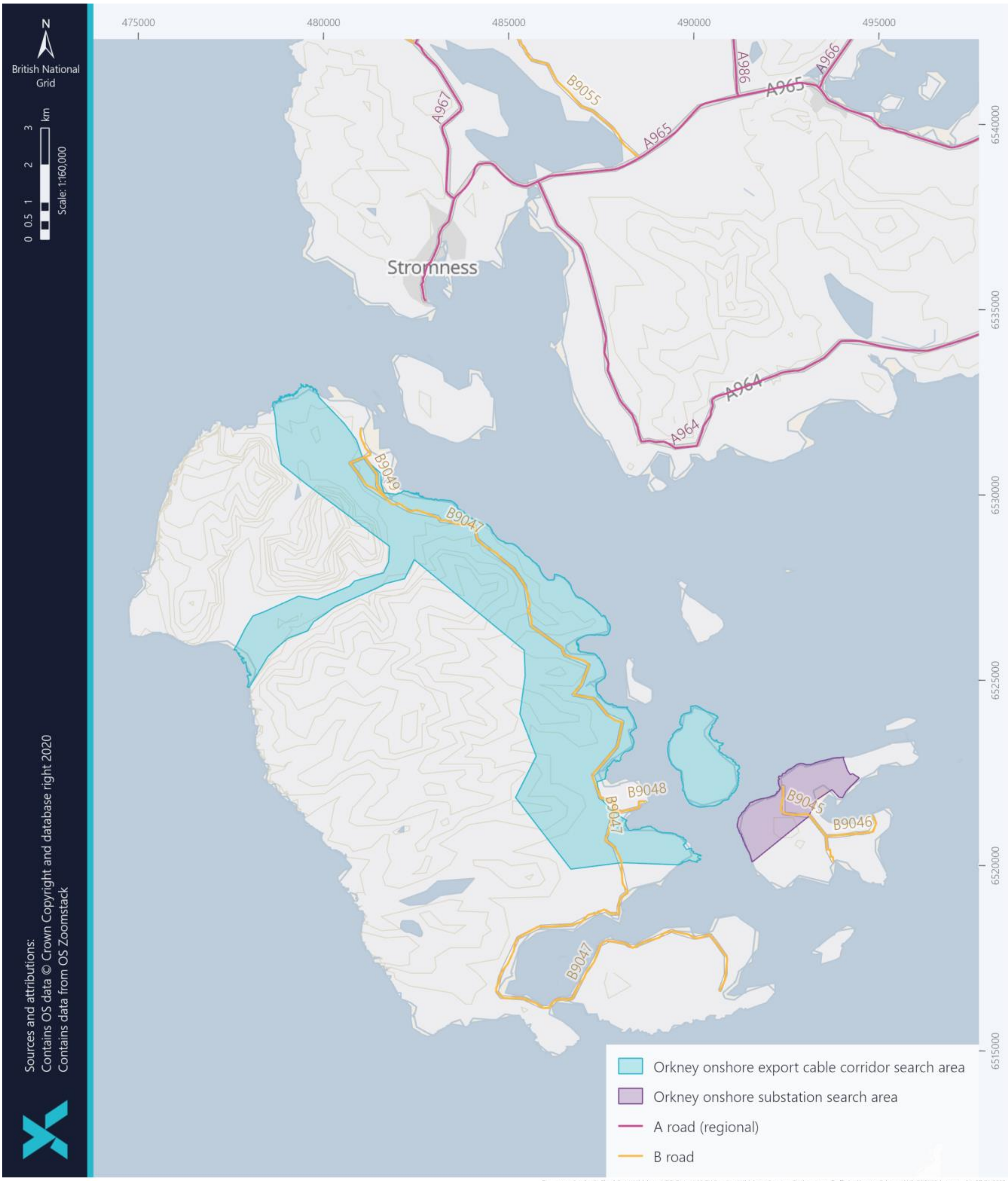

Figure 4-9 Traffic and Access Receptors Within the Study Area

4.9.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

Flotta is a 8 km^2 island between Hoy and South Ronaldsay. Flotta was a small farming community with a population of 431 people in the 1910's. However, the start of the First World War saw the island becoming populated but naval personnel and again during the Second World War. The Flotta Oil Terminal began construction in 1976, which takes up a large part of the north of the island. Many of the workers commute from the mainland (Undiscovered Scotland, 2021). Today, Flotta usually has a resident population of 80 people in 48 households with Whom being the main settlement.

There are two B-roads on Flotta, the B9045, which connects Flotta ferry terminal to the south of the island, and the B9046, which branches west off the B9045 connecting over to the west of the island. The majority of the wider public road network within the study area comprises minor, unnamed roads, linking the small settlements and streets to each other in the area. Traffic flow on Flotta is low due to the size and population of the island.

There are three active piers on Flotta, all located near the Flotta Oil Terminal. The crude oil jetty is used by cargos and tankers for transportation. The Gibraltar Pier is used by the Orkney Ferries Ro-Ro ferry and the Sutherland pier is the most western and is largely used by fishing boats. The Flotta ferry terminal (Gibraltar pier) services the Lyness Hoy- Flotta route, the Houton- Hoy route and the Flotta- South Wells (Longhope) route. As well as transporting passengers and vehicles, this ferry service can be used for the movement of construction material from the mainland. The main vessel traffic is the passengers for the Flotta Oil Terminal workers using dedicated passenger vessels.

Flotta Airport (IATA code of FLH) is located on the western side of the island. The airport has a helipad, adjacent to the eastern side of the northern end of the runway. Loganair's scheduled services to Flotta were discontinued in 1981, as a direct result of the introduction of free ferry services being provided by the terminal operators. The airport and associated infrastructure have been used little since, mostly used by employees working at the Flotta Oil Terminal.

As for Hoy, due to Flotta being an island the transportation of materials, where not sourced locally, will involve loads being delivered via sea and using the local road network. Which pier is used will be determined subject to further refinement of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area.

4.9.4.4 Summary and Key Issues

Table 4-61 Summary and Key Issues for Traffic and Access

	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
SUMMARY AND KEY ISSUES	• Key road links include two existing B- roads (B9047 and B9049) and smaller single-track unclassified roads; • Port and ferry facilitaties include the Moaness passenger ferry terminal in the north of the Island; and • The transportation of materials, where not sourced locally, could involve loads being delivered by road, rail and sea.	• Key road links include the B9047 and B9048. The majority of the wider public road network within the South Hoy comprises minor, unnamed roads; • Fara is an uninhabited island located in the west of Scapa Flow between the islands of Hoy and Flotta; • Three ferry routes dock at Lyness Pier: Lyness-Houton, Lyness- Flotta, and Lyness- Longhope; and • The transportation of materials, where not sourced locally, could involve loads being delivered by road, rail and sea.	• Key road links include two the B9045 and the B9046. The majority of the wider public road network within the study area comprises minor, unnamed roads; • Port and ferry facilities include three active piers the crude oil jetty, the Gibraltar Pier used by the Orkney Ferries Ro-Ro ferry and the Sutherland pier which is largely used by fishing boats; • Presence of the Flotta Airport (IATA code of FLH) located on the western side of the island; and • The transportation of materials, where not sourced locally, could involve loads being delivered by road, rail and sea.

4.9.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-62.

Table 4-62 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	A TMP will be developed and agreed with OIC and relevant parties outlining the mechanisms for managing the movement of construction related traffic.	Tertiary	Developed by the contractor and agreed by OIC.
2	Suitable access points and appropriate locations for ancillary works will be identified while Transportation, including deliveries to and from the construction areas will be taken from the existing trunk and local road network.	Primary	Inherent in design and managed through the TMP, a condition of Section 36 and/or planning consent.
3	Where required, infrastructure updates will be undertaken and/or a commitment to repair any damage caused to the existing road network as a result of construction traffic movements will be made.	Secondary	Agreed by OIC and secured via a post-consent condition.
4	Production of a CEMP, which will outline how the Project will ensure the suitable implementation and control of the mitigation measures.	Tertiary	Secured within the Section 36 and/or planning application

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures will be (secondary mitigation) dependent on the significance of the effects on traffic and access and will be consulted upon with consultees throughout the EIA process.

4.9.6 Scoping of Impacts

A number of potential impacts on traffic and access receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. Impacts during operations and maintenance are proposed to be scoped out of the assessment for traffic and access. These impacts are outlined, together with a justification for scoping them out.

Table 4-63 EIA Scoping Assessment for Traffic and Access

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Impacts arising from the increased generation of traffic	1, 2, 4	Scoped In	Potential increases to traffic flows, including HGVs on the local road networks as a result of construction traffic.	Desktop study and project specific studies as required.	Traffic management assessment.
Impacts on road safety as a result of the generation of increased traffic	1, 2, 4	Scoped In	Potential impacts on road safety as a result of the increase to traffic flows, including HGVs on the local road networks as a result of construction traffic.	Desktop study and project specific studies as required.	Traffic management assessment.
Impacts on the local community	1, 2, 4	Scoped In	Potential for increased traffic, severance and driver delay in residential areas due to project construction.	Desktop study and project specific studies as required.	Traffic management assessment
Impact on road carriageway, verges and associated structures; and impact on road users	1, 3, 4	Scoped In	Potential for impacts on roads and associated structures as well as road users due to increase traffic flows.	Desktop study and project specific studies as required.	Traffic management assessment

IMPACT	REELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Operation and Maintenance					
Impacts during operations and maintenance on existing traffic flows and the local road network	1	Scoped Out	It is considered likely that operational effects will not be significant and so it is proposed that they are scoped out of any detailed assessment as part of the EIA.	N/A	N/A

4.9.7 Potential Cumulative Effects

There is the potential for the potential impacts from the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on traffic receptors. The Orkney Islands are attracting several development proposals at present both onshore and offshore (e.g. the Hoy community windfarm and proposed Flotta Hydrogen Hub), as such there is the potential for cumulative impacts.

There is also a possibility of cumulative traffic effects generated by the construction of the substation and the installation of the underground cable especially since they are likely to occur at the same time as the proposed Flotta Hydrogen Hub. The contractor will be required to plan activities to reduce the potential for effects on the local road system.

The traffic and access CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2.

4.9.8 Approach to Analysis and Assessment

4.9.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on traffic and access will utilise Project-specific and publicly available data (see section 4.9.3) and will be augmented by consultation during the EIA phase. The assessment will be undertaken predominately as a desk-study, although if required Project specific surveys will be undertaken to support the assessment.

Consideration will be given to the full extent of the development and its component parts, including construction programme, the anticipated number and type of vehicles, including abnormal loads, that will be generated at each stage of construction. Taking account of expected equipment and material sources, the routes to site shall be clearly identified, as well as a schedule of likely access and egress points to/from the adopted road network.

The Project has already undertaken some initial consultation with OIC on the traffic and access issues associated with the Project. As part of the EIA process further consultation will be undertaken with:

- OIC Roads Department;
- Transport Scotland;
- Other statutory consultees;
- Ferry operators;
- Local landowners and communities; and
- Other interest groups/organisations.

The views and information gathered from these consultations will be used to help shape the Project and ensure that wherever possible, adverse effects on people and the natural environment have been avoided or reduced, and where possible benefits have been delivered.

The principal approach to assessing the environmental impacts of road traffic associated with new developments are set out within The IEMA publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic (1993). The IEMA Guidelines suggest the following rules to define the extent and scale of the assessment required:

- Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the number of HGVs are predicted to increase by more than 30%); and
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

Following the relevant IEMA Guidelines the predicted significance of effects will be determined based on the relationship between the magnitude of impact and the sensitivity of the receptor through a standard method of assessment based on professional judgement and the application of appropriate evaluation criteria. Predicted traffic volumes will be compared to existing baseline traffic volumes to determine whether there are any exceedances of the thresholds set out in the rules above. Effects arising as a result of additional traffic on driver delay, road safety and community effects will therefore be identified and assessed.

During the EIA process, assumptions will be made about the design, construction and mitigation measures in order to allow the assessment to progress. If any changes to these project assumptions and commitments are made that could result in effects greater than those described in the EIA Report, then additional intervention measures will be considered and, if necessary, an addendum will be published for public consultation and comment and further consideration by the OIC.

4.9.8.2 EIA Methodology

The traffic and access EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-64 will also be considered in relation to the ecology and nature conservation EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 4-64 Legislation and Guidance for Traffic and Access

LEGISLATION / GUIDANCE	SUMMARY
National Planning Framework (NPF) 3 (2014)[18]	The third National Planning Framework, setting out a long-term vision for development and investment across Scotland over the next 20 to 30 years.
Scottish Planning Policy (SPP) (2014)	Policy statement on how nationally important land-use planning matters should be addressed across the country.
Orkney Local Development Plan	Established planning policy for Orkney.

[18] *It should be noted that the draft consultation document for the fourth (NPF4) National Planning Framework was laid before Parliament in November 2021 with the expectation that this will be approved by the Scottish Parliament and adopted by the Scottish Ministers in 2022.*

LEGISLATION / GUIDANCE	SUMMARY
The Scottish Government Planning Advice Note (PAN) 75 – Planning for Transport	Planning for Transport provides advice on the requirements for Transport Assessments.
Transport Assessment Guidance (2012)	Aims to assist in the preparation of Transport Assessments for development proposals in Scotland.
The Institute of Environmental Management and Assessment (1993) Guidance Notes No. 1 Guidelines for the Environmental Assessment of Road Traffic (IEMA Guidelines)	Intended for the assessment of the effect of road traffic associated with major new developments.

4.9.9 Scoping Questions

- Do you agree with the study areas defined?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified?
- Are there any developments or infrastructure schemes which should be taken into account when considering potential cumulative traffic and transport impacts?
- Do you agree that the impacts suggested can be scoped out of the EIA section?
- Do you agree with the proposed approach assessment?
- Are there any other relevant consultees who should be consulted with respect to the assessment of effects?

4.9.10 References

Lonely Isles (2021). Lonely Isles: Fara. Available at: Fara - Lonely-Isles (weebly.com).

Orkney Islands Council (2017). Orkney Local Development Plan (LDP). Available at: https://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm.

Scottish Executive (2003). Planning Advice Note: PAN 66 - Best Practice in Handling Planning Applications affecting Trunk Roads. Available at: https://www.gov.scot/publications/planning-advice-note-pan66-best-practice-handling-planning-applications-affecting/.

Scottish Government (2005). Planning Advice Note (PAN) 75. Available at: https://www.gov.scot/publications/planning-advice-note-pan-75-planning-transport/.

Scottish Government (2014). National Planning Framework 3. Available at: https://www.gov.scot/publications/national-planning-framework-3/.

Scottish Government (2014). Onshore Wind Turbines; Renewables Planning Advice. Available at: https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/.

The Institution of Environmental Management and Assessment (1993). Guidelines for the Environmental Assessment of Road Traffic.

Transport Scotland (2012). Transport Assessment Guidance. Available at: https://www.transport.gov.scot/media/4589/planning_reform_-_dpmtag_-_development_management__dpmtag_ref__17__-_transport_assessment_guidance_final_-_june_2012.pdf.

World Atlas (2021). The Orkney Islands of Scotland. Available at: The Orkney Islands of Scotland - WorldAtlas.

Undiscovered Scotland (2021). Flotta. Available: Flotta Feature Page on Undiscovered Scotland.

Undiscovered Scotland (2021a). Hoy. Available at: Hoy Feature Page on Undiscovered Scotland.

4.10 Landscape and Visual

4.10.1 Introduction

This section of the Scoping Report identifies the landscape and visual receptors of relevance to the onshore aspects of the Project for the Orkney onshore export cable corridor search area to Flotta and the Orkney onshore substation search area for the associated grid connection. The export cable landfall and onshore export cables will be underground and the substation will be the only above ground permanent feature. As such, the LVIA will consider the potential impacts from the construction, operation and maintenance and decommissioning of the substation, and only the construction and decommissioning stages of the landfall and export cables. Whilst considering onshore elements of the Project, the seascape character will still be of relevance, particularly to the landfall locations.

Seascape, landscape and visual assessments are separate although linked processes, describing closely related but distinct sets of effects as described below.

Seascape as defined by NatureScot's Guidance on Coastal Character Assessment (SNH, 2018) consists of three components: '*the often narrow margin of the coastal edge, its immediate hinterland and areas of sea*'. Compared to landscape character assessment which focuses on the terrestrial landscape, seascape or coastal character assessment considers '*the aspects associated specifically with the coast, such as marine influences, the coastal edge and its immediate hinterland as well as the inter-relationship between these components*.' (SNH, 2018). It should be noted that published guidance from various sources may use either or both of the terms *Seascape Character* and *Coastal Character* for the above definition, however, for the purposes of this assessment, they should be considered interchangeable.

Landscape effects, in relation to the offshore aspects of the Project, are changes to landscape character resulting from how the landscape is perceived following the development. Seascape and landscape impact assessment consider these effects both in terms of the individual components of the seascape and landscape and on the structure, coherence and character of the seascape and landscape as a whole.

Visual effects are changes in the composition and character of views available in the area affected by the Project. Visual impact assessment considers the response of the people who experience these effects, who may be living or working in the area, enjoying recreational activities or simply passing through. The assessment considers the overall consequence of the effects on the visual amenity - the pleasantness of the view or outlook – that the people affected enjoy.

Information that may be considered relevant to this section is also presented within the below sections:

- Land-use and other users, section 4.3;
- Terrestrial archaeology and cultural heritage, section 4.6; and
- Seascape, landscape and visual, section 2.11.

This section of the Scoping Report has been prepared by WSP.

4.10.2 Study Area

Flotta, where the Orkney onshore substation search area is located, is a low-lying island in Scapa Flow which is visible from the surrounding coastal areas of mainland Orkney, Hoy and other small islands. It is proposed that an initial 5 km radius study area from the substation location is considered for the LVIA which would incorporate the eastern edge of Hoy, Fara, north side of South Walls, and Hoxa Head on South Ronaldsay. The study area will be refined following site selection. The study area for the potential landfall location(s) and export cables (underground cables) is proposed as a 500 m radius from the location/routes. This distance has been determined by the type of development proposed (taking into account the landfall(s) and export cables will not include any permanent above ground features) and likely extent of significant effects based on experience of similar projects and an understanding of the baseline environment.

The visual assessment will consider only the area covered by the ZTV (by definition, visual effects can only occur where a development is visible) which will be produced once the final location of the Onshore elements are determined. However, landscape and seascape assessment will consider the effect on the whole of those parts of the defined units of landscape or seascape character potentially affected, not simply on those parts covered by the ZTV.

4.10.3 Data Sources to Inform the EIA Baseline Characterisation

The existing data sets and literature with relevant coverage to the Project which have been used to inform this Scoping Report and are proposed to inform the baseline characterisation for the EIA are outlined in Table 4-65. Scottish Natural Heritage (SNH) is referenced for publications issued prior to their rebranding as NatureScot.

Table 4-65 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Coastal Character Assessment: Orkney and North Caithness	SNH (now NatureScot) (www.nature.scot)	2016	Land-use consultants for SNH (now NatureScot)
Landscape Character Assessment: Orkney – Landscape Evolution and Influences	NatureScot (www.nature.scot)	2019	NatureScot
Orkney Islands Marine Region: State of the Environment Assessment	OIC	2020	OIC
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Marine Scotland, The Scottish Government	2016	The Scottish Government
Scotland Landscape Character Assessment	NatureScot (www.nature.scot)	2019	NatureScot

TITLE	SOURCE	YEAR	AUTHOR
Scotland's National Coastal Character Map	SNH (now NatureScot) (www.nature.scot)	2010	SNH (now NatureScot)
The special qualities of the National Scenic Areas. SNH Commissioned Report No.374.	SNH (now NatureScot) (www.nature.scot)	2010	SNH (now NatureScot)
Wild Land Areas map and descriptions	SNH (now NatureScot) (www.nature.scot)	2014	SNH (now NatureScot)
Sectoral Marine Plan: Regional Locational Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/	2020	The Scottish Government

4.10.3.1 Project Site-Specific Surveys

An initial desktop study of the study areas has been undertaken in support of this Scoping Report. This research has identified information such as landscape related planning designations, landscape character typology, cumulative developments, and views from key locations such as settlements, routes, and visitor destinations.

Site surveys will be undertaken as part of the LVIA process to corroborate the desk-based research, capture representative baseline photography from agreed viewpoint locations, and undertake the assessment of potential effects. Subject to the project's programme, photography would be taken in winter months to reflect a worst-case scenario[19].

4.10.4 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 4-65) has been undertaken to support this Scoping Report. The findings of this research are presented below to provide an understanding of the Project environment and inform the Scoping process. Reference should also be made to Figure 4-10 which illustrates the seascape and landscape character and landscape designations within the study area.

The key types of landscape and visual receptors of which are likely to require consideration within the EIA are:

- Coastal and hinterland landscapes;
- Designated landscapes (national and local);
- Local residents in settlements and individual properties;
- Roads users;

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[19] *Winter is worst case due to deciduous vegetation losing its leaves and allowing views which in summer would be screened. The relevance of screening of views is dependent on the location of the viewpoint.*

- Ferry passengers;
- Walkers along core paths and other accessible areas; and
- Visitors to beaches, specific visitor destinations, and other areas of high amenity value.

The following sections provide information on these key spatial differences for landscape and visual receptors which are relevant for the following areas:

1. The section of the Orkney onshore export cable corridor search area across North Hoy (see section 4.10.4.1)
2. The section of the Orkney onshore export cable corridor search area across South Hoy and Fara (see section 4.10.4.2); and
3. The section of the Orkney onshore export cable corridor search area and the Orkney onshore substation search area on Flotta (see section 4.2.4.3).

The differentiation between North Hoy and South Hoy is based on the differing landscapes across Hoy. North Hoy is considered to be from the Rackwick landfall over to Quoyness and anywhere further north of these points. Anywhere south of these points has been considered as South Hoy.

4.10.4.1 NORTH HOY - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The geographical extent of North Hoy for the purposes of the LVIA includes the potential Murra and Rackwick Bay landfalls, and the Orkney onshore cable export cable corridor search area from these locations to where they meet, just south of Bay of Quoys. The study area is broadly defined by the lower lying land that surrounds the rugged hills within North Hoy. The study area extends from the potential landfall location at the sheltered Rackwick Bay, along the Trowie Glen U-shaped valley to the northeast, where it opens out on to the coastal pastures on the east side of Hoy. At the other potential landfall location near Murra at the north of Hoy, the landscape is defined as plateau heath and pasture, which joins the coastal pastures to the south. The rugged landform of Ward Hill (481 m AOD) lies between the two northern extents of the study area and is the highest point in Orkney with panoramic views across Orkney.

The Hoy and West Mainland NSA covers the full extent of this part of the Project. The Hoy WLA lies just outside the study area to the south. The Heart of Neolithic Orkney World Heritage Site Sensitive area also overlaps with the North Hoy (see Figure 4-10).

The study area includes the village of Rackwick on the west coast which is connected by a minor road along Trowie Glen to the northeast where it joins the B9047 near Bay of Quoys. Rackwick is a visitor destination for people walking to see the Old Man of Hoy which lies just up the coast. South of Murra, there are a few isolated houses, and more clustered settlement around the Bay of Creekland and Bay of Quoys. A local passenger only ferry leaves from the pier at Moaness between Bay of Creekland and Bay of Quoys across the Burra Sound passing either north or south of the island of Graemsey depending on the weather and/or tidal conditions.

4.10.4.2 SOUTH HOY AND FARA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA

The study area lies along the coastal edge of the moorland hills in South Hoy, a largely open landscape with very limited settlement until the settled coastal pasture areas at Lyness and Rinnigill. The B9047 is the main road in the area, with a few short minor roads extending to properties along the coast. Viewpoints and picnic sites with views across Scapa Flow lie along the B9047 to the north of Lyness. Ferries leave from the piers at Lyness. There is also a hotel and a heritage centre in the village.

Fara lies to the east of Lyness, described as a Whaleback island, largely moorland with a small area of farmland and remains of a few scattered properties, although the island is now uninhabited.

Thethe Heart of Neolithic Orkney WHS Sensitive area also overlaps with the South Hoy.

4.10.4.3 FLOTTA - ORKNEY ONSHORE EXPORT CABLE CORRIDOR SEARCH AREA AND SUBSTATION SEARCH AREA

The island of Flotta includes low moorland in the west and undulating pasture in the east, It is however predominantly characterised by the large Flotta Oil Terminal that lies on its northern edge, with the associated road and settlement infrastructure on the south of the island. West Hill (58 m AOD) is the local high point on the island with panoramic views available across Orkney. Flotta is also visible across Scapa Flow from the surrounding island coastlines.

This area of the Project does not lie within any landscape designations.

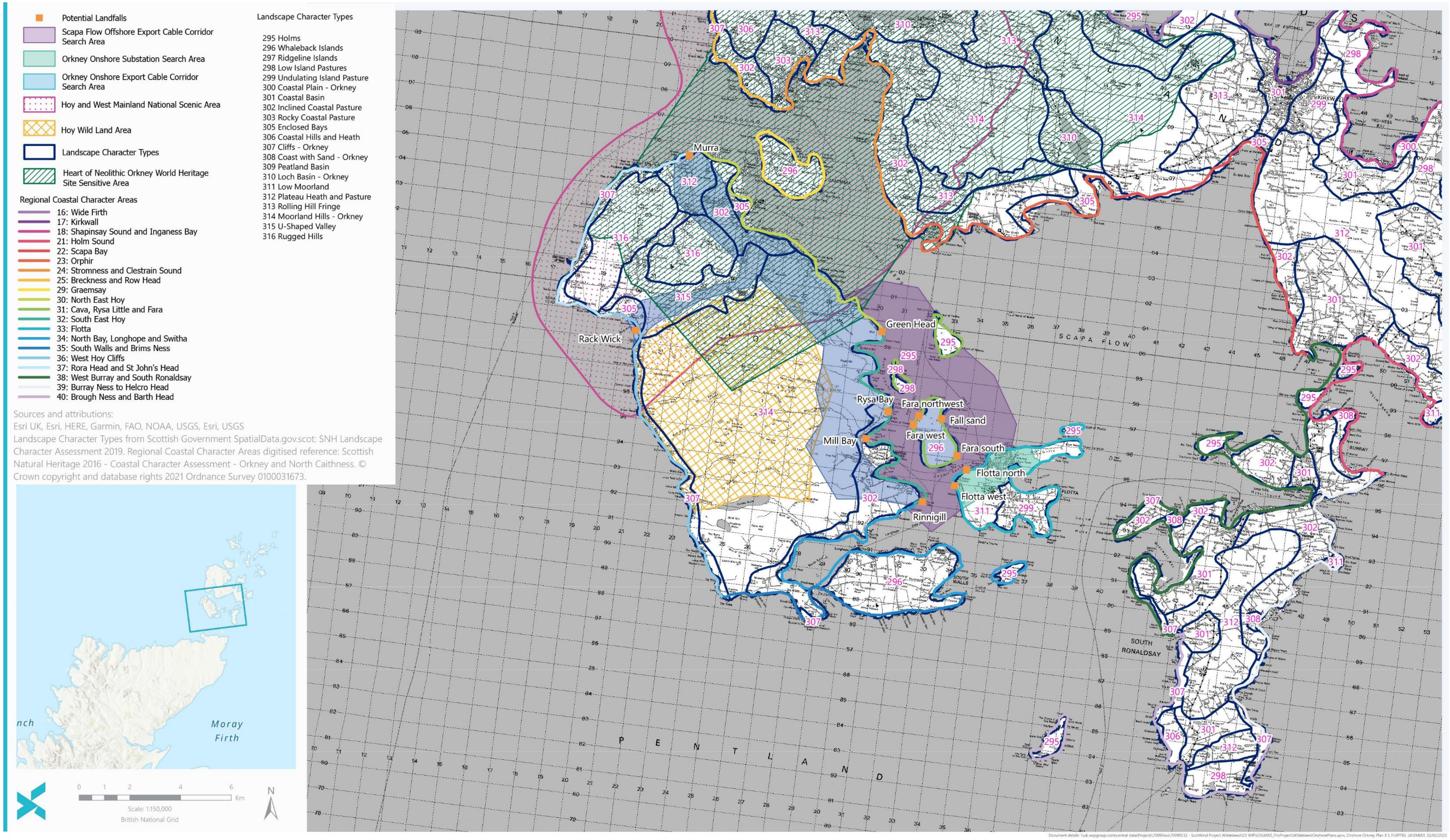

Figure 4-10 Seascape Character, Landscape Character, and Landscape Designations

4.10.4.4 Summary and Key Issues

The landscape character of the study area is defined from local to national scale within NatureScot and local authority documents (Table 4-65). For the onshore elements of the Project, it is proposed to use NatureScot's Landscape Character Assessment (NS, 2019a) including the supplementary Orkney – Landscape Evolution and Influences (NS, 2019b), Coastal Character Assessment (SNH, 2010) and Coastal character assessment: Orkney and North Caithness (LUC-SNH, 2016) to inform the baseline landscape character assessment of the Project and study area. The local coastal character types identified in the 2016 Orkney and North Caithness assessment are considered an appropriate scale to assess the export cable landfall construction impacts.

Table 4-66 identifies the key landscape and visual receptors that are proposed to be included within the LVIA. It is anticipated that these will be refined through the design process and final project envelope to ensure a focus on potential significant effects only. Viewpoints from key locations to represent these receptors will be identified through the site/route selection process and production of ZTV plans with the final viewpoints for assessment to be agreed with consultees.

Table 4-66 Summary and Key Issues for Landscape Character and Visual Amenity

SUMMARY AND KEY ISSUES	PROJECT COMPONENT		
	NORTH HOY	SOUTH HOY AND FARA	FLOTTA
	• Landscape Character (NS, 2019a) – NS LCT 312: Plateau Heath and Pasture; – NS LCT 315: U-Shaped Valley; – NS LCT 302: Inclined Coastal Pasture; – NS LCT 314: Moorland Hills – Orkney; and – NS LCT 305 Enclosed Bays. • Local Coastal Character (LUC-SNH, 2016) – 30d – Middle Skerry to Out Taings; – 36c – Rackwick; and – 37c – Braebuster. • Landscape Designations – Hoy and West Mainland NSA; – Hoy WLA; and – Heart of Neolithic Orkney WHS Sensitive Area. • Visual Receptors – Residents at Rackwick, Bay of Quoys and dispersed properties across the island – Ferry passengers – Walkers to the Old Man of Hoy and up Ward Hill	• Landscape Character (NS, 2019a) – NS LCT 302: Inclined Coastal Pasture; – NS LCT 314: Moorland Hills – Orkney; and – NS LCT 296: Whaleback Islands. • Local Coastal Character (LUC-SNH, 2016) – 31e – North Point to Ayre Point; – 31f – Ayre Point to North Point; – 32a – Crock Ness to The Point; – 32b – The Point to Ruberry; and – 32c – Ruberry to Greenhead. • Landscape Designations – No landscape designations. • Visual Receptors – Residents in Lyness, Rinnigal and dispersed properties across the island; – Visitors to the island; – Ferry passengers; and – Promoted viewpoints along the east coast and up Ward Hill.	• Landscape Character (NS, 2019a) – NS LCT 299: Undulating Island Pasture; and – NS LCT 311: Low Moorland. • Local Coastal Character (LUC-SNH, 2016) – 33a – Innan Neb to the pier; and – 33b – The pier to the jetty. • Landscape Designations – Heart of Neolithic Orkney WHS Sensitive Area. • Visual Receptors – Local Residents; and – West Hill Viewpoint.

4.10.5 Embedded Mitigation Considered Within the EIA

Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 4-67.

Table 4-67 Embedded Mitigation Measures That are Committed as Part of the Project Development Process

REF	EMBEDDED MEASURE	FORM (PRIMARY OR TERTIARY MITIGATION)	HOW THE MITIGATION WILL BE SECURED
1	Consideration of landscape character, landscape designations and visual amenity throughout the site/route selection process and design of the chosen locations.	Primary	Through the design process, Technical Working Group discussions, establishing design principles and Section 36 consent and / or planning applications.
2	Landscape Plan presents the design of the final development	Tertiary	Requirement of the Section 36 and/or planning application conditions.
3	Landscape Maintenance and Management Plan (LMMP) provides assurances on how the design of the Project meets landscape proposals	Tertiary	Requirement of the Section 36 and/or planning application conditions.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on landscape and visual receptors and will be consulted upon with consultees throughout the EIA process.

4.10.6 Scoping of Impacts

A number of potential impacts on landscape and visual receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project in Orkney. A number of impacts are proposed to be scoped out of the assessment for landscape and visual receptors. These impacts are outlined in Table 4-68, together with a justification for scoping them out.

Table 4-68 EIA Scoping Assessment for Landscape and Visual Receptors

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
Construction and Decommissioning					
Impact of all Project elements on the Hoy and West Mainland NSA, Hoy WLA and seascape/landscape character within the study area	1, 2 ,3	Scoped In	The construction and decommissioning of the Project have the potential to create significant effects, albeit temporary, on the special qualities of the NSA, WLA and character of the seascape and landscape within the study area.	Desktop study; site survey; and viewpoint photography.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 4-69).
Impacts of all onshore Project elements on visual amenity of local residents, road users, walkers, and visitors within the study area	1, 2 ,3	Scoped In	The construction and decommissioning of the Project have the potential to create significant effects, albeit temporary, on visual amenity for local residents, road users, walkers and visitors within the study area.	Desktop study; site survey; and viewpoint photography.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 4-69).
Operation and Maintenance					
Impact of all Project elements on the Hoy and West Mainland NSA, Hoy WLA and seascape/landscape	1, 2 ,3	Scoped Out	There will be no permanent above ground infrastructure associated with the cable landfall(s) and onshore cable route(s) as they will be all underground. Therefore there will be no potential to create	N/A	N/A

IMPACT	RELEVANT EMBEDDED MITIGATION	SCOPING RESULT	JUSTIFICATION	INFORMATION REQUIRED TO INFORM THE ASSESSMENT	ASSESSMENT METHOD
character within the study area			significant effects on the special qualities of the NSA, WLA and character of the landscape within the study area.		
Impact of substation on seascape and landscape character	1, 2 ,3	Scoped In	The operations and maintenance of the substation has potential to create significant effects on the seascape and landscape character of the study area due to the type of development, scale, and potential visibility.	Desktop study; site survey; viewpoint photography; ZTVs; wirelines; photomontages; and 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 4-69).
Impacts of landfall(s)and UGC(s) on visual amenity of local residents, road users, walkers, and visitors within the study area	1, 2 ,3	Scoped Out	There will be no permanent above ground infrastructure associated with the cable landfall(s) and onshore export cables as they will be all underground. Therefore there will be no potential to create significant effects on visual amenity within the study area.	N/A	N/A
Impacts of substation on visual amenity of local residents, road users, walkers, and visitors within the study area	1, 2 ,3	Scoped In	The operations and maintenance of the substation has potential to create significant effects on visual amenity for local residents, road users, walkers and visitors within the study area due to the type of development, scale, and potential visibility. study area	Desktop study; site survey; viewpoint photography; ZTVs; wirelines; photomontages; and 3D modelling.	Desk top assessment using the maximum design scenario, undertaken in accordance with best practice guidance (Table 4-69).

4.10.7 Potential Cumulative Effects

There is the potential for the impacts from the onshore substation element of the Project to interact with impacts from other projects, plans and activities, resulting in a cumulative effect on landscape and visual receptors for example with the proposed Flotta Hydrogen Hub. These cumulative effects are likely to be relatively localised given the type, scale, and size of development and the landscape character of the Orkney onshore substation search area.

As the export cable landfall(s) and onshore export cables (underground) would not have any permanent above ground infrastructure it is not anticipated there will be potential for any significant cumulative landscape and visual effects. It is therefore proposed to scope out cumulative assessment for these elements.

The landscape and visual CEA will consider the maximum adverse design scenario for each of the project, plan or activity in question in line with the methodology outlined in section 1.4.2. An 8 km radius cumulative study area from the onshore substation location is proposed to consider potential cumulative effects with other similar types of development. Through analysis of ZTVs and desk-based study the cumulative sites with most potential to create significant cumulative landscape and visual effects will be included within the assessment.

In terms of reporting, operational and in-construction sites will be included as part of the baseline. Consented (but un-built) projects will be considered as 'future baseline'. Application sites will be considered separately in the cumulative assessment. It is proposed that, where possible, onshore infrastructure relating to the other ScotWind leasing sites, if relevant, will be included in the cumulative assessment based on the level of information that can be provided at the time, noting these would likely be at pre-planning stage when the LVIA is undertaken.

4.10.8 Approach to Analysis and Assessment

4.10.8.1 Analysis and Assessment Approaches

The assessment of impacts arising from the Project on landscape and visual receptors will utilise Project-specific and publicly available data (see section 2.4.3) and will be augmented by consultation during the EIA phase. In order to facilitate resource effective stakeholder consultation though the development phase of the Project, a seascape, landscape and visual working group will be established, which will be used to consult on surveys methods, interim results, assessment methods and outputs. Key consultees will include:

- NatureScot;
- OIC;
- Local landowners and communities; and
- Other interest groups/organisations.

The Project has already undertaken some initial consultation with a number of organisations including NatureScot, THC and OIC with respect to seascape, landscape and visual issues associated with the Project.

The LVIA will be based on what is considered to be the maximum adverse scenario for each element of the onshore infrastructure from the Project design envelope. This will be determined by ZTVs, desk and site survey and design viewpoints. The use of 3D modelling and feedback from public consultation events will also inform the assessment.

Wherever possible, identified impacts are quantified, but the nature of landscape and visual assessment also requires interpretation by professional judgement. In order to provide consistency in determining landscape sensitivity and the prediction of magnitude of change, pre-defined criteria will be used. These will be derived from the Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and IEMA, 2013, 3rd Edition).

The findings of the LVIA assessment will be used to inform the terrestrial archaeology and cultural heritage assessment on historic setting, see section 4.6.

4.10.8.2 EIA Methodology

The landscape and visual EIA will be undertaken in line with the methodology set out in section 1.4.2. The specific legislation and guidance documents outlined below in Table 4-69 will also be considered in relation to the landscape and visual EIA. In addition, any upcoming guidance being developed will be utilised where appropriate.

Table 4-69 Legislation and Guidance for LVIA

LEGISLATION / GUIDANCE	SUMMARY
Assessing impacts on National Scenic Area – Draft technical guidance (NatureScot, 2020)	This draft guidance will be followed to inform the approach to assessing potential effects of development on the special qualities of NSAs.
Assessing impacts on Wild Land Areas - technical guidance (NS, 2020)	The LVIA will follow this guidance for assessing the impact of the Project on WLAs.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NS, 2021)	Whilst focussed on windfarms, the principles set out in this guidance are still relevant to inform the cumulative assessment.
Guidance on Coastal Character Assessment (C.Anderson for SNH, 2018)	The key guidance for establishing coastal character areas which will inform any additional coastal character assessment required.
Guidelines for Landscape and Visual Impact Assessment: Third Edition (LI and IEMA, 2013) ('GLVIA3')	The key industry best practice guidance which provides the basis to the approach for the LVIA.
Landscape Institute TGN 06/19 Visual representation of development proposals (LI, 2019a)	It provides guidance as to appropriate techniques to capture site photography and produce appropriate visualisations.
Residential Visual Amenity Assessment Technical Guidance Note 02/2019 (LI, 2019b)	Where development is in close proximity to residential areas and has the potential to create effects, this guidance will be used to identify and assess any potential significantly overbearing effects.

LEGISLATION / GUIDANCE	SUMMARY
Orkney Local Development Plan 2017 (OIC, 2017), particularly Policy 9 Natural Heritage and Landscape.	Sets out a vision and spatial strategy for the development of land in Orkney over the next ten to twenty years. The Plan contains the land-use planning policies which OIC will use for determining applications. It also contains development proposals for towns, villages and rural settlements, and establishes settlement boundaries for each of these areas where the principle of development will be accepted. Policy 9 seeks to protect Orkney's natural environment from the detrimental effects of development and conserve its rich natural heritage.

4.10.9 Scoping Questions

- Do you agree with the proposed study areas?
- Do you agree to the approach and proposed scale of landscape baseline?
- Has the consultee identified any further landscape or visual receptors to be considered within the assessment (e.g. where potential significant effects may occur)?
- Do you agree with the proposed landscape and visual receptors that are scoped out?
- Are there any specific cumulative sites in planning to consider as part of the cumulative assessment?
- Are there any comments on the overall methodology proposed to assess effects on seascape, landscape and visual receptors, including cumulative effects?
- Are there any further consultees that should be consulted on LVIA matters?

4.10.10 References

Carol Anderson Landscape Associates for Scottish Natural Heritage (2018). Guidance note: Coastal Character Assessment.

Landscape Institute (2019a) Technical Guidance Note 02/19 Residential Visual Amenity Assessment.

Landscape Institute (2019b) Technical Guidance Note 06/19 Visual representation of development proposals.

Landscape Institute and IEMA (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd Edition.

LUC for Scottish Natural Heritage (2016). Coastal character assessment: Orkney and North Caithness.

NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments.

NatureScot. (2020a). Assessing impact on National Scenic Areas – DRAFT technical guidance.

NatureScot (2020b). Assessing impacts on Wild Land Areas - technical guidance.

NatureScot (2019a). Landscape Character Assessment: Orkney – Landscape Evolution and Influences.

NatureScot (2019). Scottish Landscape Character Types Map and Descriptions. Available online at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions. [Accessed 09/12/2021].

Orkney Islands Council (2020). Orkney Islands Marine Region: State of the Environment Assessment.

Scottish Natural Heritage (2014). Wild Land Areas map and descriptions. Available online at: https://www.nature.scot/doc/wild-land-areas-map-and-descriptions-2014. [Accessed 09/12/2021].

Scottish Natural Heritage (2010a). Scotland's National Coastal Character Map. Available online at: https://www.nature.scot/sites/default/files/2018-05/National%20coastal%20character%20map.pdf [Accessed 09/12/2021].

Scottish Natural Heritage (2010b). The Special Qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report 374.

The Scottish Government (2016). Pilot Pentland Firth and Orkney Waters Marine Spatial Plan.

5 SUMMARY OF EIA SCOPING

5.1 Overview

OWPL are proposing to develop the West of Orkney Windfarm, a fixed and/or floating OWF located 23 km from the north Caithness coast and 28 km from the west coast of Orkney. This follows on from the OWPL being awarded an OAA from CES in January 2022.

The Project qualifies as requiring an EIA under the EIA regulations. The purpose of this document is to request Scoping Opinions in relation to the scope of the EIA, covering both the offshore infrastructure and onshore transmission infrastructure.

It is anticipated that the Scoping Opinions will be based on responses to this Scoping Report from statutory and non-statutory consultees, which will then be used to guide OWPL in progressing the EIA. This Scoping Report supports the following requests for Scoping Opinions:

- A Scoping Opinion from MS-LOT on behalf of Scottish Ministers under Regulation 12 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, Regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and Regulation 13 of The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) for the offshore aspects of the Project, including potential request for deemed planning;
- A Scoping Opinion from The Highland Council under Regulation 17 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 for the onshore Caithness infrastructure; and
- A Scoping Opinion from Orkney Islands Council under Regulation 17 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 for the onshore Orkney infrastructure.

5.2 Approach to EIA Scoping

The objective of this EIA Scoping Report is to ensure that a robust and proportionate EIA report is submitted in support of the applications for consents through the engagement with relevant consultees to provide relevant information and feedback on the proposed approach to the EIA. A proportionate approach has been taken by the applicant to scope out impacts with which have previously and repeatedly been shown to be non-significant and to scope in impacts where there is considered to be the potential for a significant impact.

5.3 Topics to be Scoped into the Project EIA

This EIA Scoping Report has identified the main onshore and offshore receptors that may potentially be significantly impacted by the construction, operation or maintenance of the Project, and therefore, scoped into the Project EIA. For each of the relevant impacts and receptors that have been scoped into the Project EIA, the proposed approach for the analysis and assessment has been described and questions have been posed to consultees to comment.

The topics and impacts which have been scoped in / out of the Project EIA are provided in Table 5-1. Transboundary impacts have been scoped out for the following offshore topics:

- Physical and coastal processes;
- Water and sediment quality;
- Benthic subtidal and intertidal ecology;
- Marine archaeology and cultural heritage;
- Military and aviation;
- Seascape, landscape and visual;
- Socioeconomics;
- Other sea users; and
- Offshore air quality, noise and vibration.

Onshore topics, due to their nature, are not anticipated to result in transboundary impacts and hence have not been considered within this EIA Scoping Report.

Table 5-1 Summary of Topics and Impacts to be Scoped in / out of the Project EIA

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
Offshore				
Physical and coastal processes	• Change to seabed levels, sediment properties and suspended sediment concentrations; • Impact on designated features within the designated sites due to export cable construction; and • Change to coastal landfall morphology.	• Change to the tidal, wave and sediment transport regimes resulting in impacts on morphology and coast receptors; • Introduction of scour; and • Seabed abrasion associated with Project infrastructure (e.g. anchor chains if a floating structure is progressed).	N/A	N/A
Water and Sediment Quality	• Impacts on water quality status of designated waterbodies due to increased suspended sediment and potential release of contaminants or radioactive particles; and • Disturbance and release of contaminated sediments or radioactive particles.	N/A	• Changes in water and sediment quality from accidental discharges from vessels during construction.	• Changes in water and sediment quality due to pollution from accidental discharges from vessels during operation and maintenance; • Impacts on water quality status of designated waterbodies due to increased suspended sediment and potential release of contaminants or radioactive particles; and • Changes in water and sediment quality associated with operational cleaning of Project infrastructure.
Benthic subtidal and intertidal ecology	• Temporary habitat loss/ disturbance; • Long-term loss or damage to benthic habitats and species; • Increased suspended sediment concentrations and associated deposition; • Increased risk of introduction and spread of INNS; • Removal of hard substrate during decommissioning; and • Release of sediment bound contaminants.	• Temporary habitat loss/ disturbance; • Increased suspended sediment concentrations and associated deposition; • Colonisation of hard structures; • Changes in physical processes; • Impacts from the release of sediment bound contaminants; • Impact to benthic communities from any thermal load or EMF arising from the cable during operation; and • Introduction and spread of INNS.	• Accidental release of pollutants.	• Accidental release of pollutants.
Fish and shellfish ecology	• Temporary habitat disturbance or loss; and • Underwater noise.	• Long-term habitat loss and disturbance; • Introduction of new hard substrate and potential for fish aggregation; • EMF effects; and • Ghost fishing due to lost fishing gear becoming entangled in installed infrastructure.	• Temporary increases in SSC and associated sediment deposition; and • Accidental release of pollutants,	• Underwater noise; • Accidental release of pollutants; and • Barrier effects to migratory fish from the presence of fixed foundations or floating platforms and associated infrastructure.
Offshore ornithology	• Disturbance from construction/decommissioning activities.	• Collision risk; • Displacement of seabirds from the array area; • Barrier effects; and • Indirect effects.	N/A	N/A

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
Marine mammals and megafauna	• Noise related impacts associated with construction, including physiological impacts, barrier effects and displacement; • Indirect effects of construction noise on marine mammal prey species; • Vessel disturbance; • Injury and disturbance from decommissioning activities generating noise; • Habitat change, including foraging opportunities, with decommissioning; and • Other temporary effects associated with decommissioning.	• Habitat change, including foraging opportunities; • Displacement or barrier effects associated with physical presence of devices and infrastructure; and • Entanglement with moorings (floating WTG).	• Risk of injury of marine mammals and megafauna from collision with installation vessels; • Associated impacts with decreasing marine water quality including increasing turbidity; and • Accidental release of pollutants.	• Disturbance from vessel traffic; • Noise related impacts during operation; • Increased vessel activity and associated collision risk; • Risks associated with EMFs associated with subsea and midwater cabling; and • Accidental release of pollutants.
Commercial fisheries	• Temporary loss or restricted access to fishing grounds; • Displacement of fishing effort; • Interference with fishing activity as a result of increased vessel traffic; • Increased steaming times; and • Safety issues for fishing vessels.	• Loss of access to fishing grounds; • Displacement of fishing effort; • Increased steaming times; • Interference with fishing activity as a result of increased vessel traffic; and • Safety issues for fishing vessels.	N/A	N/A
Shipping and navigation	• Vessel displacement due to construction activities; • Vessel to vessel collision between a 3rd-party vessel and a project vessel; • Increased vessel to vessel collision risk between third party vessels due to vessel displacement. • Vessel to structure allision risk; • Reduced access to local ports due to construction activities associated with the Project; and • Vessel interaction with subsea cables and mooring lines associated with the Project.	• Commercial traffic displacement due to the presence of the Project; • Fishing vessel and recreational vessel displacement due to the presence of the Project; • Vessel to vessel collision risk between a 3rd-party vessel and a project vessel; • Increased vessel to vessel collision risk between 3rd-party vessels (route-based) due to the displacement; • Increased vessel to vessel collision risk involving fishing vessels and/or recreational vessels due to displacement; • Vessel to structure allision risk for commercial shipping due to the presence of Project structures; • Vessel to structure allision risk for fishing vessels; in transit due to the presence of Project structures • Vessel to structure allision risk for recreational vessels due to the presence of Project structures; • Reduced access to local ports due to maintenance activities with the Project; • Reduction in under keel clearance due to the presence of cable protection; • Vessel interaction with subsea cables and mooring lines associated with the Project;	N/A	N/A

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
		• Loss of station; • Interference with marine navigation equipment; and • Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders.		
Marine archaeology and cultural heritage	• Loss of or damage to known marine and intertidal historic environment assets; • Loss of or damage to unknown marine and intertidal historic environment assets; and • Loss of or damage to submerged prehistoric landscapes	• Loss of or damage to known marine historic environment assets; • Loss of or damage to unknown marine historic environment assets; • Loss of or damage to submerged prehistoric landscapes; and • Long-term changes to the setting of historic environment assets.	N/A	N/A
Military and aviation	• Low flying (including SAR); • Offshore helicopter installations (Sule Skerry lighthouse); • Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military Exercise and Training Areas (MEXAs); and • Space Hub Sutherland.	N/A	• Civil airport patterns and procedures; • Military aerodrome patterns and procedures; and • HMRs.	• Civil ATC radar; • Military ATC radar; • Military AD radar; and • Met Office radar.
Seascape, landscape and visual	N/A	• Impacts of WTGs on seascape and landscape character types within the ZTV; • Impacts on NSAs, WLAs, WHS and SLAs within the ZTV; • Impacts of WTGs on Road Users on the A838 and A836 (North Coast 500 and cycle routes), and A967; • Impacts of WTGs on Ferry passengers, Cruise Ship passengers and recreational sailors; • Impacts of WTGs on people occupied in coastal recreational pursuits; visitors/walkers on coastal core paths, beaches and promoted viewpoints; and • Impacts of WTG navigation and aviation lighting on seascape, landscape and visual receptors.	• Impacts on seascape and landscape character types within the ZTV; • Impacts on NSAs, WLAs, WHS and SLAs within the ZTV; and • Impacts on visual receptors within the ZTV.	• Impacts of the offshore cable routes on seascape, landscape and visual receptors; • Impacts of WTGs on landscape character types within the study area but outwith the ZTV; • Impacts on NSAs, WLAs and SLAs within the study area but outwith the ZTV; • Impacts of WTGs on Residential Visual Amenity; • Impacts of WTGs on Road Users on the A9 and A897; and • Impacts of WTGs on visitors/walkers on core paths and recreational routes inland within the study area.
Other sea users	• Temporary obstruction of recreational activities; • Temporary obstruction to the Pentland Floating Offshore Wind Farm; • Temporary obstruction to the EMEC wave test sites; • Temporary obstruction to oil and gas activities within Scapa Flow;	• Obstruction of recreational activities; • Obstruction of Pentland Floating Offshore Wind farm activities; • Obstruction of EMEC wave test sites; • Obstruction of Oil and Gas activities; • Obstruction of subsea cables; • Obstruction of spoil disposal;	• Temporary obstruction to carbon capture, natural gas storage, underground gasification and coal deposits.	• Obstruction of carbon capture, natural gas storage, underground gasification and coal deposits.

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
	• Temporary obstruction to subsea cables (telecommunication and power cables); • Temporary obstruction to spoil disposal; • Temporary obstruction to Dounreay NPDE and Vulcan NRTE seabed decommissioning activities; and • Temporary obstruction or interference to the Project from the Space Hub Sutherland.	• Obstruction of Dounreay nuclear facility decommissioning; and • Temporary obstruction or interference to the Project from the Space Hub Sutherland.		
Offshore air quality, airborne noise and vibration	N/A	N/A	• Piling activities generating airborne noise/vibration that may impact other marine users; • Piling activities generating airborne noise/vibration that may impact onshore human receptors on the north coast of Scotland and Orkney; • Cable installation activities generating noise/vibration that may impact marine users and onshore human/ecological receptors; • Auxiliary construction activities (project vessels, helicopter movements, use of other machinery and generators) generating noise and vibrations that may impact marine users, onshore human receptors impacting human health and/or onshore ecological receptors; and • Exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of Sulphur Dioxide (SO_2), NO_2, PM_{10} and $PM_{2.5}$ and impact human health and/or onshore ecological receptors.	• Operation of WTGs producing airborne noise/vibration; and • Maintenance vessel and equipment activity noise, vibration or vessel emissions that may impact marine users, onshore human receptors and/or onshore ecological receptors.
Socio-economics	• Employment in the supply chain; • Economic output effects in the supply chain; • Access to job opportunities by local residents; • Impact on demand for housing and local services; and • Impacts on the economic value of tourism and recreation activities.	• Employment in the supply chain; • Economic output effects in the supply chain; • Access to job opportunities by local residents; • Impact on demand for housing and local services; and • Impacts on tourism, recreation activity and associated economic value.	• Socio-cultural effects; and • Distributional effects.	• Socio-cultural effects; and • Distributional effects.
Onshore Caithness				
Geology and hydrology	• Changes to soil quality; • Soil compaction and erosion; • Groundwater flow, levels and quality;	• Changes to soil and groundwater quality; • Contamination of surface watercourses or waterbodies; and • Contamination of private water supplies.	N/A	N/A

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
	• Contamination of surface watercourses or waterbodies; • Changes to surface water runoff; • Changes in flow and/or contamination of private water supplies; and • Risk of flooding to the development and increased risk of flooding in areas downstream.			
Freshwater ecology	• Mortality of important receptors; • Damage to key freshwater habitats; and • Interruptions to fish passage.	• Mortality of important receptors; • Damage to key freshwater habitats; and • Interruptions to fish passage.	N/A	N/A
Terrestrial non-avian ecology	• Direct habitat loss due to land-take; • Disturbance and damage/injury to habitats or protected species; and • Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation.	• Disturbance and damage/injury to habitats or protected species; and • Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation.	N/A	N/A
Terrestrial ornithology	• Direct loss of habitat used by birds for nesting, foraging, roosting, and/or other activities due to land-take; • Disturbance and damage/injury to habitats used by these animals or to individual birds; and • Indirect effects on habitats used by birds e.g. due to pollution or sedimentation.	• Disturbance and damage/injury to habitats used by these animals or to individual birds; and • Indirect effects on habitats used by these animals or to individual birds, e.g. due to pollution or sedimentation.	• Collision of birds with cables.	N/A
Land-use and other users	• Temporary and permanent loss of agricultural land and soils including peatland; • Changes in agricultural activity and type of land-use; • Temporary and permanent loss of forestry; • Interference with recreation/tourism and/or residential receptors; and • Temporary impacts on third-party infrastructure, including utilities.	• Long term loss of agricultural land and soils including peatland; • Long term changes in agricultural activity and type of land-use; and • Long term loss of forestry.	N/A	• Long term interference with recreation/tourism and/or residential receptors; and • Long term impacts on third-party infrastructure, including utilities.
Terrestrial archaeology and cultural heritage	• Loss of or damage to known historic environment assets; • Loss of or damage to unknown historic environment assets; and • Loss of or damage to deposits of paleoenvironmental interest.	• Long-term changes to the setting of historic environment assets.	N/A	• Loss of or damage to known historic environment assets; • Loss of or damage to unknown historic environment assets; • Loss of or damage to deposits of paleoenvironmental interest; and • Temporary changes to the setting of historic environment assets.
Air quality	• Dust emissions associated with Project works; • Dust (Onshore cable laying); and • Dust and emissions from vehicle use.	N/A	• Dust (Access roads / tracks).	• Dust and emissions resulting from operation and maintenance works.

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
Noise and vibration	• Onshore noise associated with construction/ decommissioning of onshore components; • Ground-borne vibration associated with construction/ decommissioning of onshore components; and • Onshore noise and ground-borne vibration associated with vehicle use.	• Onshore noise associated with operation and maintenance of onshore components; and • Ground-borne vibration associated with operation and maintenance of onshore components.	N/A	N/A
Traffic and access	• Impacts arising from the increased generation of traffic; • Impacts on road safety as a result of the generation of increased traffic; • Impacts on the local community; and • Impact on road carriageway, verges and associated structures; and impact on road users.	N/A	N/A	• Impacts during operations and maintenance on existing traffic flows and the local road network.
Landscape and visual	• Impacts of all onshore Project elements on the Portskerra SLA, Halladalde Flows WLA and seascape/ landscape character within the study area; and • Impacts of all onshore Project elements on visual amenity of local residents, road users, walkers, and visitors within the study area.	• Impacts of substation on landscape character within the study area; and • Impacts of substation on visual amenity of local residents, road users, walkers, and visitors within the study area.	N/A	• Impacts of all onshore Project elements on the Portskerra SLA, Halladale Flows WLA, and seascape/ landscape character within the study area; and • Impacts of landfalls and UGCs on visual amenity of local residents, road users, walkers, and visitors within the study area.
Onshore Orkney				
Geology and hydrology	• Changes to soil quality; • Soil compaction and erosion; • Groundwater flow, levels and quality; • Contamination of surface watercourses or waterbodies; • Changes to surface water runoff; • Change in flow and/or contamination of private water supplies; and • Risk of flooding to the development and increased risk of flooding in areas downstream.	• Changes to soil and groundwater quality; • Contamination of surface watercourses or waterbodies; and • Contamination of private water supplies.	N/A	N/A
Freshwater ecology	• Mortality of important receptors; • Damage to key freshwater habitats; and • Interruptions to fish passage.	• Mortality of important receptors; • Damaghe to freshwater habitats; and • Interruptions to fish passage.	N/A	N/A
Terrestrial non-avian ecology	• Direct habitat loss due to land-take; • Disturbance and damage/injury to habitats or protected species; and	• Disturbance and damage/injury to habitats or protected species; and • Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation.	N/A	N/A

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
	• Indirect effects on habitats or protected species, e.g. due to pollution or sedimentation.			
Terrestrial ornithology	• Direct loss of habitat used by birds for nesting, foraging, roosting, and/or other activities due to land-take; • Disturbance and damage/injury to habitats used by these animals or to individual birds; and • Indirect effects on habitats used by birds e.g. due to pollution or sedimentation.	• Disturbance and damage/injury to habitats used by these animals or to individual birds; and • Indirect effects on habitats used by these animals or to individual birds, e.g. due to pollution or sedimentation.	• Collision of birds with cables.	N/A
Land-use and other users	• Temporary and permanent loss of agricultural land; • Changes in agricultural activity and type of land-use; • Temporary and permanent loss of forestry; • Interference with recreation/tourism and/or residential receptors; and • Temporary impacts on third-party infrastructure, including utilities.	• Long term loss of agricultural land and soils including peatland; and • Long term changes in agricultural activity and type of land-use.	N/A	• Long term interference with recreation/tourism and/or residential receptors; • Long term impacts on third-party infrastructure, including utilities; and • Long term loss of forestry.
Terrestrial archaeology and cultural heritage	• Loss of or damage to known historic environment assets; • Loss of or damage to unknown historic environment assets; and • Loss of or damage to deposits of paleoenvironmental interest.	• Long-term changes to the setting of historic environment assets.	N/A	• Loss of or damage to known historic environment assets; • Loss of or damage to unknown historic environment assets; • Loss of or damage to deposits of paleoenvironmental interest; and • Temporary changes to the setting of historic environment assets.
Air quality	• Dust emissions associated with Project works; • Dust (Onshore cable laying); and • Dust and emissions from vehicle use.	N/A	• Dust (Access roads / tracks); and • Dust and emissions from vehicle use.	• Dust and emissions resulting from operation and maintenance works.
Noise and vibration	• Onshore noise associated with construction/ decommissioning of onshore components; • Ground-borne vibration associated with construction/ decommissioning of onshore components; and • Onshore noise and ground-borne vibration associated with vehicle use.	• Onshore noise associated with operation and maintenance of onshore components; and • Ground-borne vibration associated with operation and maintenance of onshore components.	N/A	N/A
Traffic and access	• Impacts arising from the increased generation of traffic; • Impacts on road safety as a result of the generation of increased traffic; • Impacts on the local community; and	N/A	N/A	• Impacts during operations and maintenance on existing traffic flows and the local road network.

EIA TOPIC	SCOPED IN		SCOPED OUT	
	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE	CONSTRUCTION AND DECOMMISSIONING	OPERATION AND MAINTENANCE
	• Impact on road carriageway, verges and associated structures; and impact on road users.			
Landscape and visual	• Impact of all Project elements on the Hoy and West Mainland NSA, Hoy WLA and seascape/landscape character within the study area; and • Impacts of all onshore Project elements on visual amenity of local residents, road users, walkers, and visitors within the study area.	• Impact of substation on seascape and landscape character; and • Impacts of substation on visual amenity of local residents, road users, walkers, and visitors within the study area.	N/A	• Impact of all Project elements on the Hoy and West Mainland NSA, Hoy WLA and seascape/landscape character within the study area; and • Impacts of landfall(s)and UGC(s) on visual amenity of local residents, road users, walkers, and visitors within the study area.

5.4 Next Steps

The applicant will be progressing the Project EIA, while the Scoping Opinions are produced by the competent authorities. Once the Scoping Opinions have been received, it will be used to guide the EIA process. The EIA process will include:

1. Baseline characterisation;
2. Assessment of potential impacts;
3. Evaluation of impact significance; and
4. Cumulative Effects Assessment.

Each of the above will be documented within technical sections in the EIA Report.

Inter-related effects, ecosystem effects and transboundary effects will also be considered where relevant for the EIA topic in question, as well as additional EIA matters, including the consideration of human health, major accidents and disasters and climate change. The potential for transboundary impacts and the associated approach for the EIA has been provided in each technical scoping section.

The Project has made a commitment to work with organisations, communities and individuals who have an interest in the development of the Project. The Project will adhere to all statutory consultation requirements, including PAC, as well as non-statutory consultation, including community engagement to gain feedback on data collection methods, results, assessment methods and EIA outputs. The Project intends on setting up technical working groups and community panels and holding a number of rounds of public consultation prior to the submission of the EIA Report.

5.5 Proposed Structure of the EIA Reports

Separate EIA reports are proposed for the offshore, onshore Caithness and onshore Orkney aspects of the Project. The proposed structures of the EIA Reports are provided in Table 5-2, Table 5-3 and Table 5-4.

Table 5-2 Proposed Structure of the Offshore EIA Report

SECTION	TITLE
Non-technical summary	
1	Introduction
2	Legislative Context and Regulatory Requirements
3	Project Need
4	Site Selection and Consideration of Alternatives
5	Project Description

SECTION	TITLE
6	EIA Methodology
7	Stakeholder Consultation
8	Physical and Coastal Processes
9	Water and Sediment Quality
10	Benthic Subtidal and Intertidal Ecology
11	Fish and Shellfish Ecology
12	Marine Mammals and Megafauna
13	Offshore Ornithology
14	Commercial Fisheries
15	Shipping and Navigation
16	Marine Archaeology and Cultural Heritage
17	Military and Aviation
18	Seascape, Landscape and Visual
19	Socio-economics
20	Other Sea Users
21	Summary and Conclusion

Table 5-3 Proposed Structure of the Onshore Caithness EIA Report

SECTION	TITLE
Non-technical summary	
1	Introduction
2	Legislative Context and Regulatory Requirements
3	Project Need
4	Site Selection and Consideration of Alternatives

SECTION	TITLE
5	Project Description
6	EIA Methodology
7	Stakeholder Consultation
8	Geology and Hydrology
9	Freshwater Ecology, Terrestrial Non-avian Ecology and Terrestrial Ornithology
10	Land-use and Other Users
11	Terrestrial Archaeology and Cultural Heritage
12	Air Quality
13	Noise and Vibration
14	Traffic and Access
15	Landscape and Visual
16	Summary and Conclusion

Table 5-4 Proposed Structure of the Onshore Orkney EIA Report

SECTION	TITLE
Non-technical summary	
1	Introduction
2	Legislative Context and Regulatory Requirements
3	Project Need
4	Site Selection and Consideration of Alternatives
5	Project Description
6	EIA Methodology
7	Introduction
8	Geology and hydrology

SECTION	TITLE
9	Freshwater ecology, terrestrial non-avian ecology and terrestrial ornithology
10	Land-use and other users
11	Terrestrial archaeology and cultural heritage
12	Air quality
13	Noise and vibration
14	Traffic and access
15	Landscape and visual
16	Summary and conclusion

APPENDIX A GLOSSARY AND ABBREVIATIONS / ACRONYMS

A.1.1 Glossary

TERM	DEFINITION
Option Agreement Area	The area of seabed that the applicant has been awarded through the ScotWind leasing process, which has associated terms and over which Crown Estate Scotland will grant a lease in the event that the developer succeeds in obtaining all the necessary consents and the project achieves FID.
Applicant	Offshore Wind Power Limited (OWPL) is the applicant. OWPL is a joint venture between Macquarie's Green Investment Group, TotalEnergies and the Renewable Infrastructure Development Group.
Array Area	The area in which the generation infrastructure including turbines and associated foundations, inter-array cables and Offshore Substation Platforms (OSP), will be located. The array area reflects the Option Agreement Area (OAA) awarded to OWPL from Crown Estate Scotland (CES).
Cumulative Effect	Changes to the environment caused by the potential impacts of the Project combined with the potential impacts of present and future projects, plans or activities.
Project Design Envelope	Project parameters that are assessed as part of the Environmental Impact Assessment (EIA) process for a Project.
EIA Regulations	Collectively the term used to refer to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017; The Marine Works (Environmental Impact Assessment) Regulations 2007, The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.
Embedded Mitigation	Mitigation measures included in the Project design.
Environmental Impact Assessment	Process of identification and assessment of the potential environmental impacts associated with the Project.
Environmental Impact Assessment Report	A report documenting the findings of the Environmental Impact Assessment in accordance with relevant regulations.
Electromagnetic Field (EMF) Emissions	EMF emissions are generated from the transmission of electricity through cables. The cables produce electromagnetic fields which have both electric (E) measured in volts per metre (V m^{-1}) and magnetic components (B) measured in micro tesla (μT). While the direct electric field is mostly blocked with the use of conductive sheathing, the magnetic field penetrates most materials and therefore are emitted into the marine environment with the resultant induced electric (iE) field.
European Protected Species (EPS)	Species listed in Annex IV of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) are classified as EPS. This provision identifies species of community interest in need of strict protection, as per Article 12 of the Directive.

TERM	DEFINITION
European Site	Special Areas of Conservation (SAC) and Special Protection Areas (SPAs) that were originally designated under EU legislation. Prior to the UK's withdrawal from the EU, the UK's European Sites contributed to the Natura 2000 and were referred to as Natura 2000 sites.
Foundations	The foundation on which the wind turbine generators or Offshore Substation Platforms (OSPs) are installed.
Flotta Hydrogen Hub	The Flotta Hydrogen Hub is a proposed development that will be used for a production and export facility at a repurposed area of the existing Flotta Oil Terminal to create a green hydrogen hub. OWPL have an exclusive partnership for the Project to power the Flotta Hydrogen Hub.
Horizontal Directional Drilling	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Habitats Regulations Appraisal	Process of identification and assessment of the potential for the Project to have an adverse effect on the integrity of Special Areas of Conservation (SACs) or Special Protection Area (SPA).
Inter-Array Cables	Cables which link the wind turbines to each other and the offshore substation platforms.
Intertidal	The area of the shoreline which is covered at high tide and uncovered at low tide.
Landfall	The location where the export cables will be brought ashore.
Maximum Design Scenario	The maximum design parameters for the different elements of the Project (both on and offshore) considered to be a worst case for any given assessment.
Marine Licence	Licence granted under either the Marine and Coastal Access Act 2009 or the Marine (Scotland) Act 2010.
Marine Scotland	Civil service directorate which is responsible for the integrated management of Scotland's seas.
Navigational Risk Assessment	Process of identifying and assessing hazards and risks to vessel navigation from a proposed Offshore Renewable Energy Installation (OREI), based on Formal Safety Assessment (FSA).
Offshore Export Cables	The subsea, electricity cables running from the Offshore Substation Platforms (OSPs) to the landfall and transmitting the electricity generated from the offshore wind far to the onshore cables for transmission onwards to the onshore substation.
Offshore Export Cable Corridor	The area within which the Offshore Export Cables will be installed.
Offshore Export Cable Corridor Search Area	The search area for the offshore export cable corridor. The search area will be refined as the EIA process continues to a more defined offshore export cable corridor.
Offshore	Anything located or referring to the marine environment seaward of MHWS.

TERM	DEFINITION
Offshore Substation Platform (OSP)	Offshore platforms potentially consisting of a combination of High Voltage Alternating Current (HVAC) substations, High Voltage Direct Current (HVDC) converter stations and/or a combined HVAC/HVDC substation depending on the final electrical set up of the Project.
Offshore Transmission Infrastructure	The proposed transmission infrastructure comprising Offshore Substation Platforms (OSPs), and associated foundations and substructures, and the Offshore Export Cables.
Offshore Infrastructure	The proposed generation infrastructure comprising turbines and associated foundations and substructures, the Offshore Substation Platforms (OSPs) and associated foundations, offshore export cables and the inter-array cables.
Onshore	Anything located or referring to the onshore environment landward of MLWS.
Onshore Export Cable	The buried electricity cables running from landfall to the onshore substation, connecting the offshore wind farm to the grid and/or the Flotta Hydrogen Hub.
Onshore Export Cable Corridor	The area within which the onshore export cables will be installed.
Onshore Export Cable Search Area	The area of search for the onshore export cable corridor. The search area will be refined as the EIA process continues to a more defined onshore export cable corridor.
Onshore Substation	Contains the electrical components for transforming the power supplied from the Project via the export cables to meet the export requirements.
Onshore Substation Search Area	The areas of search for the onshore substation location.
Onshore Infrastructure	The proposed onshore transmission infrastructure comprising of export cables and onshore substations.
Project	The proposed Offshore Wind Farm and associated offshore and onshore infrastructure to which this Scoping Report relates.
Pre-Application Consultation (PAC)	Requirement for projects of a certain nature to fulfil the PAC requirements (including holding pre-application event(s)) under the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 and the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 (as amended).
Power Purchase Agreement (PPA)	A contract for a long-term electricity supply agreement between a business and an electricity producer.
Safety Zones	An area around a structure or vessel which should be avoided.
Section 36 Consent	Consent under section 36 of the Electricity Act 1989 for the construction or extension, and operation, of electricity generating stations.
Scoping Opinion	The Scoping Opinions that will be provided by Marine Scotland Licensing Operations Team ("MS-LOT") on behalf of Scottish Ministers, The Highland Council ("THC") and The Orkney Islands Council ("OIC"), setting out the opinion on the content of the Project EIA Report including those issues that will or will not need to be addressed in "the Project EIA".

TERM	DEFINITION
Scoping Report	This Scoping Report sets out the proposed contents of the Project EIA Report and provided to Scottish Ministers, Orkney Islands Council and The Highland Council to support the request for a Scoping Opinion.
The Scottish Government	The devolved government for Scotland.
ScotWind	First Offshore Wind Leasing Round held since the devolution of the Scottish Crown Estate and has been administered by Crown Estate Scotland,
Scour Protection	Protective materials to avoid sediment being eroded away from the base of the foundations as a result of the flow of water.
Subtidal	The region of waters below the level of low tide.
Transboundary Effects	Effects that arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s).
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to a nacelle housing mechanical and electrical generating equipment.

A.1.2 Acronyms/Abbreviations

ACRONYM AND ABBREVIATION	TERM
ACP	Air Space Change Plan
AD	Air Defence
AIAA	Area of Intense Aerial Activity
AIS	Automatic Information System
ALARP	As Low as Reasonably Practicable
AMP	Access Management Plan
AON	Apparently Occupied Nest
AoS	Area of Search
AOT	Apparently Occupied Territory
AQMA	Air Quality Management Area
ARC	Amphibian and Reptile Conservation Trust
ATBA	Area to be Avoided
ATC	Air Traffic Control
ATS	Air Traffic Services
ATT	Admiralty Total Tide
AWI	Ancient Woodland Inventory

ACRONYM AND ABBREVIATION	TERM
BAP	Biodiversity Action Plan
BBCT	Bumblebee Conservation Trust
BERR	Department of Business Enterprise and Regulatory Reform
BGS	British Geological Survey
BoCC	Birds of Conservation Concern
BODC	British Oceanographic Data Centre
BOWL	Beatrice Offshore Wind Farm Ltd
BPM	Best Practical Means
bq	Becquerels
BSBI	Botanical Society of Britain and Ireland
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CaP	Cable Plan
CAP	Civil Aviation Publication
CBA	Cost Benefit Analysis
CBRA	Cable Burial Risk Assessment
CCC	Clyde Cruising Club
CCS	Carbon, Capture and Storage
CEA	Cumulative Affects Assessment
CEF	Cumulative Effects Framework
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CIEEM	Chartered Institute of Ecology and Environmental Management
CiFA	Chartered Institute for Archaeologists
CIFA	Communities Inshore Fisheries Association
CION	Connection and Infrastructure Options Note
CJB	Cable Joint Bay
CO2	Carbon dioxide
CoCP	Code of Construction Practise
COP	Conference of Parties
CPA	Coast Protection Act
CPG	Counterfactuals of Population Growth Rate
CPS	Counterfactuals of Population Size

ACRONYM AND ABBREVIATION	TERM
CRM	Collision Risk Modelling
CSEMP	Clean Seas Environmental Monitoring Programme
CSV	Construction Support Vessel
CTD	Conductivity Temperature Depth
CTV	Crew Transfer Vessel
DBA	Desk Based Assessment
DDC	Dounreay Demonstration Centre
DECC	Department of Energy and Climate Change
DGC	Defence Geographic Centre
DMP	Dust and Air Quality Management Plan
DPO	Draft Plan Option
DSFB	District Salmon Fishery Board
DSLP	Design Specification and Layout Plan
DSM	Density Surface Modelling
DSRL	Dounreay Site Restoration Limited
DTI	Department of Trade and Industry
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre
EMF	Electromagnetic Field
EPS	European Protected Species
ERCoP	Emergency Response Cooperation Plan
ESAS	European Seabirds at Sea
EU	European Union
EUNIS	European Nature Information System
FAD	Fish Aggregation Device
FCS	Forestry Commission Scotland
FEAST	Feature Activity Sensitivity Tool
FEPA	Food and Environment Protection Act
FL	Flight Level

ACRONYM AND ABBREVIATION	TERM
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FMMS	Fisheries Management and Mitigation Strategy
FPM	Freshwater Pearl Mussel
FSA	Formal Safety Assessment
FSS	Food Standards Scotland
GBS	Gravity Base Substructure
GCR	Geological Conservation Review
GES	Good Ecological Status
GHG	Greenhouse Gas
GIG	Green Investment Group
GPP	Guidance for Pollution Prevention
GPS	Global Positioning System
GRAD	Gradiometer
GSD	Ground Sample Device
GT	Gross Tonnes
GW	Gigawatt
GWDTE	Ground Water Dependent Terrestrial Ecosystem
ha	Hectare
HBAP	Highland Biodiversity Action Plan
HBRG	Highland Biological Recording Group
HCA	Helicopter Certification Agency
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HES	Historic Environment Scotland
HGV	Heavy Goods Vehicle
HIAL	Highlands and Islands Airport Limited
HIE	Highlands and Islands Enterprise
HIS	Habitat Suitability Index
HMPA	Historic Marine Protected Area
HMR	Helicopter Main Route
HRA	Habitats Regulations Assessment
IALA	International Association of Lighthouse Authorities
IAQM	Institute of Air Quality Management

ACRONYM AND ABBREVIATION	TERM
IBTS	International Bottom Trawl Survey
ICES	International Council for Exploration of the Sea
ICPC	International Cable Protection Committee
IED	Industrial Emissions Directive
IEMA	Institute of Environmental Management and Assessment
IFP	Instrument Flight Procedure
IHLS	International Herring Larvae Survey
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
JTB	Joint Transition Bay
kJ	Kilo Joules
km	Kilometre
kV	Kilo Volt
LAT	Lowest Astronomical Tide
LBAP	Local Biodiversity Action Plan
LCT	Landscape Character Type
LDP	Local Development Plan
LEDS	Liquid Effluence Diffuser System
LMP	Lighting Management Plan
LoD	Limit of Detection
LSE	Likely Significant Effect
LSO	Launch Site Operator
LVIA	Landscape and Visual Impact Assessment
MAG	Magnetometer
MAIB	Marine Accident Investigation Branch
MBES	Multi-beam Echosounder
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MEHRA	Marine Environment High Risk Area
MERMAN	Marine Environment Monitoring and Assessment National Database
MEXA	Military Exercise and Training Area

ACRONYM AND ABBREVIATION	TERM
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MoD	Ministry of Defence
MSFD	Marine Strategy Framework Directive
MSL	Mean Sea Level
MS-LOT	Marine Scotland – Licensing Operations Team
MSP	Marine Spatial Plan
MSS	Marine Scotland Science
MW	Megawatt
NAEI	National Atmospheric Emissions Inventory
NAFC	North Atlantic Fisheries College
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NCMPA	Nature Conservation Marine Protected Area
NDB	Non-Directional Beacon
NECRIFG	North East and East Coast Regional Inshore Fisheries Group
NEPS	National Electrofishing Programme for Scotland
NLB	Northern Lighthouse Board
NM	Nautical Mile
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NNSS	Non-Native Species Secretariat
NO2	Nitrogen dioxide
Nox	Nitrogen oxides
NPDE	Nuclear Power Development Establishment
NPF3	National Planning Framework 3
NPF4	National Planning Framework 4
NRA	Navigational Risk Assessment
NRHE	National Record of the Historic Environment
NRMM	Non-Road Mobile Machinery
NRTE	Naval Reactor Test Establishment

ACRONYM AND ABBREVIATION	TERM
NSA	National Scenic Area
NSP	Navigational Safety Plan
NtM	Notice to Mariner
NTSLF	National Tidal and Sea Level Facility
NVC	National Vegetation Classification
O&M	Operations & Maintenance
OAA	Option Agreement Area
ODAS	Oceanographic Data Acquisition System
OEM	Original Equipment Manufacturer
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFA	Orkney Fisheries Association
OFLO	Offshore Fisheries Liaison Officer
OIC	Orkney Islands Council
OMMRI	Orkney Marine Mammal Research Institute
ONS	Office of National Statistics
ORE	Offshore Renewable Energy
OREI	Offshore Renewable Energy Installation
ORJIP	Offshore Renewables Joint Industry Programme
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
OWIARC	Orkney Wildlife Information and Records Centre
OWPL	Offshore Wind Power Limited
OWSMRF	Offshore Wind Strategic Monitoring and Research Forum
PAC	Pre-Application Consultation
PAD	Protocol for Accidental Discoveries
PAN	Planning Advice Note
PEMP	Project Environmental Monitoring Programme
PEXA	Practice and Exercise Area
PFOW	Pentland Firth and Orkney Waters
PHA	Preliminary Hazard Analysis
PM10	Particular matter (<10 μm)
PM2.5	Particular matter (<2.5 μm)
PMF	Priority Marine Feature

ACRONYM AND ABBREVIATION	TERM
PMP	Peat Management Plan
PO	Plan Option
PoMRA	The Protection of Military Remains Act 1986
PPA	Power Purchase Agreement
PRAG	Particle Retrievals Advisory Group
ProW	Public Rights of Way
PSA	Particle Size Analysis
PSR	Primary Surveillance Radar
PVA	Population Viability Analysis
RAF	Royal Air Force
RIDG	Renewable Infrastructure Development Group
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
ROVSV	Remotely Operated Vehicle Support Vessel
RSL	Relative Sea Level
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SBL	Scottish Biodiversity List
SBP	Sub-bottom Profiler
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SCDS	Supply Chain Development Statement
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SEL	Sound Exposure Level
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SHET-L	Scottish Hydro Electric Transmission plc.
SHPP	Species and Habitat Protection Plan
SI	Sustainability Index
SLA	Special Landscape Area
SLVIA	Seascape, landscape and visual impact assessment

ACRONYM AND ABBREVIATION	TERM
SMP	Seabird Monitoring Programme
SMR	Sites and Monuments Record
SMRTS	Scottish Marine Recreation and Tourism Survey
SNCB	Statutory Nature Conservation Body
SO2	Sulphur dioxide
SOPEP	Shipboard Oil Pollution Emergency Plan
SOV	Service Operated Vessels
SPA	Special Protection Area
SPL	Sound Pressure level
SPM	Single Point Mooring
SPP	Scottish Planning Policy
SRMP	Soil Resource Management Plan
SSEN	Scottish and Southern Electricity Networks
SSS	Side scan sonar
SSSI	Site of Special Scientific Interest
STS	Ship-to-Ship
STW	Scottish Territorial Waters
SVP	Sound Velocity Profiler
SWFPA	Scottish Whitefish Producers Association
SWT	Scottish Wildlife Trust
TAC	Total Allowable Catch
TCE	The Crown Estate
THC	The Highland Council
TLP	Tension Leg Platform
TMP	Traffic Management Plan
TTWA	Thurso and Wick Travel to Work Areas
TWG	Technical Working Group
UHI	University of the Highlands and Islands
UHRS	Ultra-high Resolution Seismic
UKCS	UK Continental Shelf
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VMP	Vessel Management Plan

ACRONYM AND ABBREVIATION	TERM
VMS	Vessel Monitoring System
WB	Waterbody
WCA	Wildlife and Country Side Act 1981
WFD	Water Framework Directive
WHO	World Health Organisation
WHS	World Heritage Site
WLA	Wild Land Area
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
WW1	World War 1
WW2	World War 2
WWT	Wildfowl and Wetlands Trust
ZTV	Zone of Theoretical Visibility