



Project:

130355 Orkney Mainland HVAC 220 kV Subsea Link

Document title:

**HRA Screening and Report to Inform the Appropriate Assessment (RIAA)**

**Scope:**

The Habitats Regulations Appraisal (HRA) Report has been produced to inform the HRA process for the project. Specifically, this report provides the supporting information that will enable screening with respect to identifying any potential Likely Significant Effects (LSE) of the pre-lay installation survey and construction activities on European sites. Additionally, this document constitutes the Report to Inform Appropriate Assessment (RIAA).

Number of pages:

92

Date:

2025-01-30

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# 1 Introduction

## 1.1 Introduction Orkney Mainland Project

SSEN (Employer) has awarded Nexans Norway AS (Contractor) a Contract for engineering, manufacturing, installation and trenching of a 70 km HVAC 220 kV Subsea & Land cable, including fibre from the new substation near Finstown on Orkney Island to new Dounreay West substation on the north coast of Scotland, Figure 1-1 for details.

The Orkney Islands represent a major source of renewable electricity potential, and its new connection to the mainland will help decarbonize the UK's electricity production and also secure a better transmission infrastructure between the Scottish mainland and Orkney.



Figure 1-1: Project Description

Prior to construction of the project, Nexans are planning to undertake a pre-lay survey of the cable routing corridor during the survey period between 1 April and 31 September 2025. The survey will aim to verify and record conditions of the seabed prior to installation.

Following the completion of the pre-lay survey, this information will be used to inform the construction and installation phase of the project throughout summer 2026 (mattress installation) and spring / summer 2027, with completion estimated toward the end of 2027.

## 1.2 Introduction of document

The Habitats Regulations Appraisal (HRA) Report has been produced to inform the HRA process for the project. Specifically, this report provides the supporting information that will enable screening with respect to identifying any potential Likely Significant Effects (LSE) of the pre-lay survey and installation activities<sup>1</sup> on European sites. If no LSE on any European site(s) are identified, no further stages in the appraisal will be required. Where LSEs on a European site(s) cannot be ruled out, a more detailed appraisal has been undertaken (step three of the HRA process), with a Report to Inform Appropriate

<sup>1</sup> Only aspects below MHWS.

Assessment (RIAA) produced<sup>2</sup>. The RIAA will aid the Competent Authority<sup>3</sup> with its own Appropriate Assessment (AA), which must consider whether or not the project may result in an adverse effect on the integrity of a European site or sites before it can be consented or carried out ('integrity test').

The appraisal within this report is based on existing understanding of the baseline environment, pre-lay survey and the construction method statement for the project.

This HRA Screening and RIAA Report has been prepared for submission to Marine Directorate in support of an European Protected Species (EPS) License application for pre-lay survey works and the construction of the project which was granted a Marine Licence in June 2024 (MS-00010803).

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<sup>2</sup> This may also be referred to as a Statement to Inform the AA (SIAA).

<sup>3</sup> In the case of the offshore components of the project, the Competent Authority is the Marine Directorate (on behalf of Scottish Ministers).

## 2 Terms and Abbreviations

Term	Definition
Employer	SSEN – Scottish and Southern Electricity Networks
Contractor	Nexans Norway AS

Abbreviation	Elaboration
1SW	One-Sea-Winter
AA	Appropriate Assessment
AC	Alternating Current
AOT	Apparently Occupied Territories
CES	Coastal East Scotland
CES	Crown Estate Scotland
cSAC	Candidate Special Areas of Conservation
dB	Decibels
EC	European Commission
EMEC	European Marine Energy Centre
EU	European Union
FCS	Favourable Conservation Status
FLO	Fisheries Liaison Officers
HP	High-Powered
HRA	Habitats Regulations Appraisal
HVAC	High Voltage Alternating Current
Hz	Hertz
IAMMWG	Inter-Agency Marine Mammal Working Group
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organisation
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
kHz	Kilohertz
km	Kilometres
kV	Kilovolts
kW	Kilowatts
LSE	Likely Significant Effects
m	Metres
m <sup>2</sup>	Metres squared
MBES	Multi-beam Echosounder

Abbreviation	Elaboration
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MSW	Multi-Sea-Winter
MU	Management Units
MW	Megawatts
NAMMCO	North Atlantic Marine Mammal Commission
NS	North Sea
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Areas
RIAA	Report to Inform Appropriate Assessment
SAC	Special Areas of Conservation
SBP	Sub Bottom Profiler
SCANS	Small Cetaceans in European Atlantic Waters and the North Sea
SCI	Sites of Community Importance
SD	Standard Deviation
SIAA	Statement to Inform the Appropriate Assessment
SMU	Seal Management Unit
SNH	Scottish Natural Heritage (renamed NatureScot as from 24/08/2020)
SPA	Special Protection Areas
SSEN	Scottish and Southern Electricity Networks
SSS	Side Scan Sonar
SSSI	Sites of Special Scientific Interest
TTS	Temporary Threshold Shift
UK	United Kingdom
USBL	Ultra-Short Baseline
WTG	Wing Turbine Generator
ZOI	Zone of Influence

## 3 The HRA Process

### 3.1 Legislative context

#### 3.1.1 Habitats Directive and Habitats Regulations

A network of protected areas for specific sensitive habitats and species of importance (known as European sites) was established by the European Union (EU) member states under the EU Habitats Directive (Council Directive 92/43/EEC) and the EU Birds Directive (Council Directive 2009/147/EC). In Scotland, European sites are implemented by the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) and the Conservation of Habitats and Species Regulations 2017 (referred to collectively as the Habitats Regulations).

The relevant sections of the Habitats Directive to this report are Article 6(3) and 6(4), as implemented under the Conservation (Natural Habitats &c.) Regulations 1994, Regulations 48 and 49 and similarly under the Conservation of Habitats and Species Regulations 2017 (as amended).

Article 6(3) of the Habitats Directive states:

“Any plan or project not directly connected with or necessary to the management of the 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”.

The Habitats Regulations require consideration of potential effects from projects/surveys on European sites; in the United Kingdom (UK) these sites include Special Areas of Conservation (SACs), candidate SACs (cSACs), Special Protection Areas (SPAs), potential SPAs (pSPAs), Sites of Community Importance (SCIs) and Ramsar sites<sup>4</sup>. A HRA must be carried out to determine the potential for a project/survey to result in adverse effects on the integrity of a European site, either individually or in combination with other projects and/or plans.

#### 3.1.2 Post EU exit

The UK withdrew from the EU in January 2020 and since January 2021 it has no longer been bound by EU legislation. The Scottish Parliament, along with the rest of the UK, passed EU exit legislation regarding the Habitats Regulations to ensure environmental protection with respect to habitats and species is still aligned with EU environmental standards. The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 were consequently implemented in Scotland.

Amendments were generally minor and technical in nature. The Habitats Regulations now transpose the EU Habitats Directive and the EU Birds Directive into national law in Scotland. Under this legislation, and in accordance with the Scottish Government’s EU Exit guidance, the term “European site” has been retained in this report to refer to the above sites that are protected in Scotland, the rest of the UK, and in EU Member States (Scottish Government, 2020). Such sites are now part of the UK National Site Network. Management objectives are now established for the UK National Site Network, and for Scottish sites, Scottish Ministers must work in cooperation with other UK administrations to manage and adapt the site network. The European Commission (EC) no longer plays a role in the designation process or the Imperative Reasons of Overriding Public Interest (IROPI) process in regard to the UK National Site Network. In Scotland, this now falls within the remit of Scottish Ministers, with input from NatureScot and the Joint Nature Conservation Committee (JNCC). Scottish Ministers, along with the Secretary of State, additionally possess powers to amend annexes of the Directives (to the extent that applies to the Habitat Regulations) and issue guidance on interpreting the requirements of the Directives. In addition Scottish Planning Policy acknowledges that Ramsar sites are afforded the

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## 4 Wetlands of international importance designated under the Ramsar Convention.

same protection where they are also designated as a European site to sites formally defined as European sites in the Habitats Regulations. (Scottish Government, 2020).

The objectives of the Habitats Regulations in relation to the UK National Site Network include:

- Maintain or restore habitats and species listed in the Habitats Directive to Favourable Conservation Status (FCS).
- Ensuring survival and reproduction of certain species of wild birds in their area of distribution, and maintaining their populations levels which correspond to ecological, scientific and cultural requirements.

European sites (coastal and offshore) contribute to Scotland's Marine Protected Area (MPA) network.

## 3.2 HRA process

A HRA is a detailed assessment of the potential effects of a proposed project/survey that tests whether or not it could result (alone or in combination with other projects/plans) in an adverse effect on the integrity of a European site before the project/survey can be authorised or carried out ('integrity test'). If an LSE on a European site or sites cannot be ruled out an AA must be carried out by the Competent Authority. The HRA process is iterative with each step informing the next (Scottish Government, 2018):

Step 1: Is the project directly connected with or necessary for site management for nature conservation?

Step 2: Is the project likely to have a significant effect on the site(s) either alone or in-combination with other plans or projects?

Step 3: Can it be ascertained that the project will not adversely affect the integrity of the site(s) either alone or in-combination with other plans or projects (the AA)?

This project is not directly connected with, or necessary for, site management for nature conservation and so the project will proceed to screening. This report has been prepared to address the screening step of the HRA process.

### 3.2.1 HRA screening

The purpose of HRA Screening is to identify aspects of the survey whereby it is not possible to rule out LSE on European sites (either alone or in combination). It further identifies the European sites where potential LSE may occur. An LSE has been defined as "any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects"<sup>5</sup>. An LSE is considered as "one that cannot be ruled out on the basis of objective information [4]. The test is a 'likelihood' of effects rather than a 'certainty' of effects'. LSE should therefore not simply be interpreted as 'probable' or 'more likely than not', but rather whether a significant effect can objectively be ruled out".

Screening will include a consideration of the potential for connectivity between European sites and the survey. If connectivity between the European sites and the survey is established, an assessment of the potential for LSE on the relevant qualifying features of the European sites will be undertaken. Any potential adverse effect on a site's conservation objectives is typically considered to be an LSE.

### 3.2.2 Appropriate Assessment (AA)

Where it is not possible to rule out LSE on European sites and features based on objective information, the site is progressed to step 3, where an AA is required. A project/plan is required to

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<sup>5</sup> Article 6(3) of the Habitats Directive.

provide a RIAA; this considers the potential effects of the project/plan, both alone and in combination, with regard to the UK National Site Network site's structure and function, whilst also considering the Conservation Objectives in place. The Competent Authority is then required to conduct an AA of the implications for the European site with respect to its Conservation Objectives, in respect to the integrity of the European site, prior to deciding to undertake or give any consent or permission to a project/plan. This is stated in Regulation 48 of the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2019.

### **3.2.3 Assessment of alternatives**

Should it be concluded by the Competent Authority in their AA that there may be adverse effects on the integrity of the European sites, alternative solutions should be considered and assessed by the developer. This may relate to changes to project/plan design, location, etc.

### **3.2.4 Assessment of 'imperative reasons of overriding public interest (IROPI)'**

If there are no alternative solutions to the development, it may be that the development cannot proceed unless it satisfies principles of IROPI. IROPI may relate to human health, public safety or beneficial consequences of primary importance to the environment.

Where development satisfies the IROPI, compensatory measures must be implemented in order to maintain coherence of the UK National Site Network. Such measures should be developed in order to offset potential adverse effects on the European site(s).

The Energy Bill facilitates amendments and improvements to be made to the HRA process in order to reduce timeframes. UK governments will be given the power to tailor the HRA process to ensure environmental protection is addressed early in the consenting process; specifically, the consideration of strategic compensatory measures upfront through this new Bill will reduce timeframes drastically. While this currently relates to solely to offshore wind, similar principles should be followed for other offshore renewable energy projects.

### **3.2.5 Mitigation**

NatureScot<sup>6</sup> have provided guidance to clarify what stage of mitigation can be considered within a HRA process for Scottish developments [5], this was following the judgement of the European Court of Justice in the People Over Wind and Sweetman Case 2018<sup>7</sup>.

It is understood that mitigation measures with the intention of avoiding or reducing harmful effects on a European site cannot be considered at the screening stage (i.e., contained within this Report). Embedded mitigation (e.g., project design considerations (including environmental monitoring), management plans, post-consent plans, survey timing, etc.) that may incidentally reduce or avoid effects on sites can be considered within the screening process.

## **3.3 Guidance**

Guidance documents for conducting HRAs in Scotland are outlined in Table 3-1, and referenced more fully in the Reference section of this report.

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<sup>6</sup> Previously Scottish Natural Heritage (SNH).

<sup>7</sup> Case C323/17.

Table 3-1: Guidance documents of relevance to the project.

Guidance	Overview
<p>Habitats Regulations Appraisal (HRA) of Local Development Plans (LDPs) - Guidance for planning authorities in Scotland (NatureScot, 2023).</p>	<p>The key purpose of this guidance is to help planning authorities in Scotland undertake the Habitats Regulations Appraisal (HRA) of Local Development Plans (LDPs). It is a revision of Habitats Regulations Appraisal of Plans - Guidance for plan-making bodies in Scotland (2015).</p>
<p>European Site Casework Guidance: How to consider plans and projects affecting Special Areas of Conservation (SACs) and Special Protection Areas (SPAs),2022 [9]</p>	<p>This document aids in the response to consultations over plans and projects that could affect European sites, it also applies where NatureScot is a Competent Authority and where considering effects of their own plans and projects. It sets out legal requirements, providing explanation for the steps involved alongside providing guidance.</p>
<p>The Habitat Regulation Assessment Handbook, 2021 [6]</p>	<p>This is a definitive source of guidance for the assessment of plans and projects under the UK Habitats Regulations.</p>
<p>Advice to Marine Scotland. Policy Guidance Document on demonstrating the absence of Alternative Solutions and IROPI under the Habitats Regulations for Marine Scotland,2021 [7]</p>	<p>This document provides guidance on the IROPI process, whereby a lack of alternative solutions may be concluded for a project.</p>
<p>Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC, 2021 [10]</p>	<p>This document aims to provide methodological assistance to carry out and/or review the assessments as required under Article 6(3) and 6(4).</p>
<p>EU Exit: habitats regulations in Scotland, 2020 [8]</p>	<p>This looks into the changes made to the Habitats Regulations following EU exit in Scotland.</p>
<p>Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2018)</p>	<p>This document aims at providing guidelines to the Member States on the interpretation of certain key concepts used in Article 6 of the 'Habitats' directive.</p>
<p>Habitats Regulations Appraisal: Guidance for Plan-making Bodies in Scotland,2015 [4]</p>	<p>The purpose of this document is to inform plan-making bodies in Scotland of the HRA process. The document informs how to ensure compliance with the Habitats Directive in order to protect internationally European sites.</p>
<p>HRA Advice Sheet 1 (Version 1) - Aligning Development Planning procedures with Habitats Regulations Appraisal requirements, (Scottish Government, 2012)</p>	<p>This advice sheet is intended to complement the SNH guidance by offering more detailed practical advice on aligning Development Planning procedures with HRA requirements.</p>

## 4 Project Description

The subsea cable corridor is proposed to be approximately 53 km long, 200 m wide and follows a broadly south-west alignment from Warebeth, Orkney across the western approaches to the Pentland Firth to Dounreay, Caithness. The details of this corridor can be found under the Marine License application: MS-00010803.

The pre-lay survey will be conducted within the cable corridor shown in Figure 4-2. The proposed survey period is between 1 April to 31 September 2025, with an expected duration of up to 30 days, including local mobilization, transit, survey and local demobilisation.

The contractor that will be employed for the offshore survey is still to be determined, therefore exact details on the vessels to be used are not available. Mobilisation and demobilisation is expected to occur from Port of Aberdeen. Once mobilised, the expected sail time to Warebeth is 24 hours. The ports of Scrabster and Lerwick will be the nominated ports on respective landfall sides for scheduled port calls for any crew changes and unexpected port calls.

The pre-lay survey will be undertaken via Multi Beam Echo Sounder (MBES), Side Scan Sonar (SSS), Sub Bottom Profiler (SBP), Ultra Short Baseline (USBL) Underwater Positioning (See Section 4). Unexploded Ordnance (UXO) survey will also be conducted [1].

Geophysical information and data collected from the pre-lay survey will subsequently be used to inform detailed micro routing, the cable burial protection plan, and installation phase of this project. Details of the specific installation activities are outlined below in Section 4.3.

### 4.1 Embedded mitigation

The pre-lay survey activities, including vessel movements, will adhere to a strict plan. Additionally, communication with relevant fisheries, maritime agencies, and statutory nature conservation bodies will be organised throughout the survey duration. FLOs will be utilised where appropriate and any notifications to Kingfisher Information Services will be made in sufficient time. Compliance with approved operating procedures will be monitored throughout the survey and the contracted survey vessels and crew will also adhere to national and international regulations (e.g., IMO, COLREGs and MARPOL, SOLAS). JNCC guidelines will be adhered to in relation to the geophysical survey [11] and vessel crew will employ best practice measures for boat control in accordance with the Scottish Marine Wildlife Watching Code and Guide to Best Practice.

A Construction Environmental Management Plan (CEMP) [3] will be prepared for the construction of the project. This will be implemented for the installation of the project. Within the CEMP, a non-native species management plan / biosecurity plan will be detailed. Further best practice measures will also be adhered to in relation to accidental and unplanned events (i.e., Shipboard Oil Pollution Emergency Plans (SOPEP) under MARPOL Annex I) and ballast water management (i.e., International Convention for the Control and Management of Ships Ballast Water and Sediments). Installation vessels will further be limited to slow speeds, limiting impacts of disturbance to species.

### 4.2 Pre-lay survey

The pre-lay survey will include use of MBES, SSS, SBP, USBL and magnetometer equipment from an ROV or similar equipment [1]. The pre-lay survey works will be used to identify any objects (man-made or otherwise) that may pose an obstruction or hazard to subsequent project installation activities. It will further identify any potentially sensitive habitats that are present. The survey corridor is likely be 20 m either side of the routing corridor centreline (subject to confirmation).

Indicative survey equipment systems are presented in Table 4-1. These devices are subject to change depending on the survey vessel proposed. However, the equipment outlined in Table 4-1 would remain representative of the equipment required for the proposed surveys even if specific brand changes occur. A gradiometer system is expected to be used for the UXO survey.

Table 4-1: Parameters of indicative offshore geophysical survey equipment.

Survey Equipment	Device(s)	Frequency (kHz)	Estimated Noise Level SPL (dB re 1 µPa @ 1 m)
Multi-beam Echosounder (MBES)	R2Sonic 2024	450–700	221 (rms); 222 (peak)
Sidescan Sonar (SSS)	Edgetech 2205	230/850	181 (rms); 195 (peak)
Sub bottom profiler (SBP)	Edgetech DW-216 Chirp	2–16	181 (rms); 195 (peak)/ 177 (rms); 197 (peak)
Ultra Short BaseLine (USBL) Underwater Positioning	Kongsberg HiPAP 500 with cNode beacons	21–31	202 (rms); 204 (peak)

#### 4.2.1 Mitigation

The pre-lay survey activity will be conducted in accordance with the JNCC guidelines for minimising risk to marine mammals [11]. This will include the provision of JNCC qualified MMO and PAM personnel to provide pre-work watches before all operations during daylight and dark hours, respectively.

### 4.3 Cable Installation

The project comprises a 220 kV interconnector cable spanning approximately 53 km between mainland Scotland and Orkney. The subsea component will be routed from the landfall at Dounreay, Caithness on the mainland and the landfall at Warebeth, Orkney. Cable installation is anticipated to take place during 2026 and 2027 and will include mattress installation, grapnel run, cable laying and cable protection.

#### 4.3.1 Concrete mattress installation

Prior to cable installation, concrete mattresses will be installed as protection to pre-existing FO cables identified in the cable route. Mattresses will be gently laid on the seafloor using dedicated construction vessels with cranes [1]. This is currently estimated to take place summer 2026.

#### 4.3.2 Grapnel run

A Pre-Lay Grapnel Run (PLGR) will subsequently be performed to ensure potential obstructions (i.e., fishing gear) are removed prior to cable laying [1]. The process will involve dragging a series of hooks in a train along the seabed along the entire cable corridor. The grapnel is typically deployed from a vessel.

#### 4.3.3 Cable installation

The dedicated laying vessel for the project is likely to be by Nexans' installation vessel C/S Nexans Skagerrak (Figure 4-1). Cable laying is expected to occur over a period of 14 days.



Figure 4-1: C/S Nexans Skagerrak.

During installation the cable is initially laid onto the seafloor leading to minimal disturbance of the seabed. The main cable protection method is proposed to be a water jet trencher. Specifically, it is expected that a 'CapJet' will be used; these work by fluidizing the seabed under the laid cable, the trench will subsequently be naturally backfilled. The Capjet will be deployed from the laying vessel, though other support vessels may also be used. It has been assumed for the purpose of this Report that cable jetting will start outside of the Orkney landfall and work towards Dounreay and occur over a period of 26 days.

Whereby burial by jetting is deemed unpracticable, subsea rock will be installed.

#### 4.3.4 Remedial rock installation

Remedial rock will be used to shield cables from physical damage and reduces the risk of physical exposure. Rock will be installed via a chute, ensuring high accuracy.

#### 4.3.5 Guard vessels

Guard vessels will be deployed where required to guard cable sections at incremental stages. Generally, guard vessels will be used prior to trenching, and where sections of the cable are exposed/insufficiently buried after trenching.

#### 4.3.6 Nearshore cable protection

It is anticipated that in the nearshore region of Orkney and Dounreay, cast iron shells will be required for cable protection due to seabed type (e.g., rocky substrate on a slope). These will be installed as the cable is laid.

#### 4.3.7 Mitigation

The cable installation activity will be conducted in accordance with the JNCC guidelines for minimising risk to marine mammals [11]. This will include the provision of JNCC qualified MMO and PAM personnel to provide pre-work watches before all installation activity during daylight and dark hours, respectively.

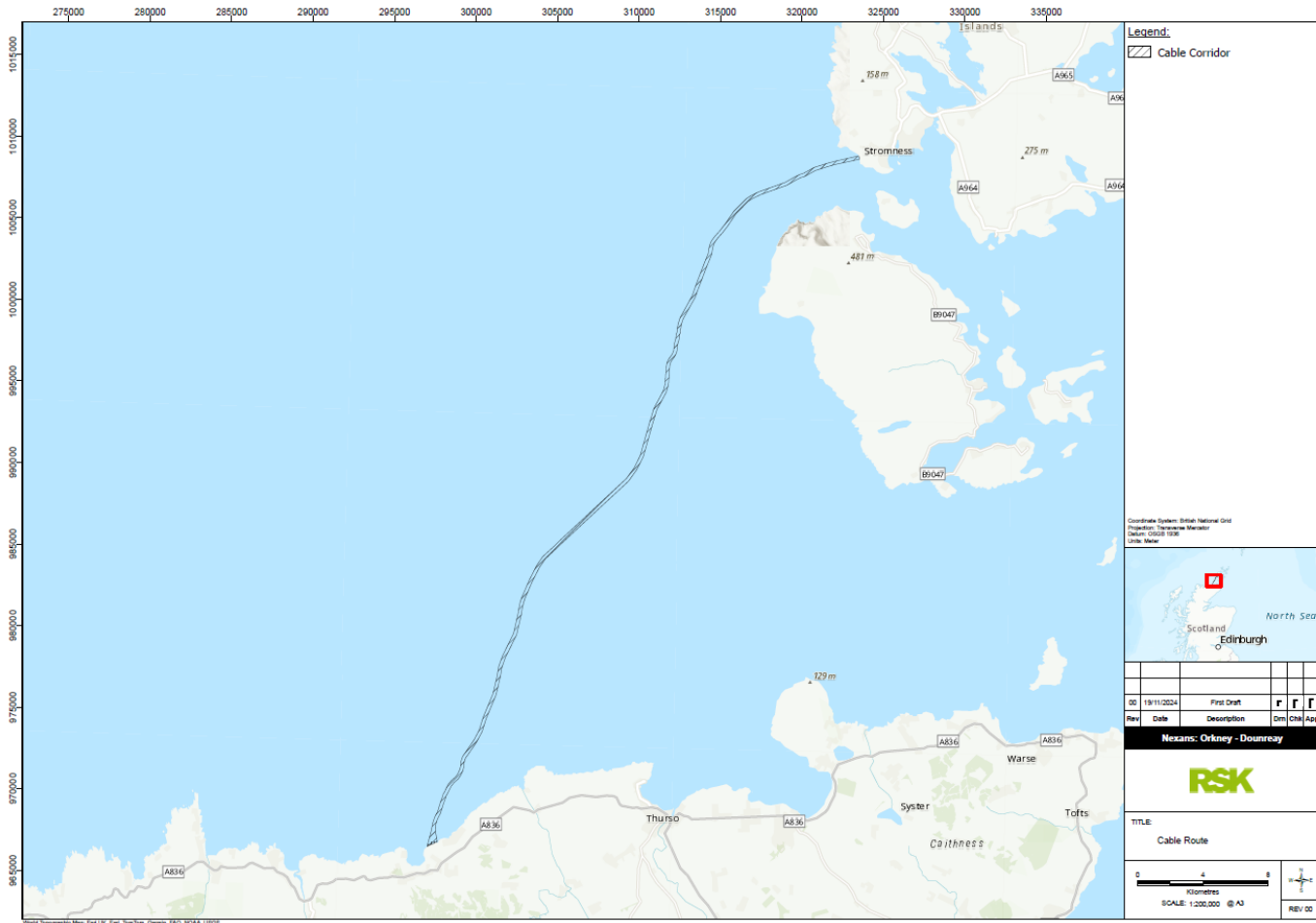


Figure 4-2: Offshore cable routing corridor.

Source: CES (2024)

## 5 Methodology

### 5.1 Screening process

#### 5.1.1 Overview

This section outlines the stepwise HRA screening process. European sites, to which the HRA process applies, include:

- SACs, including cSACs.
- SPAs, including pSPAs.
- Ramsar sites.

These sites may be designated for the following qualifying features:

- Annex I habitats (SAC).
- Marine mammals (SAC).
- Diadromous fish (SAC).
- Offshore ornithology (seabirds) (SPA).
- Wetlands of international importance (Ramsar sites).

#### 5.1.2 Identification of UK National Site Network sites

The identification of European sites of relevance to the project is undertaken with reference to their qualifying features. This requires consideration of the physical distance of the European site/qualifying features from the proposed activities associated with the survey, and the likely connectivity (interaction or impact pathway) between the site and qualifying features and the proposed activities.

Connectivity of European sites and qualifying features is site-specific and is dependent on life cycle, breeding, foraging and migratory characteristics associated with the qualifying features and potential effects of the project.

A precautionary 25 km screening boundary was applied to the cable corridor to initially identify European sites that may be of relevance to the pre-lay survey and construction activities. In recognition of the significant ranges of some highly mobile or migratory species, exceptions were made for European sites with marine mammal, seabird and diadromous fish features, for which there may be connectivity with the project. The distances chosen were considered as an appropriate distance for inclusion in this screening and reflects the foraging and migratory ranges where appropriate:

- Distances for marine mammals were defined on a species basis and utilised marine mammal Management Units (MU) [12] (see Section 6.2.3).
- Diadromous fish sites were defined by Atlantic salmon (*Salmo salar*, hereafter referred to as salmon) migration routes (see Section 6.2.4).
- SPA sites to be considered were subject to the foraging ranges of certain species [13, 14] (see Section 6.3).

Terrestrial/freshwater habitats have not been considered within this HRA Report due to the project location and the consideration of aspects below MHWS. However, consideration will be given to the freshwater pearl mussel (*Margaritifera margaritifera*) due to their association with salmon. Otters (*Lutra lutra*) are noted as qualifying features of European sites and are considered within this HRA Report in relation to their use of the marine environment for foraging. LSE on the terrestrial components of the SACs such as those affecting the presence/availability of freshwater/holts will be considered as part of the onshore HRA documentation.

Ramsar sites will be considered where relevant to the activities associated with the survey. Whereby Sites of Special Scientific Interest (SSSI) overlap with SPA or SAC areas the potential for LSE will be considered concurrently for both sites.

### 5.1.3 Determination of LSE

Where potential connectivity between the pre-lay installation survey or construction of the project and qualifying features of European sites is identified, further appraisal is required to determine if the potential for LSE can be ruled out.

In order to rule out the potential for LSE, an assessment of impacts will be carried out in view of the conservation objectives for the relevant European sites and their qualifying features, as appropriate.

This determination of potential LSE combines information on the impact pathways and the conservation objectives for the qualifying features of the European sites. Where there is no potential for the conservation objectives to be impeded, potential LSE can be ruled out. Where there is reasonable doubt that a significant effect can objectively be ruled out, potential LSE must be concluded.

### 5.1.4 Integrity test

For any sites where the potential for LSE could not be ruled out, the effect on the integrity of the European site in respect to its Conservation Objectives was assessed.

## 6 Screening

### 6.1 Introduction

This section outlines the European sites that have been identified to have potential connectivity with the pre-installation survey and construction of the project, based on the approach set out in Section 3.2.1. These will be taken into account in the assessment of potential LSE.

### 6.2 Special Areas of Conservation (SACs)

#### 6.2.1 Overview

No European site directly overlaps the cable corridor; the Stromness Heaths and Coast SAC is located approximately 2.07 km away from the cable corridor. Other relevant SACs were identified based on an overlap with the 25 km general screening boundary, or by having highly mobile features as a primary reason for site selection. Table 6-1 and Figure 6-1 denote SACs of relevance to the survey identified using this approach.

Table 6-1: SAC sites of relevance to the project.

Notes: \*denotes features that are a primary reason for site selection.

\*\*distances are approximate to the closest point of the cable route corridor.

Species in bold denote features of sites that do not overlap directly with the cable corridor, but have potential connectivity based on the approach set out in Section 6.2.

Site (site code)	Feature	Distance to cable route (km)**
Stromness Heaths and Coast SAC (UK0013589)	Vegetated sea cliffs of the Atlantic and Baltic Coasts	2.07
Hoy SAC (UK0012791)	Vegetated sea cliffs of the Atlantic and Baltic Coasts	2.15
Caithness and Sutherland Peatlands SAC (UK0013602)	Otter ( <i>Lutra lutra</i> )	3.58
Loch of Stennes SAC/SSSI (UK0014749/135898)	Lagoons	4.75
River Thurso SAC (UK0030264)	Atlantic salmon ( <i>Salmo salar</i> )	12.39
Strathy Point SAC (UK0030066)	Vegetated sea cliffs of the Atlantic and Baltic Coasts	13.56
River Naver SAC (UK0030260)	<b>Atlantic salmon (<i>Salmo salar</i>)</b> Freshwater pearl mussel ( <i>Margaritifera margaritifera</i> )	25.67
River Borgie SAC/SSSI (UK0012995/170074)	<b>Atlantic salmon (<i>Salmo salar</i>)</b> Freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) Otter ( <i>Lutra lutra</i> )	28.91

Site (site code)	Feature	Distance to cable route (km)**
Faray and Holm of Faray SAC/SSSI (UK0017096/169832)	<b>Grey seal (<i>Halichoerus grypus</i>)</b>	38.90
Sanday SAC (UK0030069)	<b>Harbour seal (<i>Phoca vitulina</i>)</b> Intertidal mudflats and sandflats	49.41
Moray Firth SAC (UK0019808)	<b>Bottlenose dolphin (<i>Tursiops truncatus</i>)</b> Sandbanks which are slightly covered by seawater all the time	51.69
Inner Hebrides and the Minches SAC (UK0030393)	<b>Harbour porpoise (<i>Phocoena phocoena</i>)</b>	100.03
Southern North Sea SAC (UK0030395)	<b>Harbour porpoise (<i>Phocoena phocoena</i>)</b>	439.45

Sources: Natura 2000 Viewer; JNCC Marine Protected Area Mapper; NatureScot SiteLink

Note: dashes indicate where sites are located outside of the screening boundary for the noted species.

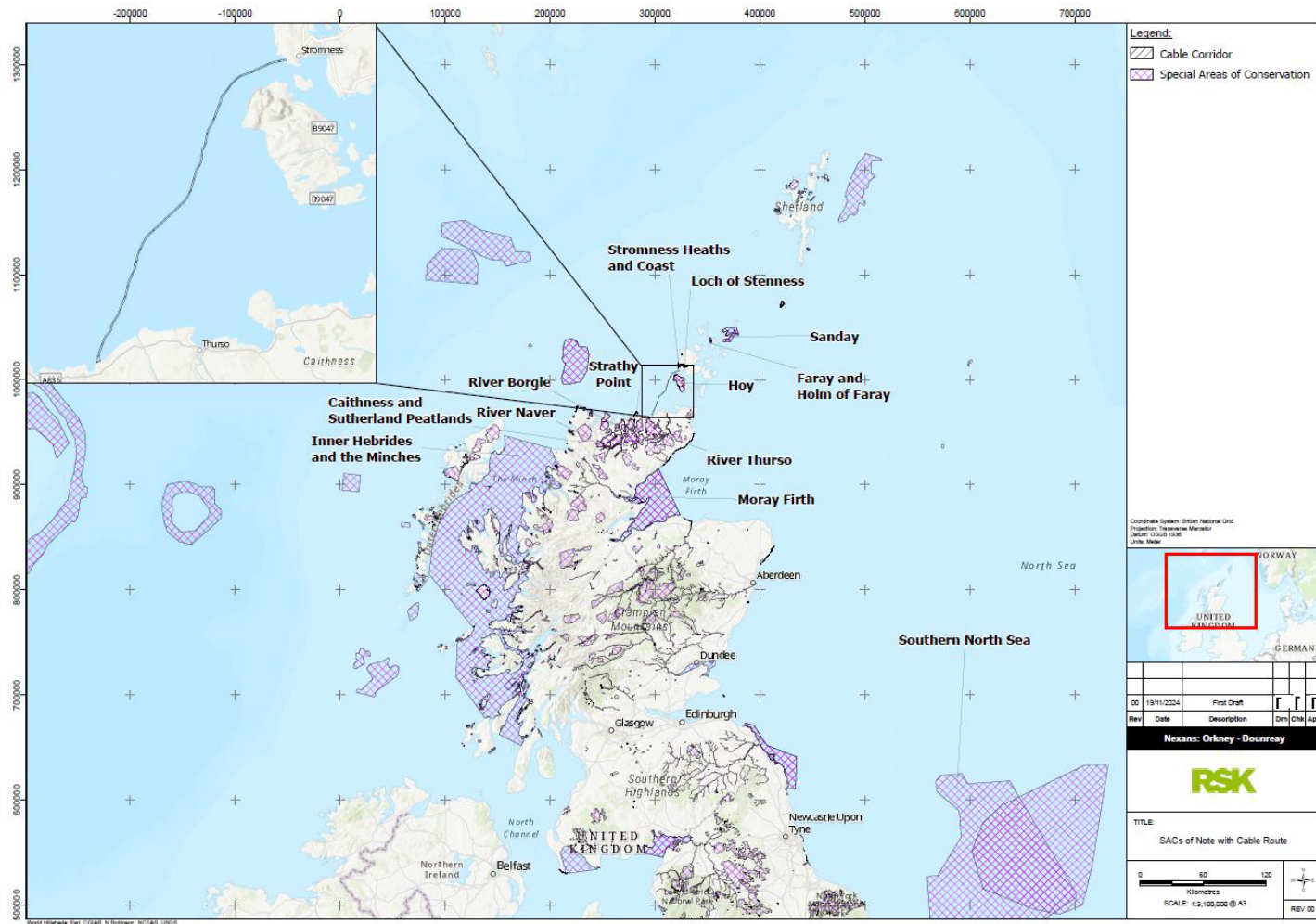


Figure 6-1: SAC sites of relevance.

### 6.2.2 Annex I habitat features

SACs with Annex I habitat features are screened in/out of the HRA based on a Zone of Influence (ZOI) of potential effects of the pre-lay installation survey and construction of the project. This is considered to extend up to a maximum of 10 km from the cable corridor. In the context of Annex I habitats the majority of effects occur within the immediate footprint of the cable corridor, however sediment disturbance generated during the pre-lay installation survey or construction works may result in adverse effects on water quality and generate smothering effects where sediments resettle, this effect will be exacerbated should piling be required. These effects may extend beyond the immediate cable corridor footprint. Additionally, there may be direct smothering of Annex I habitat features should the cable be laid directly atop of such habitats.

The Stromness Heaths and Coasts and Hoy SAC, located 2.07 and 2.15 km away from the cable corridor respectively are both designated for vegetated sea cliffs of the Atlantic and Baltic Coasts and onshore qualifying features. The Strathy Point SAC, located 13.56 km from the cable corridor is also noted for its vegetated sea cliffs of the Atlantic and Baltic Coasts, however this is located just outside of the 10 km screening boundary. The Loch of Stennes SAC/SSSI (4.75 km away), is designated for lagoons.

### 6.2.3 Annex II marine mammal features

SACs with marine mammal Annex II species features will be considered in the HRA where the species' ranges may overlap with the cable corridor. Marine mammal species features of European sites that may be relevant are:

- Harbour porpoise (*Phocoena phocoena*).
- Bottlenose dolphin (*Tursiops truncatus*).
- Grey seal (*Halichoerus grypus*).
- Harbour seal (*Phoca vitulina*).

As an Annex II species feature of the Caithness and Sutherland Peatlands SAC, otter are also considered as a marine mammal feature in the HRA, their range extends across terrestrial and coastal environments.

The mobile nature of marine mammal species means that they range beyond and utilise areas outside of the boundaries of sites for which they are Annex II features. Activities outside the boundaries of European sites therefore may still have the potential to impact marine mammal features of SACs, even where the relevant SACs are located some distance away from the cable corridor. Such connectivity can be challenging to define or assess, so to provide a consistent framework, impacts on marine mammal populations are managed and assessed through the implementation of MUs, defined by the UK Inter-Agency Marine Mammal Working Group (IAMMWG) [12]. The MUs for species relevant to the HRA are presented in Table 6-2.

The MU for harbour porpoise that overlaps the cable corridor is the North Sea (NS) MU (comprising International Council for the Exploration of the Sea (ICES) Subareas 4, Division 7d and part of Division 3a (Skagerrak and northern Kattegat)) [9, 15]. Though individual harbour porpoise have been shown to undertake extensive migrations [16], it is generally recognised that harbour porpoise do not undertake coordinated migrations; instead their movements appear to be focussed on inshore-offshore movements, rather than north-south or east-west [17]. Therefore it is assumed that individuals that occur in northern Scotland and Orkney waters are distinct population(s) that move between inshore and offshore regions surrounding the isles. Therefore these populations are deemed less likely to interact with SACs extending far into the southern North Sea. Based on the above, transboundary sites<sup>8</sup> were not considered within this HRA Report, emphasis was instead placed on sites on the northern North Sea portion of the NS MU (ICES Subarea IVa).

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<sup>8</sup> Those outside of the UK.

Bottlenose dolphins have two distinct ecotypes; offshore and coastal. It is possible that both of these ecotypes may overlap with the cable corridor and/or its ZOI. Only the Coastal East Scotland (CES) MU will be considered within this HRA Report [12, 15].

Part 6 of the Marine (Scotland) Act 2010 enforces the application of seal MU's around Scotland; these areas are East Scotland, Moray Firth, North Coast and Orkney, Shetland, South West Scotland, West Scotland and Western Isles [18, 19]). Harbour seals typically forage within 30 to 50 km of the coastline; they generally forage in proximity to their haul-out sites [20]. Grey seals however can forage over 100 km from their haul-out sites, though localised regions of high densities occur closer to haul-out sites [21]. Past projects/plans have utilised a screening boundary of 20 km for grey seals, however a precautionary approach has been taken within this HRA Report; a screening boundary of 75 km will subsequently be applied for both common and grey seals.

Ranges of otter often differs between male and females; freshwater males tend to occupy larger ranges of up to 40 km, whilst females utilise an overall smaller area [22]. Coastal individuals tend to have much smaller home ranges and forage within 10 km of water [22, 23]. As the Caithness and Sutherland Peatlands SAC is largely onshore and coastal it is anticipated that otters typically forage within 20 km of their home range at this site [22].

Table 6-2: Search area used to identify SAC sites of relevance.

Species	Search area	Rationale
Harbour porpoise ( <i>Phocoena phocoena</i> )	NS MU	The NS MU overlaps the cable corridor, therefore it will be utilised to inform the screening boundary for harbour porpoise.
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	CES MU	The CES MU overlaps the cable corridor. It will therefore inform the screening boundary for bottlenose dolphin.
Grey seal ( <i>Halichoerus grypus</i> )	75 km radius	Grey seals can forage over greater distances from their haul-out sites, however localised high densities occur closer to such sites (especially during breeding season) [19].
Harbour seal ( <i>Phoca vitulina</i> )	75 km radius	Harbour seals typically forage within 30 to 50 km of their haul-out sites. There may also be localised areas of higher densities closer to haul-out sites [19].
European otter ( <i>Lutra lutra</i> )	20 km radius	Otters typically forage within 20 km of their home range at this site due to the coastal / inshore nature

The Faray and Holm of Faray SAC/SSSI is located 38.90 km from the cable corridor and is designated for grey seal. The Sanday SAC is designated for harbour seal and is located within 49.41 km of the cable corridor. Bottlenose dolphin are noted as qualifying features of the Moray Firth SAC (51.59 km away from the cable corridor), which falls within the CES MU; harbour porpoise of the Southern North Sea SAC are within the NS MU, located over 400 km from the cable corridor. The Inner Hebrides and Minches SAC was also considered in this HRA Report, designated for harbour porpoise; whilst located outside of the NS MU, due to distance potential connectivity of individuals from the cable corridor cannot be ruled out.

Otters, whilst not solely marine, are qualifying features of the Caithness and Sutherland Peatlands SAC. This site is located 3.58 km from the cable corridor. They are further noted as features of the River Borgie SAC/SSSI, however this is located 28.91 km from the cable corridor, outside their expected home range.

#### 6.2.4 Annex II diadromous fish features

Annex II diadromous fish features will be screened in/out of the HRA for the survey based on the migratory behaviour of the species. Salmon spend early life stages in freshwater, prior to migrating to

sea as smolts. They later return to rivers to spawn after one (one-sea-winter; 1SW) or more (multi-sea-winter; MSW) winters at sea [24].

Freshwater pearl mussel has a symbiotic relationship with salmon. The early life cycle is spent attached to the gills of young salmon; individuals are therefore reliant on salmon for population sustainability and juvenile recruitment. Accordingly, this will be considered in parallel in the determination of LSE on European sites with salmon noted as a qualifying feature.

Scotland has up to 400 salmon rivers, including the River Tay, River Dee, River Spey and River Tweed. Salmon return to Scottish waters from a range of directions, however, given the known distribution of marine feeding, individuals will likely have a northerly and westerly bias. It is possible that fish could return directly to the east coast of Scotland travelling between Orkney and Shetland or to the east of Shetland. However, the lack of recorded salmon fisheries on Orkney or Shetland and the lack of Scottish fish captures in Norwegian fisheries suggest that this may not be common [25].

The River Thurso SAC, River Naver SAC and River Borgie SAC/SSSI, support significant salmon Atlantic salmon (*Salmo salar*) populations. Given the distance of the sites from the survey, it is plausible that individuals originating from these European sites may overlap with the cable corridor at any given time. In tandem, the River Naver and River Borgie SAC are also designated for freshwater pearl mussel.

No European sites that note lamprey or European eel (*Anguilla anguilla*) are located within proximity (within 50 km) to the survey area. Therefore, such species are not assessed further within this HRA Report.

### 6.2.5 Potential pathways for LSE

A number of potential pathways for effects on Annex I habitat and Annex II marine mammal features of European sites have been identified.

The potential pathways for effects on Annex I habitat features are as follows:

- Disturbance to the seabed.
- Marine discharges (planned).
- Marine releases (accidental).

The potential pathways for effects on Annex II diadromous fish features are as follows:

- Disturbance to the seabed.
- Marine discharges (planned).
- Marine releases (accidental).
- Underwater noise.

The potential pathways for effects on Annex II marine mammal features are as follows:

- Marine discharges (planned).
- Marine releases (accidental).
- Physical presence of vessel(s).
- Underwater noise (continuous and impulsive)<sup>9</sup>.

#### 6.2.5.1 Disturbance to the seabed

Seabed habitats and benthic species may be disturbed by construction of the project through cable installation; there will be temporary disturbance to sediments, alongside localised smothering and/or habitat loss.

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<sup>9</sup> Vessel noise is classified as continuous noise while geophysical survey equipment outputs are classified as impulsive noise.

Direct disturbance to the seabed and habitat loss is an anticipated consequent of the construction of the project, encompassing 10.74 km<sup>2</sup>.

The recoverability of sediments in the marine environment is largely dependent on sediment type and energy of the benthic environment. Higher energy environments comprised of sandy sediments are anticipated to recover quicker than coarser habitat types in deeper areas. The majority of sediments and associated habitats of relevance to the survey areas comprise coarse sediments, sands and rock, therefore there may be limited recoverability with respect to the coarser sediments.

Alongside direct disturbance, it is anticipated that there will be increases in suspended sediment concentrations over the duration of the survey and construction. This may directly lead to reduced visual acuity and subsequent declines in foraging success for mobile species.

#### 6.2.5.2 Marine discharges

Chemical or hydrocarbon discharges have potential to trigger serious environmental implications. Discharges may lead to reductions in water quality and increase turbidity in the surrounding environment. Indirect effects to Annex I habitats, diadromous fish and marine mammal species through reduced fitness, smothering, reduction of available prey species and reductions in visual acuity impacting foraging success may also occur.

However, only routine vessel discharges regulated per MARPOL Regulations are expected as part of the survey scope.

#### 6.2.5.3 Marine releases

Accidental pollution (e.g., spills and contaminant releases) may occur as a result of the use of vessels associated with the project. Pollution events may lead to direct effects on Annex I habitats and diadromous fish and marine mammal species through contact with contaminants resulting in reduced functioning, physical injury or direct mortality. Alternatively, accidental pollution may indirectly affect species through the reduction of available prey species, through ingestion of contaminated prey and/or reduction of prey species survival rates.

The loss of fuel/oils used for generators/equipment lubrication from vessels is the main risk of accidental marine release.

#### 6.2.5.4 Physical presence of vessel(s)

The presence of vessel(s) has the capacity to cause disturbance or pose a collision risk to marine mammals.

Marine mammals are vulnerable to collisions from vessels. Vessel strikes are a known cause of injury and/or mortality in marine mammals [26], with collisions potentially occurring with vessels of all sizes. The more serious incidents tend to be caused by very large vessels, with large slow-moving whales considered most susceptible to vessel strike. Vessels going at speeds of 14 knots or more are also more likely to cause incidents. Injuries sustained can include fracturing, bruising, nicks or slicing off parts of fins, and the most serious accidents can result in death of the animal, although death may not be immediate [27].

#### 6.2.5.5 Underwater noise

Survey vessels will generate elevated underwater noise levels, as will the geophysical survey activities themselves. Marine mammals and certain fish species are sensitive to noise, and therefore have the potential to be disturbed via underwater noise sources. Impacts may include direct changes in behaviour (i.e., avoidance) or indirect disturbance (i.e., masking).

Continuous noise from the vessels and noise associated with construction of the project are unlikely to cause significant effects on the qualifying features of the SACs (marine mammals or fish), as the species are likely to be habituated to vessel noise. Therefore a small increase in the numbers of vessels present will not cause more than temporary disturbance, which overall is considered negligible.

Impulsive underwater noise sources (in this case the geophysical survey equipment) have the capacity to cause significant impacts on marine mammal and noise sensitive fish species. Fish are more sensitive to lower frequency sounds, yet their sensitivity declines rapidly above approximately 200 Hz for most species. It is also important to consider that not all species are sound pressure

sensitive [28]. Additionally certain species are known to be sensitive to just particle motion (e.g., Atlantic mackerel (*Scomber scombrus*)) and therefore impacts are likely to vary between species [28]. Little is known regarding how fish respond to impulsive sounds, with most evidence concluded in a laboratory setting, where natural behaviours are often absent.

Marine mammals are considered to be most sensitive to impulsive sounds due to their dependency on hearing for navigation, foraging and social communication. Harbour porpoise, grey seals and harbour seals are the most common species in relation to the survey areas, and therefore potentially the most vulnerable to noise impacts. Otters are considered less sensitive to underwater noise as they are more adapted to in air hearing.

Harbour porpoise are sensitive to high frequency sounds, with their hearing sensitivity range between 16–140 kHz [30]; they are therefore unlikely to detect the low frequency SBP or USBL positioning systems. As such, no significant impacts are expected for harbour porpoise with respect to masking and behavioural disturbance.

There are no species-specific audiograms for grey or harbour seals, however similar species are known to be sensitive to sounds within the range of 1–75 kHz [31]. Seals of both species may therefore be impacted due to detection of the SBP and USBL positioning system sound source via disturbance and/or masking. Therefore, there is potential for temporary avoidance of the cable corridor for the duration of the SBP surveys.

#### **6.2.6 Assessment of potential LSE**

Table 6-3 presents an assessment of the potential for the pre-lay installation survey and project construction activities to lead to LSE on Annex I habitats, Annex II diadromous fish features and Annex II marine mammal features of the relevant European sites (SACs) identified in the preceding sections. This includes the justification where potential LSE has been ruled out for sites and/or pathways.

There was an overarching justification that potential LSE could not be ruled out for the Inner Hebrides and the Minches SAC, Southern North Sea SAC, Moray Firth SAC, Sanday SAC and Faray and Holm of Faray SAC/SSSI due to marine mammal features and potential LSE resultant of impulsive underwater noise originating from the geophysical survey. However, the other European sites for Annex I habitats, Annex II diadromous fish and Annex II marine mammal features have been screened out of the HRA process and will not be included in the RIAA.

Table 6-3: Determination of potential LSE for SACs (Grey = LSE Ruled Out).

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Vegetated sea cliffs of the Atlantic and Baltic Coasts Lagoons	Stromness Heaths and Coast SAC Hoy SAC Strathy Point SAC	Disturbance to the seabed	Concrete mattress installation Cable and remedial rock installation Nearshore cable protection	LSE ruled out	Direct disturbance and habitat loss will only occur directly within the cable corridor. Indirect increases in suspended sediment concentrations are not expected to impact the qualifying features of the SAC due to negligible impact pathways.  Therefore the potential for LSE has been ruled out for the three sites in relation to Annex I habitats.
		Marine discharges	All		There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during the construction of the project.  Therefore the potential for LSE has been ruled out for the three sites in relation to Annex I habitats.
		Marine releases			Loss of fuel from vessels is the main risk of accidental marine release.  The natural properties of marine diesel (low in asphaltene and fast evaporation) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.  Therefore the potential for LSE has been ruled out for the three sites in relation to Annex I habitats.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Otter ( <i>Lutra lutra</i> )	Caithness and Sutherland Peatlands SAC	Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during construction of the project .</p> <p>Therefore LSE has been ruled out for otters associated with the Caithness and Sutherland Peatlands SAC.</p>
		Marine releases			<p>Loss of fuel from vessels is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore LSE has been ruled out for otters associated with the Caithness and Sutherland Peatlands SAC.</p>
		Physical presence of vessel(s)			<p>During the short duration of survey and construction of the project, any vessel disturbance will be temporary and localised to the cable corridor. Additionally, otters largely utilise highly coastal areas and therefore overlap with the offshore environment is not foreseen to be significant. Otters are highly mobile and are anticipated to be able to readily avoid the vessels; additionally vessel presence is anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel presence.</p> <p>Therefore, LSE has been ruled out for otters associated with the Caithness and Sutherland Peatlands SAC.</p>
		Underwater noise			<p>Whilst otters can detect underwater noise, using sea otters as a proxy, it is anticipated that otters are primarily air adapted in relation to their hearing. They are also not expected to be specialised for detecting signals in background noise [32].</p> <p>Therefore, LSE has been ruled out for otters associated with the Caithness and Sutherland Peatlands SAC.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Atlantic salmon ( <i>Salmo salar</i> )	River Thurso SAC River Naver SAC River Borgie SAC/SSSI	Disturbance to the seabed	Concrete mattress installation Cable and remedial rock installation Nearshore cable protection	LSE ruled out	<p>Direct disturbance and habitat loss will only occur directly within the cable corridor.</p> <p>There is potential for individuals to overlap with the prey-lay installation survey and construction of the project. Individuals may therefore be impacted by increases in suspended sediment concentrations. However, the impact of suspended sediments is expected to be negligible, owed to the high levels of dispersion that is expected in the offshore environment. Any sediment that is resuspended is additionally anticipated to resettle in areas of similar habitats.</p> <p>Therefore the potential for LSE has been ruled out for these sites.</p>
		Marine discharges	All		<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during the construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for these sites.</p>
		Marine releases			<p>Loss of fuel from vessels is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for these sites.</p>
		Underwater noise (continuous)			<p>Vessels generate low, continuous levels of noise that is not anticipated to significantly disturb species. Additionally, vessel presence is anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel noise, which will absorb the additional noise from vessels associated with the project.</p> <p>Therefore, the potential for LSE has been ruled out for these sites.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Underwater noise (impulsive)	Geophysical survey		<p>There is potential for individuals originating from the SAC to be impacted by impulsive elevations in underwater noise associated with the pre-lay installation survey.</p> <p>Whilst diadromous fish are deemed sensitive to sound, their response to impulsive sound is largely hypothesised and lacking in understanding. Fish are not anticipated to be as sensitive to sound when compared with marine mammals. Additionally, considering the localised nature of sound source impact ranges (5 km) and the temporary nature of pre-lay survey, significant impacts are not foreseen.</p> <p>Therefore, the potential for LSE has been ruled out for these sites.</p>
Freshwater pearl mussel ( <i>Margaritifera margaritifera</i> )	River Naver SAC River Borgie SAC/SSSI	All pathways	All	LSE ruled out	<p>As no LSE are expected for salmon, impacts to freshwater pearl mussel are anticipated to be negligible.</p> <p>Therefore, the potential for LSE has been ruled out for this species for the two noted sites.</p>
Grey seal ( <i>Halichoerus grypus</i> )	Faray and Holm of Faray SAC/SSSI	Underwater noise (impulsive)	Geophysical survey	Potential for LSE cannot be ruled out	<p>There is potential for individuals originating from the SAC to be impacted by impulsive elevations in underwater noise associated with the pre-lay installation survey.</p> <p>Grey seal rely heavily on sound for communication, navigation and foraging. Therefore they are anticipated to be highly sensitive to impulsive sounds. Temporary behavioural disturbance may occur for individuals originating from this site and connectivity cannot be ruled out.</p> <p>As such the potential for LSE cannot be ruled out for these sites with respect to impulsive underwater noise.</p>
		Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during the construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for these sites.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine releases			<p>Loss of fuel from vessels is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for these sites marine releases.</p>
		Physical presence of vessel(s)			<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable corridor. Grey seals are generally sufficiently mobile to avoid vessels either in their path or moving towards them. Vessel presence is also anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel presence, minimising any disturbance.</p> <p>Additionally, the site is located a sufficient distance from the cable corridor, as such minimal impacts to the qualifying features are expected.</p> <p>Therefore the potential for LSE has been ruled out for these sites for vessel presence.</p>
		Underwater noise (continuous)			<p>Vessels generate low, continuous levels of noise that is not anticipated to significantly disturb species. Additionally, vessel presence is anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel noise, which will absorb the additional noise from vessels associated with the project.</p> <p>Therefore the potential for LSE has been ruled out for these sites for continuous underwater noise.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Harbour seal ( <i>Phoca vitulina</i> )	Sanday SAC	Underwater noise (impulsive)	Geophysical survey	Potential for LSE cannot be ruled out	<p>There is potential for individuals originating from the SAC to be impacted by impulsive elevations in underwater noise associated with the pre-lay installation survey.</p> <p>Harbour seal rely heavily on sound for communication, navigation and foraging. Therefore they are anticipated to be highly sensitive to impulsive sounds. Temporary behavioural disturbance may occur for individuals originating from this site and connectivity cannot be ruled out.</p> <p>As such the potential for LSE cannot be ruled out for this site with respect to impulsive underwater noise.</p>
		Marine discharges			<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during the construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for this site for marine discharges.</p>
		Marine releases	All	LSE ruled out	<p>Loss of fuel from vessels is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for this site for marine releases.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Physical presence of vessel(s)			<p>During the short duration of pre-lay survey and construction of the project any vessel disturbance will be temporary and localised to the cable corridor. Harbour seals are generally sufficiently mobile to avoid vessels either in their path or moving towards them. Vessel presence is also anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel presence, minimising any disturbance.</p> <p>Additionally, the site is located a sufficient distance from the survey, as such minimal impacts to the qualifying features are expected.</p> <p>Therefore the potential for LSE has been ruled out for this site for vessel presence.</p>
		Underwater noise (continuous)			<p>Vessels generate low, continuous levels of noise that is not anticipated to significantly disturb species. Additionally, vessel presence is anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel noise, which will absorb the additional noise from vessels associated with the project.</p> <p>Therefore the potential for LSE has been ruled out for this site for continuous underwater noise.</p>
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	Moray Firth SAC	Underwater noise (impulsive)	Geophysical survey	Potential for LSE cannot be ruled out	<p>There is potential for individuals originating from the SAC to be impacted by impulsive elevations in underwater noise associated with the pre-lay installation survey.</p> <p>Bottlenose dolphin rely heavily on sound for communication, navigation and foraging. Therefore they are anticipated to be highly sensitive to impulsive sounds. Temporary behavioural disturbance may occur for individuals originating from this site and connectivity cannot be ruled out.</p> <p>As such the potential for LSE cannot be ruled out for this site with respect to impulsive underwater noise.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during the construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for this site for marine discharges.</p>
		Marine releases			<p>Loss of fuel from vessels is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for this site for marine releases.</p>
		Physical presence of vessel(s)			<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable corridor. Bottlenose dolphins are generally sufficiently mobile to avoid vessels either in their path or moving towards them. Vessel presence is also anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel presence, minimising any disturbance.</p> <p>Additionally, the site is located a sufficient distance from the survey, as such minimal impacts to the qualifying features are expected.</p> <p>Therefore the potential for LSE has been ruled out for this site for vessel presence.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Underwater noise (continuous)			<p>Vessels generate low, continuous levels of noise that is not anticipated to significantly disturb species. Additionally, vessel presence is anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel noise, which will absorb the additional noise from vessels associated with the project.</p> <p>Therefore the potential for LSE has been ruled out for this site continuous underwater noise.</p>
Harbour porpoise ( <i>Phocoena phocoena</i> )	Inner Hebrides and the Minches SAC Southern North Sea SAC	Underwater noise (impulsive)	Geophysical survey	Potential for LSE ruled out	<p>There is potential for individuals originating from the SAC to be impacted by impulsive elevations in underwater noise associated with the pre-lay installation survey.</p> <p>Harbour porpoise rely heavily on sound for communication, navigation and foraging. Therefore they are anticipated to be highly sensitive to impulsive sounds. Temporary behavioural disturbance may occur for individuals originating from this site and connectivity cannot be ruled out.</p> <p>As such the potential for LSE cannot be ruled out for this site.</p>
		Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during the construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for the two sites for marine discharges.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine releases			<p>Loss of fuel from vessels is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the two sites for marine releases.</p>
		Physical presence of vessel(s)			<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable corridor. Harbour porpoise are generally mobile enough to avoid vessels either in their path or moving towards them. Vessel presence is anticipated to be moderate-high within the cable corridor, as such local species are expected to be habituated to vessel presence, minimising any disturbance.</p> <p>Additionally, the site is located a sufficient distance from the survey, as such minimal impacts to the qualifying features are expected.</p> <p>Therefore the potential for LSE has been ruled out for two sites for vessel presence.</p>
		Underwater noise (continuous)			<p>Vessels and construction of the project will generate continuous levels of noise that is not anticipated to significantly disturb species. Additionally, vessel presence is anticipated to be moderate-high within the survey areas, as such local species are expected to be habituated to vessel noise, which will absorb the additional noise from the vessels associated with the project.</p> <p>Therefore the potential for LSE has been ruled out for the two sites for continuous underwater noise levels.</p>

## 6.3 Special Protection Areas (SPA)

### 6.3.1 Overview

A number of studies have been carried out to determine typical and maximum foraging ranges for a variety of seabirds with the aim of establishing ranges within which to screen in European sites for relevant environmental assessments. Maximum foraging ranges for a number of breeding seabirds were calculated [13], and this work has been further updated [14]. The mean maximum foraging ranges (km; plus one standard deviation (SD) of the mean where available) have been used as the basis for screening European sites into the appraisal where the foraging ranges exceed the initial 25 km screening boundary applied to the cable route corridor (see Section 5). On this basis, additional sites have been included in this report for species known in across northern Scotland and Orkney, if their breeding foraging range may overlap with the survey area [33]. Table 6-4 presents the indicative breeding foraging ranges of the relevant marine birds with known presence in relation to the survey areas.

Table 6-4: Indicative foraging ranges for seabird species during the breeding season.

Species	Mean maximum ( $\pm 1$ SD) foraging range (km)
Arctic skua ( <i>Stercorarius parasiticus</i> )	3
Little tern ( <i>Sternula albifrons</i> )	5
Common eider ( <i>Somateria mollissima</i> )	22
European shag ( <i>Gulosus aristotelis</i> )	24
Common tern ( <i>Sterna hirundo</i> )	27
Cormorant ( <i>Phalacrocorax carbo</i> )	40
Arctic tern ( <i>Sterna paradisaea</i> )	41
Common gull ( <i>Larus canus</i> )	50
Sandwich tern ( <i>Thalasseus sandvicensis</i> )	58
Great black-backed gull ( <i>Larus marinus</i> )	73
Herring gull ( <i>Larus argentatus</i> )	86
Common guillemot ( <i>Uria aalge</i> )	154
Razorbill ( <i>Alca torda</i> )	165
Lesser black-backed gull ( <i>Larus fuscus</i> )	236
Atlantic puffin ( <i>Fratercula arctica</i> )	265
Black-legged kittiwake ( <i>Rissa tridactyla</i> )	301
European storm petrel ( <i>Hydrobates pelagicus</i> )	336
Northern gannet ( <i>Morus bassanus</i> )	509
Leach's storm petrel ( <i>Oceanodroma leucorhoa</i> )	657
Great skua ( <i>Catharacta skua</i> )	931
Northern fulmar ( <i>Fulmarus glacialis</i> )	1200
Manx shearwater ( <i>Puffinus puffinus</i> )	2366

Sources: [13, 14]

Seabirds disperse widely during the non-breeding seasons and are less constrained by central place foraging. While seabird species vary in the distances they move/migrate, a generic 15 km buffer has

been applied to determine LSEs for non-breeding seabirds that may be qualifying features of SPA, either as a named feature or a component of an assemblage feature [33]. This is considered a proportionate approach which recognises that while northern Scotland and Orkney may be utilised by non-breeding seabirds, it is only a small proportion of the wider area likely to be used for foraging and other activities outside of the breeding season.

Only Scottish European sites with a border to the northern North Sea were considered due to the low likelihood of birds travelling to and from other areas, when alternative, closer foraging areas are available. This excludes sites from England, Wales and transboundary designated sites including Ireland and Norway.

Table 6-5: SPA sites and features of relevance to the project.

Notes: \*primary reason for site selection.

\*\*distances are approximate.

Species in bold denote features of sites that do not overlap directly with the cable corridor, but have potential connectivity with the survey based on the approach set out in Section 6.3.

Site	Features*	Distance to cable route (km)**
Hoy SPA/SSSI (UK9002141)	Great skua ( <i>Catharacta skua</i> ), breeding Red-throated diver ( <i>Gavia stellata</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• Arctic skua (<i>Stercorarius parasiticus</i>).</li> <li>• Northern fulmar (<i>Fulmarus glacialis</i>).</li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• Black-legged kittiwake (<i>Rissa tridactyla</i>).</li> <li>• Great black-backed gull (<i>Larus marinus</i>).</li> <li>• Atlantic puffin (<i>Fratecula arctica</i>).</li> </ul>	0
North Caithness Cliffs SPA (UK9001181)	Common guillemot ( <i>Uria aalge</i> ), breeding Peregrine ( <i>Falco peregrinus</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• Northern fulmar (<i>Fulmarus glacialis</i>).</li> <li>• Atlantic puffin (<i>Fratecula arctica</i>).</li> <li>• Razorbill (<i>Alca torda</i>).</li> <li>• Black-legged kittiwake (<i>Rissa tridactyla</i>).</li> </ul>	0

Site	Features*	Distance to cable route (km)**
Scapa Flow SPA (UK9020321)	Black-throated diver ( <i>Gavia arctica</i> ), non-breeding Common eider ( <i>Somateria mollissima</i> ), non-breeding Great northern diver ( <i>Gavia immer</i> ), non-breeding Long-tailed duck ( <i>Clangula hyemalis</i> ), non-breeding Red-breasted merganser ( <i>Mergus serrator</i> ), non-breeding Red-throated diver ( <i>Gavia stellata</i> ), breeding European shag ( <i>Gulosus aristotelis</i> ), non-breeding Slavonian grebe ( <i>Podiceps auritus</i> ), non-breeding	0.27
North Orkney SPA (UK9020314)	Great northern diver ( <i>Gavia immer</i> ), non-breeding Red-throated diver ( <i>Gavia stellata</i> ), breeding Slavonian grebe ( <i>Podiceps auritus</i> ), non-breeding Velvet scoter ( <i>Melanitta fusca</i> ), non-breeding	13.25
Marwick Head SPA/SSSI (UK9002121/135799)	Common guillemot ( <i>Uria aalge</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>Black-legged kittiwake (<i>Rissa tridactyla</i>).</li> </ul>	14.65
Rousay SPA (UK9002371)	Arctic tern ( <i>Sterna paradisaea</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>Arctic skua (<i>Stercorarius parasiticus</i>).</li> <li>Northern fulmar (<i>Fulmarus glacialis</i>).</li> <li>Common guillemot (<i>Uria aalge</i>).</li> <li>Black-legged kittiwake (<i>Rissa tridactyla</i>).</li> </ul>	23.54
Pentland Firth Island SPA/SSSI (UK9001131/170043)	<b>Arctic tern (<i>Sterna paradisaea</i>), breeding</b>	27.91
Copinsay SPA/SSSI (UK9002151)	Seabird assemblage, breeding: <ul style="list-style-type: none"> <li><b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li><b>Great black-backed gull (<i>Larus marinus</i>).</b></li> <li><b>Common guillemot (<i>Uria aalge</i>).</b></li> <li><b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> </ul>	34.07

Site	Features*	Distance to cable route (km)**
East Caithness Cliffs SPA (UK9001182)	<p><b>Common guillemot (<i>Uria aalge</i>), breeding</b></p> <p><b>Herring gull (<i>Larus argentatus</i>), breeding</b></p> <p><b>Black-legged kittiwake (<i>Rissa tridactyla</i>), breeding</b></p> <p><b>Razorbill (<i>Alca torda</i>), breeding</b></p> <p>European shag (<i>Gulosus aristotelis</i>), breeding</p> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• Cormorant (<i>Phalacrocorax carbo</i>).</li> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Great black-backed gull (<i>Larus marinus</i>).</b></li> </ul>	40.61
Calf of Eday SPA (UK9002431)	<p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• Cormorant (<i>Phalacrocorax carbo carbo</i>).</li> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Great black-backed gull (<i>Larus marinus</i>).</b></li> <li>• <b>Common guillemot (<i>Uria aalge</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> </ul>	43.86
Cape Wrath SPA (UK9001231)	<p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Common guillemot (<i>Uria aalge</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> <li>• <b>Razorbill (<i>Alca torda</i>).</b></li> </ul>	58.90
Handa SPA (UK9001241)	<p><b>Common guillemot (<i>Uria aalge</i>), breeding</b></p> <p><b>Razorbill (<i>Alca torda</i>), breeding</b></p> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Great skua (<i>Stercorarius skua</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> </ul>	82.14

Site	Features*	Distance to cable route (km)**
Fair Isle SPA (UK9002091)	<p>Arctic tern (<i>Sterna paradisaea</i>), breeding</p> <p>Fair Isle wren (<i>Troglodytes troglodytes fridariensis</i>), breeding</p> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Northern gannet (<i>Morus bassanus</i>).</b></li> <li>• <b>Great skua (<i>Stercorarius skua</i>).</b></li> <li>• Arctic skua (<i>Stercorarius parasiticus</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> <li>• <b>Razorbill (<i>Alca torda</i>).</b></li> <li>• European shag (<i>Phalacrocorax aristotelis</i>).</li> </ul>	110.48
Seas off Foula SPA (UK9020331)	<p><b>Great skua (<i>Stercorarius skua</i>), breeding and non-breeding</b></p> <p>Seabird assemblage, breeding and non-breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>), breeding and non-breeding.</b></li> <li>• Arctic skua (<i>Stercorarius parasiticus</i>), breeding.</li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>), breeding.</b></li> <li>• <b>Common guillemot (<i>Uria aalge</i>), breeding and non-breeding.</b></li> </ul>	113.73
North Rona and Sula Sgeir SPA (UK9001011)	<p><b>Leach's storm petrel (<i>Oceanodroma leucorhoa</i>), breeding</b></p> <p>European storm petrel (<i>Hydrobates pelagicus</i>), breeding</p> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Northern gannet (<i>Morus bassanus</i>).</b></li> <li>• Great black-backed gull (<i>Larus marinus</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> </ul>	128.06

Site	Features*	Distance to cable route (km)**
<p>Troup, Pennan and Lion's Head SPA (UK9002471)</p>	<p><b>Common guillemot (<i>Uria aalge</i>), breeding</b> Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• <b>Razorbill (<i>Alca torda</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> </ul>	<p>128.58</p>
<p>Foula SPA (UK9002061)</p>	<p><b>Atlantic puffin (<i>Fratercula arctica</i>), breeding</b> Arctic tern (<i>Sterna paradisaea</i>), breeding <b>Common guillemot (<i>Uria aalge</i>), breeding</b> European shag (<i>Gulosus aristotelis</i>), breeding <b>Leach's storm petrel (<i>Oceanodroma leucorhoa</i>), breeding</b> Red-throated diver (<i>Gavia stellata</i>), breeding <b>Great skua (<i>Stercorarius skua</i>), breeding</b> Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• Arctic skua (<i>Stercorarius parasiticus</i>).</li> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Razorbill (<i>Alca torda</i>).</b></li> </ul>	<p>142.60</p>
<p>Sumburgh Head SPA (UK9002511)</p>	<p>Arctic tern (<i>Sterna paradisaea</i>), breeding Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Common guillemot (<i>Uria aalge</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> </ul>	<p>150.40</p>

Site	Features*	Distance to cable route (km)**
Shiant Isles SPA (UK9001041)	Barnacle goose ( <i>Branta leucopsis</i> ), non-breeding <b>Atlantic puffin (<i>Fratercula arctica</i>), breeding</b> <b>Razorbill (<i>Alca torda</i>), breeding</b> European shag ( <i>Gulosus aristotelis</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> </ul>	164.45
Buchan Ness to Collieston Coast SPA (UK9002491)	Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• European shag (<i>Gulosus aristotelis</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> </ul>	168.26
Noss SPA (UK9002081)	Common guillemot ( <i>Uria aalge</i> ), breeding <b>Northern gannet (<i>Morus bassanus</i>), breeding</b> Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> </ul>	181.37
Fowlsheugh SPA (UK9002271)	<b>Black-legged kittiwake (<i>Rissa tridactyla</i>), breeding</b> Common guillemot ( <i>Uria aalge</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• Razorbill (<i>Alca torda</i>).</li> </ul>	204.27

Site	Features*	Distance to cable route (km)**
Rum SPA (UK9001341)	Red-throated diver ( <i>Gavia stellata</i> ), breeding <b>Manx shearwater (<i>Puffinus puffinus</i>), breeding</b> Golden eagle ( <i>Aquila chrysaetos</i> ), breeding Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> </ul>	217.61
Ramna Stacks and Gruney SPA (UK9002021)	<b>Leach's storm petrel (<i>Oceanodroma leucorhoa</i>), breeding</b>	220.04
Fetlar SPA (UK9002031)	Arctic tern ( <i>Sterna paradisea</i> ), breeding <b>Great skua (<i>Stercorarius skua</i>), breeding</b> Seabird assemblage: <ul style="list-style-type: none"> <li>• Arctic skua (<i>Stercorarius parasiticus</i>).</li> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> </ul>	220.32
Flannan Isles SPA (UK9001021)	<b>Leach's storm petrel (<i>Oceanodroma leucorhoa</i>), breeding</b> Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> <li>• Razorbill (<i>Alca torda</i>).</li> </ul>	221.15
Canna and Sanday SPA (UK9001431)	Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> <li>• European shag (<i>Gulosus aristotelis</i>).</li> </ul>	230.08
Seas off St Kilda SPA (UK9020332)	<b>Northern gannet (<i>Morvus bassanus</i>), breeding</b> Seabird assemblage, breeding: <ul style="list-style-type: none"> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• <b>European storm-petrel (<i>Hydrobates pelagicus</i>).</b></li> </ul>	231.40

Site	Features*	Distance to cable route (km)**
<p>Outer Firth of Forth and St Andrews Bay Complex SPA (UK9020316)</p>	<p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Manx shearwater (<i>Puffinus puffinus</i>).</b></li> <li>• <b>Atlantic puffin (<i>Fratercula arctica</i>).</b></li> <li>• Arctic tern (<i>Sterna paradisaea</i>).</li> <li>• Common tern (<i>Sterna hirundo</i>).</li> <li>• <b>Northern gannet (<i>Morus bassanus</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• European shag (<i>Phalacrocorax aristotelis</i>).</li> </ul> <p>Seabird assemblage, non-breeding:</p> <ul style="list-style-type: none"> <li>• European shag (<i>Phalacrocorax aristotelis</i>).</li> <li>• Razorbill (<i>Alca torda</i>).</li> <li>• Atlantic puffin (<i>Fratercula arctica</i>).</li> <li>• Manx shearwater (<i>Puffinus puffinus</i>).</li> <li>• Black-legged kittiwake (<i>Rissa tridactyla</i>).</li> <li>• Little gull (<i>Hydrocoloeus minutus</i>).</li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• Common gull (<i>Larus canus</i>).</li> <li>• Black-headed gull (<i>Chroicocephalus ridibundus</i>).</li> </ul> <p>Waterfowl assemblage, non-breeding:</p> <ul style="list-style-type: none"> <li>• Velvet scoter (<i>Melanitta fusca</i>).</li> <li>• Slavonian grebe (<i>Podiceps auratus</i>).</li> <li>• Red-throated diver (<i>Gavia stellata</i>).</li> <li>• Goldeneye (<i>Bucephala clangula</i>).</li> <li>• Common scoter (<i>Melanitta nigra</i>).</li> <li>• Common eider (<i>Somateria mollissima</i>).</li> <li>• Red-breasted merganser (<i>Mergus serrator</i>).</li> <li>• Long-tailed duck (<i>Clangula hyemalis</i>).</li> </ul>	<p>235.38</p>

Site	Features*	Distance to cable route (km)**
<p>Hermaness, Saxa Vord and Valla Field SPA (UK9002011)</p>	<p><b>Northern gannet (<i>Morus bassana</i>), breeding</b></p> <p><b>Great skua (<i>Catharacta skua</i>), breeding</b></p> <p><b>Atlantic puffin (<i>Fratercula arctica</i>), breeding</b></p> <p>Red-throated diver (<i>Gavia stellata</i>), breeding</p> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• European shag (<i>Gulosus aristotelis</i>).</li> </ul>	<p>241.33</p>
<p>St Kilda SPA (UK9001031)</p>	<p>Atlantic puffin (<i>Fratercula arctica</i>), breeding</p> <p><b>European storm petrel (<i>Hydrobates pelagicus</i>), breeding</b></p> <p><b>Great skua (<i>Stercorarius skua</i>), breeding</b></p> <p><b>Leach's storm petrel (<i>Oceanodroma leucorhoa</i>), breeding</b></p> <p><b>Northern gannet (<i>Morus bassanus</i>), breeding</b></p> <p>Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• <b>Manx shearwater (<i>Puffinus puffinus</i>).</b></li> <li>• <b>Northern fulmar (<i>Fulmarus glacialis</i>).</b></li> <li>• Razorbill (<i>Alca torda</i>).</li> </ul>	<p>283.43</p>

Site	Features*	Distance to cable route (km)**
<p>Forth Islands SPA (UK9004171)</p>	<p>Arctic tern (<i>Sterna paradisaea</i>), breeding            Common tern (<i>Sterna hirundo</i>), breeding  <b>Northern gannet (<i>Morus bassanus</i>), breeding</b>            Lesser black-backed gull (<i>Larus fuscus</i>), breeding            Atlantic puffin (<i>Fratercula arctica</i>), breeding            Roseate tern (<i>Sterna dougallii</i>), breeding            Sandwich tern (<i>Thalasseus sandvicensis</i>), breeding            European shag (<i>Gulosus aristotelis</i>), breeding            Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• Cormorant (<i>Phalacrocorax carbo</i>).</li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• Herring gull (<i>Larus argentatus</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• Razorbill (<i>Alca torda</i>).</li> </ul>	<p>283.51</p>
<p>Mingulay and Berneray SPA (UK9001121)</p>	<p>Razorbill (<i>Alca torda</i>), breeding            Seabird assemblage, breeding:</p> <ul style="list-style-type: none"> <li>• European shag (<i>Gulosus aristotelis</i>).</li> <li>• <b>Northern fulmar (<i>Fulmaris glacialis</i>).</b></li> <li>• Common guillemot (<i>Uria aalge</i>).</li> <li>• <b>Black-legged kittiwake (<i>Rissa tridactyla</i>).</b></li> <li>• Atlantic puffin (<i>Fratercula arctica</i>).</li> </ul>	<p>297.20</p>
<p>Ailsa Craig SPA (UK9003091)</p>	<p><b>Northern gannet (<i>Morus bassanus</i>), breeding</b>            Lesser black-backed gull (<i>Larus fuscus</i>), breeding            Seabird assemblage:</p> <ul style="list-style-type: none"> <li>• Common guillemot (<i>Uria aalge</i>)</li> <li>• Herring gull (<i>Larus argentatus</i>)</li> <li>• Black-legged kittiwake (<i>Rissa tridactyla</i>).</li> </ul>	<p>375.63</p>

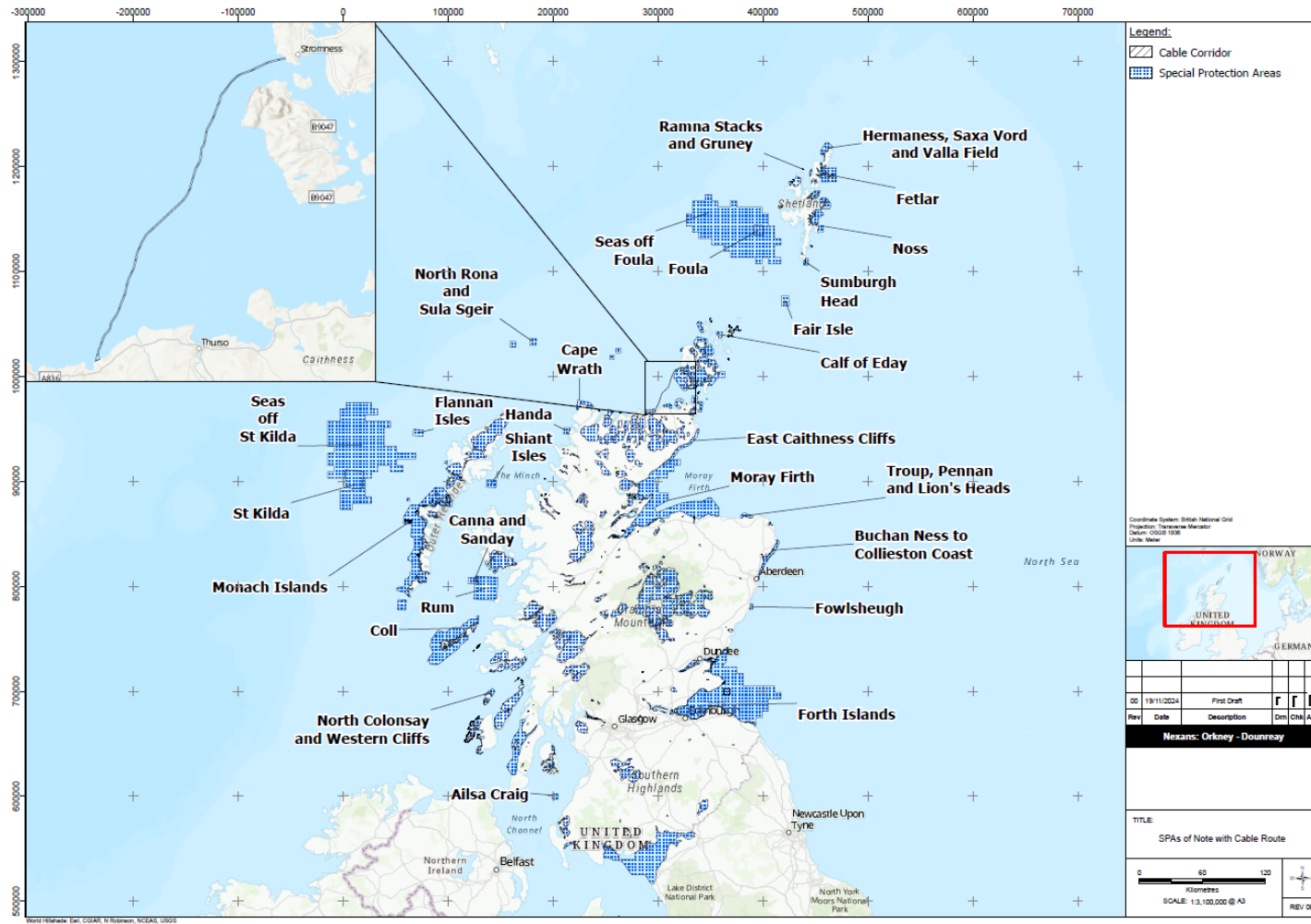


Figure 6-2: SPA sites of relevance to the survey.

### 6.3.2 Potential pathways for LSE

A number of potential pathways for effects on bird features of European sites have been identified. They are as follows:

- Marine discharges (planned).
- Marine releases (accidental).
- Physical presence of vessel(s).
- Underwater noise.

Chemical or hydrocarbon discharges have potential to trigger serious environmental implications. Discharges may lead to reductions in water quality and increase turbidity in the surrounding environment. Indirect effects to birds through reduced fitness, reduction of available prey species and reductions in visual acuity impacting foraging success may also occur. Seabirds would only be vulnerable when in contact with the sea surface, for example, during resting or foraging.

However, only routine vessel discharges regulated per MARPOL Regulations are expected as part of the survey scope.

#### 6.3.2.1 Marine releases

Accidental pollution (e.g., spills or leaks) may occur as a result of the use of vessels associated with the project. Pollution events may lead to direct effects on birds through contact as a result of preening or landing in slicks and associated reduced fitness or direct mortality. Alternatively, accidental pollution may indirectly affect species through the reduction of available prey species, through reducing prey species survival rates. Seabirds would only be vulnerable to releases when in contact with the sea surface, for example, during resting or foraging.

The loss of fuel from vessels associated with the project is the main risk of accidental marine release.

#### 6.3.2.2 Physical presence of vessel(s)

There will be temporary and localised increases in vessel traffic in the area of Orkney and Caithness due to the pre-lay installation survey and construction of the project. The physical presence of vessels will trigger disturbance, as will the low frequency in-air noise produced.

A number of species are particularly sensitive to disturbance (e.g. auk, diver, cormorant and seaduck species), both visual and auditory [34] that may result in displacement from the area. The level of disturbance will be greater for species that spend more time on the surface of the water; species with small or spatially restricted populations will also be more vulnerable. Disturbances can also result in changes to behaviour and lead to impacts on energy budgets of bird species; this may be of particular concern within the ongoing background context of avian flu.

Based on known species-specific sensitivities to disturbance from vessels [35, 36], and taking into account local populations, marine birds have been grouped into the following sensitivities:

- High sensitivity – common eider (*Somateria mollissima*) and European shag (*Gulosus aristotelis*).
- Medium sensitivity – red-throated diver (*Gavia stellata*), cormorant (*Phalacrocorax carbo*), black-legged kittiwake (*Rissa tridactyla*), herring gull (*Larus argentatus*), sandwich tern (*Thalasseus sandvicensis*), common tern (*Sterna hirundo*), little tern (*Sternula albifrons*), common guillemot (*Uria aalge*), razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*).
- Low sensitivity – Leach's storm petrel (*Oceanodroma leucorhoa*), European storm petrel (*Hydrobates pelagicus*), northern fulmar (*Fulmaris glacialis*), Manx shearwater, northern gannet (*Morus bassanus*), common gull (*Larus canus*), great black-backed gull (*Larus marinus*), lesser black-backed gull (*Larus fuscus*), Arctic tern (*Sterna paradisaea*).
- Negligible sensitivity – Arctic skua (*Stercorarius parasiticus*), great skua (*Catharacta skua*).

The disturbance response of seabirds depends on a variety of factors including which life cycle season the disturbance occurs in, duration, extent and intensity of the disturbance and how habituated species are to disturbance. Species show a spectrum of disturbance responses, with some species more resilient to others and responses varying depending on the marine activity [35]. Disturbance owing to the pre-lay installation survey and construction activities (physical presence of vessels) may displace seabirds resulting in temporary habitat loss due to reduced areas available for foraging, loafing and moulting.

### 6.3.2.3 Underwater noise

The potential exposure of seabirds to underwater noise varies largely with their feeding ecology, with some species at higher risk than others. Those that forage utilising plunge diving (i.e., gannets) or those that spend significant amounts of time underwater (i.e., auks and scoters) have the potential to be impacted via underwater noise. Other species (i.e., terns, gulls and shearwaters) have very shallow dive are less likely to be impacted inherently due to limited exposure. Waterfowl species do not fully immerse themselves in the water when they are feeding (e.g., wading, dabbling, etc.) and as such are not expected to be impacted by underwater noise as a result.

Species sensitivity to underwater noise has only been documented in few species, including the lesser scaup (*Aythya affinis*) and the cormorant [37]; species thresholds were not significantly different from that of odontocetes and pinnipeds at low frequencies. For those species that are sensitive, behavioural disturbance may be illustrated in the form of evasion [38].

### 6.3.3 Assessment of potential LSE

Table 6-6 presents an assessment of the potential for the project to lead to LSE on offshore ornithological features of European sites (SPAs) as a result of the survey. This includes the justification where potential LSE has been ruled out for sites and/or pathways. Potential LSE cannot be ruled out for offshore ornithological features of the following SPAs:

- Scapa Flow SPA.
- Hoy SPA/SSSI.
- Marwick Head SPA/SSSI.
- Rousay SPA/SSSI.
- North Caithness SPA.
- Copinsay SPA/SSSI.
- Calf of Eday SPA.
- East Caithness Cliffs SPA.
- Cape Wrath SPA.

However, further European sites can be screened out of any future RIAA, with supporting evidence provided in Table 6-6.

Table 6-6: Determination of potential LSE for SPAs.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Black-throated diver ( <i>Gavia arctica</i> )	Scapa Flow SPA	All pathways	All	LSE ruled out	<p>Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SPA may overlap with the cable route corridor.</p> <p>As a non-breeding population, birds are expected to be present at the SPA from early autumn, with numbers peaking in winter. The pre-lay installation survey and construction of the project are expected to begin during April, running until September (summer months), when significant populations of black-throated diver are not expected to be present at the SPA.</p> <p>Therefore the potential for LSE has been ruled out for Scapa Flow SPA for black-throated diver.</p>
Common eider ( <i>Somateria mollissima</i> )	Scapa Flow SPA	All pathways	All	LSE ruled out	<p>Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SPA may overlap with the cable route corridor.</p> <p>As a non-breeding population, birds are expected to be present at the SPA from early autumn, with numbers peaking in winter. The pre-lay installation survey and construction of the project are expected to begin during April (summer months), when significant populations of common eider are not expected to be present at the SPA.</p> <p>Therefore the potential for LSE has been ruled out for the Scapa Flow SPA for common eider.</p>
Great northern diver ( <i>Gavia immer</i> )	Scapa Flow SPA North Orkney SPA	All pathways	All	LSE ruled out	<p>Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SPA may overlap with the cable route corridor.</p> <p>As a non-breeding population, birds are expected to be present at the SPA from early autumn, with numbers peaking in winter. The pre-lay installation survey and construction of the project are expected to begin during April (summer months), when significant populations of great northern diver are not expected to be present at the SPA.</p> <p>Therefore the potential for LSE has been ruled out for these sites.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Long-tailed duck ( <i>Clangula hyemalis</i> )	Scapa Flow SPA	All pathways	All	LSE ruled out	Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SPA may overlap with the cable route corridor. As a non-breeding population, birds are expected to be present at the SPA from early autumn, with numbers peaking in winter. The pre-lay installation survey and construction of the project are expected to begin during April (summer months), when significant populations of long-tailed duck are not expected to be present at the SPA. Therefore the potential for LSE has been ruled out for the Scapa Flow SPA for long tailed duck.
Red-throated diver ( <i>Gavia stellata</i> )	Scapa Flow SPA Hoy SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	It is anticipated that individuals originating from the Scapa Flow SPA may potentially partially overlap with the cable route corridor, with maximum foraging ranges of up to 9 km [39]. There is direct overlap of the project with the Hoy SPA and therefore potential connectivity cannot be ruled out. Individuals are expected to begin to arrive at breeding sites from May onwards; the pre-lay installation survey and construction of the project are expected to take place from April to September (summer months). Whilst significant populations of red-throated diver are not expected to be present at the SPA during the survey or construction window due to the temporary nature of activities, potential connectivity cannot be ruled out. Red-throated divers are sensitive to disturbance via vessels and marine developments [36]. Therefore the potential for LSE cannot be ruled out for these two sites for red-throated diver.
		Underwater noise (impulsive)	Geophysical survey		
		Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project. Therefore the potential for LSE has been ruled out for these two sites for red-throated diver.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine releases			<p>Loss of fuel from the vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for these two sites for red-throated diver.</p>
		Underwater noise (continuous)			<p>It is unlikely that continuous noise sources (i.e., vessel noise and construction noise) will trigger LSE due to continuous low frequency sounds and the level of habituation consequent of moderate-high vessel presence within the cable route corridor. Individuals would have to be located within the immediate vicinity for disturbance to occur and this is deemed unlikely.</p> <p>Therefore the potential for LSE has been ruled out for these two sites for red-throated diver.</p>
	North Orkney SPA	All pathways	All	LSE ruled out	<p>Whilst this site is located within the screening boundary for the project (25 km), this site is expected to be outside of the foraging range for this species (9 km), as such no potential LSE is expected.</p> <p>Therefore the potential for LSE has been ruled out for the North Orkney SPA for red-throated diver.</p>
Slavonian grebe ( <i>Podiceps auritus</i> )	Scapa Flow SPA	All pathways	All	LSE ruled out	<p>Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SPA may potentially overlap with the cable route corridor.</p> <p>As a non-breeding population, birds are expected to be present at the SPA from early autumn, with numbers peaking in winter. The pre-lay installation survey and construction of the project are expected to begin during April (summer months), when no significant populations of Slavonian grebes are expected to be present at the SPA.</p> <p>Therefore the potential for LSE has been ruled out for the Scapa Flow SPA for the Slavonian grebe.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	North Orkney SPA				Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SPA may potentially overlap with the cable route corridor. However, this site is on the cusp of that boundary, as such the cable route corridor is not expected to be a central foraging range for individuals originating from this site. Therefore the potential for LSE has been ruled out for the North Orkney SPA for the Slavonian grebe.
Velvet scoter ( <i>Melanitta fusca</i> )	North Orkney SPA	All pathways	All	LSE ruled out	Based on the non-breeding screening boundary, it is anticipated that individuals originating from this SAC may potentially overlap with the cable route corridor. However, this site is on the cusp of that boundary, as such the cable route corridor is not expected to be a central foraging range for individuals originating from this site. Therefore the potential for LSE has been ruled out for the North Orkney SPA for the velvet scoter.
European shag ( <i>Gulosus aristotelis</i> )	Scapa Flow SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	During the short duration of activities associated with the project, any vessel disturbance will be temporary and localised to the cable route corridor. However, European shag are highly sensitive to disturbance from vessels, based on high displacement indices and a low habituation index [35, 36], and considering the distance of the site to the cable route corridor (0.27 km) potential connectivity cannot be ruled out for this impact. Therefore, the potential for LSE cannot be ruled out for the Scapa Flow SPA for the European shag.
		Underwater noise (impulsive)	Geophysical survey		European shag forage by pursuit diving and so there is potential for overlap with underwater noise impacts, specifically impulsive sounds associated with the pre-lay installation survey. They have a maximum dive depth of up to 45 m, therefore the potential for disturbance and subsequent LSE cannot be ruled out for this site with respect to impulsive sounds.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor during construction of the project. Therefore the potential for LSE has been ruled out for the Scapa Flow SPA for the European shag.
		Marine releases			Loss of fuel from vessels associated with the project is the main risk of accidental marine release. The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk. Therefore the potential for LSE has been ruled out for the Scapa Flow SPA for the European shag.
		Underwater noise (continuous)			It is unlikely that continuous noise sources (i.e., vessels and construction noise) sources will trigger LSE due to continuous low frequency sounds and the level of habituation consequent of moderate-high vessel presence within the cable route corridor. Individuals would have to be located within the immediate vicinity for disturbance to occur and this is deemed unlikely. Therefore the potential for LSE has been ruled out for the Scapa Flow SPA for the European shag.
Great skua ( <i>Catharacta skua</i> )	Hoy SPA/SSSI	Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project. Therefore the potential for LSE has been ruled out for the Hoy SPA/SSSI for the great skua.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine releases			<p>Loss of fuel from vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the Hoy SPA/SSSI for the great skua.</p>
		Physical presence of vessel(s)			<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor.</p> <p>Additionally, great skua are expected to have negligible sensitivity to vessel disturbance due to habituation and low incidences of aggregation around vessels [35, 36]</p> <p>Therefore the potential for LSE has been ruled out for the Hoy SPA/SSSI for the great skua.</p>
		Underwater noise			<p>Great skua are not expected to be sensitive to underwater noise due to the lack of time spent below the water's surface.</p> <p>Therefore the potential for LSE has been ruled out for the Hoy SPA/SSSI for the great skua.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	Fetlar SPA Hermaness, Saxa Vord and Valla Field SPA Seas off Foula SPA Foula SPA Fair Isle SPA Handa SPA St Kilda SPA	All pathways	All	LSE ruled out	<p>The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for great skua given the extensive foraging range of the species (931 km). As such potential for LSE is not expected.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for great skua.</p>
Arctic skua ( <i>Stercorarius parasiticus</i> )	Hoy SPA Rousay SPA	Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for the two sites designated for Arctic skua.</p>
		Marine releases			<p>Loss of fuel from vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the two sites designated for Arctic skua.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Physical presence of vessel(s)			<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor.</p> <p>Additionally, Arctic skua are expected to have negligible sensitivity to vessel disturbance due to habituation and low incidences of aggregation [32, 33]. Therefore the potential for LSE has been ruled out for the two sites designated for Arctic skua.</p>
		Underwater noise			<p>Arctic skua are not expected to be sensitive to underwater noise due to the lack of time spent below the water's surface.</p> <p>Therefore the potential for LSE has been ruled out for the two sites designated for Arctic skua.</p>
Northern fulmar ( <i>Fulmarus glacialis</i> )	Hoy SSSI Rousay SPA North Caithness SPA Copinsay SPA/SSSI Duncansby Head SSSI	Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for northern fulmar.</p>
		Marine releases			<p>Loss of fuel from vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for northern fulmar.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	Calf of Eday SPA East Caithness Cliffs SPA Cape Wrath SPA Handa SPA	Physical presence of vessel(s)			During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor.  Additionally, northern fulmar are expected to have low sensitivity to vessel disturbance due to habituation and low incidences of aggregation around vessels [35, 36].  Therefore the potential for LSE has been ruled out for the noted sites designated for northern fulmar.
		Underwater noise			Northern fulmar are not expected to be sensitive to underwater noise due to the lack of time spent below the waters surface.  Therefore the potential for LSE has been ruled out for the noted sites designated for northern fulmar.

	<p>Fetlar SPA  Hermaness,  Saxa Vord  and Valla  Field SPA  Noss SPA  Seas off Foula  SPA  Foula SPA  Sumburgh  Head SPA  Fair Isle SPA  North Rona  and Sula  Sgeir SPA  Troup,  Pennan and  Lion's Head  SPA  Buchan Ness  to Collieston  Coast SPA  Fowlsheugh  SPA  Shiant Isles  SPA  Flannan Isles  SPA  Seas off St  Kilda SPA  St Kilda SPA</p>	<p>All pathways</p>	<p>All</p>	<p>LSE ruled out</p>	<p>The distance of the noted sites from cable route corridor infer that the area is unlikely to be a central place foraging area for northern fulmar given the extensive foraging range of the species (1200 km). As such potential for LSE is not expected.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for northern fulmar.</p>
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Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	Mingulay and Berneray SPA				
Common guillemot ( <i>Uria aalge</i> )	Hoy SPA/SSSI Marwick Head SPA/SSSI Rousay SPA/SSSI North Caithness SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	<p>During the short duration of activities associated with the project, any vessel disturbance will be temporary and localised to the cable route corridor.</p> <p>However, common guillemot are moderately sensitive to disturbance from vessels, based on moderate displacement indices and a low habituation index [35, 36] and considering the distance of the sites to the survey area (&lt;60 km), potential connectivity cannot be ruled out for this impact.</p> <p>Therefore, the potential for LSE cannot be ruled out for the noted sites designated for common guillemot.</p>
	Copinsay SPA/SSSI Calf of Eday SPA	Underwater noise (impulsive)	Geophysical survey		<p>Common guillemot forage by pursuit diving and so there is potential for overlap with underwater noise impacts associated with the geophysical survey. They have a maximum dive depth of up to 180 m, therefore the potential for disturbance and subsequent LSE cannot be ruled out for the noted sites designated for common guillemot.</p>
	East Caithness Cliffs SPA Cape Wrath SPA	Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for common guillemot.</p>
		Marine releases			<p>Loss of fuel from vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for common guillemot.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Underwater noise (continuous)			<p>It is unlikely that continuous noise sources (i.e., vessels and construction noise) sources will trigger LSE due to continuous low frequency sounds and the level of habituation consequent of moderate-high vessel presence within the cable route corridor. Individuals would have to be located within the immediate vicinity for disturbance to occur and this is deemed unlikely.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for common guillemot.</p>
	Handa SPA Troup, Pennan and Lion's Head SPA Sumburgh Head SPA Foula SPA Seas off Foula SPA	All pathways	All	LSE ruled out	<p>The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for common guillemot given the extensive foraging range of the species (154 km). As such potential for LSE is not expected. A number of these sites are additionally on the cusp of the foraging range for this species.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for common guillemot.</p>
Black-legged kittiwake ( <i>Rissa tridactyla</i> )	Hoy SPA Marwick Head SPA/SSSI Rousay SPA/SSSI North Caithness SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor.</p> <p>However, black-legged kittiwake are moderately sensitive to disturbance from vessels, based on moderate displacement indices and a low habituation index [35, 36], and considering the distance of the sites to the cable route corridor (&lt;60 km), potential connectivity cannot be ruled out for this impact.</p> <p>Therefore, the potential for LSE cannot be ruled out for the noted sites designated for black-legged kittiwake.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	Copinsay SPA/SSSI Calf of Eday SPA East Caithness Cliffs SPA Cape Wrath SPA	Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project. Therefore the potential for LSE has been ruled out for the noted sites designated for black-legged kittiwake.
		Marine releases			Loss of fuel from vessels associated with the project is the main risk of accidental marine release. The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk. Therefore the potential for LSE has been ruled out for the noted sites designated for black-legged kittiwake.
		Underwater noise			Black-legged kittiwake are not expected to be sensitive to underwater noise due to the lack of time spent below the water's surface. Therefore the potential for LSE has been ruled out for the noted sites designated for black-legged kittiwake.

	<p>Hermaness, Saxa Vord and Valla Field SPA</p> <p>Noss SPA</p> <p>Foula SPA</p> <p>Sumburgh Head SPA</p> <p>Fair Isle SPA</p> <p>North Rona and Sula Sgeir SPA</p> <p>Troup, Pennan and Lion's Head SPA</p> <p>Handa SPA</p> <p>Buchan Ness to Collieston Coast SPA</p> <p>Fowlsheugh SPA</p> <p>Shiant Isles SPA</p> <p>Flannan Isles SPA</p> <p>Forth Islands SPA</p> <p>Outer Firth of Forth and St</p>	<p>All pathways</p>	<p>All</p>	<p>LSE ruled out</p>	<p>The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for black-legged kittiwake given the extensive foraging range of the species (301 km). As such potential for LSE is not expected.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for black-legged kittiwake.</p>
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Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	Andrews Bay Complex SPA St Kilda SPA Mingulay and Berneray SPA Rum SPA Canna and Sanday SPA				
Great black-backed gull ( <i>Larus marinus</i> )	Hoy SPA/SSSI Copinsay SPA/SSSI	Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project. Therefore the potential for LSE has been ruled out for the two sites designated for the great black-backed gull.
		Marine releases			Loss of fuel from vessels associated with the project is the main risk of accidental marine release. The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk. Therefore the potential for LSE has been ruled out for the two sites designated for the great black-backed gull.
		Physical presence of vessel(s)			During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor. Additionally, great black-backed gulls are expected to have low sensitivity to vessel disturbance due to habituation and low incidences of aggregation around vessels [35, 36]. Therefore the potential for LSE has been ruled out for the two sites designated for the great black-backed gull.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Underwater noise			<p>Whilst great black-backed gulls are known to partake in plunge diving behaviours, they only shallow dive up to 2 m. For an impact to occur individuals will be required to very close to the sound source, the project will predominately be in water depths in excess of 5 m. Great black-backed gulls are therefore are not expected to be sensitive to underwater noise due a lack of close interaction with the project.</p> <p>Therefore the potential for LSE has been ruled out for the two sites designated for the great black-backed gull.</p>
	East Caithness Cliffs SPA Calf of Eday SPA	All pathways	All	LSE ruled out	<p>The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for great black-backed gull given the extensive foraging range of the species (73 km). As such potential for LSE is not expected.</p> <p>Therefore the potential for LSE has been ruled out for the two sites designated for great black-backed gull.</p>
Atlantic puffin ( <i>Fratecula arctica</i> )	SPA North Caithness SPA Cape Wrath SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	<p>During the short duration of activities associated with the project, any vessel disturbance will be temporary and localised to the cable route corridor.</p> <p>However, Atlantic puffin are moderately sensitive to disturbance from vessels, based on moderately high displacement indices and low habituation indexes [35, 36], and considering the distance of the sites to the cable route corridor (&lt;60 km) potential connectivity cannot be ruled out for this impact.</p> <p>Therefore, the potential for LSE cannot be ruled out for the three noted sites designated for Atlantic puffin.</p>
		Underwater noise (impulsive)	Geophysical survey		<p>Atlantic puffin forage by pursuit diving and so there is potential for overlap with underwater noise impacts associated with the geophysical survey. They have a maximum dive depth of up to 50 m, therefore the potential for disturbance and subsequent LSE cannot be ruled out for the three noted sites designated for Atlantic puffin.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project. Therefore the potential for LSE has been ruled out for the three noted sites designated for Atlantic puffin.
		Marine releases			Loss of fuel from vessels associated with the project is the main risk of accidental marine release. The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk. Therefore the potential for LSE has been ruled out for the three noted sites designated for Atlantic puffin.
		Underwater noise (continuous)			It is unlikely that continuous noise sources (i.e., vessel and construction noise) sources will trigger LSE due to continuous low frequency sounds and the level of habituation consequent of moderate-high vessel presence within the cable route corridor. Individuals would have to be located within the immediate vicinity for disturbance to occur and this is deemed unlikely. Therefore the potential for LSE has been ruled out for the three noted sites designated for Atlantic puffin.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
	Hermaness, Saxa Vord and Valla Field SPA Noss SPA Seas off Foula SPA Foula SPA Fair Isle SPA North Rona and Sula Sgeir SPA Shiant Isles SPA Flannan Isles SPA Outer Firth of Forth and St Andrews Bay Complex SPA Seas off St Kilda SPA Canna and Sanday SPA	All pathways	All	LSE ruled out	The distance of the noted sites from the cable route corridor infer that the survey area is unlikely to be a central place foraging area for Atlantic puffin given the extensive foraging range of the species (265 km). As such potential for LSE is not expected.  Therefore the potential for LSE has been ruled out for the noted sites designated for Atlantic puffin.
Arctic tern ( <i>Sterna paradisaea</i> )	Rousay SPA/SSSI	Marine discharges	All	LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project.  Therefore the potential for LSE has been ruled out for the Rousay SPA/SSSI designated for Arctic tern.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine releases			<p>Loss of fuel from vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the Rousay SPA/SSSI designated for Arctic tern.</p>
		Physical presence of vessel(s)			<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridors.</p> <p>Additionally, Arctic tern are expected to have negligible sensitivity to vessel disturbance due to habituation and low incidences of aggregation around vessels [35, 36].</p> <p>Therefore the potential for LSE has been ruled out for the Rousay SPA/SSSI designated for Arctic tern.</p>
		Underwater noise			<p>Arctic tern are not expected to be sensitive to underwater noise due to the lack of time spent below the water's surface.</p> <p>Therefore the potential for LSE has been ruled out for the Rousay SPA/SSSI designated for Arctic tern.</p>
	Pentland Firth Island SPA/SSSI	All pathways	All	LSE ruled out	<p>The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for Arctic tern given the foraging range of the species, as the survey is located on the cusp of this range (41 km). As such potential for LSE is not expected.</p> <p>Therefore the potential for LSE has been ruled out for the Pentland Firth Islands SPA/SSSI designated for Arctic tern.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Razorbill ( <i>Alca torda</i> )	North Caithness SPA East Caithness Cliffs SPA Cape Wrath SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	<p>During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor.</p> <p>However, razorbill are moderately sensitive to disturbance from vessels, based on moderately high displacement indices and a low habituation index [35, 36], and considering the distance of the sites to the cable route corridor (&lt;60 km) potential connectivity cannot be ruled out for this impact.</p> <p>Therefore, the potential for LSE cannot be ruled out for the noted sites designated for razorbill.</p>
		Underwater noise (impulsive)	Geophysical survey		<p>Razorbill forage by pursuit diving and so there is potential for overlap with underwater noise impacts associated with the geophysical survey. They have a maximum dive depth of up to 140 m and on average dive up to 30 m. Therefore the potential for disturbance and subsequent LSE cannot be ruled out for the noted sites designated for razorbill.</p>
		Marine discharges	All	LSE ruled out	<p>There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for razorbill.</p>
		Marine releases			<p>Loss of fuel from vessels associated with the project is the main risk of accidental marine release.</p> <p>The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk.</p> <p>Therefore the potential for LSE has been ruled out for the noted sites designated for razorbill.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Underwater noise (continuous)			It is unlikely that continuous noise (i.e., vessel and construction noise) sources will trigger LSE due to continuous low frequency sounds and the level of habituation consequent of moderate-high vessel presence within the cable route corridor. Individuals would have to be located within the immediate vicinity for disturbance to occur and this is deemed unlikely.  Therefore the potential for LSE has been ruled out for the noted sites designated for razorbill.
	Foula SPA Troup, Pennan and Lion's Head SPA Handa SPA	All pathways	All	LSE ruled out	The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for razorbill given the extensive foraging range of the species (165 km). As such potential for LSE is not expected.  Therefore the potential for LSE has been ruled out for the noted sites designated for razorbill.
Leach's storm petrel ( <i>Oceanodroma leucorhoa</i> )	Foula SPA Ramna Stacks and Gruney SPA	All pathways	All	LSE ruled out	The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for Leach's storm petrel given the extensive foraging range of the species (657 km). As such potential for LSE is not expected.  Therefore the potential for LSE has been ruled out for the two sites designated for Leach's storm petrel.
Manx shearwarer ( <i>Puffinus puffinus</i> )	Outer Firth of Forth and St Andrews Bay Complex SPA Rum SPA St Kilda SPA	All pathways	All	LSE ruled out	The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for Manx shearwater given the extensive foraging range of the species (2,366 km). As such potential for LSE is not expected.  Therefore the potential for LSE has been ruled out for the noted three sites designated for Manx shearwater

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
Northern gannet ( <i>Morus bassana</i> )	Hermaness, Saxa Vord and Valla Field SPA Noss SPA Fair Isle SPA North Rona and Sula Sgeir SPA Seas off St Kilda SPA Forth Islands SPA St Kilda SPA Ailsa Craig SPA	All pathways	All	LSE ruled out	The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for northern gannet given the extensive foraging range of the species (509 km). As such potential for LSE is not expected.  Therefore the potential for LSE has been ruled out for the noted sites designated for northern gannet.
Herring gull ( <i>Larus argentatus</i> )	East Caithness Cliffs SPA	Physical presence of vessel(s)	All	Potential for LSE cannot be ruled out	During the short duration of pre-lay installation survey and construction of the project, any vessel disturbance will be temporary and localised to the cable route corridor.  However, herring gull are highly sensitive to disturbance from vessels, based on high displacement indices and a low habituation index [35, 36], and considering the distance of the site to the cable route corridor (40.72 km) potential connectivity cannot be ruled out for this impact.  Therefore, the potential for LSE cannot be ruled out for the East Caithness Cliffs SPA designated for herring gull.

Qualifying feature	European site(s)	Potential pathway for LSE	Project phase	Potential for LSE	Justification
		Marine discharges		LSE ruled out	There will be no permissible at sea chemical or hydrocarbon discharges during the pre-lay installation survey nor construction of the project. Therefore the potential for LSE has been ruled out for the East Caithness Cliffs SPA designated for herring gull
		Marine releases			Loss of fuel from vessels associated with the project is the main risk of accidental marine release. The natural properties of marine diesel (low in asphaltene and fast evaporation and dispersion) limit its persistence in the marine environment. Due to this and the low risk associated with an accidental release make this a low risk. Therefore the potential for LSE has been ruled out for the East Caithness Cliffs SPA designated for herring gull.
		Underwater noise			Whilst herring gull are known to partake in plunge diving behaviours, they only shallow dive up to 2 m. For an impact to occur individuals will be required to very close to the sound source, the project will be within water depths in excess of 5 m. Herring gulls are therefore are not expected to be sensitive to underwater noise due a lack of close interaction with the project. Therefore the potential for LSE has been ruled out for the East Caithness Cliffs SPA designated for herring gull.
European storm petrel ( <i>Hydrobates pelagicus</i> )	North Rona and Sula Sgeir SPA St Kilda SPA	All pathways	All	LSE ruled out	The distance of the noted sites from the cable route corridor infer that the area is unlikely to be a central place foraging area for European storm petrel given the extensive foraging range of the species (336 km). As such potential for LSE is not expected. Therefore the potential for LSE has been ruled out for the two sites designated for European storm petrel.

## 7 In-combination assessment

### 7.1 Introduction

This section includes an overview of the approach to identify and assess cumulative projects/plans that may need to be considered within a RIAA (if required).

### 7.2 Approach

The HRA process requires consideration of the potential effects on European sites from the project in-combination with other plans an/or projects. This in-combination assessment will consider projects that are reasonably foreseeable, including:

- Existing projects (either built or in construction).
- Approved projects, awaiting implementation.
- Proposals awaiting determination within the planning process.

Offshore activities and industries that will be considered within this in-combination assessment include, but are not limited to, the following:

- Marine renewables.
- Coastal projects.
- Marine aggregate extractions.
- Oil and gas activities.
- Carbon capture and storage.
- Subsea cables and pipelines.

Projects will be considered where there is sufficient publicly available information to conduct a meaningful assessment of in-combination effects. If there is a lack of sufficient information regarding relevant projects, they will not be considered further within the in-combination assessment. Projects over 40 km away were not considered due to the anticipated largely localised impacts of the project.

### 7.3 Assessment

The projects that are considered within this in-combination assessment are presented in Table 7-1.

Of the projects identified, cumulative impacts would be most likely to become significant consequent of construction of the OWF's. This would be due to potential pile driving posing risk to noise sensitive species when considered in combination with the pre-lay installation survey of the project. However, the likelihood for temporal overlap of the project with the noted OWF's is deemed unlikely considering the timeline of the project (i.e., pre-lay installation survey taking place in 2025). Additionally, there is limited perceived impact pathways for operational wave energy, tidal, cable, pipeline and aquaculture sites to induce cumulative impacts on receptors and associated European sites. Hence, projects identified below are not taken further into the RIAA.

Table 7-1: Projects considered or the in-combination assessment.

Development	Type	Status	Description	Distance (km)*	Start date	End date	Taken forward into the RIAA?
<b>Offshore wind farm (OWF)</b>							
Pentland Floating Offshore Wind Farm Highland Wind Ltd.	Floating OWF	Planning	100 MW Approximately 6 km off the coast of Dounreay 6–10 Wind Turbine Generator (WTG) (capacity 10–16 MW)	6.6	-	-	N
West of Orkney Offshore Wind Power Ltd.	OWF	Planning	2 GW Up to 125 WTG	22.9	Onshore construction 2027 Offshore construction 2028 Operational 2029	50 year consent	N
<b>Tidal stream</b>							

Development	Type	Status	Description	Distance (km)*	Start date	End date	Taken forward into the RIAA?
Shapinsay Sound Test Site (Head of Holland) European Marine Energy Centre (EMEC)	Tidal	Operational	The following is a list of EMEC clients who have deployed devices at the site: Flumill: Installed 2011, decommissioned 2012 CoRMaT 500 kW, Nautricity: Installed 2014, decommissioned 2014 ATIR Prototype, Magallanes: Installed November 2014, decommissioned East Coast Oil and Gas Engineering (EC-OG), Subsea Power Hub: Installed April 2017, removed November 2017 to undergo detailed performance analysis.	25.7	2011	-	N
<b>Wave energy</b>							
Billia Croo Test Site EMEC	Wave	Operational	Five 11 kV subsea cables feed into the EMEC substation Three waverider buoys	0.57	2003	-	N
<b>Cables</b>							
Northern Lights BT	Telecommunications	Active	Laid between mainland Scotland and Orkney, located at Dunnet Bay, Caithness and Bay of Skail, West Coast Orkney. 67 km long	0	-	-	N

Development	Type	Status	Description	Distance (km)*	Start date	End date	Taken forward into the RIAA?
Fabrice BT	Telecommunications	Active	Laid between Iceland, the Faroe Islands and Scotland (Dunnet Bay, Caithness)	0	-	-	N
<b>Pipelines</b>							
P/C TEE TO FLOTTA	Oil	Active	-	18.7	-	-	N
<b>Aquaculture</b>							
Bring Head Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	7.5	2001	-	N
Chalmers Hope Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> )	9.3	2000	-	N
Sinclair Mussels	Shellfish	Active	Common mussel ( <i>Mytilus edulis</i> )	10.4	-	-	N
Lyrava Bay Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> )	11.6	-	-	N
Toyness Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	12.8	2001	-	N
Pegal Bay Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	12.9	1992	-	N

Development	Type	Status	Description	Distance (km)*	Start date	End date	Taken forward into the RIAA?
South Cava Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	13.8	2010	-	N
Fara West Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	15.9	2001	-	N
North Bay West Orkney Oysters (Hoy) Ltd.	Shellfish		Flat or native oysters (e.g., Pacific oyster ( <i>Crassostrea</i> <i>gigas</i> ))	16.8	-	-	N
Quanterness Cooke Aquaculture Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	20.4	1997	-	N
Puldrite Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	21.4	1999	-	N
Westerbister Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	22.6	2016	-	N
Hunda Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	23.6	2020	-	N
Carness Bay Cooke Aquaculture Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	24	1987	-	N

Development	Type	Status	Description	Distance (km)*	Start date	End date	Taken forward into the RIAA?
Lober Rock Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	24.3	2019	-	N
Meil Bay Cooke Aquaculture Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	25.2	1989	-	N
Lamb Holm Quarry O-Fish-Shell Ltd.	Shellfish	Active	European lobster ( <i>Homarus gammarus</i> )	26.3	2009	-	N
Orkney Shellfish Hatchery (OSH) Ltd	Shellfish	Active	Flat or native oysters (e.g., Pacific oyster ( <i>Crassostrea gigas</i> )), European lobster ( <i>Homarus gammarus</i> )	26.3	-	-	N
Wyre Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	27.6	2015	-	N
Shapinsay Scottish Sea Farms Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.), wrasse ( <i>Labridae</i> spp)	29.4	1995	-	N
Kirk Noust Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	29.5	1990	-	N
Bay of Vady Cooke Aquaculture Scotland Ltd.	Fish	Active	Atlantic salmon ( <i>Salmo salar</i> ), lumpsucker ( <i>Cyclopteridae</i> spp.)	29.9	2001	-	N

## 8 Report to Inform the Appropriate Assessment

The HRA Screening concluded that there is potential for LSE on several European sites resultant of the project. This section assesses whether the survey will adversely affect the integrity of the relevant European sites to assist the Competent Authorities in their AA. This section comprises the RIAA.

Table 8-1 summarises European sites and qualifying features whereby potential for LSE cannot be ruled out and outlines whether there are adverse effects on integrity of the sites due to LSE on the sites' Conservation or not.

In total, 14 sites have be taken forward for consideration within the RIAA, including five SACs and nine SPAs.

Table 8-1 Summary of the 'integrity test' and impacts on Conservation Objectives.

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
Harbour porpoise	Inner Hebrides and the Minches SAC Southern North Sea SAC	Underwater noise (impulsive)	Geophysical survey	<p>It is acknowledged that there may be temporary disturbance of individuals originating from this site consequent of impulsive underwater noise from the geophysical survey. As such potential connectivity with individuals from this SAC and the pre-lay installation survey cannot be ruled out.</p> <p><b>The Inner Hebrides and Minches SAC</b> supports a favourable population of harbour porpoise (as of 2018) with up to 500 individuals recorded [40]. The Southern North Sea SAC supports approximately 17.5% of the total NS MU [41].</p> <p>Harbour porpoise are highly mobile individuals that span across the large area of the NS MU and beyond; as such the population of the SACs considered in this report are not expected to overlap with the cable corridor nor within the impact pathway distance (5 km radius, please refer to accompanying EPS and Basking Shark Risk Assessment) in significant numbers over the short survey duration. Additionally, Marine Mammal Observers (MMO) and Passive Acoustic Monitoring (PAM) operators will be placed on board the survey vessels conducting the geophysical activity; strict JNCC guidelines regarding minimising noise impacts will also be adhered to where appropriate [11].</p> <p>Therefore, there are no LSE on the Conservation Objectives of the Inner Hebrides and the Minches and Southern North Sea SAC with respect to harbour porpoise and so the integrity of the site is not anticipated to be adversely affected as a result of pre-lay installation survey.</p>
Bottlenose dolphin	Moray Firth SAC	Underwater noise (impulsive)	Geophysical survey	<p>It is acknowledged there may be temporary disturbance of individuals originating from this site consequent of impulsive underwater noise from the geophysical survey. As such potential connectivity with individuals from this SAC and the pre-lay installation survey cannot be ruled out.</p> <p>This SAC supports the only resident population of bottlenose dolphin within the North Sea and provides protection to approximately 200 individuals of the CES MU. Populations of this SAC maintain a FCS (assessed in 2016). Individuals have been documented travelling down the east of Scotland, and have additionally been recorded off Ireland and Norway. It is anticipated individuals from this SAC are largely coastal [42].</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
				<p>No bottlenose dolphin were noted within the recent SCANS-IV survey carried out in summer 2022, in the block of relevance to the survey (Block CS-K). Bottlenose dolphin are also highly mobile individuals that span across the large area of the CES MU and beyond; as such the population of the Moray Firth SAC is not expected to overlap with the cable corridor nor within the impact pathway distance (5 km radius) in significant numbers over the short survey duration. Additionally, Marine Mammal Observers (MMO) will be placed on board any survey vessels associated with the geophysical campaign; strict JNCC guidelines regarding minimising noise impacts will also be adhered to where appropriate [11].</p> <p>Therefore, there are no LSE on the Conservation Objectives of the Moray Firth SAC with respect to bottlenose dolphin and so the integrity of the site is not anticipated to be adversely affected as a result of the pre-lay installation survey.</p>
Grey seal ( <i>Halichoerus grypus</i> )	Faray and Holm of Faray SAC/SSSI	Underwater noise (impulsive)	Geophysical survey	<p>It is acknowledged that there may be temporary disturbance of individuals originating from this site consequent of impulsive underwater noise from the geophysical survey. As such potential connectivity with individuals from this SAC cannot be ruled out.</p> <p>The SAC supports the second largest breeding colony across the UK, accounting for approximately 9% of the UK annual pup production. It is anticipated that the colony associated to this SAC may be in decline, with pup production sitting at around half of historic estimates [43, 44]. August counts as of 2019 stood at 228 individuals, a decline of 52% since 2007 [41].</p> <p>Grey seals are highly mobile individuals that span across area of the North Coast and Orkney Seal Management Unit (SMU), where populations are estimated as 8,599 [41]; the SAC population represents just 2.65% of the SMU. As such, the population of the Faray and Holm of Faray SAC/SSSI is not expected to overlap with the cable corridor nor within the impact pathway distance (5 km radius) in significant numbers over the short survey duration (30 days) to warrant risks to the Conservation Objectives of the site. Additionally, MMO and PAM personnel will be placed on board the survey vessel conducting the geophysical activity; strict JNCC guidelines regarding minimising noise impacts will also be adhered to where appropriate [11].</p> <p>Therefore, there are no LSE on the Conservation Objectives of the Faray and Holm of Faray SAC/SSSI with respect to grey seal and so the integrity of the site is not anticipated to be adversely affected as a result of the pre-lay installation survey.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
Harbour seal ( <i>Phoca vitulina</i> )	Sanday SAC	Underwater noise (impulsive)	Geophysical survey	<p>It is acknowledged that there may be temporary disturbance of individuals originating from this site consequent of impulsive underwater noise from the geophysical survey. As such potential connectivity with individuals from this SAC cannot be ruled out.</p> <p>The SAC supports the second largest discrete group of harbour seal across Scotland, representing over 4% of the UK population. However, it is thought that the population is drastically depleted from historic populations. August counts as of 2019 stood at 77 individuals, a decline of 96% since 2002 [44].</p> <p>Harbour seals are highly mobile individuals that span across area of the North Coast and Orkney SMU, where populations are estimated as 1,405 [44]. As such, the population of the Sanday SAC is not expected to overlap with the cable corridor nor within the impact pathway distance (5 km radius) in significant numbers over the short survey duration (30 days) to warrant risks to the Conservation Objectives of the site. Additionally, MMOs will be placed on board any survey vessels associated with the geophysical campaign; strict JNCC guidelines regarding minimising noise impacts will also be adhered to where appropriate [11].</p> <p>Therefore, there are no LSE on the Conservation Objectives of the Sanday SAC with respect to harbour seal and so the integrity of the site is not anticipated to be adversely affected as a result of the pre-lay installation survey.</p>
Red-throated diver ( <i>Gavia stellata</i> )	Scapa Flow SPA Hoy SPA	Physical presence of vessel(s) Underwater noise (impulsive)	All	<p>It is acknowledged there is potential for disturbance to red-throated divers consequent of the pre-lay installation survey and construction of the project, as such potential connectivity with individuals from the SPA cannot be ruled out.</p> <p>Approximately 76 pairs of red-throated divers occupy the Scapa Flow SPA [45], whilst 46 individuals are estimated at Hoy SPA [39, 45]. During breeding season, the red-throated diver is expected to be largely constrained to inshore waters within 9 km of their foraging range, foraging almost entirely on inshore marine areas close to their freshwater breeding territory. Hence, this species is not expected to be significantly impacted by the project, due to their nearshore preference. Individuals arrive at breeding sites from May and are present until September and October. Chick-rearing takes place from July and August, and fledging occurs during August [39]. Peak numbers of individuals at the SPAs are unlikely to overlap significantly with the survey or during construction of the project (both estimated to take place</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
				<p>from April to September). There is also sufficient time between the survey and project construction (2025 and 2027) to minimise risk of repeat disturbance to individuals.</p> <p>Taking into consideration the short duration of activities and that vessels will be following predefined route corridors, impacts with respect to disturbance are expected to be minimal. Vessels will also be travelling at slow cruising speeds (e.g. typical laying speed is 10 m/min and typical survey speed is 4 knots or slower), reducing the risk of disturbance further; this will increase capacity for individuals to avoid vessels.</p> <p>Populations of the noted SPA sites are not expected to overlap with the project nor within the impact pathway distances in numbers significant enough to warrant risks to the Conservation Objectives of the sites. Additionally, JNCC guidance will be adhered to regarding noise generating activities, minimising the risk of significant impacts [11]. Therefore, there are no LSE on the Conservation Objectives of the noted SPA sites with respect to red-throated diver and so the integrity of the sites are not anticipated to be adversely affected as a result of the project.</p>
Herring gull ( <i>Larus argentatus</i> )	East Caithness Cliffs SPA	Physical presence of vessel(s)	All	<p>It is acknowledged that there is potential for disturbance to herring gulls originating from the East Caithness Cliffs SPA consequent of vessel presence associated with the project. Potential connectivity with individuals from the SPA can therefore not be ruled out.</p> <p>It is estimated approximately 3,267 Apparently Occupied Territories (AOT)<sup>10</sup> occur within the SPA, a 79% decline since 1977 [46]. The herring gull has a large foraging range of up to 86 km, with the SPA site located 40.72 km from the cable route corridor. Breeding season for the herring gull is expected to begin during May and run until July and therefore peak numbers of individuals at the SPA are unlikely to overlap significantly with the survey or during construction of the project (both estimated to take place from April to September).</p>

<sup>10</sup> Calculated from the total number of pairs/nests in a colony.

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
				<p>Taking into consideration the short duration of activities and the fact that vessels will be following predefined route corridors, such that impacts with respect to disturbance are expected to be minimal. Vessel will also be travelling at slow cruising speeds, reducing the risk of disturbance further.</p> <p>Overall, the herring gull population of the East Caithness Cliffs SPA sites is not expected to overlap with the project nor within impact pathway distances in significant enough numbers to warrant risks to the Conservation Objectives of the sites. Therefore, LSE on the Conservation Objectives of the East Caithness Cliffs SPA are not expected with respect to herring gull and so the integrity of the site is not anticipated to be adversely affected as a result of the project.</p>
Razorbill ( <i>Alca torda</i> )	<p>North Caithness SPA</p> <p>East Caithness Cliffs SPA</p> <p>Cape Wrath SPA</p>	<p>Physical presence of vessel(s)</p> <p>Underwater noise</p>	All	<p>It is acknowledged there is potential disturbance to razorbill originating from the noted sites consequent of vessel presence and underwater noise. Potential connectivity with individuals from the noted SPA sites can therefore not be ruled out.</p> <p>The razorbill has an extensive foraging range of up to 165 km with the SPA sites ranging in distance from between 28.39 km to 58.81 km away from the project. The breeding season of razorbill is expected to occur from May to June and hence peak numbers of individuals at the noted SPAs are unlikely to overlap significantly with the survey or during construction of the project (both estimated to take place from April to September). There is also sufficient time between the survey and project construction (2025 and 2027) to minimise risk of repeat disturbance to individuals.</p> <p>Taking into consideration the short duration of activities and that vessels will be following predefined route corridors, impacts with respect to disturbance are expected to be minimal. Vessel will also be travelling at slow cruising speeds, reducing the risk of disturbance further.</p> <p>Overall, populations of razorbills associated with the noted SPA sites are not expected to overlap with the project nor be within the impact pathway distances in numbers significant enough to warrant risks to the Conservation Objectives of the sites. Additionally, JNCC guidance will be adhered to regarding noise generating activities, minimising the risk of significant impacts [11]. Therefore, LSE on the Conservation Objectives of the noted SPA sites are not expected with respect to razorbill and so the integrity of the sites are not anticipated to be adversely affected as a result of the project.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
Atlantic puffin ( <i>Fratecula arctica</i> )	Hoy SPA North Caithness SPA Cape Wrath SPA	Physical presence of vessel(s) Underwater noise	All	<p>It is acknowledged there is potential for disturbance on to Atlantic puffin originating from the noted sites consequent of vessel presence and underwater noise associated with the project. Potential connectivity with individuals from the noted SPAs can therefore not be ruled out.</p> <p>The Atlantic puffin has an extensive foraging range of up to 265 km with the SPA sites ranging in distance from between 0.65 km to 58.81 km. The breeding season of Atlantic puffin typically occurs between June to July. Hence, peak numbers of individuals at the SPAs are unlikely to overlap significantly with the survey or during construction of the project (both estimated to take place from April to September). There is also sufficient time between the survey and project construction (2025 and 2027) to minimise risk of repeat disturbance to individuals.</p> <p>Taking into consideration the short duration of activities and that vessels will be following predefined route corridors, impacts with respect to disturbance are expected to be minimal. Additionally, vessels will be travelling at slow cruising speeds, reducing the risk of disturbance further. Additionally, JNCC guidance will be adhered to regarding noise generating activities, minimising the risk of significant impacts [11].</p> <p>Overall, Atlantic puffin populations associated with the noted SPA sites are not expected to overlap with the project nor be within the impact pathway distances in numbers significant enough to warrant risks to the Conservation Objectives of the noted sites. Therefore, LSE on the Conservation Objectives of the noted SPA sites are not expected with respect to Atlantic puffin and so the integrity of the sites are not anticipated to be adversely affected as a result of the project.</p>
Black-legged kittiwake ( <i>Rissa tridactyla</i> )	Hoy SPA Marwick Head SPA/SSSI Rousay SPA/SSSI North Caithness SPA	Physical presence of vessel(s)	All	<p>It is acknowledged there is potential for disturbance to black-legged kittiwakes originating from the noted sites associated with the project, consequent of vessel presence. Potential connectivity with individuals from the noted SPAs can therefore not be ruled out.</p> <p>The black-legged kittiwake has an extensive foraging range of up to 301 km with the SPA located ranging in distance from between 0.65 km to 58.81 km. The breeding season of black-legged kittiwake typically occurs between May to July and hence peak numbers of individuals at the SPA are unlikely to overlap significantly with the survey or during construction of the project (both estimated to take place from April to September).</p> <p>Taking into consideration the short duration of activities and that vessels will be following predefined route corridors, impacts with respect to disturbance are expected to be minimal.</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
	Copinsay SPA/SSSI Calf of Eday SPA East Caithness Cliffs SPA Cape Wrath SPA			<p>Additionally, vessels will be travelling at slow cruising speeds, which will also reduce the risk of disturbance further.</p> <p>Overall, populations of black-legged kittiwake associated with the noted SPA sites are not expected to overlap with the project, nor be within the impact pathway distances in numbers significant enough to warrant risks to the Conservation Objectives of the noted sites. Therefore, LSE on the Conservation Objectives of the noted SPA sites are not expected with respect to black-legged kittiwake and so the integrity of the sites are not anticipated to be adversely affected as a result of the project.</p>
Common guillemot ( <i>Uria aalge</i> )	Hoy SPA/SSSI Marwick Head SPA/SSSI Rousay SPA/SSSI North Caithness SPA Copinsay SPA/SSSI Calf of Eday SPA East Caithness Cliffs SPA Cape Wrath SPA	Physical presence of vessel(s) Underwater noise (impulsive)	All	<p>It is acknowledged there is potential for disturbance to common guillemot originating from the noted sites consequent of vessel presence and the geophysical survey. Potential connectivity with individuals from the noted SPAs cannot be ruled out.</p> <p>The common guillemot has an extensive foraging range of up to 165 km with the SPA sites ranging in distance from between 0.65 km to 58.81 km. The breeding season of common guillemot is expected to occur from March to July, and hence peak numbers of individuals at the SPA are unlikely to overlap significantly with the survey or during construction of the project (both estimated to take place from April to September). There is also sufficient time between the survey and project construction (2025 and 2027) to minimise risk of repeat disturbance to individuals.</p> <p>Taking into consideration the short survey duration and that vessels will be following predefined route corridors, impacts with respect to disturbance are expected to be minimal. Additionally, vessels will be travelling at slow cruising speeds, reducing the risk of disturbance further. Impacts are therefore expected to be highly localised in the immediate cable route corridor area. Additionally, JNCC guidance will be adhered to regarding noisy activities, minimising the risk of significant impacts [11].</p> <p>Overall, populations of common guillemot associated with the noted SPAs are not expected to overlap with the project nor be within the impact pathway distances in numbers significant enough to warrant risks to the Conservation Objectives of the sites. Therefore, LSE on the Conservation Objectives of the noted SPA sites are not expected with respect to common</p>

Qualifying feature	European site(s)	Potential pathway for LSE	Survey	Are there adverse effects on the integrity of the European sites?
				<p>guillemot and so the integrity of the sites are not anticipated to be adversely affected as a result of the project.</p>
<p>European shag (<i>Gulosus aristotelis</i>)</p>	<p>Scapa Flow SPA</p>	<p>Physical presence of vessel(s) Underwater noise (impulsive)</p>	<p>All</p>	<p>It is acknowledged that there is potential for disturbance to European Shag originating from the Scapa Flow SPA consequent of vessel presence and the geophysical survey. Potential connectivity with individuals from this SPA therefore cannot be ruled out.</p> <p>It is estimated that approximately 3,726 of non-breeding individuals (as of 2017/18 winter counts) inhabit the SPA, representing 3.4% of the UK population and 1.9% of the biogeographic population [47]. The European shag has a foraging range of up to 24 km, however a 15 km buffer was implemented for non-breeding seabirds.</p> <p>The non-breeding season of European shag is expected to occur from September to January. As the survey and construction of the project is expected to cease in September, spanning largely summer months, significant overlap of individuals from this SPA with the project is not foreseen. Peak numbers of non-breeding individuals are not expected to be present at the SPA during activities relating to the project.</p> <p>Overall, due to the limited capacity for temporal overlap with the project, LSE on the Conservation Objectives of the Scapa Flow SPA are not expected with respect to European shag and so the integrity of the site is not anticipated to be adversely affected as a result of the project.</p>

## 9 Conclusion

This HRA Screening and RIAA Report has been prepared for submission to Marine Directorate in support of a Marine License application for pre-lay survey works and construction of the project which was granted a Marine Licence in June 2024 (MS-00010803).

This HRA has assessed the potential for LSE on European sites of relevance to the survey, based on a screening approach that is receptor specific to the qualifying features of European sites. It has taken into consideration the project description and potential impact pathways that may arise consequent of the project. Aspects assessed for the determination of LSE include:

- Disturbance to the seabed.
- Marine discharges.
- Marine releases.
- Physical presence of vessel(s).
- Underwater noise.

Screening was undertaken to determine the potential for LSE on the qualifying features for both SACs and SPAs. A total of five SACs and nine SPAs were carried forward to AA due to potential connectivity of LSE on the qualifying features of the sites.

The RIAA established that there are no LSE on the Conservation Objectives of the sites, and therefore the integrity of the European sites would not be adversely affected by the project, largely attributed to the highly localised impacts and short survey duration.

An EPS and Basking Shark Risk Assessment has been included alongside this HRA Report.

## 10 References

### 10.1 Project References

Ref.	Document title	Doc. no.	Employer doc. no.
1	Construction Method Statement (CMS) for Marine License Application	00907106	
2	LT17 Orkney - Mainland HVAC 220 kV Subsea Link Environmental Appraisal, Scottish and Southern Energy Networks – Xodus (2019)		
3	Construction Environmental Management Plan	00907425	

### 10.2 Internal References

Ref.	Document title	Doc. no.

### 10.3 External References

Ref.	Document title	Doc. no.
4	Habitats Regulations Appraisal: Guidance for Plan-making Bodies in Scotland – Tyldesley et al. (2015)	
5	The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement’- SNH (n.d.)	
6	The Habitat Regulations assessment Handbook – Tyldesley et al. (2021a)	
7	Advice to Marine Scotland. Policy Guidance Document on demonstrating the absence of Alternative Solutions and Imperative Reasons of Overriding Public Interest under the Habitats Regulations for Marine Scotland’ – Tyldesley et al. (2021b)	
8	EU Exit: Habitats Regulations in Scotland – Scottish Government (2020)	
9	Conservation and Management Advice, Inner Hebrides and the Minches SAC, 2020 – NatureScot (2020)	
10	Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the ‘Habitats’ Directive 92/43/EEC’ – EC (2001)	
11	JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines – JNCC (2017)	

Ref.	Document title	Doc. no.
12	Review of Management Unit Boundaries for Cetaceans in UK waters (2023) – IAMMWG (2023)	
13	Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas – Thaxter et al. (2012)	
14	Desk-based revision of seabird foraging ranges used for HRA screening – Woodward et al. (2019)	
15	Management Units for cetaceans in UK waters (January 2015) – IAMMWG (2015)	
16	Oceanic movements, site fidelity and deep diving in harbour porpoises from Greenland show limited similarities to animals from the North Sea – Nielsen et al. (2018)	
17	Report of Joint IMR/NAMMCO International Workshop on the Status of Harbour Porpoises in the North Atlantic – NAMMCO and IMR (2019)	
18	Does the Seal Licensing System in Scotland Have a Negative Impact on Seal Welfare? – Nunny et al. (2016)	
19	Seal Licensing – Seal Management Areas – Scottish Government (2021)	
20	Modelling harbour seal habitat by combining data from multiple tracking systems – Bailey et al. (2014)	
21	Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles – Carter et al. (2020)	
22	Otter – NatureScot (2024)	
23	Wild Seaweed Harvesting, Strategic Environmental Assessment Environmental Report – Scottish Government (2016)	
24	Depth use and migratory behaviour of homing Atlantic salmon ( <i>Salmo salar</i> ) in Scottish coastal waters – Godfrey et al. (2015)	
25	Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables – Malcolm et al. (2010)	
26	A global review of vessel collisions with marine animals – Schoeman et al. (2020)	
27	Cetacean Ship Strikes – Sea Watch Foundation (2009)	
28	An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes – Popper et al. (2019)	
29	Sound exposure guidelines for Fishes and Sea Turtles – Popper et al. (2014)	
30	Hearing thresholds of a male and a female harbor porpoise ( <i>Phocoena Phocoena</i> ) – Kastelein et al. (2017)	

Ref.	Document title	Doc. no.
31	Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects – Southall et al. (2019)	
32	Auditory sensitivity and masking profiles for the sea otter ( <i>Enhydra lutris</i> ) – Ghaul and Reichmuth (2016)	
33	Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds - Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges – NatureScot (2023)	
34	Assessing the sensitivity of seabird populations to adverse effects from tidal stream turbines and wave energy devices – Furness et al. (2012)	
35	Displacement and habituation of seabirds in response to marine activities – MMO (2018)	
36	Joint SNCB Interim Displacement Advice Note – MIG-Birds (2022)	
37	A comparison of auditory brainstem responses across diving bird species – Crowell et al. (2015)	
38	The common murre ( <i>Uria aalge</i> ), an auk seabird, reacts to underwater sound – Anderson et al. (2020)	
39	Identification of important marine areas in the UK for red-throated divers ( <i>Gavia stellata</i> ) during the breeding season – Black et al. (2015)	
40	Conservation and Management Advice, Inner Hebrides and the Minches SAC, 2020 – NatureScot (2020)	
41	Harbour Porpoise ( <i>Phocoena phocoena</i> ) Special Area of Conservation: Southern North Sea, Conservation and Advice on Operations – JNCC and Natural England (2019)	
42	Conservation and Management Advice, Moray Firth SAC, March 2021 – NatureScot (2021)	
43	Faray and Holm of Faray – JNCC (2024)	
44	Scientific Advice on Matters Related to the Management of Seal Populations: 2022	
45	Conservation and Management Advice, Scapa Flow SPA, June 2022 – NatureScot (2022)	
46	Seabird counts at East Caithness Cliffs SPA for marine renewable casework – Swann (2016)	
47	Scapa Flow proposed Special Protection Area (pSPA) – inshore wintering waterfowl survey 2017/18 – Jackson (2018)	

## 11 List of Appendices

N/A